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The Solar System: Nature and Mechanics

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Abstract: Origin, mechanics and properties of the Solar System are analysed in the framework of the Complete Relativity theory (by the same author). According to Complete Relativity, everything is relative. Any apparent absolutism (notably scale invariance of dimensional constants, absolute elementariness, invariance to time) is an illusion stemming from limits imposed by [or on] polarized observers that will inevitably lead to misinterpretation of phenomena (another illusion) occurring on non-directly observable scales, or even on observable scales but distant or lowly resolved energies, in space or time. The analysis confirms the postulates and hypotheses of the theory (eg. existence of discrete vertical energy levels) with a significant degree of confidence. During the analysis, some new hypotheses have emerged. These are discussed and confirmed with various degrees of confidence (in this and follow-up papers). Main conclusions that stem from my research and are further confirmed, with more or less confidence, in this paper are: - universes are, indeed, completely relative, - Solar System is a scaled (inflated, in some interpretations) Carbon/Beryllium isotope equivalent with a nucleus in a partially condensed state and components localized in various vertically excited states, - life is common everywhere, but presence of extroverted complex forms on planetary surfaces is generally very limited in time, - anthropogenic climate change is probably only a part of a major mass extinction event (although humanity definitely has a role, the sense of control is an illusion), - major extinction events on a surface of a planet are relative extinctions, may be a regular part of transformation and migration of life below the surface in the process of a planetary [equivalent of] neurogenesis.

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1. Introduction

Here I hypothesize that the Solar System is either a large scale ^{10}C (10-Carbon isotope), ^{10}Be (10-Beryllium isotope) atom or a localized superposition of such atoms in a relatively special state (regarding scaled pressure/temperature) and provide evidence for the equivalence of large (U_1) scale systems with standard (U_0) scale systems through the analysis of the Solar System in the context of Complete Relativity[1] (CR).

> Note that ^{10}C isotope is unstable on standard (U_0) scale, with a half-life of 19.3 seconds. Its apparent relative stability on U_1 scale must be the result of time dilation (eg. due to scale difference and/or difference in state/conditions) and/or exchange of strength between components of general force (transition from dominantly electromagnetic to dominantly gravitational) with possible relative inversion of stability of isotopes between adjacent scales (discrete vertical energy levels - as postulated in CR).
> No element can be absolutely stable, therefore, in case the inversion is real, due to instability of ^{10}B (decay product of ^{10}C and ^{10}Be) on U_1 scale, the Solar System could be cycling between ^{10}C and ^{10}Be states (^{10}B being the intermediate state).

I hypothesize that formation of planetary systems in general starts with the inflation of gravitons from standard scale atoms (or lower scale equivalents), likely in the events of annihilation at relative event horizons of larger scale.

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Obviously, one should be familiar with CR in order to fully understand this paper.
Reader is therefore advised to consult CR for definitions of gravitational maxima, gravitons, general force and other important and commonly used terms in this paper if these sound unfamiliar or seem to deviate from conventional definitions.

I propose that, in this process, the electro-magnetic component of the general force has been exchanged with the neutral gravitational component resulting in the dominance of gravity over electromagnetism at this scale.

However, I also propose that such exchange may be natural on standard scale - particles could be cycling between polarized and neutral states. In case of U_1 systems, the system likely starts inflation from U_0 electro-magnetic with gravitation becoming dominant afterwards. At the end of the lifecycle gravitons collapse (deflate) to U_0 again, now exchanging gravity for electromagnetic force. It is the opposite for U_0 systems inflating from U_{-1} scale - inflation starts gravitational but ends up in electro-magnetic equilibrium.

Note, however, that this does not imply that dominant forms of energy on particular scale are absolutely dominant. Proper conditions (ie. at certain properly scaled temperature/pressure) can ensure stability of non-dominant forms.

In any case, obviously, the hypothesized equivalence between the Solar System (or any planetary system, in general) and an atom should be taken relative. Note also that various interpretations will be presented and explored here, some of which may be mutually incompatible, while some may be simultaneously true.

Implications of discrete vertical energy levels [and CR in general] on nature are large and particularly affect the understanding of life. Existence of these levels is required for conservation of relativity but one consequence is relativization of components of living beings (eg. living tissue, blood, etc.) between scales - they operate on different timescales and generally have different composition. In example, standard blood (blood of U_0 scale), scaled to U_1 scale will not be the same substance simply containing *zillion* extra standard blood cells, rather, to an U_0 scale observer it will appear much different. Indeed, what I will consider the blood of a planet is commonly interpreted as magma. Thus, the planets can be living beings and here I will analyse Earth not only as a particle but as an evolving, albeit extremely introverted, living being.

2. Constants

Table 1 shows commonly used constants in the paper.

The values of planetary constants are taken from NASA Planetary Fact Sheet[2].

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Table 1. Commonly used constants

Description	Constant	Value
Neptune mass on scale 1	M_{U_1}	$1.02413 * 10^{26}$ kg
Neptune equivalent mass on scale 0	M_{U_0}	($9.10938356 * 10^{-31}$ kg / 510998.9461 eV) * (510998.9461 eV - 11.260288 eV) = $9.109182827 * 10^{-31}$ kg
Neptune orbital velocity	v_{U_1}	5430 m/s
Neptune spin velocity	s_{U_1}	2660 m/s
Neptune radius on scale 1	R_{U_1}	24622000 m
Neptune equivalent radius on scale 0	R_{U_0}	(24622000 m / 4495060000000 m) * 70 * 10^{-12} m = $3.834298096 * 10^{-16}$ m
Solar System charge radius = Neptune orbital radius	r_{U_1}	4495060000000 m
Sun mass	$M_\odot$	$1.988500 * 10^{30}$ kg
Sun radius	$R_\odot$	695735 km = 695735000 m
Earth mass		$5.9723 * 10^{24}$ kg
Carbon-12 atom mass		$1.992646547 * 10^{-23}$ g = $1.992646547 * 10^{-26}$ kg
Carbon-12 charge radius = Carbon-10 charge radius	r_{U_0}	70 pm = 70 * 10^{-12} m
Carbon-10 nucleus charge radius		$2.708 * 10^{-15}$ m
Carbon-10 nucleus mass		10.016853 u = $1.663337576 * 10^{-26}$ kg
Standard speed of light	$c = c_0$	$2.99792458 * 10^8$ m/s
Standard electron mass	M_e	$9.10938356 * 10^{-31}$ kg

3. Definitions

Definitions of terms and expressions that may be used in the paper. Note that these may be different than standard or common definitions in everyday use.

Some terms in use in this paper have been defined in CR and reader should be familiar with these (and CR in general) if the aim is to understand this paper properly.

3.1. Elementary Polarization

Elementary particles, relative to a universe of a particular scale, are generally polarized.

Physical interpretation (manifestation) of polarization depends on environment, but any elementary particle can be interpreted as a more or less evolved graviton (as defined in CR).

> Note that, in CR, elementary particles are not absolutely elementary, reference frames will exist where existence of constituent particles is apparent and real.

In case its electro-magnetic component is dominant, the particle is electrically polarized (charged) and represents a relative electric monopole.

However, electric component is generally a sum of multiple constituent charge quanta, typically 2 quanta of identical charge and 1 quantum of opposite (anti) charge, which are strongly entangled (there are no absolute monopoles). Spin momentum of charge is quantized, by a relative constant ($\hbar$) - a quantum of momentum, which is a consequence of harmonic oscillation of waveforms of energy in some reference frames (scales).

Suppose the spin momentum of each component is equal to $1/2\ \hbar$ in value, and spins of two dominant charges are perpendicular to each other (having a [fixed] phase difference of $\pi/2$ degrees). Two dominant charges now have a total magnetic spin momentum:

$$S_1 = \sqrt{\left(\frac{1}{2}\hbar\right)^2 + \left(\frac{1}{2}\hbar\right)^2} = \frac{\sqrt{2}}{2}\hbar = \frac{1}{\sqrt{2}}\hbar$$

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Total spin momentum of the particle is thus:

$$\vec{S} = \vec{S}_1 + \vec{S}_2$$

If the S_2 (anti) charge momentum is perpendicular to S_1, the value of total spin momentum is:

$$S = \sqrt{\left(\frac{1}{\sqrt{2}}\hbar\right)^2 + \left(\frac{1}{2}\hbar\right)^2} = \sqrt{\frac{1}{2}\left(\frac{1}{2}+1\right)}\hbar = \frac{\sqrt{3}}{2}\hbar$$

Due to fixed $\pi/2$ phase and equal value, influence of components of S_1 on the orientation [of the momentum projection] cancel (the two components may be interpreted as fermions in the same quantum orbital, so their projections cannot both be oriented in the same direction), and the orientation of the projection of the momentum S on the axis of quantization will depend solely on the orientation of momentum S_2.

Note that, per the Pauli exclusion principle, S_2 has to be on a different local orbital.

With the applied magnetic field, projection of the momentum on the *magnetic* axis (eg. z) will thus be oriented either *up* or *down*:

$$S_z = \pm\frac{1}{2}\hbar$$

This is a typical spin magnetic momentum of standard charges such as electrons and protons.

Figure 1 a) shows charge in a collapsed state (as a particle) with acquired (coupled) real mass m, charge radii r_1, r_2 (corresponding to momenta S_1 and S_2, respectively) and radius of imaginary mass r_M, here having a momentum aligned with S.

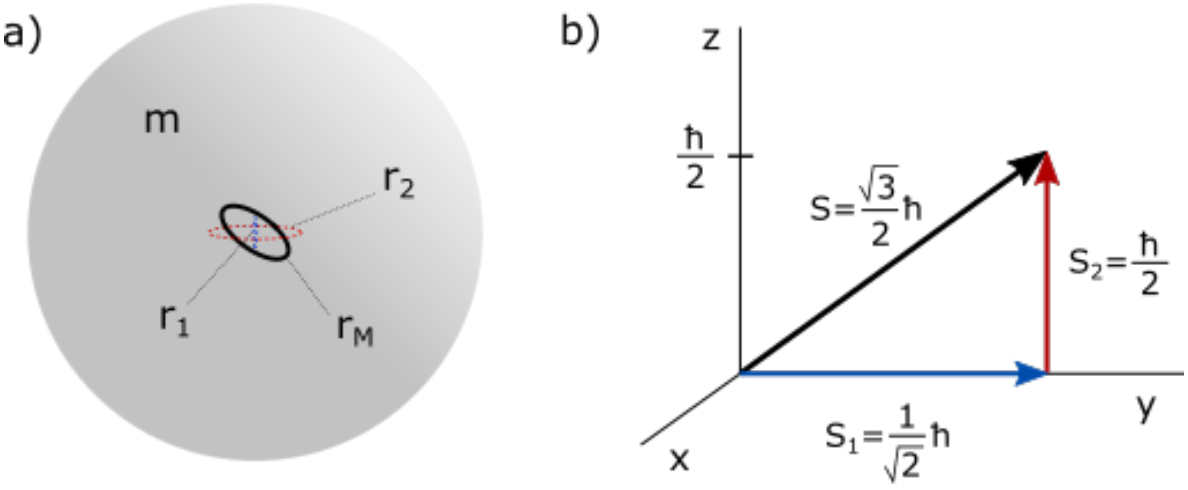

Figure 1. Spin momentum

Its momentum is quantized by $\hbar$, electric charge by e and gravitational force by $\hbar_{mg}$. The *private* space of such particle may be, depending on a reference frame, characterized either by properly scaled gradients or averages, of electric permittivity (ϵ) and magnetic permeability (μ) - or pressure and density.

With a decrease in environmental pressure (em/gravitational field interactions) a quantum may split into smaller quanta (which remain strongly entangled), spreading as far as possible (the range is finite and determined by the mass of smaller quanta - or environmental pressure on that scale), with

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a wave-like distribution of potential. Figure 2 illustrates such relatively unbound, *free* charge. Total momentum is the sum of individual momenta (and equal to original momentum of the particle in case of isotropic effect). With the splitting, the quantum of energy will decouple from real mass m unless the splitting is synchronized with the dilution or explosion of mass m where individual quanta of m are of appropriate scale and momenta to couple with individual quanta of img mass.

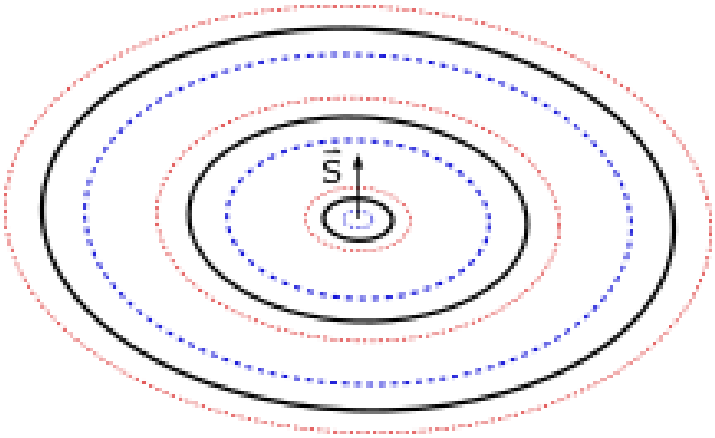

Figure 2. Charge wave

Figure 3 a) shows one interpretation of strength of forces of a wave with distance from centre (black = gravitational force, blue and red = electric force). Now each component (maximum) of a wave, starting from outer ones, can be excited independently, can change spin, merge with adjacent maxima and form moon charges.

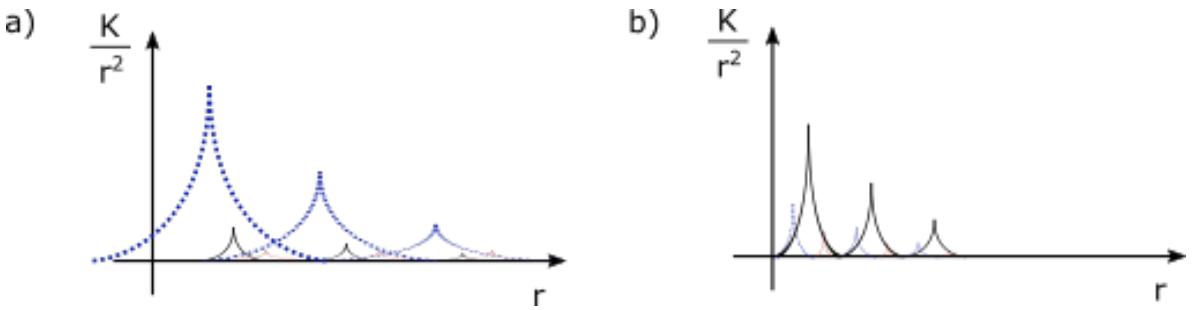

Figure 3. Charge wave forces

This allows the charge to interact (interfere) with itself in certain reference frames.

However, if components are strongly entangled in a particular reference frame, entanglement will be conserved with any interaction - the waveform may simply collapse (localize) into, what may be interpreted as, corpuscular form.

Figure 3 b) shows how the *private* space of the same particle can be modified by interaction with another particle - essentially, the electric force has been exchanged for gravitational force. Such interaction may also collapse the wave into a particle with moon charges, where the number of moons depends on the equilibrium point of interaction (difference in energy of interacting particles).

Note that it is possible for the effect to be strongly localized - local space may be modified to attenuate one force and strengthen the other, while particles outside that space may not feel such [degree of] change.

Apart from the spin momentum, particles generally have an orbital angular momentum, and may be vertically and horizontally excited. Vertical excitation will be changing the nature of their dominant expression (ie. from electro-magnetic to gravitational) and scale of energy, while horizontal excitation will be evolving them through various forms (species) and energies.

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On one vertical energy level their form may be generally wavelike, while on the other they may exhibit a corpuscular form. Energy levels are discrete, but transition between them can be relatively instantaneous or continuous (interpretation depends on a reference frame), as required by complete relativity. Both interpretations can, and generally do, exist independently in reality. This is enabled through entanglement and coupling of energy between scales. Each form of energy thus has two components - real and imaginary (img) mass (charge). It can be said that energy exists on various scales simultaneously, but interpretation is scale-dependent (generally, one form may be visible in dominantly electro-magnetic, other in gravitational spectra).

Quantization of energy, by the postulates of CR, also must be relative. In reference frames where it exists, it may generally be correlated with the wavelike nature of energy at particular scale and described through [spherical] harmonics, as in quantum mechanics (QM). Localization (measurement) in some reference frames can be interpreted as transformation of wavelike form of energy into corpuscular form, however, this transformation is never absolute and better interpretation may be wave confinement. Spin momentum is generally an orbital momentum with a non-zero mass radius, although in some reference frames it may be approximated and treated as a point momentum.

Note that, if both interpretations (scales) of energy are observable (directly or indirectly), superposition of states is generally the correct interpretation of a system. In example, on one scale, interpretation of the Solar System as a ^{10}C atom equivalent may be favoured, on the other it may be ^{10}B or ^{10}Be. This is a consequence of different speed of time (time dilation) between scales. On one scale, transition (eg. decay of 10^{C} into ^{10}B) can be relatively instantaneous, on the other continuous.
Note that this implies that measurement of continuous flow of energy can be used to determine when will the discrete jump on the other scale occur. In example, if both scales favour the same interpretation, one can assume the discrete jump occurred recently and the system is either at the beginning or the end of the cycle (decay). On the other hand, if the two states strongly favour different interpretations, the discrete jump is likely [relatively] imminent. Generally, discrete jumps on one scale will be synchronized with cataclysmic changes on the other. This is a consequence of non-absolute constancy of rates of evolution (flow of energy). Thus, evolution (flow) of energy is generally characterized by the period of weak (relatively constant rate) evolution and periods of strong (exponentially changing rate) evolution near the ends/beginnings of transition. This behaviour should be typical for all changes of energy levels, only the magnitude of changes varies.

3.1.1. Equilibrium and Nature of *fundamental* Forces

Equilibrium state of 3 components of charge in the example above is maintained through [conservation of] angular momenta. Due to rotation of local space, general force is a centripetal force and in stable orbitals equal to centrifugal force.

In case of a completely neutral (gravitational) force:

$$\frac{mv^2}{r} = \frac{GMm}{r^2}$$

This is established when angular velocity of the orbiting body and angular velocity of coupled space (coupled effective gravitons, or gravitational field tubes) become equal:

$$v = v_s = \sqrt{\frac{GM}{r}}$$

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If the body increases velocity ($v > v_s$), centrifugal force becomes greater than gravitational force and now acts as a fictitious repulsive force.

For $v < v_s$, gravitational force is higher than centrifugal force, and the body *feels* attractive force.

Nature (polarization) of the force can thus be changed with a change in radii (expansion/collapse) of gravitational maxima.

This seemingly allows for electro-magnetic force to be a fictitious force - a result of radii change of gravitational maxima due to absorption and emission of energy.

> Note that electric polarization of atoms is achieved through emission and absorption of electrons, which is affecting the atom radius - positive polarization will generally decrease radius (in common atom radius interpretation), while negative will increase it.
> However, when radius is proportional to gravity, positive polarization would create repulsion, while negative would create attraction. The sole change in radii then cannot be the equivalent of electro-magnetic force, as nature of EM force (attraction/repulsion) depends on the pair of interacting charges, not solely on the polarity of individual charge.
> Thus, electric polarization of a graviton will, as hypothesized in CR, require deformation, creation of a bipolar structure. Nature and strength of force will then generally depend on [the type of] correlation (entanglement) between particles.
> A neutral graviton effectively curves space, proportionally to its scale and isotropically in ideal ground case. Any kind of energy will be affected by this curvature. Assuming neutral particles are all composites of charges, electro-magnetic polarization of space will also affect all particles, but the force may be effectively cancelled.
> One force may [relatively] evolve from the other, however, gravitational and electro-magnetic force are two different species of force, with different modes of mediator polarization, although generally entangled and coexisting together as components of general force.

Even if orbital changes are not electro-magnetic in nature, such changes imply radial polarization of reference frames, thus a reference frame can be polarized even if its mass is purely gravitational, and this will be reflected in a relativistic (ω) factor.

However, there are no absolutely pure gravitational reference frames and changes in stable orbits may generally happen with the exchange of gravitational for electro-magnetic potential.

3.2. Weak and Strong Evolution

Rates of evolution or flow of energy cannot be absolutely constant. As noted before, energy on one scale is generally entangled with energy on other scales (which can be interpreted as simultaneous existence on multiple scales) and time dilation exists between these scales. A particular state on one scale (characterized by relatively discrete jumps between energy levels) can be interpreted as the attractor for the other scale (characterized by continuous transition between equilibria). With attraction generally being exponentially correlated with distance (in space/time) one can assume that between two equilibria evolution proceeds at a relatively constant rate but near the points of equilibria the rate grows and decays exponentially.

The period of relatively constant rate of evolution may be referred to as [the period of] weak evolution, while periods of accelerated evolution may be referred to as [periods of] strong evolution.

3.3. Primary Atom Radius

Generally, radius of an atom is assumed to be equal to the radius of its outermost electron orbit.

However, other particles can be bound to atomic nuclei. Here, I hypothesize that neutrinos and anti-neutrinos are commonly bound to nuclei, generally occupying separate energy levels but may also be bound with other particles (eg. forming electron/neutrino pairs).

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Primary radius of the atom is then equal to the orbital radius of its outermost primary component.

At minimum, it is equal to the general radius of the atom (outermost electron orbit). However, in equilibrium - with all primary neutrinos present, it may be over twice that radius.

Here, a bound particle is considered primary if it is a component of the system equilibrium state (this is further discussed in chapter *Initial structure hypothesis*).

One could argue that neutrinos and anti-neutrinos, being neutral, cannot be bound to atomic nuclei because electro-magnetic force is the dominant force and gravity is weak. However, as it will be shown later, planetary systems are relative equivalents of atoms and, in these, equivalents of lower mass particles commonly orbit the nuclei. If the formation of planetary systems starts with inflation of energetic atoms in extreme conditions (eg. through annihilation at event horizons), then these lower mass particles must have existed in the atoms as well. However, as electro-magnetic force is, with inflation, effectively exchanged for gravitational force, it is possible that these lower mass particles have some charge on standard scale. They could be then interpreted as charged neutrinos - since they do appear to have neutrino masses. It is however, also questionable, whether any of the charged particles are charged all the time even on the standard (U_0) scale. Exchange of the electro-magnetic component of general force for gravity could periodically happen even if usually for brief moments (correlated with time-energy uncertainty), and what happens at [critically] low temperatures where properties of space (eg. magnetic permeability and vacuum permittivity) are obviously changing? Are all heavy bosons in general electrically neutral? Note that particles such as W bosons are never detected directly - their charges are thus purely theoretical, based on the assumption of charge conservation. Charge may not be [completely] conserved in bosons, rather exchanged for gravity. Note that this can also explain pairing of like charges (not necessarily limited to Cooper electron pairs). The exchange can also explain bosenovas, in which case, these do not only resemble supernovas - they are small scale supernovas.

3.4. MAU

MAU or Mars relative Astronomical Unit is a unit of distance. 1 MAU is equal to the distance of the outermost positive charge from the atom nucleus centre.

On U_1 scale $^{10}C/^{10}Be$ atom equivalent, 1 MAU is equal to the distance of Mars from the Sun.

It is assumed that in the equivalent system on standard (U_0) scale Mars would be positively charged. On U_1 where, due to dominance of gravity, it may be difficult to associate specific electric charge to planets, charge may be correlated with other properties of a body (eg. difference in magnetic spin between the planets).
Note also that in anti-matter systems 1 MAU would be equal to the distance of the outermost negative charge from the nucleus.

3.5. Weak Nuclear Decay

Weak nuclear decay transforms a neutron into a proton or vice versa. If these are parts of an atom, this is nuclear transmutation - transformation of one atom of an element into an atom of another element. The models of decay described here may differ from the models in QM.

Per my hypotheses, neutrinos and anti-neutrinos can be, like electrons, bound to atomic nuclei (and, as other fermions, grouped into pairs), although such (bound) neutrinos may be charged on standard scale, as noted already. In equilibrium, the number of bound electron (e) neutrinos and electron anti-neutrinos within the [primary] radius of the atom corresponds to the number of protons

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and neutrons, respectively. These are, together with nuclei and electrons, primary components of the atom.

Decay process involves annihilation of neutrinos and anti-neutrinos and stability of elements will depend on their number, ratio and mass (excitation state).

3.5.1. β^- Decay

Transformation of a neutron to a proton, with emission of excess energy:

$$n \rightarrow p^+ + \Delta E$$

Here, bound non-primary e neutrino and bound primary e anti-neutrino annihilate to produce, depending on energy, either an electron/positron (e^-/e^+) pair, or up/anti-up quark pair:

$$e_v + \overline{v}_e \rightarrow (e^- + e^+) \,||\, (u^+ + u^-) \tag{1}$$

In case of electron/positron production, positron further partially annihilates with the down quark (here, both are composite particles), producing neutrino/anti-neutrino pair and up quark:

$$e^+ + d^- \rightarrow u^+ + v_e + \overline{v}_e \tag{2}$$

Neutrino bounds to the atom [as a primary component], while anti-neutrino and electron are ejected in a spin paired state (boson), before separating again:

$$e^- + \overline{v}_e \rightarrow W^- \rightarrow e^- + \overline{v}_e \tag{3}$$

Note that, per QM, lepton number has to be conserved in particle interactions and the neutrino in step (2) cannot be created (at least not without an additional anti-lepton). While the decay process here might seem as an unnecessary complication, I argue that instead the QM model is an oversimplification (generally a problem with reductionism) that makes physics between different scales incompatible. Nature is generally holistic, not only does it seek diverse solutions to a particular problem but it aims to solve diverse problems with a single solution. And this is why the Occam's razor in the hand of a reductionist generally leads to illusion (reduction of physics to absolutely sterile mathematics being the biggest one).
Gravitational disturbance (temporary change in properties of space) is, in effect, the disturbance of both naked and bound neutrinos (components of space coupled to the atom [components]) and these can then affect the mass or rate of creation of W bosons, allowing for decay rates of elements to significantly deviate from the average (per CR, they should generally oscillate about a mean value), even if temporarily. Note that comparison of experiments and discrepancies[3] (between obtained W boson masses and QM standard model prediction) clearly show that oscillation/deviation is real.

In case of up/anti-up quark production in the first step, the up quark is absorbed, while anti-up quark pairs with the down quark before transformation and ejection:

$$u^- + d^- \rightarrow W^- \rightarrow (u^- + d^-) \,||\, (e^- + \overline{v}_e)$$

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Note that a decay of W^- into an electron and anti-neutrino even when it is created from anti-up and down quarks would suggest that charge in electron is a composite of 1/3 and 2/3 charge quanta. In the decay of a proton to neutron through electron capture, electron could then [inverse] decay to u^- and d^- by pairing with an anti-neutrino (inflating to W^- boson), u^- would annihilate with u^+, leaving 2 down and 1 up quark, forming a neutron.

Outside of atom, the transformed pair (W boson) is unstable (short-lived), except in extreme conditions.

Note that, in this case, to conserve equilibrium conditions, one of bound non-primary e neutrinos must reduce its orbit to become a primary component.

β^- decay is the effective transformation of a down quark to an up quark of the atom nucleus.

Boson mass

According to the Standard Model of particle physics, the rest mass of a W boson is over 80 times that of a neutron and orders of magnitude higher than that of down and up quarks.

Thus, the production of a W boson is apparently a violation of energy conservation. In QM perturbation theory this is *solved* with the time-energy uncertainty principle which allows production of such particles (*borrowing* vacuum energy) providing they decay quickly (lifetime of a W boson is 10^{-25} seconds).

Note that this is compatible with CR, assuming *production* and *energy borrowing* are interpreted as inflation of energy from a lower (unobservable) vertical energy level into a higher vertical energy level. Since the lower level is unobservable, energy conservation is relatively violated. Absolutely, however, it is not.

However, mass of the boson is also considered variable with probability of deviation from rest mass decreasing fast with amount of deviation, thus, making probability of beta decay proportional to the probability of creation of a low mass W boson (1 MeV).

In reality, there is no violation of energy conservation (in modern QM interpretations there is no violation either, however, the *solution* is much worse - the particles are declared virtual and are assumed not to exist in reality although they are mathematically required intermediates) and the mass of a W boson is, in fact, a result of conservation of energy due to momentum - energy equivalence (note that, per CR postulates, even rest mass has a momentum), where one component of the angular momentum is exchanged for the other. In this case, the angular momentum of a particle orbiting the nucleus is collapsed [localized] to a spin momentum, where *radius* has been exchanged for mass.

This is, generally, a process of conversion of a polarized component of general force into a neutral (gravitational) component - effectively, exchange of charge for mass.

If this is temporary, like in case of β decay, radius is inflated again (restoring em component) and two components of the force are again separated (concentrated) into multiple particles (although neither component can be absolutely zero for any particle).

Thus, although W boson is theoretically charged in QM, and charge is conserved between initial and final state of the system, in reality it is not conserved in the boson itself (unless created mass is indeed extremely low compared to rest mass) - otherwise conservation of energy would be violated.

Probability of beta decay is then proportional to conservation of charge in the inflated W boson.

However, stability of particles must be relative - in extreme conditions, a massive (*uncharged* or weakly charged) W boson may be stable (eg. in Bose-Einstein states of atoms).

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Destabilization of systems (including beta decay) is likely generally sourced in spatial/temporal asymmetry in exchange between neutral (gravitational) and polarized (electric) potential.

3.5.2. β^+ Decay

Transformation of a proton to a neutron, with emission of excess energy:

$$p^+ \rightarrow n + \Delta E$$

Here, bound primary e neutrino and bound non-primary e anti-neutrino annihilate to produce either an electron/positron (e^-/e^+) pair, or down/anti-down quark pair:

$$e_v + \overline{v}_e \rightarrow (e^- + e^+) \,||\, (d^+ + d^-) \quad (1)$$

In case of electron/positron production, electron further partially annihilates with the up quark (here, both are composite particles), producing neutrino/anti-neutrino pair and a down quark:

$$e^- + u^+ \rightarrow d^- + v_e + \overline{v}_e \quad (2)$$

The anti-neutrino bounds to the atom [as a primary component], while neutrino and positron are ejected in a spin paired state (boson), before separating again:

$$e^+ + v_e \rightarrow W^+ \rightarrow e^+ + v_e \quad (3)$$

In case of down/anti-down quark production in the first step, the down quark is absorbed, while anti-down quark pairs with the up quark before transformation and ejection:

$$u^+ + d^+ \rightarrow W^+ \rightarrow (u^+ + d^+) \,||\, (e^+ + v_e)$$

Note that, in this case, to conserve equilibrium conditions, one of bound non-primary e anti-neutrinos must reduce its orbit to become a primary component.
β^+ decay is the effective transformation of an up quark to a down quark of the atom nucleus.

3.5.3. Inverse β decay

Transformation of a proton to a neutron by electron anti-neutrino scattering. Generally, this interaction will occur when the atom is not in equilibrium, more specifically - the number of bound e neutrinos is lower than the number of protons.

$$\overline{v}_e + p^+ \rightarrow e^+ + n$$

In this process, e anti-neutrino annihilates with a bound non-primary e neutrino, initiating a β^+ decay with electron/positron product:

$$e_v + \overline{v}_e \rightarrow e^- + e^+ \quad (1)$$

$$e^- + u^+ \rightarrow d^- + v_e + \overline{v}_e \quad (2)$$

However, since the number of bound primary e neutrinos was initially lower than the number of protons, now even the created neutrino is bound (as a non-primary component) rather than ejected with a positron:

$$e^+ \rightarrow e^+ \quad (3)$$

3.5.4. Electron Capture

Transformation of a proton to a neutron by electron capture.

$$p^+ + e^- \rightarrow v_e + n$$

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Bound electrons induce the creation of positrons from the atom nucleus, filling its outer energy levels. In low energy conditions this may not be possible and one of the innermost electrons may be captured to fill the vacant level. However, the electron in this level is highly unstable, it is attracted to the outer proton core where it partially annihilates with the up quark, proceeding further as β^+ decay:

$$e^- + u^+ \rightarrow d^- + v_e + \overline{v}_e \tag{1}$$

The anti-neutrino bounds to the atom as a primary component, while neutrino gets ejected:

$$v_e \rightarrow v_e \tag{2}$$

Although not shown, intermediate steps here are possible (creation of W bosons).

4. Initial Structure Hypothesis

In planetary systems, outer planets (gas planets in case of Solar System) are [groups of] electrons, while inner planets (terrestrial, in the Solar System) are [groups of] positrons whose gravitational maxima have been extracted from the system nucleus to balance the electrons.

Naturally, electrons and positrons here should be considered as relative electrons and positrons - not only has charge been exchanged for gravity, the associated gravitons may have been in different mass eigenstates at the time of inflation. In general, outer planets may be vertically excited negative charges, while inner planets are vertically excited positive charges - or vice versa, in case of anti-matter counterparts.
Relativity in positrons here may even be greater - they could represent quarks (and possibly also electron holes, which are usually considered as quasiparticles).
It should also be possible for any of these to be paired with neutral fermions (eg. neutrinos).
All these possibilities will be explored later.

A planet can be in 1e or 2e configuration (state), while the star is a superposition of nuclei partons (quarks). Inner and outer primary dwarf planets in a planetary system are bound anti-neutrinos and neutrinos, respectively.

Here, 1e or 2e should not be interpreted as states holding 1*e or 2*e charges, respectively (where e is equal to the amount of charge of an electron) - the states may hold particles with fractional charges (eg. quarks).
When it comes to regions dominated by charged particles (positrons/electrons), the configuration 1e should be interpreted as a state holding 1 charged particle (whatever its charge), while 2e should be interpreted as a state holding a pair of charged particles (whatever their charges are). However, the total number of particles can be higher, as charged particles can also be paired with neutral particles (eg. neutrinos), at least occasionally.
In case of regions dominated by neutral particles (neutrinos/anti-neutrinos), the configuration 1e should be interpreted as a state holding 1 neutral particle, while 2e should be interpreted as a state holding 2 neutral particles.

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Primary components of the Solar System are shown in Figure 4.

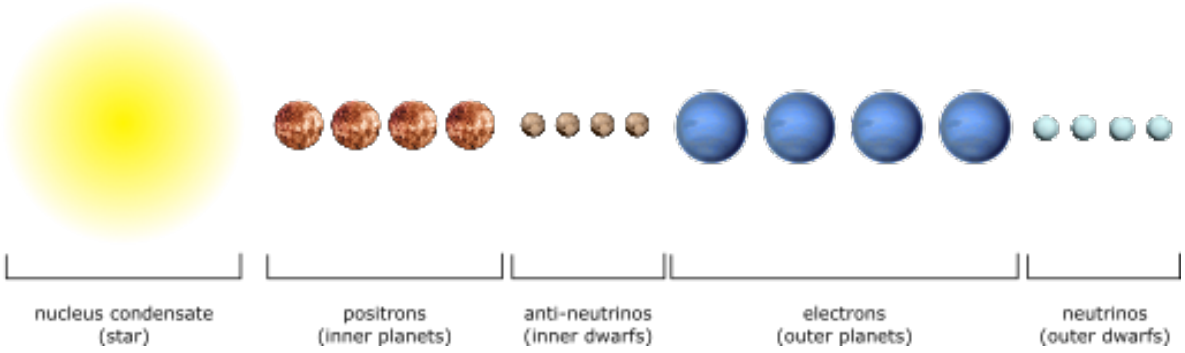

Figure 4. Primary components of the Solar System (planet images source: Pixabay/OpenClipart-Vectors[4])

In case of the Solar System, inner dwarfs (anti-neutrinos) or their remnants here are: Vesta, Ceres, Pallas, Hygiea (corresponding to number of neutrons in ^{10}C). Possible primary neutrinos (outer dwarfs) are: Orcus, Pluto, Salacia, Haumea, Quaoar, Makemake (corresponding to number of protons in ^{10}C). Note that, in equilibrium, there should be 6 primary neutrinos present, however, some could be grouped together in 2e states, just like in case of planets (6 dwarf planets in the Kuiper belt may not all be primary neutrinos then, and some could be dead remnants - representing possible energy levels).

The current Solar System seems to have 10 nucleons, it may be the equivalent of a ^{10}C atom, ^{10}Be atom or a ^{10}B atom, but the most likely may be a superposition (relative transition between two of these configurations), this will be explored in the following chapters.

Figure 5 a) shows the configuration of a ^{12}C atom (stable on standard scale, possibly unstable on U_1), on the left is the configuration of positrons, on the right is the configuration of electrons.

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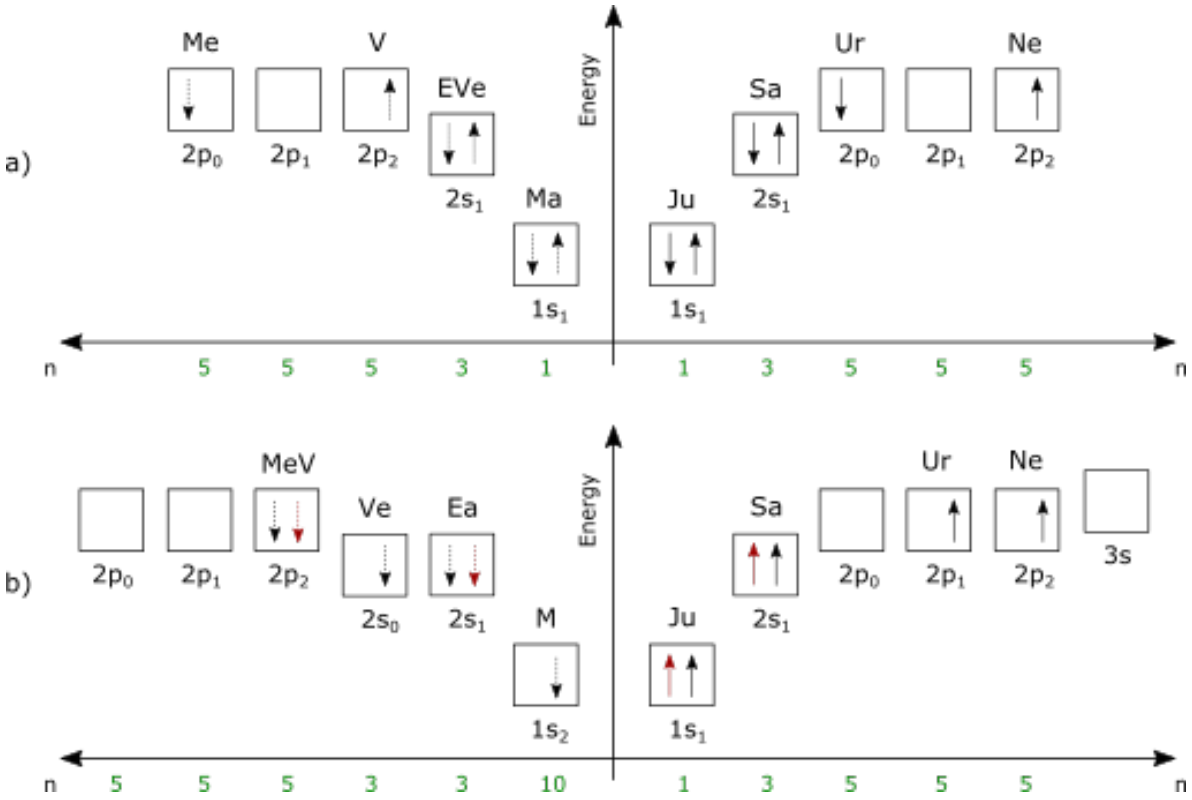

Figure 5. a) stable ^{12}C energy levels b) possible Solar System (U_1.^{10}C) energy levels

In this interpretation, energy levels are mirrored between positive and negative charges (relative to the [relative] event horizon in between).

Figure 5 b) shows a possible configuration of a ^{10}C atom at time of inflation (configuration unstable on standard scale, relatively stable on U_1 scale).

Note the splitting of s levels on the left side. This is illustrated as a possibility, but might not be the case in reality.
Due to dual interpretation, principal quantum number has an imaginary value (n) and effective value (N) which here is either 1 or 2.
Note also that 2 particles are allowed per sub-shell and there is no reason for a lone electron not to pair up with a bound neutrino, possibly forming a boson (eg. W), although such pairing may be extremely unstable at room temperature/density, oscillating in existence (on U_1 scale though, this state can be relatively stable).

The spin momentum here (represented by up and down arrows) is a magnetic momentum. Mass and charge can have different spin momenta and can be on different orbitals or energy levels. In the Solar System, bound particles have been localized (forming planets and dwarf planets, with coupled real mass) and this affects the interpretation. It may then appear that in some cases Pauli exclusion principle (two fermions coupled in the same orbital cannot have equal spin orientation) is violated, however, localization of large scale gravitons is localization of energy levels as well and Pauli exclusion principle should be respected *within* the planet (two gravitons within the planet may appear to share the same orbital about the Sun but they are on different orbitals within the planet - once delocalized, they would be on different orbitals about the Sun). Singlet, doublet and triplet states, all may be possible in localized energy levels.

Electric charge here is subdued (gravity dominates) and magnetic fields can be induced fields rather than associated with intrinsic magnetic momentum. Also, time is slower on this scale and

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real mass coupled to gravitons transitions continuously between energy levels, so planets can appear to be in transition between states (which is unobservable in standard scale atoms). Some initial states may have been unstable at time of inflation (^{10}C is unstable on standard scale) and this may appear fossilized due to slow evolution (continuous transition) of real mass (Venus and Uranus may be candidates for such states). Nevertheless, initial symmetry/inversion between inner and outer particles should be relatively conserved.

4.1. General Deduction of Quantum Structure

Here is an example how the element and exact isotope species can be determined from the number and types of planets.

The observed (star, planets) and hypothesized (dwarf planets) components of TOI-178 system are shown in Figure 6.

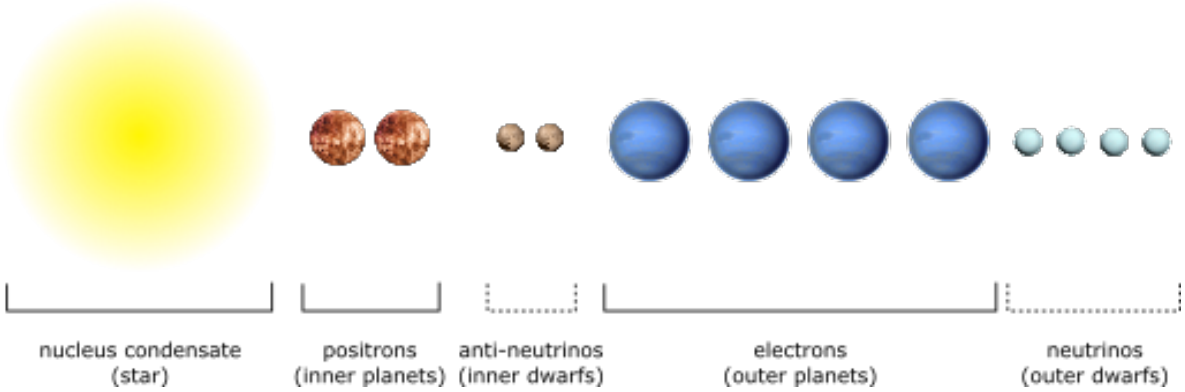

Figure 6. Primary components of the TOI-178 System (planet images source: Pixabay/OpenClipart-Vectors[4])

With the assumption of maximum 2 electrons (positrons) per planet, the TOI-178 system has these restrictions on the number of particles:

- 2 inner planets limit the number of positrons to 2 - 4,
- 4 outer planets limit the number of electrons to 4 - 8.

Since the intersection of the two groups contains only one solution (4), the TOI-178 system must be a Beryllium atom.

> Note that this is valid for neutral atoms. In case of strongly ionized atoms, the determination of species must also take the mass of the star into account.

If the number of inner planets corresponds to number of neutrons, this must be a ^{6}Be isotope.

This can be confirmed by comparing the mass of the TOI-178 system [star] with the mass of the Sun. Assuming that the Solar System is ^{10}C (or ^{10}Be), the determined mass of TOI-178 ($0.647^{+0.035/-0.032}$ $M_{\odot}$[5]) agrees well with the hypothesis.

However, the measured mass is still somewhat larger than expected - this will be resolved later.

> Note that it may be possible for the number of inner planets to actually reduce with increasing number of neutrons due to increased gravitational potential provided by neutrons, but this also requires either low [properly scaled] temperatures/densities for condensation of charges beyond the 2e configuration or excessive number of neutrons compared to protons.

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Thus, in heavy elements, due to condensation of mass and with no significant change in atomic radii, it may be possible for all planets of a system to be gaseous giants, where the number of charges cannot then be precisely determined from the number of planets. This may be unlikely though (condensation of mass/charge beyond 2e may be confined to the star). However, masses can be inflated due to mass oscillation. Eg. assuming U_1 electron neutrino mass is on the order of the mass of Ceres, the mass of U_1 tau electron neutrino would be on the order of 10^{24} kg. Mass oscillation should exist in all particles, leptons and quarks included. Thus, even inner planets in 1e or 2e configuration may become gas giants. However, symmetry/inversion should exist between inner and outer planets and it should be possible to make a distinction between inner, outer charges and neutrinos in between.

The number of bound [primary] anti-neutrinos should also correspond to number of neutrons, while the number of bound [primary] neutrinos should correspond to the number of protons.

Note that, while bound anti-neutrinos/neutrinos should correspond to number of neutrons/protons, they may not be in the same configuration as positrons/electrons.
Thus, it is possible that TOI-178 has a single inner dwarf planet (holding 2 anti-neutrinos) instead of two dwarf planets, and two outer primary dwarf planets instead of four.
Additional particles may also be bound to the system, however, orbitals of these should probably lie beyond the primary components, unless these are lower mass homogeneous particles with no distinct large scale gravitons (such as smaller asteroids and comets).
Note also that, with the exception of the innermost planet, planets of the TOI-178 are in orbital resonance (18:9:6:4:3). The pattern does suggest one additional particle (or a binary) between the inner and outer planets, one that would complete 13 revolutions for every 18 revolutions of the second planet (pattern 18:13:9:6:4:3).

4.2. Singlet, Doublet and Triplet States in Planets

In QM, it is assumed that two particles in a singlet state share the orbital. However, per CR, superposition cannot be absolute and the two particles can have somewhat different orbital radii. On standard scale this difference may be unresolvable, but on large scale (U_1) it can be. The difference may oscillate about 0, but interpretation involving fine energy level splitting may also be valid.

In any case, in 2e states there should be two major gravitons. In terrestrial planets one of these probably should be associated with the mantle, the other with the core. If these are in a singlet state, in equilibrium, there should be no differential motion between the core and the mantle. Again, however, per CR, the difference cannot be absolute 0, it must oscillate about the 0. Per the hypothesis, Earth is in such configuration. Indeed, the rotations of Earth's core and mantle are synchronized but oscillation has been detected as well[6].

Note that the detected rotation may be the rotation of real mass, but this should be [relatively] synchronized with the rotation of gravitons.

Two gravitons are likely necessary for core/mantle differentiation (at least on shorter timescales of formation, and in case of lower initial densities of available real mass for planetary formation - in which case, the planet may not even form without the presence of a large scale graviton and its associated dark matter), but this differentiation probably exists even in 1e states due to [occasional, periodic?] coupling with neutrinos. If such coupling is temporary, differential motion between the

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core and the mantle should be higher after decoupling (as decoupling involves spin change) and the difference should be proportional to graviton mass (img mass), inversely proportional to real mass. If friction between mantle and core is low, the differential motion may be effectively fossilized at the time of decoupling. Indeed, pronounced differential motion in Mercury and Venus explains their [unexpected] low obliquity to orbit (differential motion has a stabilizing effect). Note that both, Mercury and Venus, should be, according to hypothesis, in 1e states. This suggests they are, or were at some point, coupled with neutrinos.

Doublet and triplet states may be possible as well. Particularly interesting is the doublet state. Differentiated core may indicate a doublet state where inner and outer core have anti-aligned spins and no differential motion in equilibrium, but then there should exist a large difference between mantle and core rotation.

However, there are other, probably more likely, interpretations. One of them is splitting of energy levels, the other is oscillation between energy levels.

Differentiation of the mantle into layers, for example, would then be relatively synchronized with the oscillation of a graviton between energy levels (which themselves may be the result of splitting of the primary mantle level). And the causality here is relative, in some cases the cause for differentiation or creation of discontinuities (two adjacent layers don't have to be of different chemical composition) may be the graviton, in others real mass. What drives energy level changes depends primarily on mass difference between img (graviton) mass and real mass. Dominant force may vary with time, in the early days of formation, the graviton is probably the dominant driver. In any case, most appropriate term here is synchronization, rather than causality. One is simply transitioning continuously, the other in discrete jumps. Note that this mechanism of evolution allows for higher plasticity in planetary characteristics, eg. core differentiation and solidification in a planet may be a transient and periodic phenomenon, allowing for periodic re-establishment of a magnetic field. In equilibrium however, disturbance by external force (eg. asteroid impacts) is likely required for energy level changes.

4.2.1. Correlation with Planetary Atmospheres

Assuming large scale gravitons of terrestrial planets like Earth have mass on the order of 10^{19} kg (as established in later chapters), equal scaling gives mass of large scale anti-neutrino gravitons on the order of 10^{15} kg - 10^{16} kg. These gravitons are generally coupling to bodies of real mass on the order of 10^{19} - 10^{20} kg (inner dwarf planets). Interestingly, this is on the order of mass of Venusian atmosphere. If Venus is coupled to a neutrino than this graviton could act as an gravitational attractor in Venusian atmosphere (assuming the graviton radius is on that level). This could then help sustain life in Venusian atmosphere and may have a role in the long-term stability of its extreme super-rotation. Note that the graviton doesn't have to be present all the time - it could be periodically inflated (delocalized) to this radius (assuming the neutrino is coupled to the planet, otherwise, the process should include both inflation and deflation - assuming neutrino is initially coupled to an inner dwarf planet in the asteroid belt). The presence of atmosphere in a planet then may generally indicate a [periodic] presence of neutrino gravitons. Another interesting case is the atmosphere of Mars, its mass is on the order of 10^{16} kg - hypothesized mass of a naked neutrino graviton. Mercury has no significant atmosphere (its mass is less than 10^{4} kg). All this suggests that Venus, Earth and Mars are all [periodically?] coupled to neutrinos (which may imply triplet states in case of Earth and Mars), while Mercury is not. With 3 neutrinos coupled to planets, and assuming a 6p4n state of the Solar System, only 1 neutrino should be coupled to inner dwarfs. And that's probably the active one - Ceres. The mass of Earth's atmosphere is on the order of 10^{18} kg and the Earth is probably transitioning from one extreme to the other (eg. Mars -> Venus). Interestingly, the mass of Earth's atmosphere varies annually on the order of 10^{15} kg (mass of a naked neutrino graviton). Could this variation indicate the presence of coupling? And do states on Venus and Mars represent fossilized end-states or are these two at the end/beginning of a cycle? If that is the case, and all these cycles are relatively synchronized, the Earth should be at the end

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of an atmospheric cycle as well, which would suggest relatively imminent rapid changes in Earth's atmosphere.

4.3. Stability of Atoms

Stability of isotopes of standard atoms depends on the number of neutrons. The model of the atom presented here, however, suggests that primary [anti-]neutrinos may be more directly involved in this stability. Periodic coupling of particles with neutrinos could ensure spin (obliquity) and orbital stability (eg. by resetting eccentricity/resonance). According to the previous chapter, Mercury is not coupled to a neutrino. Its high orbital eccentricity goes in favour of this interpretation. Indeed, even in conventional models, Mercury's orbit is relatively unstable[7]. If decay process involves emission of primary [anti-]neutrinos, temporary absorption of the primary [anti-]neutrino by a nearby atom could explain half-life of elements. When absorbed, the primary neutrino resets the system stability. That way, on average, half of isotopes would decay after every fixed period (half-life), regardless of the initial amount of atoms.

> This process in some form (evolved) probably exists in any entangled community or organization. Consider a human family, for example. If humans, like atoms, have souls, death of a human probably involves emission of particles (waves) on some scale and these are then probably temporarily absorbed by another human [soul], affecting its mentality, which may even be, at least in some cases, correlated with temporary ageing reversal and some increase in lifespan. This is, what I believe, I have experienced about the age of 36. But I believe I have seen this in others as well. The probability for absorption should be directly or indirectly proportional to genetic match between the deceased and the absorber. Here, *genetic* match between the souls should have priority, however, DNA is likely correlated with the properties of the soul. I have explored soul-body couplings in more detail and correlated them with consciousness in other papers.

Stability of decay rates of elements then depends on stability of [periodic] couplings with primary [anti-]neutrinos. Energy level/spin changes of large scale gravitons, due to entanglement with U_{-1} gravitons, may then indirectly and temporarily disturb decay rates of standard elements in the associated gravitational well. I believe this indeed happens periodically in any planetary system.

5. Quantum Nature

Even though the dominant force on this scale is gravity, being formed through the inflation/deflation of gravitons (conserving many small-scale characteristics), the Solar System can be modelled as an atom with 10 nucleons. Here I assume this is a large scale 10-Carbon isotope equivalent. Due to specific conditions some of its components are at the lowest energy level - multiple nucleons are condensed into a single nucleus, orbitals are two dimensional (collapsed from spherical cloud structure), highly aligned (same plane), and momentum carriers are [scaled] point like structures - they are strongly localized.

Scale invariance of physical laws (as postulated in CR) requires that non-dimensional ratios - those of radii, masses and velocities (energies in general) in two systems of the same species (carbon in this case) in the same state but of different scale (vertical energy level) are equal.

> Scale invariance in CR is relative scale invariance. Non-dimensional ratios are preserved between different vertical energy levels but the constants have different values (unless the metric is scaled as well).

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Radius of the outermost electron in a standard ^{10}C atom can then be obtained from Neptune spin and orbital radius:

$$\frac{\text{Neptune spin radius}}{\text{Neptune orbital radius}} = \frac{\text{10C outermost electron spin radius}}{\text{10C outermost electron orbital radius}} = \frac{R_{U_1}}{r_{U_1}} = \frac{R_{U_0}}{r_{U_0}}$$

This gives [localized] electron radius R_{U_0} = 3.834298096 * 10^{-16} m. Note that radii of particles inside the atom can be different than outside of the atom (radii depend on localization energy). Generally, radii are affected by kinetic energy and oscillate with mass.

Note that, in this paper, I will often write results with a lot of decimals - suggesting high precision, however, in a lot of cases this interpretation is wrong as variables in the equations commonly have varying precision and uncertainty. Since the paper is constantly updated and high precision is generally irrelevant for the aim of this paper (only the most significant digits are usually relevant, less significant digits usually should not be taken seriously), I do not bother rounding the values. However, In the final version of the paper, the values should be properly rounded, with stated uncertainties.

Sun core radius from ^{10}C nucleus radius and outermost electron radius:

$$\frac{\text{10C nucleus charge radius}}{\text{10C outermost electron spin radius}} = \frac{\text{Sun core radius}}{\text{Neptune spin radius}}$$

The above gives Sun core radius of 173894.6069 km, or 1/4 of the apparent Sun radius, in agreement with experimentally obtained values of Sun core size. More precisely, this is the Sun outer core [discontinuity] radius and also [approximately] U_1 classical electron radius.

The values of constants used here are values listed in chapter *Constants*.

Proton radius approximation:

$$\frac{\text{Sun radius}}{\text{Solar System charge radius}} = \frac{P}{N}\frac{\text{10 * proton radius}}{\text{10C charge radius}}$$

The factor P/N = 6/4 = 3/2 is the ratio of protons to neutrons in Carbon-10 (^{10}C) atom, factor 10 is the number of nucleons (P+N).

The above gives 0.722296 * 10^{-15} m = 0.722296 fm for the proton radius, close to experimentally obtained value of 0.8414(19) fm (2018 CODATA[8]).

The same result can be obtained using spin radii:

$$\frac{\text{Sun radius}}{\text{Neptune spin radius}} = \frac{P}{N}\frac{\text{10 * proton radius}}{\text{10C outermost electron spin radius}}$$

A precise value can be obtained by taking into account the influence of quarks instead of P/N (this will be elaborated later):

$$\frac{\text{Sun radius}}{\text{Solar System charge radius}}\left[\left(\frac{2}{3}\right)^2 + \frac{1}{3}\right] = \frac{\text{10 * proton radius}}{\text{Carbon-10 charge radius}}$$

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which gives 0.8426785306 fm, a value in agreement with the CODATA value.

Radius of the proton cannot be absolutely constant, due to hypothesized entanglement between vertical scales, apart from required oscillation, it should probably be shrinking as the universe expands.

Comparing masses:

$$\frac{\text{Sun mass}}{\text{Neptune mass}} \approx \frac{\text{10C nucleus mass}}{\text{10C outermost electron mass}} \tag{Q1.1}$$

This gives:

$$19416.48033 \approx 18260.0087$$

The above shows mass ratios agree not only to the order of magnitude but are actually very close in value. The excess energy is:

$$\begin{aligned}\Delta M &= \text{Sun mass} - \frac{\text{10C nucleus mass}}{\text{10C outermost electron mass}}\text{Neptune mass} \\ &= 1.18437729 * 10^{29}\, kg \approx 6\%\,\text{Sun mass}\end{aligned}$$

and it must be the locally accumulated relativistic energy of the Solar System (discrepancy arises due to non-invariant reference frames in the mass measurement - the mass of the standard ^{10}C atom is measured from an external frame, while the mass of the Solar System is derived from within the system and *improperly* treated as rest mass).

Although the Solar System is at rest relative to us, relativistic energy (deviation from rest velocity) of the system relative to underlying space is always locally real and must be stored somewhere within the system. The likely capacitor is local space of the system and the energy is stored in the form of gravitational potential.

> If the energy is stored mostly in the Sun, this would imply non-homogeneous storage of kinetic energy as gravitational potential - likely proportional to the scale of the large scale gravitons. However, it is also possible that energy was accumulated before the birth of planets.
> Most likely, this energy was accumulated with nucleus inflation during the conversion of electro-magnetic potential to gravitational.
> Of course, the Sun loses energy over time but lost mass is on the order of 10^{27} kg, significantly lower than hypothesized relativistic energy.
> There are other possibilities for excess mass acquisition, however, acquisition of mass on the order of 10^{29} kg is, after inflation, probably unlikely, especially considering distances and motion of bodies in the galaxy.

From this one can calculate the scaled speed of *light* (information) for the U_1 scale (c_1):

$$M = M_\odot - \Delta M = 1.870062271 * 10^{30}\, kg$$

$$v = v_s + v_p$$

$$M_\odot = \frac{M}{\sqrt{1 - \frac{v^2}{{c_1}^2}}}$$

$$c_1 = \frac{v}{\sqrt{1 - \frac{M^2}{{M_\odot}^2}}}$$

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If v is interpreted as the cumulative velocity against the CMB (Constant Microwave Background) radiation, a sum of secondary velocity v_s (velocity of the Solar System against CMB) and primary velocity v_p (equal to velocity of the local galactic group against CMB), for v_s = 368 km/s and v_p = 628 km/s, one obtains:

$$c_1 = 2.93 * 10^6\ m/s$$

Obtained c_1 is equal to one of possible values calculated in CR[9], but will also be confirmed here later in a different calculation.

At first, it might seem that this calculation cannot be valid since both velocities are relative to CMB and v_p should not be included in calculation. However, the obtained c_1 is confirmed later. This puts certain constraints on Sun's evolution, implying that Sun's graviton (or, superposition of large scale gravitons) was, after initial inflation, accelerated to 628+368 km/s (additionally inflating) in the same direction as the local galactic group, then decelerated to 368 km/s, however, not losing the acquired energy (it is yet to lose it on U_1 scale).
This is a plausible explanation with hypothesized duality taken into account - on one scale transition is quantized, on the other continuous. Here the energy of the graviton is quantized and requires certain time to collapse to lower energy level. Indeed, if one assumes that fusion in the Sun started with the moment of deceleration when its speed became equal to 368 km/s and assuming at that point real mass (fusion fuel) was equal to the mass of the outer (or, *surface*) gravitational maximum it would be reasonable to assume that collapse would occur once fuel spent in fusion becomes equal to acquired relativistic mass (ΔM).
Since this mass has not yet been depleted, the collapse has not occurred yet, but, according to my calculations (see chapter *Quantization of the Sun: Energy replenishment*), this moment could be relatively near.
The other possibility is that accumulated energy does correspond to the current speed (368 km/s), but the mass of Neptune has been decreased instead, from 1.08 * 10^{26} kg to 1.02 * 10^{26} kg (current mass). Explanations for this may include mass oscillation, moon creation and conversion of gravitational potential to electro-magnetic potential, however, I consider this less likely, especially comparing the rates of energy absorption and emission between the Sun and Neptune.

Comparing masses of systems of different scales requires proper relativistic treatment. Apart from the speed of *light* being different between the scales, a proper reference frame must be chosen. In case of comparison of U_1 scale system (such as the Solar System) with an U_0 system (such as a ^{10}C atom) a proper reference frame is the CMB (Constant Microwave Background) radiation rest frame.
Proper equation is thus (for $v_1 = v_0 = v$):

$$\frac{\text{Sun mass}}{\text{Neptune mass}}\sqrt{1-\frac{v^2}{{c_1}^2}} = \frac{\text{10C nucleus mass}}{\text{10C outermost electron mass}}\sqrt{1-\frac{v^2}{{c_0}^2}}$$

v = $v_\odot$ = cumulative speed relative to CMB = 996 km/s
c_1 = speed of *light* on U_1 scale = 2.93 * 10^6 m/s
c_0 = c = speed of *light* on U_0 scale = 2.99792458 * 10^8 m/s

Note that CMB radiation is of U_{-1} scale.

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Note also that maximum speed (c_n) depends on pressure and density of space and it is generally not equal to the standard speed of light. Here thus, even though the term *speed of light* may be used, c_1 should be understood as maximum speed of U_1 scale information, and also particles (stars) in local space.
Within the galaxy, speed limit for orbiting bodies is generally defined by the gravitational maximum (event horizon) of the well - stars orbiting galactic centres with semi-major Keplerian velocities larger than c_1 could exist in other galaxies.

One can now attempt to resolve the excess mass of the TOI-178 (^{6}Be) system. Assuming its velocity [relative to CMB] is 77.22 km/s larger than Sun's velocity, its mass should be:

$$M_{TOI-178} = \frac{M_{Be-6}}{M_{C-10}} M \frac{1}{\sqrt{1-\frac{v^2}{{c_1}^2}}} = 1.207764563 * 10^{30}\, kg$$
$$= 0.607\, M_\odot = 0.646\, M$$

M_{Be-6} = rest mass of ^{6}Be atom = 6.0197 u
M_{C-10} = rest mass of ^{10}C atom = 10.016853 u
M = rest mass of the Sun (relative to CMB) = 1.870062271 * 10^{30} kg
v = cumulative speed of TOI-178 relative to CMB = 1073.22 km/s

However, mass of TOI-178 obtained from measurements is $0.650^{+0.027/-0.029}$ $M_\odot$[5].
Apparently, *measured* mass is bigger by the relativistic [omega] factor:

$$\frac{1}{\sqrt{1-\frac{v^2}{{c_1}^2}}} \approx \frac{v}{v_\odot}$$

The cause of discrepancy is, again, in the reference frame - calculation is done relative to CMB, while measurements were done from the Solar System (Earth) reference frame.
From such reference frame Sun is at rest and its rest mass is equal to relativistic mass relative to CMB, $M_\odot$ (1.988500 * 10^{30} kg).
However, one must take into account the radial velocity [relative to the Sun] of TOI-178. Relative to the Solar System, the mass of TOI-178 should thus be:

$$M_{TOI-178} = \frac{M_{Be-6}}{M_{C-10}} \frac{M}{\sqrt{1-\frac{(v_\odot+v_r)^2}{{c_1}^2}}} \frac{1}{\sqrt{1-\frac{v^2}{{c_1}^2}}}$$

v_r = radial velocity of TOI-178 = 57.4±0.5 km/s

This gives 0.650 $M_\odot$ for the mass of TOI-178, in agreement with measurements.
Note that relativistic effects are always physical, but not always on the same scale and not always in the same space - eg. some may be physical on small scale (mental) in space of the observer, some on a large scale in space of the observable, or vice versa[10].

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Solar System is thus a [negatively] polarized reference frame relative to TOI-178 and to convert the measurement to a proper [neutral] reference frame, one must multiply the measured value with a positively polarized omega factor:

$$\left(\frac{1}{\sqrt{1-\frac{(v_\odot+v_r)^2}{{c_1}^2}}}\right)^{-1} = \sqrt{1-\frac{(v_\odot+v_r)^2}{{c_1}^2}}$$

Note also that TOI-178 is the only system I have analysed beyond the Solar System. The reason that an effectively randomly chosen system fits the hypothesis goes strongly in its favour. All planetary systems close to the Solar System, and probably all systems in the Milky Way, should conform to the same speed limit. However, I find that analysing all these is beyond the scope of this paper. Hopefully, other researchers will do these analyses eventually.

5.1. Validating rest mass and $^{10}C/^{10}Be$ configuration

If the Sun is a large scale equivalent of an atom nucleus containing 10 nucleons, one can calculate the mass of a proton (hydrogen) equivalent on large (U_1) scale:

$$M_H = \frac{M_p}{M_{C-10}} M = 1.88050050 * 10^{29}\, kg = 0.095\, M_\odot = 99\, M_J$$

M_p = standard proton mass = 1.67262192 * 10^{-27} kg
M_{C-10} = standard ^{10}C nucleus mass = 1.663337576 * 10^{-26} kg
M = previously calculated Sun rest mass = 1.870062271 * 10^{30} kg

And this is on the order of red dwarfs - smallest known stars, in agreement with the result.

One can then assume that no star in the observable universe should have a mass smaller than this at times of creation (after inflation).

Observations seem to be in good agreement with this. Until recently, the star with lowest known mass was considered to be the AB Doradus C, with a mass of 0.090±0.005 $M_\odot$[11] or 94.3±4.7 M_J (Jupiter masses) - in complete agreement with the above. However, more recent evidence indicates that this might not be a star, rather a binary of two brown dwarfs[12]. The current record holder is considered to be EBLM J0555-57Ab, with a mass of 85±4 M_J (0.081±0.004 $M_\odot$)[13].

Of course, stars are losing mass over time. Assuming maximum age of universe of 13.8 * 10^9 years and knowing the rate of ageing (mass loss) of red dwarfs, one can calculate what mass would a red dwarf with initial mass of 0.095 $M_\odot$ (99 M_J) have at this point. All of these stars should still be alive and on the main sequence (it is expected for stars of this mass to remain on main sequence for over 6 trillion years, with total burning lifetime of about 10 trillion years).

Assuming luminosity of 3.29 * 10^{-4} $L_\odot$ for a typical 0.095 $M_\odot$ red dwarf (luminosity based on 0.095 $M_\odot$ Scholz's WISE J0720-0846A[14]), mass at this point would be:

$$m = 0.095 M_\odot - \Delta t * m_p * \frac{4}{E_r} * P * \frac{1}{N} = 1.87923566 * 10^{29}\, kg = 0.0945\, M_\odot$$

Δt = age of the universe = 4.3549488 * 10^{17} s
m_p = standard proton mass = 1.67265 * 10^{-27} kg
E_r = energy per reaction = 4.32 * 10^{-12} J
P = power output = 3.29 * 10^{-4} * 3.8 * 10^{26} J/s
N = fraction of mass used in fusion = 2/3

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Mass loss through radiation is thus almost negligible, but one must also account for the loss of mass due to solar wind. Mass loss through solar wind for cooler stars is estimated to be higher than that of the Sun[15], assuming mass loss rate 10 times higher for 0.1 $M_\odot$ dwarfs (which may be conservative), mass at this point should be:

$$m = 0.0945M_\odot - \Delta t * 10 * M_r = 0.0945M_\odot - 0.00345M_\odot = 0.0911\,M_\odot$$

M_r = Sun mass loss rate = 2.5 * 10^{-14} $M_\odot$/yr[16] = 7.922022 * 10^{-21} $M_\odot$/s

Considering that red dwarfs with lower mass have been observed (assuming they are indeed red dwarfs), the result suggests that either the assumed mass loss rate is indeed conservative (but not much) or the universe may be a bit older. However, the excellent agreement of the result with AB Doradus C suggests otherwise - perhaps AB Doradus C is not a binary after all rather a proper red dwarf, while smaller ones - like EBLM J0555-57Ab, may be binaries, or should be classified as brown dwarfs?

5.1.1. Remnant Hypothesis

Brown dwarfs may generally be remnants of dead stars (instead of protostar material), just as asteroids and comets may generally be remnants of dead planets and moons. If stars generally have multiple gravitational maxima (as I do hypothesize), once the gravitons decouple from the body of matter (real mass), it should not be surprising if dead aggregates of matter are, due to significant angular momenta, kept separated - forming binary systems (in most cases). One of the binaries should represent the remnant of the star's core while the other should be the remnant of outer layers. Distribution of mass between them should generally be asymmetric.

Moment of inertia puts constraints on density distribution inside bodies. Based on this, it is estimated that Sun's core contains about half of the mass of the Sun. It is also considered that Sun's core radius is 0.2 - 0.25 $R_\odot$ (Sun's radius) but exact distribution of mass here is unknown. I argue that Sun's core is not bigger than 0.2 $R_\odot$ and most of the mass conventionally attributed to the core is in the region near 0.25 $R_\odot$. The core then has a significantly lower mass than assumed. In a later chapter, I have calculated that Sun's core mass is several times that of Jupiter. At the end of its life, the Sun leftovers are probably going to form a binary system of a white dwarf (remnant of non-core mass) and a brown dwarf less than 10 times the mass of Jupiter (core remnant, which may still be alive and act like a gas planet, as decoupling of gravitons is relatively synchronized, not absolutely).

I assume that, with decreasing star mass, the outer mass is decreasing while core mass is increasing (due to generally smaller angular momentum of smaller stars). Remnants of red dwarfs should then be brown dwarfs, where one should be about 80-85 times Jupiter mass (0.075 - 0.081 $M_\odot$) while the other (core remnant) would be on the order of 10 times Jupiter mass. Distance between these binaries and their masses would then be generally proportional to the original size of the star.

The study indicating AB Doradus C is a binary, does provide masses conforming to this ratio, 0.072±0.013 $M_\odot$ and 0.013±0.001 $M_\odot$[12].

Is AB Doradus C an ageing red dwarf revealing presence of multiple gravitational maxima or indeed its remnant - which would imply its death was violent or that it represents a remnant from an older universe?

In any case, decoupling of gravitons from bodies of matter is generally a change of energy level so it occurs with spin inversion, explaining lower rotation periods of dwarfs compared to bigger (original) bodies.

Decoupling/disentanglement is not absolutely instantaneous. Thus, during graviton spin change, real mass could experience gravitational dragging - slowing its rotation.

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If remnant core mass is increasing while outer mass is decreasing (with decreasing original star mass), remnant binaries with roughly equal mass should be possible. According to above, their masses should be about 40 times Jupiter mass.

However, original system can also be a binary system with stars having similar masses. Therefore, equally massive binary remnants with masses smaller than 40 M_J (perhaps with a wider orbit as well) are also possible. With differently sized original companions, different remnant companions are possible.

This can then explain the recently discovered abundance of Jupiter-mass binary objects in the Trapezium cluster[17] - something highly unexpected with conventional theories on formation of planetary systems.

These objects were probably not planets ejected from original systems (as some suggest but struggle to explain), rather, they represent *in situ* remnants of stars. However, it should be clear that at least some of these could also have been created with the inflation of unbound (free) [pairs of] standard particles (or more precisely, their gravitational maxima) - like muon electrons.

5.1.2. Dark Shade of Glue

A body coupled to a large scale (U_1) graviton (gravitational maximum) is a body coupled to a dark matter halo and dark matter filaments of smaller scale (U_{-1} gravitons) as well. Once the U_1 graviton decouples from the body this *glue* of U_{-1} scale holding matter together should also start to dissolve - flattening the space (U_{-1} gravitons are entangled with the parent U_1 graviton). The body of matter can still remain clumped (held together by electro-magnetic forces or gravity of still smaller scale) but will lose energy faster than the body coupled to a large scale graviton and will tend to spread out (unless recycled by new coupling) due to increased vulnerability to cosmic disturbances.

> Note, however, that due to relativity of causality, sometimes the filaments will start dissolving before the decoupling.

One must distinguish then a [still] living remnant from a dead remnant. In example, the outer part of the Sun may not collapse to form a conventional (long-lived) white dwarf, rather disintegrate and spread as a nebula. However, if the core remnant is still alive and massive enough, the material could form a shell about it (but will eventually sink to the centre as it should be composed of heavier elements than the core). Common white dwarfs could actually be such objects. In that case, a white dwarf with a carbon envelope should be relatively young (older ones should be surrounded by helium and hydrogen, with carbon in the core). Note that, in such scenario, the gravitational well of the [U_1] core graviton becomes over-capacitated - decreasing its lifespan (increasing probability for premature death).

A good analogy to dark matter holding ordinary matter (real mass) together can be found in hyphae of living fungi holding soil together (preventing erosion). A good analogy to an over-capacitated core is an overweight person.

If asteroids are remnants of dead bodies, the particles they're composed of should not be held together by a dark matter halo and probably not by dark matter filaments as well (unless very young or entangled with another graviton of U_1 scale). If then a theory of gravity does not distinguish between different scales of gravity, or - in other words, does not distinguish between living (graviton entangled) and dead celestial bodies, applying its laws to one of these can result in anomalies in certain cases (due to misinterpretation of phenomena or understatement/overstatement of certain quantities - like mass/density and mass loss).

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Young asteroids (or, generally, asteroids with coupled U_{-1} gravitons forming dark matter filaments) are then less likely to disintegrate as they pass through an atmosphere.
However, any asteroid passing through atmosphere is disturbing bodies in that atmosphere and can couple to local U_{-1} gravitons if these are/become available (if the well is under-capacitated there will be available gravitons for coupling, if not, death events are required to enable new couplings).
Celestial bodies not entangled with U_1 gravitons (or, *properly* dead bodies) should be clumps of matter loosely held together. Effectively, the gravitational constant between the components of these bodies is reduced and this should be verifiable experimentally (providing the quantity of mass can be precisely determined - without involving gravity).
I assume that electro-magnetic radiation of elements is not noticeably affected so the effect should be most pronounced in non-polar intermolecular bonding, especially between less massive (less polarizable) molecules and higher intermolecular distances (ie. at high temperatures) - as induced dipole attraction falls sharp with distance.

In, here assumed, interpretation of graviton-body (soul-body) coupling there is no mass shielding so the total mass of the system is the sum of ordinary and dark matter mass. Thus, the force one usually attributes to ordinary mass should generally be attributed to the sum of both masses. With that neglected, bodies lacking dark matter (such as certain asteroids) may be observed anomalously accelerating (as their coupling to gravity is limited).

Indeed, such anomalies associated with asteroids have been observed recently (eg. 'Oumuamua, DART[18]).

Note that interstellar visitors are more likely to show anomalies as they are generally not entangled with local U_1 gravitons and probably not entangled with any remote ones as well.
An asteroid ejected from Mars millions of years ago, in example, can still be entangled with Mars' U_1 graviton and may not show any anomalies - especially if the graviton wasn't changing energy levels in the meantime.
In another example, any kind of a satellite launched from Earth will carry coupled U_{-1} gravitons (filaments) which will remain entangled with Earth's U_1 graviton - no matter the distance, until this entanglement is disturbed, either by Earth's loss of consciousness (temporary or permanent U_1 graviton decoupling) or satellite entanglement with another U_1 graviton.

If the hypothesis is correct, with more visitors more anomalies should be observed. But more local surprises[19] cannot be excluded as well.

As weakening of intermolecular bonds (weakening of localized G) can precede U_1 graviton collapse, such weakening detected on Earth could be interpreted as a precursor to large scale weakening - collapse (de-localization) of the Earth's U_1 graviton.

This weakening should cause Earth to expand a bit (first partially then globally). And this will (due to effectively reduced boiling point) cause some degassing. These gases are likely to be primarily greenhouse gases, at least those that will remain in the atmosphere (lighter gases may escape). Primary candidate is methane (CH_4), which relatively quickly decays into CO_2 (perhaps even faster with reduced intermolecular bonding). This may help explain enriched CO_2 atmosphere of Venus and dominance of CO_2 in Martian atmosphere.

Again, due to relativity in causality, degassing can start before the expansion - for a different reason (eg. current degassing is correlated with climate change). I believe all major extinctions and correlated climate changes are also correlated with temporary graviton collapses. Nature isn't picky

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when it comes to causes and precursors for certain effect. Therefore, the effectively induced actions leading to certain effect can be, over time, diverse, even anthropogenic.

Increase in seismic activity (including volcanism) can also be correlated with the changes in inter-molecular bonding. Not only that, but precursors of collapse may have a wave-like distribution with increasing frequency over time. Allowing certain predictability of seismic activity[20].

5.1.3. Plastic Density

It was noted previously that applying conventional theories to asteroids can yield anomalies. Particularly interesting ones are anomalous masses or densities, like the one in 33 Polyhymnia and similar bodies. Polyhymnia is a spherical body in the main asteroid belt with a 54 km diameter and estimated density of 75.28±9.21 g/cm^3[21]. This extreme density cannot be explained by known elements so it is considered unphysical and most likely a result of measurement errors (which is certainly possible as determination of mass of bodies like Polyhymnia is extremely hard). However, Polyhymnia is not the only asteroid with anomalous density and I believe these cases deserve further investigation. Assuming these are not highly compressed remnants (of cores of giant planets), these could represent [almost naked] large scale gravitons. The shape here is important. Polyhymnia is a very good candidate due to its spherical form (a form of a graviton in ground state) which would be, otherwise, unexpected for such small body.

Interestingly, the study of Carry on density of asteroids[21] suggests clumping of bodies of very variable densities on the same order of mass, 10^{18} - 10^{19} kg (including Polyhymnia), while, as it will be shown in later chapters, I have determined that Earth's [large scale] graviton mass is on the order of 10^{19} kg.

Since gravitons aren't supposed to have highly variable masses (their masses should be relatively quantized, coupled real mass should be more variable, as well as their size), one explanation for the clumping could be that most of these bodies are coupled to a graviton of the same species (eg. 10^{18} kg or 10^{19} kg). These bodies thus, apart from the dark matter associated with the graviton, are not composed out of heavy exotic elements (which would require existence of *islands* of stability in the periodic table of elements) - rather, the img component of total mass dominates, while their real mass (standard matter) could be much lower and much less dense. Most of these bodies could simply be *dusty* or *icy* gravitons (low mass/density of standard matter, high gravitational mass) and I would like to see at least one of these bodies further investigated, especially Polyhymnia.

Alternatively, some of these bodies may be remnants of giant planets. This is also unexpected by conventional theories, however, I have predicted [re]cycling of planetary systems (explored in later chapters). Therefore, Polyhymnia could be a remnant of a core of a Jupiter-like planet as well. In that case, it should be older than the current Solar System. Its aphelion may then be a relative fossil of a semi-major axis of a Jupiter-like planet in the previous cycle. On the other hand, if it is a relatively naked graviton, it could represent a *placeholder* for a Jupiter-like planet's core in the next cycle (I assume Jupiter-like bodies contain multiple gravitational maxima - at least two, core graviton is only one of them).

5.1.4. Distinguishing Living from Dead Bodies

Living bodies are active bodies and require energy to sustain that activity and prevent decay. Components of a living body are mutually entangled, exchange energy/information and are themselves habitable for life of smaller scale. In case of planetary systems, a habitable planet is generally a living planet (although it can remain habitable for considerable time even after death). Celestial bodies can give and receive energy through standard radiation (electro-magnetic, gravitational, particle emission), tidal interactions, impacts and large scale gravitational waves (assuming these exist, as hypothesized in CR). This energy can be conserved in the form of heat and radioactivity. One can assume then that living bodies which are most of the time far away from sources of energy prioritize energy accumulation over radiation. Living bodies farther away from sources of radiation will pri-

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oritize tidal interactions and other energy sources. Most likely candidates for living bodies are thus energetic bodies (but possibly not in the extreme, although extremophiles likely exist on any scale and planetary extremophiles could even contain relatively isolated more habitable areas) entangled with other living bodies.

The intensity of tidal heating is proportional to the square of the orbital eccentricity[22], being zero in a circular orbit and reaching a maximum in a parabolic orbit, and inversely proportional to the size of the orbit. One might consider a simple case of tidal heating between two bodies, but this is generally an n-body problem and may include many entangled bodies.

In case of celestial bodies, gravitational entanglement is a primary entanglement, in terms of energy exchange, with orbital resonance being the secondary component.

In an example, one might consider large bodies of the main asteroid belt - Vesta, Pallas, Ceres and Hygiea. Of these, Ceres is a dwarf planet, others are probably remnants of dwarf planets.

When considering entanglements, these can be positive (sustaining life/habitability) and negative (destroying life/habitability) so both number and type of entanglements must be considered.

Assuming Ceres is alive and others are remnants of once living dwarfs, the number of positive entanglements, accumulating and accumulated energy should be proportional to the probability of life in these bodies. Being relatively far from sources of significant radiation, these are probably not the primary sources of energy here, neither are tidal interactions (resonances) with other bodies due to great distances (mainly from the Sun and Jupiter). However, since I hypothesize periodic perturbations in the Solar System (chapter *The cycles*) coupled with changes in energy levels of large scale gravitons, it's useful to analyse orbital eccentricities and resonances as these should be correlated with these changes.

Ceres seems to [still] be an active world so where does the energy come from if radiation and tidal heating can be ruled out? It is also too small to still be powered by primordial residual heat (energy accumulated during formation, whether gravitational or in the form of radioactive isotopes). The answer probably is in the residual energy, but not one accumulated during formation, rather relatively periodically - probably with the ends/beginnings of, later hypothesized, 2nd order cycles (periods of ≈26 million years). Changes in energy levels of large scale gravitons, hypothesized to occur at these times, can produce significant energy - in multiple ways. Temporary orbital disturbance can produce significant tidal energy while gravitational disturbance of local space can even induce radioactivity. Assuming eccentricity is maximized at these times and with eccentricity decreasing with accumulation of tidal energy, one can also assume that at the end of the cycle, eccentricity should be at its minimum. Having lowest eccentricity of the four bodies, Ceres may have accumulated most energy but this low eccentricity may also signal the end of the cycle when its activity should be at its minimum.

> Note that, as Solar System barycentre is generally not in the Sun's centre, bodies can be in orbital resonance with the Sun as well. Since orbital motion of the Sun about the barycentre is mostly influenced by Jupiter, orbital period of Jupiter is the dominant component of Sun's orbital period. Resonance with Jupiter could thus be considered as resonance with the Sun as well.

Considering orbital period entanglements with planets, Ceres is also the one with least entanglements (resonances), whether active (between semi-major associated periods exclusively) or potential/passive ones (eg. between a period calculated for perihelion of one body and a period calculated for aphelion of the other body), as shown in Table 2.

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Here, two periods are considered entangled (in resonance) if the difference between the result of division of periods (longer one divided by the shorter one) and rounded result of this division (integer) is less than 0.1, with no libration, eg. perihelion precession, taken into account. Longer resonances (multiples of longer periods) have not been taken into account as well. Note that, since these resonances are not perfect, bodies tend to go out of resonance over time, however, resonances may be periodically re-established as well with 2nd order cycles. This re-establishment of resonances may have been observed in planetary systems already[23].
Note that orbital resonances of planetary bodies in general are not surprising if the orbitals represent discrete (quantized) energy levels for gravitons. If planets form with the collapse (localization) of large scale gravitons, all of them could be in resonance at the time of formation.

	Mercury	Venus	Earth	Mars	Jupiter	Saturn	Uranus	Neptune
Vesta (a)	a		a	a	a		p	s
Vesta (p)	s	a	a	p	a			a
Vesta (s)	s	p		s	p			a
Pallas (a)	p			a	a			
Pallas (p)	s	as	a	p			as	s
Pallas (s)	p					a	p	
Ceres (a)			a					s
Ceres (p)	s		as		s	a		ap
Ceres (s)	p					a	p	
Hygiea (a)				ap	a	a	p	p
Hygiea (p)						a	s	p
Hygiea (s)		as		s	p		ps	a

a = aphelion
p = perihelion
s = semi-major axis

Table 2: Orbital period entanglements between main dwarfs and planetsZero active resonances in Ceres could also be interpreted as a signal that it had exhausted its energy sources and is living on reserves. If other three bodies are dead, their entanglements are probably negative - with no coupled large scale gravitons and associated dark matter, resonances are probably contributing to decay (decomposition) of these bodies, even though they are beyond Roche limits of entangled partners (note however, that the absence of dark matter and effective decrease of local G could be interpreted as increase in Roche limits) - by making them more sensitive to impacts. Possibly negative entanglement might have contributed to significant oblateness of Vesta and Pallas (result of impacts).

Oblateness of Vesta and Pallas is particularly interesting - even though they are not significantly impacted by tidal interactions (rather by asteroid impacts) the end result (oblateness) is relatively equivalent and can be correlated with resonances (entanglements) as well. Dead bodies generally deform and decay. A body with no atmosphere and no coupled large scale graviton(s) (and associated dark matter) is more sensitive to asteroid impacts. These impacts, as well, probably occur periodically with 2nd order cycles.
Table 2 is also very interesting. Hypothesized symmetry and entanglement between inner and outer planets (more explored later) seems to be evident here as well. Considering number of entanglements and/or entangled entities, Vesta shows symmetry between Mars and Jupiter, Mercury and Neptune, Pallas shows symmetry between Venus and Uranus, Mars and Jupiter, Ceres shows symmetry between Mercury and Neptune, Earth and Saturn, while Hygiea reveals symmetry between Mars and Jupiter. Overall, symmetry between Earth and Saturn is also

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noticeable in the dominance and number of aphelion (a) entanglements. Interesting also is the inversion between Earth and Saturn, outermost dwarf (Hygiea) lacks entanglements with Earth, while innermost (Vesta) has no entanglements with Saturn. This inversion seems to be present in other entangled pairs as well.
Conventional theories on planetary formation cannot explain this, but this is another evidence in favour of the formation hypothesis presented in this work.
Interestingly, the only terrestrial planet with no active resonances is Earth (it does have a passive resonance with Ceres), so this may be common for terrestrial planets in development (still cultivating life on surface).

Hygiea was probably oblate as well, its current spherical form is probably the result of a re-accumulation process following an impact, as others have hypothesized already[24]. Impact may have resulted in significant mass loss of Hygiea (its mass is one order of magnitude lower than the mass of Ceres), however, it cannot be excluded that Hygiea has been recently reanimated (coupled with a large scale graviton) and is acquiring mass through impacts in the process of body development. Recently established hydrostatic equilibrium could go in favour of this interpretation.

Note however, that due to relativity in causality, spherical form can precede graviton coupling.

Resonance in temporal periods may be important for energy exchange, but what about spatial resonances?

Note that, in CR, time is commonly interpreted as a dimension of space (subspace) on particular scale.

These may be important for information exchange which is certainly more important for living bodies than for the dead ones. And here, using orbital circumference instead of a period, Ceres has the maximal number of entanglements while Hygiea has minimal.

This was determined equivalently to the entanglement of periods, the only difference being the division of orbital distances (perihelion, aphelion, semi-major) rather than periods.

Although correlation of orbital momenta with communication should not be surprising, it is unlikely for orbital (or spin) angular momentum to be used for communication itself.

Regardless of its nature (conscious/non-conscious) on this scale, communication within the planetary system is most likely to occur through variable electro-magnetic fields and charged particles. Communication between planetary systems may occur through absorption and emission of large scale gravitational waves (during energy level changes of large scale gravitons).

However, dead bodies could remain on the same orbit for significant time (eg. Ceres and Pallas have equal semi-major axes but Pallas is here assumed to be dead), thus, considering orbitals alone is certainly not enough to distinguish between living and dead bodies. Presence of a variable magnetic field on the other hand is probably a good indicator of life in planets and dwarf planets but this field may not be present on the surface for the whole lifespan of such bodies (I believe magnetic fields are generally present near the core of these bodies and only strengthen and extend beyond the surface during development).

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Considering that the semi-majors of Pallas and Ceres are equal, possibly more important for communication is the entanglement involving only perihelia and aphelia. Here Ceres is again on top, however, Pallas is just behind. If one further assumes that entangled properties must be anti-aligned (eg. perihelion/aphelion entanglement) Ceres is a more convincing *winner*. Hygiea remains in the last place.

Shape of bodies is another thing to be considered. With current conditions on U_1 scale, [large scale components of] living bodies on this scale should be elliptical (spherical) or torus(ring)-like. Considering all this, Ceres is most likely to be [still] alive.

Note that Ceres is also distinct by its size. The three other bodies are roughly equal in size, but twice smaller than Ceres. If Ceres is the only one alive and all belong to same species, this suggests that dwarf planets either contract or lose outer layers (not surprising with multiple gravitational maxima) at the time of death. In any case, change in shape and size should be normal for death events.

Another component to be considered is the amount of dark matter. If the amount of dark matter in a body is greater than standard matter by orders of magnitude, the body should probably be interpreted as a relatively naked soul, and a relatively non-living or dormant system on its own. Note that souls (gravitons) can oscillate in scale/mass. Oscillation correlated with tidal interactions should be interpreted as continuous oscillation about the mean value of an energy level. However, at times of strong evolution, with the absorption/emission of large scale gravitational waves, U_1 gravitons can change energy levels (in discrete jumps) and this then becomes another way for celestial bodies to acquire energy - transition between energy levels can produce heat through gravitational disturbance and effect on radioactivity. Both, temporary accelerated decay and inverse-decay of elements are possible (through influence on [coupling of] primary neutrinos/anti-neutrinos). Thus, energy level transitions could be interpreted as charging or discharging events. Note, however that, even if graviton transitions may be relatively discrete, discharging can proceed continuously on smaller scale (different scales of energy are relatively entangled and this relativity here is manifested in time dilation). Relative periodicity should probably exist in the transitions. As noted before, extreme eccentricities (low/high) could also signal the ends/beginnings of cycles. Here, minimal eccentricity may be proportional to the scale of bodies although its non-dimensionality suggests otherwise. In case of Jupiter, its low orbital eccentricity could signal the end of a, later hypothesized, 1st order cycle of the Solar System.

Are sudden changes of eccentricity of orbital bodies possible? Yes, but it all depends on the ratios between img and real mass and how fast do changes in graviton energy levels change the corresponding dark matter mass distribution. Assuming dark matter responds relatively instantaneously, energy [disturbance] carriers affecting real mass travel at the speed of standard light.

If, for example, Sun's img mass is significantly greater than real mass, a change in energy levels of its constituent large scale gravitons will very quickly and significantly affect other bodies in the Solar System. If this is a temporary change (part of oscillation) it can be interpreted as a reset of orbital eccentricities to maximum values. As for the Sun, this would be manifested in sudden but temporary changes in radius and luminosity. Changes of this kind are probably relatively synchronized with energy level changes in living orbiting bodies as well (which probably generally happen more frequently). However, if img mass in these bodies is significantly lower than real mass (as hypothesized for terrestrial planets), the effect of local energy level changes on the body (size, activity) will not be as great although it should be noticeable (even over shorter timescales, and probably should be correlated with both extinctions and proliferation of life).

All living celestial bodies are then probably oscillating in radius/mass, although in varying amounts and over varying timescales (oscillation in stars and gas giants should be more pronounced than in terrestrial planets, for example).

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5.1.5. Dwarf planets as localized neutrinos

If outer planets are mostly localized excited electrons (muon/tau), dwarf planets in the main asteroid belt should probably be localized muon/tau anti-neutrinos. Assuming Ceres represents a typical living muon anti-neutrino (although tau may be more appropriate), the mass of the standard (U_0) muon anti-neutrino (or neutrino) then is:

$$M_{\nu_\mu} = \frac{M_C}{M_N} M_\mu = 1.725846 \times 10^{-33}\, kg$$

M_C = Ceres' mass = 9.38392 * 10^{20} kg
M_N = Neptune mass = 1.02413 * 10^{26} kg
M_μ = standard muon mass = 1.883531627 * 10^{-28} kg

Assuming mass ratios between leptons and their neutrino partners are equal between all three pairs, standard electron neutrino mass is:

$$M_{\nu_e} = \frac{M_{\nu_\mu}}{M_\mu} M_e = 8.346765 \times 10^{-36}\, kg$$

M_e = standard electron mass = 9.10938356 * 10^{-31} kg

> Note that this is the mass of a [primary] standard electron neutrino in the Solar System equivalent state, its rest mass should probably be somewhat lower than this.

Indeed, experiments done so far, confirm this is the [order of] mass of localized electron neutrinos[25].

From this then, one can obtain the mass of a large scale (U_1) electron or a positron, it is about 0.5 * 10^{24} kg, on the order of mass of terrestrial planets. Mercury and Mars are in a very good agreement with this mass. Masses of Venus and Earth are about 10 times higher and probably represent somewhat heavier particles, they are in excellent agreement with the masses of down quarks (the mass of the standard down quark is about 10 times the mass of the standard electron) or pairs of up quarks.

If Neptune and Uranus represent muon [electrons], Jupiter seems to represent a tau [electron]. Assuming 6% of Jupiter mass represents kinetic energy (as elaborated later), Jupiter's rest mass is 1777 * 10^{24} kg, this translates to a standard tau [electron] mass of about 1777 MeV/c^2, exactly as determined experimentally.

Coincidence? Hardly.

5.1.6. Alternative Configuration

Mercury has somewhat lower mass than 0.511 * 10^{24} kg, while Mars has somewhat higher mass than 0.511 * 10^{24} kg (expected mass for a positron equivalent). This may be a consequence of horizontal mass oscillation (oscillation within the order of magnitude), however, other interpretations may be more likely. Mercury could be a dead planet at this point and it may have been originally coupled with Mars. Original Mars' mass would then be about 2 x 0.511 * 10^{24} kg. This would then imply that Mars is now in 1e state and the whole Solar System is in an unstable state, for which 10-Be configuration of states may be a more appropriate interpretation.

Jupiter and Saturn would then probably belong to the same shell (1s), Uranus and Neptune to another shell (2s). Mars is in -1s, transitioning from 2e to 1e, while Venus and Earth belong to -2s. Negative sign here indicates symmetry, eg. 1s and -1s states are symmetric relative to the main asteroid belt (fossilized event horizon).

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5.1.7. Mass Oscillation, Symmetry and Superposition

If the Solar System's maximal planetary mass (Jupiter) represents tau [electron] while minimal planetary mass (Mercury) represents electron (positron), the two states represent eigenstates of electron (positron) mass oscillation as well. If logarithmic superposition of two masses is considered as the reference mass frame, the lower eigenstate mass can be considered negative (a relative Dirac's hole), the higher positive. Superposition is then the lowest energy state of the system (pair), where both particles have equal masses and 0 relative mass. This should then be the most likely state, and masses of exoplanets should clump about the mass of the superposition, or half the mass of superposition if it is not strongly localized (shouldn't be in case of pairing of inner and outer planets, but may be in case of pairing of particles in 2e states).

Mass of the superposition is:

$$M_S = 10^{\frac{1}{2}\left[log(M_M)+log(M_J)\right]} = 2.5 \times 10^{25}\, kg = 4.191\, M_\oplus$$

M_M = Mercury mass = 0.330 * 10^{24} kg
M_J = Jupiter mass = 1898.190 * 10^{24} kg

One half of this (representing single planet in 1e) is 1.25 * 10^{25} kg = 2.095 $M_\oplus$.

Interestingly, this is not only in agreement with the transition point between terrestrial and Neptunian (ice) worlds (2.0±0.7 $M_\oplus$[26]) but the two masses indeed represent the clumping points of exoplanetary masses.

Masses of detected and confirmed exoplanets, up to 1 Jupiter mass, are shown in Figure 7.

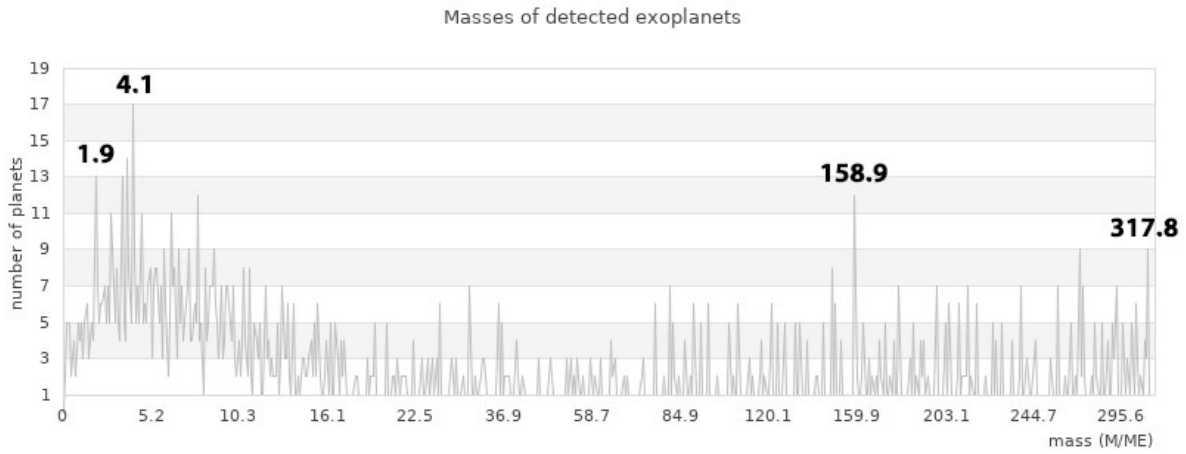

Figure 7. Masses of detected exoplanets (data source: The Extrasolar Planets Encyclopaedia[27])

Evidently, not only are masses clumping about the superposition, but the two peaks corresponding to calculated masses are evident as well.

Note that, if hypothesized Jupiter's rest mass (1777 * 10^{24} kg) is used in the equation above, the agreement with the observed peaks gets even better.

Other peaks are interesting as well. The peak at 317.8 $M_\oplus$ (Earth masses) is exactly equal to Jupiter's mass. This is conventionally unexpected, but not surprising if Jupiter is the tau [electron] equivalent. The peak at 158.9 $M_\oplus$ can be explained by down quark oscillation, assuming standard down quark mass of 4.588 MeV/c^2 (4.588 * 10^{24} kg on U_1 scale), and oscillation equivalent to lepton oscillation (conserved ratios between mass eigenstates) as hypothesized in CR, the 158.9 $M_\oplus$ would represent a muon down quark equivalent. Note that the mass of Saturn can be explained similarly.

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Assuming standard up quark mass of 2.7475 MeV/c^2 (2.7475 * 10^{24} kg on U_1 scale), the muon up quark equivalent mass is 568.32 * 10^{24} kg (equal to Saturn's mass, which here probably represents muon up quark antimatter equivalent).

Note that standard muon electron mass is 105.7 MeV/c^2, which should then be 105.7 * 10^{24} kg on U_1 scale, explaining mass of Neptune (which is only slightly lower, at 102 * 10^{24} kg). Uranus probably also represents a muon electron, albeit possibly dead (leftover real mass) or in transition between different mass eigenstates (which also explains its strange obliquity to orbit). It is also possible that Uranus lost some of its real mass with collision.

> Note that there are alternative explanations. Eg. if Saturn is interpreted as a particle in tau eigenstate, its electron eigenstate is 0.1634 * 10^{24} kg, half of Mercury's mass. Mercury could then represent a 2e configuration of such particles.
> Note also that the obvious entanglement between the Solar System U_1 particles and local standard U_0 particles suggests that perhaps in other planetary systems masses of standard particles may be different (wherever the U_1 scale particles are different). In that case, our interpretation of other planetary systems is biased and it would be appropriate to consider every planetary system as a distinct universe.

5.2. EH Operator Validation

> The following is an attempt to validate the EH operator defined in CR. However, this is completely unnecessary for validation of main CR postulates and hypotheses.
> Masses between discrete vertical energy levels have already been calculated in CR. This is simply an attempt at alternative calculation of these masses.

If the carbon atom at appropriate density/pressure is the Solar System equivalent, carbon photon is the carbon atom of lower scale (vertical energy level).

One can thus calculate the [average] mass of photons or photon scale particles, eg. electron half-photon:

$$\frac{\text{Neptune mass}}{\text{10C outermost electron mass}} = \frac{\text{10C outermost electron mass}}{\text{e half-photon mass}}$$

$$\text{e half-photon mass} = \frac{(\text{ 10C outermost electron mass })^2}{\text{Neptune mass}} = 8.102 * 10^{-87}\ kg$$

However, obtained half-photon mass above assumes linear progression of discrete states of scale invariance (vertical symmetry, distance in scale from U_0 to both U_1 and U_{-1} is equal), which is against the postulates of CR - although this can be the mass of a half-photon in another time (another cycle state).

> There can be no symmetry between current space and time, but due to cyclic nature of a universe and with cycle states being inverse of each other, symmetry would exist between past and future dimensions (space and time dimensions exchange in a way that current space is symmetric with previous space).

Thus, CR predicts asymmetric invariance with exponential progression of discrete vertical states. Using this prediction, the masses of standard photon [scale] electron equivalent (half-photon) and

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carbon graviton have been calculated already in CR (yielding 9.10938356 * 10^{-73} kg for the [electron] half-photon mass, 1.663337576 * 10^{-68} kg for the half-graviton mass), but the values can also be obtained using EH operator.

Using EH factor 6/4 on the orders of magnitude of mass distances:

$$log_{10}\left(\frac{M_{U_1}}{M_e}\right) = EH_{6/4}\left[log_{10}\left(\frac{M_e}{M_n}\right), log_{10}\left(\frac{m_{U_1}}{M_n}\right)\right]$$

gives M_n = 3.910613743 * 10^{-68} kg for the mass of graviton in current cycle state, and m_{U_1} = 6.06011796 * 10^{19} kg for the mass of Neptune in current cycle state. Neptune mass is obviously not in agreement with current total Neptune mass (unless one considers scaling of the gravitational constant G), however, total mass is the sum of real and img mass and this could be interpreted either as real or img mass component of total mass (see next chapter, where one mass component of Neptune is calculated to be approximately on the order of 10^{20}).

Here, M_p = M_n / m_{U_1} = 6.453032383 * 10^{-88} kg could be interpreted as the mass of carbon half-photon in inverse cycle state.

Mass of a half-photon can now be obtained from M_n:

$$M_p = \frac{M_e}{^{10}C \text{ atom mass}} M_n \approx M_n * 10^{-5}$$

Note that, in current state the ratio of magnitude distances from electron to graviton and from electron to U_1 electron (Neptune) is:

$$log_{10}\left(\frac{M_e}{M_n}\right)\left[log_{10}\left(\frac{M_{U_1}}{M_e}\right)\right]^{-1} = \frac{4}{6}\frac{5}{5} = \frac{2}{3}$$

So, for the inverse state (4p6n):

$$log_{10}\left(\frac{M_e}{M_n}\right)\left[log_{10}\left(\frac{M_{U_1}}{M_e}\right)\right]^{-1} = \frac{6}{4}\frac{3}{7} = \frac{9}{14}$$

$$log_{10}\left(\frac{M_{U_1}}{M_e}\right) = EH_{4/6}\left[log_{10}\left(\frac{M_e}{M_n}\right), log_{10}\left(\frac{m_{U_1}}{M_n}\right)\right]$$

Respecting conditions for the EH inverse, the following values are obtained: mass M_e = 3.910613743 * 10^{-68} kg of [^{10}C outermost] electron equivalent in U_{-1}.4p6n (= M_n in U_0.6p4n ≈ graviton neutrino mass), M_{U_1} = 9.10938356 * 10^{-31} kg for the mass of Neptune equivalent in U_{-1}.4p6n (= M_e in U_0.6p4n), M_n = 3.719162593 * 10^{-92} kg for the mass of graviton in U_{-1}.4p6n, m_{U_1} = 4.18129939 * 10^{-36} kg for the mass of Neptune in U_{-1}.4p6n (= m_e in U_0.6p4n ≈ electron neutrino mass).

Note that here, mass of the photon is obtained from:

$$M_p = \frac{^{10}C \text{ atom mass}}{M_e} M_n = 6.791044478 * 10^{-88}\, kg$$

suggesting inverted roles of photon and graviton.

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5.3. Outermost Angular Momenta and c_1 Confirmation

With angular momentum conserved between the Solar System equivalent at U_0 scale (here assumed to be a ^{10}C atom at equivalent scaled density/pressure) and the Solar System, one may attempt to calculate angular velocity of the outermost electron in that equivalent. From this then, with c_0 equal to standard speed of *light* (c), c_1 can be obtained. Conservation of angular momentum gives:

$$L = mvr = \frac{v}{r}mr^2$$

$$M_{U_1}\, v_{U_1}\, r_{U_1} = M_{U_0}\, v_{U_0}\, r_{U_0}$$

$$v_{U_0} = \frac{M_{U_1}\, v_{U_1}\, r_{U_1}}{M_{U_0}\, r_{U_0}} = 3.920242676 * 10^{82}\ \frac{m}{s}$$

M_{U_1} = Neptune total mass = 1.02413 * 10^{26} kg
v_{U_1} = Neptune orbital velocity = 5430 m/s
r_{U_1} = Solar system charge radius = Neptune orbital radius = 4495.06 * 10^9 m
M_{U_0} = U_0 scale Neptune equivalent total mass = 9.109182827 * 10^{-31} kg (see Table 1)
v_{U_0} = U_0.Neptune equivalent orbital velocity
r_{U_0} = ^{10}C charge radius = 70 * 10^{-12} m

The above gives the outermost electron velocity in case of conversion of both mass and orbital radius into angular velocity, for a point energy in constant vacuum density. The result is, of course, unrealistic due to disregard for relativistic effects.

Mass M_{U_0} must have been relativistic before the [real] speed limit was reached (vertical energy level changed) and it became stabilized as mass M_{U_1}.

> Since vertical energy levels are discrete (just like horizontal energy levels in the atom), one can assume that inflation of an U_0 system resulting in a stable U_1 system occurs only if there's sufficient energy to reach the discrete U_1 level. The speed at which this occurs can then be considered the real speed limit on U_0 scale, rather than the standard speed of light. Here, however, it is the graviton that is inflating and this speed can be much larger than the standard speed of light (c).

Thus, in order to get the orbital velocity just before the [vertical] energy level change, mass on one scale must be equalized with relativistic mass on another ($M_{U_1} = M_{U_0}$), this gives:

$$v_{U_0} = \frac{v_{U_1}\, r_{U_1}}{r_{U_0}} = 3.486882257 * 10^{26}\ \frac{m}{s}$$

With real mass not participating in inflation (gravitons inflate naked), this velocity is effectively the velocity of space, making it potentially valid even in the context of General Relativity (GR).

Using conservation of energy and non-relativistic standard graviton mass (rest mass), one can now obtain the velocity of the outermost electron in the standard (^{10}C) equivalent of the Solar System:

$$E_{-1} = E_0$$

$$\rho_{vac} * V_{U_0} * {v_{U_0}}^2 = M_{U_0} * v^2$$

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$$\rho_{vac} = \text{mean vacuum energy density} = 9.9 * 10^{-27}\ \frac{kg}{m^3}$$

$$\rho_{vac} * \frac{4}{3}\pi(R_{U_0})^3 * {v_{U_0}}^2 = M_{U_0} * v^2$$

$$2.842208873 * 10^{-19} = M_{U_0} * v^2$$

R_{U_0} = U_0.Neptune radius = 3.834298096 * 10^{-16} m (see Table 1)

This gives v = 5.585837356 * 10^5 m/s, for the velocity of the outermost electron of a standard ^{10}C atom [in Solar System equivalent state].

Assuming inflation is stimulated by annihilation and considering conversion of electro-magnetic potential to gravitational potential, the inflating graviton here probably represents a superposition of two standard photons. The product of density and volume on the left of the equation (2.337660431 * 10^{-72} kg) should then roughly represent the mass of two standard photons localized to outermost electron radius in ^{10}C in Solar System equivalent state. Indeed, it is roughly equal to previously calculated photon rest mass in CR (1.821876712 * 10^{-72} kg).
Using momentum conservation, one can now calculate photon mass relative to the standard (conventionally presumed absolute) reference frame, where its speed is limited to c = c_0 = 2.99792458 * 10^8 m/s:

$$p = mv = mv_{U_0} = 2.337660431 * 10^{-72}\,kg * 3.486882257 * 10^{26}\,\frac{m}{s} = m_0\,c_0$$

$$m_0 = \frac{p}{c_0} = \frac{p}{c} = 2.719 * 10^{-54}\,kg$$

or, using photon rest mass obtained in CR:

$$m_0 = 2.119 * 10^{-54}\,kg$$

This mass is in agreement with localized photon mass obtained from recent experiments[28].

To confirm validity of the result one can calculate this velocity differently. Introducing the term *total velocity* (v_{tot}) as the sum of electron's spin and angular velocity.

Per CR postulates, every spin momentum must be an orbital momentum. If one assumes that, once captured by the atom, the outermost electron self-orbital (spin) momentum becomes the nucleus-orbital momentum, in ground state (with quantum number l = 0) thus, total momentum of the electron is:

$$mr^2\omega_{tot} = \frac{1}{2}\hbar$$

$$v_{tot} = r\omega_{tot} = \frac{1}{2}\frac{\hbar}{mr}$$

Using m = $M_{U_0} \approx M_e$ and r = r_{U_0}, this gives v_{tot} = 8.269308487 * 10^5 m/s. Once localized, this momentum in the atom is further divided between orbital and spin momentum. With the ratio between spin and orbital velocities equal to Neptune spin/orbital velocity, one obtains electron orbital velocity:

$$v = v_{U_0} = \frac{v_{tot}}{1 + \frac{s_{U_1}}{v_{U_1}}} = 5.550351679 * 10^5\ \frac{m}{s}$$

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s_{U_1} = Neptune spin velocity = 2660 m/s
v_{U_1} = Neptune orbital velocity = 5430 m/s

The result is obtained from the following:

$$v_{tot} = v_a + v_s \tag{Q1.2}$$

$$M_e\, v_{tot}\, r_a = \frac{1}{2}\hbar \tag{Q1.3}$$

Splitting the momentum in scalar space:

$$m_{re} v_a r_a + m_{img} v_s r_s = M_e v_{tot} r_a$$

$$\frac{m_{re}}{M_e} v_a + \frac{m_{img}}{M_e} v_s \frac{r_s}{r_a} = v_{tot} \tag{Q1.4}$$

and assuming:

$$m_{re} = M_e$$

from Q1.2 and Q1.4, follows:

$$m_{img} = M_e \frac{r_a}{r_s} \tag{Q1.5}$$

M_e = standard electron mass = 9.10938356 * 10^{-31} kg
r_a = r_{U_0} = orbital radius of the outermost ^{10}C electron = 70 * 10^{-12} m
r_s = spin radius of the outermost ^{10}C electron

Obviously, Q1.2 is satisfied with $r_s = r_a$.
However, it would now be interesting to see what happens if Q1.2 remains satisfied with the collapse (localization) of the spin momentum ($r_s < r_a$).
In that case, masses of orbital and spin momenta must be different. With orbital mass equal to standard electron mass, spin mass m_{img} is:

$$m_{img} = M_e \frac{r_a}{r_s} = 1.66303410 * 10^{-25}\, kg = 9.99817551 * {}^{10}C \text{ nucleus mass}$$

$$m_{img} \approx 10 * {}^{10}C \text{ nucleus mass} \approx 93.3\, GeV/c^2$$

r_s = R_{U_0} = spin radius of the outermost ^{10}C electron = 3.834298096 * 10^{-16} m

A certainly interesting result. Note that this is simply conversion of one component (radius) of the momentum for the other (mass).
Note also that the original assumption of M_e being equal to standard electron rest mass could be wrong. If the radius of a localized free electron is smaller than r_a, the value of M_e could be significantly lower than the standard electron mass (as mass would be exchanged for radius). If one assumes then that m_{img} here is actually equal to standard electron rest mass, M_e becomes 4.98972743 * 10^{-36} kg.
The r_s = R_{U_0} may be interpreted as the radius of a localized standard electron, however, outside of the atom, further localization may be possible. Assuming localization is quantized and that the above conversion ratio is conserved with additional localization of this electron, one obtains what may be interpreted as the rest radius of a free localized electron:

$$r_{s_e} = \frac{r_s}{r_a} r_s = \frac{{r_s}^2}{r_a} = 2.100 * 10^{-21}\, m$$

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If above is interpreted as the rest mass radius, the rest charge radius should then be:

$$r_{c_e} = \sqrt{2} r_{s_e} = 2.970 * 10^{-21}\, m$$

Obviously the charge of the electron has to be spinning faster than light:

$$v = \frac{1}{2mr_{c_e}}\hbar$$

For m = 9.10938356 * 10^{-31} kg (which might seem wrong due to separate mass radius, however, if free electron is not naked, acquired real mass can be the charge mass shielding the mass of the graviton), this gives v = 9.745 * 10^{15} m/s.
This speed is the speed limit for particles in (or, entangled with) electron's space and it suggests that acquired real mass is of U_{-1} scale or lower, making the spin momentum of the electron effectively the rotation of space, relative to standard scale. The quantization of the imaginary mass with ^{10}C nucleus mass may be interpreted as confirmation of the carbon-like nature of the Solar System equivalent on the standard scale, however, the magnitude of exchange of polarized (electro-magnetic) potential for neutral gravitational potential suggests the Solar System may be a scaled Bose-Einstein condensate of multiple atoms.
Note that the obtained mass (93.3 GeV/c^2) is equal to predicted W boson (or electron-neutrino coupling) mass in some Electroweak models[29]. Did the system inflate in the process of β decay? Or does this signal mass oscillation/temporary coupling?
From the calculated mass one can now obtain [initial] real component of Neptune's total mass:

$$\frac{m_{re}}{m_{img}} = \frac{m_{re_1}}{m_{img_1}} \approx \frac{m_{re_1}}{M_{U_1}}$$

$$m_{re_1} \approx \frac{M_e}{m_{img}} M_{U_1} = 5.60974244 * 10^{20}\, kg$$

In the above, it was assumed that charge radius is equal to mass spin radius (r_s) of the gravitational maximum. However, real charge radius is smaller.
If one assumes Earth's mass was initially condensed to the inner core and inner core radius was the radius of the associated large scale graviton(s), the gravity at that radius was equal to the Sun surface gravity (274 m/s^2), and charge radius of Earth must be at the radius where gravity is equal to half this value (this will be validated later):

$$r_c = \sqrt{GM\frac{2}{274}} = \sqrt{\frac{GM}{137}} = 1705704\, m \qquad \text{(Q1.6)}$$

M = Earth's total mass = 5.9723 * 10^{24} kg
G = G_0 = standard gravitational constant = 6.674 * 10^{-11} m^3/kgs^2

Using Q1.5, one can now calculate the initial real mass component of the Earth:

$$m_{re} = \frac{r_c}{r_a} m_{img} \approx \frac{r_c}{r_a} M \approx 6.81 * 10^{19}\, kg \qquad \text{(Q1.7)}$$

r_a = Earth's orbital radius = 149.6 * 10^9 m

This initial real mass will be further validated later. However, obtained charge radius is, as it will be shown later, induced charge radius, rather than the primary or primordial charge radius.

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Note that real mass is, per definitions in CR and applied to this case, standard observable matter, while img mass is the mass of a large scale graviton and associated dark matter.
In calculations above real mass was associated with orbital angular momentum, while img mass was associated with spin angular momentum. This may be valid for some bodies, but for some bodies the inverse is likely true. I believe the inverse is certainly valid for terrestrial planets (in other words, their souls are much less massive than their bodies), while in black holes the img component may generally dominate (possibly in stars and gas planets as well). Thus, calculated real mass component of Earth is actually the img component of its mass (implying Earth's gravitational well is over-capacitated), however, this can also be interpreted as the initial real mass component (as it was interpreted here) or real mass at full capacity (where real mass is equal to img mass in value).
It will be shown later that Earth's mass relative to U_1 scale is about $6.95 * 10^{19}$ kg, very close to here obtained mass.

Two results for the velocity are in good agreement. Small difference can be attributed to uncertainty in vacuum energy density - a value of $9.79 * 10^{-27}$ kg/m^3 would yield the correct value.
From this one can now obtain the speed of *light* on U_1 scale:

$$\frac{v_{U_0}}{c_0} = \frac{v_{U_1}}{c_1}$$

$$c_1 = \frac{v_{U_1}}{v_{U_0}} c_0 = 2.93291874 * 10^6 \frac{m}{s}$$

The result is in agreement with c_1 previously obtained from relativistic energy of the Solar System ($2.93 * 10^6$ m/s).

5.4. The extent of validity of c_1

The speed c_1 ($2.93 * 10^6$ m/s) has been calculated as the relevant quantization constant and speed limit for particles of Sun's scale in local space. But what is the extent of that space?

Any private space should be entangled with a specific gravitational maximum in the form of a graviton. The Sun should be orbiting this maximum. Therefore, its centre is likely to be the galactic centre, while its radius can be inferred from motion of stars - stars orbiting close to this maximum should orbit at average velocities close to c_1.

Note that, according to CR, all velocities are average values of oscillation. Therefore, in eccentric orbitals, stars can exceed c_1 at periapsis - this is not forbidden, but the average (semi-major) velocity should not.
There are two interpretations of this - either the *orbit* (shape) of the maximum itself is eccentric or the star is in [properly scaled] thermal motion relative to the maximum - oscillating perpendicularly to maximum's surface (the gravitational maximum generally has a torus shape).

According to measurements, stars with such velocities are concentrated at the galactic centre, near the supermassive black hole Sagittarius A* (Sgr A*). It appears that there are no stars in Milky Way orbiting at velocities $\geq c_1$. In example, as of August 2019, the fastest star orbiting Sgr A* is S62[30].

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For the enclosed mass M of 4.15 * 10^6 $M_\odot$[31], its Keplerian orbital velocity at determined semi-major (r = 740.067 AU = 1.10714 * 10^{14} m) is:

$$v = \sqrt{\frac{GM}{r}} = 2.23 * 10^6 \frac{m}{s}$$

G = standard gravitational constant = 6.674 * 10^{-11} m^3/kgs^2

As of 2020, S4711 is the star with fastest semi-major velocity[32]: 2.44 * 10^6 m/s, still under 2.93 * 10^6 m/s.

This is a strong evidence for c_1 being the maximum velocity for all stars in Milky Way. The radius of the associated graviton should thus be the radius of the event horizon for these stars. For mass M of 4.15 * 10^6 $M_\odot$, this radius (semi-major) is:

$$r = \frac{GM}{{c_1}^2} = 6.41541 * 10^{13}\, m = 428.838\, AU$$

Plausible locations for large scale gravitons of galactic space are radii of maximal velocities of stars in a galaxy. However, if angular velocity of stars is much lower than the expected velocity of the maximum, any such extreme is unlikely the location of the graviton. However, these stars could be fossils of the body of matter previously bound to a graviton - which had collapsed. Since collapse must include a reversal of momentum, the spiral galaxies could be the result of collapse through discrete energy levels.
Consider the rotational profile of the Milky Way galaxy in Figure 8 (right). Assume that the gravitational maximum was initially located at ≈13.33 kpc, at which point the stars at that location had 10 times higher angular velocities, when the maximum (graviton) started collapsing:

1. the reversal of momentum slowed down the stars at the location 10 times,
2. another reversal occurred at ≈7.33 kpc restoring the velocity of the graviton, accelerating and igniting local stars,
3. another collapse, slowing down the stars 10 times,
4. restoration at ≈1.33 kpc, acceleration then reversal and deceleration of stars 10 times,
5. ... possible intermediate levels ...
6. restoration at 428.838 AU, stars accelerated.

The above assumes inflation/deflation is simultaneous with a change in radii. This may not be true. It is also unlikely for velocity to remain constant over all [scales of] radii.
Thus, the initial velocity of the gravitational maximum may have been 10 times lower than c_1, it only increased 10 times once the radius decreased to smaller scale (< 1 kpc).
Note that constant velocity across different radii [with non-changing gravitational constant] implies angular momentum was not conserved (some quanta have radiated away or perhaps collapsed to smaller spin momenta - forming future stars, etc.). The primary question then is - is the gravitational maximum currently located at 428.838 AU? And is there a standard supermassive black hole at all in the centre of the Milky Way [or any other galaxy]? In other words, is every supermassive black hole simply a large scale graviton with an escape velocity greater than the speed of standard light?

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The profile of the Milky Way galaxy suggests that velocity of the maximum remains constant with collapse (the GM product and radius change equally) at least to some extent, while speed of stars about 428.838 AU suggests the gravitational maximum is still there. After all, assuming the maximum had collapsed to the radius of a hypothesized supermassive black hole (≈0.1 AU radius), the Sun and other stars should conform to the speed limit of $c = c_0 = 2.99792458 * 10^8$ m/s, not $2.93 * 10^6$ m/s.
In any case, the gravitational maximum at 428.838 AU appears to be the *black hole* for stars and similar large scale objects of the Milky Way.
This does not rule out the existence of standard black holes (event horizons for standard particles) in the centre but, if they do exist, their individual masses should be much smaller than 10^6 $M_\odot$.
Of course, multiple gravitational maxima are possible and may be likely, the galaxy could have at least two (like the Sun itself) - one about 428.838 AU and the other about 0.1 AU in radius, with mass accreted in between and about the maxima.

Note, however, that speed limits are inherently linked to gravitons and depend on their scale. As shown in CR (see chapter *Discrete states of invariance - Lorentz factor - Determination of c_n - Applying speed limits*), different limits may apply to two bodies of apparently similar mass - depending on the scale of graviton[s] coupled to this mass.

A living star, for example, is considered to represent a collective of U_0 scale matter (standard atoms) coupled to a graviton of U_1 scale. As such, this body should respect the speed limit c_1. However, if the coupling (entanglement) is lost, the *body* of U_0 matter (dead star) is now limited by c_0 and can exceed c_1.

In effect, with the conservation of linear momentum and assuming no mass-shielding exists in coupling, dead stars may reach a velocity of 2 x c_1 after decoupling (and may not typically exceed that velocity, although theoretically possible).

5.4.1. Explaining galactic structure

The collapsing spin-alternating graviton can explain extremes in angular velocities of a galaxy and bright (ignited) regions. It can also explain the young counter-rotating disk(s) of massive stars close to galactic centre[33].

Not only that, it can explain the structure of a galaxy, assuming it is a large scale quantum system:

- the large scale graviton is oscillating between discrete energy levels,
- there are energy levels it is more likely to occupy than others (explaining discontinuities in density),
- stability of states is different for different galaxies and may differ between levels (stability is inversely proportional to eccentricity of arms),
- an energy level may split into two.

As the graviton is spiralling between states it is affecting momenta of gravitons of smaller scale (eg. those forming stars and planets).

The number of spiral arms is then proportional either to the age of the galaxy, or to the number of oscillating large scale gravitons.

Oscillation of this large scale energy should affect [and thus imply oscillation of] smaller scale energy (possibly explaining at least one order of general oscillation of stars, as hypothesized in chapter *The cycles*).

Nature of supermassive black holes

While black holes can be remnants of massive stars, some black holes may not be remnants (at least not remnants of U_1 scale stars) rather producers of stars. This is likely true for supermassive black

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holes in galactic centres. Assuming these were originally much larger (the associated U_1 gravitons were on a higher energy level), the mass lost with the energy level change could be the mass that fuelled creation of stars. If radiation in the form of photons was the major constituent of energy in early universe, the high energy photons colliding (annihilating) at relative event horizons (gravitons or gravitational maxima) of these black holes could have produced highly energetic pairs of gravitons of larger scale where one was expelled outwards and the other inwards. Inflation of these gravitons then resulted in formation of stars and, with similar energy level changes of stars (deflation of their U_1 gravitons), planets. If standard light atoms (fuel for stars) were also created in photon annihilation at event horizons and, with most of these horizons equally polarized (expelling matter outwards, anti-matter inwards), this could resolve the issue of [at least some] missing anti-matter.

If annihilation at event horizons is asymmetric, it could explain all the missing anti-matter. This may not be surprising as escape of matter requires high momenta while acquisition does not. Thus, asymmetry is not emergent rather the initial amounts of created matter energy and anti-matter mass were never equal. In fact, this asymmetry probably arises wherever there is a gradient in the field potential and the annihilation occurs at the rotating event horizon (where one colliding particle is orbiting in the direction of space rotation, other is moving in the opposite direction - may even be relatively at rest).

Note that produced and accreted orbiting fuel (hydrogen) could be, guided through magnetic field lines, delivered relatively directly to forming stars. This would imply high initial electro-magnetic polarization of gravitational maxima and would explain high two-dimensionality of galactic and planetary planes (especially in early stages of formation). However, the high initial [large scale] electro-magnetic polarization was obviously generally not conserved in stars (or U_1 bodies in general) - it has been (with inflation) converted to gravity through coupling (relative superposition) of opposite charges.

In any case, if [initial] star systems are created with deflation of energy levels of supermassive black holes, the ratio of mass between a black hole and its host galaxy should be much higher in the early universe. Indeed, evidence is emerging[34], confirming this prediction of the hypothesis[35].

The fact that, even in older galaxies, the stars still effectively revolve about central supermassive black holes, also goes in favour of this hypothesis of creation.

Considering the scales of energy involved, this *evaporation* of black holes (and induced inflation of stars) must have been relatively fast. Recent studies do confirm that, as fully developed galaxies (with low black hole/galaxy mass ratios) are also found in the early universe. Should this kind of *evaporation* be considered as a new mechanism or simply a large scale variant of Hawking evaporation? In any case, the mechanism allows much bigger rates of loss of energy for large black holes. It should dominate during galactic development, while standard Hawking radiation should dominate in the adult stage.

This is, of course, not the only mechanism for creation of stars. Newer stars could be created with recycling of existing inflated gravitons. I hypothesize that, at the point of star's death, the inflated graviton is deflated to lower vertical energy level, the galactic orbital angular momentum is exchanged for radial momentum, and the graviton spirals down all the way to the event horizon of the central black hole (or, the central large scale graviton). Relatively simultaneously, the entangled graviton within the central black hole also collapses (or inflates) to the event horizon, where (in equilibrium conditions) they annihilate again, resulting again in vertical energy level changes of products with

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radial momenta away from the event horizon. With energy and mass asymmetry conserved, the inflated graviton should end up roughly at the same place, reigniting the dead star and starting a new cycle of its life, assuming new fuel has been picked up with radial inflation.

The graviton probably expands radially as a wave. Only once it reaches its range it localizes (concentrates energy) by coupling to matter (exchanging some orbital momentum for spin momentum).
This is a general wave and can be interpreted as a superposition of a gravitational wave and an electro-magnetic wave.

Is the energy and mass asymmetry conserved? In equilibrium it should be, at least roughly. In other words, in equilibrium conditions, most stars will probably be recycled. However, during energy level changes (eg. as in the early universe), this is not the case, and relative creation, rather then relative recycling, dominates.

The hypothesis thus predicts high correlation between the black hole energy and star creation. It can then be further confirmed through relatively simultaneous observation and measurement of energy in dying/igniting stars and central black holes. When the star dies, the energy in the black hole should temporarily increase (not instantaneously). After it decreases, a new star should emerge, and assuming no change in asymmetry in mass, the new star should emerge roughly at the same distance as the old star, possibly reigniting the existing one.

Timing the events and knowing distance, one can measure the speed of the gravitons (or, large scale gravitational waves). If discrete gravitons exist on different scales (eg. large scale graviton not simply representing a collective of small scale gravitons, rather a large scale quantum) these large scale gravitons should travel at lower speed than the standard speed of light. That speed, c_1, has been calculated previously. However, as large scale gravitons are coupling with standard scale gravitons, waves of both scale could be emitted at the time of death. Neither types of waves, however, should significantly affect Earth or the Solar System during transit, unless this is the point of absorption or emission.

Assuming transit of both types can be detected, the speed c_1 could be determined if both types of waves are detected and the [distance to the] source is known. If predicted c_1 is correct, with small scale wave detected and source determined, one could calculate when to expect the large scale transit. This kind of experiments, however, due to relatively low value of c_1, may be effectively limited to nearby sources. However, both types (albeit, likely from different sources) should be in transit all the time and there could be a way to discriminate between them. For example, as large scale waves are much slower than standard photons or standard gravitational waves, identification of the source may not be as straightforward. The source may be at some offset and at different distance then expected for a standard wave.

Note that, similar to the accumulation of ordinary matter during graviton inflation, since this is a high energy graviton, matter could be dragged with it as it collapses to the event horizon of the black hole (this accretion should have a form of spiral arms as the graviton transforms from the spherical into a more two-dimensional form). It is possible that this is the dominant way of creation of accretion disks in supermassive black holes. Note also that, since neutral gravitons have spherical waveforms, dark matter halos of galaxies could be explained as transitioning or non-coupled gravitons (which could be of different scales).

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5.4.2. History in Barycentres

What is interesting about the obtained galactic graviton radius (with Keplerian velocity equal to c_1) of 428.838 AU (0.002079 pc) is that this is also roughly the barycentre location between the Sun and the assumed mass of the supermassive black hole Sagittarius A* (4.15 * 10^6 $M_\odot$). Studies show that stars *close* to Sagittarius A* (SgrA*) actually orbit the mass centred about the same[36] distance[37] (0.00205 pc) from the nominal radio position of SgrA*. I wouldn't call this a coincidence. This suggests that the Milky Way's supermassive black hole SgrA* seems to be located about 428 AU from the dark mass centre.

One interpretation is that the SgrA* is the result of spin localization (collapse) of a graviton from about 428 AU radius to about 0.1 AU (Schwarzschild radius). The 428 AU could then now be the orbital radius of SgrA* itself. However, I still believe there are at least two galactic maxima, where the other could have a radius equal to 428 AU and a mass of about 9.7 * 10^4 $M_\odot$ in the form of a dark matter halo (assuming that most of 4.15 * 10^6 $M_\odot$ is indeed concentrated in SgrA*). The SgrA* could then be interpreted as the core of this *body*.

Another interesting, and relatively analogous, case is the barycentre between the Sun and Jupiter. Its distance from the Sun's centre is:

$$r = r_a \frac{1}{1 + \frac{M_\odot}{M_J}} = 742391\,km$$

r_a = Jupiter-Sun distance = 778.479 * 10^6 km
$M_\odot$ = Sun mass = 1.988500 * 10^{30} kg
M_J = Jupiter mass = 1898.13 * 10^{24} kg

This is close to the Sun's surface radius of 695700 km. In a later chapter, I have calculated that the Sun's initial radius was 0.94 $R_\odot$, or 6% lower than the current radius (due to acquired kinetic energy), which has increased slowly to current value with energy radiation. I have also calculated that the Sun should have spent most of acquired energy by now as fusion fuel (its current radius is equal to its rest radius - radius it had before acquisition of additional energy). Sun's mass has increased by 6% (of current value) with kinetic energy, but what about Jupiter? Assuming it existed at this point (it probably did, other planets probably did not) its mass would have probably increased by 6% (of current value) as well. The barycentre between the current Sun mass and 6% lower Jupiter mass gives a value of 697888 km - basically equal to 1 $R_\odot$. For a short time then (changes across the system cannot be absolutely simultaneous) the barycentre may have been exactly at the Sun's surface. I wouldn't interpret this as coincidence either.

I believe then that the primordial radius of one of the Sun's gravitons was equal to 1 $R_\odot$, but may have collapsed closer to the core with mass acquisition during Sun's formation.

The 6% Difference in Creation

I hypothesize that planetary systems start as binaries - whether their gravitons were inflated from smaller scale or deflated from larger scale. This is a consequence of condensation, where nucleus and inner components of the atom are condensed into a single body, while outer components (ie. electrons) are condensed into a separate body. This may happen in an annihilation event - as in the moment of annihilation, where velocities cancel, the effective local temperature is close to absolute 0, resulting in condensation.

The Solar System thus inflated as two bodies, which now represent Sun and Jupiter. This is why acquired kinetic energy is concentrated in these bodies. However, shortly after inflation the superposition of gravitons (gravitational maxima) had decomposed into multiple components. The primordial Sun superposition thus *gave birth* to terrestrial planets while Jupiter superposition *gave birth* to Saturn, [which gave birth to] Uranus and Neptune. Evidence for this entanglement exists in these bodies. As it will be shown later, major discontinuities in the Sun correlate with orbital radii

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of terrestrial planets. Similarly, discontinuities in Jupiter correlate with radii of other outer planets. Discontinuity in Jupiter at 0.84 R_J (58725 km) matches almost exactly the radius of Saturn[38] (58232 km), while discontinuity at 0.68 R_J is the sum of Uranus and Neptune radii (Saturn's core may be of the same size as well[39]).

However, even though gravitational maxima were initially in superposition, does the kinetic energy affect only the outermost (greatest) maxima or all of them? And, did they all keep this energy or did it concentrate into separate bodies (perhaps closer to the Sun)?

Table 3 shows calculated 6% excess mass for outer planets.

Table 2. Possible kinetic mass components of outer planets

planet	mass (10^{24} kg)	6% of mass, if kept (10^{24} kg)	6% of mass, if lost (10^{24} kg)
Jupiter	1898.190	113.8914	121.161
Saturn	568.340	34.1004	36.277
Uranus	86.813	5.20878	5.541
Neptune	102.413	6.14478	6.537

Assuming Jupiter and Saturn kept the mass, but Uranus and Neptune lost it, they may have lost it to terrestrial planets as the total lost mass is roughly equal to the sum of terrestrial masses (12 * 10^{24} kg). However, even if that is the case, the terrestrial planets must have already had some mass (on the order of 10^{19} kg). Thus, the lost mass could probably account for the moons of outer planets as well. However, it may be more likely for the lost mass to be in Kupier belt objects. Note that *decomposition* of the primordial Sun and Jupiter can be interpreted as de-localization of energy. I believe that gravitons of terrestrial planets had radii roughly equal to current orbital radii before they were localized again, this time into separate bodies, orbiting the original body (the Sun). Similarly, acquired kinetic energies of Neptune and Uranus delocalized and then collapsed into other particles. This scenario of formation of a planetary system implies most bodies in it are more or less entangled.

What happens when the Sun spends the acquired fuel (6% mass) through nuclear fusion? I hypothesize that the event marks the end of a 1st order cycle of the Solar System. This is further explored in later chapters.

The above, however, treats all planets equally, as if they all have one major gravitational maximum. Assuming Jupiter and Saturn are in 2e configuration, as hypothesized, they should have two major maxima.

> Here, major maximum would be a maximum present at time of acquisition of kinetic energy. Each major maximum then acquires energy independently. The major maximum can split later into multiple minor maxima.

Assuming 6% of one maximum has been *lost* (collapsed to form a separate body or bodies), with 6% of the other kept (absorbed), rest mass of Jupiter must be:

$$1898.190 \times 10^{24} - 121.161 \times 10^{24} = 1777.029 \times 10^{24}\, kg$$

Similarly, rest mass of Saturn must be 532.063 * 10^{24} kg, or, with both quanta kept, 500.139 * 10^{24} kg.

But, assuming the mass is lost, where is it? Interestingly, one quantum of Saturn's lost mass (36.277 * 10^{24} kg $\approx$ 6.1 M_E) could account for, elsewhere hypothesized planet Nine - whose most recently estimated mass is about 6.2 M_E[40] (Earth masses). Similarly, Uranus' lost mass could account for another, elsewhere hypothesized, planetary mass object in the Kuiper belt[41].

Also interesting is the fact that total lost mass is in agreement with the conventional consensus predicting that Kuiper belt must have originally contained 30-50 M_E of material[42].

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This may not be a coincidence, this material would be the real mass coupling to lost (discarded) dark matter mass and if two masses are equal the wells would be at full capacity. Most of this real mass is, however, missing - which is not the problem for the Solar System formation hypothesis presented here.

Note that conventional theories on the Solar System formation cannot explain any big bodies (even dwarf planets, let alone bigger bodies) in the Kuiper belt given its low overall mass (the primordial cloud of dust would have been too widely dispersed to ever coalesce into anything at all). Contrary, the very existence of these bodies can be interpreted as the evidence for the formation hypothesis presented here. Still, there's the question of whereabouts of Jupiter's lost mass (as I believe it did lose it). If the initial Kuiper belt real mass was not much bigger than the current real mass then the Jupiter's lost mass may have been ejected far out and may mostly still be in the form of naked dark matter.

Note that the formation hypothesis presented here implies that the outer planets have been much closer during formation. The gravitational interactions between them would then produce a lot of shuffling and ejection of mass. The ejected naked dark matter, being gravitationally tied to the Sun, could then act as the moving (orbiting) gravitational lens, explaining observed peculiar transients[43]. This raises an interesting possibility, once the orbit of this object is determined, it can be tracked and utilized to probe distant phenomena. The cited study is concentrated on a peculiar transient involving 3 objects and the entanglement between them suggests a maximal separation of 6 AU between them giving a maximal distance of 2 light years for the hypothesized gravitational lens. Based on the formation hypothesis, distance is probably not bigger than 0.8 light years and is probably even less than 10000 AU. But this can be further constrained.

Assuming this is the quantum of lost dark matter associated with Jupiter ($121.161 * 10^{24}$ kg), and assuming there's a large scale graviton involved, its diameter should be slightly smaller than the diameter of Neptune if localized, the radius of Jupiter otherwise. With that kind of structure, the separation between observed objects becomes equal to this diameter and the distance of the *lens* becomes 6.6 AU (close to Jupiter's aphelion) in case of a ≈47000 km diameter, or 20.1 AU (basically the aphelion of Uranus) for a Jupiter sized diameter.

Here, Jupiter sized diameter would be probably more likely and could explain Uranus' eccentricity (aphelion), but is it possible this structure has not been detected so far - even if it is in the form of dark matter? Concentrated about the shell (or possibly ring) of Jupiter's diameter, the hypothesized dark matter mass would be of relatively low density but with still relatively high net gravitational influence on nearby bodies. Gravitational lensing puts constraints on density and here the observed effect may not involve lensing rather heating induced through interaction of this structure with other bodies passing through. Interestingly, Uranus has satellites with the semi-major radius equal to the hypothesized radius of this body, however, high declination of observed transients rules out direct interaction with Uranus' system. If there is no large scale graviton involved then the dark matter could be spread over the whole orbital path about the Sun and this could explain why it has not been detected so far. Even in that case however, distribution of mass is unlikely completely homogeneous.

In any case, if there are non-localized rings or clouds of dark matter in *orbit* about the sun, even if small, the effect on orbit-crossing asteroids may not be negligible, increasing uncertainty in models of orbital paths of eccentric asteroids.

Note that *lost* kinetic energy could explain at least some of the dark matter in galaxies as well.

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6. Initial Setup and Regular Disturbances

As noted before, Solar System is likely the product of inflation (likely through annihilation) of smaller scale particles or/and deflation [through annihilation] of particles of larger scale.

Suppose that at the moment of annihilation the carbon atom was briefly ionized and its mass and charge were condensed into the core when it started inflating. With the electrons inflating along, eventually, due to attraction, the core charge would separate from mass again.

The energy provided for transition between adjacent energy levels is generally higher than required, thus, the flattened carbon atom probably initially expanded to multiple times its current radius, then compressed to current size, reaching the stable state of the energy level.

The atom nucleus in the process expanded up to the main asteroid belt, then compressed, leaving behind orbiting gravitons which collapsed (localized) to form terrestrial planets. The collapses were recorded in the Sun, forming discontinuities. With the inflation of scale, electro-magnetic potential was exchanged for (or *annihilated into*) gravitational potential.

Note that the effect is the same even without initial ionization - in that case, discontinuities would be inflated along with the atom, rather than produced in the process.

In the transition from charged two-dimensional ring to three-dimensional sphere, equatorial spin momentum has been fragmenting and [due to spin decoupling] spreading to (forming) polar regions.

Latitude variable rotation may have been initially established as the product of conservation of momentum in such redistribution of mass, even if it now may be sustained differently.

Besides the long lived energy level changes, short lived (temporary) inflation/deflation of gravitons will occur with the absorption/emission of [properly scaled] gravitational waves, which may be electrically polarized (electro-magnetic).

In case of dipole waves, absorption will induce separation of charges and collapse of a spherical form of the graviton into a two-dimensional ring form.

Such disturbances will generally occur at regular intervals, with periods generally increasing proportionally to the scale of the system and the scale of disturbance. On the scale of stellar systems, common minimum periods are on the order of millions of years (although smaller periodic disturbances of the system should exist too, these may be of different nature).

Large scale events are always preceded and superseded by smaller scale events so accelerated evolution may proceed for years on smaller scales before the actual disruption on larger scale occurs.

One may now attempt to calculate how much such disturbances last on the large (cataclysmic) scale.

With no change in energy level, orbital areal velocity of bodies, per Kepler's 2nd law, must remain constant and there should be no change in constitutional mass either.

Assuming img mass is greater than real mass, with the temporary collapse of the major graviton of the Sun, escape velocity is extremely reduced and orbiting neutral real mass will be increasing orbital radii (although solid mass will generally preserve volume due to smaller scale electro-magnetic and neutral gravitational forces).

In order for this to be a temporary disturbance (no loss of structural entanglement), collapse must not exceed a specific time period - orbital period of the constituting mass of the system. This then implies that semi-major axes (and thus orbital periods) of orbiting bodies are not affected by the disturbances, only orbital eccentricities are increased.

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Applying the same to the Sun's constitutional mass, approximating gravitational maximum as a point maximum (linear ejection of mass from centre) and assuming Sun's constitutional mass barycentre at the [inner] core radius at the time of collapse of the Sun's graviton, maximal allowed ejection distance r at the time the gravitational well is fully restored is:

$$r = \frac{2\pi r_c}{2} = \pi r_c \approx 0.63 R_\odot$$

$R_\odot$ = Sun radius = 695700 km
r_c = inner core radius = 1/5 $R_\odot$ = 139140 km

Maximal time between the collapse and full restoration of the well is then:

$$t_c = \frac{2\pi r_c}{v_c} = \frac{1}{f_c} = 608272.5061 \text{ s} \approx 7 \text{ days}$$

where f_c (1644 nHz[44]) is the rotation frequency of the Solar core.

Note that there is a discontinuity in the *seismic* profile of the Sun at $0.63R_\odot$. This is where Sun's angular velocity starts differentiating with latitude (it rotates as a solid from $0.63R_\odot$ down to the core).
Note also the following:

$$\frac{1}{v_c} * 10^{12} = \frac{1}{2\pi r_c f_c} * 10^{12} = \frac{1}{2\pi * 0.2 * 695700 * 1644 * 10^{-9}} * 10^9$$
$$= 695771\ km \approx R_\odot$$

suggesting that this should be satisifed:

$$v_c * R_\odot = 1 * 10^{12}\ \frac{m^2}{s}$$

or, in terms of areal velocity of the core:

$$v_a = \frac{1}{2} v_c r_c = \frac{{R_\odot}^2 \pi}{5^2 t_c} = 1 * 10^{11}\ \frac{m^2}{s}$$

A hint of *deeper* entanglement between the Solar core and surface (or rest) radius, also suggesting radii quantization (rest radius being exactly 5 times the core radius) which should not be surprising if these radii represent energy levels of large scale (U_1) gravitons. A value of $R_\odot$ which would produce the result equal to the input radius, in the first equation above, is 695735496 m. Should this value be interpreted as real Sun's rest radius? If so, assuming the Sun's outer graviton collapses once the Sun expands to this radius, with the rate of expansion of 2.35 cm per year, there would be about 1.5 million years left until next collapse (although expansion is probably accelerated near the end of the cycle). In any case, assuming 1st order periods of 4.25 - 4.5 billion years, a rate of expansion significantly greater than about 1 cm per year would be suggesting end of the cycle is near.

In the context of CR, evolution of systems generally does not proceed at uniformly constant rates, it is generally a process with cyclic strong (cataclysmic) changes and a slow (weak) continuous evolution through the cycle.

This life ain't a fairytale vaguely based on true events, but reality firmly based on a fairytale...

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7. The Cycles

Changes in energy of the Solar System cannot be exempt from general oscillation and remain uniform over its lifetime.

For the Solar System, I hypothesize the following 3 periods (some evidence for which will be provided in this paper, some in follow-up papers) for the first three orders of general oscillation:

1. $4.25 * 10^9$ years,
2. $25.7 - 25.92 * 10^6$ years,
3. $1.512 * 10^6$ years.

These are cycles of existence of the Solar System and its bodies.

Only the 1st and the 2nd order cycles may result in horizontal energy level changes of large scale gravitons, but all these disturbances are probably sourced in gravitational stresses and have strong effect on the evolution of the system (and all life within), which is temporarily accelerated at the end of each cycle.

> I believe that the currently accepted age of Earth and the Solar System of ≈ 4.54 billion years is incorrect and the correct age should be closer to 4.25 billion years (this will be elaborated later). This then suggests that the system is at the end of a 1st order cycle, however, these periods should be understood as averages and the length of 1st order cycles may vary by up to a couple of hundreds of millions of years.

The 1st order period could be interpreted as *lifespan* (or lifecycle) of the Solar System as a whole. At the time of [1st order] death, gravitons of the Sun [and likely all planets] collapse in scale (and probably into superposition or, two distinct superpositions) exchanging localized momenta for galactic orbital angular momenta. Eventually, this system will couple with real mass and inflate again, possibly even into the same species ($^{10}C/^{10}Be$ in this case). It may even couple with the same real mass again (recycling it) - if it doesn't change the galactic energy level (orbital radius), in which case the collapse may be interpreted as temporary loss of consciousness (this recurring coupling should be manifested as reignition of the star after the explosion/expansion of plasma during collapse). The finite orbital speed of gravitons then puts constraints on the periods of time between the collapse and reignition. If these gravitons would orbit at the standard speed of light, reignition of a star at the distance of 25800 light years from galactic centre would occur after about 162106 years. However, assuming these gravitons orbit at the speed c_1 (U_1.c) reignition occurs after about 16.6 million years (note that possibility for coupling is quantized by this period, if 1st re-coupling fails another try can occur after another 16.6 million years, although probability for re-coupling probably decreases exponentially with time). Assuming img mass of a planetary system is significantly greater than real mass, decoupling will cause significant drift (from the original orbit) and spreading of leftover real mass. This then decreases the probability of re-coupling (reignition) but possibly not much as the original orbit of naked gravitons is probably eccentric. In fact, it is possible that decoupling occurs once the tidal energy is dissipated and the orbit is circularized (not necessarily due to circularization, rather synchronized with it). Gravitons may have innate tendency toward specific eccentric orbits (possibly even specific inclination). Circularization, then, would be increasing tension in coupling and since this tension is maximal in a circular orbit, that is also the state of greatest probability for [natural] decoupling (death, or *temporary* loss of consciousness in case of reignition) which may also be interpreted as breakdown of entanglement with particular real mass. Orbital momenta of naked gravitons should, however, be understood as relative - as decoupled gravitons of planetary systems could be inflating (rather than deflating) in scale so the orbital radius of the original system becomes the radius of the graviton (which now can be interpreted as a wave, or a non-localized graviton, in some reference frames). Regardless of interpretation, period between collapse and reignition should be on the same order of magnitude

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(smaller by 6 million years at most in case of speed c_1) and probably the same in value as well (which would imply that the system is inflating/deflating and rotating/orbiting at the same time).

Note that naked (non-coupled) gravitons do not orbit at Keplerian velocities, rather at the speed of *light* (which depends on the scale of gravitons). The same is true for gravitons (souls) coupling with bodies on Earth. These gravitons, however, orbit Earth's centre at the standard speed of light ($c_0 = c$). I have even provided evidence for this in follow-up works, at the same time explaining anomalous orbital velocities of stars in galaxies[45].

The system of naked gravitons may also inflate or deflate through annihilation or fusion with another system, and then start evolving as new lifeform of another generation or new species, acquiring real mass in vicinity.

In any case, death and new conception are relatively synchronized, and, for these species death is likely not the same as death on our scale. Here, discarded real mass may be fully reused by another soul - with no significant decay and decomposition of the mass involved (regarding the individual components of the system, this seems more likely for planets but not as likely for stars as planets are not expected to expand fast with the graviton collapse).

If recycling of mass is common in planetary systems, this should be taken into account in comparison with standard scale atoms. Consider the following example. Assume the initial configuration of the Solar System was ^{10}C, then, after the 1st order period elapsed, the system of gravitons collapsed but real mass was then reused by a ^{10}Be soul (graviton superposition). Long-lived dead remnants of the previous system can now influence interpretation, whether they become incorporated into newly formed bodies or remain in orbit as dead remnants. In that case, one interpretation of the system can be a relative superposition of ^{10}C and ^{10}Be. There are, however, other interpretations for the apparent superposition (eg. the original soul itself may be a superposition of the two, depending on the pre-inflation conditions).

The 2nd order period could be interpreted as the *lifespan* (lifecycle) of Sun's core and Jupiter, and possibly all outer planets. Based on current evidence, these collapses should be temporary regardless of nature (death or loss of consciousness). Naturally, even if the large bodies of real mass of gas giants are not disturbed much, the collapses should cause orbital disturbances, and are likely to induce bombardment of terrestrial planets with asteroids.

These should thus be correlated with large extinctions on these planets.

Note that it has been recently discovered that Saturn's rings are much younger than previously thought. The age reported is $\leq$100-400 million years[46], with 10-100 million years being most likely, as already suggested by others[47]. Due to proposed orbital disturbances, the age of rings is likely to correlate with the length of the 2nd order cycle. In that case, assuming they are recreated with each cycle, the rings should be 26 million years old at most (± a few million years).
Interestingly, cosmic-ray exposure ages of chondrites (86% of all meteorites) are less than 50 million years. Exposure ages of achondrites, in example, cluster between 20 and 30 million years. This too certainly could be correlated with the hypothesized 2nd order cycle. Note that typical origin of achondrites are differentiated bodies (planets, moons and dwarf planets) which, unlike small asteroids, should have a distinct large scale graviton coupled to real mass.

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Thus, ejection of achondrites could by synchronized with collapses of gravitons of these bodies with the end of a 2nd order cycle, while additional collisions and orbital disturbances could be sourced in the collapse of Jupiter's graviton(s).

The 3rd order period could be interpreted as *lifespan* (lifecycle) of Earth and possibly all inner (terrestrial) planets (at least in the order of magnitude). Based on evidence, this collapse too is temporary.

Collapse of Earth's graviton should be synchronized with accelerated evolution of life on its surface. Evidence exists for accelerated human evolution 1.4 - 1.6 Ma[48]. Thus, another such event (effective time compression) should be happening right about now if the 3rd order period is 1.512 My.

All of these periods are time averaged, deviations will exist, but larger periods should be relatively quantized by smaller periods.

Ongoing extinction on Earth may be correlated with the end of a 3rd order period, however, everything suggests this is also the end of a 2nd order period. And, considering the age of Earth and the Solar System, we may be at the end of a 1st order period too. Thus, major cataclysmic changes should be relatively imminent. While I am convinced that the ongoing 6th major extinction on Earth is synchronized with the end of the current 2nd order cycle, the end of the 1st order cycle may be more synchronized with the end of an additional 2nd order cycle, some 26 million years away.

One may argue that the 6th major extinction is caused by humans, therefore, unnatural and should not be correlated with the end of a 2nd order cycle. I disagree, for various reasons. First, this cause could be much more relatively natural (as shown later, in chapter *Earth, as a living organism*) than relatively unnatural. Secondly, causality in CR is relative - the end of a 2nd order cycle could be interpreted as the cause for the ongoing extinction through influence on human psyche (it should be clear now that *free will* can only be relatively free).
Note that I have associated consciousness with gravitons. If Earth's graviton is near the collapse and constituent small scale gravitons of Earth's space are coupled to human bodies (providing consciousness to humans) why wouldn't Earth's sense, or expectation, of collapse manifest itself through collective human action?
Why would nature care for human intelligence or human egos? In my experience, effect matters much more than the cause in a universe and collective human actions are simply a manifestation of convergence to a certain effect. But this is not a one-way communication, theoretically at least, human action should also be able to influence the Earth's soul (graviton). I believe, however, that *we* are effectively helpless here. This development is all coded and if cataclysmic changes are scheduled, humans may soon become an insignificant actor in the play.

Currently accepted age of Earth and the Solar System, based on uniform evolution and absolute decay rates of elements, is probably wrong. Per CR postulates, decay rates of elements cannot be constant over all time, they must change, either directly with changes in pressure and density of space (eg. at times of graviton collapses), or effectively - eg. with cosmic ray bombardment.

The rates may be relatively constant during weak evolution, however, at the end of a cycle that is synchronized with graviton collapse (eg. the 2nd order cycle) the rates should be significantly, even if temporarily, disturbed (eg. accelerating decay). Full collapse is probably not even required. Most likely, the rates are disturbed with the end of a cycle of any order, only the magnitude of disturbance is proportional to the cycle magnitude (period). The magnitude of disturbances will be calculated later.

It is probably safe to assume that the type of induced decay (beta decay or inverse beta decay) depends whether graviton energy level is being increased or decreased. If the graviton is oscillating

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between energy levels, then, in some cases, assumption of constant decay rates (although incorrect) will not produce anomalous results. However, if energy levels are exclusively increasing (as it is probably the case with planets in development) or decreasing with each jump (probably the case near death) the assumption of absolutely constant decay rates will produce incorrect results.

7.1. Smaller Periods

Assuming the ratio between 3rd and 4th order periods is equal to the ratio between 1st and 2nd order periods, and the ratio between 4th and 5th order periods is equal to the ratio between 2nd and 3rd, the following periods are obtained for the 4th and 5th order:

- 9221.4 years (4th order),
- 537.9 years (5th order).

Here, 25.92 * 10^6 years was assumed for the 2nd order period.

While 4th order disturbances could be cataclysmic they (and their effects) should be relatively short-lived and may not generally produce global effects on Earth.

The analysis of recent magnetic excursions and supervolcanic eruptions shows excellent agreement with the proposed 4th order period, as shown in Table 4, for the last 9 cycles.

Table 3. 4th order period correlation with excursions

cycle	years before present	correlated event
0	0	current events (extinction, climate change, ozone depletion, likely magnetic excursion or reversal, ...)
1	9221.4	^{10}Be enrichment in ice cores ≈9200 years ago[49] (hypothesized extreme solar storm event), Lake Michigan/Erie magnetic excursion 10-9 ka and 14-12 ka[50]
2	18442.8	Hilina Pali magnetic excursion 18.5 ka[51]
3	27664.2	Lake Mungo magnetic excursion 30780±520 - 28140±370 and ≈26000 years b.p.[52], Oruanui eruption ≈26.5 ka[53]
4	36885.6	Mono Lake magnetic excursion 36 - 30 ka[54] (34.5 ka[51]), Dome C/Vostok ^{10} Be enrichment (likely due to excursion) ≈35 ka[55]
5	46107.0	Laschamp magnetic excursion 46.6±2.4 ka[56] (41.2 ka[51]), Neanderthals extinction
6	55328.4	?
7	64549.8	Norwegian-Greenland Sea magnetic excursion 64.5 ka[51]
8	73771.2	Toba volcanic eruption ≈74000 years ago[57]

Note that the same results can be obtained with a period of 9157.4 years (obtained using 25.74 * 10^6 years for the 2nd order period) and a phase shift of 64 years, assuming year 1958 (3rd Industrial Revolution, rapid rise in CO_2 emissions) should be associated with current events.

Agreement with hypothesized associated events is remarkable, however, if the proper date for Laschamp is 41.2 ka and assuming Gothenburg magnetic excursion (13.75 - 12.35 ka[58]) is also a part of this cycling, it is possible that the 4th order period of 9221.4 years occasionally (or regularly?) breaks into two equal periods (2nd harmonic) - which could, apart from these two, also *explain* the 14-12 ka Lake Michigan/Erie excursion, enhanced ^{10}Be deposition in Antarctic ice ≈60 ka[55] and the Younger Dryas cooling/extinctions ≈12900 years ago[59].

In case of 2nd harmonics, the alternative interpretation is superposition (in the form of arithmetic average) - eg. arithmetic average of calculated 36885.6 and 46107.0 years is 41.5 ky (note that this

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corresponds to one of the Milankovitch cycles - obliquity cycle), which is exactly the age of magnetic field reversal during the Laschamp event according to the analysis of ancient New Zealand kauri trees[60]. Similarly, the 2nd harmonic, or the superposition of 18442.8 and 27664.2 gives 23.1 ky (average of another Milankovitch cycle - apsidal precession[61]), all in agreement with orbital periodicities found in Vostok ice cores[62]. In fact, all the periodicities derived from Vostok cores (100 ky, 41 ky, 23 ky and 19 ky) can be correlated with the main 4th order period (9221.4 y) or the 2nd harmonic.

Note that, since the 4th order period was derived from the first three periods, evidence for the 4th order period may also be interpreted as the evidence for these three.

The presence of harmonics probably should not be surprising given how common is resonance in celestial mechanics. Evidence exists for the 2nd harmonic (≈13 million years) of the 2nd order period (25.92 million years) too[63].

Evidence can also be found for additional harmonics of the 4th order period.
The 3rd harmonic could be correlated with the Noah's Great Flood (dated to ≈6000 years by Biblical scholars), giving a date about 6148 years ago.
The same harmonic could also be correlated with the recent rapid shrinkage of human brains (recently dated to ≈3000 years ago[64]), giving a date some 3074 years ago.
The 2nd harmonic (1536.9 y) of that harmonic (or, 6th harmonic of the 4th order period) could be correlated with Dansgaard-Oeschger warm events (for which some have previously hypothesized a 1470 year period[65]).

Of course, as there are no absolute constants in CR, these periods should be oscillating and evolving, even if weakly. Also, temporary disturbances of oscillation cannot be excluded, as well as the possibility for some harmonics to only be present occasionally (eg. close to events of strong evolution). For these reasons, the hypothesized periods should probably be understood primarily as relatively constant average intervals between associated events at times these are occurring.

However, possible deviation is proportional to period length (but should be of smaller magnitude), and remarkable agreement of the 4th order period with correlated events suggests deviation for the 4th order period may be generally small, up to a couple of decades at most.

Particularly interesting is then the ^{10}Be enrichment about 9197 years ago[49] (9125 b.p.), which would give year 2046 for the next excursion, assuming there's no deviation.

Interestingly, year 2046 comes up elsewhere as well. According to trends[66], human yearly consumption overshoot will reach double the Earth's capacity about the year 2046 - which probably should be interpreted as the most likely peak of civilization collapse, as other studies indicate reserves should be depleted about the same time[67]. The trends also indicate that global warming will reach 2 °C above pre-industrial levels[68] (which is recognized as an important threshold) about the same time[69]. Is all this synchronicity a coincidence? I do not believe so. Horizontal and vertical interconnectedness or entanglement between parts of nature is inherent, what should be questioned is causality. In CR it is treated as a special case of synchronization or synchronicity, which itself may be interpreted as temporal/spatial attractor of correlated events. And this has an important consequence regarding predictions on Earth's climate change. None of these models account for the magnetic field collapse, nor do the studies on Earth's past and present magnetic field suggest high probability of such collapse

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in near future. However, with increasingly relative, spatially and temporally limited causality, comes increasing synchronicity. At these times one simply cannot rely on predictions of one-dimensional or isolated studies. Holistic approach suggests major extinctions are characterized by convergence of multiple tipping points between some of which no apparent causal relation may be apparent. Thus, even though there is no apparent link between anthropogenic influence on the planet (climate change trigger, biodiversity loss, etc.) and its magnetic field, if the magnetic field collapse can contribute to the catastrophe, with many trends pointing toward one and with the magnetic field exhibiting possible pre-collapse behaviour, it's probably likely that the collapse of the magnetic field is converging to the same point as well (even if isolated studies suggest there's no reason to consider it exhibiting anything more than normal fluctuation).

7.1.1. Excursion Mechanics

Long-lived magnetic reversals do not show periodicity, however, according to the above, there is periodicity in magnetic excursions (which can include short-lived reversals as well - like in case of Laschamp, but generally only include reduced magnetic field strength and pole wandering).

There are different possible causes for magnetic reversals and excursions. Some of these causes can be periodic but the periodicity may not be evident if other causes are not periodic. Therefore, some of the causes of long-lived magnetic reversals may be periodic as well.

Like larger periodicities, the 4th order periodicity is most likely to be correlated with orbital mechanics. If that is so, magnetic excursions are likely synchronized with impacts (others have already proposed impacts as the cause[70]). These impacts and excursions are then correlated with climate changes.

As noted before, causality in CR is relative and this relativity seems most likely to be evident at discrete scales of invariance. This is why I find it inappropriate to state that impacts cause excursions or climate changes. These may, in fact, start before the impact. This relativity, apart from explaining dark matter and a lot of other phenomena on various scales, also explains the observed violation of causality in Milankovitch cycles[71].
Note that in the chapter above the next magnetic excursion (at least, it may be much more than excursion if it is synchronized with the end of a larger cycle) is predicted to occur about the year 2046. It is apparent that climate changes have started, magnetic field is decreasing strength and the poles are wandering at accelerated pace but there have been no large impacts recently, suggesting that the impact(s) is/are yet to come in the near future. One could argue that current climate changes are caused by humans but I do not think the universe cares. Due to relative causality, one interpretation is that the effect has induced the cause - which sometimes may be anthropogenic, sometimes not. Anthropogenic cause of climate change, however, is probably not a proper interpretation over larger scale, humans may have just started *the fire* but *the fire* will go beyond human control and this large scale event is correlated with something else.

If the end of a smaller cycle is synchronized with the end of a larger cycle, the impacts should be greater. In addition to asteroid impacts, the event should be relatively synchronized with rising mantle plumes, increased volcanism, seismicity and bigger rapid climate changes that would fragment

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the atmosphere, part heating, part cooling - with the collapse of the Atlantic Meridional Overturning Circulation (AMOC).

A magnetic excursion or reversal would generally cause an increase in solar/cosmic radiation, however, again, it's probably more appropriate to say that increase in radiation is synchronized with the magnetic field *collapse*. Thus, instead of increase in radiation being caused by reduced magnetic field strength, the increased radiation may be due to a violent solar storm - solar mass ejection directed toward Earth (which would further suppress the magnetic field, and which would then potentially result in *collapse*).

In contrast to Earth, magnetic reversals in the Sun do show periodicity. It may very well be that magnetic excursions on Earth are periodic due to periodicity of mass ejections from the Sun toward Earth. It wouldn't surprise me if there are also asteroids near Earth at time of these ejections, whose impacts on Earth may be correlated with the same. In a later chapter I show that most likely years of pending asteroid impacts in the current event could be predictable. According to these calculations, first possibility is about the year 2029, then 2040, 2048, etc.

Interestingly, the calculations also predict Tunguska and Chelyabinsk events, however, although they may be associated with the current magnetic *collapse*, I am not convinced that these are the last. Although very energetic, Tunguska event apparently did not include a direct impact, while Chelyabinsk event was of relatively low power, certainly not of such power that it could be interpreted as the [relative] cause of magnetic *collapse*. Even if causality is relative and the effect can precede the presumed cause, the cause should still match the effect and these two do not match the large scale event.

Note that even the causality violation is relative. If the event cannot be reduced to an absolute instant in time (in CR, it cannot) then both the cause and the effect may have already started. In this example, a single impact could be interpreted as multiple impacts stretched (quantized) in time with a peak (larger impact) somewhere, not necessarily in the middle. Thus, both Tunguska and Chelyabinsk could be interpreted as quanta of the cause while anthropogenic climate excursion could be interpreted as one quantum of the effect. The peak of greenhouse emissions emitted by humans could be interpreted as the peak of this anthropogenic quantum (although the peak energetic footprint may be more appropriate). But this peak is not the peak of atmospheric greenhouse gases (and/or the energetic peak) in the current event, rather simply the peak of anthropogenic contribution.

8. Effects of Mass and Gravitational Stresses on Keplerian Motion

Orbits of bodies in gravitationally bound systems are generally expected to obey the following equation (orbital law):

$$v^2 = \frac{GM}{r}$$

G = gravitational constant

where v and r are orbital (Keplerian) velocity and radius, respectively, while M is the mass contained within the radius r.

In planetary systems, most of the mass M is contained within the star, while in galaxies, greatest mass concentration is in the central supermassive black holes, although, as hypothesized here, in older galaxies most mass will be in stars rather than in the central black hole.

However, in both systems, there are orbits at which the equation is apparently not satisfied - v is either higher or lower than *expected* for observed mass M.

In galaxies, it is assumed that the discrepancy is caused by exotic gravitational mass - *dark matter*.

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In planetary systems, spin of bodies does not obey the equation, but this is considered natural and largely ignored.

It is however, a legitimate question - why should a gravitationally bound mass in a galaxy obey the orbital law, while clouds of gas orbiting near the surface of a star should not (if most of M is below the surface)?
Of course, the source of *anomaly* can be conversion to thermal (radial) motion but can it fully explain the deviation and how is the conversion linked to it?

In CR, the source of gravity in bodies such as living stars and planets are both large scale gravitons and the coupled real mass (ordinary matter). Only dead bodies should be composed solely of ordinary matter.

Thus, a potential equivalent *dark matter* problem may exist in stars, planets, dwarf planets and larger moons (asteroids and comets, at least those smaller and irregular, are relatively homogeneous composites of smaller scale wells [held together in most part by electro-magnetic force] so their spin momentum should not be Keplerian, even if their orbits about a larger body should).

Every large scale graviton has its own gravitational well and is a *dark matter* source. However, the addition (acquisition) of matter of smaller scale (real mass), in one interpretation, shields the existence of the inner graviton(s), effectively decreasing imaginary mass content of the well. Note that, in this exchange of *dark* gravitational potential for *real* gravitational potential, net gravitational force remains constant, but the capacity of the well (for real mass) is decreasing. In another interpretation, total mass is increasing with acquisition of real mass, however, the well still has finite coupling capacity equal to img mass, although the well can become significantly over-capacitated. In CR, it was established that velocity is Keplerian at full capacity, faster in under-capacitated wells, lower in over-capacitated wells. A body may also have multiple gravitational maxima, in which case, the outermost (surface) graviton may shield existence of inner maxima.
The shielding effect is not limited to the neutral gravitational component of general force, electro-magnetic component may be shielded as well.
Thus, if there is no exchange of neutral gravitational potential for electro-magnetic potential, and if there are no changes in kinetic energy, despite the loss of matter, the gravity of a star, in case of shielding interpretation, should not change its average value with age (it should, however, still oscillate). The attraction remains, but its nature changes - from being mostly in its looks (real mass) to being mostly in its mentality (dark matter), as in any living being.
Luminosity is then, generally, a good measure of gravitational mass only if the well is at full capacity, otherwise it is only correlated with real mass, and age (if there is no fuel replenishment). However, even if real mass may not be correlated with total gravity at all times, these should get synchronized periodically. The reason why they are not synchronized at all times may simply be a difference in scale - since energy changes are discrete, burning of real mass (small scale mass) will appear continuous, while on large scale, where energy quanta are orders of magnitude larger, change in mass (gravity) may require millions or billions of years.
It is thus possible that the Sun does not have much fuel (real mass) left at this point, its gravity is rather in dark matter associated with the graviton that is yet to collapse.
It is then likely that a collapse is synchronized with depletion of fusion fuel.

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The solution for terrestrial bodies lies in the dominance of ordinary matter, which has been, very early on, transforming orbital momenta to radial and more random momenta (eg. with heat produced in collisions).

Due to interaction of the atmosphere with a solid body beneath (or the magnetosphere), neither the gases of the atmosphere may obey the orbital law.

Note that even if pressure from high temperature (kinetic energy) is balancing gravitational force, the thermodynamics (within the gas cloud) cannot break the orbital entanglement of the gas cloud as a whole.

If the gas is in the form of plasma (as in the case of Sun), it is more likely to be entangled with the charge component of graviton's [general] force, which then, apart from temperature, could be the source of its non-Keplerian motion - whether this motion is a residual momentum (leftover from early accretion) or actively maintained.

Assuming the orbital momentum of Sun's plasma has a dominantly electro-magnetic origin, its neutral gravitational equivalent can be calculated:

$$v = v_e = \frac{2\pi r}{T} = \sqrt{\frac{GM_2}{r}} = 2066.95\,\frac{m}{s}$$

v_e = equatorial velocity of the Sun surface
G = gravitational constant = $6.674 * 10^{-11}$ m^3/kgs^2
r = equatorial radius of the Sun = 695500 km
T = rotation period at equator = 24.47 days

which gives for the mass of the hypothetical neutral graviton:

$$M_2 = 4.45215 * 10^{25}\,kg$$

If the electro-magnetic component of the graviton would be exchanged for neutral gravitational component, the equatorial matter could remain entangled with such maximum.
The observed angular velocity could be interpreted as evidence of spin change during the transition between vertical energy levels and transformation of electro-magnetic potential into neutral gravitational potential.
Suppose that entire potential was initially electro-magnetic but with an opposite spin. During transformation, Keplerian velocity component would be decreasing total angular velocity and, as the neutral component becomes larger than the electro-magnetic component, real mass would start spinning in another direction - aligned with Keplerian velocity. With complete transformation, real mass would have a Keplerian angular velocity.
However, with the exchange of potential and inflation of space, [assuming real mass is acquired not inflated] increasing gravity must be radially compressing orbitals, increasing density of real mass. If the compression is not isotropic and the mass is spiralling inwards (as expected for interaction of binaries at the event of annihilation), angular velocity (being exchanged for radial) will be decreasing from Keplerian with orbital radius.
This will be increasing pressure and temperature about the centre which will balance the neutral gravitational force at equilibrium.

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Angular velocity of matter about stars is thus generally proportional to the difference between neutral and electro-magnetic potential and, in magnitude, inversely proportional to temperature/density of real mass.

However, stability of a gravitational maximum is proportional to its mass and inversely proportional to gravitational stress.

That gravitational stress affects the number of sunspots has already been shown[72], and here I propose that a sunspot pair is the result of a collapse of a quantum of a neutral gravitational maximum (which may generally be a superposition of multiple large scale gravitons) into a pair of [electrically] oppositely charged and relatively unstable smaller maxima.

Note that orbital radius of a sunspot pair should be equal to the radius of the maximum before collapse.
Gravitational wells of planets, dwarf planets and major moons have likely been formed in the similar way to sunspots. In other words, if the Sun would be unstable (as it was during planetary formation) and contracting, the created sunspots would have a good probability to more permanently localize and form protoplanets. The radii where collapses occur should be the radii of discontinuities in the Sun (possibly limited to outer layers).
The equivalent of sunspots *bathing* in Sun's plasma, in standard atomic nuclei is probably the sea of quarks, which are popping in and out of existence (oscillating between vertical energy levels).
Note also that the size of sunspots ranges from the size of a moon to the size of the biggest planet (Jupiter) in the Solar System, which I do not believe is a coincidence. Graviton sizes are quantized, however, since gravitational (and electro-magnetic) wells can be under/over-capacitated this may not be so evident (slow and continuous oscillation and transition of real mass between energy levels can also, as noted before, mask the quantization).
But is sunspot creation/decay induction initiated locally? Or is it the result of absorption and emission of large scale photons (eg. communication between stars)? I believe it is communication, just not sure whether it is conscious or not. Similar is probably happening inside planets, just not near surface, rather in the cores. And stars probably communicate with planets as well. This then begs the question - should solar flares and coronal mass ejections toward Earth or any planet be considered as intentional rather than coincidental? Discontinuities in the Sun are entangled with terrestrial planets. What happens in the Sun could then be mirrored inside Earth. Should it be surprising then if a particular ejection from the Sun would be synchronized with magnetic excursion (temporary magnetic field collapse) on Earth? As noted before, causality can be very relative on this scale. Of course, solar ejecta is generally not desirable (that's one reason for the very existence of Earth's magnetic field) as it harms the surface life, but surely there are exceptions. In some cases one might want to harm the surface life. Just like humans fry cancer cells with radiation, humans themselves could be fried with solar radiation, as they might have been during the Laschamp excursion, which could be interpreted as a precursor of a larger excursion, or a warning. In that case, it is probably not the Neanderthals that were targeted rather polarized Cro-Magnons (who probably exterminated Neanderthals during the time, possibly in fights over shelters). If that interpretation is true, considering Laschamp excursion failed to exterminate the [then perhaps still potential] disease, could an increase in radiation dosage be expected in next excursion? I believe so, with probability for that increasing with increasing extinction of wild animals and destruction of the biosphere. If this is a major extinction, as everything suggests, complete sterilization probably can be expected. But it is not

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only causality that is relative in existing conditions on large scale, multiple interpretations are commonly valid. These will be explored later.
In any case, I find it likely that the Sun periodically showers terrestrial planets with energetic ejecta (in 4th order cycles) but whether this will be synchronized with a magnetic excursion on a particular planet depends on local conditions (eg. presence of disease). Thus, magnetic excursions may not generally show periodicity, rather only at times when sterilization is desirable. Apparently, we live in times when it is very much desirable.

The neutral component of a naked graviton is gravitational energy that is manifested as *dark matter*, while *visible* or ordinary matter is real mass attracted to the gravitational well of such maximum. The velocity curves of the Sun and the Milky Way galaxy likely have the same solution - in the form of gravitational maxima and relativity of their nature due to exchange between polarized and non-polarized potentials of general force.

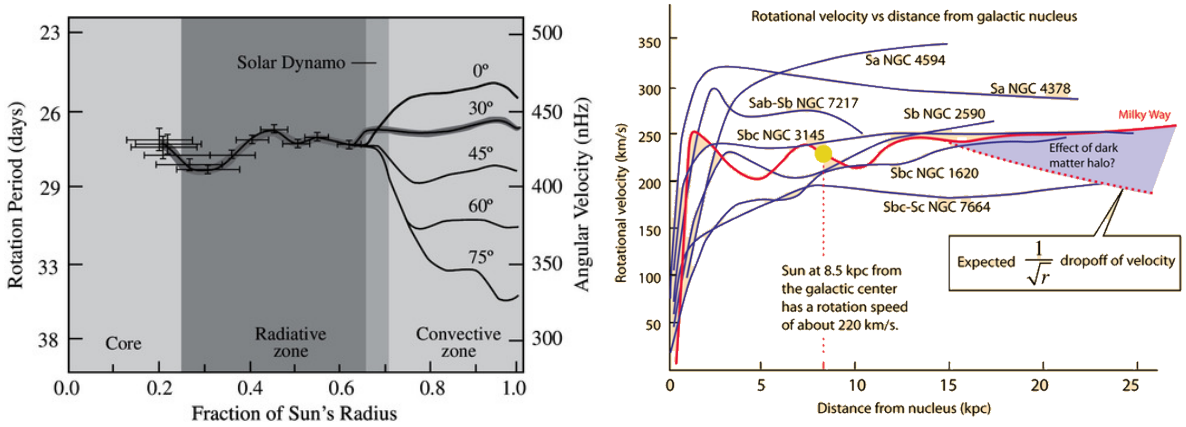

Figure 8. left) internal rotation of the Sun[73], right) rotation of spiral galaxies[74]

Rotation frequencies of the Sun (from the core up) and rotational velocities of several spiral galaxies are shown in Figure 8.

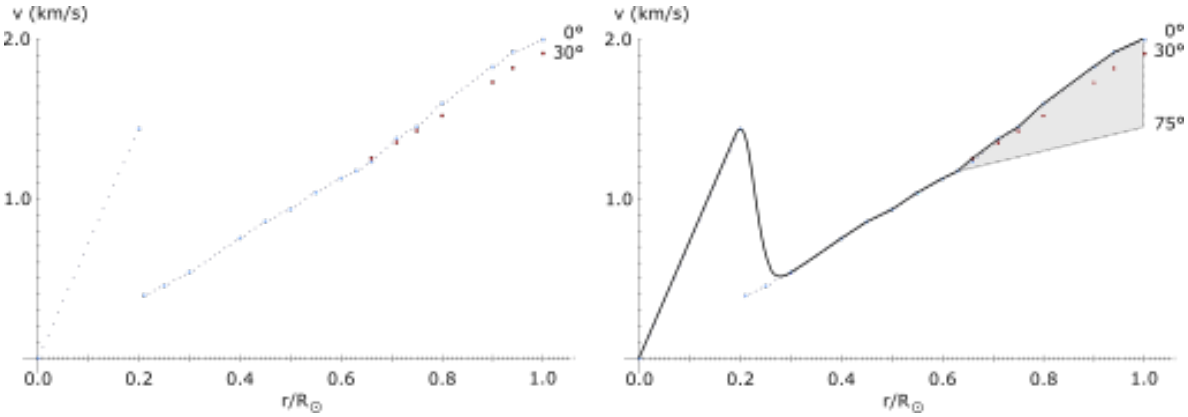

Figure 9. Rotational velocities of the Sun

On the left, Figure 9 shows the rotational velocities of the Sun based on rotation frequencies from two independent studies, one for the core ($r < 0.2R_{\odot}$) and other from the core up (black dots are interpolated values, red dots show velocities at 30° latitude).

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On the right, Figure 9 shows the complete velocity curve (with interpolated *connection* between two curves) and dispersion of velocities (shaded area) due to differential rotation in the convective zone.

Note that *interpolated* values near 0.2 $R_\odot$ do not represent the current state, rather initial state at the core when the discontinuity had more pronounced thickness. In the current state, discontinuity is extremely compressed and velocities increase sharply at 0.2 $R_\odot$. This will be elaborated below.

What is obvious from the figures is that Sun rotates like a composition of two solid or rigid bodies (diverging only toward the polar regions of the convective zone), consistent with condensation of U_1 particles into two ground states (+1s/-1s).

Assuming the Sun is not solid anywhere (as expected in conventional theories), it should be mainly composed of plasma.
However, there is a possibility that fusion in stars operates differently (or at least has a secondary component) - through the bombardment of solid (or solid-like) material with particles produced in the radiative zone. These may be high energy photons produced through matter/anti-matter annihilation and/or high temperature of plasma.

Evidently, velocity curve of the Sun is similar to a typical velocity curve of a spiral galaxy - in both cases there is an initial sharp increase in velocity in the core, followed by a decline, with each next increase in velocity being less steep than the previous one. Note that latitude dependent differential rotation may also be common at specific places in galaxies too.

If the spin momentum of the Sun is effectively immune to [large scale] collisions (even if the core would be solid, everything approaching the Sun is vaporized before reaching the surface), the only disturbance of Keplerian orbits must come from incomplete conversion of electro-magnetic potential and increase of temperature.

Assuming that orbital velocity is decreasing (from Keplerian velocity) proportionally to electro-magnetic potential, as hypothesized, orbital velocity of plasma should keep increasing with radius until it becomes equal to Keplerian velocity, beyond which point there should be no accumulation of charge and the radial component of the solar wind should dominate.

Using approximation of the velocity/radius dependence based on the velocity curve of the Sun (up to 130000 km from surface[75]), and equalizing with orbital law:

$$v = \frac{2533.61175}{1.18686 - 0.1}\left(\frac{r}{R_\odot} - 0.1\right) = \sqrt{\frac{GM_\odot}{r}} \tag{S1.1}$$

one obtains the orbit of such discontinuity:

$$r = 32.8\, R_\odot = 22.826 * 10^6\, km \approx 33\, R_\odot$$

First results from the Parker solar probe indicate a significant rotational velocity of the solar wind about 40 $R_\odot$, peaking at the closest approach. The results indeed indicate a high probability of a maximal velocity about 33 $R_\odot$ in case a rigid rotation of the solar wind is maintained up to that point.

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Rigid rotation is a consequence of relative cancellation of neutral and electro-magnetic influence on angular velocity, making it dependent on real mass (solar wind) density (pressure) which for particle orbitals falls of proportionally to distance r (number of particles per $2\pi r$ is constant).

Note that, even without rigid rotation, the discontinuity should occur near the point where velocity becomes Keplerian, otherwise, higher velocity would indicate dark matter presence - another maximum.

Note that 33 $R_\odot$ is equal to 0.1 MAU (Sun-Mars distance), while the above equation gives 0.1 $R_\odot$ for v = 0. This correlation of the radius of the Sun with the orbit of Mars is not a coincidence - Mars is the outermost positive charge of the U_1.$^{10}C/^{10}Be$ atom (Solar System).

If the same is applied to the core of the Sun, the velocity at 0.2 $R_\odot$ should be equal to Keplerian velocity. Here, however, this velocity is the sum of Keplerian velocity of the surface maximum and a core maximum. For a surface maximum at $R_\odot$:

$$v = s\sqrt{\frac{GM}{0.2R_\odot}} + s_\odot\sqrt{\frac{GM_\odot}{{R_\odot}^2}\frac{(0.2R_\odot)^2}{{R_\odot}^2}0.2R_\odot} = s\sqrt{\frac{GM}{0.2R_\odot}} + s_\odot\sqrt{GM_\odot\frac{(0.2R_\odot)^3}{{R_\odot}^4}}$$

$s, s_\odot \in \{-1, 1\}$

where M is the mass of the core maximum, s is the spin polarization of gravity of the core maximum and $s_\odot$ is the spin polarization of gravity of the surface maximum.

Equalizing this velocity with measured velocity at the core discontinuity:

$$v = 2\pi * 0.2R_\odot * f = 2\pi * 0.2R_\odot * 1644 * 10^{-9} = 1437.2545\,\frac{m}{s}$$

and setting spin polarization positive for counter-clockwise rotation [of the surface maximum], gives s = -1 and gravitational mass of the core roughly 3/2 the Jupiter mass:

$$M = 2.951797 * 10^{27}\,kg$$

which gives mean core density of:

$$\rho = 261.602486\,\frac{kg}{m^3}$$

implying the primary gravitational mass of the Sun is above the core. Difference in mass between the core and outer layers is roughly equal to the mass difference between inner and outer planets.

For the ratios to be equal, core mass must be 3 times higher, which suggests that space has been stretched (compressed, relative to core) from 0.286 $R_\odot$ (1.43 * 0.2 $R_\odot$) to 0.2 $R_\odot$. Modifying the equation for Keplerian velocity accordingly would give the initial mass (8.90211033 * 10^{27} kg):

$$v = s\sqrt{\frac{GM}{0.2R_\odot}\frac{1.43}{1.43}} + s_\odot\sqrt{GM_\odot\frac{(1.43 * 0.2R_\odot)^3}{{R_\odot}^4}}$$
$$= s\sqrt{\frac{GM}{0.2R_\odot}} + s_\odot\sqrt{GM_\odot\frac{(0.286R_\odot)^3}{{R_\odot}^4}}$$

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Radius independent Keplerian velocities, like those at the outskirts of galaxies, are the effect of stretched space between maxima.
With shorter distance between maxima, minimum is more localized and changes in velocity are sharper.
Apparently, such stretching occurs in the Sun too, which is not surprising, considering established (and predicted in CR) self-similarity of universes.
Note that the equation S1.1 is defined by the straight line passing through 0.1 $R_\odot$ and 1.18686 $R_\odot$, so if one assumes that, without space stretching, the defining points would be 0.0 $R_\odot$ and 1.0 $R_\odot$, 0.286 $R_\odot$ is the sum of translation of both points in radial direction due to stretching.
Note also that, if the Sun loses all outer mass with the collapse of the outer graviton, with leftover mass roughly equal to initial core mass, the Solar System becomes geocentric.
Space on particular scale is composed out of dark matter of particular scale so the stretching of space is a physical phenomenon in CR. Dark matter is thus relatively omnipresent. This is in contrast with conventional theories where dark matter is assumed to be present only in *anomalous* gravity. In other words, in conventional theories non-anomalous gravity is attributed solely to real mass which is coupled to absolute (single-scale) and abstract space, while, in CR space is physical and therefore carries part of the mass itself, the only question is how much and at what scale does coupling with real mass occur (which then determines the speed limit and possibilities for local accumulation of relativistic energy).

This stretching of space is evident in Figure 10 in the sharp increase of velocity from 0.286 $R_\odot$ to 0.2 $R_\odot$. To conserve momentum, this increase in velocities in the inner half had to decrease velocities in the outer half of the Sun, up to 1.18686 $R_\odot$.

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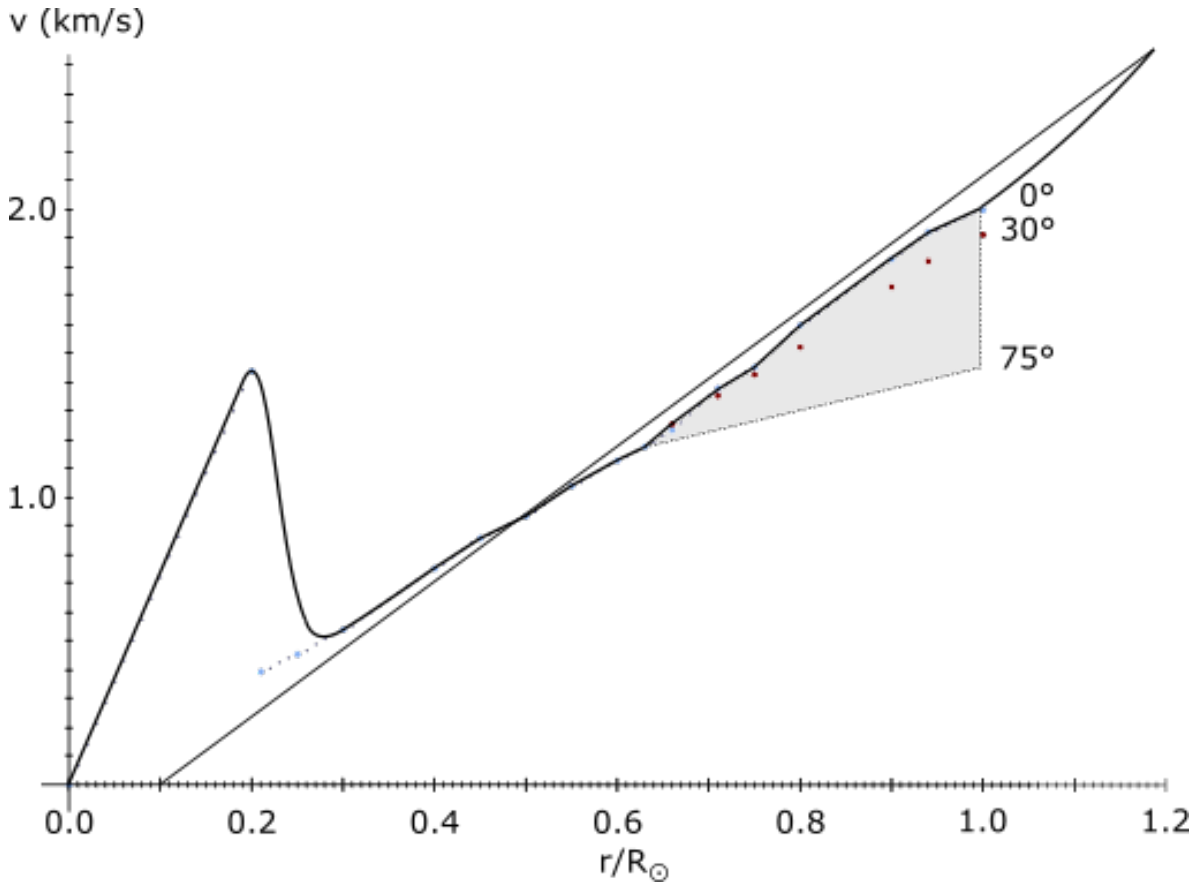

Figure 10. Rotational velocities of the Sun and near corona

The Sun should have at least (or can be reduced to) two large scale gravitons (each of which can be a superposition of multiple gravitons).
Gravity between the two maxima must be cancelled near 0.2 $R_\odot$. Therefore, any particle escaping the core will overcome escape velocity at the surface of the Sun (if not slowed down by other particles). The same is true for the other direction. Thus, orbitals of particles in the *vacuum* area near 0.2 $R_\odot$ must be highly unstable and it should be the area of lowest [real mass] density. However, gravitational stress can induce the collapse of the outer graviton. If that stress is low (insufficient for full collapse), the graviton will be fragmenting and collapsing into quanta of smaller charged graviton pairs, starting in polar regions (and, without further increase of stress, limited to polar regions). At these places (sunspots), gravitational escape velocity is decreased allowing higher bandwidth of escaping mass, although significant transverse velocity component will exist, especially for charged particles.
Note that orbitals at polar regions seem to be entangled with the core. Strong entanglement between large scale [quark] pairs may exist between the core and surface, it is also possible that gravitational stress is adding energy to such entanglement and inflating maxima of such pairs (creating *wormholes*). In that case space is effectively stretched from the core to the surface (at sunspots) entangling orbital velocities but also being fixed to specific latitude by magnetic field lines (*shielding* inclined velocity component), the period of rotation of such plasma on the surface would be equal to:

$$T = \frac{2\pi R_\odot}{v} = 3041363\,s = 35.2\,days$$

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which is the rotation above 75° latitude and should then be the location of sunspot creation near surface. Note that, once the orbital entanglement is lost, being charged, the sunspots will drift along the magnetic field lines.

The two maxima are entangled - collapse of the inner graviton would cause expansion of the outer one, while the collapse of the outer one would cause contraction of the inner one.

Note that the collapse of the outer maximum would act as *dark energy* for the gas inside the convection zone - it would expand and cool. At the same time, with the collapse of the inner maximum, the accumulated real mass (in the *radiative zone* and below) would contract. If now the planetary systems are equivalents of atoms, *dark energy* is large scale atomic gas expansion, the observable universe is a gas, expanding possibly in a large scale *convection zone* (it thus has a torus like shape) and at the same time orbiting a central contracting or already contracted mass - possibly even an U_2 scale black hole. However, considering the properly scaled density/pressure of this gas, the observable universe is more likely [part of] the expanding graviton itself.
The core graviton of the Sun may be the result of vacuum induction during inflation, but, all gravitons could be interpreted as results of vacuum induction and quantization.
In example, similar to inner Solar planets, the stars of an arm of a spiral galaxy could be a result of vacuum collapse into smaller quanta (gravitons).
One may understand the creation of vacuum as stretching of space and decrease of density, but no space can be absolutely empty. Thus, if one is stretching space, one is also inflating smaller scale maxima.
The stretching of space between entangled galaxies would result in creation (inflation) of dark matter filaments between them. Intergalactic and galactic dark matter may have thus been created with inflation of space.
Due to discretization of stable energy [levels], with enough energy applied to vacuum creation, the inflation will result in [relatively] permanent maxima of larger scale.
Vacuum inflation may be most likely in annihilation events, due to high symmetry and energy localization. However, stretching of space between strongly entangled particles can also result in permanently inflated particles (as in quark/anti-quark pairs).
If inflated particles are always of equal species to the original particles, evidently the [private] space of such particles is composed of the same particles but of lower scale.
In case of annihilation, the stretched (inflated) space might not be the space of the annihilating pair, rather the *underlying* space, making the product of inflation highly dependent on the point of interaction. It may be more appropriate to state that, rather than being stretched in between, space is compressed at maxima. Similar to the 1st law, one could then construct another law:

Space remains at constant density unless acted upon by gravitational force of different scale.

Thus, even if it may appear that, once deformed, no force is necessary to act on bodies in space to accelerate their radial motion relative to the sources of gravity, force (energy) is necessary to maintain such state of space.
As everything must conform to general oscillation, some force is always present, with relative magnitude and distance it is acting upon.
The speed of motion (radiation) will depend on density of space and, if gravitational force is limited, there will be a speed limit on motion. However, constancy of density is relative and even density is relative to the scale of the 1st order *observer*, or, more precisely, the strength of its entanglement with such space.

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Absolute, and absolutely invariant limits are impossible. In any case, it seems that everything must be mirrored, and when it appears that is not the case, the cause is simply a large distance - in scale of space/time.
If the point of interaction of an annihilating pair imparts energy to the pair in highly asymmetric manner, the inflation would result in a pair of maxima of different scale (in fact, one of the particles could even be deflating).
Thus, a possibility exists that even the proton and electron particles are a result of an *anomaly* in annihilation of particle/anti-particle pairs of equal scale.
Note that a gravitational maximum must have a real radius - a point maximum would imply infinite gravity and no possibility for containment of smaller maxima.

Somewhere in the vacuum region of the Sun or *below* it, conditions may even be suitable for standard life. Note that radius of the core is almost 22 times Earth radius, if density is not isotropic, smaller bodies (moons) may be orbiting inside. Considering momentum of the Solar System barycentre, density should not be isotropic.

The idea of planets or moons, even habitable ones, inside the Sun is not that ludicrous as it may seem.
Note that, in the hypothesis, Sun's core is a Jupiter-like planet and nuclear fusion in the Sun is occurring outside the core, within the *radiative zone* - in case of thermonuclear fusion, and possibly also at its edge about 0.66 $R_{\odot}$ - in case of low energy nuclear reactions if these are occurring at this time. A layer of vacuum between two maxima would prevent conduction and convection of heat between the two, while a strong magnetic field generated by the core [or the core moon] can provide protection from energetic ions. This only leaves radiative transfer of energy between the core and the *radiative zone* as the potential problem but definitely not an unsolvable one (eg. radiation can be reflected or attenuated). The flow of energy between the core and outer layers must be balanced in such a way the equilibrium conditions allow for habitability. However, seismic profiling and inertia can put constraints on the vacuum volume (eg. the torus-like layer of vacuum may be more ring-like than spherical) but this must take into account the presence of dark matter and the possibility that seismic waves may be bent about some structures (effectively acting like an invisibility cloak for sound waves). The dark matter, where sufficiently dense, could insulate parts of the sun from electro-magnetic radiation as well. In any case, deduction of details of the interior by seismic profiling is very prone to interpretation bias, eg. interpretation strongly depends on the ratio between dark matter (img mass) and real mass. Another problem is the inherently low resolution in profiling the core area (mostly due to reliance on g-modes of oscillation, for which unequivocal detection is very difficult). For all these reasons, habitable areas inside the stars, planets and other celestial bodies cannot be ruled out. In fact, there are many reasons to consider it likely that most life in the observable universe is concentrated in the interior of celestial bodies.
How did matter accumulate in the *radiative zone*, so the core is not as dense as conventionally assumed?
Assuming the Sun's outer gravitational maximum was initially dominantly electro-magnetic (it should have been, as hypothesized already) it was in the form of a two-dimensional ring, with a strong magnetic field. The outer and inner maxima would be channelling charged particles into the equatorial region in between. Neutral particles would be concentrating in the centre, forming a core. In the end, majority of the mass (fusion fuel) would be concentrated between the core and outer maximum, at which point the outer maximum had exchanged most of its

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electro-magnetic potential of general force for gravitational (also becoming almost completely spherical) and in the process must have contracted from the original size.

9. Symmetry/Inversion between Inner and OUTER planets

Obviously, inner planets differ from outer planets in terms of energy, size and composition, but the hypothesis of equivalence with (or inflation from) atomic constituents also requires certain symmetry between the two groups of planets - they should be oppositely charged and spin entangled (or at least were initially).

The orientation of planetary magnetic fields goes in favour of the hypothesis - in one group of planets magnetic north is aligned with mass spin momentum vector, in other it is anti-aligned. Not only that, 3rd inner planet (Venus) relative to the main asteroid belt (*event horizon*) and 3rd outer planet (Uranus) from the belt seem to have inverted spins relative to other planets in the group. The fact that inversion occurs in the same place within the group (3rd planet relative to the asteroid belt) is further strengthening the hypothesis.

Note that spin of Uranus' real mass is more horizontal than vertical, but its obliquity is still over 90° so its original obliquity was likely the same as Venus' - 180°. The current obliquity is probably a result of later perturbation. However, Uranus' magnetic field is still pretty vertical (suggesting it is independent of real mass, not as sensitive to perturbation). It is anti-aligned to magnetic fields of other outer planets and aligned with the magnetic field of Earth, Mercury and Mars. Likewise, Venus' own magnetic field (when present) should be anti-aligned to the magnetic field of other terrestrial planets and Uranus, or at least it was originally.
Note also that, if symmetry is conserved over time (as it seems), magnetic reversals must be relatively synchronized between the entangled planets (eg. a magnetic reversal on Venus should be synchronized with a reversal on Uranus).

But, as it will be shown later, symmetry, relative to the asteroid belt, exists elsewhere too.

9.1. Ordered Structure

Planetary systems may be grouped into classes depending on architecture. These classes are:

- Ordered - where planetary masses tend to increase with distance form the star,
- Anti-ordered - where planetary masses tend to decrease with distance,
- Mixed - where masses show broad increasing and decreasing variations,
- Similar - masses of all planets are similar to each other (like *peas in a pod*).

Assuming now that planetary systems did form by the inflation of annihilating gravitons one can make certain predictions on class distribution.

Annihilation of a particle/anti-particle pair will generally produce (inflate) another two particles with opposite momenta. Now assume relatively simultaneous annihilation of many such graviton pairs where gravitons are components of larger systems (ie. larger particles) so this is annihilation of matter/anti-matter systems and inflation of new matter/anti-matter systems.

The expected outcome is thus clumping of matter (eg. observable universe) on one side and anti-matter on the other side.

Such inflation scenario together with mass oscillation makes it possible for Ordered and Anti-ordered classes to be much more represented than expected by conventional models of planetary formation. Each side could even have a preference for one class over the other.

Indeed, studies show that about 37% of observed planetary systems belong to Ordered class, while simulations based on conventional models typically produce about 1.5%[76]. No Anti-ordered systems

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have been observed (although some observation bias could exist - some systems may still contain undetected planets). Additionally, simulations predict 0% planets in habitable zones of Ordered systems, while in reality about 7% of these contain at least one planet in the habitable zone (The Solar System, in example, has 3).

Conventional models are obviously missing something, while observations go in favour of my hypotheses.

Another interesting structures going in favour of these hypotheses are binary systems. It is common for atoms of the same element to couple and form molecules, sharing electrons (eg. in a covalent bond).

Assuming such system of gravitons (with or without coupled real mass) is inflated, with acquired real mass it would form a binary planetary system with stars sharing planets in between. Molecular bond, however, could be broken in the process and stars may be separated by great distances. It would not be surprising then to find binary systems of *identical twins* even greatly separated. Indeed, studies show that *identical twins* are common and are commonly separated by hundreds or thousands of AU[77]. This is hard to explain by conventional star formation theories - at such distances masses are expected to be random.

10. Quantization of momentum

Previous works based on Titius-Bode law have shown that planetary orbits are quantized[78]:

$$r = ae^{2\lambda n}$$

More recently it has been shown that distances and orbital periods are consistent with quantized scaling[79] (stable orbits are in harmonic resonances), rather than logarithmic spacing - from the Sun reference frame.

> However, proper reference frame in this case is not the Sun, rather the asteroid belt.

If orbital radii are quantized, orbital (Keplerian) velocities are quantized.

Here, it will be shown that angular momentum is quantized (from a proper reference frame), as well as surface gravity.

> If QM cannot describe the Solar System as an atom, it is QM that should be revised, not reality.

Orbital and spin angular momenta are correlated.

> Note that spin radius cannot be 0 in CR. Every spin radius is thus orbital radius and if orbital radii are generally quantized, spin radii [and associated Keplerian velocities] should be too.

Gravitons (relative event horizons) are, in an ideal case (no electro-magnetic polarization and no relativistic deformation), sphere surfaces with a well defined radius. Mass spin radius and spin velocity of a body (particle) are radius and spin velocity of its gravitational maximum.

Surface gravity of a planet depends on real mass content (defining surface radius) of the well and mass of the graviton. Assuming ratio of used capacity to full capacity for real mass between the planets is roughly the same and assuming ratio of mass of a graviton to [the square of] its radius is equal between particles on the same energy level, surface gravities of planets will be correlated.

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If velocities and radii are quantized, and if momentum is quantized, gravitational mass must be quantized too.

If gravitational mass and radius of a maximum are quantized, its surface gravity must be quantized.

For outer planets, radius of the maximum is here hypothesized to be equal to what is currently defined as the surface radius (1 bar pressure level).

When quantized, orbital angular momentum satisfies the following equation in Bohr interpretation:

$$mvr = n\hbar$$

where $\hbar$ is a constant, n is a positive integer number and m, v, r are components of orbital angular momentum - mass, velocity and radius, respectively.

Using total mass of the planet for m will not reveal quantization. In example, using Neptune's mass of 1.02413 * 10^{26} kg and setting n to 5:

$$mvr = 5\hbar = 2.499714508 * 10^{42}\ Js$$

one obtains the scaled $\hbar$ (Planck's) constant for outer planets:

$$\hbar = \hbar_{m_2} = 4.999429016 * 10^{41} \approx 5 * 10^{41}\ Js$$

While the result is certainly interesting, the same $\hbar$ will not produce quantized momenta for other planets (it needs to be scaled).

The mass which should produce quantized angular momenta is, as previously established (equation Q1.4), img (or initial *real*) part of total mass.

However, if surface gravity is correlated with spin momentum, it must be correlated with orbital momentum too, and one may obtain the following equation for surface gravity (derived later, in chapter *G relativity and sensitivity*):

$$g = \frac{vr}{n\hbar} M_N g_N$$

where $\hbar$ is equal to the obtained $\hbar$ above, M_N and g_N are Neptune's mass and surface gravity, respectively.

n	planet	orbital velocity v (m/s)	orbital radius r (10^6 km)	total mass M (10^{24} kg)	required total mass (10^{24} kg)	calc. gravity g (m/s^2)	gravity (m/s^2)	acc. (m/s^2)
5	Neptune	5430	4495.06	102.413	102.413	11.15	11.15	11.00
5	Uranus	6800	2872.46	86.813	127.976	8.92	8.87	8.69
3	Saturn	9680	1433.53	568.340	108.084	10.565	10.44	8.96
1	Jupiter	13060	778.57	1898.190	49.168	23.225	24.79	23.12

Table 4. Calculated gravity for outer planets

In Table 5, required total mass is the total mass (gravitational energy) required to satisfy the quantization by the QM Bohr interpretation (showing how far it can be from reality) based on obtained $\hbar$ relative to Neptune, calc. gravity is calculated surface gravitational acceleration according to the equation above, while acc. is the surface acceleration taking rotation into account.

Protons and electrons are parts of two different universes (as difference in scale suggests), so one should use a different $\hbar$ constant for terrestrial planets (proton partons).

The angular momentum of Mercury (m = M = 3.3011 * 10^{23} kg):

$$mvr = 5\hbar = 9.053654959 * 10^{38}\ Js$$

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gives the scaled $\hbar$ constant for inner planets:

$$\hbar = \hbar_{m_1} = 1.810730992 * 10^{38}\ Js$$

Surface gravity for inner planets, using obtained $\hbar$, Mercury mass M_M and gravity g_M:

$$g = \frac{vr}{n\hbar} M_M g_M$$

n	planet (*mirror*)	orbital velocity v (m/s)	orbital radius r (10^6 km)	total mass (10^{24} kg)	required total mass (10^{24} kg)	calc. gravity g (m/s^2)	gravity (m/s^2)
5	Mercury (Neptune)	47360	57.91	0.330	0.33011	3.70	3.70
3	Venus (Uranus)	35020	108.21	4.868	0.14335	8.52	8.87
3	Earth (Saturn)	29780	149.6	5.972	0.12193	10.02	9.798
10	Mars (Jupiter)	24070	227.92	0.642	0.33006	3.70	3.71

Table 5. Calculated gravity for inner planets

In Table 6, showing calculated surface gravity for inner planets, required total mass is the total mass based on $\hbar$ relative to Mercury, while the *mirror* is an outer planet candidate for [magnetic] spin entanglement.

Quantization can also be shown without using mass (directly), through the volumetric space-time momentum (gravitational momentum):

$$gvr = nh\ [\frac{m^3}{s^3}]$$

With h obtained from above, substituting mass with gravity, the equation for gravity becomes:

$$g = \frac{vr}{nh} {g_0}^2\ ,$$

where g_0 is the gravity of Neptune, or, in case of terrestrial planets, the gravity of Mercury, and it yields the same results.

While the second equation will yield the correct results for gravity, the equation gvr = nh will not, showing the inverse coupling of gravity to momentum:

$$\frac{1}{g} vr = nh\ [ms]$$

This gives, for outer planets:

$$h = h_{g_2} = 4.378148126 * 10^{14}\ ms,$$

for inner planets:

$$h = h_{g_1} = 1.482496 * 10^{14}\ ms$$

Now, one can couple mass with gravity:

$$mvr = n\hbar_m,\ \frac{1}{g} vr = nh_g,\ \hbar_{mg} = \frac{\hbar_m}{h_g}$$

$$g = \frac{vr}{nh_g} = \frac{n\hbar_m}{m} \frac{1}{nh_g} = \frac{1}{m} \frac{\hbar_m}{h_g}$$

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$$g = \frac{\hbar_{mg}}{m},$$

and obtain relation to Sun's gravity:

$$r = \frac{n\hbar_m}{mv} = \frac{gnh_g}{v}$$

$$r^2 = n^2\hbar_m h_g \frac{g}{mv^2}$$

$$\frac{mr}{g}\frac{4\pi^2 r^3}{T^2} = n^2\hbar_m h_g\,[kg\,m^3]$$

$$mr^3\frac{g_S}{g} = n^2\hbar_m h_g\,[kg\,m^3] \rightarrow v^2 = rg_S$$

$$m^2 r^3 g_S = n^2{\hbar_m}^2\,[\frac{kg^2\,m^4}{s^2}]$$

where g_S is the gravity of the Sun at orbital radius r.

For outer planets:

$$\hbar_{mg} = \hbar_{mg_2} = 1.14190495 * 10^{27}\,\frac{J}{m} = 1.14190495 * 10^{27}\,N$$

For inner planets:

$$\hbar_{mg} = \hbar_{mg_1} = 1.221407 * 10^{24}\,N$$

The above obtained $\hbar_{mg}$ constants are based on total mass, for img mass, the quantum of gravitational force ($\hbar_{mg}$) may be treated as invariant between inner and outer planets (with properly defined *surface* gravity g):

$$\hbar_{mg} = 6.968267285 * 10^{20}\,N$$

Small deviation in calculated gravity from real gravity in tables 5 and 6 probably stems mainly from horizontal oscillation of surface gravity. Note, for example, with rotation taken into account (g_N = 11.0 m/s^2) calculated gravity for Saturn would match exactly the measured value of 10.44 (which is the value without rotation!). On the other hand, the gravity of Jupiter with rotation closely matches the calculated value (without rotation). This confirms that the definition of surface relative to fixed pressure (1 bar in this case) is appropriate for outer planets but should oscillate (cycle) between planets to take into account fossilization of a previous gravitational maximum in rotation period.

Correlation with rotation is expected, as conversion between electro-magnetic and gravitational potential affects both gravity and rotation of mass.

For terrestrial planets surface gravity is defined unrelated to pressure, as gravity at ground (sea) level. In case of Venus, the calculated value matches Venus' gravity at the transition zone between mesosphere and thermosphere.

For Earth, the value matches the transition zone between upper and lower mantle, or, if one calculates with constant mass, it is, just like in case of Venus, the value of height of the mesosphere/thermosphere transition zone, but negative (below surface). So, here too, the cyclic nature of surface gravity (and fossilization) is evident.

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The *constants* h ($\hbar$) and G (gravitational constant) are scale dependent, but they also must oscillate. The above results could thus be interpreted as due to oscillation of energy of space (as h/G directly depend on it).
This oscillation may be, for the electron, confined to the atom, at least at non-condensing temperatures.
Another interpretation for the excitations of G is the absorption of large scale external gravitational waves, however, these cannot explain the confinement of the oscillation to atoms.
In any case, when comparing small scale atoms with large scale atoms (eg. planetary systems), one must not only choose a proper reference frame and take into account the possible effects of measurement, but resolve the issues of QM - make *constants* (properties of space) relative, with proper attribution of relativistic effects.

If surface gravity and spin radius are both quantized, then mass must be quantized too:

$$g = \frac{GM}{{r_s}^2}$$

$$M = \frac{g}{G}{r_s}^2$$

g = gravitational acceleration
M = mass
r_s = radius

and, with all three orbital components quantized (m, v, r), the orbital angular momentum would now be quantized if mass would be the same for all inner/outer planets.

Indeed, looking at required total mass in Table 5, the sole required mass that doesn't match others well is that of Jupiter. But that can easily be solved, if one assumes that energy level n is 2 instead of 1.
It is similar for inner planets, setting n = 6 for Venus and n = 9 for Earth, yields good results.
Note that, with such changes, n would be decreasing with a decrease in distance from the Sun, for both outer and inner group of planets (expected if n is correlated with orbital harmonics).

However, masses between planets in some cases differ by multiple orders of magnitude so the img mass (large scale graviton mass) probably varies as well. But at least one solution for that exists - vertical mass oscillation of particles (equivalent to standard lepton mass oscillation, between generations).

Interestingly, similar planets (Venus/Earth, Uranus/Neptune) in this interpretation share the energy level (n). With Uranus/Neptune being outermost planets, and with expected symmetry, this suggests that the original orbit of Mercury (or, its graviton) was either between Earth and Mars or it was coupled to Mars (as already proposed in chapter *Quantum nature*).

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Indeed, a recent study provides strong evidence for Mars/Mercury coupling[80].

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Note that the following probably should be satisfied (with oscillations in superposition):

$$\frac{N}{P}\frac{\hbar_{m_2}}{\hbar_{m_1}} = \left(1 - \frac{h_{g_1}}{h_{g_2}}\right)\frac{\hbar_{m_2}}{\hbar_{m_1}} = \frac{m_p}{m_e},$$

where m_p, m_e are masses of standard proton and electron, respectively. The factor N/P is the ratio of neutrons to protons in the Solar System atom. The relative high excitation of Mars (n = 10) and low excitation of Jupiter (n = 1) can then be correlated with a 6p4n (^{10}C) state.

Some examples of planetary configurations for various states is shown in Table 7.

base	state	N/P	surface gravity/orbital distance examples
Carbon	6p4n	4/6 = 2/3	Mercury 3.7 (0.25 MAU, n=5), Venus 8.87 (0.5 MAU, n=3), Earth 9.798 (0.66 MAU, n=3), Mars 3.71 (1 MAU, n=10)
Boron	5p5n	5/5 = 1	Mercury B 3.32 (0.2 MAU, n=5), Venus/Earth A 5.25 (0.5 MAU, n=5), Earth B/Mars 6.43 (0.75 MAU, n=5)
Beryllium	4p6n	6/4 = 3/2	Venus/Earth A 1.85 (0.25 MAU orbit, n=10), Earth B/Mars 37.1 (1 MAU, n=1)

Table 6. Examples of discrete surface gravity and orbital distance for inner planets

Another evidence of entanglement between standard systems and planetary systems.

As all *constants*, constant masses of standard protons and electrons are a superposition of oscillation. As with the $\hbar$ constant, the oscillation can be detected on large scale.
On standard (U_0) scale, proton to electron mass ratio is:

$$\frac{m_p}{m_e} = 1836.15267343(11)$$

On U_1 scale:

$$\frac{N}{P}\frac{\hbar_{m_2}}{\hbar_{m_1}} = 1840.66694172611441$$

$$\left(1 - \frac{h_{g_1}}{h_{g_2}}\right)\frac{\hbar_{m_2}}{\hbar_{m_1}} = 1826.09096003909666$$

From these, the value of superposition might be obtainable using the EH operator, eg. using 12/4 for the 1st order approximation:

$$EH_{12/4}(,\lambda) + \left(1 - \frac{h_{g_1}}{h_{g_2}}\right)\frac{\hbar_{m_2}}{\hbar_{m_1}} = \frac{m_p}{m_e} = 1836.182024284$$

$$\lambda = \frac{N}{P}\frac{\hbar_{m_2}}{\hbar_{m_1}} - \left(1 - \frac{h_{g_1}}{h_{g_2}}\right)\frac{\hbar_{m_2}}{\hbar_{m_1}} = \left(\frac{h_{g_1}}{h_{g_2}} + \frac{N}{P} - 1\right)\frac{\hbar_{m_2}}{\hbar_{m_1}}$$

The correlation of the Solar System with carbon is interesting, as it suggests that the base element for life may be strongly correlated with system configuration. In that case, life in non-carbon planetary systems may not be carbon-based (which would in most cases probably imply changes in *magic* numbers for atoms as well) or may be less abundant due to lower abundance of carbon.

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10.1. Proper quantization in QM

If one wants to compare the Solar System with a room temperature equivalent of a carbon atom in the context of QM, one must account for the effects of exchange of em potential with neutral gravitational potential, mass condensation and lepton oscillation.

In that case, img mass component of the total initial momentum (Q1.3, Q1.4), which is equal (relatively, but difference is negligible) between bound electrons, is the correct mass to be used in comparison.

Total initial momentum is the angular momentum, it is quantized and for all electrons in ground state should be equal to:

$$m_{img}\, v_{tot}\, r_a = \frac{1}{2}\hbar$$

However, generally, total momentum is the sum of orbital and spin components.

The radius of electron in an atom is equal to its orbital radius when in a delocalized form. Only upon spin localization, the momentum splits into two components (although orbital momentum can be quantized by smaller spin momenta as well).

Each quantum sub-shell may contain up to 2 electrons. If these are in condensed form, their momenta are strongly coupled, they will *behave* as a single body, and the proper equation for the magnitude of total angular momentum per sub-shell is:

$$m_{img}\, v_{tot}\, r_a = \sqrt{l(l+1)}\hbar + s\hbar \qquad \text{(Q2.1)}$$

$$v_{tot} = v_a + v_s = v_a + \frac{2\pi R_s}{T_s}$$

R_s = spin radius
T_s = spin rotation period

where s is the total [magnetic] spin of electrons in a sub-shell.

Note that here obliquity to orbit was not taken into account, it is assumed that primordial total velocity does not depend on it. For the same reason, it is assumed that the component of total momentum that transformed into the spin momentum is equal to its projection on the z axis once localized. In other words, it is the process of localization which produces obliquity in the spin momentum, in such way that the previous total spin magnitude now becomes a projection (added momentum is perpendicular to the original - see Figure 1). Localization is thus adding energy to the particle (inflating spin radius/mass in this interpretation), or removing energy from the particle (in case of negative s), which should not be surprising.
There are various interpretations for the primordial spin component being equal to the standard projection. One of them is spin component annihilation.
Generally, two fermionic particles have to have anti-aligned spin (eg. -1/2 and +1/2) to occupy the same sub-shell, however, with the exchange of electro-magnetic potential for gravitational potential some spin components may be annihilated. The annihilation of spin can be confined to single axis, thus it should be possible for a sub-shell to have 0 total spin even if it is occupied by a single particle (1e). It is also possible for total spin to be equal to 1 in 2e states, but this may indicate that conversion started with 2 particles separated (or in a triplet state - where magnetic spins are aligned).
Therefore, here spin momentum magnitude s can have the following values: 0, ±1, ±1/2.

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Another, probably more likely, interpretation of integer spins in 1e states is pairing with neutral fermions (eg. neutrinos). In any case, the above values of s probably represent local singlet, doublet and triplet states of coupled particles. Note that out of 4 largest bodies in the main asteroid belt that are supposed to represent primary anti-neutrinos, only Ceres is classified as a dwarf planet and has the most energy to remain active (alive). Other three (Vesta, Pallas, Hygiea) are not in hydrostatic equilibrium and probably represent dead bodies of dwarf planets. In that case, where are the gravitons (naked anti-neutrinos) that were coupled with these bodies? I believe they are coupled with certain terrestrial planets. Similarly, if the 6 hypothesized primary neutrinos are limited to dwarfs in the Kuiper belt region (which apparently does contain 6 dwarf planets) and further limited to most massive, or those in resonance with Neptune, some of these could be missing (being coupled to outer planets).
However, since the main asteroid belt contains 4 dwarf bodies (matching exactly the hypothesized number of primary anti-neutrinos) while the Kuiper belt contains 6 dwarf bodies (matching exactly the hypothesized number of primary anti-neutrinos), I'm inclined to consider that neutrinos (or anti-neutrinos) do not like sharing shells with other neutrinos (anti-neutrinos) - they prefer coupling to *electrons/positrons* if these are not already paired. Just like in case of main asteroid belt, where 3 bodies are dead, 3 bodies in Kuiper belt are likely dead as well. These are probably bodies not in resonance with Neptune - Salacia, Quaoar, and Makemake.
Note that any celestial body coupled to a localized U_1 graviton should be in hydrostatic equilibrium (once fully formed), however, the body can remain in hydrostatic equilibrium for significant time even after death, although its activity should be generally decreasing and it should be more vulnerable to disturbance.

Since the value of m_{img} here is constant, its value is irrelevant to prove QM equivalent quantization. For the sake of argument, let it be equal to $7 * 10^{19}$ kg (although it's probably much bigger in case of outer planets).

In the 6p4n (^{10}C) interpretation, Jupiter has to represent 2 particles (2e configuration) so it is appropriate to derive $\hbar$ from its momentum.

Assuming n = 1 (as expected) for Jupiter, l must be equal to 0, with s equal to 1, the $\hbar$ is:

$$\hbar = m_{img}\, v_{tot}\, r_a = 1.382 * 10^{36}\ Js$$

Derived values of l and s (and obtained $\hbar$ using these values) for all the outer planets are shown in Table 8.

n	conf.	l	s	planet	orbital vel. v_a (m/s)	orbital radius r_a (10^6 km)	spin vel. v_s (m/s)	spin radius R_s (km)	spin rot. period T_s (h)	calc. $\hbar$ (Js)
5	1e	1	1/2	Neptune	5430	4495.06	2668	24622	16.11	$1.3310 * 10^{36}$
5	1e	1	0	Uranus	6800	2872.46	2568	25362	17.24	$1.3319 * 10^{36}$
3	2e	1	0	Saturn	9680	1433.53	9538	58232	10.656	$1.3636 * 10^{36}$
1	2e	0	1	Jupiter	13060	778.57	12293	69911	9.9250	$1.3817 * 10^{36}$

Table 7. Obtained values for l, s and $\hbar$ for outer planets

The obtained value of $\hbar$ for Uranus shows remarkable agreement with Neptune. The $\hbar$ values for Saturn and Jupiter still agree well with Neptune's $\hbar$ (up to the second decimal), but increase in value with increase in spin radius is obvious. Likely reason for this is oscillation of spin velocity (radius) as noticed previously in quantization of gravitational momentum. Note that this is equivalent to $\hbar$ oscillation, if one is to conserve discrete quantum numbers.

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However, the orbital radius oscillates too. Note that orbital velocity is almost equal to spin velocity for planets in 2e configuration (Jupiter and Saturn). Setting orbital velocity equal to equatorial spin velocity and decreasing spin velocity proportionally yields much better results for Jupiter:

$$\hbar = m_{img}\, r_a\, v_{tot} = m_{img}\, r_a \left(\frac{v_e}{v_a} v_a + \frac{v_e}{v_a} v_s\right) = 1.33 * 10^{36}\, Js$$

v_e = 12571 m/s

and, similarly, for Saturn:

$$\hbar = m_{img}\, r_a\, v_{tot} \frac{1}{\sqrt{2}} = m_{img}\, r_a \left(\frac{v_a}{v_e} v_a + \frac{v_a}{v_e} v_s\right) \frac{1}{\sqrt{2}} = 1.3372 * 10^{36}\, Js$$

v_e = 9871 m/s

These results show that constants in QM are the result of superposition (average) of oscillating values.

One may attempt to do the same with positive charges (terrestrial planets), however, here, determination of spin radius is more challenging and spin rotation period is not primordial.

Instead of using matter (real mass) velocity, better results should be obtainable using primordial space (Keplerian) velocity at R_s:

$$v_s = \frac{2\pi R_s}{T_s} = \sqrt{\frac{GM}{R_s}}$$

G = G_0 = standard gravitational constant = 6.674 * 10^{-11} m^3/kgs^2

One possible configuration is shown in Table 9 (with l and s of Earth/Mercury mirroring Saturn/Jupiter, Venus/Mars mirroring Uranus/Neptune, and spin velocity of Mercury set to its perihelion velocity).

n	conf.	l	s	planet	total mass (10^{24} kg)	orbital vel. v_a (m/s)	orbital radius r_a (10^6 km)	spin vel. v_s (m/s)	spin radius R_s (m)	calc. $\hbar$ (Js)
10	2e	1	1/2	Mars	0.642	24070	227.92	27650	56044	4.3107 * 10^{35}
3	2e	1	0	Earth	5.972	29780	149.6	28435	492971	4.3107 * 10^{35}
3	1e	1	0	Venus	4.868	35020	108.21	45462	157195	4.3107 * 10^{35}
5	1e	0	1	Mercury	0.330	47360	57.91	58980	6333	4.3107 * 10^{35}

Table 8. Possible configuration of inner planets

Note that roughly the same $\hbar$ for Earth can be obtained by setting l to 1, s to -1/2, and spin velocity equal to Keplerian velocity at surface (the value of s should probably be generally negative for terrestrial planets, as suggested by smaller spin radii/mass compared to outer planets).

Note that spin radius R_s should correspond to a detectable discontinuity. By these results, this may be the inner inner core boundary or a dipole offset.

However, proper spin radius equivalent to the spin radius of outer planets can be calculated.

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From Q1.2 - Q1.5 follows that the current mass of a planet is the result of conservation of momentum (and velocity in it) during collapse of the orbital (*non-localized*) maximum to a spin maximum:

$$m_{img}\, v_s\, r_a = m_{re}\, v_s\, r_s \tag{Q2.2}$$

With m_{img} equal to $7 * 10^{19}$ kg and with the assumption that r_a is, for all terrestrial planets, equal to current orbital radius, spin radius is:

$$r_s = \frac{m_{img}}{M} r_a$$

n	conf.	planet	total mass M (10^{24} kg)	orbital radius r_a (10^6 km)	spin radius r_s (m)
10	2e	Mars	0.642	227.92	24851090
3	2e	Earth	5.972	149.6	1753428
3	1e	Venus	4.868	108.21	1556019
5	1e	Mercury	0.330	57.91	12283939

Table 9. Calculated spin radius for inner planets

Here, spin radius should correspond to charge radius. However, obtained radii for Mercury and Mars appear to be too large, indicating that either the collapse did not occur at r_a or there were additional collapses.

Interestingly, calculated spin radius of Mars is roughly equal to radius of Neptune. It is also roughly equal to orbital radius of Deimos, the outermost moon of Mars, which may be interpreted as evidence of Mars' primordial charge radius and a source of quantization of Moon radii.
If that is indeed the case, remains of moon charges of Mercury might also be present about the 12k km orbit and small deviation between the obtained spin radius and the orbit of Deimos may be attributed to oscillation of radii or mass (real mass of $6.6 * 10^{19}$ kg gives the orbit of Deimos).
I believe current moons of Mars are remains of a larger moon, or moons, the gravitons of which have collapsed into Mars in the process of planetary neurogenesis (hypothesis which will be presented later), thus, it is possible the original orbit was equal to obtained spin radius.
Collapse of moons in this process is simultaneous with the recession of a planet's magnetic field. Moons with a distinct large scale graviton are thus entangled with the magnetic dipole of the planet.UPDATE 2022.03.07:

Indeed, recent research suggests that large satellites (moons) are required to sustain the magnetic fields of terrestrial planets[81]. If the obtained primordial radius is interpreted as a localized ground state radius and, assuming negative excitation for inner planets, the excited radius [for terrestrial planets] may be the ground radius divided by n.
For Mercury and Mars, this gives roughly the radius of Mercury (2x radius of Mars' core, 2x radius of Earth/Mercury inner core).
For Earth, this gives the inner inner core radius or possibly dipole offset maximum (the dipole offset orbital [radius] thus being the real charge radius, opposed to the induced one in the outer core).
Note that, core differentiation into molten outer and solid inner part should probably be associated with 2e configuration. Both Mercury and Earth are hypothesized to be in 2e configuration and both presently do have differentiated cores. Current data on Mars indicates its core is likely

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entirely liquid, again, consistent with hypothesized 1e configuration. The same should thus be true for Venus.
However, even in 1e configuration, core splitting is expected in the early stage of planet development and may even periodically occur in adult form. This should probably be interpreted as relatively temporary coupling of the particle with a neutrino. Generally thus, it is the integer value of s (or perhaps only a triplet state, where s=1?) that is a primary signal of a differentiated core.
If Solar System gravitons are oscillating between ^{10}C and ^{10}Be configuration, even with the change in scale [of a graviton], Mars must periodically exist in 2e configuration (acquiring one of Earth's gravitons, while Earth acquires Venus' graviton).
Even if the lifetime of the ^{10}Be configuration may be short, created temperature difference in the core should be sustainable over longer periods of time if the collapse of the 2e configuration *induces* splitting of the 1e maximum into 2 quanta (or pairing with a neutrino).
Since both Mars and Venus appear to have been habitable on surface some time ago, both must have been in such configuration. The switch most likely occurs with the end of a 1st order Solar System cycle (4.25 Gy), but it likely also has precursors of shorter duration with the end of 2nd (≈26 My) and possibly even 3rd (1.512 My) order cycles.
There is a high possibility that Mars' surface (or at least part of it) becomes *habitable* for a *short* period of time with the end of each cycle, not only when these are synchronized with the end of a major (1st order) cycle.
In any case, as we apparently are at the end of at least a 2nd order cycle, the magnetic field of Mars could be [partially] restored within a decade or a couple of decades, and, once it is stabilized, should persist for millions of years.
If 1e configuration can effectively morph into a 2e equivalent, two maxima of 2e configuration can certainly fuse into the 1e equivalent maximum (which could be, again, interpreted as neutrino acquisition and reconfiguration - into a doublet state in this case). Generally, this happens when a planet reaches the adult stage (acquired real mass with its own gravity stimulates inflation of the inner core maximum), but the same effect can also be achieved with suspended animation (spin momentum), as demonstrated by Mercury.
Simultaneously with increasing habitability of Mars, one can thus expect decreasing habitability of Earth.

However, here the actual value of m_{img} is important and another interpretation is possible - the initial assumption of great symmetry may be wrong. While outer planets correspond to electrons of an atom, the inner planets correspond to parts extracted from the nucleus and these may not all be positrons and not even leptons (rather quarks). In that case, chosen m_{img}, while it gives good results for Venus and Earth, is not appropriate for Mercury and Mars - it should be smaller.

Assuming m_{img} smaller by the ratio of mass between Earth and Mercury, one obtains a charge radius for Mercury of 679 km and 1373 km for Mars, which seem to be appropriate.

There are different possible interpretations of m_{img}. It could be interpreted as the total mass of a naked particle (graviton of particular scale) before coupling (in CR, naked or non-localized particles have non-zero mass, although, if total mass is the sum of real and img mass - as defined in CR[82], the img component of mass in this case would be zero).

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10.1.1. Formation of moons

In the previous determination of spin radii, the configuration (2e vs 1e) was not taken into account. However, even in case of 1e configuration, particles are [at least occasionally] likely paired with primary neutrinos and thus effectively in 2e configuration (the difference is in smaller m_{img} for neutrinos). All terrestrial planets should thus have 2 major gravitational maxima (which may be further split into smaller maxima). Therefore, obtained spin radii should be understood as superposition or average between the two (as such, it probably represents a gravitational minimum and possibly a charge radius as well).

All terrestrial planets are thus formed from two bodies. In case of coupling with neutrinos, the other body must have had a mass of a dwarf planet. By the hypothesis, Earth is not paired with a neutrino, and should have thus formed through the collision with a body of mass on the order of mass of terrestrial planets. Conventional theories assume that this body (Theia) had a mass at least about that of Mars. All these collisions must have produced satellites (moons), however, in case of collisions with dwarf planets (neutrinos) these moons are likely to be shorter lived.

The creation of Earth and the Moon probably proceeded as follows. The two gravitons were initially in a superposition which had a radius roughly equal to current orbital radius of Earth. One maximum collapsed to radius roughly equal to current Earth inner core radius while the other collapsed to radius of about 3 times the current Earth radius. As it started acquiring additional mass, it collapsed again to the radius of current Earth's mantle and, together with the core [maximum], now forms Earth. With the collapse, a smaller quantum of energy (gravitational maximum of smaller mass) was *emitted* away (and is still receding from the system) to form the Moon.

Assuming naked core graviton radius r_c equal to 1206115 m, with mantle mass 3 times the core mass, the radius of the naked mantle graviton (before coupling and eventual additional splitting) should be $\sqrt{(2^3)}\ r_c$ = 3411408 m. With coupling the two radii increase (in terrestrial planets naked gravitons generally have significantly lower mass than coupled real mass making them more sensitive to deformation), the core maximum increases to $\sqrt{(2^1)}\ r_c$ = 1705704 m.

> Note that this is roughly equal to the previously obtained spin radius of superposition and would be equal to radius of superposition assuming initial Earth orbital radius of roughly 0.63 MAU, instead of current 0.66 MAU. It is also roughly equal to the Moon's radius, which is probably not a coincidence.
> Note also that original radii have been effectively fossilized as discontinuities between inner and outer core and between outer core and mantle (although these two may have somewhat expanded as well).

The mantle maximum increases proportionally, to $\sqrt{2}\ \sqrt{(2^3)}\ r_c$ = 4824459 m (note that the Earth/Moon mass barycentre, currently equal to 4637220 m, may be receding toward this value). I assume that this maximum had additionally split into multiple maxima, correlated with mantle discontinuities and mantle differentiation.

Knowing Theia's mass, using equation for spin radius obtained from Q2.2, one can obtain initial orbital radius of the Moon (formation radius). Assuming mass of Theia equal to Mars' mass, the Moon's formation radius is:

$$r_s = \frac{m_{img}}{M} r_a = 16311526\, m$$

$m_{img} = 7 * 10^{19}$ kg
$M = 6.42 * 10^{23}$ kg
$r_a = 149.6 * 10^{9}$ m

This is lower than the Roche limit (≈18000 km) for current densities/radii of Earth and the Moon. Thus, either these were somewhat different at the time of Moon formation or the newly formed Moon

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lost some mass through tidal interactions (which then may have formed a relatively short-lived second moon).

> Note that this requires the Moon had sufficient radial momentum to escape the complete destruction. Conservation of momentum with the collapse and *emission* does imply that.

Another possibility is that Theia had a bit lower mass than assumed ($\leq 5.79 * 10^{23}$ kg). However, alternative formation scenarios are possible. Theia might have had a larger mass, resulting in larger radial momentum for ejecta. For Theia mass equal to 0.4 $M_{\oplus}$, r_s is equal to 4437 km.

> Note that conventional theories on formation of planetary systems have very tight constraints and thus low probabilities for the formation of systems like the Earth-Moon system, while the model involving large scale gravitons effectively implies creation of such a system with the collapse (localization) of gravitons.

If all terrestrial planets have moons with significant mass for some periods during evolution they also should have magnetic fields on the surface during these periods. With the rate of evolution inversely proportional to mass (as it will be shown later) it is then probably safe to assume that most of them also evolve surface habitability during these periods of time (although complex lifeforms may be limited to the habitable zone). Just like the formation of moons and the magnetic field, the habitability then effectively becomes a coded event as well. In favour of this hypothesis goes the, conventionally hard to explain, roughly equal obliquity to orbit between Earth and Mars (which is here coded as well - in the quantized inclination of naked large scale gravitons). Lack of such obliquity in Mercury and Venus can be explained with coupling to neutrinos which then results in differential motions between planet's core and mantle. This, coupled with tidal interaction with the Sun tends to relatively quickly erase the fossilized obliquity after the moons are lost. Note that Mars' obliquity is fossilized obliquity and as such (with no large moon present) it is unstable. However, I hypothesize that moons are periodically reformed (periodicity being probably equal to hypothesized periodicity of Solar System 2nd order cycles) and the current high value of Mars' obliquity could indicate a relatively imminent moon formation (causality/synchronization here is significantly relative so the obliquity can precede moon formation). The mass of Phobos and Deimos could be then recycled in this event.

> Note that rotation periods of Mercury and Venus are comparable to their orbital periods (close to being tidally locked to Sun), their mass spin momentum is effectively non-existent relative to the Sun. This may be normal for two particles in 2e configuration with anti-aligned mass spin momentum, suggesting that Earth and Mars may be in 1e configuration, however, there is no reason for mass spin momenta in relative superposition to be anti-aligned (also, slow rotation does not imply 2e configuration, it's probably common for dead planets, regardless of configuration). Anti-alignment is required for particles sharing the same quantum state but gravitons *within* the planet can be in different states. In the example of Earth there are two mass radii, associated with n = 1 and n = 4. Mass spin alignment is probably generally valid for couplings of any two equally charged particles (probably due to anti-aligned charges occupying the energy levels in between, in equilibrium). In case of coupling with non-charged particles like neutrinos, however, two neutral (mass) gravitons could be generally anti-aligned.
> Thus, particles have both neutral and charged gravitons and only two gravitons can share the same state, regardless of their nature (neutral or charged). Note that particles generally

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have multiple constituent charged gravitons (of different polarity) and since energy levels are mirrored between different charges, there are [negative] levels below the level of superposition (n = 0) occupied by the opposite charge.

10.2. Quantization of radii and gravity

From:

$$\frac{1}{g}vr = nh_g$$

and:

$$v^2 = rg_s = r\frac{GM_\odot}{r^2} = \frac{GM_\odot}{r}$$

follows:

$$r = n^2\frac{g^2{h_g}^2}{GM_\odot} = n^2\frac{GM^2{h_g}^2}{{r_s}^4M_\odot} \tag{Q2.3}$$

While, from Q2.1 and Q2.2, orbital radius is:

$$r = \frac{1}{m_{img}v_{tot}}\left(\sqrt{l(l+1)}+s\right)\hbar = \frac{1}{m_{img}\left(\sqrt{\frac{GM_\odot}{r}}+\sqrt{\frac{GkM_\odot}{r}}\right)}\left(\sqrt{l(l+1)}+s\right)\hbar$$

$$r = \frac{1}{{m_{img}}^2GM_\odot\left(1+\sqrt{k}\right)^2}\left(\sqrt{l(l+1)}+s\right)^2\hbar^2 \tag{Q2.4}$$

For outer planets:

$$\hbar = g_0\, h_g\, m_{img} = 1.3310 * 10^{36}\, Js \tag{Q2.5}$$

Here, square root of k is another quantum momentum magnitude [sum], shown in Table 11.

n	configuration	l	s	planet	$\sqrt{k}$
5	1e	1	1/2	Neptune	$\frac{1}{2}$
5	1e	1	0	Uranus	$\sqrt{\frac{1}{2}\left(\frac{1}{2}+1\right)}-\frac{1}{2}=\frac{\sqrt{3}}{2}-\frac{1}{2}$
3	2e	1	0	Saturn	1
1	2e	0	1	Jupiter	$\sqrt{\frac{1}{2}\left(\frac{1}{2}+1\right)}=\frac{\sqrt{3}}{2}$

Table 10. Obtained k momentum for outer planets

From Q2.3 and Q2.4 follows that surface gravity is quantized:

$$g = \frac{1}{n}\frac{\left(\sqrt{l(l+1)}+s\right)}{\left(1+\sqrt{k}\right)}g_0$$

where g_0, equal to 43.43 m/s^2, is the quantum of gravity.

From Q2.3 and with total mass equal to:

$$M = m_{re} = m_{img}\frac{r_a}{r_s} = m_{img}\frac{r}{r_s}$$

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follows that spin radius r_s is quantized too:

$$r_s{}^6 = n^2 r \frac{G m_{img}{}^2 h_g{}^2}{M_\odot}$$

Combined with Q2.4 and Q2.5:

$$r_s{}^3 = n \frac{\left(\sqrt{l(l+1)} + s\right)}{\left(1+\sqrt{k}\right)} \frac{\hbar^2}{g_0 m_{img} M_\odot}$$

$$r_s = \left[n \frac{\left(\sqrt{l(l+1)} + s\right)}{\left(1+\sqrt{k}\right)} \frac{g_0 m_{img} h_g{}^2}{M_\odot} \right]^{\frac{1}{3}}$$

Note that the constant on the right is, for m_{img} = 7 * 10^{19} kg, equal to:

$$\frac{g_0 m_{img} h_g{}^2}{M_\odot} = 2.93050621 * 10^{20}\, m^3$$

apparently an integer multiple of the speed of light on U_1 scale (2.93 * 10^6 m/s).
For Neptune this gives spin (charge) radius equal to half of the current surface radius - as expected, like in case of Earth, real charge radius should be half of the mass radius of the maximum (for Earth, mass radius of the maximum is the inner core radius).
Note that dipole offset for Neptune is roughly half the radius, consistent with the result.
For m_{img} equal to 5.6 * 10^{20} kg, one gets the mass radius of the maximum (surface radius).
The result is similar for Uranus.
Note that the equation might not give accurate current spin radius for Jupiter and Saturn. Reason for this may be that the initial assumption of current radius being equal to collapse radius (r_a = r) is not valid, however, more likely explanation is oscillation of mass (and therefore, spin radius) - even if the Solar System is carbon-like, its negative and positive charge components are not necessarily all electrons and positrons.
Inflation of mass can be asymmetric due to lepton oscillation.
However, the result for Jupiter gives radius exactly two times the dipole offset of Saturn in surface radius relative units (2 x 0.03778 R = 0.07557 R), but roughly 2/3 the actual dipole offset of Jupiter (0.119 R). The value is also equal to dipole offset of Earth (0.076 R).
On the other hand, the result for Saturn gives radius 0.146 R (4 x 0.0365 R), closer to dipole offset of Jupiter.
Again, these results suggest the cause for deviation is oscillation.

For inner planets, the constants are different:

$$h_g = h_{g_1} = 1.482496 * 10^{14}\, ms$$

$$\hbar = g_0\, h_g\, m_{img} = 4.5069360896 * 10^{35}\, Js$$

and possible quantization parameters, along with the calculated spin radius, are shown in Table 12.

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n	conf.	l	s	planet	$\sqrt{k}$	spin radius (m)
10	2e	1	1/2	Mars	$\sqrt{\frac{1}{2}\left(\frac{1}{2}+1\right)}+\frac{1}{2}=\frac{\sqrt{3}}{2}+\frac{1}{2}$	6477988
3	2e	1	0	Earth	1	4146215
3	1e	1	0	Venus	$\sqrt{\frac{1}{2}\left(\frac{1}{2}+1\right)}+\frac{1}{2}=\frac{\sqrt{3}}{2}+\frac{1}{2}$	3920325
5	1e	0	1	Mercury	$\sqrt{\frac{1}{2}\left(\frac{1}{2}+1\right)}+\frac{1}{2}=\frac{\sqrt{3}}{2}+\frac{1}{2}$	4140950

Table 11. Possible quantization parameters and spin radii for inner planets

Note that the above parameters for Mars' orbital radius give a perihelion rather than a semi-major axis, suggesting that it (and generally, planets with large eccentricity) may be in a superposition of two quantum states.

Results for spin radius are obviously wrong, most likely reason for this is the bad h_g constant as it is based on gravity at surface radius, which, for inner planets, is not defined as the radius of a graviton.

However, correlation with dipole offsets is still present. Calculated spin radius of Earth/Mercury is almost exactly 10 times the experimentally obtained dipole offset of Mercury (414.7 km).

If the assumption of charge radius being 10 times lower than calculated spin radius for terrestrial planets is valid, somewhat larger current offset for Earth (484.7 km from centre) must be the result of oscillation (superposition) and faster rotation.

Consistent correlation of results with dipole offsets suggests the primary or primordial source of magnetic dipoles in planets is concentrated (collapsed) orbiting charge with a large spin momentum close to the dipole offset radius, rather than currents induced with Coriolis force in outer parts of differentiated cores.
In fact, deviation of a dipole offset from calculated value should, in some part, be due to induced currents rather than oscillation.
In that case, faster rotation rates and greater liquid mass would introduce greater deviation. This is consistent with obtained results, as Jupiter and Saturn do rotate much faster than Uranus and Neptune, while Earth rotates much faster than Mercury.
However, as calculated and experimentally obtained dipole offsets both seem to be multiples of ≈0.034-0.038 R, only deviation from integer multiples of that quantum may be attributed to induced currents, the rest is more likely due to [quantized] oscillation.

Using the radius of the [inner] gravitational maximum for Earth (1206115 m), one obtains [the proper?] h_g constant for charge radius calculation of inner planets:

$$h_g = h_{g_1} = \frac{vr}{gn} = 5.419815085 * 10^{12}\, ms$$

v = Earth's orbital velocity = 29780 m/s
r = Earth's orbital radius = 149.6 * 10^9 m
g = gravity of the maximum with GM equal to current total GM = 274 m/s^2
n = 3

Results obtained using this constant are shown in Table 13.

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n	conf.	l	s	planet	$\sqrt{k}$	spin radius (m)
10	2e	1	1/2	Mars	$\sqrt{\frac{1}{2}\left(\frac{1}{2}+1\right)}+\frac{1}{2}=\frac{\sqrt{3}}{2}+\frac{1}{2}$	713566
3	2e	1	0	Earth	1	456716
3	1e	1	0	Venus	$\sqrt{\frac{1}{2}\left(\frac{1}{2}+1\right)}+\frac{1}{2}=\frac{\sqrt{3}}{2}+\frac{1}{2}$	431833
5	1e	0	1	Mercury	$\sqrt{\frac{1}{2}\left(\frac{1}{2}+1\right)}+\frac{1}{2}=\frac{\sqrt{3}}{2}+\frac{1}{2}$	456136

Table 12. Possible quantization parameters and spin radii for inner planets, with corrected h_g

These are now much closer to dipole offsets. Difference should be attributed to oscillation.

Models of the dipole location of Earth indeed show oscillation, in the last 10000 years it has oscillated from the maximum of 414.7 km (equal to the dipole offset of Mercury) in the western hemisphere to the maximum of 554.7 km in the eastern hemisphere[83].

Dipole offset in current models is thus a superposition (arithmetic mean) of these two maxima (484.7 km).

The agreement of 414.7 km maximum with the dipole offset of Mercury suggests that either:

- the influence of rotation on the offset is negligible,
- rotation stops once the maximum is reached,
- induced currents are created at the expense of primary charge, effectively transferring the charge radius from inner core to outer core.

Possibly, this is the effect of conservation of momentum, where spin of the primary charge is reduced at the expense of core rotation.

10.3. Lepton oscillation model

In the previous chapter it was hypothesized that the discrepancy between the QM model of the atom and the Solar System can be resolved by lepton oscillation.

This can be solely mass oscillation, which requires external energy, or the oscillation of general force *flavour* which does not require much external energy as mass is inflated with the exchange of polarized (electro-magnetic) potential for a neutral gravitational potential (it does need stimulation though, most likely by resonance - synchronization).

However, while general force flavour has certainly been changed to [dominantly] neutral with the change in vertical energy level, difference in mass between the outer planets is too large compared to the difference in electro-magnetic energy to be explained by general force oscillation alone.

If the Solar System has been inflated, as hypothesized, from a smaller scale atom (or superposition of atoms) or equivalent (eg. photons), then likely there was enough energy for superposition of electron mass eigenstates. Taking into account that these electrons are also neutralized, superposition becomes even more likely (charged leptons repel) due to lower energy requirements.

> With oscillation and inflation taken into account, the fact that planets of the Solar System have different masses goes in favour of it being the atom, rather than against it.

However, the excess energy left after the vertical energy level increase (inflation) may not be the only source of superposition. Most energy in the vertical energy level change is spent on inflation - not flavour oscillation, so even without inflation, the flavour oscillation energy can be provided by the nucleus or absorption of properly scaled gravitational waves.

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Atoms which are not under influence of strong external magnetic fields may be dominantly in neutral or oscillating configuration, regardless of scale - there is a lot of energy for mass oscillation in nucleons.
If neutrinos oscillate in flight they must be absorbing energy in space, but their flavour may instead be predetermined with oscillation of particles inside the atom. In fact, lepton oscillation [of electron scale particles] might be confined to atoms if discharge of outermost particles is synchronized with their mass flavour being in ground (lowest energy) state in the form of electron.
There is no such requirement for neutrinos as their mass is much lower than that of the electron. Probability of discharge of masses greater than electron mass might be simply too low due to much greater gravitational attraction.

With no absolute constants allowed and implied oscillation of relative *constants*, oscillation in the energy of space is predicted by CR.

With no oscillation, in the Solar System, the inner planets would all be in positron equivalent states, while outer planets would be scaled electrons.

Note that, with em force almost completely neutralized (especially for inner planets), due to equal energy of positrons and electrons there are no large differences between these particles, apart from anti-alignment of magnetic spins.
One might ask why and how are positrons created (extracted) here? The answer is in neutralization - when charged they balance the electrons and, most likely, they are, together with neutrinos (main dwarf planets), the result of β^+ decay of protons. However, due to charge neutralization, instead of being ejected from the nucleus, they remain bound to it.
The β^+ process implies that each positron ($1e^+$ terrestrial planet) or positron pair ($2e^+$ terrestrial planet) is entangled with a specific neutrino ($1\nu_e$ main dwarf planet) or a neutrino pair ($2\nu_e$ main dwarf planet) since the entangled pairs have been created at the same time, through the intermediate W^+ boson.
Note also, that, in order for the equation Q1.1 to remain valid, the mass excitation of Neptune must be equal to the [scaled] mass excitation of the nucleus (Sun).
Thus, for the Solar System atom, and perhaps generally, the oscillation is synchronized between the innermost and outermost parts of the atom, consistent with absorption of wave-like forms of energy.
Oscillation can thus explain the difference in masses between the planets, but oscillation itself should be quantized.

10.3.1. The relative creation

Applying neutralization and lepton oscillation to the model of inflation (vertical energy level change), one can now attempt to reconstruct the history of the Solar System development.

With inflation, the [absolute] distance between particles is increasing. Assuming the system started in polarized state, neutralization will be decreasing [relative] distance between equally charged particles.

Note 1: The only reason for neutralization during inflation may be a difference in [relative] external magnetic field strengths between the two scales, with larger scale system being under

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influence of much weaker magnetic fields.

Note 2: If the inflation starts with an already neutral system, the end result is similar. In that case, large scale system is a relative clone of the small scale system, with no energy wasted on neutralization, only on inflation. However, any excess energy (beyond the discrete energy needed to change the vertical energy level) will result in cloning *imperfections* proportional to the excess energy.

Note 3: I assume that only naked gravitons are inflated (in other words, at time of inflation they are decoupled from real mass at the original scale, or have been decoupled some time before), real mass is then acquired mostly after inflation - from existing mass (asteroid) fields on new scale. These fields may be generally created with deflation of other gravitons in nova like explosions. Deaths (deflations) and births (inflations) of a particular scale are relatively synchronized.

Based on wave-like appliance of energy, the inflation may have proceeded in this order:

1. Nucleus started inflating.
2. Jupiter 2e configuration started inflating. Even though 2e composites may have been separated initially, large energy of this configuration enabled the fusion of 2 electrons. With the inflation of Jupiter, 2e positron configuration was inflating (within the inflating nucleus). However, this configuration did not have enough energy for fusion and the positrons were left separated enough to form Mars ($1e^+$) and Mercury ($1e^+$).
3. Saturn 2e configuration started inflating (inside Jupiter at this point). This one had less energy that Jupiter 2e, but still enough for fusion, while the positrons again, did not - however, the energy was bigger than in the first positron pair, resulting in the creation of Venus ($1e^+$) and Gaia ($1e^+$, Earth embryo).
4. Another 2e configuration started inflating (inside Saturn). This one had even less energy than Saturn 2e, and, this time, not enough for fusion, so 2e separated into Uranus (1e) and Neptune (1e). A [relatively] simultaneous $2e^+$ inflation resulted in fusion of $1e^+$ with Mars (this component, however, which may be referred to as Vulcan had decoupled from Mars by now), and fusion of the other $1e^+$ with Gaia, creating Earth.

Note that, on the *right* (outer) side, the energy of inflation is decreasing, while on the *left* (inner) it is increasing. This fluctuation is the result of an attempt to balance the *left* and *right* side of the system.
Note also, that, if the original (small scale) system was in an electric field, the system did have a left and right (or top and bottom) side, not only inner and outer orbits.

The initial inflation, of course, did not inflate gravitons of planets to their current radii, rather roughly to their current orbital radii. The initial Sun surface [graviton] radius was thus roughly equal to current Mars' orbital radius. But this radius on this energy level is unstable and it was quickly deflated to the stable one - roughly equal to current Sun surface radius.

Relatively simultaneous with its deflation the gravitons of future terrestrial planets also started deflating to stable levels.

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Note that, in another interpretation, the collapse of these inner maxima has been triggered by gravitational stress induced with the contraction of the Sun's outer graviton. Effectively, this is creation of sunspots, however, in this case, as the Sun continued contracting the gravitons forming sunspots never restored to initial radii so they do not form the Sun anymore, only remain entangled with its discontinuities (or, more precisely, gravitons still occupying these discontinuities).

Similar is the case with outer planets, except in this case, all of them were effectively a part of Jupiter. The discontinuity inside Jupiter with radius equal to Saturn's radius has two interpretations, both probably true. Discontinuity represents a stable energy level but can also be interpreted as fossilized Saturn's graviton radius while it was within Jupiter.

Note that this implies that Saturn is entangled with Jupiter's graviton at that radius (assuming Jupiter represents 2e configuration - one graviton is at surface radius other at this one).
The *ejection* of Saturn's graviton probably involved deflation with spin inversion and inflation and another spin inversion on its current location.

Comparing energies of planets, lepton oscillation and the [attempt of] energy balancing is obvious.

Assuming that scaled mass of a standard electron (0.511 MeV/c^2) is equal to 0.511 * 10^{24} kg, scaled muon (105.658 MeV/c^2) is 105.658 * 10^{24} kg, while scaled tau particle (1776.86 MeV/c^2) has a mass of 1776.86 * 10^{24} kg, rough correlation with masses of Mercury/Mars, Neptune/Uranus and Jupiter is obvious.

The tau/muon/electron mass ratios are present within the inner and outer planets:

$$\frac{\text{Venus} + \text{Earth}}{\text{Mars}} \approx \frac{\text{Venus} + \text{Earth}}{2\text{Mercury}} \approx \frac{\text{tau}}{\text{muon}}$$

$$\frac{\text{Neptune}}{\text{Earth}} \approx \frac{\text{Uranus}}{\text{Venus}} \approx \frac{\text{Jupiter}}{\text{Neptune}} \approx \frac{\text{tau}}{\text{muon}}$$

$$\frac{\text{Outer planets}}{\text{Inner planets}} \approx \frac{\text{Uranus} + \text{Neptune}}{\text{Mercury embryo} + \text{Mars}} \approx \frac{\text{muon}}{\text{electron}}$$

Note that the last equality suggests the whole system could be reduced to an excited hydrogen atom (or condensation of hydrogen atoms) equivalent, assuming outer planets represent a delocalized muon (electron in an excited state) - where outer planets represent condensed wave maxima, while inner planets similarly represent a delocalized positron. If the core (the Sun) has been excited equally to the excitation of the electron (by the muon/electron ratio), then it has been excited from a system of roughly 10 particles of proton or neutron mass. The whole system could thus represent the excitation of 10 condensed hydrogen atoms, but also excitation of a single ^{10}C atom or some other element with 10 nucleons (although not just any other - the choice is constrained by the number of inner/outer planets).
Note that, in the above interpretation of the quantum wave function (Schrödinger), its maxima do not just represent the probabilities of finding the particle at particular location (cloud, ring, etc.) but represent actual masses (energies) located at these locations when the particle is

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delocalized (in a wave state). Thus, when particles travel as waves, they are not absolutely massless or abstract momenta, the mass is simply spread out (delocalized) but remains entangled. Localization events are condensation events of entangled mass and this condensation (localization) can be complete (into a single component or particle) or incomplete (into multiple locations corresponding to wave maxima) - as evident in double-slit experiments.
Note also that, assuming Jupiter's rest mass is 1777 * 10^{24} kg, as hypothesized before, the agreement in ratios becomes even better.

but also in relation to the Sun:

$$\frac{\text{Sun}}{\text{Saturn}} \approx \frac{\text{tau}}{\text{electron}}$$

which suggests that the whole system is in superposition of particles of different generations.

The grouping and correlation of Venus/Earth and Uranus/Neptune here is understandable, as the pairs share the same quantum shell.
Correlation of Uranus/Neptune with Mercury/Mars lies in the fact that Mars and Mercury were the first pair created on the inner side, while Uranus and Neptune were the last to be created on the outer side - with increasing energy on the inner side and decreasing on the outer side, the ratio of Uranus+Neptune/Mercury+Mars becomes roughly equal to the ratio of mass of outer to inner planets. This gives mass of 0.198 * 10^{24} kg for the Mercury embryo ($1e^+$).
Comparing Venus ($1e^+$) and Earth ($2e^+$), the addition of another maximum doesn't impact the total mass significantly (as most energy comes from neutralization which is, at least roughly, invariant to number of particles occupying the state).
If Mercury embryo mass was entirely core mass, total core mass of current Mercury should be equal to:

$$\frac{\text{Earth core}}{\text{Venus core}}(\text{Mercury embryo mass}) = \frac{0.325}{0.32} 0.198 * 10^{24}\, kg = 0.2011 * 10^{24}\, kg$$

, 61% of its total mass (for Venus' core at 32% of total mass, Earth's core at 32.5% of total mass).

Evolving event horizon (c_n) model

In this model, particles are entangled with different event horizons (still, mostly concentrated between inner and outer charges) impacting their relativistic energies differently.

In Table 14, standard particle candidates are shown for each planet. Rest masses are relative to the possible event horizon of creation, specified in parentheses. Note that original rest mass may be bigger or smaller than relativistic mass, depending on the conditions in the annihilation (creation) event.

Most likely particle candidates, according to this model, are marked green.

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planet	relativistic mass M [10^{24} kg] (v)	rest mass M_0 candidates [10^{24} kg] (c_{EH})	particle candidates (MeV/c^2)
Mercury	0.330 (47.4 km/s)	0.361 (19.34 km/s = Vesta orbit), 0.353 (16.76 km/s = Hygiea orbit), 0.383 (24.1 km/s = Mars orbit), 0.489 (35 km/s = Venus orbit)	? (0.198), positron (0.511)
Venus	4.868 (35.0 km/s)	5.67 (17.905 km/s = Ceres orbit), 5.545 (16.76 km/s = Hygiea orbit)	anti-down quark (≈4.8)
Earth	5.972 (29.8 km/s)	7.47 (17.905 km/s = Ceres orbit), 7.47 (17.89 km/s = Pallas orbit), 4.77 (-17.905 km/s = -Ceres orbit)	anti-down quark (≈4.8)
Mars	0.642 (24.1 km/s)	1.076 (19.34 km/s = Vesta orbit), 0.383 (-19.34 km/s = -Vesta orbit), 0.461 (-16.76 km/s = -Hygiea orbit), 0.539 (-13.1 km/s = -Jupiter orbit)	positron (0.511)
Jupiter	1898.19 (13.1 km/s)	1396 (-19.34 km/s = -Vesta orbit), 1293 (-17.905 km/s = -Ceres orbit), 1824 (-47.4 km/s = -Mercury orbit)	D^- meson (1869), tau (1776.86), anti-charm quark (≈1275)
Saturn	568.34 (9.7 km/s)	491.4 (-19.34 km/s = -Vesta orbit), 477.7 (-17.905 km/s = -Ceres orbit)	K^- meson (493.7)
Uranus	86.813 (6.8 km/s)	80.285 (-17.89 km/s = -Pallas orbit), 94.982 (16.76 km/s = Hygiea orbit)	muon (105.658), strange quark (≈95)
Neptune	102.413 (5.43 km/s)	96.5 (-16.76 km/s = -Hygiea orbit)	muon (105.658), strange quark (≈95)

Table 13. Standard particle candidates for planets (green = most likely)

Rest mass in Table 14 was calculated using proper relativistic factor (Omega factor in CR):

$$M_0 = M\left[1 - \left(\frac{v^2}{{c_n}^2}\right)^s\right]^{-\frac{1}{2}q}$$

$$q = sgn(c_n) = \frac{c_n}{|c_n|}$$

$$s = sgn({c_n}^2 - v^2) = \frac{{c_n}^2 - v^2}{|{c_n}^2 - v^2|}$$

c_n <> 0

q = sidereal polarization of the reference frame

s = polarization of mass relative to the reference frame

where $c_n = c_{EH}$ is the *rest* velocity of the reference frame (event horizon [fossil]).

Note 1: The correlation suggests that inflation energy for these planets came individually from specific particles, with roughly equal kinetic energy. This is consistent with the hypothesized matter/anti-matter atom pair annihilation - with colliding positron/electron pairs producing the particles inflated into planets.
Such annihilation would likely occur within the gravitational maximum (event horizon) discontinuity, sending created matter and anti-matter in opposite directions, perpendicular to the maximum.
The central galactic black holes and dark matter maxima in inner/outer layers of galaxies are likely remnants of such maxima.

Note 2: Due to neutralization, there are no significant differences between planetary systems created from matter and anti-matter atoms, apart from mass distribution - if the Solar

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System is created from matter (a *matter* of convention), in an anti Solar System inner planets would have greater mass than outer planets. The reason for this is the asymmetry of space at the event horizon, where opposite charges are separated to opposite sides of the horizon. Note that this implies that horizons are, at the moment of collapse, between outer and inner planets at the place where, after collapse, a neutrino (main dwarf planet) is formed.
Note also that an event horizon for electron/positron annihilation can be provided by the atom nucleus itself - with the incoming electron, a graviton is extracted (expanded) from the nucleus (and possibly from the electron too) together with positron charge. At the point of annihilation, maximum (or a maximum pair) collapses with energy distributed between the created neutrino(s) and two charged particles, with none of them having enough energy to overcome escape velocity.
Due to mass asymmetry the pair will not annihilate again and the external energy (photons) is required to decouple mass and charge, and return the system to original state.
Likely, all annihilation events require expansion of particle maxima and creation of a temporary event horizon pair even if one [of larger scale] is already present at the point of annihilation.

Note 3: In CR, not only are the flavours oscillating, but, neither the rest or inertial mass is constant. Deviation from average mass is greatest in bound systems where it depends on the energy level particle occupies in the system.

Note 4: Correlation of standard masses with planetary rest mass in reference frames of orbits of bound neutrinos (main dwarf planets) is overall very good, with lower confidence only in case of the participants of the first planetary creation event - Mars and Mercury (unless the standard particle equivalent is yet to be discovered).
For Mars, the horizon at Jupiter orbit is a better fit, while for Mercury, it is the Venus orbit.

Note 5: Correlation of the Solar System with standard scale particle generations, reveals the existence of *new* particles in the standard model of physics (which, obviously, should be scale invariant), for example, if one interprets Saturn as K^-, the Sun/Saturn mass equivalence with tau/electron reveals 2 additional standard particles:

$$\frac{\text{tau}}{\text{electron}} K^- = 1717.751\, GeV = 1.72\, TeV$$

$$\frac{\text{muon}}{\text{electron}} K^- = 102.143\, GeV$$

or, with the assumption of *new* energy splitting, a completely new generation (based on Sun's relativistic mass):

$$\frac{\text{tau}}{\text{electron}} X^n = 3477.228 * 571.864\, MeV = 1988.500\, GeV = 1.9885\, TeV$$

$$\frac{\text{muon}}{\text{electron}} X^n = 206.768 * 571.864 = 118.243\, GeV$$

or, with Sun's proper rest mass:

$$\frac{\text{tau}}{\text{electron}} X^n = 3477.228 * 537.552\, MeV = 1869.190\, GeV = 1.8692\, TeV$$

$$\frac{\text{muon}}{\text{electron}} X^n = 206.768 * 537.552 = 111.149\, GeV$$

One of these may have been discovered[84] already[85].

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Evidently, using most likely particle candidates on the hypothesized particle configuration, the electric charges are in balance, as shown in Table 15.

planet	configuration	particle species (charge)	total charge
Mercury	1e	positron (1 e^+)	1 e^+
Venus	1e	anti-down quark (1/3 e^+)	1/3 e^+
Earth	2e	anti-down quark (1/3 e^+)	2/3 e^+
Mars	2e	positron (1 e^+)	2 e^+
Jupiter	2e	anti-charm quark (2/3 e^-)	4/3 e^-
Saturn	2e	K^- meson (1 e^-)	2 e^-
Uranus	1e	strange quark (1/3 e^-)	1/3 e^-
Neptune	1e	strange quark (1/3 e^-)	1/3 e^-

Table 14. Standard particle candidates for planets, with listed electric charges

The configuration gives total $4e^+$ charge for inner planets and $4e^-$ for outer planets (symmetry).

The fact that charge configuration agrees well with the hypothesis of 6 charges on each side (Carbon configuration) but the mass for the same particle species agrees well with 4 total particles on each side (Beryllium configuration) suggests $^{10}C/^{10}Be$ oscillation.

Thus, the Solar System may be interpreted as a hybrid, a superposition of 2 atoms, ^{10}C and ^{10}Be. Another interpretation is that Mercury, Venus, Uranus and Neptune are dead remnants of past configuration.

Extremely slow rotation in terrestrial planets certainly could be one indicator of dead remnants. In gas/ice giants, one indicator could be the significant offset of a magnetic dipole from the planet centre and its high misalignment with the rotation axis. However, the presence of a significant offset and reduced magnetic field strength (with no significantly reduced rotation) in terrestrial planets may be common during, later hypothesized, adult neurogenesis events.

In that case the system is in 4e configuration and charge symmetry is preserved if Earth is composed out of two up quarks (2 x 2/3 e^+) instead of anti-down quarks.

Dead planets can have a significantly lower mass than living ones. Assuming the previous configuration was 6e, and Earth was in the same configuration (two up quarks), Mercury may represent a remnant of an anti-down quark.

The question is, however, why are electrons replaced with quarks/mesons? Perhaps these were created in the annihilation event and afterwards simply occupied the energy levels usually occupied by electrons.

Is this hybridization unique to the inflation through annihilation of smaller scale atoms, or this is a normal state even in atoms of standard scale?

In CR, of course, the process is scale invariant and cannot be unique to one scale only, even if one cannot set up a proper reference frame to observe it.

The stability of atoms is achieved through neutral energy provided by neutrons and neutrinos. It is thus likely that all atoms are oscillating between polarized and non-polarized states.

Consider the case of elementary hydrogen (^1H).

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If 1e+ charge (eg. positron) is extracted from the nucleus to balance the electron, what prevents them from annihilating?
Obviously, between the two particles there must exist an event horizon [pair], which collapses in the interaction, forming a [bound] neutrino, but also emitting a gravitational wave of 2 graviton quanta, one of which is absorbed by the electron, the other by the positron - pushing them to stable orbits and preventing annihilation.
Note that both positron and electron are now [even more] entangled and form a *standing* wave.
If absorbed maxima are neutral they will increase masses of particles, decreasing charges (albeit in asymmetric manner relative to event horizon). This may be negligible but a probability exists the absorption will trigger charge [scale] collapse and mass [scale] inflation inverting the dominant nature of general force (em/gravity exchange) between the particles.

Note that, with charge extracted, proton core too becomes neutral.

It appears that [outer event horizons of] proton cores favour giving energy to electrons, while neutrons favour positrons (correlated with spin anti-alignment). Asymmetry in neutralization energy between bound positrons and electrons is thus caused in mass difference between protons and neutrons (note that magnetic fields of outer planets are much less subdued than those of inner planets).

If one interprets Neptune as the electron, Jupiter contains the mass of two down quarks, while Saturn mass has been increased with the equivalent of one up quark mass (note that charges were separated from mass before neutralization).
Assuming these masses came from protons (nucleus is scaled equally to Neptune), there are only 4 complete protons left in the nucleus. If now free up quarks [masses] couple with down quarks of a neutron, it will be converted to 2 protons. With 6 protons and 3 neutrons left, 3 more neutrons are needed to balance the core.
With a complete neutron (2 down quarks + 1 up quark) mass on the outer side, and with remaining proton quarks left in the core, it might seem that neutralization is quantized by neutron mass.
However, the fact that Neptune and Uranus are significantly neutralized suggests that neutralization energy is correlated with quantum states and is likely scaling with element mass.
In any case, biggest planets should always be the most charged ones.
Note that, with imaginary mass being dark matter and with outer planets having significant excess of gravitational potential compared to inner planets, Solar System mirrors the galaxy.
The reason why outer planets and nearby masses are not rotating faster is due to collapse of orbital maxima into spin momenta with acquisition of real mass (where Keplerian velocity indicates real mass/graviton coupling at full capacity).

With an excess of protons, too much energy on the outer side can cause the ejection of bound positrons and neutrinos, converting protons to neutrons.

With an excess of neutrons, too much energy on the inner side can be enough to fuse bound positrons with the nucleus [core], converting neutrons to protons.

Standard model

In this model, planets are simply correlated with appropriate quarks/leptons of the atom.

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As noted elsewhere, in CR, both quarks and leptons should oscillate in mass within atoms, at least horizontally. But it probably should not be unusual for an electron to be in a tau mass eigenstate at time of inflation (although, on standard scale in standard conditions, excited electrons don't generally spend much time in that state compared to lower mass states).
In case particles in standard atoms do not oscillate in mass vertically, there are other interpretations:

- at the time of Solar System inflation standard atoms have been heavier,
- heavy particles have been created (inflated) in the annihilation event.

The correlation is shown in Table 16.

Table 15. Standard particle candidates for planets

planet	mass M [10^{24} kg]	particle candidates (MeV/c^2)
Mercury	0.330	1 x positron (0.511)
Venus	4.868	1 x anti-down quark (≈4.6)
Earth	5.972	1 x anti-down quark (≈4.6) + 1 x positron (0.511), or 2 x up quark (2 x 2.7475)
Mars	0.642	1 x positron (0.511)
Jupiter	1898.19 (1777*)	1 x tau electron (1776.86)
Saturn	568.32	1 x muon anti-up quark (568.32**)
Uranus	86.813	1 x muon electron (105.658)
Neptune	102.413	1 x muon electron (105.658)

* Previously hypothesized Jupiter's rest mass.
** Previously hypothesized quark oscillation (equivalent to lepton), with the assumption of 2.7475 MeV/c^2 standard up quark mass (chapter *Quantum nature*).

Assuming Earth represents 2 x up quarks, total charge is in balance, as shown in Table 17.

Table 16. Sums of charges

configuration	charge sum [e]
1 x positron, 1 x anti-down quark, 2 x up quark, 1 x positron	+ (3+2/3)
1 x tau, 1 x muon anti-up quark, 1 x muon, 1 x muon	- (3+2/3)

Obviously all masses can be correlated with standard particles. Deviation can be attributed to mass oscillation, relativistic energies and possibly non-equilibrium states at the moment of inflation. In addition to that, some planets may be dead remnants.

Mass eigenstates are relatively discrete states and should be most likely. However, although transitions between mass eigenstates are relatively fast, one cannot assume that every particle was settled at a particular mass eigenstate at the moment of inflation.
Also, as noted before, rest masses are not absolute constants in CR and should be understood as average values. In example, electron rest mass of 0.511 MeV/c^2 can be a time averaged mass of a single electron and/or a statistical average over many electrons.

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Alternatives?

I have shown in CR, how 2/3 of electron charge can be exchanged for mass, converting electron to a down quark[86] (1/3 e) - where most of the mass goes to a force carrier graviton, giving atomic range for the resulting gravity. If inner anti-down quarks here are a result of exchange of positron charge for mass and this had to be reflected in outer particles, perhaps Saturn and possibly Jupiter represent a pair of muons which have both exchanged charge for mass.

Using the equation (1.6) from CR, the resulting mass after exchange is:

$$M = 10^n \frac{2}{3} Q \frac{q_e}{4\pi\epsilon_0} \frac{m}{GC} \left[\frac{MeV}{c^2}\right]$$

M = mass of the particle after conversion
Q = fraction of charge exchanged
n = vertical energy level (integer)
q_e = elementary charge = 1.60218 * 10^{-19} C
ϵ_0 = vacuum electric permittivity = 8.85418782 * 10^{-12} F/m
m = initial mass [MeV/c^2]
G = gravitational constant = 6.674 * 10^{-11} m^3/kgs^2
C = 1 MeV/c^2

The resulting charge is obtained by subtracting (or adding, in case of negative initial charge) Q from the initial charge.

This, for the conversion of 1/3 charge of a single muon (m = 105.658 MeV/c^2, Q = 1/3, n = 0) gives a 506.6 MeV/c^2 particle with 2/3 e charge. Converting a bottom quark (4.18 GeV, 1/3 e) with Q = 1 and n = -3 yields a particle of 60.1245 MeV/c^2 mass and 2/3 e charge. Total mass of the two obtained particles is 566.7245 MeV/c^2, very close to Saturn's 568.34 MeV/c^2. Conversion of an up quark (2.2 MeV, 2/3 e), with Q = 2 and n = 0 yields a particle of 63.2889 MeV/c^2 mass and 4/3 e charge. Instead of the particle obtained in bottom quark conversion, using this particle gives total mass 569.8889 MeV/c^2 and, interestingly, a total charge of 2 e.

Similarly, conversion of 2/3 of muon charge (Q = 2/3, n = 0) gives a 1013 MeV/c^2, which in 2e configuration becomes ≈ 2026 MeV/c^2, close to Jupiter's 1898 MeV/c^2.

However, the sum of two protons or anti-protons (2 x 938.272 = 1876.544 MeV/c^2) is in much better agreement with Jupiter's mass and gives total charge 2 e.

Note that, CR equation (1.6) - with electron (positron) as the initial particle, using Q = 2/3 and n = 0, gives 4.9 MeV/c^2 for down (anti-down) quark mass, which agrees even better with Venus' mass than the initially assumed 4.6 MeV/c^2.
The equation gives 1.0548 MeV/c^2 and 1/3 e charge for the input 2/3 e charge and 2.2 MeV/c^2 mass (up quark), using Q = 1/3 and n = -1. This, with calculated down quark mass of 4.9 MeV/c^2, gives total mass of 5.9548 MeV/c^2, very close to Earth's 5.972 MeV/c^2. Total charge here is then 2/3 e (assuming both particles are equally polarized). However, conversion of a bottom quark (4.18 GeV/c^2, 1/3 e), using Q = 6/3 and n = -5, yields a particle of 1.2025 MeV/c^2 mass and 5/3 charge. This, with the down quark gives a total charge of 2 e, albeit with somewhat higher total mass, 6.1025 MeV/c^2 (a down quark energy of 4.8 MeV would here give a better agreement with Earth's mass).

With these conversions, total charge on the outer side is either

$$2 \times \left(-\frac{1}{3}\right) + 2 \times \left(-\frac{2}{3}\right) + (-1) + (-1) = -4$$

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or

$$2 \times (-1) + 2 \times (-1) + (-1) + (-1) = -6$$

or a mix of the two, which, again, suggests carbon/beryllium.

Obviously, the equation can certainly produce very interesting results. Converting a top quark (173.1 GeV/c^2, 2/3 e), using Q = 4/3 and n = -7, yields a mass of 0.332 MeV/c^2 (charge 2/3 e), very close to Mercury's 0.330 MeV/c^2. Converting an up quark (2.2 Mev/c^2, 2/3 e), using Q = 2 and n = -2, yields a mass of 0.633 MeV/c^2, close to Mars' 0.642 MeV/c^2.

Converting a down or anti-down quark (4.7 MeV, 1/3 e), using Q = 4/3 and n = 0, yields a particle with mass 90.1388 MeV/c^2 and charge of 1 e, which can be correlated with Uranus' 86.8 MeV/c^2 (again, if Uranus is dead, mass lower than expected should not be surprising).

High correlation doesn't end with planets. For example, conversion of electron mass/charge using Q = 1 and n = -2 gives a neutral particle with mass exactly equal to the Moon's 0.0735 MeV/c^2, conversion of proton mass/charge using Q = 1 and n = -5 gives a neutral particle with mass of 0.13496 MeV/c^2, very close to Titan's (moon of Saturn) 0.1345 MeV/c^2.

All this is a very convincing evidence that living celestial bodies are large scale subatomic particles.

> Note, however, that inflation/deflation of mass is only one interpretation of the equation, inflation/deflation of *constants*, such as G, is another.

10.3.2. Evaluation of Invariance

Correlation between planetary masses and standard particles revealed in the previous chapter is remarkable, not only because ratios of particle masses are equal on both scales, but numeric values seem to be equal between kilograms on one scale and electron volts on another - differing only in the order of magnitude. The conservation of values is not surprising if this is interpreted as transition between discrete vertical energy levels, where the integer n in the term 10^n ensures preservation of numerical values across levels, changing only the magnitude. In that case, electronvolts on one scale should be electronvolts on the other. Conversion between kilograms and electronvolts involves two constants - speed of *light* (c) and elementary charge (e):

$$eV = m\frac{c^2}{e}$$

$$m = eVK$$

$$e = c^2K$$

where K on the Solar system scale (U_1.K or K_1) is 1 * 10^{18} Cs^2/m^2 if numerical values for planetary masses are interpreted as mega electronvolts and mass relative to U_1 scale is equal to mass relative to U_0 scale (which, however, is not the case, as it will be shown later).

On U_0 scale the value of K is 1.78 * 10^{-36} Cs^2/m^2. Interestingly, the difference is on the order of 10^{54}, which suggests the value of K_0 may be obtained by multiplying K_1 with the rest mass of photon it is localized on U_0 scale (10^{-54} kg) and a constant $1\ kg^{-1}$.

> Note that the U_0 photon rest mass divided by K_1 gives 10^{-72} eV, the same order of magnitude as photon rest mass on U_{-1} scale (as hypothesized in CR). Note also that the order of magnitude of U_0.K (10^{-36}) is also the order of magnitude of mass of standard electron neutrino.

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Since planetary masses are derived from GM products, integer value of K must be the consequence of dependence of the gravitational constant G on the speed of light c.

Both values, gravitational constant G and c, have been determined from standard scale (U_0) experiments, thus:

$$G = G_0$$

$$c = c_0$$

Mass M of a planet is then determined through gravitational interaction between two bodies, equalizing centripetal force with gravitational force:

$$\frac{mv^2}{r} = \frac{GMm}{r^2}$$

$$v^2 = \frac{GM}{r}$$

$$M = \frac{v^2 r}{G}$$

$$\frac{v^2 r}{G_0}\frac{1}{K} = m_0 \frac{{c_0}^2}{e_0}$$

$$\frac{v^2 r}{G_0}\frac{{c_1}^2}{e_1} = m_0 \frac{{c_0}^2}{e_0}$$

where r is the distance [from centre] to the orbiting body [centre], and v is its orbital velocity, and, in case of planets, also the fossil of the *rest* velocity of the gravitational field line (orbital maximum) before the collapse into a spin (satellite) maximum.

> Planets orbiting at *rest* velocity are effectively at rest in the system. Since every gravitational maximum has its personal space/time - planetary orbitals are orbits of space/time within another space/time.

Equalizing centripetal force with electro-magnetic force:

$$\frac{mv^2}{r} = \frac{1}{4\pi\epsilon_0}\frac{e^2}{r^2} = \frac{\mu_0 c^2}{4\pi}\frac{e^2}{r^2} = 1 * 10^{-7} c^2 \frac{e^2}{r^2}$$

$$m = 1 * 10^{-7}\frac{c^2}{v^2}\frac{e^2}{r}$$

Now equalizing M (gravitational mass) and m (charge mass):

$$M = m$$

$$\frac{v^2 r}{G} = 1 * 10^{-7}\frac{c^2}{v^2}\frac{e^2}{r}$$

$$G = 1 * 10^{7}\frac{1}{c^2 {e_0}^2}{v_0}^4 {r_0}^2$$

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10.4. ħ constant weakness

Obvious dependency on the order of mass magnitude makes ħ a weak "constant", but at the same time explains why planetary orbits appear discrete while the orbits of small satellites seem unlimited. Obviously all masses m > 0 must have a quantized momentum but ħ is relative.

11. G relativity, equivalence with dark matter, Earth's graviton mass

If dark matter is interpreted as a component of space associated with a particular graviton, in one interpretation, the gravitational constant G becomes variable - proportional to dark matter.

The G is also dimensional and as such, with no change in metric, not generally invariant to scale. Interesting are then the differences between discrete vertical energy levels. If one is using the same G for measurements on standard scale and for measurements of planetary masses, it seems that at least one of the mass interpretations must be wrong. However, there are two ways for the G to be preserved. One of them is mass shielding, the other is conversion of dark matter to real mass (ie. annihilation). Assuming the G of the planetary scale graviton is much higher than the standard G, the dominant gravity source in the empty well is dark matter. However, this is changing as the well gets filled with real mass. With the well at full capacity - in case of shielding, or in over-capacitated wells, gravity is dominated by standard real mass and the value of standard G can be used on this scale as well.

In the previous chapter, it was determined that surface gravity in planets is correlated with momentum, the equation comes from the following.

Orbital angular momentum (Bohr interpretation):

$$Mvr = n\hbar$$

multiplied with [surface] gravity is:

$$gMvr = gn\hbar$$

$$g = \frac{vr}{n\hbar} gM$$

Fixing g on the right side (eg. M = mass of Neptune, g_0 = gravity of Neptune), multiplying with R^2/R^2:

$$g = \frac{vr}{n\hbar} g_0 M \frac{R^2}{R^2}$$

Fixing R in the numerator (eg. R_0 = radius of Neptune) and equalizing with Newton gravity:

$$g = \frac{vr}{n\hbar} g_0 {R_0}^2 \frac{M}{R^2} = \frac{GM}{R^2}$$

Gravitational *constant* is:

$$G = \frac{vr}{n\hbar} g_0 {R_0}^2$$

v = orbital velocity
r = orbital radius
R = radius of the planet (spin radius)

Here, v, r and n are variable. One might then consider ħ a relatively strong constant, but g_0 and R_0 are weak.

It has been shown that g_0 alternates between two values (one taking rotation into account and one without it). The following can be concluded:

- all planets have mutually entangled properties,
- past/future state of g_0/R_0 is fossilized (memorized) in rotation period,
- gravitational *constant* G of a gravitational well depends on its own place in a larger gravitational well.

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Note that G of a planetary gravitational well is here derived form its orbital momentum in a larger well, rather than its spin momentum.

Planets are orbiting stars, but their bodies are also *orbiting* their souls (gravitons). Mantle of a planet can be interpreted as a moon to its core, just like a moon can be interpreted as a collapsed gravitational maximum (event horizon) of a planet. In that system, mantle/moon is the planet and a planetary core is the star.

In case the planet is not fully developed (has active moons - in case of inner planets), mantle layers are [relative equivalents of] asteroid belts and moons are [relative equivalents of] the planets charged oppositely to the outer core of the planet.

Thus, there are gravitational *constants* relative to that system (note that every spin momentum is orbital momentum - even though the surface and the centre are entangled, propagation of changes is not instant).

Current value of the standard gravitational *constant* (6.674 * 10^{-11} m^3/kgs^2) was commonly measured on Earth's surface and is relative to an absolute reference frame. In interpretations where G is not scale invariant, proper G for gravitons of inner planets can be obtained from surface gravity and real mass m.

Assuming gravitational potential is the same for a naked and coupled graviton (difference is in the dominant source of gravity - dark matter/real mass), the initial G (or, G of the naked graviton) can be obtained from initial real mass:

$$g = \frac{\hbar_{mg}}{m} = \frac{GM}{R^2} \tag{G1.1}$$

Assuming speed of matter (real mass) is significantly lower than the Keplerian speed of the graviton:

$$m = \frac{2\pi^2 {r_s}^3}{G{T_{re}}^2} \tag{G1.2}$$

m = initial real mass of the body
r_s = radius of the graviton
T_{re} = weighted average period of rotation of real mass
R = surface radius

from (G1.1) and (G1.2) follows:

$$\hbar_{mg} \frac{G{T_{re}}^2}{2\pi^2 {r_s}^3} = \frac{GM}{R^2}$$

$$M = \hbar_{mg} \frac{{T_{re}}^2 R^2}{2\pi^2 {r_s}^3}$$

with M calculated, one can now obtain G through (G1.1):

$$G = \frac{gR^2}{M} = \frac{1}{\hbar_{mg}} \frac{g2\pi^2 {r_s}^3}{{T_{re}}^2} = \frac{1}{\hbar_{mg}} \frac{g{v_{re}}^2 r_s}{2}$$

Note that this can also be written as:

$$G = \frac{1}{2} \frac{v_{re} r_s}{\hbar_{mg}} g \frac{2\pi r_s}{T_{re}}$$

$$G = \frac{v_{re} r_s}{\hbar_m} \hbar_g g \frac{\pi r_s}{T_{re}} = \frac{v_{re} r_s}{\hbar_m} \frac{vR}{ng} g \frac{\pi r_s}{T_{re}}$$

$$G = \frac{v_{re} r_s}{\hbar_m} \frac{\pi R^2}{Tn} \frac{2\pi r_s}{T_{re}} = \frac{v_{re} r_s}{n\hbar_m} \frac{2\pi^2 r_s}{TT_{re}} R^2$$

substituting middle term for g_0:

$$g_0 = \frac{2\pi^2 r_s}{TT_{re}}$$

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$$G = \frac{v_{re} r_s}{n\hbar_m} g_0 R^2$$

v_{re} = matter (real mass) rotation speed at the gravitational maximum r_s

This relation is now equivalent to the obtained relation for G from orbital momenta.

Note that for Earth, with r_s = 1206115 m (≈ inner core radius) and T = T_{re} = 24h = 86400 s:

$$g_0 = 0.00319 \frac{m}{s^2}$$

which would match exactly the gravity of the inner core [maximum] with mass M equal to calculated real mass of Earth (from G1.2, m = 6.95 * 10^{19} kg):

$$g_0 = \frac{Gm}{{r_s}^2} = 0.00319 \frac{m}{s^2}$$

G = G_0 = standard G = 6.674 * 10^{-11} m^3/kgs^2)

Now, for the naked graviton, energy is concentrated at r_s and g_0 is then, with conserved gravitational potential, equal to 274 m/s^2 (equal to Sun's surface gravity!), giving initial G of:

$$G = \frac{g_0 {r_s}^2}{m} = 5.731534632 * 10^{-6} \frac{m^3}{kgs^2}$$

Note that initial real mass (current img mass) can also be calculated from equations given in CR:

$$M = \frac{m_{re}}{\sqrt{1 - \frac{{v_{re}}^2}{{c_s}^2}}} + m_{img}$$

with:

$$M\sqrt{1 - \frac{{v_{re}}^2}{{c_s}^2}} \approx m_{img}$$

$$c_s = \sqrt{\frac{GM}{r_s}} = 18178.98 \frac{m}{s}$$

$$v_{re} = \frac{2\pi r_s}{T_{re}} = 87.71 \frac{m}{s}$$

real mass is:

$$m = m_{re} = \left(1 - \sqrt{1 - \frac{{v_{re}}^2}{{c_s}^2}}\right) m_{img} = 6.95 * 10^{19}\, kg$$

v_{re} = current velocity of real mass at r_s

T_{re} = current rotation period of real mass = 86400 s

r_s = radius of the naked graviton = 1206115 m

c_s = Keplerian angular velocity of the naked graviton

m_{img} = initial img mass ≈ M = 5.9723 * 10^{24} kg

Initial real mass can also be interpreted as a quantum of mass that would surely trigger graviton collapse/expansion to another orbital energy level, or *ionization* of the system.

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11.1. Earth's Energy Revelation

Previously, it was calculated that Earth's initial real mass (current img mass) is 6.95 * 10^{19} kg. The energy of that mass on U_1 scale is:

$$E = E_1 = mc_1{}^2 = 5.97 \times 10^{26}\, MJ$$

m = 6.95 * 10^{19} kg
c_1 = 2.93 * 10^6 m/s

A very interesting value, since Earth's mass relative to U_0 scale is 5.972 * 10^{24} kg, and it was previously determined that values in kg relative to U_0 scale are equal (in value, if not in magnitude) to values in electronvolts on this scale (U_1). This result further suggests that joules on U_1 scale are equal in value to electronvolts on U_1 scale. The calculated real mass of 6.95 * 10^{19} kg then actually is Earth's rest mass on U_1 scale. The value of 5.972 * 10^{24} kg is interpretation of mass on U_0 scale (relative to U_0 constants).

Now one can obtain the true value of the U_1.K constant used in chapter *Evaluation of invariance*. If one converts Joules to electronvolts using a conversion factor determined on U_0 scale (1 J = 6.241509 * 10^{18} eV):

$$K_1 = \frac{6.95 \times 10^{19}\, kg}{3.724 \times 10^{51}\, eV} = 1.866 \times 10^{-32}\, C\frac{s^2}{m^2}$$

which is obviously wrong, as it is only 4 orders of magnitude higher than K_0. Using the suggested conversion factor (1 J = 1 eV):

$$K_1 = \frac{6.95 \times 10^{19}\, kg}{5.97 \times 10^{32}\, eV} = 1.16 \times 10^{-13}\, C\frac{s^2}{m^2}$$

There is now a difference on the order of 10^{23} between K_0 and K_1.

The conversion factor of 1 implies elementary charge on U_1 scale is equal to 1 in value. However, while the above calculated energy strongly suggests that the value is equal to one, this does not imply that the order of magnitude is 1 (10^0).

Using the energy-mass equivalence, one can obtain U_1 masses for other planets as well, which should, according to above, correspond to their img masses (in case of terrestrial planets) or real masses (in case of outer giants):

$$m = m_1 = \frac{E_1}{c_1{}^2} = \frac{m_0 \times 10^8}{c_1{}^2}$$

m_0 = mass relative to U_0 scale [kg]

Table 18 shows the obtained masses for terrestrial planets.

Table 17. U_1 masses of terrestrial planets

planet	m_0 (10^{24} kg)	m (kg)
Mercury	0.330	3.84 * 10^{18}
Venus	4.868	5.67 * 10^{19}
Earth	5.972	6.95 * 10^{19}
Mars	0.642	7.48 * 10^{18}

11.2. Alternative determination of Earth's graviton mass/radii

Considering its total mass, Earth's rotation is obviously not Keplerian. But what if the bodies are, in some cases (eg. terrestrial planets), orbiting/rotating in such way that coupled graviton(s) are rotating in Keplerian motion relative to the enclosed graviton(s) mass?.

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Why would the rotation be Keplerian? Rotation of coupled (entangled) gravitons and bodies should be synchronized in equilibrium. Reversing the notion, perhaps the changing angular momenta of the body is changing mass radii of the coupled gravitons in such way that their angular motion remains Keplerian - as such motion ensures stability. Synchronicity, or synchronization, is generally, however, a better term.

Assuming then that the current Earth's rotation period is Keplerian for its large scale gravitons, for graviton mass 2 x 6.95 * 10^{19} kg, the [outer] graviton mass radius is equal to the initial inner core radius (≈1206115 m). For a single graviton (enclosed mass equal to 6.95 * 10^{19}), the radius is 957294 m, roughly 250 km lower than the initial inner core radius. Interestingly, a discontinuity at 250 km inner core depth has been detected[87].

The above has been calculated from Keplerian radius/period relation:

$$r^3 = \frac{T^2}{4\pi^2} GM$$

T = rotation period = 86400 s
G = 6.674 * 10^{-11} m^3/kgs^2
M = enclosed mass

Note that this implies that graviton radii are growing with time, as rotation speed of the body decreases. This could then also be used to determine whether a body is dead, as for dead terrestrial planets the obtained radius should be bigger than the radius of the planet. In that case, for the same graviton mass, both Venus and Mercury are dead (as has been hypothesized previously in some interpretations). Even if one assumes a 10 times lower graviton mass for Mercury, the graviton radius is bigger than Mercury radius (2.7 times).

This graviton mass (or img component of Earth's total mass) can also be determined from momentum conservation. Assuming initial rotation velocity was equal to calculated c_1:

$$mv_1r_1 = Mv_2r_2$$

$$mc_1r_1 = M\frac{2\pi r_2}{T_2}r_2$$

$$m = \frac{M}{c_1}\frac{2\pi r_2}{T_2}\frac{r_2}{r_1}$$

M = 5.9723 * 10^{24} kg
$v_1 = c_1$ = 2.93 * 10^6 m/s
T_2 = 24 h = 86400 s

For r_2 equal to r_1 and equal to the above determined 957294 m, the mass m is 2 x 7.1 * 10^{19} kg.

However, if Earth has 2 gravitons and they settled at different radii, the calculation should take that into account. Assuming the 2nd graviton was coupled to the body proto-Earth collided with (Theia), and conserved entanglement of gravitons with parent masses:

$$m_a = m = \frac{M_T}{c_1}\frac{2\pi r_a}{T_2}\frac{r_a}{r_1}$$

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$$m_b = m = \frac{M - M_T}{c_1} \frac{2\pi r_b}{T_2} \frac{r_b}{r_1}$$

m = 6.95 * 10^{19} kg
M_T = Theia mass
m_a, r_a = mass and settled radius, respectively, of incorporated Theia graviton
m_b, r_b = mass and settled radius, respectively, of incorporated proto-Earth graviton

For $r_1 = r_a$ = 1206115 m, the first equation gives Theia mass M_T = 2.32 * 10^{24} kg = 0.4 $M_\oplus$, in agreement with estimates[88]. The second equation then gives 961840 m for r_b.

The collision with Theia is thus in agreement with Earth's assumed 2e configuration. One of Earth's gravitons then originates from Theia body and two gravitons should have equal mass (eg. representing 2 up quarks). Note that, if both gravitons have equal mass, coupled bodies should also have roughly equal mass.

There are thus two interpretations for the current Earth momentum. Either the current real mass (roughly equal to total mass, M) is the result of annihilation of initial img mass which was roughly equal to M (which can also be interpreted as conversion of relativistic energy to [ordinary] mass, as in the chapter *G relativity, equivalence with dark matter, Earth's graviton mass*), or real mass was acquired and slowed down the rotation of the coupled graviton(s), which have much lower and constant mass - as hypothesized here.

Of course, since inner core mass estimates are on the order of 10^{23} kg, unless the inner core is significantly non-homogeneous and most mass is concentrated at its edges, taking its total mass into account, the current rotation is not Keplerian. However, if gravitons indeed have a relatively two-dimensional surface (as hypothesized), concentration of mass about graviton radii should not be surprising (especially if space within these radii is not flat). And if initial angular velocity was indeed as high as c_1 (expected for naked U_1 gravitons), most mass should be concentrated *above* the graviton radii. This is true even for initially high electro-magnetic polarization, as charged particles tend to concentrate along the outer magnetic field lines (oscillating between the poles). In case of high polarization, significant concentration of real mass within the graviton radius may only be possible with multiple gravitons (or frequent oscillation of a single graviton), where gravitons are spin anti-aligned and at different energy levels (different radii). Even in that case, however, outer layers should have more mass than the inner layers. In any case, acquisition of inner real mass should probably proceed mostly through the poles.

11.2.1. Graviton rotation in stars and gas planets

If rotation period of gravitons coupled to terrestrial bodies is synchronized with the body rotation period, what about the gravitons in stars and gas giants?

In terrestrial planets, gravitons are assumed to have lower mass than the coupled real mass (ordinary matter), thus, real mass is effectively dragging gravitons, causing them to slow down.

Vice versa is true if graviton mass is higher than real mass. And this is probably the case in larger bodies, such as supermassive black holes (which may effectively be naked gravitons), stars and possibly gas giants as well - with img mass to real mass ratio decreasing respectively.

11.3. Correlation with extinctions

As found previously in CR and here, changes in local (spin) energy level of a graviton will fossilize the level as a discontinuity in the celestial body.

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For Earth, the required quantum of energy (relativistic mass) that should surely result in orbital energy level changes (*ionization*) has been calculated in the previous chapter to be equal to 6.95 * 10^{19} kg (equal to Earth's mass relative to U_1 scale).

Typical ionization energy for standard Carbon electron at the scaled distance of Saturn (<70 * 10^{-12} m) is ≈50 eV. The same amount of energy should be required to excite the mirrored positive charge (scaled Earth). From this, one can calculate roughly how much energy is needed for the orbital excitation of Earth's graviton:

$$M_x = \frac{E_p}{E_e} M = 5.84 * 10^{20}\, kg$$

E_p = 50 eV
E_e = 0.511 MeV
M = U_0.M_E = 5.9723 * 10^{24} kg

The obtained value is 1 order of magnitude bigger than calculated previously. The reason for discrepancy is likely mass (vertical) oscillation. Assuming Earth is in a state of an anti-down quark equivalent, the energy E_e in calculation should be roughly 10 times bigger. Assuming anti-down quark mass of 4.8 MeV/c^2, the energy needed becomes:

$$M_x = 6.22 * 10^{19}\, kg$$

This is now much closer to previously calculated 6.95 * 10^{19} kg.
The Earth should, however, by hypotheses in this paper, be a composition equivalent to coupling of two particles (2e state). This does not change excitation energy significantly, it is rather split into two levels. These levels are 64.5 eV and 47.9 eV for standard Carbon[89], and the excitation energy that would match the previously calculated value should be the superposition of these two.
Indeed, taking superposition into account, excitation energy becomes:

$$M_x = \frac{1}{2} \frac{E_{p_1} + E_{p_2}}{E_e} M = 6.99 * 10^{19}\, kg$$

E_{p_1} = 64.5 eV
E_{p_2} = 47.9 eV
E_e = 4.8 MeV

This is a very interesting number considering asteroid impacts are correlated with major mass extinctions.

In example, estimates for the mass of the impactor responsible for the Chicxulub crater range from 1.0 * 10^{15} kg to 4.6 * 10^{17} kg[90].

To trigger *ionization*, required locally relativistic velocity of such impactor, assuming its rest mass is equal to 4 * 10^{17} kg, is:

$$v = \sqrt{\left(1 - \frac{m^2}{{m_{re}}^2}\right) {c_s}^2} = 18.17828\, \frac{km}{s}$$

m = impactor mass = 4 * 10^{17} kg
m_{re} = required relativistic mass = 6.95 * 10^{19} kg
c_s = Keplerian angular velocity of the maximum = 18178.98 m/s

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Here, c_s is Keplerian velocity for enclosed mass equal to current Earth's total mass ($5.972 * 10^{24}$ kg) and radius equal to initial inner core radius (1206115 m). Thus, here it is assumed that Earth's mass was initially compressed to that radius and, in one interpretation, represents the initial mass of the naked graviton. Such limiting speed is questionable. The speed close to c_1 ($2.93 * 10^6$ m/s) may be more likely.

Interestingly, this is within the range of typical velocities of Earth's orbit crossing asteroids (12.6 - 40.7 km/s[91]) and comets (16 - 73 km/s[91]). In fact, it seems quite likely that the Chicxulub impactor had the required energy to trigger the change.

However, this approach is flawed - apparently, most asteroids and comets would have enough energy to trigger the change regardless of rest mass. If asteroids and comets have accumulated relativistic energy, it must be the energy relative to Solar System space, not Earth's space.

Assuming the speed limit is the Keplerian velocity of the Sun's outer maximum:

$$c_s = \sqrt{\frac{GM_\odot}{R_\odot}} = 436.751 \frac{km}{s}$$

$G = 6.674 * 10^{-11}$ $m^3 kg^{-1} s^{-2}$
$M_\odot = 1.988500 * 10^{30}$ kg
$R_\odot = 695735$ km

required impact velocity becomes:

$$v = 436.744 \frac{km}{s}$$

This is the average velocity of the solar wind.

It should not be surprising that average velocity of the solar wind matches the Keplerian velocity of the Sun's maximum if the angular Keplerian momentum is converted to radial electro-magnetic momentum.

Now this raises a couple of interesting questions:

1. is it possible for a coronal mass ejection (CME) to accelerate the asteroid or a comet to required impact velocity?,
2. does CME itself represents accumulated relativistic energy in this case (eg. through implantation[92]), at least in part?,
3. is a rocky/icy impactor even required - perhaps the CME itself can produce the crater?
4. is mass the sole requirement for energy level changes?

The 3rd seems unlikely, especially if there is no temporary collapse of Earth's magnetic field. However, magnetic field reversals could be coupled with strong CME's, and research shows that CME's can produce significant land erosion and ejecta with no protective magnetic field present[93]. Geology can probably rule out this possibility due to a difference in end products between different impacts.

The CME would certainly accelerate an asteroid on its path away from the Sun. If massive impacts are correlated with energy level changes of large scale gravitons, it is possible that it is not solely the amount of energy that matters, but what kind of energy too - electro-magnetic or gravitational?

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Note that energy required to trigger orbital energy level changes is lower, 1/2 of the ionization energy. Energy required to trigger graviton spin energy level changes is even lower.

On standard scale the electro-magnetic energy of photons is the dominant energy triggering energy level changes, on the scale of planets, dominant energy should be gravitational.

However, both energies should be involved as electro-magnetic energy is not absolutely absent, it's certainly not negligible in case of Earth. On the other hand, one type of energy can be converted to the other at time of impact.

Energy level changes of Earth's graviton mass radius and charge radius might not be well synchronized relative to standard scale. Thus, collapse of the magnetic field (collapse of charge energy level) could precede the inflation of a graviton mass radius.

Evidence suggests there may have been multiple impactors at different locations at the time of the Cretaceous-Paleogene (K-Pg) boundary formation. A potential impact crater significantly larger than Chicxulub formed at the same time has been identified[94], suggesting significantly bigger impact energy.

However, the Earth is still active (alive) - Earth's graviton (or, relative superposition of gravitons) is likely still present within Earth. If there was no orbital excitation, were there local (spin) energy level changes?

Assuming energy requirement scales with orbital radii, the required energy for local changes can be calculated:

$$M_{x-1} = \frac{R}{r} M_x = 5.6 * 10^{14}\, kg$$

R = r_{x-1} = Earth's graviton radius = 1206115 m
r = Earth's orbital radius = 149.6 * 10^9 m
M_x = 6.95 * 10^{19} kg

The Chicxulub impactor apparently had the required energy for such changes.

If similar energies are involved in all major mass extinctions, [at least some] discontinuities within the Earth (those correlated with graviton energy level changes) should be correlated with major extinctions. This is indeed confirmed in another chapter (*Earth as a living organ(ism) > Future development, neurogenesis > Correlation with mantle layers*).

There are potential impactors of similar size crossing Earth's orbit, eg. 1866 Sisyphus.

However, there are multiple energy levels and energy difference between some could be lower than calculated M_{x-1}.

As changes in energy levels are correlated with Earth's formation and evolution, the energy requirements are probably generally decreasing with time.

Note that energy levels have orders. So far two orders have been calculated, but the 3rd order too could have a significant impact on the planet, assuming equal scaling:

$$M_{x-2} = \frac{r_{x-2}}{R} M_{x-1} = \frac{R}{r} M_{x-1} = \frac{R^2}{r^2} M_x = 4.51 * 10^9\, kg$$

Apparently, we are currently experiencing a major massive extinction on Earth. If these are relatively synchronized with impacts, perhaps one should not be surprised if the 99942 Apophis asteroid (with estimated mass of 4 * 10^{10} kg[95]) is accelerated and deflected toward Earth at its close approach in 2029.

Given the fact that universes are self-similar, why assume that evolution of a planet is not similarly scripted as is the embryonic development of a human being?

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Feeling of free will does not imply one has free will. In CR, everything is relative. Therefore, even anthropogenic triggers of global changes should be entangled with code execution at some level.

It might not be the CME [alone] that is coupled with such impactors, rather a large scale graviton ejected from the Sun (eg. one of those hypothesized to form sunspots). This could make coupling much easier. If the graviton is ejected as a wave and has energy similar to, or compatible with, that of the asteroid, it will likely collapse and couple with the asteroid at the encounter. The graviton will impart momentum on the asteroid, affecting its orbit.

Note that this orbital deflection does not have to be synchronized with the impact, it could occur years before. The coupling itself could be hard to observe. Travelling (inflating) as a wave the graviton may be unnoticeable (it can be interpreted as inflating sphere surface made of diluted dark matter), although its emission might be synchronized with CME. What will happen at the time of coupling with the asteroid depends on energy ratios. In any case, the shape, spin and orbital momentum of the body can all be affected.
If graviton collapse is isotropic from the asteroid reference frame and perpendicular to its orbital velocity the effect on the asteroid orbit will be small. However the total mass is likely to double, affecting gravitational acceleration. The collapse cannot be absolutely perpendicular (the angle depends on wave frequency, distance from the source and amount of mass dragging with collapse) and the two effects combined could affect the orbit enough to put the body on a collision course with Earth.
Note that, at the time of impact, the graviton should decouple from the asteroid and either couple with some mantle layer and/or stimulate energy level change of the existing graviton already coupled with Earth.

It cannot be excluded that the Moon too has a role in these events. Moon graviton collapse followed by wave-like inflation, asteroid coupling and Earth absorption is an alternative interpretation.

It is possible that one (eg. the Moon) is involved in electro-magnetic energy level changes, other (eg. the Sun) in gravitational.

11.4. Evidence for a constant change of G

The amount of variability in G will depend on the context. Large variability is expected when G is taken relatively to a particular discrete vertical energy level, assuming no change in metric.

However, even with G considered invariant it should not be considered absolutely invariant (across all of space and time of particular scale). In equilibrium conditions it should generally oscillate about some mean value (which itself may change or oscillate over space/time) - the only question is the magnitude of changes, which, however, in equilibrium, may be relatively small within a particular scale.

According to CR, gravity commonly exchanges with electro-magnetic force. Therefore, G should generally increase at the expense of the Coulomb constant, although changes in space/time cannot be instant and some phase shift at distance will exist.

In a bound configuration such as a Solar System, change in G of local space will be reflected in (or synchronized with) changes of orbital momentum.

Taking mass and distance into account, major influence on G on Earth is the interaction with the Sun (multiple orders of magnitude larger than the Moon and planets).

The G constant should thus oscillate, with the 1st order oscillation due to Earth's elliptical orbit about the Sun.

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The formation hypothesis implies entanglement of the Earth's orbit with energy levels (commonly represented by discontinuities) in the Sun. Perihelion and aphelion can be correlated then with two discontinuities in the Sun, and changes in local G will be proportional to changes in velocity relative to *naked* Keplerian velocities at these discontinuities. The two discontinuities are those at 2/3 $R_\odot$ and 1/2 $R_\odot$.

This is based on the hypothesis of initial inflation where discontinuities in the Sun also represent fossils of initial radii of gravitons of terrestrial planets. The Earth is entangled with two discontinuities (which may be due to 2e configuration, although this is not a requirement) which also represent local energy levels.
Note that Earth's orbital distance is at 2/3 orbital distance of Mars (hence the entanglement with the 2/3 $R_\odot$ discontinuity).

With a change in distance from the Sun, spin velocity of the Earth's graviton is changing relative to the rest frame of the two discontinuities - its radius is expanding and contracting, directly affecting the local G constant.

Mean change of G is thus a superposition of influence of two discontinuities. For the perihelion:

$$\Delta G_p = \frac{1}{2}\left(\frac{\sqrt{1-\frac{v^2}{{c_{1.1}}^2}}}{\sqrt{1-\frac{{v_p}^2}{{c_{1.1}}^2}}} + \frac{\sqrt{1-\frac{v^2}{{c_{1.2}}^2}}}{\sqrt{1-\frac{{v_p}^2}{{c_{1.2}}^2}}}\right) = 1.0002446$$

Change of G for the aphelion:

$$\Delta G_a = \frac{1}{2}\left(\frac{\sqrt{1-\frac{{v_a}^2}{{c_{1.1}}^2}}}{\sqrt{1-\frac{v^2}{{c_{1.1}}^2}}} + \frac{\sqrt{1-\frac{{v_a}^2}{{c_{1.2}}^2}}}{\sqrt{1-\frac{v^2}{{c_{1.2}}^2}}}\right) = 1.0002354$$

Giving the total:

$$\Delta G = \frac{1}{2}(\Delta G_p + \Delta G_a) = 1.00024$$

v = orbital velocity of Earth at semi-major axis = 29784.485 m/s
v_p = orbital velocity of Earth at perihelion = 30037.537 m/s
v_a = orbital velocity of Earth at aphelion = 29538.694 m/s
$c_{1.2}$ = space (Keplerian) angular velocity of the 1/2 R Sun discontinuity = 151.266563 * 10^3 m/s
$c_{1.1}$ = space (Keplerian) angular velocity of the 2/3 R Sun discontinuity = 230.556106 * 10^3 m/s

Velocities $c_{1.1}$ and $c_{1.2}$ have been calculated in the *Quantization of the Sun: Layers of the Sun* chapter.

For a mean G of 6.673899 * 10^{-11} m^3/kgs^2 and ΔG = 1.00024, the amplitude of oscillation is 1.60173576 * 10^{-14} m^3/kgs^2.

Measurements of G on Earth indeed show sinusoidal oscillation, although in at least one previous analysis it has been correlated with the 5.9y (5.899±0.062 y) period oscillation component of Earth's length of day (LOD)[96].

However, calculated amplitude of yearly oscillation (1.60173576 * 10^{-14} m^3/kgs^2) agrees with the amplitude obtained from measurements (1.619±0.103 * 10^{-14} m^3/kgs^2).

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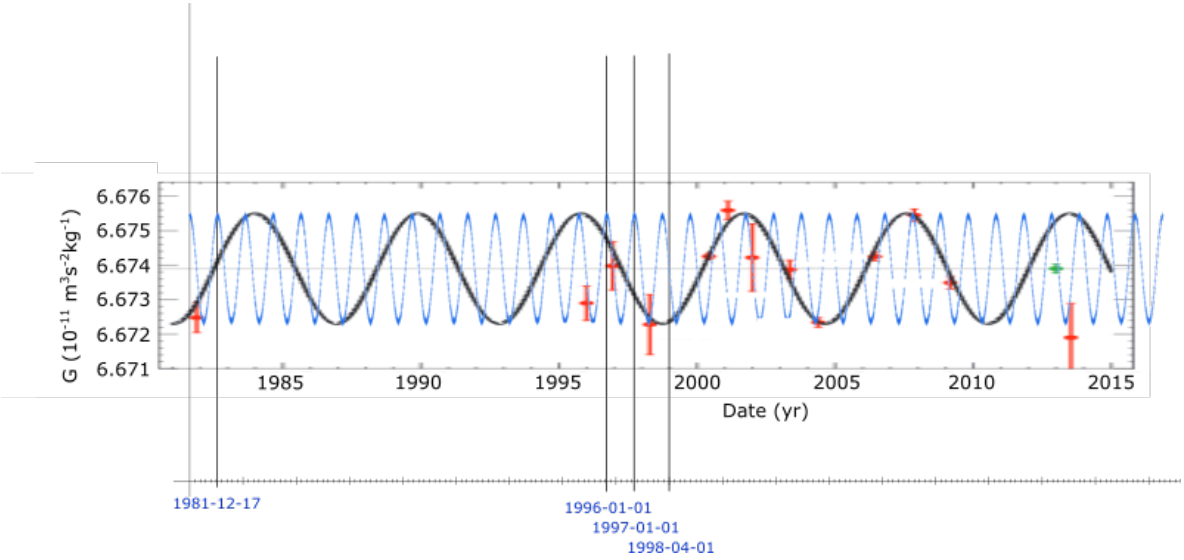

Figure 11. Oscillation of the gravitational constant

Figure 11 shows yearly oscillation (blue) superimposed on the 5.9 y oscillation from previous analysis (black). Red crosses are previously measured values of G, plotted with uncertainties (horizontal and vertical).

Yearly oscillation is obviously a better fit, but when linked to orbits of the Earth about the Sun (orbital data taken from NASA Horizons On-Line Ephemeris System[97]) a phase shift of ≈0.6167 y (golden ratio?) is required for the best fit (as shown in Figure 11).

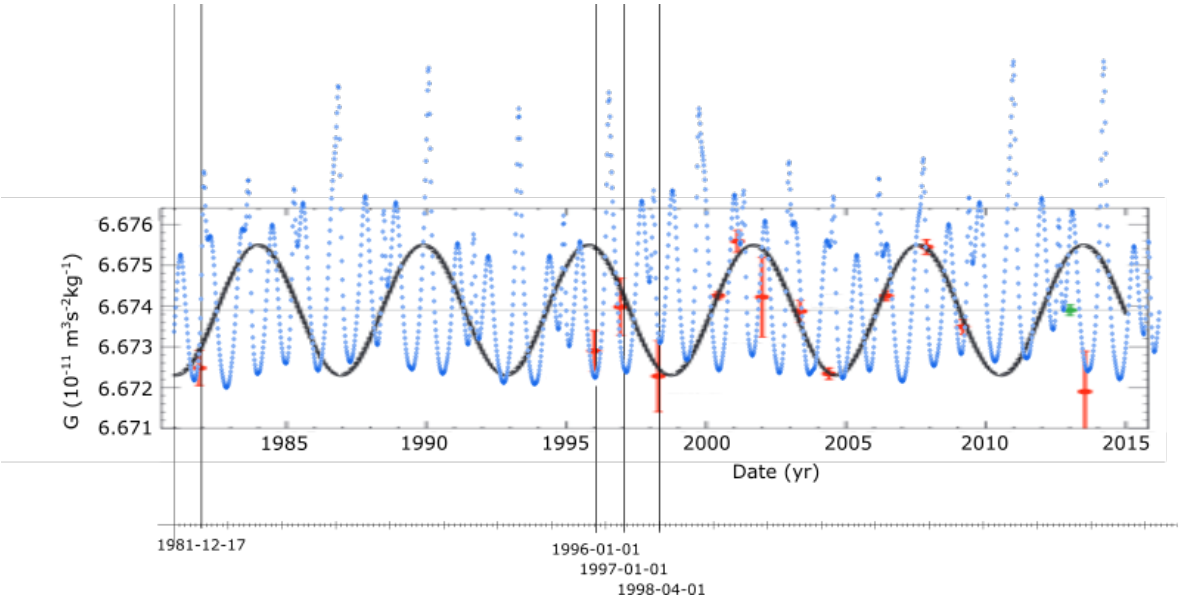

Figure 12. Oscillation of the gravitational constant

Interestingly, as shown in Figure 12, with the influence of the Sun removed, leaving only planetary gravitational interactions, best fit requires no phase shift.

The 5.9 y period oscillation in LOD is equal to a solar orbit in 2:1 resonance with Jupiter and a 5:1 resonance with Saturn. If Mars (assuming current 1e configuration) is entangled with 1e of Jupiter, the Earth (2e configuration) may be entangled with the remaining 1e of Jupiter and 1e of Saturn, instead of being entangled with 2e of Saturn.

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The resonant orbital (outer edge of the main asteroid belt) must be the event horizon (which should currently be in a collapsed form - similar to larger horizons collapsed into dwarf planets) of such entanglements.
This is (or rather, a memory of - due to neutralization of EM force) a magnetic spin entanglement between particles (notice the anti-alignment of magnetic fields between Earth and Jupiter/Saturn), and thus should have a signature in geomagnetic field.

11.5. Physical manifestation

CR predicts (implies) oscillation of constants but may generally not offer physical interpretation as these can be diverse. However, relatively physical interpretation must exist. In case of fields the source should be mass oscillation of carrier particles. Here, it would be the mass oscillation of quanta of space (gravitons).

Obviously, one can keep the gravitational constant fixed and assume it is the mass (M) of the source of gravity that oscillates. However, this creates illusion because both have to oscillate and the two oscillations cannot be absolutely synchronized (only in cases of absolute equivalence, which in this case would be G = M, there would be no illusion).

The Earth is most strongly entangled with the Sun (at least gravitationally) but this entanglement oscillates between two energy levels (which can also be interpreted as a relative superposition of the two). This is correlated with changes in Earth's orbital velocity/distance which are proportional to changes in radii of Earth's large scale gravitons. This oscillation of radii is proportional to orbital oscillation of constituent quanta of local space resulting in oscillation in density of space (dark matter) at particular distance from the Earth's centre (which can be interpreted as mass oscillation of constituent gravitons). This is then measured as oscillation of G.

12. Quantization of surface radii

Here are, somewhat empirically determined, equations for quantization of surface radii in the Solar System - may not be applicable to planetary systems in general (with no modification).

Neutral equatorial radius for outer planets:

$$R = \frac{K_2}{r^2} M \frac{1}{2^{(2-p)}} \left[\left(\frac{1}{10^1} \right)^{(4-N)} 3^{(3-p)} \frac{1}{n^{(p-1)}} \right]^{(s-1)}$$

Neutral equatorial radius for inner planets:

$$R = \frac{r^2}{K_1} \frac{1}{M} n^{(1-p)} 2^{(N-1)} \left[2^{(4-n)} \frac{1}{3^{(1-p)}} \right]^{(s-1)}$$

Since both r and M (gravity) are quantized, it follows that R is quantized too by the K constant - other factors (n, p, s, N) are integers.

The above may be understood as the invariant component of the radius during the cycle. Current radius includes a small correction due to oscillation in electric polarization (charge), value of which evolves weakly during the cycle state.

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Current equatorial radius for outer planets:

$$R = \frac{K_2}{r^2} M \frac{1}{2^{(2-p)}} \frac{1}{10^{(3-N)}} \left(\frac{3^2}{10^1}\right)^{(2-K_\varphi)} K_\varphi \left[\frac{1}{n^{(p-1)}}\right]^{(s-1)}$$

$$K_\varphi = 10^{-\left[\sin\left(180^\circ - \Delta_\varphi\right)^{(p \bmod 2)} \cos\left(180^\circ - \Delta_\varphi\right)^{(1-p \bmod 2)}\right]}$$

$$\Delta_\varphi = \varphi_0 - \varphi_1$$

Current equatorial radius for inner planets:

$$R = \frac{r^2}{K_1} \frac{1}{M} n^{(1-p)} (2 + K_\varphi) \left[2^{(2-p)} 10^0 \left(\frac{10^0}{3^2}\right)^{-K_\varphi}\right]^{(s-1)}$$

$$K_\varphi = 10^0 \cos\left(180^\circ - \Delta_\varphi\right)^{(p \bmod 2)} \sin\left(180^\circ - \Delta_\varphi\right)^{(1-p \bmod 2)}$$

$$\Delta_\varphi = \varphi_0 - \varphi_1$$

K_2 = 4885811.341 m^3/kg
K_1 = 2.385039177 * 10^{-9} m/kg
M = total mass
r = orbital radius
N = shell number
s = number of particles in a sub-shell
p = state of quantization
n = shell energy level
Δ_ϕ = angle between spin momenta of a particle pair occupying the shell (in case of a single particle - induced pair by splitting of the maximum)

Calculated radii for the state 6p4n are shown in Table 19, along with measured radii (rightmost column).

N	n	planet	M (kg)	r (10^6 km)	s	p	Δ_ϕ (°)	neutral R (km)	current R (km)	R (km)
2	5	Neptune	1.02413 * 10^{26}	4495.06	1	2	36.7084	24764	24764	24764
2	5	Uranus	8.6813 * 10^{25}	2872.46	1	1	233.1511	25703	25559	25559
2	3	Saturn	5.6834 * 10^{26}	1433.53	2	1	0.2	60806	60268	60268
1	1	Jupiter	1.89819 * 10^{27}	778.57	2	1	-0.847	68848	71492	71492
2	5	Mercury	3.3011 * 10^{23}	57.91	2	2	172.3047	2555.7	2439.7	2439.7
2	3	Venus	4.8675 * 10^{24}	108.21	1	0	0	6051.8	6051.8	6051.8
2	3	Earth	5.9723 * 10^{24}	149.60	2	1	90.3135	6284.72	6378.14	6378.14
1	10	Mars	6.4171 * 10^{23}	227.92	1	2	-91.9957	3394.1	3396.2	3396.2

Table 18. Calculated neutral and current radii, compared to measured R

Note the quantization of Δ_ϕ. For inner planets, it is quantized by 90° (any deviation may be due to higher order oscillation).

For outer planets, the quantum is reduced to 1/5 of this value, 18°, suggesting, perhaps that the equation for outer planets should be modified, or, instability in radii entanglement, assuming it exists.

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Thus, to obtain 90° quantization, one only needs to multiply Δ_ϕ (quantized by 18°) with 5, revealing how it may be entangled with that of the inner planets, as shown in Table 20.

planet	*normalized* Δ_ϕ (°)	entanglement (anti-aligned)	entanglement (aligned)
Neptune	(5 * 36) % 360 = 180	Venus	Mercury
Uranus	(5 * 234) % 360 = 90	Mars	Earth
Saturn	(5 * 0) % 360 = 0	Mercury	Venus
Jupiter	(5 * 0) % 360 = 0	Mercury	Venus

Table 19. Correlation of outer and inner planets, in case of anti-aligned and aligned entanglements

Note that s above is interpreted as the number of particles in a sub-shell (Mercury, Earth, Jupiter and Saturn are in 2e states, Venus, Mars, Uranus and Neptune in 1e states).

Interestingly then, the anti-aligned entanglement seems to correspond to entanglement between equal states, while aligned radii entanglement corresponds to entanglement between different states.

12.1. Radius of the Sun and its correlation with proton radius

Assuming original composition of the Sun being 6 protons + 4 neutrons, 6 positrons worth of charge (inner planets) would have to be removed to balance the electrons (outer planets).

This makes the Sun neutral:

$$6 \times (-\frac{1}{3}e + 2 \times \frac{2}{3}e) + 4 \times (2 \times -\frac{1}{3}e + \frac{2}{3}e) - 6e = 0$$

The fractional charges above imply QM standard model interpretation, where proton consists of 1 down quark (-1/3 e charge) and 2 up quarks (+2/3 e charge), while neutron consists of 2 down quarks and 1 up quark.

The Sun still consists of both positive and negative charges but their spin effects on radius cancel out. The radius is thus:

$$R = R_2 + R_1$$

$$R_2 = \frac{K_2}{{r_2}^2} M_2 \frac{1}{2^{(2-p_2)}} \left[\left(\frac{1}{10^1} \right)^{(4-N_2)} 3^{(3-p_2)} \frac{1}{{n_2}^{(p_2-1)}} \right]^{(s_2-1)}$$

$$R_1 = \frac{{r_1}^2}{K_1} \frac{1}{M_1} {n_1}^{(1-p_1)} 2^{(N_1-1)} \left[2^{(4-n_1)} \frac{1}{3^{(1-p_1)}} \right]^{(s_1-1)}$$

where R_2 is the sum radius of negative quarks and R_1 is the sum radius of positive quarks.

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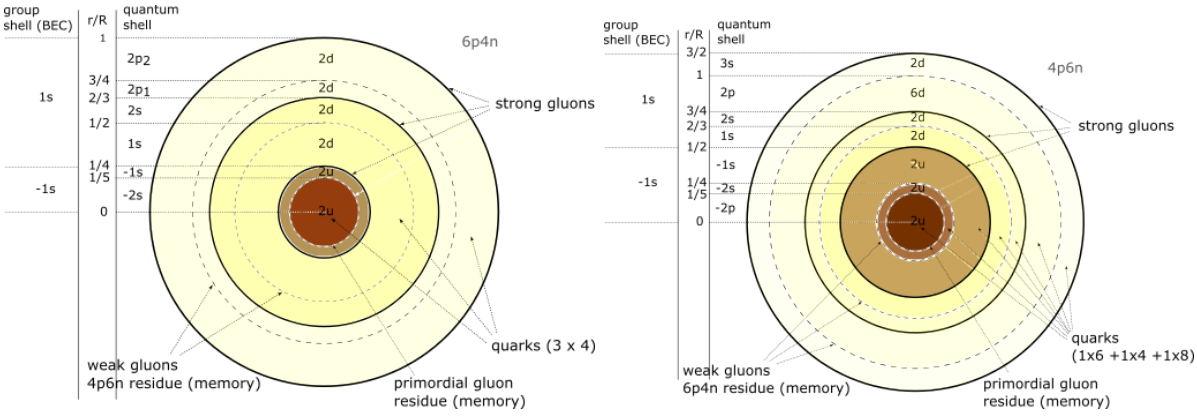

Figure 13. Sun partitioning in: a) 6p4n state b) 4p6n state (R = radius in 6p4n state)

As shown in Figure 13, without 6 +e charges, the Sun is a sum neutron consisting of 6 layers, 4 layers containing pairs of negative [down equivalent] quarks and 2 layers (inner and outer core) containing pairs of positive [up equivalent] quarks. Due to condensation, this is the equivalent of a single neutron so 8 negative quarks can be grouped into a single sub-shell as 2 negative quarks, while 4 positive quarks can be grouped into another sub-shell as a single positive quark (8/4 = 2/1).

Thus, the parameter $s_2 = 2$, while $s_1 = 1$.

The energy of these two sub-shells must be equal, so $M_2 = M_1 = M$.

For equal impact on radii, this must be satisfied:

$$\frac{K_2}{{r_2}^2} M_2 = \frac{{r_1}^2}{K_1} \frac{1}{M_1}$$

Since $M_2 = M_1 = M$:

$$\frac{K_2}{{r_2}^2} M = \frac{{r_1}^2}{K_1} \frac{1}{M} = \sqrt{\frac{K_2}{K_1}} \frac{r_1}{r_2}$$

$$R = \sqrt{\frac{K_2}{K_1}} \frac{r_1}{r_2} \left[\frac{1}{2^{(2-p_2)}} \left(\frac{1}{10^1} \right)^{(4-N_2)} 3^{(3-p_2)} \frac{1}{{n_2}^{(p_2-1)}} + {n_1}^{(1-p_1)} 2^{(N_1-1)} \right]$$

Here p_1 corresponds to number of major (strong) gluons, p_2 to weak gluons, N continues increasing from Mercury (2) so $N_1 = 3$ and $N_2 = 4$:

$$p_2 = 2,\ N_2 = 4,\ n_2 = 3^2 = 9$$

$$p_1 = 3,\ N_1 = 3,\ n_1 = 3$$

Sun radius then becomes:

$$R = \sqrt{\frac{K_2}{K_1}} \frac{r_1}{r_2} \left[\frac{1}{3} + \left(\frac{2}{3} \right)^2 \right]$$

Here, ratio r_1/r_2 is equal to the ratio of orbital radii of the outermost electron (Neptune) and the outermost positron (Mars).

This gives R = 694271.2405 km.

Radius of the sum U_1 scale proton can be obtained by raising the quark factors of R to the power of 2. This is due to the fact that the removal of a negative down quark reduces the negative radius 9 (3^2) times, while the addition of a positive up quark reduces the positive radius 3/2 times. Distance between charges increases (due to greater difference between them) so total radius is decreased by the sum of these factors.

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$$R_{p_1} = \sqrt{\frac{K_2}{K_1}}\frac{r_1}{r_2}\left[\frac{1}{3}+\left(\frac{2}{3}\right)^2\right]\left[\left(\frac{1}{3}\right)^2+\frac{2}{3}\right] = \sqrt{\frac{K_2}{K_1}}\frac{r_1}{r_2}\left[\frac{1}{3}+\left(\frac{2}{3}\right)^2\right]^2$$

Radius of the standard proton (U_0 scale) can now be obtained through this equation:

$$\frac{R_{p_1}}{r_1} = \frac{N * R_p}{r_{U_0}}$$

Where r_1 is the Solar System charge radius (Neptune's orbit), N is the number of nucleons in the Solar System, R_p is the standard proton radius and r_{U_0} is the standard Carbon-10 (Carbon-12) charge radius.

Using Sun radius R obtained above, this gives:

$$R_p = R_{p_0} = \frac{1}{10}\frac{R}{r_1}\left[\left(\frac{1}{3}\right)^2+\frac{2}{3}\right] r_{U0} = 0.840905616 * 10^{-15}\, m$$

12.2. Δ_ϕ validation

Dominant magnetic field in outer planets may be generated by positive charge, in inner planets by negative.

In any case, calculated Δ_ϕ, as interpreted here, should represent the angle between magnetic dipoles, at least in equilibrium. There are a couple of unknowns though. Is this the primordial angle and is it conserved? In any case, the assumption is that the primordial magnetic field was much stronger and it is then when it could affect planet's radius significantly.

12.2.1. Mercury

Δ_ϕ obtained for Mercury (roughly 180°) corresponds to ↓↑ spin configuration. This is generally consistent with a low strength magnetic field.

12.2.2. Venus

Δ_ϕ for Venus (0°) suggests a relatively strong magnetic field. Currently, however, except for the induced one by the interaction of the solar wind with Venus' ionosphere, Venus does not have a strong internally generated magnetic field of its own. The are a couple of explanations for this state:

- it is a result of advanced stage in exchange of electro-magnetic potential for gravitational potential,
- Venus is in a transition between two states (magnetic reversal),
- Venus is dead.

Multiple interpretations may be true. In any case, its magnetic field may be confined inside the planet.

12.2.3. Earth

Earth's magnetic dipole is not axial, revealing a primal quadrupole configuration, as expected with 2e configuration. Considering the movement of north and south dip poles and attributing it to imminent collapse, in the primal configuration two major (inner and outer) dipoles may have been separated by 90°, equal to calculated Δ_ϕ.

This configuration may have been fossilized in the inner core anisotropy, as shown in Figure 14.

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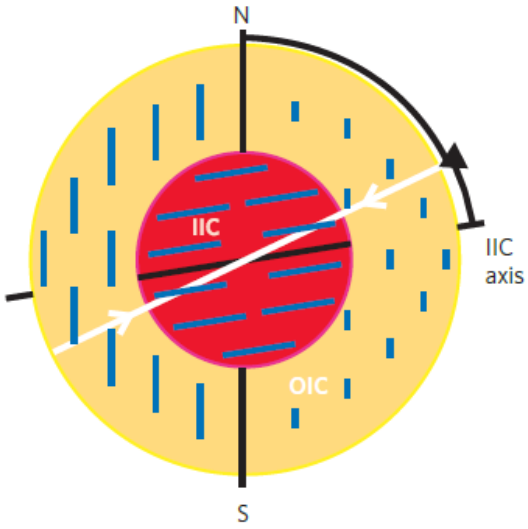

Figure 14. Equatorial anisotropy of the Earth's inner core[98]

12.2.4. Mars

Obtained Δ_ϕ shows primal dipole configuration of Mars mirroring the Earth's. The configuration may be verified once the magnetic field of Mars is restored to full capacity.

12.2.5. Jupiter

Δ_ϕ (0°) is consistent with ↑↑ configuration and may be consistent with observation, as shown in Figure 15, on the left.

Another possibility is a Δ_ϕ of 109°, which is obtained by setting N = 2 for Jupiter (instead of N = 1, see Table 19), shown in Figure 15 on the right.

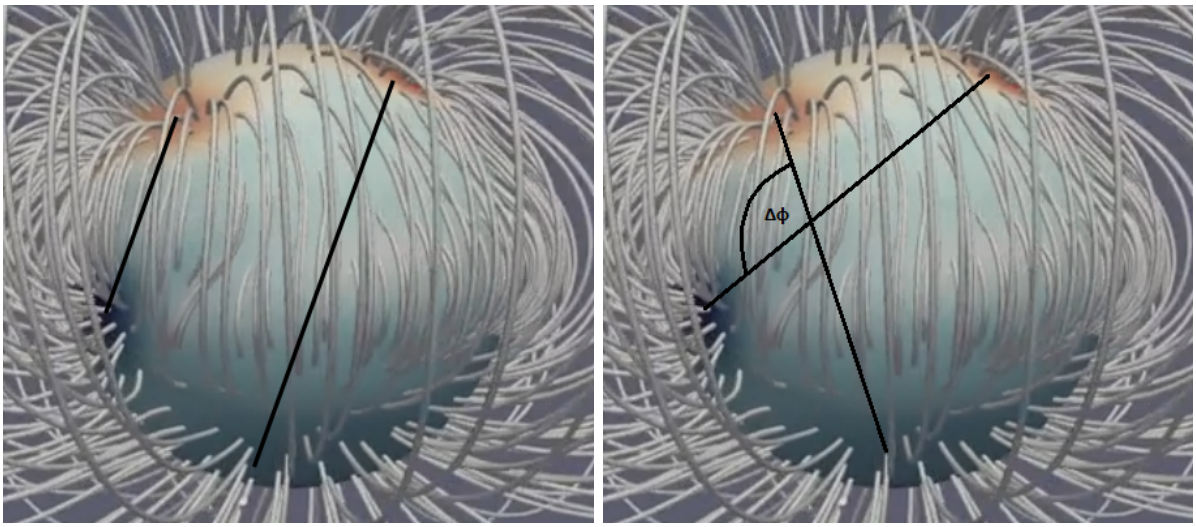

Figure 15. Magnetic field of Jupiter[99], left) Δ_ϕ=0°, right) Δ_ϕ=109° (N=2)

12.2.6. Saturn

Saturn's dipole field is aligned with the rotation axis and highly axisymmetric, while quadrupole and higher components are significantly weaker.

This is consistent with ↑↑ configuration suggested by Δ_ϕ (0°).

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12.2.7. Uranus

Dipole centre has a significant offset from the centre of the planet. Assuming primal core-dipole entanglement, Δ_ϕ may be interpreted as the angle between the equator and dipole rotated by such angle that the [shortest] distance from dipole centre to equator (x) is equal to distance from planet surface to the intersection of the rotated axis and axis translated to centre, as shown in Figure 16.

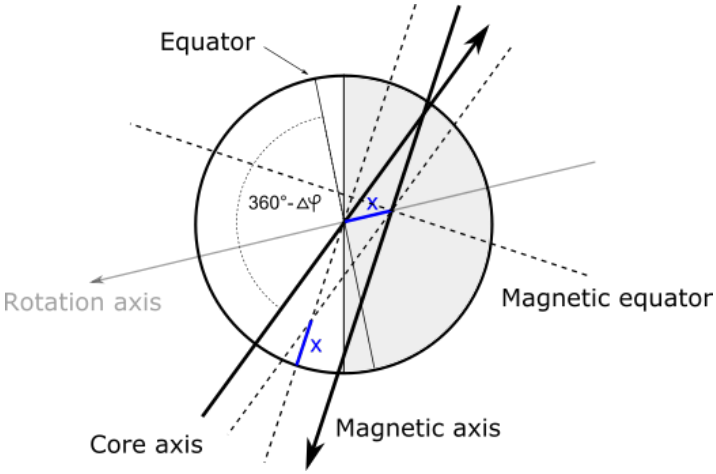

Figure 16. Uranus' magnetic field model

With an 58.6° tilt of the dipole from rotational axis and no inclination, the offset = x = 0.38192 R.

With an inclination of the dipole from rotational axis equal to 1.82°, the offset is equal to 0.353 R, in agreement with NASA/GSFC-O_3 model[100].

12.2.8. Neptune

Similar to Uranus, the dipole offset from the centre is significant. Using the same method as in case of Uranus, one obtains the dipole shown in Figure 17.

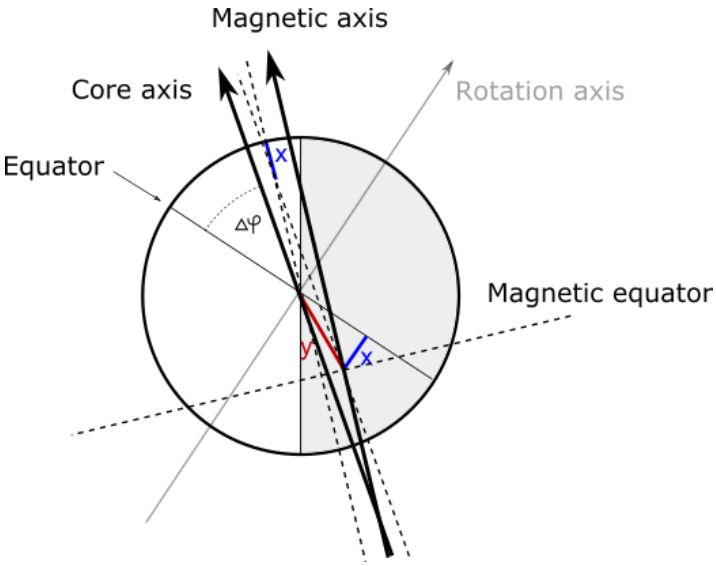

Figure 17. Neptune's magnetic field model

With an 46.9° tilt of the dipole from rotational axis, with no inclination, the offset is equal to 0.12193 R.

With an inclination of 63.2716°, the offset = y = 0.485 R (x = 0.244967695 R), equal to NASA/GSFC-O_8 model[101] offset.

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13. Earth, as a particle

For terrestrial planets, gravity should generally increase with depth, down to the inner gravitational maximum (although multiple maxima generally exist).

As noted before, interesting things arise if one assumes that initial graviton energy is equal to current total energy. In case of Earth, with graviton radius equal to initial Earth's inner core radius (somewhat smaller than the current radius - inner core grows over time), its gravity would be equal to the Sun's surface gravity (274 m/s^2). This is unlikely a coincidence. These radii (Sun's surface, Earth's inner core) probably represent energy levels, which are, at times occupied by the gravitons.

In the empty gravitational well, gravity down to this inner maximum is:

$$gvr = nh$$

$$gr^2 = n\,T\frac{h}{2\pi}$$

$$gr^2 = n\,T\,\hbar,$$

$$g = n\,T\frac{\hbar}{r^2},$$

where T is the rotation period at radius r. In equilibrium, T at surface for a solid body is:

$$T = T_0,$$

while real radius of the planet is:

$$R = R_0$$

If nT is const.:

$$g = \frac{\hbar_{mg}}{m}\frac{R^2}{r^2}$$

For Earth:

$$T = 24\,h = 86400\,s$$

$$R_0 = const. = 6307105\,m$$

Down to the inner core radius r_c:

$$n = n_s = 1$$

$$g = 86400\frac{\hbar}{r^2} = \frac{GM}{r^2}$$

G = gravitational constant = 6.674 * 10^{-11} m^3/kgs^2
M = total gravitational mass of Earth = 5.9723 * 10^{24} kg
$\hbar = \hbar_1$ = 4.613325255 * 10^9 m^3/s^3

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n	discontinuity	radius (m)	gravity (m/s^2)
1	crust surface	6371000	9.82
1	crust surface *perihelion*	6357000	9.86
1	real surface	6307105	10.02
1	outer core / mantle	3411408	34.25 (274 / 2^3)
1	transition zone (induced charge)	1705704	137 (274 / 2)
1	g. maximum = inner core radius = r_c	1206115	274
1	transition zone	852852	137
1	inner inner core	603058	69 (274 for n=2)

Table 20. Gravity of [naked] Earth

Below r_c (1206115 m) gravity becomes:

$$g = n^2 \frac{1}{T} \frac{1}{\hbar_2} r^2$$

At r_c (relative event horizon):

$$n\,T \frac{\hbar_1}{r^2} = n^2 \frac{1}{T} \frac{1}{\hbar_2} r^2, \rightarrow \hbar_2 = 6.144878706 * 10^4\, ms$$

At the event horizon gravity is independent of period and radius:

$$g = \sqrt{\frac{\hbar_1}{\hbar_2}}$$

Below r_c the space-time gradient inverts and gravity is decreasing until it reaches minimum, afterwards possibly increasing again to next maximum, continuing the oscillation.

Note that, although used here, this kind of correlation of rotation periods of real mass with gravity is not generally appropriate.
Note also that radii of large scale gravitons (gravitational maxima) should oscillate and, once real mass is acquired, a phase shift may exist between the graviton radius and radius of condensed mass associated with it. Also, a difference in radii is expected with presence of multiple gravitons. Concentration of real mass will also depend on graviton angular momentum. Thus, current somewhat larger inner core radius (≈1220 km) of Earth is not surprising (note that the Sun as well is a bit larger than [what is defined as] its surface radius).
Inner inner core has also been detected, with a radius of ≈650 km[102], about 50 km larger than the radius of the corresponding hypothesized energy level in Table 21.
Note however that this (or any) *seismic* discontinuity does not necessarily imply presence of a real graviton, it may rather represent an energy level that has been occupied at some point by a real graviton. Of course, discontinuities can also represent areas of phase transition or differentiation of matter (real mass), in which case the discontinuity may not represent an energy level.

13.1. Gravity with acquired matter

A naked graviton (soul) will effectively curve space about it. In case of shielding interpretation, acquired matter will not affect the overall curvature of that space as long as gravity of the graviton is greater than gravity of acquired matter.

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However, clumping or condensation of matter (non-homogeneous system) can produce measurable effects.

In, addition, a maximum may split into multiple maxima (which may even further collapse and localize to form smaller orbiting spin momenta).

Regardless of interpretation (shielding or no shielding), during Earth's development (evolution), the gravitons have likely been oscillating between different energy levels, accumulating mass at different radii from the centre, leaving discontinuities behind.

> Each layer of the mantle is then a relatively independent body, just as terrestrial planets orbiting the Sun are independent bodies. This is a consequence of *enforcement* of self-similarity. It should thus not be surprising that Earth core mimics the Sun - the Earth is relatively mirroring the Solar System nucleus (up to Mars).

Distribution of gravity inside Earth is thus likely relatively wavelike, being cancelled at least at some discontinuities (even if currently not globally), albeit with overall increasing density toward the core. This enables Earth's mantle to have layers where pressures and temperatures are suitable for complex ecosystems.

> Note that vacuum present between layers is an ideal heat insulator (at least regarding conduction and convection). Layer surfaces should thus, at least in places, contain hydrospheres and even atmospheres *above* them with decaying density with distance from the surface. I suspect, however, that there are many magma carrying tubes (*blood* vessels) crossing layers and branching into smaller tubes and capillaries within them.
> Top mantle layers (upper 1000 km) are thus relatively insulated from the core heat which is only periodically transferred in bulk from the core to the surface (or surfaces) at times of major extinctions, probably stimulated by impacts (note that impact-stimulated volcanism has been hypothesized before[103]). Previous research has already shown that mantle plumes rising from the core do exist and are indeed a major mechanism of core heat transfer[104] rather than mantle convection/conduction.

The existence of vacuum *chambers* and tunnels due to such distribution of gravity can explain the neutrino anomalies detected by ANITA[105], which cannot be explained by conventional physics paired with current models of Earth's interior[106].

One could argue that Earth contains materials which require extreme pressures (eg. ringwoodite) to form, but this does not refute the hypothesis of multiple gravitational maxima and deeper habitable zones. Bot low and high pressure areas probably exist. I find it likely that the total mass of Earth was initially compressed (possibly to initial inner core radius) and most high-pressure materials may have been created during this compression. The Earth probably quickly expanded afterwards, correlated with local energy level changes.

14. Earth, as a living organ(ism)

Earth is definitely showing signs of a self-regulated living organism on surface, at least between major extinctions. But even disruptions of that self-regulation can be explained either as a regular component of embryonic development process or as a presence of a disease. These interpretations are not mutually exclusive - both can be simultaneously valid, at least in some cases.

While it may be hard to identify the equivalent of genetic coding in such a large scale organism, it shouldn't be discarded as a possibility due to lack of imagination, especially when there's sound logic behind its existence and evidence in its favour.

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Definition of life in CR allows for development of life with no dominant genetic code in the body. In extremely introverted forms of life development of the constitutional biome (including cells) may not be a result of interpretation of physical genetic code (eg. DNA equivalent), rather interpretation of code existing on another scale (eg. mental). I argue that the code is relatively universal, its interpretation, however, is scale dependent.

In all living beings known to humans, life is not limited to epidermis (outermost skin layer) - in fact, life there is generally least diverse and complex. Higher diversity and complexity on skin surface is generally limited to short periods during embryonic development. The fact that no complex life has been detected on a surface of any planet but Earth goes in favour of this hypothesis.

Existing models of Earth's interior are mainly based on assumptions on planetary formation that do not involve soul/body coupling and which are certainly not backed by abundant and solid evidence. Quite contrary, there is an increasing number of cases defying conventional formation theories. Interior models are also based on data from seismic profiling which has limited resolution and is very prone to interpretation bias[107].

Bias exists in definition of life itself in modern science - apparently there is no solid consensus on required constitution of a living being. But even if there would be one, in current *climate*, it would hardly *allow* for Earth to be alive.

However, assuming extroversion and introversion of life can go to extremes, then everything would have to be relatively alive - either as a distinct lifeform or a composition of lives at some smaller scale, only differing in the ratio of mental to physical interaction (or amount of life in these domains or dimensions of reality). The remaining question is what can be considered a single unit (or organism) of life? For example, any piece of rock on Earth is a relatively living rock because it contains living components (eg. bacteria, but also molecules and atoms - which I also consider living beings, albeit extremely introverted) but it's probably not conscious or living as an individual lifeform itself (in other words, the rock is simply a vessel carrying other organisms but not alive itself). On the other hand, animals like humans are also ecosystems composed of living beings but somehow also alive as distinct organisms themselves. Why? What does it take for the collective of organ[ism]s to become a new organism with its own distinct consciousness? A collective of bacteria organized into biofilms does act as a single organism. Is this then indeed a new conscious organism? Probably, even if extroverted expression of consciousness is limited.

Just like bacteria do in biofilms, a group of people can acquire different functions in the group and the group can act like a single unit, even if the symbiosis is soft and entanglements between people are not *wired* on visible, or what we would interpret as physical, scale. That unit, however, probably represents a distinct conscious organism as well. The unit could be referred to as proto-conscious proto-organism, a potential precursor to *fossilization* of soft symbiosis into a *hard-wired* organism.

I find distinct consciousness to be the requirement for any collective to also represent a new living individual. But distinct individual consciousness obviously requires concentration of energy and if this is not energy composed out of standard atoms than it must be the energy of smaller scale. In my theories, consciousness thus requires coupling of a particle of one scale with a body of another scale. The soul (graviton of particular scale) is at the moment of coupling localized (from a waveform toward a corpuscular form) and the amount of consciousness is then proportional to the strength of localization. A biofilm then probably is a conscious organism on its own but probably not significantly conscious as this consciousness is not as focused as it is, for example, in a human individual. In fact,

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any kind of spontaneous self-organization must be relatively spontaneous and this then probably implies that it is always synchronized with soul-body coupling. And this coupling may be strong, or loose and periodic (resulting in pulses of consciousness or conscious individuality). Therefore, there exists a real probability that even a piece of rock occasionally becomes a living individual (even if just for a split second). And if this coupling intensifies it could develop and evolve into something much more.

The coupling of consciousness (or the soul) with a collective of matter (real mass) is how individual life starts and how it evolved from a bunch of atoms and molecules into more complex organisms. In my hypotheses, the soul represents the goal of individual [quantum of] evolution, it is the effect (or template) the local collective starts converging to with coupling. There is thus a phase shift between the body and the soul - if the soul is more evolved the evolution of the collective is progressive, otherwise regressive. It is obvious that the rate of convergence to the effect is inversely proportional to the amount or focus of consciousness (as an organism reaches adult stage, its development eventually stops and at that point consciousness is maximal). As we age further, consciousness starts diluting again but, this time, instead of inducing development or convergence, it's inducing divergence or decay, of collective support for individuality. It is well known that a genome is simply a book of recipes for the manufacture (expression) of components (proteins) but it doesn't contain any recipe for the development of the organism from conception to adulthood. The development is effectively guided by the soul once it couples with the body (collective). Thus, as we grow, as our consciousness becomes more focused, it becomes harder for us to affect (through mental pathways) processes or the collective of our body - at least in a way that would greatly impact its function. However, it is probably possible at least for some individuals to dilute consciousness (eg. through meditation, dreams or hallucination) and, once again, guide the collective toward a particular effect.

> Generally, both, the soul and the body (collective), evolve toward or away from the same lifeform but this lifeform manifests itself differently on different scales. In other words, the code is universal, but its interpretation is scale relative. Communication between the soul and the body is two-way but there are periods when one side dominates. At least some dreams could be a result of transfer or sharing of information between scales. Thus, if one sees a familiar character or a place in a dream, that does not mean the dream is based on local information - it may simply be a local interpretation of remote information.

So what about Earth, is it a piece of rock with low probability of strong or longer-lasting individuality or is it a, more or less, conscious individual? First of all, it's definitely not just an ordinary, only enlarged, rock aggregate (or an asteroid). It has layers, it has atmosphere, liquid water and sources of energy. That still doesn't make it alive, especially if it did develop according to conventional theories of planetary formation. However, in my theories, formation of a planet starts with inflation (or deflation) of a graviton and its coupling to a body of matter (real mass). It then must be conscious, but how much? I believe the Earth is in the last stages of embryonic development so its consciousness is somewhat localized but still mostly driving evolution of the collective toward the adulthood. Similar to biofilms on it, the whole collective of life on Earth is diversified and, when *healthy*, forms a self-regulating system where different species have different roles - even if some or most may not be aware of it (I know that I am guided, but I don't think other people are not, they're just not aware of it).

> I believe one indicator of mental guidance and thus, presence of Earth's soul or evidence of Earth's individuality, are events of synchronicity.
> Since the guidance is strongest at times of soul-body coupling/decoupling (which can be a temporary loss of consciousness, or permanent - death) when the soul is changing scale and

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form (wave/particle), which are also times of energy level change (whether horizontal or vertical), the evolution/development (with coupling) or decay (with decoupling) of organisms is, at these times, fastest. Therefore, just like organismal development (which is a quantum of evolution itself), evolution itself proceeds at changing rates. Generally, there are long periods of weak evolution (where vertical spatial code transfer and horizontal temporal guidance dominate) but there are also relative pulses of strong evolution (where horizontal spatial code transfer and vertical temporal guidance dominate). Here, spatial code transfer is a transfer of standard genetic code while temporal guidance is effective attraction (convergence) of events toward a particular template (temporal attractor) provided by the soul. Souls and bodies exist on different scales - interpretation is relative. The inflation (evolution) of the whole observable universe (or its constituent quanta) started with soul-body couplings/decouplings on large scale. The template or attractors, which now may be static, but which guided the body components of the early universe, are dark matter haloes and filaments (they still guide, but contemporary guidance is dominantly horizontal). Recent observations are confirming this, initially extremely fast, guidance[108].
One can imagine that the equivalent of dark matter haloes and filaments exists in time (which is a dimension of space of certain scale) guiding the creation of our brain and nervous systems, for example. The haloes reveal the presence of a soul (source of singular identity, focused consciousness, or relative singularity), while filaments could be understood as channels of entanglement (correlation) enabling extroverted expression and symbiosis between souls but which are also guiding the components of the body (organisms of different scale) toward a particular organization and symbiosis. Note, however, that filaments are simply a strongly correlated collective of halos (and associated souls) of smaller scale.
Note also that, if events of synchronicity are an expression of the hypothesized guidance, these events as well should increase with pulses of strong evolution. Synchronicity events could be thus becoming more and more meaningful, unequivocal and more leading, rather than misleading.

The entire Solar System is then also an individual organism, and, relative to that system, Sun and planets may be interpreted as organs (physically relatively passive, or extremely introverted, symbiotic organisms).

Note that, most of our organs are also dominantly introverted organisms which, when alive, have their own souls coupled to them. We are influenced by these souls but our primary soul (soul dominantly correlated with our identity) is the soul coupled with the brain. Our development, from conception, is - similarly to the Solar System development, a parallel development of multiple strongly entangled organisms whose souls effectively revolve about the primary graviton. Yes, the bodies of our organs do not apparently orbit our brains but souls of these organs could. The souls could be only periodically coupling with organ bodies (which could be correlated with heart rates and lower consciousness of these organs). In fact, orbiting souls could be imparting momentum on organ bodies at the time of coupling so the organs could over time move in the orbit direction, however, the impact may be negligible. As noted before, souls have greatest impact on collectives prior to localization but this impact is mental (of low scale energy) and may produce some other effect rather than displacement (eg. effect correlated with organ operation).

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The souls of organs could be periodically coupling to the brain (collapsing from the orbit) - with each decoupling from the original body (organ), thus, exchanging information. This would then explain changes in habits or preferences in people with implanted foreign organs.
Note also that our brain is not as introverted as other organs - our extroverted expression is completely controlled by the brain. The nervous systems connected to the brain go all over the body and should probably be considered as parts of the brain - similar to hyphae systems of *Ophiocordyceps unilateralis* fungi who take control of their host's extroversion by growing these networks all over their host's body.

Obeying the principle of self-similarity, each living organ has an active core, replicating the role of the Sun in the Solar System to localized space-time.

As these are extremely introverted organisms, creatures of extroverted nature accustomed to absolutism may not recognize them as living beings, however, lack of complexity in physical momenta or ability is simply replaced with complexity in mental momenta and ability - which is reflected in momenta of smaller scale life-forms (or quanta of consciousness) residing inside their bodies. One of these life-forms are humans, who are, relative to Earth, likely its [precursor] neural proteins.

Deeper understanding of organisms of planetary scale (or larger) requires understanding of [discrete] scale-invariance of physical laws. One cannot expect that time for these beings (or communication between their constituent parts - eg. neuron equivalents) flows at the same rate as for organisms of smaller scale (eg. humans), nor that their tissue should look like our tissue (discrete states of invariance imply a difference). As calculated before, Earth's mass on U_1 scale is on the order of 10^{19} kg, while we perceive it as 10^{24} kg. Thus, on the scale of Earth, 1 kilogram is equal to about 10^5 kilograms on our scale, or the scale of atoms. Similar is with time.

14.1. Rough internal structure

With no apparent complex, stochastic or conscious large scale extroverted physical interactions (apart from electro-magnetic absorption and emission which may be interpreted as communication) present in planets, planets must be extremely introverted life-forms. In such organisms there's simply no need for limbs and large scale complexity in organismal structure, it is the smaller constituent quanta of these structures that can be complex. And the behaviour of most will be complex (or relatively stochastic) if these are correlated with high introverted intelligence or consciousness of the being.

Most expressed organ of an organism such as Earth then must be the brain, likely organized into layers with possibly minimally expressed gyrification (although that may depend on the stage of development).

Gyrification of tissue may be present in standard complex life only due to presence of organs required for extroverted interaction (eyes, nose, ears, mouth, body from the neck down).

Even so, it has to have other organs [or organ equivalents] necessary for the function of that brain.

Most likely blood arteries are underground tubes, with blood being the flowing magma and water (nutrients).

Proper interpretation of lava solidification is thus coagulation of blood.

Its blood veins are underground tubes filled with oil (compressed dead carbon matter).

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Note that, unlike human blood, Earth's arteries do not carry large quantities of dissolved oxygen while its veins do not carry dissolved carbon dioxide (at least not in high concentrations near surface).
Rather, they carry bound oxygen and carbon, which are then used as fuel to produce molecular oxygen and carbon dioxide where needed.
It is possible, however, that within the mantle, arteries and veins do carry significant amounts of dissolved gases.

Complex life and networks of interconnected diversity are not limited to surface (epidermis). In fact, surface is likely just a breeding ground for cultivation of precursor neuron cells and proteins of a planet. Most complex life is thus resident within mantle layers where it is protected and not so vulnerable to external influence.

The core of a planet probably has the role of a heart and geyser eruptions may provide one way to probe the heart rate when the surface is active.

Note that, with all ice melted, the fraction of Earth's surface covered by water would be about 75%. Human brain is also about 75% water. But that's not where the correlation ends. In example, the salty ocean is a large scale equivalent of the salty water present in the brain - cerebrospinal fluid (CSF).

14.2. Age, lifecycle and the 3rd order period

It has been hypothesized already that Earth lives in cycles (lifecycles), where the average period of the cycle is equal to the 3rd order period of general oscillation of the Solar System.

At the end of each lifecycle, the Earth's major graviton decouples from the body of Earth, either temporarily, or permanently - in which case it is replaced by another graviton. These de-couplings/re-couplings should continue at least until the end of a 1st order cycle, at which point the Earth may die and start disintegrating (although, the body of real mass may be eventually reused again). Unless some [locally] non-coded disturbance occurs (causing premature death), the lifetime of Earth should be relatively quantized by the 3rd order period. Thus, coded lifetime or age is:

$$\Delta T_E = n\frac{1}{f_x} = n\,T_x$$

For n = 2840, and determined period of the 3rd order general oscillation of the Solar System (T_x) equal to 1.512 * 10^6 years:

$$\Delta T_E = nT_x = 4.29408 * 10^9 years$$

Lifetime may be interpreted as the age of the body, while lifecycle is the average interval a major soul is coupled with that body (or, average duration of coupling between souls and bodies). In other words, lifecycle represents the lifespan of soul/body coupling and body can survive many lifecycles if it does not disintegrate between couplings (Earth's body obviously does not). I hypothesize that lifetime and lifecycle are generally different at or near discrete scales of invariance (postulated in CR), converging to equality with distance from these scales.

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Lifetime and lifecycle should thus be different for relatively elementary particles of particular scale, such as planets. In these creatures, with expiration of a lifecycle, soul and body decouple but the body is generally reused, possibly by another soul (graviton). Lifetime for planets will thus be generally larger than lifecycle.

There are at least 3 ways to calculate the 3rd order period of existence cycle T_x [and thus, Earth's lifecycle], all giving the same result:

14.2.1. Decay rate of ^{10}Be

Current Solar System may be in a ^{10}C, ^{10}Be state or a superposition of these states. In any case, I believe entanglement exists between the Solar System and standard ^{10}Be. I propose that half-life of ^{10}Be is, on average, equal to the 3rd order period of the Solar System oscillation (in one interpretation, the half-life has been fossilized as the 3rd order period).

Several measurements of ^{10}Be half-life have been performed.

In example, in 1987. it was measured to be 1.51±0.06 * 10^6 years[109].

In 2009. it was measured to be 1.388±0.018 * 10^6 years[110].

Even though half-life of U_0 elements should be consistent during the existence cycle of the U_1 system, it likely changes during the transition between cycles. Discrepancy in measurements of ^{10}Be half-life (but also other signals, eg. ongoing major extinction) then suggest we are at the end of a cycle. For that reason, I do not consider the value from 2009. or any of the more recent values as the average value through the lifetime of the Solar System. As other evidence suggests, this value probably is 1.512 * 10^6 years.

Interestingly, this value is the average of Satya and Treta yuga in Vedic religion. Probably not a coincidence, as I've found correlations with other periods I obtained as well[111].

14.2.2. Heart rate

The average heart rate of Earth may be calculated from the global average period between geyser eruptions:

$$\langle T_g \rangle_T = 6.6\, hours$$

Note that Earth is in a superposition of quantum states and our [energy] scale is too low to disturb that superposition.
The fact that we can measure these rates [and anything else in the Solar System of similar scale], with high precision without disturbing the system, shows that, while uncertainties in measurement are fundamental, the size of uncertainty is a measurement problem arising from inadequate scale of observational energy, a relative quantity (Planck's *constant*, $\hbar$, as a dimensional *constant* between entangled properties, must be a relative, not absolute *constant*).
Note that this also shows the nature of superposition - as postulated by CR, a system cannot be in multiple states at the same time unless these are separated in space, and cannot be in multiple states at the same space unless they are separated in time.

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For Earth heart rate = my rest heart rate (76 bpm) scaled:

$$1 \text{ Earth scale minute} = 76 * 6.6 = 495\, hours = 20.625\, days$$

Given the number of heartbeats $EH_{3/3}(1 * 10^9, 4 * 10^9) = 2 * 10^9$ and scale invariance of heartbeats, the period is:

$$T_x = 2 * 10^9 * 6.6 = 1.32 * 10^{10} h = 1.51 * 10^6\, years$$

This number of heartbeats with a heart rate of 76 bpm corresponds to a human lifespan of 50 years. This, I consider as the global average human lifespan over the course of evolution on Earth's surface (or at least, during the last 1.512 million years).

With such number of heart beats[112] (between incarnations), the Earth would belong to, not only mammalian species, but relative homo species.

Note, however, that Earth's heart rate may change, it may only be relatively equivalent to human heart rate at this stage of development.

The 3rd order cycle of the Solar System ($1.512 * 10^6$ years) can thus be interpreted as evidence of inter-scales evolutionary entanglement - a man is, on its path of evolution, between the standard scale carbon atom and the Solar System (relative large scale carbon atom equivalent).

To species accustomed to the concept of birth and extroverted nature it might appear that Earth never fully develops.

This is most certainly not the case - life past the embryonic form for us always results in the change of environment, but this is only due to inadequacy of the uterus to ensure the continuity of progressive evolution, one which includes growth of the physical form.

Once extroverted intelligence evolves into, relatively more energy efficient, introverted intelligence, there is no need for physical growth or reason for most of conventional physical organs.

Spherical form may thus be interpreted as a pinnacle of evolution, rather than an undeveloped form of life, even though it externally manifests itself as a *mere* particle, or, a piece of rock. If a man should regard any cosmic phenomena as a deity, it should certainly be Earth, as it would be the one closest to us. A god with whom we are strongly entangled and thus evolutionary depend on. A god who can take and give, and thus be real.

14.2.3. Speed of time

Space-time may be represented by two dimensions, one positively polarized (space), one negative (time), relative to a neutral one (event horizon in between).

These 3 dimensions are spatially separated and quantized, but they are entangled and may orbit the same body, such that orbital velocity of the event horizon is:

$$v_{EH} = (v_S - v_T) * C,$$

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where v_S and v_T are orbital velocities of space and time dimensions, respectively. 3rd order space for Earth is 1-dimensional - the Earth is an inflated quantum of space/time orbiting the Sun. Dimensions of [3rd order] space and time of Earth have been further separated during inflation, but they remain entangled. Assuming that space dimension is [at] Earth's orbital radius, the time dimension should be somewhere in the higher orbit.

Time dimension velocity is quantized by v_S:

$$v_T(n) = \left\{(n+j)+(n-i) \pm [(n+j)*(n-i)]^{-1}\right\}^{-i} \\ *\left\{(n+j) \pm [(n+j)*(n-i)^2]^{-1}\right\}^{-j} * v_S(n)$$

$$n, i, j \in \mathbb{Z}$$

$$i = n - C_1\,,\ j = C_2 - n\,,\ i + j = C_2 - C_1$$

$$C_1, C_2 \in \mathbb{N}$$

The values in square brackets, depending on the sign, give maximum and minimum values of v_T during the cycle state. The average (mean) v_T:

$$v_T(n)_{AVG} = \left[(n+j)+(n-i)\right]^{-i} * \left[(n+j)\right]^{-j} * v_S(n) = \left(2n+j-i\right)^{-i} * \left(n+j\right)^{-j} * v_S(n)$$

$$v_T(n)_{AVG} = \left(C_1+C_2\right)^{C_1-n} * \left(C_2\right)^{n-C_2} * v_S(n)$$

For inner planets, in state 6p4n:

$$C_1 = 2\,,\ C_2 = 3$$

$$v_T(n) = [5+(3*2)^{-1}]^{-i} * [3+(3*4)^{-1}]^{-j} * v_S(n) = (5+6^{-1})^{-i} * (3+12^{-1})^{-j} * v_S(n)$$

$$i = n - 2\,,\ j = 3 - n\,,\ i + j = 1$$

$$v_T(n) \approx \frac{1}{v_n} * v_S(n)\,,\ v_n = v_{n-1} + 2^{n-2}\,,\ v_0 = \left(\frac{2}{3}\right)^{-1} = \left(\frac{N}{P}\right)^{-1}$$

Solar System may also be observed as a hydrogen-like atom, where space, time and event horizon dimensions have been split into 4 component vectors (levels).

The event horizon velocity (derived from v_S and v_T), given the orbital energy level vectors for inner (n_1), outer (n_2) planets and the oscillatory vector k:

$$\boldsymbol{n}_1 = \begin{bmatrix} 5 \\ 3 \\ 3 \\ 10 \end{bmatrix},\ \boldsymbol{n}_2 = \begin{bmatrix} 1 \\ 3 \\ 5 \\ 5 \end{bmatrix},\ \boldsymbol{k} = \begin{bmatrix} 0 \\ 3^1 \\ 3^2 \\ 5^2 \end{bmatrix}$$

$$\boldsymbol{v}_{EH} = (\boldsymbol{v}_S - \boldsymbol{v}_T) * \left(\frac{\boldsymbol{n}_1 + \boldsymbol{k} \oplus \boldsymbol{n}_2}{10^1} + \frac{\boldsymbol{k}}{10^2}\right),$$

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where $\oplus$ is the sign operator:

$$\boldsymbol{a} \oplus \boldsymbol{b} = \begin{bmatrix} -1^{a_1+1} * b_1 \\ -1^{a_2+1} * b_2 \\ -1^{a_3+1} * b_3 \\ -1^{a_4+1} * b_4 \end{bmatrix}$$

Note that the ratio of sums of elements of n_2 and n_1 is:

$$\frac{\sum n_2}{\sum n_1} = \frac{14}{21} = \frac{2}{3} = \frac{N}{P} = \frac{4}{6}$$

where N is the number of neutrons, while P is the number of protons of the Solar System, assuming a ^{10}C state (6p4n).

The event horizon velocity (from v_S only):

$$v_{EH_0}(n) = \frac{r_S(n)}{r_{Mars}} v_S(n) = \frac{1}{r_{Mars}} \sqrt{GM * r_S(n)}$$

$$c_{EH} = 1 \frac{km}{s}$$

$$v_{EH}(n) = v_{EH_0}(n) + (-1)^{(\delta_{jn,2})} \left[1 + 2^{(1-\delta_{j,i+1})} - (ij+1) 3^{(-2^{\delta_{j,i+1}})^{\frac{1}{2}}} \right] c_{EH},$$

where $\delta_{a,b}$ is the Kronecker delta function.

n	Planet	i	j	v_S (km/s)	v_T km/s (entanglement)	σ_T (current value)	v_{EH_0} (entanglement) km/s	σ_{EH_0} (neutron correction)	v_{EH} (entanglement) km/s
4	Mercury	2	-1	47.36	5.47 (Neptune)	$-2^2 * 10^{-2}$ = -0.04	12.033 (Jupiter)	+4.73	16.77 (Hygiea)
3	Venus	1	0	35.02	6.78 (Uranus)	$+2^1 * 10^{-2}$ = +0.02	16.63 (Hygiea)	+1.275	17.9 (Ceres)
2	Earth	0	1	29.78	9.66 (Saturn)	$+2^1 * 10^{-2}$ = +0.02	19.55 (Vesta)	-1.66	17.88 (Pallas)
1	Mars	-1	2	24.07	13.08 (Jupiter)	$-2^1 * 10^{-2}$ = -0.02	24.07 (Mars)	-4.73	19.34 (Vesta)

Table 21. Orbital velocities of time and event horizon dimensions

Table 22 shows space velocities for inner planets and calculated velocities of time and event horizon dimensions along with their correlation with bodies of the Solar System.

Evidently, the speed of time dimension decreases as the speed of space increases and orbits are quantized and entangled (as predicted by CR):

$$\frac{v_S}{v_T} = \sqrt{\frac{r_T}{r_S}} \approx (C_1 + C_2)^{n-C_1} * C_2^{C_2-n}$$

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Orbital velocity of Earth's space is 29.78 km/s. Average velocity of the event horizon for Earth is 2/3 of this velocity, while the average velocity of time dimension is 1/3 of this velocity:

$$v_{EH_{AVG}} = \frac{2}{3}29.78 = 19.85333' \, km/s$$

$$v_{T_{AVG}} = c_{t_1} = \frac{1}{3}29.78 = 9.92666' \, km/s$$

Orbital radius of the time dimension is the space dimension of Saturn - Earth's time dimension is entangled with the space dimension of Saturn (time dimension of Saturn is entangled with Earth space dimension).

Average event horizon is entangled with the current orbit of Vesta, the dwarf planet.

Deviation of $v_{T_{AVG}}$ from current Saturn orbit is equal to deviation of $v_{EH_{AVG}}$ from current Vesta:

$$v_{Vesta} = \frac{v_{Saturn}}{v_{T_{AVG}}} * v_{EH_{AVG}} = 3 * \frac{9.68}{29.78} * \frac{2}{3}29.78 = 9.68 * 2 = 19.36 \, km/s$$

Speed of time for human bodies (c_{t_0}) is equal to standard speed of light c, given the average life expectancy of 50 years (2*10^9 heartbeats with 76 bpm heart rate), the 3rd order period of Earth's existence cycle is:

$$T_x = \frac{c_{t_0}}{c_{t_1}} * 50 \, years = 3 * \frac{2.99792458 * 10^8}{29.78 * 10^3} * 50 \, years = 1.51 * 10^6 \, years$$

14.3. Body mass

If Earth is a living organism, predicting real mass of Earth in the same way as it is done with other organisms should give the result of the correct order of magnitude.

Assuming that Earth is a relative mammal, given the 3rd order existence half-life (period) T_x of 1.512 * 10^6 years (Earth's lifecycle period), mass can be calculated from empirical relationship between mass and lifespan of mammalian species.

$$\left(\frac{m_E}{m}\right)^{\frac{1}{4}} * T_{x_M} = T_x$$

Given human adult mass m of 84 kg and lifespan T_{x_M} of 50 years, mass of earth m_E is:

$$m_E = m\left(\frac{T_x}{T_{x_M}}\right)^4$$

$$m_E = 7 * 10^{19} kg$$

A very interesting result. As predicted, it is roughly equal to previously calculated initial Earth real mass (current img mass) relative to U_0 scale, but also roughly equal to the mass of Earth relative to U_1 scale.

Note that the value of ${T_x}^4$, 5.2 * 10^{24} is of the same order of magnitude (and even close in value) as the total gravitational mass of Earth (M = 5.9723 * 10^{24}).

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The same mass can be obtained using the CR equation for real mass, assuming graviton rotation period equal to Earth's sidereal rotation period (23.9 hours) instead of length of day (24 h):

$$m_E = m_{re} = \left(1 - \sqrt{1 - \frac{{v_{re}}^2}{{c_s}^2}}\right) m_{img}$$

where

$$v_{re} = \frac{2\pi r_{re}}{T_{re}} = \frac{2\pi r_s}{T_{re}}$$

$$c_s = \sqrt{\frac{G m_{img}}{r_s}} \approx \sqrt{\frac{GM}{r_s}}$$

Using T_{re} = 23.9*60*60 = 86040 s, G = G_0 = 6.673899 * 10^{-11} m^3/kgs^2, r_s = 1206115 m, $m_{img} \approx$ M = 5.9723 * 10^{24} kg:

$$m_E = 7 * 10^{19}\, kg$$

The results suggest the equation relating mass and lifespan is incomplete (it works for standard mammals, where total mass is basically equal to real mass).
With no metric (or G) scaling, Earth's mass is apparently bigger. There is 10^{18} kg in surface oceans alone, 10^{22} kg in the crust, 10^{23} kg in the inner core and more in the mantle (based on density inferred from seismic profiles), however, these values are relative to the gravitational constant of the standard (U_0) scale G_0 (6.674 * 10^{-11} m^3/kgs^2).
Properly scaled mass of Earth on U_1 scale is mass obtained using G_1 (eg. previously calculated 5.731534632 * 10^{-6} m^3/kgs^2).
Proper, relativistic, equation for relationship between mass and lifespan is thus:

$$G_1 m_E = G_0 m \left(\frac{T_x}{T_{x_M}}\right)^4 \qquad \text{(M1.1)}$$

Various results can now be obtained, depending on the value of variables, as shown in Table 23.

Relative Earth mass heightn	G_1(n) [m^3/kgs^2]	G_0(n) [m^3/kgs^2]	T_x	m_E(n) [kg]
1	5.731534632 * 10^{-6}	6.674 * 10^{-11}	25.82 My	6.9543 * 10^{19}
2	6.674 * 10^{-11}	6.674 * 10^{-11}	1.512 My	7.0244 * 10^{19}
3	6.674 * 10^{-11}	6.674 * 10^{-11}	25.82 My	5.9723 * 10^{24}
4	6.674 * 10^{-11}	5.731534632 * 10^{-6}	1.512 My	7.1816 * 10^{22}
5	6.674 * 10^{-11}	5.731534632 * 10^{-6}	25.82 My	5.1290 * 10^{29}
6	6.674 * 10^{-11}	6.674 * 10^{-11}	19.3 s	1.8802 * 10^{-30}
7	4.9000394 * 10^{-2}	6.674 * 10^{-11}	4.25 Gy	5.9723 * 10^{24}

Here, m_E(1) is the proper relativistic mass of Earth calculated with 2nd order T_x, m_E(2) is the relativistic mass calculated using 3rd order T_x. Third mass, m_E(3), is the mass of Earth relative to standard scale (m_{E_0}) calculated using 2nd order T_x.
Masses m_E(4) and m_E(5) could be considered as *inverse* (or *anti*) masses of Earth relative to the gravitational maximum of radius r_s.
Note that m_E(4) is [roughly?] equal to 2/3 of the mass of the Earth's inner core, while m_E(5) is roughly 1/4 of the Sun's mass. Interestingly, the Tx associated with m_E(5) is almost equal to the calculated lifecycle of the Sun's core.
Note also the presence of multiple periods in the cycling of Earth's [maximum] existence, 1.512 My and 25.82 My. While the shorter period could be considered as a fossil of the Solar System U_0 half-life ($^{10}Be_0$),

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this entanglement cannot be lost completely and some time compression at the end of 1.512 My cycles can also be expected.
I have previously hypothesized that the Solar System is a product of annihilation and inflation of ^{10}C and ^{10}Be atoms of smaller scale, thus, entanglement with ^{10}C can also be expected, although the collapse and the induced time (evolution) compression should be negligible due to short half-life (19.3 s) of ^{10}C.
Note that with T_x of 19.3 s, mass of Earth [$m_E(6)$] becomes roughly equal to the mass of 2 standard electrons (or positrons).
If $m_E(4)$ and $m_E(5)$ are correlated with Earth's inner core and Sun [core] mass, the data suggests asymmetry between mass and *inverse* mass, growing with period T_x.
The solution is the inflation of T_x and/or G.
With G_0 [roughly] equal to 2.222 * 10^{-5} m^3/kgs^2, $m_E(5)$ becomes equal to the mass of the Sun, while for G_0 [roughly] equal to 1.9561 * 10^{-5}, $m_E(4)$ becomes equal to to the proper relativistic mass of the Sun.
The same can be obtained with T_x equal to 36.23 My and 2.06 My, respectively.
With a period of 555619.11 years, $m_E(4)$ becomes equal to Earth's inner core mass (assuming that mass is 1.1 * 10^{23} kg).
Interestingly, for T_x equal to the 1st order period (4.25 Gy), the value of equation M1.1 ($G_1 m_E$ product) is 2.93 * 10^{23}, equal to the speed of *light* on U_1 scale (2.93 * 10^6 m/s) multiplied by 10^{17}.
Note also that the ratio between $G_1(7)$ and $G_1(1)$ is roughly equal to the ratio between $G_1(1)$ and $G_0(1)$ divided by 10:

$$G_1(7) \approx \frac{1}{10}\frac{G_1(1)}{G_0(1)}G_1(1)$$

which is consistent with association of different G's to different vertical energy levels and therefore to scale (period) of general oscillation.
If $G_0(1)$ is associated with U_0 scale and G1(1) is associated with U_1 scale (as hypothesized), G1(7) should be associated with U_2 scale.
If one assumes that:

$$G_1(7) = \frac{1}{10}\frac{G_1(1)}{G_0(1)}G_1(1)$$

one obtains a T_x of the 1st order of 4.254788 Gy (4.254788 * 10^9 years).

14.4. Future development, neurogenesis

Here I hypothesize that cultivation of life on the surface of a planet is a cultivation of precursor neuron cells and proteins (relative to the planet) which are, at the point of differentiation transferred to planet's [brain] mantle layers in some form. Similar to accelerated (time compressed) evolution during human embryo-genesis, I hypothesize that effective time compression occurs during planetary evolution too - with the end of each cycle of general oscillation of the Solar System (Earth) and with amount of compression being inversely proportional to cycle order.

The points of differentiation and migration in neurogenesis are major mass extinction events (although it is possible that limited transfers occur in smaller extinctions too), which are thus only relative extinctions - life is not completely extinct, it undergoes rapid evolution and migrates away to mantle where it continues evolution.

I hypothesize that Earth's brain has, like human brain, 6 major layers, and that complete formation of these layers requires 6 major mass extinctions during Phanerozoic.

At this point, there is no doubt that we are amidst an major extinction event, a 6th one.

Being part of neurogenesis, extinction events must be coded at some level and, at least roughly, periodic.

Extinction events have relative triggers. While in the past these may have been impactors and volcanism, current extinction seems to have an anthropogenic trigger.

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Thus, one could conclude that current extinction is not part of neurogenesis, rather a part of unlimited cancer growth. However, tumours in humans are known to *induce* neurogenesis (it is one mechanism enabling migration - metastasis).

I find the induction questionable though - humans are not consciously triggering neurogenesis on Earth, it is thus more plausible for neurogenesis to be a reaction of the immune system to inhibit cancer growth. Extinctions coupled with neurogenesis go in favour of such hypothesis. In case of cancer in humans though, and at least during adult neurogenesis in humans, the immune system seems to fail to cure or exterminate the cancerous cells in most cases (in case of humans who are cancerous themselves for Earth, I believe).

The immune system of Earth though, should probably be more advanced, and I believe cancerous homo.beta[113] will be subdued.

> Homo.beta refers to species of humans currently inhabiting the Earth's surface, self-proclaimed homo sapiens. For various reasons, I consider the title homo sapiens premature for this species, so I have reserved it for an evolved form of human.

Judging by past major extinctions, and correlating with human neurogenesis, these events probably should be expected with the advancement of planetary neurogenesis:

- increasing rate of volcanism and earthquakes (due to gyrification/formation of brain tissue, incl. fragmentation/cracking of the crust and flooding of the surface, curing cancer?),
- asteroid/cometary impacts (providing energy, acting as specific event triggers - eg. graviton energy level changes, tissue formation with volcanism, curing cancer?),
- water level changes (melting of polar ice to enable migration, flooding of surface with interior water, curing cancer?),
- ocean pH reaching minimum (possibly triggering migration, curing cancer?).

Migration of large scale cells and proteins from surface to mantle layers requires tunnels connecting these regions. Most likely, these tunnels exist on specific places and are recreated or reopened at time of migration. A likely place for such tunnel opening on surface is the south pole, but may exist on north pole of a planet too.

> One fact going in favour of this hypothesis is that during all previous major extinctions there were periods when poles were free from ice. Although, one could argue that, during Phanerozoic, world was more often without polar ice caps, than with.

Cells and proteins are transferred with the flow of cerebrospinal fluid (CSF) - a salty ocean. In humans, CSF has a pH of 7.33 (on average), and, since pH is scale invariant the pH of Earth's CSF should be roughly equal. The current acidification of Earth's oceans will, therefore, probably continue until pH drops to this value, when migration should follow. Afterwards, new surface water may be delivered by asteroid impacts, but it is also possible that some or most of it returns from the mantle.

Based on correlation with atmospheric CO_2, climate models predict the hypothesized pH minimum in year 2300 AD for an atmospheric concentration of CO_2 of 1900 ppmv[114] (all fossil-fuel sources burned).

> The ocean is, of course, currently stratified and pH varies with depth. However, I believe it is the surface pH that is the important marker here. Various interpretations for this are possible (perhaps only surface layers are used - which I find likely, or different layers of the ocean are

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used for different things, eg. surface layers may form CSF, others may be used for cytoplasm equivalents) but the evidence that indeed surface pH here is relevant comes from the analysis of past extinctions.
In example, the pH minimum (about 7.33 as hypothesized), associated with CSF, has been already confirmed for Permo-Triassic[115] extinction.
The cited work shows a [relatively] rapid drop in pH to a minimum, followed by rapid increase and slow progress toward stabilization. Two models were developed for CO_2/pH concentration (low- and high- CO_2, with a difference in pH minimum between the two being less than 0.2), in high-CO_2 model, the pH minimum is 7.35, in agreement with the predicted minimum. The work, however, favours the low-CO_2 model, so it cannot be excluded that Earth's CSF pH is somewhat higher (less acidic) than human.
In any case, the existence of a pH minimum and its value strongly support the theory of neurogenesis.

A precursor of 6 mantle layers has likely been created in events during Precambrian era, while population with neuron cells and final formation is occurring in Phanerozoic.

There have been 5 major *extinctions* in Phanerozoic, thus the next event should probably populate top layers and complete the formation of the final layer (I):

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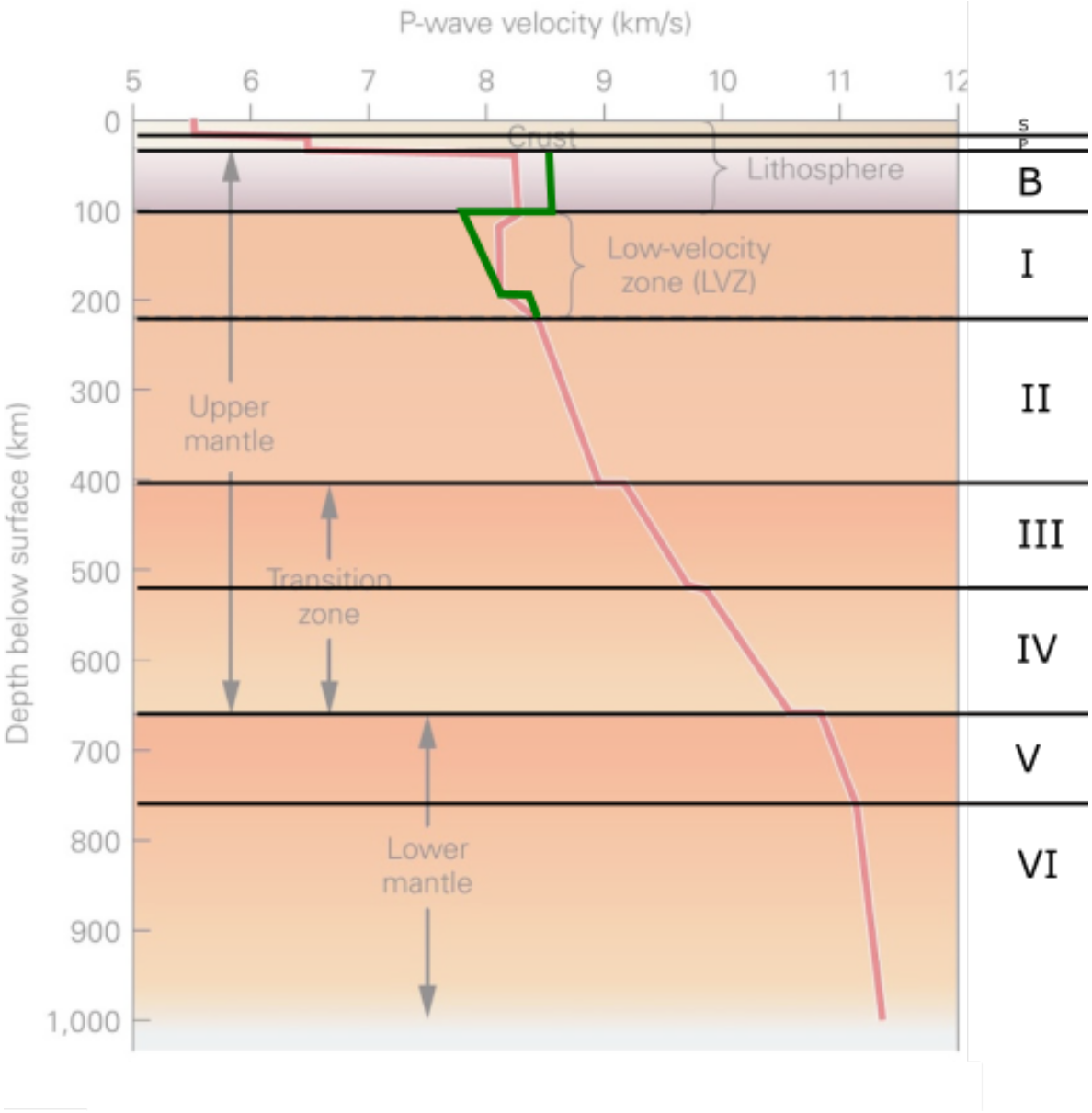

Figure 18. Layers of Earth's brain, superimposed on seismic velocities[116]

Formed layers of Earth's brain are shown in Figure 18. Comparing with other layers, it seems evident that layer I is yet to be completed (according to PREM based models, it's a partially molten rock, unlike the deeper layers of upper mantle which are considered to be composed of solid rock) - green line illustrates one possibility of seismic velocities after formation (suggesting further melting of the upper part, solidification of the lower part of the layer).

Energy from the Sun provides incubation energy used for the maintenance of the Earth's surface ecosystem and weak evolution, but additional energy is needed for the formation of brain layers of homo.omega.

> Here, homo.omega is a species of life Earth belongs to.

This energy is delivered through asteroid (also could be interpreted as food) and possibly cometary (water/organic compounds) impacts.

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Year 2300 AD for the event is very conservative though, as it is based on linear extrapolation, does not include rising water temperatures and reaction of the biosphere.

Acidification of water at these events must be, in significant part, driven by injections of gases (eg. sulfur dioxide) through oceanic ridges and vents or, with rising temperature, methane seeps (where methane gets converted to CO_2) which would introduce significant departure from linear correlation of pH with atmospheric CO_2.

Mathematical analysis of past perturbations of Earth's carbon cycle[117] also predicts sooner triggering of the 6th major extinction event, before year 2100[118] (based on most likely future emission scenarios, the critical mass of oceanic carbon uptake calculated by the study author will be reached before year 2066).

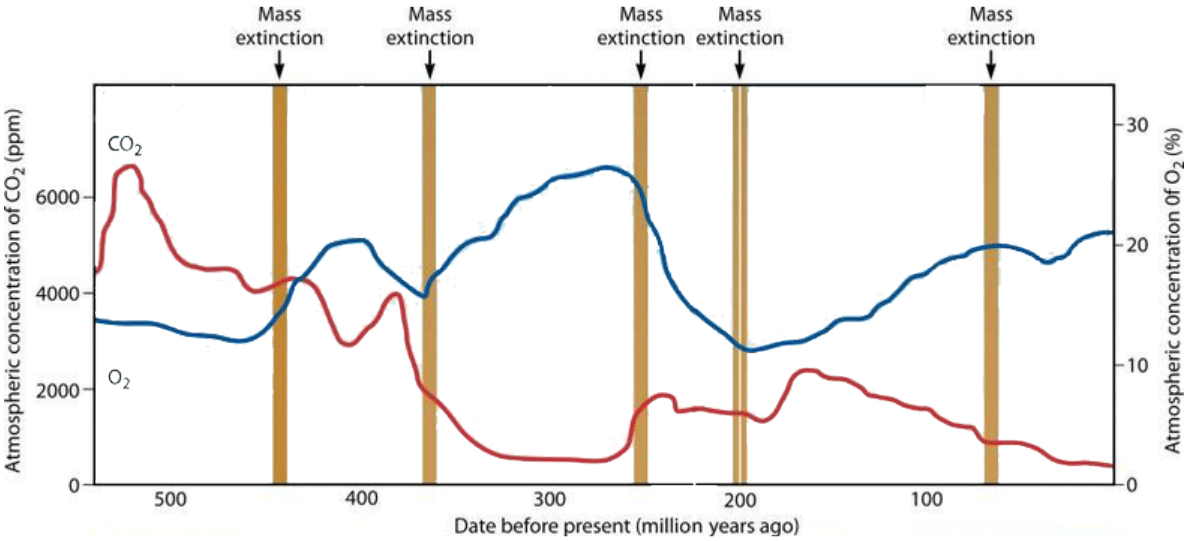

Figure 19. The history of atmospheric CO_2 concentration[119]

From Figure 19 and more recent models[120], it is evident that CO_2 concentration has a decreasing trend overall. And this is expected with increasing energy from the Sun (Sun was about 6% less luminous 500 million years ago) = less greenhouse gases needed to maintain the temperature required for cultivation.

Everything in nature oscillates (and fluctuates), perturbations exist (coded or not) so this decrease in amplitude is not simple and linear, however some rough periodicity in extinctions should be present.

Statistically significant periodicity of extinctions[121] (at least in the last 250 million years) has been noted before - 26, and more recently 27[122], million years between extinctions. In any case, due to differences in extinction strength, multiple harmonics (or energy splitting of a single oscillator) are possible.

Using available data, one can construct models for atmospheric CO_2 concentration synchronized with the oceanic pH minimum of a particular major extinction, as shown in Table 24.

year [mya]	a) CO_2 [ppm]	b) CO_2 [ppm]	c) CO_2 [ppm]	d) CO_2 [ppm]	e) CO_2 [ppm]
444	3800	200	2000	3800	2000
370	1000	2000	1000	1800	1200
252	800	900	800	800	800
201	1800	1800	1800	1800	600
66	250	250	250	300	500
0	450	700	750	800	450

Table 22. CO_2 pH minimum marker models

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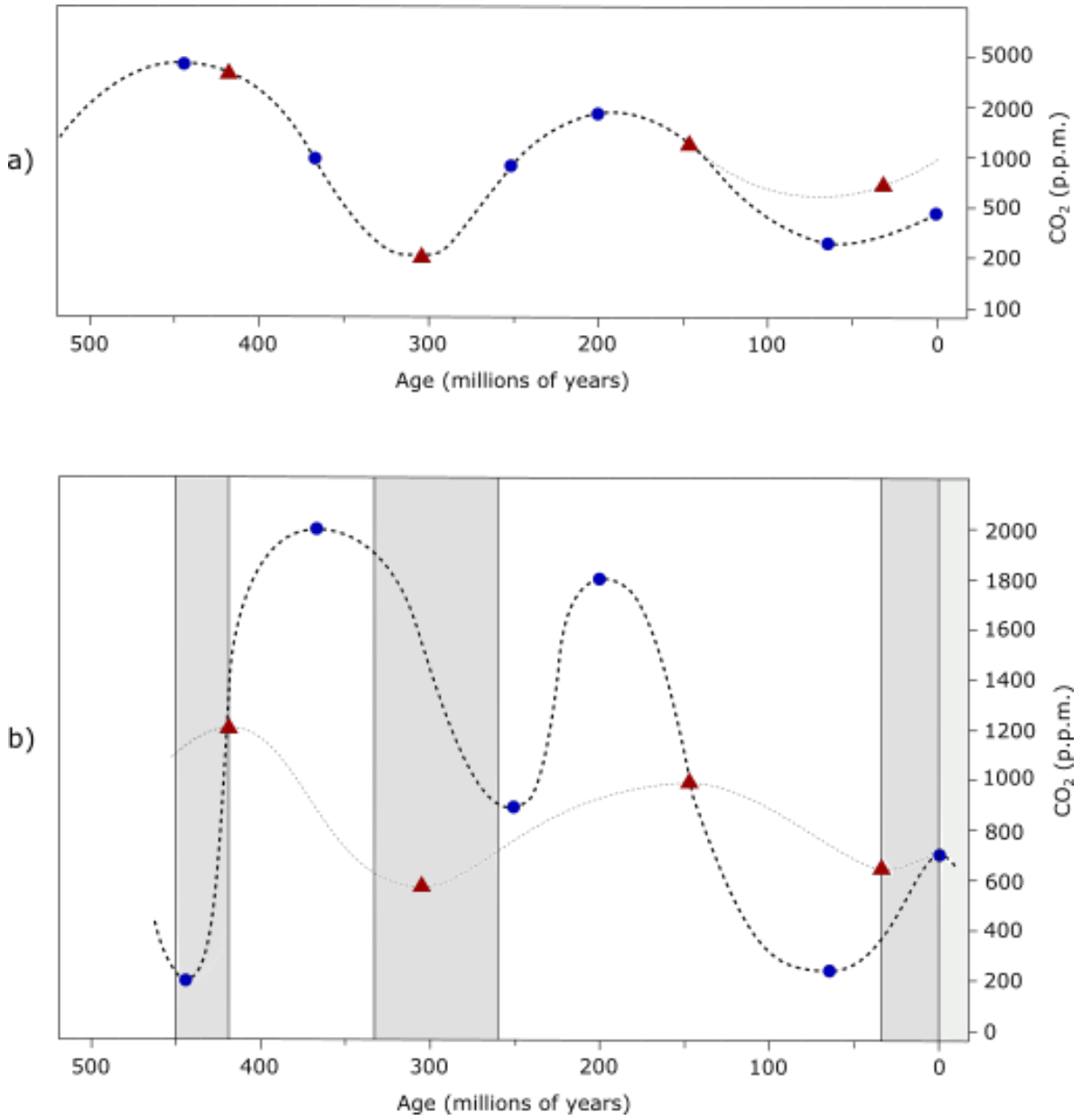

Figure 20. CO_2 pH minimum marker models a) and b) (blue dots = major extinction events, red = minor extinction events, on b) grey = icehouse periods, white = greenhouse periods)

Models are constructed in such a way to simulate oscillation of CO_2 markers and compression of the amplitude with time, but they are also quantized - each marker is a multiple of 50 ppm CO_2 quantum.

Some of the models are shown in Figure 20, blue dots are major extinction events, red triangles are minor extinction events (the curve does not necessarily follow actual CO_2 levels between the extinctions, it is only used to illustrate oscillation of markers).

From these models, grouping of extinctions (suggesting oscillation of frequency) becomes more apparent. Major extinctions can be grouped into pairs separated by 126.5 (±8.5) million years, while paired extinctions are separated by roughly half that distance - 62.5 (±11.5) million years. Minor extinctions (420, 305, 145 and 34 mya) may be grouped in the same way - pairs separated by 160 million years, 113 (±2) million years separation of paired extinctions.

Model a) is the product of energy level splitting of a single oscillator, while b) is the product of 2 harmonic oscillators - one high energy (major) and one low energy (minor).

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Points on the curve should not be interpreted as maximal atmospheric CO_2 levels across the boundary, simply the points of migration or pH minimums.

While these particular models may be speculative, all Phanerozoic CO_2 models show decreasing CO_2 over time (this should be more evident when comparing boundaries of major extinction events) and recent research shows that maximal atmospheric CO_2 across the K-Pg boundary (last major extinction) was 875 ppm[123].

Thus, the maximal atmospheric CO_2 concentration during current *extinction* should be lower than 875 ppm, probably not higher than 800 ppm and not lower than 500 ppm (suggesting that a larger part of acidification will not be sourced in dissolved atmospheric CO_2).

Note that, apart from suitable pH, another requirement for migration is probably a significantly ice free Antarctica. Studies measuring paleoclimatic proxies show that the melting of the Antarctic ice sheet is *baked in* at some point between 500 - 800 ppm CO_2 concentration[124] (the melting is not perfectly synchronized with the CO_2 level, conventional belief is that it would take at least a couple of thousands of years for all ice to melt once the tipping point has been passed). Thus, it is quite likely that the rise of CO_2 beyond 800 ppm is indeed unnecessary (eg. some 3 million years ago Antarctica had much higher temperatures[125] but the CO_2 levels were even somewhat lower than today).

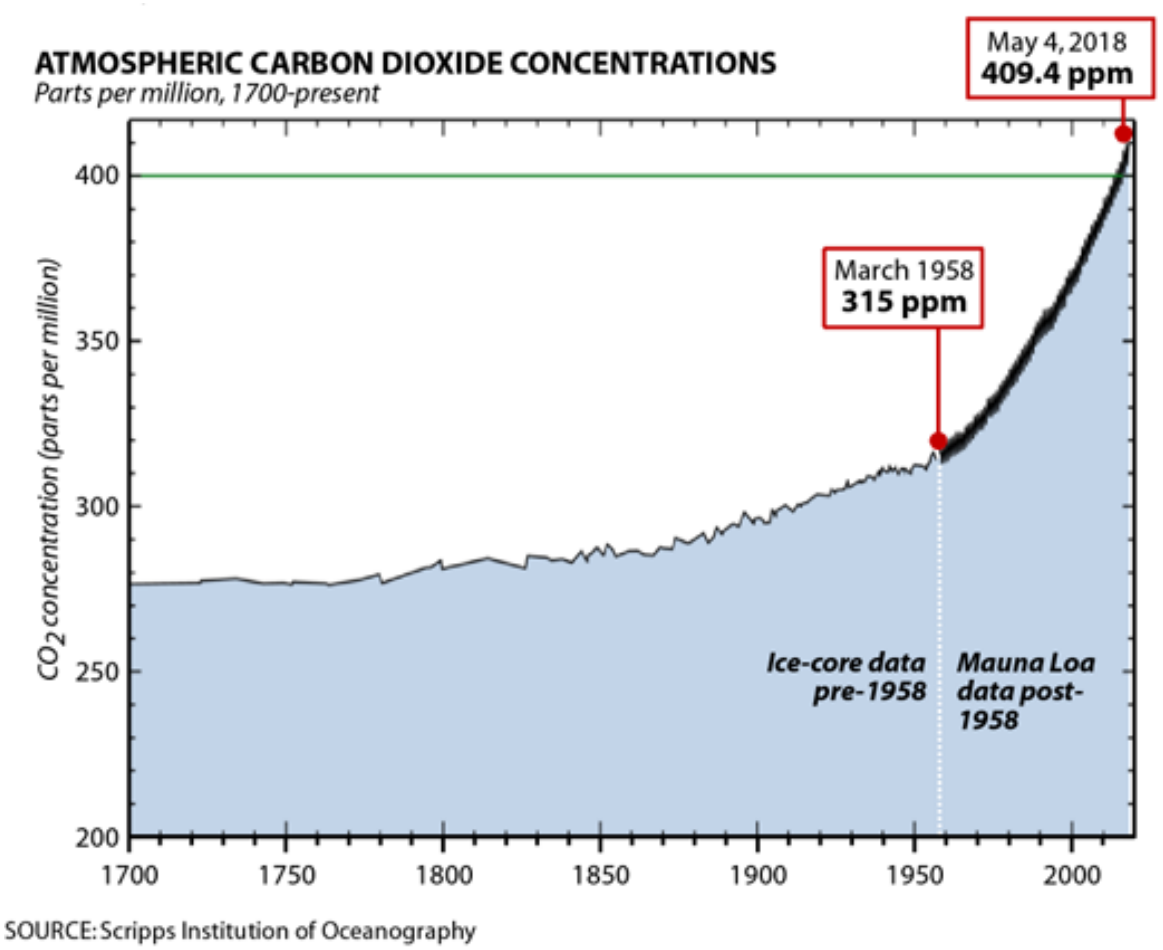

Figure 21. Recent history[126] of CO_2 concentration[127]

Recent history of CO_2 concentration is shown in Figure 21. Assuming that CO_2 has been, during that history, correlated with rate of evolution, one can extrapolate the relation for accelerated evolution of the current *extinction*.

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Development and evolution of organisms is generally strongly correlated with temperature. It should not be surprising then that increasing CO_2 (which is synchronized with increasing temperature) is correlated with the increase in rate of evolution on Earth's surface. However, it is probably unlikely that the CO_2 will remain the main driver of temperature increase.

Extrapolating from Figure 21, from year 1850 onward:

$$CO_2 = 300 * \left(\frac{6}{5} * 2^{45x^2}\right)^x \text{ ppmv} \tag{C1.1}$$

$$x = \frac{T - 1905}{10 * 55} = \frac{T - 1905}{550}$$

which, for the concentration of 800 ppmv gives year T = 2075.

Note that the equation roughly corresponds to IPCC RCP8.5 (Representative Concentration Pathway 8.5) scenario. Both predict equal CO_2 for year 2100, however, RCP8.5 predicts 800 ppm to be reached sooner - in year 2066.
RCP8.5 is considered a worst-case scenario and, at this point, still may be considered unlikely. However, while replacement of coal and oil with other energy sources may eventually reduce human CO_2 emissions, it is not reducing human impact on nature, which is generally not directly proportional to CO_2 emissions, rather to energy (resources) consumption, which is growing as usual.
If the impact threshold is reached (*point of no return*), human emissions are completely irrelevant and positive feedback mechanisms will produce climate consistent with the RCP8.5 scenario. Studies are already confirming this[128].
Humanity may be [very] slowly abandoning the *business* of CO_2 emissions, but, as proper cancer, it has not abandoned the unsustainable infinite growth policy.
Climate is a part of an eco-system, it evolves with the eco-system, and one cannot expect that disruption of eco-systems won't impact climate. Since causality is relative, disruption of eco-systems can be interpreted as a precursor to bigger climate disruption, mass extinctions are always relatively synchronized with climate disruptions.

While humans may eventually reduce their CO_2 emissions significantly, the rate of evolution should keep accelerating according to equation and, regardless of atmospheric CO_2 (which may still be increasing even with 0 human emissions), the required pH minimum will eventually be reached.

UPDATE 2023.09.04

Recent studies go in favour of this hypothesis. The expected slowdown in the rise of atmospheric greenhouse gases during the COVID-19 pandemic was not observed[129]. Since 2006, methane levels are rising rapidly, while the direct anthropogenic contribution is decreasing[130].

Asteroid impacts, previously correlated with Earth's graviton energy level changes, should start before the migration, increasing in frequency and energy with time. Although required energy for changes may be lower than in previous major extinctions, it should still be significant.

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Lower requirement for energy from asteroids, natural earthquakes and volcanism, if real, may in part be due to presence of effective anthropogenic equivalents (eg. wars, nuclear detonations, drilling, etc.).
However, energy requirement primary comes from the difference in graviton energy levels and these can be associated with mantle layers/discontinuities. Here, I assume that layers III, IV and V are the result of splitting of a major energy level - thus, the mantle has 4 major layers, although effectively 6 due to energy splitting. Note that the thickness of major layers is roughly doubling with depth. Since the energy requirement for excitation is decreasing with distance from the centre (reflected in decreasing thickness of 4 major layers toward the top) and assuming the current energy level is increasing with each major extinction, the energy requirement for excitation must be decreasing too.

Assuming interval between possible impacts is quantized proportionally to [the equivalent of] a 50 ppm CO_2 increase (representing a quantum of energy), given the C1.1 equation, one can calculate potential years of impacts and correlate these with potential impactors, as shown in Table 25 for several concentrations.

model	CO_2 [ppm]	year of impact	associated impactor (diameter)	impactor closest approaches	2nd order impactor (diameter)
a), e)	450	2029	99942 Apophis (≈375 m)	2029, 2065	
b)	700	2066	99942 Apophis (≈375 m)	2029, 2065	
c)	750	2071	1866 Sisyphus (≈7 km)	2058, 2071	2000 SG_{344} (37 m)
d)	800	2075	162173 Ryugu (≈1 km)	2076	

Table 23. Calculated impact dates correlated with hypothesized CO_2 markers and possible impactors (2nd order = lower energy)

Evidently, there are *good* candidates among extinction causing asteroids in NEO (near Earth orbit) for calculated dates.

As noted before (chapter *The cycles*), the energy level changing impact may be spread over time - split into multiple impacts with energy generally rising toward the peak.

There may be multiple impactors and/or a single impactor breaking into multiple smaller ones. In example, breaking of Apophis (homo induced?) could result in two impacts, one about 2029, another about 2066. In fact, some smaller impacts that can be correlated with this may have happened already (eg. Chelyabinsk meteor).

In any case, fission of extinction pulses is certainly possible and had probably happened in previous extinctions.

Note 1: According to current models based on Newtonian or GR mechanics, none of these asteroids is on a collision course with Earth in near future. However, these models do not predict periodic existence/extinction pulses coupling with a collapse and inflation of gravitons. As argued before (see, for example, chapters 8 *The cycles* and 12.3 *Correlation with extinctions*), there are good reasons to believe that courses of asteroids are altered at times of extinctions.
If these impacts are *genetically coded* at some level, as hypothesized, they should not be questionable, it is only the source and method of delivery that may be unknown prior to the event.
Note 2: Interestingly, there was an *impact* event on Earth at the time when 400 ppm CO_2 was reached (Chelyabinsk meteor, ≈ 20 m diameter, 2013.), agreeing with hypothesized 50 ppm

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quantization and suggesting that, not only are intervals between impacts quantized, but that impacts may possibly be expected with every 50 ppm of CO_2 increase.
However, if the events are generally correlated with the average ppm value given by the C1.1 equation, which gives year 2015 for 400 ppm, the 400 pm in year 2013 should be understood as deviation due to inherent uncertainty.
Assuming probability of correlation of these events with CO_2 significantly increases once CO_2 rises above background levels, the first event should have occurred at 300 ppm - the beginning of industrial revolution. Indeed, one such event had occurred at 300 ppm - Tunguska, 1908. Note that the Chelyabinsk meteor is the largest known body entering Earth's atmosphere since the Tunguska meteor.
The equation gives year 1992 for 350 ppm. No meteors of comparable impact energy were recorded in or about 1992., probably eliminating significant direct impacts on land area. If such event did occur, it had likely occurred over the ocean (or island), triggering large waves and possibly earthquakes. Interestingly, an 7.2+ magnitude earthquake and tsunami wave did occur offshore in Nicaragua - in 1992. This earthquake is notable for tsunami wave being unusually large (9.9 m high) for the strength of the earthquake (belonging to a group of rare *tsunami earthquakes*).
I do not believe, however, that the impact (assuming it happened) caused the earthquake. This was likely the effect of synchronization of events (*synchronicity*) - the tsunami was caused by the earthquake but it was amplified by the impact. The Earth is a living being and it would not be surprising it reacts, even if unconsciously, to incoming bolides and impactors (just like humans do) to some degree.
I have witnessed such synchronization myself - on 2019.03.07 I have observed a larger meteor burning up in the atmosphere exactly at the time of an earthquake in Hungary, its trajectory was toward the epicentre. It is even possible that Earth reacts to every possible impactor, although the reaction may be proportional to impactor energy and thus usually negligible.
Note that, due to enhanced relativity in causality on the scale of U_1 gravitons, the *reaction* can happen some time before or after the impact.
Also interesting about the Nicaragua event is that it occurred at the time of my birthday (September 1st, local time) producing an obvious signal[131] for me. I interpret this as a confirmation that the meteor was involved in this event, although I am aware many could have a problem with such interpretation.
At the point of writing of this paper, such sign[al]s are still considered meaningless by modern science (they are treated as mere coincidence). However, with CR the phenomena becomes not only real, but a [relatively] special form of synchronization and a driver of evolution with exponentially increasing significance near the end of an existence cycle.
Thus, if one doesn't believe in signals of synchronicity (I didn't before I started experiencing them) I suggest one to study all my work, particularly the work referenced above.
I must admit, however, that my interpretation of the signal could be wrong.
Note that Nicaragua, Chelyabinsk and Tunguska impact sites on the world map can be connected with a straight line - a correlation suggesting that next impact may also occur somewhere along this line (even the Chicxulub, Yucatan crater is close).
Although there were no sightings of large meteors over land, a smaller magnitude impact was recorded on land area in 1992 - the *Peekskill* meteorite. It was recorded one month after the Nicaragua event and is notable for hitting a car in urban area (possibly a fragment of a larger body that fell elsewhere?).
Also interesting, and symbolic, is the fact that the last visit of the Halley's comet to the inner Solar System occurred at the time when 350 ppm CO_2 was first reached - in 1986., and the next time it will be close to Earth is 2061. - exactly at 650 ppm (calculated using the C1.1 equation).

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On the other hand, the assumption of 50 ppm quantization may be wrong, a 100 ppm quantization does not require the impact in 1992 while still predicting Tunguska and Chelyabinsk (gives year 2040 for the next possible impact).
It is currently hypothesized that Tunguska event was caused by a large body which eventually escaped Earth's atmosphere - it can thus be interpreted as a warning.
Given the fact that neither the Chelyabinsk nor hypothesized Nicaragua meteor did not directly impact land, it appears these too were warnings.
However, I do not interpret these as warnings. I believe one purpose of the atmosphere is to disintegrate incoming bodies to protect life during weak evolution. Without it the Chelyabinsk meteor would be called a meteorite. Tunguska asteroid close-by, however, would not leave any effect but the atmosphere might have caused the Tunguska asteroid to split. I thus believe that whatever caused the Tunguska event is destined to eventually hit Earth, the Earth might have just quantized it and spread over time with its instinct (manifested as atmosphere) to defend its surface life.
These *recent* events may then be interpreted as signals of things to come.
Note that Newton calculated year 2060 as the first possible year of the Day of Judgment (but what I interpret as the beginning of *the end* of surface world), although allegedly he revised this year later to 2016 by the suggestion of others. His final decision to revise the year was, however, based on a signal. As he was doing calculations, large earthquake occurred which he later interpreted as a signal that the year 2060 is wrong. This earthquake could be interpreted a signal, but he misinterpreted its meaning - large and frequent earthquakes are to be expected at the end. Newton also calculated the end cannot come after year 2344[132]. Interestingly, this can be correlated with the previously determined pH minimum (which should be reached sometime between ≈2040 and ≈2300, with earlier dates probably more likely).
The year 2016 is not there without a meaning for me too, it is the year [of the start] of my soul *rebirth* (transformation, or change of soul energy level) occurring at the age of 36±1 (here, margins may be interpreted as the spread of the transformation in time as it is not absolutely instant) of the incarnation[133].
Note 3: Interestingly, at the time of the Chelyabinsk event, Apophis asteroid was in close approach. Considering that the composition of Chelyabinsk meteor seems to match the composition of Apophis surface (LL chondrite) a possibility does exist that the meteor broke off of Apophis and is thus a part of impactor energy splitting.
Note 4: The equation C1.1 is one variant of a universal equation for a pulse of strong evolution. That 800 ppm as the CO_2 marker maximum was a good prediction can be confirmed with another variant (inverse) of the equation, one correlated with half-lives of elements:

$$T_{1/2} = 2C_1 - \frac{C_1}{CO_2(T_1)} * CO_2 = 2C_1 - \frac{C_1}{CO_2(T_1)} * 300 * \left(\frac{6}{5} * 2^{45x^2}\right)^x \qquad \text{(C1.2)}$$

$$x = \frac{T - 1905}{10 * 55} = \frac{T - 1905}{550}$$

where $C_1 = T_{1/2}(T_1)$ is the half-life of the element measured at time T_1. The equation gives half-life of 0 at, or near, T = 2075, which is the year when CO_2(T) is equal to 800 ppm (half-life however cannot reach absolute 0, suggesting that 800 ppm is an unrealistic marker). Just like in case of CO_2 I do not expect for half-lives to follow the equation continuously (eg. half-life might appear constant and then get reduced significantly in an instant). Generally, changes in decay rates should require sudden changes in properties of space.
One exception to this could be the half-life of ^{10}Be, due to vertical entanglement with the local U_1 system. If the Solar System cycles through ^{10}(C-B-Be) in the 1st order cycles, a continuous

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precursor enrichment in ^{10}B at a lower scale (U_0) may be effectively announcing the state change of the parent U_1 system (the Solar System).
For ^{10}Be, incorporating the value from the most recent measurements (T_1 = 2010, $T_{1/2}(2010)$ = 1.387 * 10^6 y), the half-life equation is:

$$T_{1/2} = 2 * 1.387 * 10^6 - \frac{1.387 * 10^6}{385.915461731} * 300 * \left(\frac{6}{5} * 2^{45x^2}\right)^x$$

and it gives values in good agreement with previous measurements, as shown in Table 26.

Calculation and measurements[134] of ^{10}Be half-life year	calculated [10^6 years]	sample	measured [10^6 years]
1947	1.665		1.7 ±0.4 * †
1947 (2)	1.665		1.6 ±0.2 * †
1972	1.608		1.5 ±0.3
1975	1.597		1.48 ±0.15
1986	1.550	NIST-4325	1.34 ±0.07
1987	1.545	ORNL-MASTER	1.51 ±0.06 †
1993	1.513	NIST-4325	1.53 ±5% (1.53 ±0.07) †
1993 (2)	1.513	ICN	1.48 ±5% (1.48 ±0.06) †
2007	1.413	ICN	1.36 ±0.07
2010	1.387		1.388 ±0.018
2010 (2)	1.387		1.386 ±0.016

* the value is not the initially published value, but the result of reanalysis/correction in 1972.,
† these values are discarded by scientific community, citing potential systematic errors (based on the presumption of absolute constancy of decay rates).

All measurements agree well with calculated values, except for 1986 - if there were no flaws in measurement, this may be attributed to deviation due to cycling (similar to yearly fluctuation of CO_2). Note, however, that measurement 1993 was done on the same SRM (Standard Reference Material) sample and discrepancy suggests one of these measurements is wrong.
If indeed the half-life of ^{10}Be is decreasing as hypothesized, modern science has been effectively doing cherry-picking here - discarding results which do not agree well, or are in discrepancy, with latest measurements.
Given the current precision of measurements, a new measurement at this point in time which would agree with the calculation would be in discrepancy with measurements from 2010. and would thus confirm the hypothesis of continuous decrease of ^{10}Be half-life with the *extinction* event.
Note that this effect on decay rates is temporary and significant only at the end of a cycle of general oscillation up to the 3rd order.
Note also that decay rates may not be always changing directly (affecting half-life) rather effectively (CR requires effective oscillation in particle decay, but these changes will not always be reflected in half-life of the element) - eg. through spallation reactions.
However, also note that the measured/calculated strong decrease of ^{10}Be half-life (with no associated apparent significant gravitational disturbances) can be interpreted as a consequence of relativity in causality. In that case, this decrease could be a precursor to real global change (across all unstable elements), announcing pending gravitational disturbance - collapse of the local gravitons. If ^{10}Be half-life continues to follow the equation, collapse probably has to occur before year 2075.
Note 5: In the previous note it was assumed that half-life decreases fast and the equation allows it to eventually drop to zero (although, the compression of time implies that this state lasts 0 time - thus, effectively, half-life never becomes 0).
Another possibility, although unlikely, is that half-life cannot ever reach zero, even for 0 time. In that case, the equation might have this form:

$$T_{1/2} = C_1 * CO_2(T_1) * \frac{1}{CO_2} = C_1 * CO_2(T_1) * \left[300 * \left(\frac{6}{5} * 2^{45x^2}\right)^x\right]^{-1}$$

This yields, for T_1 = 1987 (C_1 = 1.512 * 10^6 y, $CO_2(T_1)$ = 341.83707500861), results in Table 27.

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Calculation and measurements of ^{10}Be half-life year	calculated [10^6 years]	sample	measured [10^6 years]
1947	1.676 ±0.044		1.7 ±0.4 * †
1947 (2)	1.676 ±0.044		1.6 ±0.2 * †
1972	1.593 ±0.044		1.5 ±0.3
1975	1.579 ±0.044		1.48 ±0.15
1986	1.518 ±0.044	NIST-4325	1.34 ±0.07
1987	1.512 ±0.044	ORNL-MASTER	1.51 ±0.06 †
1993	1.473 ±0.044	NIST-4325	1.53 ±5% (1.53 ±0.07) †
1993 (2)	1.473 ±0.044	ICN	1.48 ±5% (1.48 ±0.06) †
2007	1.365 ±0.044	ICN	1.36 ±0.07
2010	1.339 ±0.044		1.388 ±0.018
2010 (2)	1.339 ±0.044		1.386 ±0.016

where uncertainty in calculation is the scaled variation of CO_2 (10 ppm).

Such pulses may not only be plausible but necessary - first pulse would include asteroid impact(s) (possibly triggering additional ocean acidification and formation of the layer in the mantle), the other would provide new water/life, either by comets or asteroids. A third pulse in between might also be needed to trigger the (now acidified - CSF) ocean sink and, relatively, sterilize the surface (as noted before, all this is probably synchronized with magnetic field collapse, allowing surface sterilization by UV/gamma radiation).

It may seem that new water this time is not needed - as formation of mantle layers should be complete with this *extinction* (corresponding to Carbon nature of the Solar System) there is no need for cultivation of new progenitor cells on surface. However, it probably does happen as it would provide additional radiation protection and provide support for whatever life remains on, or near, surface.

Note that, if this is the last embryonic neurogenesis event of Earth, a collapse of Moon's graviton probably should be expected. Remains of the Moon could then be the source of eventual impacts of *cometary* nature (dust/water/ice) - assuming the collapse can significantly affect the mantle (otherwise disintegration of the Moon could take millions of years).

This is evident on Mars - as layers below the surface formed, magnetic field receded leaving the surface sterilized. Delivered water froze and is now covered with dust. Thus, one can only expect to find residual and resilient bacteria within the crust of Mars.

Similar probably happened on Venus except water evaporated due to high surface temperature.

Nothing in nature is absolutely linear (although this approximation may be suitable during stages of weak evolution) and in these extreme events one can expect significant departures from linear relations (by multiple orders of magnitude) between phenomena.

Since these events are coupled with gravitational stresses of the Solar System one can expect temporary but significant increase in alpha and neutrino radiation (radiation flux induced by temporary collapse of a gravitational well associated with a large scale graviton - strongly affecting half-lives of isotopes).

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One interpretation of changes in decay rates could be [inverse] time dilation due to scale change of gravitons, but what actually are the mechanics?
If this collapse is synchronized with the collapse of the magnetic field, increased incidence of cosmic rays will increase decays of elements but this is limited to surface and should not be interpreted as real, rather effective and limited, change in decay rates.
However, a mechanism for real changes does exist. Graviton of Earth must be entangled with *static* graviton neutrinos that form its space. Spin/scale change of the large scale graviton will thus be synchronized with spin/scale changes of these neutrinos. In equilibrium, when the gravitational well is full, these neutrinos are [most of the time] bound to standard atoms contained in [or bound to] the gravitational well of the maximum. Obviously, disturbance of these neutrinos (decoupling from atoms) will destabilize the atoms (eg. causing annihilation of positive and negative charge) and induce decays.
Also note that these changes are synchronized with orbital changes of large scale maxima in the Solar System - which, like the decay rates, are accelerated during the pulse but return to *normal* after the pulse.
Due to dependence of density of graviton neutrinos to distance from gravity source (density generally inversely proportional to distance squared), it is possible that even orbital changes in eccentric planetary orbitals are synchronized with changes in decay rates, with some phase shift (in that case, graviton neutrinos directly affected are the *static* graviton neutrinos of the Sun's space). However, there is no spin/scale inversion in this case and there will likely exist a threshold eccentricity required to produce significant effects (this can be experimentally verified with satellites in eccentric orbit).
In fact, this may have been detected already[135], and can also be correlated with oscillation of fundamental constants, such as G (as presented already).
Due to universal synchronization and restoration of previous equilibrium states it may be hard to detect strong pulses in the past. In fact, astronomical and geological observations, generally, probably will not reveal any deviation from constancy of decay rates. However, probably all records of cataclysmic changes should be interpreted as fossils of this *elementary* destabilization. Thus, with such nature of changes (rapid excursions), the principle of uniformitarianism may inevitably seem, but cannot be, valid.
Note also that most of emitted radiation will be lost to space for the same reason - temporary collapse of gravitational/electro-magnetic well, thus solving the problem of missing radiogenic Helium[136]. Due to conservation of momentum, significant loss of heavier atmospheric particles is not expected due to well loss, but can occur during the short exposure to solar wind.

The assumption of absolutely constant decay rates will not only produce incorrect ages but can result in misplacement of events on a geological timescale. Thus, inconsistencies in certain geological records can serve as indirect evidence to disruptions in decay rates.

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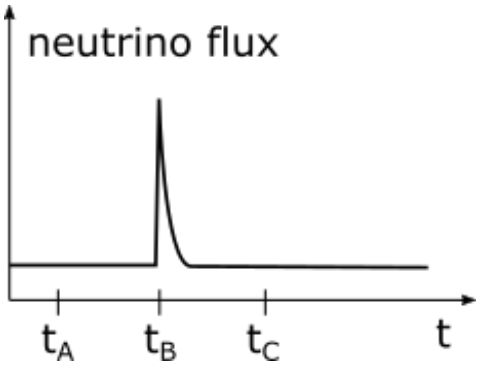

Figure 22. Neutrino pulse due to decay rate increase

Consider the neutrino pulse in Figure 22 - under the assumption of constant decay rates, 3 different fossil records A, B, C may give following results:

- assuming non-isotropic space-time perturbation, such that fossil record A decay is not affected by the event at t_B, the event at t_B (associated with fossil record B) may appear to have happened before the event at t_A (associated with fossil record A)
- in case decay rates of both A and B are affected, the distance of t_A and t_B to t_C will be increased (time interval expansion)

Neutrino flux can also be decreased indicating shortening (rather than expansion) of time intervals, although in this context the increase of the flux is expected.

Due to accumulation, duration of fossilized events would apparently increase with time so older events would seem longer in duration compared to more recent events. This is exactly the case with current fossil evidence of past carbon cycle disruptions.

In such case, the current rate of CO_2 injection is not different from those in previous major extinctions (the fact that it is anthropogenic makes no difference).

If one assumes that the average period between extinctions is equal to the 2nd order oscillation period of the Solar System, in case of ideal synchronization, it is quantized by the 3rd order period of existence (T_x = 1.512 * 10^6 years). In such case, assuming the period must be roughly 26 or 27 million years, the proper period is:

$$T_d = \left\lfloor \frac{26 * 10^6}{1.512 * 10^6} \right\rfloor 1.512 * 10^6 = \left\lfloor \frac{27 * 10^6}{1.512 * 10^6} \right\rfloor 1.512 * 10^6 = 25.704 * 10^6 \, years$$

This is in agreement with previously determined periodicity of impact cratering (25.8±0.6 * 10^6 years)[122].

One can now assume that the CO_2 injection within the Cretaceous-Paleogene (K-Pg) boundary (66.5 - 65.5 mya) is equal to current injection (currently dominantly anthropogenic) and that increase of decay rate (effective compression of time, causing boundary to be significantly overestimated in duration) is induced within the boundary - with the start of boundary corresponding to t_A and end to t_C in Figure 22.

Assuming CO_2 increased from 780 ppmv to 1440 ppmv (ΔCO_2 = 660 ppmv) in period 66.5 mya - 65.5 mya (Δt_i = 1 million years)[137], compression of time Δt_c with each major extinction is:

$$\Delta t_c = \Delta t_i - \Delta t_{ai} = 1 * 10^6 - 234 = 999766 \, years$$

where Δt_{ai} is the period of 660 ppmv of anthropogenic CO_2 increase since year 1850 (assuming this is the start of the new boundary), calculated using (C1.1).

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Such compression of time is easily achievable using C1.2. In example, for ^{10}Be:

$$T_{1/2} = 2 * 1.512 * 10^6 - \frac{1.512 * 10^6}{341.83707500861} * 300 * \left(\frac{6}{5} * 2^{45x^2}\right)^x$$

Half-life of ^{10}Be decreasing by the above equation, reaches required time compression in year 2065, on day 66 of the year. Source code:(Fig.: getage.php +)

However, year 1850 as the start of the boundary may not be convincing and recent research shows CO_2 injection of 250 ppm, not 660 ppm, within the K-Pg boundary, though this does not affect compression (Δt_c) significantly (it makes it larger for a couple of decades at most).

Probably most likely start of a new boundary (end of Holocene) is year 2065 or 2066, which, with an increase of 250 ppm, gives year 2084 as the end, the same as in the previous assumption (1850 + 234 = 2084).

Number of 3rd order cycles of existence since Cretaceous-Paleogene extinction event (66 mya):

$$n = \left\lfloor \frac{t_{KPg}}{T_x} \right\rfloor = \left\lfloor \frac{66 * 10^6}{1.512 * 10^6} \right\rfloor = 43$$

Gravitational collapses during strong evolution pulses with a period of T_x years (3rd order period) may last only Δt_{n_x} = 19.3 seconds, but collapses during stronger evolution pulses occurring with a period of T_d years (2nd order) last longer (possibly 7 days).

With each large extinction, outer gravitational maximum of the sun collapses.

This, may or may not - depending on interpretation (mass being shielded or not) and the current energy level of the outer graviton, result in the release of condensed energy beyond the Sun's surface - effectively expanding the Sun.

I assume the gravitational disturbance reaches the orbit of Mars at the time the gravitational well is restored (this may be interpreted as the temporary change of energy level of the Sun's outer graviton). Thus, with disturbance travelling at the speed of light, time of increased decay radiation is:

$$\Delta t_{n_d} = \frac{r_M}{c} = \frac{227.92 * 10^9}{2.99792458 * 10^8} = 760.259\,s = 12.671\,m$$

where r_M is the distance of Mars to Sun.

Now one can calculate time compression with each cycle (pulse) of existence Δt_{c_x} and each extinction Δt_{c_d}:

$$\Delta t_c = \Delta t_{c_d} + \Delta t_{c_x}$$

$$\frac{\Delta t_{c_d}}{\Delta t_{c_x}} = \frac{\Delta t_{n_d}}{\Delta t_{n_x}}$$

$$\Delta t_{c_x} = \Delta t_c \frac{1}{\frac{\Delta t_{n_d}}{\Delta t_{n_x}} + 1} = 24751.794\,years$$

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$$\Delta t_{c_d} = \Delta t_c - \Delta t_{c_x} = 975014.206\, years$$

Age of Earth is thus overestimated by:

$$\sigma_{T_E} = \left\lfloor \frac{\Delta T_{E_{img}}}{T_d} \right\rfloor \Delta t_{c_d} + \left\lfloor \frac{\Delta T_{E_{img}}}{T_x} \right\rfloor \Delta t_{c_x} = 245907386\, years$$

giving the real age of Earth:

$$\Delta T_E = \Delta T_{E_{img}} - \sigma_{T_E} = 4.29409 \pm 0.05 * 10^9\, years$$

where $\Delta T_{E_{img}}$ = 4.54±0.05 * 10^9 years.

If one assumes that T_d is the equivalent of 1 day of human embryo development, Earth is at the week 25 (GW25) of gestation period (right at the beginning, in case of corrected age).

The GW25 marks the end of embryonic neurogenesis in humans and thus agrees with the suggestion of final major extinction.

The current carbon cycle disruption (6th major extinction) will thus not span thousands (10000) of years as predicted by the assumption of constant decay, but possibly 234 years starting from year 1850 (10000 years of already passed Holocene extinction may be regarded as a precursor to the major event starting at year 1850).

$$1850 + 234 = 2084$$

Note that this year corresponds to 950 ppm, as predicted by (C1.1).

14.4.1. Magnetic field collapse

As noted before, the 6th major extinction will likely include a decline of the Earth's magnetic field, either as a temporary excursion (partial or global collapse), part of a complete reversal, or even a longer-lasting or permanent retreat. The Earth's magnetic field is currently declining at an accelerated rate, which, when coupled with the rapid movement of magnetic poles, indeed suggests imminent collapse. The previously determined correlation of the 4th order period of general oscillation of the Solar System with past excursions (see chapter *The cycles*) also suggests that, at least, a magnetic excursion is near.

If that is so, when will the collapse, partial or not, occur?

With no further acceleration of the decline the collapse would occur sometime beyond year 2100. However, such scenario is unlikely - additional acceleration is expected for a collapse.

The collapse should also be relatively synchronized with other impactful events, which, as I hypothesize, are correlated with the rate of evolution - which is currently correlated with the rate of atmospheric CO_2 increase. With the assumption of events occurring with every 50 ppm increase of CO_2, per the equation C1.1, one obtains the following years:

- 2029, 2040, 2048, 2055, 2061, 2066, ...

Thus, the magnetic collapse should not occur before year 2029 (or, 450 ppm CO_2) and most likely not after year 2066. per the correlation found in *The cycles*, it's most likely to occur sometime about 2048, however, it full collapse is imminent, it may be preceded by multiple partial and/or temporary collapses, perhaps even with the first one occurring 2029±2.

14.4.2. Sea level changes and migration

Neurogenesis requires transfer of differentiated progenitor cells to subterranean world, into designated mantle layers. Therefore, a passageway must exist somewhere, connecting the surface with underground tunnels leading to such places. These tunnels may be long-lived or re-created as needed.

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The passageway on the surface, however, is unlikely to be open all the time. It is a relative equivalent of mouth and animals usually do not keep their mouths open all the time, only when they feed.

Note that cultivated cells/proteins on the surface can certainly be interpreted as food (this is the case for migrating cells in standard embryogenesis as well). Everything that becomes incorporated in the body (whether during development or in adult stage of the host) can be interpreted as food. And it is not unusual for the individual quanta of that food to be many orders of magnitude smaller than the organism feeding on them. Consider whales feeding on plankton. Now, what could whales evolve into if they could evolve further? Probably an organism cultivating food on its surface. The food (eg. something evolved from plankton) takes energy from the environment to grow and multiply. Once certain mass is established, the host stimulates the food quanta to migrate toward the mouth. By the time they arrive, the mouth is opened and they are further stimulated to go inside. Once the food is digested (which may or may not be necessary) and incorporated into the body, the waste products are expelled through another opening, or pores on the body. At least some of this waste could then be used as fertilizer on surface. If waste is expelled at the time *critical* mass of food on the surface is reached, the waste itself could serve as a stimulant for migration of food toward the mouth. The benefit of cultivation of food on one's surface is that no mobility is required. Thus, the energy requirements for life are significantly lower (energy is used solely for maintenance of introversion and intra-species communication). What about reproduction? No reproduction is needed if the population has reached cultivation peak. In other words, evolution has reached its endpoint or evolvability maximum (effective local goal), where the evolved organism may represent, for example, a neuron cell equivalent or an atom equivalent. This does not imply there is no death, such organisms may be regenerated or re-evolved when necessary. In another interpretation, the organism has reached a relative perfection, where further sexual recombination and natural selection would have a low benefit to cost ratio (which is obvious if all members of the population are pretty much identical relative to their function in the environment).
Earth is a perfect organism, and so is an atom.

Scaling the largest neuron cells to Earth size, such passageway must have a radius of at least $\approx$ 250 metres to allow sequential cell transfer. However, parallel transfer of multiple cells is certainly more plausible - a radius on the order of 10^4 m or more.

Thus, the only location where this area could remain hidden (protected) and isolated when unused is probably Antarctica (even if the opening is closed, the additional layer of ice doesn't hurt, it provides additional protection). Ice melting is then required to expose this location but likely also to raise the sea level as the ocean represents the CSF, the fluid that should flow into the tunnel.

I have assumed humans, in addition to other animals, represent precursor neural proteins. Even if it may be unlikely that living humans will be migrating, rather recipes required to make them (DNA), the sea level still would have to be high enough to pick up the viable human genomes. However, even if all the ice melts, significant parts of the land would still not be covered with water. There are two solutions:

- additional water comes from the deep and/or from space,
- no additional water is needed, biomass destined for migration is concentrated where needed (eg. on Antarctica).

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The most likely outcome is probably a superposition of these 2 solutions. With climate changes (and possibly nuclear war) Antarctica may increase its habitability while the rest of the world is decreasing habitability. Biomass destined for migration (including people, or hybridized people[139]) could be thus *lured* or guided (eg. by certain fields of potential) to Antarctica prior to migration.
Note that the collapse of the Atlantic meridional overturning circulation (AMOC) would significantly decrease temperatures in the Northern Hemisphere while, at the same time, it would further accelerate warming in the Southern Hemisphere, particularly about Antarctica. Apart from increasing storms, flooding and dropping temperatures in Europe and North America (where, in the east, it would also raise sea level), the collapse would severely disrupt the rains that billions of people depend on for food in India, South America and west Africa.
Thus, AMOC collapse would significantly increase habitability of Antarctica while significantly decreasing habitability elsewhere.
Some studies suggest AMOC could collapse this century and the most recent one predicts collapse sometime between 2025 and 2095[140], with probability maximum about 2050.
Increased levels of radiation (eg. through a nuclear war, magnetic field anomalies) could also have a role in migration of biomass to Antarctica. Magnetic field is currently decreasing strength while tensions between US and China/Russia are high and have been rising lately.
In standard embryogenesis, migration of cells can be stimulated by excretion of extracellular matrices (various cell products).
Here, one equivalent factor may be hydrogen sulfide (H_2S), a highly toxic and unpleasant gas, which had a role in at least some past major mass extinctions. For example, natural gases (incl. hydrogen sulfide) leaked from deeper reservoirs in the Arctic could be carried by disturbed polar jet streams toward the equator, stimulating life to migrate south. Indeed, the increasing accumulation of Sargassum seaweed[141] on the shores of the Caribbean, America and Africa could be interpreted as a precursor to larger hydrogen sulfide emissions (the Sargassum is releasing H_2S as it rots).
If environmental pressure is required to stimulate migration, a major extinction may be interpreted as a side-effect of migration induction, or a result of filtering - which can also be interpreted as natural selection. Is it a selection of most intelligent, most adaptable and/or most easily manipulated? In any case, those who do not migrate, lack intelligence or adaptation capabilities, are probably those who go extinct and will appear in the fossil record. If intelligence is selected for migration here (effectively, or whatever the interpretation), it is then quite possible that high intelligence has evolved, or has been cultivated, multiple times on Earth.

Rise in atmospheric greenhouse gases seems unlikely to produce adequate rise in temperature required to melt all ice in the predicted short time-frame ($\leq$2066). Thus, different mechanisms may be responsible to induce significant breaking and melting of ice sheets. In addition to greenhouse gases, geothermal sources are likely. Melting can also be accelerated by asteroids, but also by advanced alien species from the deep.

However, if time indeed gets effectively compressed (with temporarily increased decay rates of elements), radioactivity itself could contribute to melting. Assuming that the increase of decay rates of hydrogen and oxygen in water molecules doesn't produce significant effect (hydrogen probably shouldn't be affected at all, and the effect may be negligible for all stable isotopes), required radioactivity (heat) may be produced by less stable isotopes trapped in ice or by elements in the crust below it.

Note that significant amount of sea level rise has been already *baked in* with the increase of CO_2 from pre-industrial 280 ppm to present levels ($\approx$410 ppm). The estimates depend on study (some are

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analyses of recent glacial-interglacial fluctuation, others of individual past events with different CO_2 ranges) and range from 10 - 40 metres. The relationship is not linear and may go roughly like this:

- with CO_2 in the range 200 - 400 ppm, sea level rise *baked in* is 26 m per 100 ppm of CO_2,
- for 400 - 600 ppm, 13 m rise per 100 ppm CO_2,
- 600 - 800 ppm, 4.3 m rise per 100 ppm CO_2.

This would then result in 65.8 m total sea level rise, *baked in* with CO_2 rising from 280 ppm to 800 ppm.

Note that, although predicted as such, migration of life (at least one that represents proteins, not cells) from the surface to mantle layers does not necessarily imply transfer of living individuals (depending on transfer conditions, it may not even be possible to survive it). DNA may be all that's required.
However, migration to Antarctica probably is a migration of living individuals. Not all species may migrate and not all individuals of species *selected* for migration will migrate (I have hypothesized elsewhere that every population contains polarized and non-polarized individuals and only one of these is affected by strong evolution[142] and will migrate). This then can explain the unexpected negatively-skewed frequency distribution of body size for extinct dinosaur species[143] (although other explanations are possible). Further going in favour of the hypothesis is the fact that distribution was distinctly negatively-skewed only toward the end of major time periods, when migration is supposed to occur. This suggests that the largest dinosaur species did not migrate, or that non-polarized individuals dominate in largest species - which I find more likely.
In case of the current strong evolution event, non-polarized individuals likely dominate in largest whales, while in humans non-polarized individuals still represent a minority. The fossil record past the current event is thus unlikely to contain humans.
But is human DNA destined for migration, or is it an *uninvited guest*? I assume if land animals are lured to Antarctica, then at least some of them should be neural precursors, otherwise, all that matters is probably life in the ocean (which, however, can contain DNA of land animals, even if not in large amounts).

Conventional potential for faster melting of ice

The rate of melting of interior ice on Antarctica generally depends on two heat fluxes - flux between the ice sheet and the atmosphere and the flux between the ice sheet and the base (geothermal heat flux).

Recent measurements show that geothermal heat flux is bigger than expected but still low, lower than 300 mW/m^2, on average[144]. Much bigger fluxes exist on Antarctica at the vents of subglacial volcanoes where they can be as high as 25 W/m^2. If such volcanism would spread all over Antarctica (average heat flux of 25 W/m^2), all ice could be melt in about 760 years (without taking into account melting caused by atmospheric heating). At the moment, however, there are no signs of this happening (although this could change with the predicted global increase in volcanism, the signs of which may be here already[145]).

On the other hand, considering atmospheric heat flux alone, if the average temperature in Antarctica interior would climb by 43.5 °C (from -43.5 °C to 0 °C), 40-50 years would be enough to melt all ice. Is this possible in the short-term? Well, this is exactly what happened on 2022.03.18 at Concordia Station[146] - temperature measured was a record high -11.8 °C, about 43.5° higher than the median average for that day of the year.

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Others report a temperature of -11.5 °C, claiming 38.5 °C higher than normal[147]. Not 43.5°, but close.

Similar was measured in Vostok, and these places are the coldest places in Antarctica. Is this the signal that yearly average of 0° C could be reached in the short-term? I wouldn't be surprised. However, melting of all ice may not be required at all for a neurogenesis event. What is certainly required is a sufficiently large area to contain the biomass destined for migration. This will probably be an area with a significant geothermal flux. And the Earth's magnetic field, which will be fragmented and weak generally, will probably have a significant dipole component concentrated in this area.

The creation of tunnels

By the theory, large scale gravitons (probably inflated from smaller scale) should be commonly involved in the formation of stars and planetary bodies. The inflation (or initial over-inflation followed be deflation and stabilization at the new energy level) of a graviton and dark matter associated with it is relatively synchronized with the clumping of real mass (ordinary matter) and makes the process of formation much faster and possible even in cases of strongly diluted real mass (like in the Kuiper belt of the Solar System, for example).

Given the generally torus-like shape of gravitons, concentration of mass is not isotropic.

Mass in planetary bodies should then be differentiated not only vertically, but horizontally as well, with lower density at the poles and possibly even with tubes (tunnels) connecting poles of large scale gravitons, or different energy levels in case of a single oscillating graviton (although these tunnels in terrestrial bodies would have to be eventually filled with fluids to ensure stability).

Note that Earth's gravity is greater on the poles, but not as much as would be expected for either simple compression or removal of material. Density does seem to be somewhat lower at the poles. Are there tunnels below? Long-lived tunnels, except near gravitons, seem unlikely due to increasing pressure with depth, however, fluid density should be increasing with depth as well. High polarization and angular momentum of the wall material (or the fluid) can increase the stability of such tubes but this is not expected for the walls in terrestrial bodies (fluid flowing toward the centre would, however, possess an angular momentum). Long term stability could be ensured with appropriate density of energy levels and relatively frequent oscillation of large scale gravitons as this provides multiple density maxima. Lateral density gradient (with increasing density away from the pole) also decreases pressure on the tube and such gradients are likely for rotating bodies (note that Earth rotated much faster during formation). Otherwise, tunnels may be only periodically recreated (fluids remelt). I suspect that on bodies like Earth the fluids involved should be [salty] water and magma, with dominant fluid probably depending on the pole. Land should be depressed at the entrance where water is involved, however, it may be elevated on the pole where magma is involved. Interestingly, the subglacial topographic depression in Antarctica known as Wilkes land anomaly (elsewhere hypothesized 480 km wide impact crater, which would make it the largest impact crater on Earth) was directly antipodal to Siberian Traps (largest known volcanic event in the last 500 million years) during the Permian-Triassic boundary (Siberian Traps are considered to be the primary cause for the Permian-Triassic extinction, largest mass extinction on Earth).

Interestingly, the Siberian Traps may not be the only large scale phenomenon the Wilkes anomaly was antipodal to over time.
The 31 km wide Hiawatha structure on Greenland, hypothesized to be an impact crater, seems to have been antipodal to Wilkes anomaly at the time of the hypothesized impact (estimated to have occurred about 58 million years ago[148]). However, rather than being directly correlated with Hiawatha structure, Wilkes may be directly correlated with the creation of the Iceland

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hotspot (likely a mantle plume effect), which was located beneath Greenland at the time[149] and was responsible for the strong wide-spread volcanism (comparable to Deccan Traps) occurring there some 60 million years ago (Vaigat formation).
Currently, however, the Iceland hotspot is antipodal to the Balleny hotspot (Balleny islands), which does not seem to be correlated with a mantle plume[150].

The crater hypothesis has its problems and it is questionable whether impacts alone can cause significant volcanism on the other side of the planet (although they can certainly cause earthquakes). However, the recreation of tunnels with graviton oscillation should create such phenomena at antipodal locations - depression on the side of water entrance/exit, bulges or traps at the side of magma expulsion (masking the depression). If Earth is modelled as a living being, different products on entrance and exit are expected. As tectonic plates move with time, the locations on the surface should move as well. I believe that all major mass extinctions are correlated with recreation of the tunnels. The Siberian Traps are already considered to be the result of a mantle plume which effectively is a *temporary* creation of a tunnel between the planet's core and surface through which magma flows upwards. Antipodal volcanism is common to large craters of the Moon and Mars[151] and there are other examples of antipodal relationships on Earth involving large igneous provinces and hotspots (Yellowstone, for example, is antipodal to French Southern and Antarctic Lands). All of these may be correlated with oscillation of large scale gravitons and associated temporary recreation/reactivation of tunnels. In fact, deep mantle plumes may not be possible without it. As noted before, energy level changes cannot be absolutely spontaneous and large impacts can be interpreted as relative triggers of energy level changes of large scale gravitons. If graviton is, at the time of impact, oriented in such way that its axis of rotation is aligned with the impact site, and this should be likely at least for impacts occurring near the poles (possibly nearer magnetic ones if these are present), then the impact can be correlated with antipodal volcanism. In that case, the seismic energy generated by the impact further stimulates the flow of fluids through the tunnels, increasing the effect on surface (note that impacts do create chimneys of stress connecting the impact source with the antipodal location[152]). Generally, however, impact sites may not be aligned with the graviton axis at the time of impact and the magnitude of extinction then should be proportional to the alignment. The exceptional magnitude of Permian-Triassic extinction thus can be explained as a result of unusually high alignment.

If there are multiple gravitational maxima in the mantle, the lateral pathways in the core-mantle heat convection cells must be branching, corresponding to the number of maxima. Thus, plate tectonics may be present in multiple places in the upper mantle as well. In fact, I suspect that surface plate tectonics is only active during embryonic development, and possibly, in a limited way, during adult neurogenesis in mature planets.

In any case, if the highly energetic expulsion of magma on the surface is matched with antipodal water intake, the mechanism of transfer of organics into the deep exists.

14.4.3. Analysis of past extinctions

Here, past extinctions are analysed for periodicity, with incorporated corrections by previously calculated time compression due to pulses of decay rate changes.

Periodicity is obtained using circular spectral analysis[153] of a couple of datasets, which all give similar results.

Data is grouped into energy levels corresponding to the extinction magnitude (5 - major extinctions, 4 - minor extinctions, 3 - other extinctions, 2 and 1 - potential extinctions).

The method

In the circular model of periodicity a time line is *wrapped* about a circle, the circumference of which represents a trial period. For each occurrence, a unit vector from the origin is calculated. If

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periodic, the series will tend to form a cluster at one point on the circumference when the correct trial period is used. Here, angular location relative to 0° (present) gives the phase (t_0).

Ages of individual events (t_i) are transformed to angles (a_i, b_i) for each trial period P:

$$a_i = \sin\left(\frac{2\pi}{P} t_i\right)$$

$$b_i = \cos\left(\frac{2\pi}{P} t_i\right)$$

$$S = \frac{1}{N}\sum_{i=1}^{N} a_i$$

$$C = \frac{1}{N}\sum_{i=1}^{N} b_i$$

$$R = \sqrt{S^2 + C^2}$$

where R is a mean vector magnitude (normalized measure of goodness of fit). The phase shift (t_0) is calculated as follows:

$$t_0 = \frac{P}{2\pi}\tan^{-1}\left(\frac{S}{C}\right) \qquad (\text{for } C > 0)$$

$$t_0 = \frac{P}{2} + \frac{P}{2\pi}\tan^{-1}\left(\frac{S}{C}\right) \qquad (\text{for } C < 0)$$

Dataset 1

energy level	extinction events [mya]	extinction events (t_i), age corrected [mya]
5	66*, 201.3*, 252.2*, 365, 445	61.986, 190.208, 238.316, 345.385, 421.148
4	37.8*, 145*, 260[a], 305[b], 420[c]	36.206, 136.774, 245.993, 288.3, 397.519
3	11.6*, 93.9*, 182.7*, 230[d], 270, 424[e], 428[f], 488[g], 502	11.402, 88.465, 172.88, 217.463, 255.844, 401.469, 404.42, 461.48, 475.257
2	117[h], 168.3*	111.194, 159.702

Table 24. Extinction events dataset 1, sources: *[122], a[154], b[155], c[156], d[157], e[158], f[159], g[160], h[161]

Extinction events in dataset 1, grouped into energy levels and calculated corrected ages for these events, respectively, are shown in Table 28.

Maximal R was obtained for a period P = 25.92 My (million years), with a phase of 9.355 My.

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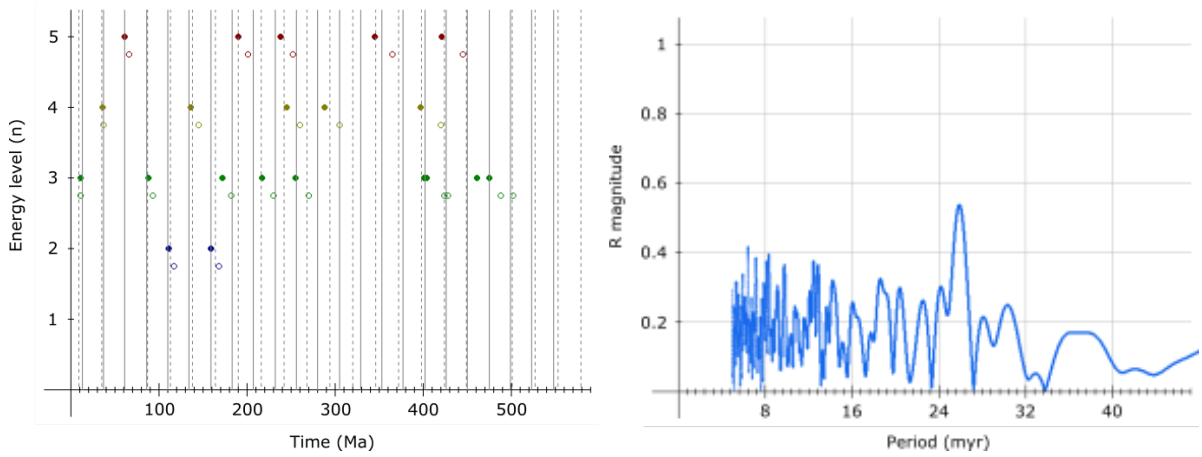

Figure 23. Dataset 1 - extinctions (left), spectral analysis (right)

On the left, Figure 23 shows extinctions plotted against the obtained periodicity (dashed grey line), solid colored circles are extinction events with corrected ages, empty circles are extinctions with non-corrected ages. On the right, Figure 23 shows the result of circular spectral analysis.

Dataset 2

Here, a larger dataset from a single source was used.

energy level	extinction events [mya]	extinction events (t_i), age corrected [mya]
5	66, 201.4, 251.9, 372.2, 445.2	61.986, 190.308, 238.041, 352.461, 421.348
4	37.8, 145, 259.8, 306.7, 419.2	36.206, 136.774, 245.793, 289.975, 396.744
3	11.6, 93.9, 183.7, 228.5, 272.3, 423, 427.4, 485.4, 500.5	11.402, 88.465, 173.88, 215.987, 257.12, 400.469, 403.82, 458.929, 473.782
2	113.1, 168.3	107.344, 159.702

Table 25. Extinction events dataset 2, source: Gradstein2016[162]

Maximal R reveals a period P = 26 My, with a phase of 8.617 My.

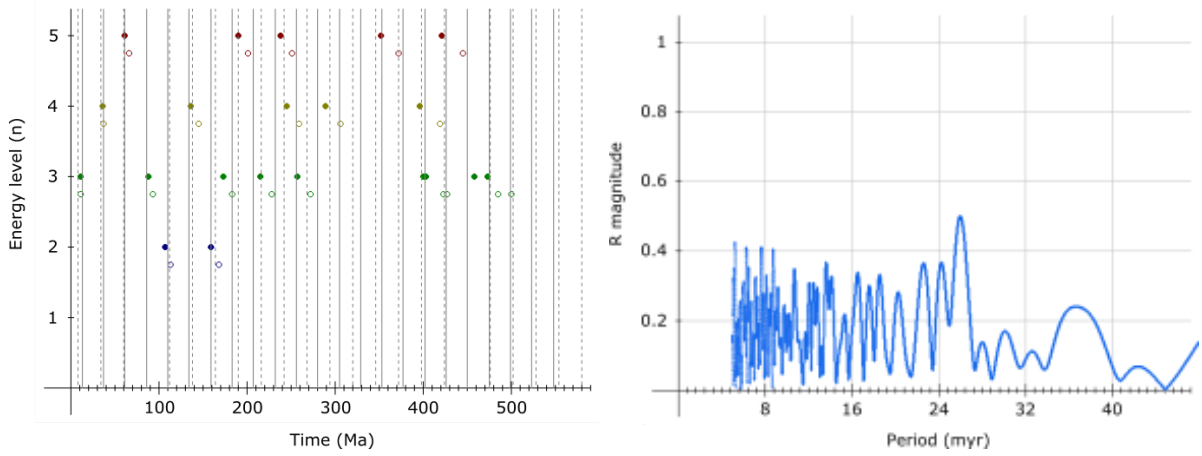

Figure 24. Dataset 2 - extinctions (left), spectral analysis (right)

Extinctions and the result of spectral analysis are shown in Figure 24.

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Dataset 3

Previous datasets do not take into account possible splitting of energy levels. Here, an even larger dataset is presented which shows possible energy splitting and how this, when not accounted for, causes lower confidence in calculated P.

energy level	extinction events [mya]	extinction events (t_i), age corrected [mya]
5	66, 201.4, 251.9, 372.2, 445.2	61.986, 190.308, 238.041, 352.461, 421.348
4	37.8, 145, 259.8, 306.7, 419.2, 514	36.206, 136.774, 245.793, 289.975, 396.744, 486.084
3	11.6, 93.9, 183.7, 228.5, 272.3, 423, 427.4, 485.4, 500.5, 541	11.402, 88.465, 173.88, 215.987, 257.12, 400.469, 403.82, 458.929, 473.782, 511.664
2	113.1, 168.3, 330.9	107.344, 159.702, 312.804
1	295, 346.7, 393.3, 467.3	279.448, 328.357, 372.239, 442.101

Table 26. Extinction events dataset 3, source: Gradstein2016[162]

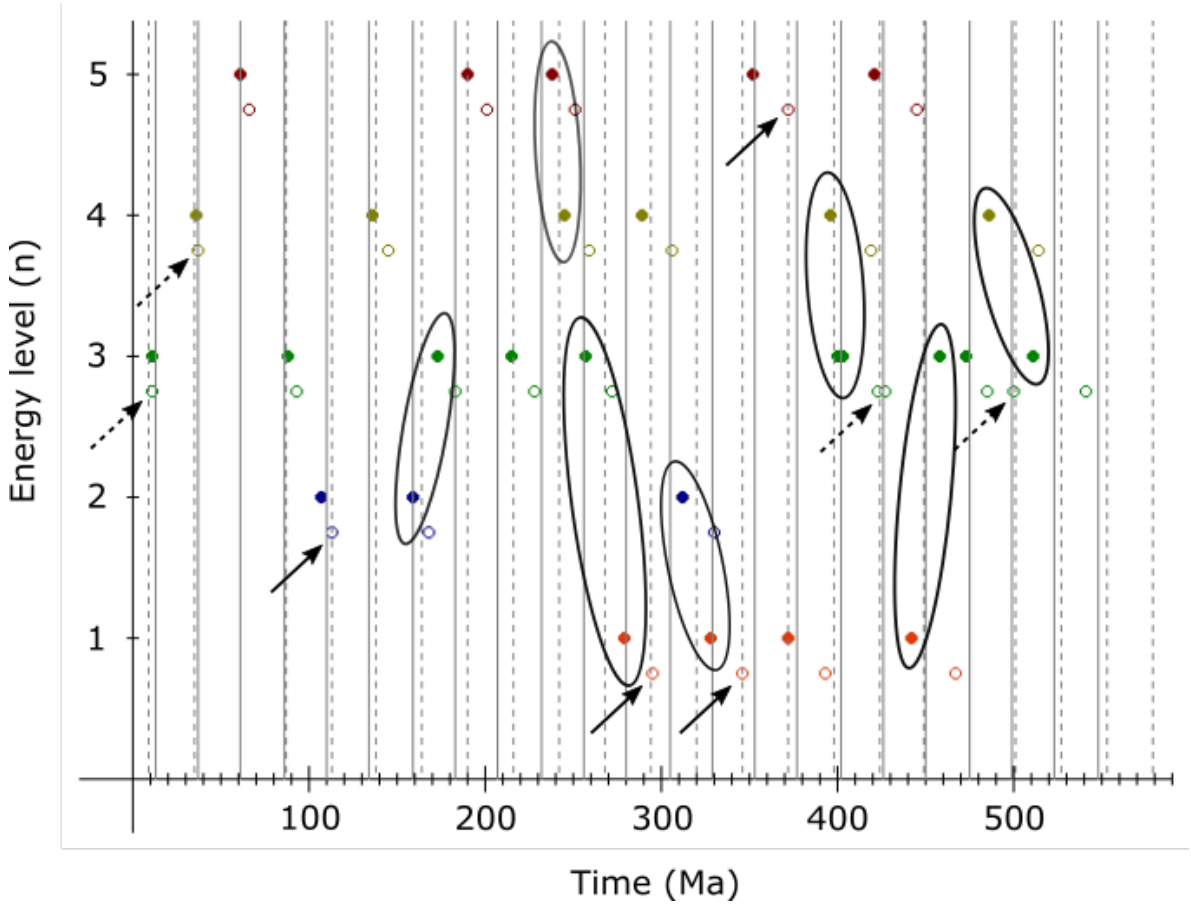

Figure 25. Dataset 3 - extinctions

Here, for R = 0.413, obtained P = 22.493 My, phase 15.603 My.

Dataset 4

Here I hypothesize that deviations from P are the result of energy splitting into smaller events which when grouped properly would fit on P intervals.

The dataset is the same as dataset 3, except the hypothesized splittings (circled extinction pairs in Figure 25) have been grouped into a single event, simply by using arithmetic mean age of the pair.

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energy level	extinction events [mya]	extinction events (t_i), age corrected [mya]
5	66, 201.4, (251.9+259.8)/2 = 255.9, 372.2, 445.2	61.986, 190.308, 241.967, 352.461, 421.348
4	37.8, 145, 306.7, (419.2+423)/2 = 421.1, (514+541)/2 = 527.5	36.206, 136.774, 289.975, 398.619, 499.361
3	11.6, 93.9, (183.7+168.3)/2 = 176, 228.5, (272.3+295)/2 = 283.7, 427.4, (485.4+467.3)/2 = 476.4, 500.5	11.402, 88.465, 166.304, 215.987, 268.346, 403.82, 451.053, 473.782
2	113.1, (330.9+346.7)/2 = 339	107.344, 320.78
1	393.3	372.239

Table 27. Extinction events dataset 4

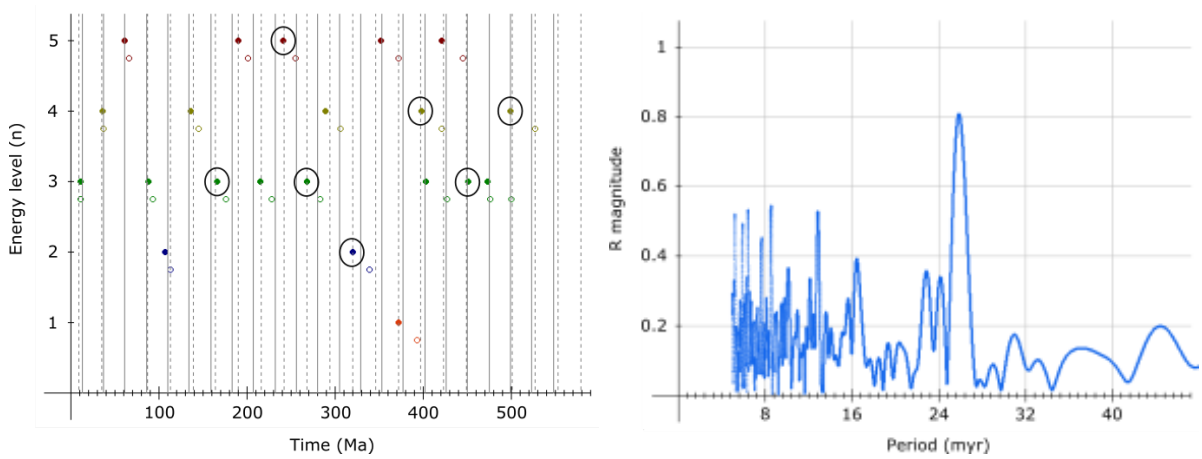

Figure 26. Dataset 4 - extinctions (left), spectral analysis (right)

The R peaks at 0.807, corresponding to P = 25.89 My, very close to one obtained from dataset 1. Phase is 9.55 My.

Dataset 5

Here dataset 4 is modified with the assumption that splitting occurs in all events, thus, in addition to previously grouped events, the remaining non-grouped events have been grouped with adjacent boundaries.

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energy level	extinction events [mya]	extinction events (t_i), age corrected [mya]
5	(61.6+66)/2 = 63.8, (199.4+201.4)/2 = 200.4, (251.9+259.8)/2 = 255.9, (372.2+382.7)/2 = 377.5, (443.8+445.2)/2 = 444.5	60.81, 189.333, 241.967, 356.687, 420.648
4	(33.9+38)/2 = 36, (139.4+145)/2 = 142.2, (306.7+314.6)/2 = 310.7, (419.2+423)/2 = 421.1, (514+541)/2 = 527.5	34.431, 134.998, 293.926, 398.619, 499.361
3	(11.6+13.8)/2 = 12.7, (89.8+93.9)/2 = 91.9, (183.7+168.3)/2 = 176, (228.5+237)/2 = 232.8, (272.3+295)/2 = 283.7, (427.4+430.5)/2 = 429, (485.4+467.3)/2 = 476.4, (497+500.5)/2 = 498.8	12.502, 86.49, 166.304, 220.213, 268.346, 405.395, 451.053, 472.107
2	(113.1+126.3)/2 = 119.7, (330.9+346.7)/2 = 339	112.87, 320.58
1	(387.7+393.3)/2 = 390.5	369.489

Table 28. Extinction events dataset 5

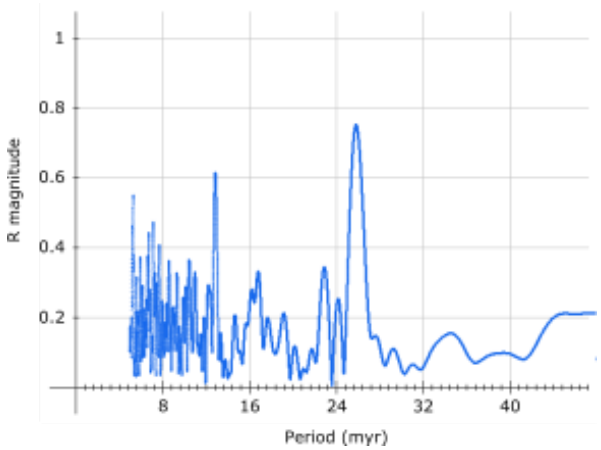

Figure 27. Dataset 5 - spectral analysis

The R peaks at 0.75, corresponding to P = 25.84 My. Phase for this P is 9.78 My, however, here another peak at 12.875 My (R = 0.61) reveals a likely harmonic.

Dataset 6

Here, dataset contains only highest energy (major and minor) extinctions, from dataset 1.

energy level	extinction events [mya]	extinction events (t_i), age corrected [mya]
5	66, 201.3, 252.2, 365, 445	61.986, 190.208, 238.316, 345.385, 421.148
4	37.8, 145, 260, 305, 420	36.206, 136.774, 245.993, 288.3, 397.519

Table 29. Extinction events dataset 6

This dataset gives highest R maximum (0.837), a period P = 25.74 My, with a phase of 9.689 My.

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Confidence

Note that equal weight was assumed for all extinctions in a particular dataset. Different weights can affect the confidence in the result (less if they are all harmonics). But even with that taken into account, there is high confidence in P ≈ 25.74 My - 25.89 My.

The result with highest confidence (25.74 My) is also the closest to calculated ideal quantization by the 3rd order period ($1.512 * 10^6$ My) - 25.705 My, further increasing confidence in such periodicity.

Note that the *burning* cycle of the Sun's core is calculated (in the "Quantization of the Sun" chapter[#]) to be equal to 25.746608 My, confirming the signal.

Interestingly, taking into account major extinctions only, one of the obtained peaks (with R = 0.94) is at 25.705 My, exactly as needed for ideal quantization.

Neurogenesis in standard lifeforms on Earth during embryonic development does imply certain periodicity in the formation of brain layers and neuron migration.

High energy impact cratering and extinctions (migrations) in planetary neurogenesis should be no exception.

In fact, with such periodicity and the last high energy extinction 37.8 My in the past, next one would be overdue, roughly by the phase shift.

Note that such delay of extinction could have some benefits due to more evolved precursor neurons at time of differentiation, although with the cost of increased probability of cancer development.
Also note that neurogenesis implies correlation of many processes. Therefore, calculated periodicity should not be limited to mass extinctions, rather present in plethora of other phenomena affecting the planet - volcanism, magnetic reversals, seafloor spreading, orogenic events, etc.
Indeed, such periodicities have been found in previous analyses[163].

However, as noted before, major extinctions seem to be grouped in pairs and multiple oscillators should probably be considered. With paired extinctions separated by roughly 63±3 My (in uncorrected ages), major extinction in the present time would be on schedule. This peak can be observed in analysis. Indeed, repeating the analysis for dataset 5, but with only major events (using corrected ages) included, yields highest peak at 12.85 My (the 2nd harmonic of 25.7 My) and R = 0.973, with the 2nd highest peak being at 59.272 My (R = 0.923).

Including current extinction (0 Mya) in the analysis gives highest peak at 59.74 My (R = 0.925) and a phase shift of 2.38 My. Note that, while the hypothesized 3rd order cycle period of 1.512 My is a harmonic of 25.7 My, the 2nd harmonic of 1.512 My (0.756 My) is a harmonic of 12.85 My and is then probably also a harmonic of the bigger period, in which case the correct period would be 59.72 My. Assuming synchronization with this harmonic (0.756 My), last major extinction 62.029±0.011/0.043 Mya (66.043±0.011/0.043 Mya uncorrected[164]) gives the interval for the current major extinction 48000 years before present to 6000 years after present. Interesting result, considering the extinction of megafauna (incl. Neanderthals) started some 50000 years ago. The age of 66.006 Mya (uncorrected) for the last major extinction would give exactly the present time for the current extinction.
In any case, this suggests the current major extinction is right on schedule.

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Thus, imminent extinction (or the ongoing extinction peak) as calculated using models based on C1.1 equation should not be surprising.

Supplement

Here is the code used to calculate correct ages of extinction events, perform the analysis and generate images.(Fig.: getext.php +)

14.4.4. Correlation with mantle layers

Grouping and correlation of extinction events with the formation of brain [mantle] layers also indicates that another major mass extinction should be near, at least in geological terms.

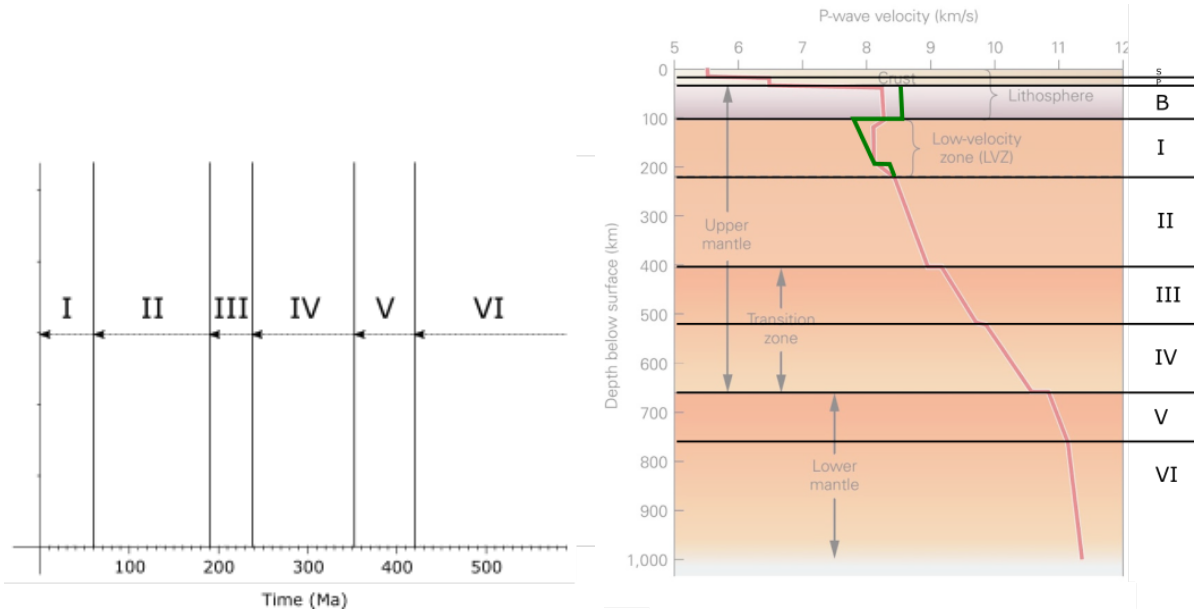

Figure 28. Correlation of major extinctions (left) with Earth's mantle layers (right)

This correlation is shown in Figure 28 - time between major extinction events of Phanerozoic is proportional to the thickness of the corresponding mantle layer.

Such correlation should not be surprising - all lifeforms grow in layers. But it also confirms the previous hypothesis that asteroid impacts are correlated with discontinuities (changes in energy levels) in Earth. Note that encapsulated growth/development is common in standard embryogenesis. It appears this is the case with planets such as Earth as well.

This is, effectively, a conversion of time separated discontinuities into events separated in space.

To quantify the correlation, periods of weak evolution and thicknesses of mantle layers have been normalized:

$$T_n(i) = \frac{T(i)}{\sum_{j=1}^{N} T_j}$$

$$D_n(i) = \frac{D(i)}{\sum_{j=1}^{N} D_j}$$

Results are shown in Table 34. Here, corrected extinction ages are used, although non-corrected ages would yield similar results.

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i	Period of weak evolution T [My]	Normalized period of weak evolution T_n	Corresponding mantle layer thickness D [km]	Normalized layer thickness D_n
5	421.348 - 352.461 = 68.887	0.163	780^b - 660^b = 120	0.176
4	352.461 - 238.041 = 114.42	0.272	660^b - 520^b = 140	0.206
3	238.041 - 190.308 = 47.733	0.113	520^b - 410^b = 110	0.162
2	190.308 - 61.986 = 128.322	0.305	410^b - 220^a = 190	0.279
1	61.986 - 0 = 61.986	0.147	220^a - 100^b = 120	0.176

Table 30. Comparison of weak evolution periods and mantle layers, sources: a[165], b[166]

Correlation in absolute value varies between the pairs, but overall, it is apparent.

At least some deviation could be explained by the fact that formation is not yet complete - eg. the boundary between layers 3 and 4 might change with the pending extinction.

If layer 3 decrease would be equal to layer 4 increase (≈ 0.0575 in normalized value) and layer 1 decrease to layer 2 increase ($\approx 0.0275 \approx 0.0575 / 2$), with a small decrease in layer 5 ($0.013 \approx 0.0275 / 2$) coupled with equivalent increase in layer 6, normalized extinction and mantle boundaries would be almost equal.

Effectively, what is necessary for better agreement is the *upward* movement of 3 discontinuities (between layers I and II, III and IV, V and VI).

There are two interpretations for the correlation. Extinction events are either memorized in Earth's [brain] mantle as they occur or they are programmed events and can be predicted through the analysis of discontinuities (layers) in the mantle. The ongoing 6th major extinction and existing discontinuity at 100 km depth suggest the latter, although superposition may be more likely - discontinuities are ancient but they move/adjust as extinctions occur.
In any case, the correlation is good evidence for living Earth and its neurogenesis.
The entanglement of 3 discontinuities (I/II, III/IV, V/VI) suggests that all 3 move during a single extinction, thus, if movement is correlated with asteroid impacts, 3 impacts may be ahead.

However, exact location of boundaries is a matter of debate. They must have some thickness, so it may be more appropriate to equate layer thickness with distance between discontinuities. If that would be a distance between lower discontinuities of two boundaries, it would, for layer 1, yield a normalized value exactly equal to the corresponding normalized period of weak evolution:

$$\frac{220 - 120}{680} = \frac{100}{680} = 0.147$$

Also, globally average velocities might not be the best choice for determination of layer discontinuities - eg. Lehmann discontinuity is at 220 km for tectonic North America, but 200 km for shield North America[167], while it may be absent beneath north Atlantic and other oceans.

No graviton can be completely neutral. At the time a discontinuity is occupied by a [large scale] graviton, a hole, proportional to polarization, is expected. Physical imprint may be further complicated with the presence of multiple gravitons and may be affected by additional disturbances.

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If one assumes that 200 km is a *proper* boundary (220 km may be a precursor boundary that will reduce to 200 km with complete formation), the correlation with extinctions for both layers, I and II, becomes remarkable:

$$\frac{200-100}{680} = \frac{100}{680} = 0.147$$

$$\frac{410-200}{680} = \frac{210}{680} = 0.309$$

Some report the base of the upper mantle at 670 km[168] rather than 660, this improves the correlation with layers 5 and 4:

$$\frac{780-670}{680} = \frac{110}{680} = 0.162$$

$$\frac{670-520}{680} = \frac{150}{680} = 0.221$$

Now, the only *problematic* boundary is the one between layers 3 and 4 (at 520 km). Some do report this boundary at 500 km, which gives much better agreement:

$$\frac{670-500}{680} = \frac{170}{680} = 0.250$$

$$\frac{500-410}{680} = \frac{90}{680} = 0.132$$

Note that extinction boundaries also have some thickness or uncertainties, notably first three, which may explain differences in reported discontinuity depths. The 3rd major extinction (Permian) is apparently split into two events (End-Capitanian and Permian-Triassic). Using End-Capitanian 245.793 Mya (259.8 Mya non-corrected) instead of Permian-Triassic 238.041 Mya (251.9 Mya non-corrected) as the date of Permian extinction gives results in remarkable agreement with the obtained layers 3 and 4 (with discontinuities at 410 km, 500 km and 670 km):

$$\frac{352.461-245.793}{421.348} = \frac{106.668}{421.348} = 0.253$$

$$\frac{245.793-190.308}{421.348} = \frac{55.485}{421.348} = 0.132$$

The correlation, with above adjustments, is shown in Table 35 (with ages rounded to a single decimal).

i	Period of weak evolution T [My]	Normalized period of weak evolution T_n	Corresponding mantle layer thickness D [km]	Normalized layer thickness D_n
5	421.3 - 352.5 = 68.8	0.163	780 - 670 = 110	0.162
4	352.5 - 245.8 = 106.7	0.253	670 - 500 = 170	0.250
3	245.8 - 190.3 = 55.5	0.132	500 - 410 = 90	0.132
2	190.3 - 62.0 = 128.3	0.305	410 - 200 = 210	0.309
1	62.0 - 0 = 62.0	0.147	200 - 100 = 100	0.147

Table 31. Correlation of weak evolution periods and mantle layers (or, major extinctions and discontinuities)

The correlation, using uncorrected ages for major mass extinctions, is shown in Table 36.

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i	Period of weak evolution T [My]	Normalized period of weak evolution T_n	Corresponding mantle layer thickness D [km]	Normalized layer thickness D_n
5	445.2 - 372.2 = 73.0	0.164	780 - 670 = 110	0.162
4	372.2 - 259.8 = 112.4	0.252	670 - 500 = 170	0.250
3	259.8 - 201.4 = 58.4	0.131	500 - 410 = 90	0.132
2	201.4 - 66.0 = 135.4	0.304	410 - 200 = 210	0.309
1	66.0 - 0 = 66.0	0.148	200 - 100 = 100	0.147

Table 32. Correlation of weak evolution periods and mantle layers, using uncorrected ages

Interestingly, corrected ages are in all cases except for i=4 in better agreement with mantle layers. Unless an artefact of rounding/imprecision (eg. in depths of discontinuities, which may be averages) this can be interpreted as evidence for effective time compression (pulses of abrupt temporary changes in decay rates of elements).

The excellent agreement here suggests no further adjustment of discontinuities is needed, except possibly for layer I, as shown in green in Figure 28 (right) which should be unsurprising given the correlation with the current extinction.

Correlation of layer 6 and the corresponding period of weak evolution has not been determined due to unknown boundary.

However, assuming the extinction at the start of Phanerozoic (511.664 mya in corrected age, or 541 mya non-corrected) is correlated with the lower boundary of layer 6, one can calculate the thickness of layer 6:

$$\frac{T_6}{T_5} = \frac{D_6}{D_5}$$

$$D_6 = \frac{T_6}{T_5} D_5 = \frac{511.664 - 421.348}{421.348 - 352.461} 120 = 157\,km$$

In that case, a discontinuity, if formed, should exist in Earth's mantle at a depth of 937 km (assuming boundary between layer 5 and 6 at 780 km).

Apparently, this discontinuity has been detected[169] (at 940 km).

14.4.5. Evidence in time compression

If planetary neurogenesis is happening on Earth, it was likely happening on Mars and Venus too. Time, however, flows differently for animals of different size. The rate of evolution on Mars should then be different from the rate of evolution on Earth - it should be faster.

Applying Kleiber's law, 4.54 billion years of evolution on Earth would, on Mars, last:

$$T_M = \frac{(M_M)^{\frac{3}{4}}}{(M_E)^{\frac{3}{4}}} T_E = 852 \text{ million years}$$

M_M = 0.642 * 10^{24} kg
M_E = 5.972 * 10^{24} kg
T_E = 4.54 * 10^9 years

Assuming Mars was formed roughly at the same time as Earth, present time on Earth corresponds to a time 3.69 billion years ago on Mars (4.54 - 0.85 = 3.69).

This is a very interesting result as studies show that Martian climate shifted from habitable to uninhabitable - when its atmosphere was lost and liquid water disappeared from surface, roughly 3.6 billion years ago[170] (src[171]).

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This suggests that current major extinction on Earth may indeed be the final major extinction of the planetary embryogenesis (neurogenesis), after which the Earth's surface will become permanently uninhabitable (although periodic and possibly spatially limited pulses of habitability cannot be excluded, as hypothesized pulses of adult neurogenesis).

The same equation gives evolution period of 3.9 billion years for Venus, suggesting Venus lost habitability some 640 million years ago. Again interesting, as studies[172] show that Venus did lose habitability roughly 700 million years ago[173].

It is a common assumption that all planets in the Solar System have been formed at the same time (this is also the case with my theory of inflation of the system), and calculations above certainly can be interpreted as a confirmation of that assumption. However, the term is relative and a deviation on the order of millions or tens of millions of years is possible.

The rate of evolution here should be matched by the rate of geologic changes. Thus, these too should have proceeded at faster rates on early Mars. In example, the average rate of production of new crust during the Mars' habitable period should have been about 5.33 times faster than on Earth. Magnetic reversals, on the other hand, are likely correlated with the Sun's activity and Mars, being farther from the Sun, should be less sensitive to this activity. Magnetic dipole reversals on Mars during the crust formation should then be less frequent (proportionally to distance difference) than on Earth during the habitable period.

Assuming sensitivity inversely proportional to the square of distance (being dependent either on Sun's gravity, electro-magnetic field strength, or, most likely, solar wind density[174]), with horizontal scale length of order 10 km on Earth for the width of features magnetized in normal, or reversed, polarity, the horizontal scale length on Mars should be:

$$d_M = d_E \left(\frac{KM_E}{KM_M} \frac{{r_M}^2}{{r_E}^2} \right)^{\frac{3}{4}} = d_E \frac{T_E}{T_M} \left(\frac{{r_M}^2}{{r_E}^2} \right)^{\frac{3}{4}} = 100\,km$$

d_E = horizontal scale length on Earth = 10 km
r_M = Mars' distance from the Sun = 227.9 * 10^9 m
r_E = 149.6 * 10^9 m

Thus, on Mars, magnetic crust anomalies should be 10 times wider than on Earth, and this is exactly what has been measured[175]. Given this and other evidence, plate tectonics had likely occurred on habitable Mars, only the number of plates, compared to Earth, may have been different.

Interestingly, observations show stronger magnetism near the Mars' south pole[176]. This could indicate that the magnetic field was confined to this area during the late stages of habitability on Mars (which should not be surprising if life is guided to the south pole, as hypothesized for the end of neurogenesis events). It could also be interpreted as younger re-magnetization (eg. during an adult neurogenesis event). Both interpretations can be true. In fact, discrepancy between most recent measurements of Mars' core radius (1650±20 km[177]) and previous estimates (1810 - 1860 km[178]) suggests a recent change in energy level of a major graviton, possibly causing core differentiation into a solid inner core and liquid outer core. This should then result in a creation of a magnetic field on surface (possibly also recreation of a larger Martian moon) and may thus be interpreted as a signal of an upcoming adult neurogenesis event on Mars.

14.4.6. Some additional predictions of neurogenesis

If cultivation of life on planet's surface is equivalent to cultivation of neural cells during embryonic neurogenesis in mammals, the events hypothesized above are not the only upcoming events that can be predicted.

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Obviously, cultivation of cells/proteins must be limited. The most effective (or most energy efficient) way to limit population growth is to substantially decrease its fertility. Recent studies show that fertility in humans is indeed decreasing, at an accelerating pace[179]. But possible ways to limit population growth are diverse and probably will be diverse. Fertility decrease does not have to be correlated exclusively with physical health (inability to produce offspring), it can rather be effective, eg. through subconscious effects on human psyche or mentality. Generally, limitation of population growth can be correlated with:

- decrease in ability or will to produce offspring,
- increase in types of reproduction inhibiting sexuality (eg. homosexuality, bestiality, etc.) and increase in asexuality,
- decrease of physical gender inequality or increase in physical attributes and behaviour decreasing sexual attraction between males and females,
- increase in male-female mental incompatibility,
- increase in socio-economic gender equality, reducing the need or will for partnerships,
- increase in acceptable sterile alternatives (artificial, virtual) or substitutes for sexual intercourse,
- increase in attraction and partnerships between younger (more fertile) and older (less fertile) male and female individuals,
- domesticated animals and artificial intelligence increasingly filling the voids usually occupied by children or partners,
- decrease in sexual compatibility (which can be strongly correlated with the above),
- increase in diseases that can be correlated with a decrease in fertility (eg. prostate cancer),
- increase in deaths (eg. through wars, natural disasters, diseases, ...), assuming limit has been exceeded and population needs to be reduced to sustainable levels,
- etc.

Evidently, all of these are currently present, and most, if not all, are increasing in the society.

Of course, at least some of these effects can be attributed to humans (eg. pollution may affect fertility directly), but even that probably should not be interpreted as non-coded or non-natural development.

Correlated with short-term interests, polarized humanity obviously does not want to limit population growth (contrary, it promotes unlimited growth), however, something, correlated with long-term interests, is obviously acting against it. I don't see much free will here, I see two forces, one seeking domination and the other its regulation. This may be common for the process of neurogenesis, where, in a healthy one, regulation prevails, and this then can be interpreted as domestication or taming of cancer, as regular part of embryogenesis.

Accelerated evolution also likely includes accelerated ageing in some species or sub-species (in some, possibly reversed), cases of which are showing up in studies too[180].

14.4.7. Adult [neuro]genesis

I have hypothesized previously that changes in energy levels of large scale gravitons are correlated with major mass extinctions and evolution of life in between. If different species of life are evolved between these major extinctions, the large scale graviton associated with these is not oscillating between adjacent levels, it is rather increasing or decreasing energy level with each major extinction. Here, progressive evolution may be associated with increasing energy levels, regressive evolution with decreasing energy levels. But what if the graviton is oscillating between two levels? In that case, relatively the same species should be evolved over and over again. This is exactly what happens in adult [neuro]genesis events. Once the highest energy level is reached, evolution (development) of new species stops. Occasionally, the graviton drops to a lower level before it returns back up, which should then be correlated with re-evolution of certain species.

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Note that death event is a collapse of the graviton [entanglement with the body]. In this collapse, graviton changes vertical energy levels, not horizontal, so, assuming direct transition, there is no regressive evolution of body components. However, the collapse may at least in some cases include transition between horizontal energy levels as well, which then should include evolutionary regression to some degree.
Note also that, assuming that decay rates of standard unstable elements are temporarily increased with energy level increases, and temporarily decreased with energy level decreases, oscillation would imply no net effect on decay rates.

Adult [neuro]genesis events are probably generally spatially and temporally limited. Note that a relatively recent adult neurogenesis event on Mars has the potential to explain unexplained phenomena on Earth (eg. some UFO/UAP sightings/interactions, greatest pyramids in Egypt). Some of the intelligent lifeforms re-evolved in the last Mars' adult neurogenesis event may have, with the neurogenesis terminating extinction event, fled to Earth. Here they may have built the greatest pyramids (possibly even original Sphinx) as shelter, possibly using some kind of 3D printing machinery. They may have somewhat evolved since and probably still inhabit Earth (and/or Moon?), somewhere in the deep. As I have hypothesized elsewhere, *modern* Egyptian religion was probably formed once Egyptians encountered these structures. They associated them with gods, considered them sacred (this is one of the reasons why there are no original inscriptions in greatest pyramids) and started imitating them - to please the gods and to secure passage to the *underworld*.

In fact, life matching or surpassing human intelligence may evolve prior to each major mass extinction (with temporary effective time compression solving flaws in the Silurian hypothesis), it just doesn't last long on surface. It thrives somewhere deeper underground (in the *underworld*).

14.4.8. Problems and alternatives

While partitioning of the Earth's mantle, its correlation with major extinctions and cultivation/evolution of cells (life) on the surface do represent a strong signature of a large scale equivalent of neurogenesis, how plausible it is that migration of life to mantle does indeed happen?

It is possible that it does not - the Earth might simply represent a large scale of a [precursor] lifeform that is yet to evolve neurogenesis. Perhaps life evolving on the surface will, on its own, eventually start digging deeper and deeper into the Earth's mantle (as surface habitability decreases) - in the process changing the environment and making it more suitable for complex life (the process may be somewhat similar to how the standard cell acquired bacteria which evolved into mitochondria).

Note however that this as well could represent the coded migration event of the neurogenesis.

Thus, even if the Earth's mantle doesn't have habitable regions at the moment, it's probably evolving in that direction.

But why then would mantle discontinuities correlate with major extinctions? This could be interpreted as a precursor of formation of habitable layers, but is it possible that the habitable regions have been created already?

To answer that question one first needs to determine what are the requirements for complex life to survive in the mantle. These appear to be: water, energy and suitable pressure (temperature) and density. The availability of water and energy probably should not be questionable (these are already predicted/confirmed with conventional theories/interpretations). The only issue then is the suitable pressure and density, enabling liquid water among other things.

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I assume the layers are created and sustained with oscillation of a large scale graviton (if not permanent presence of multiple gravitons at different energy levels). Presence of a graviton will result in concentration of matter (real mass) about that maximum. Once the graviton changes energy level (through spin reversals and temporary scale collapse) the accumulated matter will remain stable for some time (millions of years or more) but periodic presence of a graviton can ensure long-term stability. This mechanism (oscillation between energy levels) can thus create alternating gradients of gravity where gravity is cancelled at some point between two energy levels, enabling thus the establishment of pressures/temperatures suitable for complex life.

Is it possible that such places exist in Earth's mantle?

It certainly is - even without involving large scale gravitons, density can have multiple maxima, but there are constraints on size and shape (a habitable layer may be represented by a relatively hollow tube in the shape of a torus, or it could be quantized into multiple spherical cells).

Interior of the Earth has not been seen directly so one must rely on indirect observations. The mass (average density) of Earth has been determined from laws of gravity and planetary motion, and is known to very good precision. Moment of inertia of Earth has revealed strong concentration of mass about the centre. Earth's core thus must be, on average, more dense than the mantle.

Astronomy also revealed that Earth's mantle must be, on average, rigid (solid).

Everything else *known* about the interior (including core size) comes from seismology, which is limited and very prone to interpretation bias.

Interpretation is possible once the paths and velocities of seismic waves are determined. Velocity is proportional to pressure (through coefficient of stiffness and shear modulus) and inversely proportional to density. To determine pressure one needs to know the density. Obviously, the same velocity can produce infinite combinations of pressure and density.

Constraints can come from wave dispersion analysis (for shallow depths) and from modes of free oscillation[181] (which is especially valuable, as it can give averaged density in *absolute* value - independent of elasticity).

The conventional interpretation of the interior is usually based on 1-dimensional (density dependent solely on radius) models (eg. PREM), where density in the mantle generally gradually increases with depth. Pressure is then determined from calculated density.

Although 3D models exist as well, due to limited resolution[182] (averaged values) - which decreases with depth, density can oscillate/deviate from the prediction (model) and some areas in the mantle, especially at depths with high lateral heterogeneity, could have much different pressure and density than assumed. Due to poor resolution of free oscillation and absence of earthquakes (ray-paths) throughout most of the mantle, existence of habitable zones cannot be ruled out.

It is also possible that habitable zones are hidden from view - eg. in regions (eg. tubes, spheres) of effectively curved space where sound waves simply wrap about the region. Here, this is not necessarily a localized spacetime curvature (which, by conventional theories, is not even possible here) rather a material acting like an acoustic invisibility cloak (such materials are definitely possible and have been created by humans already). After all, it makes sense to hide intelligence from outer threats (eg. cancer, or earthquakes), whether extra/intra-terrestrials are involved or not.

14.5. Metabolism of Earth

Transfer of energy in wild flora and fauna is generally balanced both horizontally and vertically.

Vertical transfer of energy is a part of metabolism but changes in horizontal current affect the vertical transfer too (and vice versa).

Humans dominate in both horizontal (surface to surface) and vertical (Sun - Earth interior) energy distribution and transformation, disrupting the harmonics of life.

Horizontal effect is the increasing number of individuals at the cost of decreasing number and diversity of other species, while vertically it is the unsustainable exploitation of radiated and stored resources of the Sun/Earth ecosystem.

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Thus, one may interpret humans as the metabolism energy carrier particles, in a limited domain.

With a human population N of 7.674 * 10^9, average mass m of 62 kg, and average lifetime Δt of 72.6 years (data for year 2019, except mass - 2012):

$$P = \frac{N * m * c^2}{\Delta t} = \frac{7.674 * 10^9 * 62 * (2.99792458 * 10^8)^2}{72.6 * 365.25 * 24 * 60 * 60} = 1.86644116 * 10^{19}\ W$$

$$\frac{P}{0.0484259259 \frac{day * W}{kcal}} = 70 * M^{\alpha} = 3.8542188 * 10^{20}\ \frac{kcal}{day}$$

where M is the mass of Earth (5.9723 * 10^{24} kg).

This gives a value of 0.756 for α exponent, in agreement with Kleiber's law.

However, in case of organ interpretation, the exponent suggests a superposition of a brain and a kidney.

Note that Earth has kidney [precursor] equivalents on surface.

In order for this superposition to differentiate into the brain, the exponent would have to reduce to 0.7.

There are several ways to achieve that (sorted by probability, from highest to lowest):

1. increasing human lifetime (≈25 times) to 1813 years,
2. reducing population (≈25 times) to 307243423,
3. reducing mass (≈25 times),
4. increasing Earth's mass ≈100 times (≈ mass of Saturn).

If humans are indeed precursor proteins of neuron proteins of Earth, as carriers of energy of its brain metabolism, I would expect the solution to be a weighted superposition of the above.

However, if Earth has a heart equivalent (core), most likely it also has a kidney equivalent and the population might differentiate into proteins of varying function.

> *I, strive for neutrality - the equal, balanced usage of all parts of my universe. I am aware though, that this is an unreachable singularity, but it is the journey that makes one alive - for without it there would be no senses, for a sense of reason, and a reason for existence.*

14.5.1. Nature of human cells

Dominance of lifeforms changes over time. At present time, homo species occupies and controls most of the surface of the planet, even if that control is likely an illusion. Human population is rising and thriving at the expense of other species and the environment.

While the dominion of species may be related to precursor nature of host's organism vital components, its behaviour can be corrupted, so cultivation of new proteins becomes evolution of disease rather of something integral for survival.

While it is not questionable whether human species is a disease for the planet, it is questionable whether this is fatal or rather a normal part of evolution of healthy cells and proteins with self-correcting mechanisms.

The future of cells is also questionable. While human habitats can be interpreted as precursors of cells, this may be only an excursion and humans may be evolving into extracellular proteins in the long term.

Evolution of human habitats is, however, interesting in this context. There are signs that future human habitats could be at least partially living organisms (eg. composed out of fungi), so at least one part of the population may be evolving living cells. In any case, people in developed countries

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spend about 90% of their time indoors[183]. The extracellular life, for majority, does not seem to be on the horizon in near future. After all, humans have started adapting to indoor life tens or hundreds of thousands of years ago and today they live mostly isolated from the external environment. They have adapted to life in a very narrow (optimal) range of temperatures and can hardly endure small deviations for longer time, let alone harsh conditions of the environment, without some kind of insulation or protection. Thus, it is probably safe to assume that, if humans are vital to the host organism and are to evolve further, they will require some kind of cells. Coupled with the fact that conditions in the environment are getting harsher, most humans are probably evolving toward 100% indoor life. Assuming current population size is close to its peak, one can calculate the maximal size of the cell and how it compares to standard cells in human bodies.

Dividing the total surface area of Earth (using volumetric mean radius R = 6371 * 10^3 m) with the number of people, one gets the maximal size of the cell:

$$A = \frac{4\pi R^2}{7.7 * 10^9} = 66242.13921\, m^2$$

Radius of space per person is:

$$r = \sqrt{\frac{A}{\pi}} = 145.2085665\, m$$

If the radius of a human occupied cell of Earth is the mean free path r, the radius of a cell equivalent in human body of average diameter (height) h = 1.7 m is:

$$r_c = \frac{r}{R}\frac{h}{2} = 19.373298 * 10^{-6}\, m = 19.373298\, \mu m$$

If one calculates using landmass only (people don't naturally live on, or in, water - at least not yet):

$$A = \frac{1.4894 * 10^{14}\, m^2}{7.7 * 10^9} = 19342.85714\, m^2$$

$$r = \sqrt{\frac{A}{\pi}} = 78.46669775\, m$$

$$r_c = \frac{r}{R}\frac{h}{2} = 10.46879502 * 10^{-6}\, m = 10.46879502\, \mu m$$

Taking into account space used by wild flora and fauna:

$$r = \frac{1}{2}\sqrt{A} = 69.53930029\, m$$

$$r_c = \frac{r}{R}\frac{h}{2} = 9.277728025 * 10^{-6}\, m = 9.277728025\, \mu m$$

This is in the range of a typical standard cancer cell. It is, of course, in the range of standard healthy cells too, but human cells so far are far from being healthy or environmentally friendly. And they are not of uniform size - strong inequality exists between individual cells (whether the cell interpretation includes the yard or solely living quarters), again, typical for cancer cells.

Note that the average radius r (r_c) doesn't significantly change with changing population size because the number of cells increases as well - at the expense of space for wild flora and fauna. Even within human population - size of cells for the poor is probably decreasing proportionally to the increase in the size of cells of the affluent population, keeping the average r_c relatively constant.

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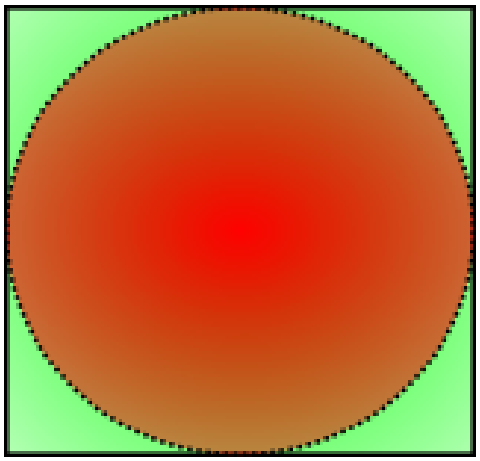

Figure 29. Homo.beta cell

Figure 29 illustrates a typical homo cell on Earth's surface, circled space (red) is occupied by human and domesticated flora and fauna, other (green) by wild flora and fauna (here exaggerated, as even today probably no more than 13% of habitable land is true wilderness). The cell is completely isolated from the environment, mental and physical connections are either intracellular or limited to connections with other human cells.

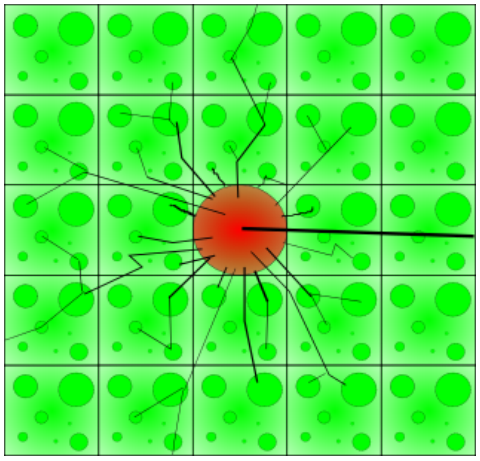

Figure 30. Normal cells

Figure 30 illustrates what I would consider a normal (healthy) unit of space on Earth. Red is a cell of homo.sapiens (Earth's neuron cell), black lines are mental connections (synapses) to other cells in nature, not necessarily human.

Carbon footprint is not the issue, it's a symptom. Human footprint is of relevance.

Cancer cell contains the individuals (proteins) and space affected by cancerous population, but is there a specific standard protein an average human could be compared with? One can try comparing sizes and characteristics. The protein equivalent on standard scale should have the size of:

$$\lambda = \frac{h}{2}\frac{1}{r}r_c = \frac{h}{2}\frac{1}{R}\frac{h}{2} = \frac{h^2}{4R} = 1.134044891 * 10^{-7}\, m$$

This is in the range of a TGF-β protein, a key player in cancer development.

Confirmation of this comes from recent studies[184], revealing human nature of TGF-β:

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> *"And while it may be difficult to imagine a protein with two dramatically different faces, it may be even more difficult to contemplate cancer cells exhibiting traits, such as cunning and deception. But the research underway at the University of Basel, and collaborating laboratories, has revealed that TGF-β not only is a two-faced protein, it also is one that seems almost Machiavellian in its activities."[185]*

Cancerous TGF-β suppresses the immune response and prevents old cells/proteins from dying (regenerating). Humanity is, at the time of this writing, expressing this cancerous behaviour on many levels:

- through treatment of standard diseases (including standard cancer) humanity is suppressing the immune system of Earth,
- forcing human life at all costs and treating death (as a disease) - instead of letting cells (and proteins - people/animals) die as programmed so they can regenerate (reincarnate),
- treating Earth and other life forms (and, generally, even people) as resources - instead of living in a sustainable symbiotic relationship,
- creating and living in centralized, stressful environments, promoting inequality in wealth and health,
- hiding the truth.

Earth's cells are not fuel cells, they are living cells.

However, humans may not be scaled TGF-β proteins at this time, rather scaled precursor TGF-β proteins.

The average cell cycle period of standard eukaryotic cell is T_0 = 24 hours, scaled to Earth, for the average human cell this is:

$$T_1 = T_0 \times \frac{T_x}{T_{x_M}} = 83\,years$$

T_x = 3rd order period of the Solar System graviton oscillation = Earth's lifecycle = 1.512 * 10^6 years

T_{x_M} = average human lifespan through evolution = 50 years

This seems to be in agreement with the average lifespan of a human house. According to UN projections, human average life expectancy at birth will reach 83 years about the year 2066. However, once life expectancy becomes 83 years, the above equation gives 50 years for the cell cycle. Thus, with increasing human lifespan, the lifespan of houses should decrease. This is apparently in agreement with reality - most human products today have a decreased lifespan compared to the past.

However, once human life becomes 100% indoor life, which will probably be synchronized with uninhabitable environment, the T_{x_M} cannot be greater than T_1. Thus, even if humans may have the capacity to live longer, they won't be able due to the disintegration of the cell. One can now calculate the optimal lifespan ($T_1 = T_{x_M}$):

$$T_{x_M} = T_1 = \sqrt{T_0 \times T_x} = 64.33\,years$$

Thus, in case of uninhabitable environment, maximum human lifespan would be 64.33 years on average.

This, of course, should be valid as long as human cells remain on surface. Once they migrate into deeper Earth and differentiate into neuron cells, the T_1 becomes equal to T_x because, for neuron cells, T_0 is equal to human lifespan (T_{x_M}). The human cell should then have a lifespan of 1.512 * 10^6 years, but what about human lifespan? Will it be the same or perhaps extremely low? It may be the scaled lifespan of the standard differentiated TGF-β in neuron cells.

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Note that, for the scaled latent TGF-β, lifespan may be 6 years, for active TGF-β much lower (based on scaling of half-life of TGF-β obtained in studies on rats[186]). However, these values are valid for TGF-β in plasma, not for the protein inside a neuron cell. Whatever the lifespan in the cell, lives are likely to be fragile outside of the cell. This could explain the lack of extraterrestrials, in which case the term is a misnomer, better term may be intraterrestrials.

Dual nature

Are humans cells cancer cells or are human cells precursor neural cells? I believe they are both. It is well known that cancer cells share characteristics of embryonic neural cells[187]. It is also known that neurogenesis can be induced by cancer[188].

What's happening on Earth currently can then be interpreted either as embryonic neurogenesis or tumour induced [adult] neurogenesis. However, perhaps the most appropriate interpretation is a tumour induced embryonic neurogenesis.

14.6. Similarities and differences

While there could be many similarities between embryogenesis (neurogenesis) on standard scale and Earth's embryogenesis (neurogenesis), to what degree these should be similar?

For example, assuming Earth represents a living organism or a living cell, is there a DNA equivalent?

If humans and other animals are protein equivalents, obviously gene equivalents exist as well. The entire human genome, for example, is a single gene on this scale, coding for a single protein (human). Every human carries multiple copies of this gene (genome) so the entire human body could be interpreted as a single strand of DNA. Thus, animals on Earth could be interpreted as superposition of large scale proteins and DNA. A primordial soup?

As noted before, time dilation exists between vertical energy levels. Compared to standard scale (U_0), time flows slower on Earth's scale (U_1). Thus, Earth could represent a large scale proto single-celled lifeform which may not be different than such lifeform on standard scale - which existed billions of years ago.

Note, however, that this proto lifeform would be a subatomic particle if the Solar System is the equivalent of a standard atom. But is this a problem? Life is self-similar and had to evolve from atoms. If some of us consider atoms as non-living things, why would nature?

But is DNA necessary at all for distinct life? A collective of organisms can act as a single organism - eg. lichen (fungi and algae in symbiosis) and biofilms (bacteria in symbiosis). The assembly of these organisms does not involve genetic code. Fungi physically connect with cells of plants, sometimes very intimately (eg. in arbuscular mycorrhizae). No DNA involved and yet the assembly functions as an organism on its own (it is more than simply the sum of its parts). In fact, self-organization even during individual development of these organisms does not involve genetic code. Standard scale DNA is not a prerequisite for life (which is obvious if atoms are living beings), it is only a prerequisite for what humans conventionally consider as living beings. In my theories, self-organization must be only relatively spontaneous. I believe it occurs [relatively simultaneously] with soul-body or hallucination-body coupling. Any *self-organized* collective or body with a soul (superposition of gravitons correlated with particular structure) coupled to it is a living organism on its own, even if this assembly may be temporary and with a low amount of consciousness (the amount of consciousness being probably proportional to the strength/frequency of coupling). No physical connections are then necessary

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between *neurons* either, only mental ones (which are in CR, however, physical on some scale, eg. as dark matter filaments of certain scale).

It appears that some form of DNA is required for reproduction, or, in other words, to boost the probability of certain self-organization (eg. by providing recipes for specific components). But atoms or subatomic particles obviously do not need this - they are basically immortal. And the same then must be true for large scale particles, such as Earth. However, if coding is not in DNA, that does not mean it does not exist. It's simply on a different scale. I believe differentiation and development of planetary bodies, for example, is coded (the same is true for any self-organization).

Discrete vertical energy levels could be considered as attractors, driving evolution from one scale to the other. Whales here, are probably most progressively evolved in this evolution between a standard subatomic particle to a large scale subatomic particle (Earth). Evolution thus has an effective goal and is equivalent with standard organismal development. Of course, in the Solar System, the whale probably represents the maximum of local evolution - there is no sufficient energy to advance (and support) its evolution beyond that size. It is possible that this is the maximum only for self-organization of collectives of standard animal cells. Larger self-organization of larger entities, even if temporary, does exist. Entire human species, be it a disease or not, may be considered as a temporary (hallucinated) organism. I believe people are subconsciously guided toward specific goals in time by this hallucination.

Recipes for components of life (eg. proteins) are relatively time-independent. Their expression is not. It makes sense that the coding for the former occurs in space, while the coding for the latter occurs in time.

15. Quantization of Moon orbits

If Earth's mass was initially concentrated within the inner core (or at the inner core radius) so its gravity was equal to the surface gravity of the Sun (in case of shielding interpretation, the inner graviton should still have this gravity), one would expect for orbitals of natural moons of Earth to be scaled orbitals of inner planets.

Allowed, or stable, orbitals are thus:

$$r = \frac{r_p}{R_\odot} r_c$$

where r_c is the initial Earth's radius ($\approx$ current inner core radius), $R_\odot$ is the radius of the Sun and r_p is the orbital radius of a corresponding planet.

Using $R_\odot$ = 695735 km, r_c = 1206.115 km, one obtains orbitals shown in Table 37.

entanglement	r_p (km)	r (km)
Mercury	57910000	100392
Venus	108210000	187591
Earth	149600000	259344
Mars	227920000	395118

Table 33. Allowed/stable orbitals of the Moon

Evidently, the Moon is currently at the scaled Mars' orbit. Even the distance between perihelion and aphelion is scaled by equal orders of magnitude - for Mars it is 42.61 * 10^6 km, while for the Moon, the distance is 42.2 * 10^3 km.

Small deviations from calculated values should be attributed to oscillation and phase shift in synchronization.

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16. Quantization of the Sun

During inflation of the Sun, multiple gravitational maxima (in the form of gravitons) were inflating within. Collapse of these maxima as the Sun was deflating was fossilized in the Sun, in the form of discontinuities. As these maxima are now gravitational maxima of inner planets, entanglement exists between radii of discontinuities and planetary orbits.

Some discontinuities are strong (permanent) while some may be weak, evolve over time and may periodically disappear, as discontinuities are likely still occupied by internal large scale gravitons of the Sun. Apparent discontinuities are those between the core, radiative and convective zone, surface discontinuity and the boundaries of tachocline.

Regardless of current configuration ($1e^+$ or $2e^+$), each inner planet may be entangled with multiple discontinuities/gravitons in the Sun. Collapse of planetary gravitons also has different possible interpretations, depending on initial energy.

If one assumes that all collapsing maxima *initially* had the mass equal to the current mass of the Sun and energy density remained constant during inflation, with the collapse (energy level change) occurring once escape velocity was equal to the speed of light (in CR, discontinuities between energy levels are speed limits), orbital radii of planets become fossils of Schwarzschild radii:

$$r = \frac{2Gm}{c^2} = \frac{2G\rho V}{c^2} = \frac{r^3}{R^3}\frac{2GM}{c^2}$$

$$r = \sqrt{R^3 \frac{c^2}{2GM}}$$

R = *initial* radius
M = 1.988500 * 10^{30} kg
c = standard speed of light = 2.99792458 * 10^8 m/s
G = 6.674 * 10^{-11} m^3/kgs^2

With equal escape velocity (pressure per surface quantum) between maxima (note that a smaller maximum is inside the other), radius of fusion, or superposition, of two maxima becomes the arithmetic mean of two radii (R_1 and R_2):

$$r = \frac{1}{2}\left(\sqrt{{R_1}^3 \frac{c^2}{2GM}} + \sqrt{{R_2}^3 \frac{c^2}{2GM}}\right)$$

In that case, discontinuities entangled with planetary orbits are at 1/5 $R_\odot$, 2/5 $R_\odot$, 1/2 $R_\odot$, 2/3 $R_\odot$ and 1 $R_\odot$.

Planet	R_1	R_2	Schwarzschild radius r (10^6 km)	current orbital radius (10^6 km)	orbital radius (MAU)
Mars	$R_\odot$	1/2 $R_\odot$	228.52	227.92	1
Earth	2/3 $R_\odot$	1/2 $R_\odot$	151.59	149.6	2/3
Venus	2/3 $R_\odot$	1/5 $R_\odot$	107.00	108.21	1/2
Mercury	2/5 $R_\odot$	1/5 $R_\odot$	57.81	57.91	1/4

Table 34. Correlation of orbital and Schwarzschild radii

Correlation of orbital and Schwarzschild radii is shown in Table 38, where $R_\odot$ is the radius of the Sun (695700 km).

Significant orbital eccentricity of Mercury and Mars also seems correlated with Sun's discontinuities.

If Sun's core radius oscillates between 0.1 + 0.186 $R_\odot$ = 0.286 $R_\odot$ (previously hypothesized initial radius) and 1/5 $R_\odot$ (current radius), with constant energy density between the two radii, time independent core radius [as superposition of two oscillatory states] is at 1/4 $R_\odot$.

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This is correlated with Mercury's orbit, as its distance from the Sun is at 1/4 MAU, while its perihelion is at 1/5 MAU.

According to equation S1.1 describing rotational velocities of plasma, and the actual velocity curve, significant points are at 0.1 $R_\odot$, ≈1/2 $R_\odot$, 1 + 0.18686 $R_\odot$ = 1.18686 $R_\odot$ and 32.8 $R_\odot$ (0.1 MAU, half of Mercury's perihelion).

The aphelion of Mars is at 1 + 0.18686/2 MAU = 1.09343 MAU = 249.2 * 10^9 m.

Note that the aphelion of Mars can also be obtained as volumetric mean of Schwarzschild radii associated with 3 discontinuities:

$$r^3 = \frac{1}{3}\left\{\left[(1\,R_\odot)^3\frac{c^2}{2GM}\right]^{\frac{3}{2}} + \left[\left(\frac{2}{3}R_\odot\right)^3\frac{c^2}{2GM}\right]^{\frac{3}{2}} + \left[\left(\frac{1}{2}R_\odot\right)^3\frac{c^2}{2GM}\right]^{\frac{3}{2}}\right\}$$

$$r = 249.2 * 10^9\ m$$

Similarly, approximate aphelions can be obtained for other planets, eg. for Mercury:

$$r^3 = \frac{1}{2}\left\{\left[\left(\frac{2}{5}R_\odot\right)^3\frac{c^2}{2GM}\right]^{\frac{3}{2}} + \left[\left(\frac{1}{4}R_\odot\right)^3\frac{c^2}{2GM}\right]^{\frac{3}{2}}\right\}$$

$$r = 70.4 * 10^9\ m$$

16.1. Layers of the Sun

Internal gravity of the Sun depends on the location of large scale gravitons and acquired real mass.

Distribution of mass, however, should not be complex unless there are collapsed large scale gravitons inside. In any case, matter accumulated between two gravitons should, in equilibrium, imitate a graviton and can thus be approximated as one (induced gravitational maximum).

One way to obtain gravity of a primordial Sun is to derive it from rotation of real mass - assuming greater rotation with greater gravitational mass, down to the inner core radius r_c, quantization is *1-dimensional*:

$$\frac{1}{g}vr = nh_2 \tag{L1.1}$$

$$g = \frac{vr}{nh_2}$$

Giving the scaled h constant:

$$h = h_2 = 5 * 10^9\ ms$$

$$n = 1$$

Another way is to assume a completely naked Sun, in which case gravity from the surface down to the core is:

$$g_p = GM_\odot\frac{r^2}{{R_\odot}^4} = 274\frac{r^2}{{R_\odot}^2} \tag{L1.2}$$

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Gravitational profile of the primordial Sun (not taking into account the gravity of the inner core maximum) is given in Table 39. Here matter velocity (v) is extrapolated from measurements, while space (Keplerian) velocity (v_s) is calculated from gravity:

$$v_s = \sqrt{gr}$$

$$v_p = \sqrt{g_p r}$$

Table 35. Gravitational profile of the primordial Sun

n	r/R	note	space velocity v_p (km/s)	space velocity v_s (km/s)	matter velocity v (m/s)	orbital radius r (km)	calculated gravity g_p (m/s^2)	calculated gravity g (m/s^2)	gravity g_i (v_cr product) m/s^2
1	1	Convective disc.	436.602565	436.602565	1969.239615	695700	274	274	200 ($1*10^{12}$)
1	3/4	4p6n disc.	283.581685	286.551447	1508.068146	521775	154.125	157.37	150 ($0.75*10^{12}$)
1	2/3	Radiative disc.	234.100417	230.556106	1248	459162	119.3544	114.61	132 ($0.66 * 10^{12}$)
1	1/2	4p6n disc.	154.362317	151.266563	945.454545	347850	68.5	65.78	100 ($0.5 * 10^{12}$)
1	2/5	weak	110.452683	108.233652	756.363636	278280	43.84	42.1	80 ($0.4 * 10^{12}$)
1	1/4	Outer core disc.	54.575321	91.901023	1396	173925	17.125	48.56	50 ($0.25 * 10^{12}$)
1	1/5	Inner core disc. = r_c	39.050921	74.602949	1437.401179	139140	10.96	40	40 ($0.2 * 10^{12}$)

Note that multiplying any discontinuity radius with inner core velocity v_c gives values proportional to r/R ratio and gives integer gravity (g_i) for inner core and all layers above.

I have previously hypothesized that the Sun had inflated to a much larger radius before being compressed to current one. In the exchange of components of angular momentum, radius may have been exchanged for space (Keplerian) velocity, as shown in Table 40.

Possible initial radii of Sun's discontinuities and correlation with bodies discontinuity (r/R)	space velocity v_s	correlated radius (10^6 km)	possible body correlation
1	436.6 km/s	436.6	end of the main asteroid belt
3/4	286.6 km/s	286.6	beginning of the main asteroid belt
2/3	230.6 km/s	230.6	orbit of Mars (semi-major)
1/2	151.3 km/s	151.3	orbit of Earth (semi-major, aphelion)
2/5	108.2 km/s	108.2	orbit of Venus (semi-major)
1/5	74.6 km/s	74.6	orbit of Mercury (aphelion?)

However, orbits may be correlated with arithmetic mean of v_s and v_p. This gives much better results for the orbit of Mercury - 56.8 * 10^6 km, agreeing with semi-major, rather than aphelion. Another possibility is entanglement with v_p instead of v_s. In that case 1/4 R discontinuity roughly agrees with the orbit of Mercury.

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Remarkable correlations are found subtracting velocities between layers, as shown in Table 41.

Alternative initial radii of Sun's discontinuities discontinuity (r/R)	space velocity v_s (km/s)	correlated radius (10^6 km)	possible body correlation
1 - 3/4	436.6 - 286.6	150	orbit of Earth (semi-major)
1 - 2/3	436.6 - 230.6	206	orbit of Mars (perihelion)
3/4 - 2/3	286.6 - 230.6	56	orbit of Mercury (semi-major)
3/4 - 1/5	286.6 - 39.1	247.5	orbit of Mars (aphelion)*
2/3 - 1/5	230.6 - 74.6	156	orbit of Earth (aphelion)
2/5 - 1/5	108.2 - 39.1	69.1	orbit of Mercury (aphelion)*
1/2 - 2/5	154.4 - 108.2	46.2	orbit of Mercury (perihelion)*

* here, one of the velocities used in subtraction is v_p, rather than v_s

Entanglement with v_p suggests that Mercury and Mars were created before Venus and Earth, as hypothesized previously. Entanglement with both, v_s and v_p, seems to be the cause of orbital eccentricity.

Difference between current surface gravity and g_i is roughly equal to the sum of surface gravities of inner and outer planets:

$$g - g_i = 274 - 200 = 74 \frac{m}{s^2}$$

thus, some entanglement may exist there too.

Below the gravitational minimum at inner core (r_c), quantization is *3-dimensional* and gravity should be increasing until the next maximum:

$$g = n^2 T \frac{\hbar_1}{r^2},$$

$$\hbar_1 = 1.273239545 * 10^{12} \frac{m^3}{s^3}$$

16.1.1. Current qualitative G model

Unlike in space *above* the outer maximum, where gravity falls to zero effectively at infinity (due to next maximum being extremely far), below the maximum gravity falls to zero at finite distance due to compression of space.

With no inner gravitons, the single point of zero gravity would be at the centre, however, due to relativity, inner gravitons must exist (each inner maximum must also be a relative outer maximum).

If the radius of the outer maximum of the Sun is the surface radius, gravity should thus be decreasing below the surface to the point where it is cancelled by the [next] inner maximum.

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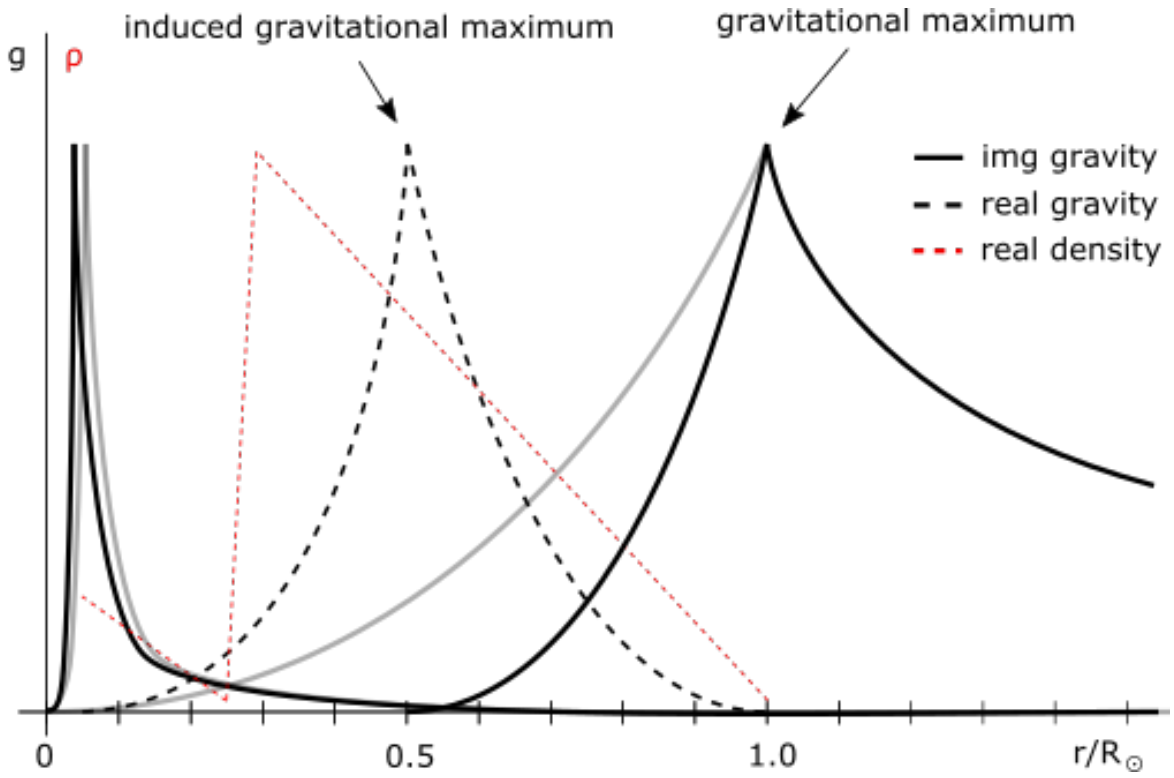

Figure 31. Rough approximation of Sun's gravity

Without the inner maximum, any free-falling real mass would be concentrated about the surface maximum. With inner maxima, concentration of real mass begins at the centre.

However, as each inner graviton has lower capacity than its outer graviton, greatest density of real mass will not be at the centre. Once inner graviton is at full capacity, as real mass accumulates between the inner maximum and the outer maximum, its counteracting the gravity of the outer maximum.

In equilibrium thus, greatest density of real mass is not at the outer maximum, rather between the inner and outer maximum.

This is illustrated in Figure 31. Here, dark matter gravity provided by [img] gravitational maxima is represented by solid black lines, while real gravity provided by real mass and its induced (effective) maximum is represented by dashed black lines. In case of outer maximum, grey line represents gravity with no real mass acquired (naked graviton), while for inner maximum, it represents the initial core maximum. Red dashed lines show linearly approximated density of real mass.

Note that Figure 31 shows gravity in absolute values. Gravities of maxima cancel at multiple points inside the Sun. At these points, gravity is zero. Induced gravitational maximum should thus, in reality, have negative gravity relative to other maxima.

From Figure 31 one can extrapolate discontinuity candidates ($r/R_\odot$): $0.0385 \approx 2/5 * 1/10$, $2/3 * 1/10$ (initial core maximum), $1/5$, $1/4$, 0.286, $1/2$, $2/3$, $3/4$, 1.

Note that there should be two major charge radii inside the Sun, if the outer charge is located at tachocline, and charge radii are mirrored relative to the induced real maximum, other charge radius boundary should be at $2/5\ R_\odot$ (mirroring the $2/3\ R_\odot$ boundary).

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In addition to these, there are other candidates, representing maximal deviation from these values - eg. discarding CMB relative relativistic energy, rest surface maximum is at 0.94 $R_{\odot}$.

16.2. Energy replenishment

Primary energy source of the Sun is, most likely, nuclear fusion.

Fuel for fusion must either be accumulated matter or matter created through conversion of imaginary mass (dark gravitational potential) to real mass by some unknown mechanism (possibly annihilation).

In case of such conversion it would take tens of billions of years to spend all fuel.

However, this solution implies the Sun eventually starts eating itself (its rest mass) - something I consider highly unlikely.

Instead, the Sun is probably burning real mass accumulated during inflation of its gravitons (whether through inflation of smaller gravitons or acquisition of matter by increasing vacuum pressure on U_1 scale).

> When compared to other living beings, it would be reasonable to assume that Sun has a relatively constant real rest (constitutional) mass and an amount of fuel which may be cyclically replenished.

To determine how much fuel the Sun has left it is necessary to determine how much fuel it had at the beginning and the rate of fuel consumption.

Assuming fusion reaction 4H -> He (energy per reaction E_r = 4.32 * 10^{-12} J) and power output P of 3.8 * 10^{26} J/s, time needed to spend all fusion fuel is:

$$\Delta t = \frac{m}{m_p} * \frac{E_r}{4} * \frac{1}{P} * N$$

m = available mass
m_p = proton mass
E_r = energy per reaction
P = power output
N = fraction of mass used in fusion

Since the Sun has two [major] maxima, fusion may be occurring at two places - in the core and above the core.

Gravitational mass of the surface maximum is assumed to be 1.988500 * 10^{30} kg (or half that value at full capacity in case of interpretation with no mass shielding), while the gravitational mass of the core has been calculated previously to be 2.951797 * 10^{27} kg.

Assuming that the calculated core mass is the mass of the graviton and therefore equal to the internal capacity for real mass, this capacity in equilibrium should be full and, due to mass loss (eg. through radiation), *excess* real mass must be constantly (cyclically) consumed as fuel.

> Note that calculated mass implies such density of the core that temperature should be orders of magnitude higher than current assumptions, for thermonuclear fusion to occur.
> If fusion is occurring in the core, most likely it is not thermonuclear.

It has also been hypothesized that the ratio of core mass and surface mass should be correlated with the ratio of mass between inner and outer planets.

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Assuming that at the beginning of the core feeding cycle, these ratios are equal, fuel mass is the *excess* mass in the outer core corresponding to the ratio.

In case of thermonuclear fusion and with 2/3 of mass consumed, time needed for the core to spend all fuel is:

$$\Delta t = \frac{m}{m_p} * \frac{E_r}{4} * \frac{1}{P} * N = \frac{8.90211033 * 10^{27}\, kg}{1.67265 * 10^{-27}\, kg} * \frac{4.32 * 10^{-12}\, J}{4} * \frac{1}{3.8 * 10^{26}\, \frac{J}{s}} * \frac{2}{3}$$

$$\Delta t = 10084091956967735\, s = 319545591.5\, years$$

where m = 8.90211033 * 10^{27} kg is the previously calculated initial mass of the core.

Assuming that, at the start of consumption cycle, imaginary mass (graviton) grows to initial mass radius (0.286 $R_\odot$) and decreases with energy loss, time left (assuming constant rate of consumption) before the next feeding cycle is then:

$$t = \left(2.951797 * 10^{27} - \frac{1}{3} 8.90211033 * 10^{27}\right) * \frac{3}{2} \frac{1}{8.90211033 * 10^{27}} \Delta t$$

$$t = -26461406017707\, s = -838511.4\, years$$

Negative time may be interpreted as the next cycle being overdue (core spent all fuel 838k years ago and is currently *burning* constitutional mass), or, that more than 2/3 of mass must be consumed in fusion.

In case 70% of mass may be spent:

$$\Delta t = 10588296554816122\, s = 335522871\, years$$

$$t = 1114734114271587\, s = 35323792.5\, years$$

However, as stated already, thermonuclear fusion in the core is unlikely. In case there is no fusion in the core at all, ruling out standard chemical reactions and radioactivity, the remaining possibility is heat generation through gravitational (Kelvin–Helmholtz) contraction:

$$\frac{dU_r}{dt} = \frac{-3GM_i^2}{10R_i^2} \frac{dR}{dt}$$

M_i = initial core mass = 8.90211033 * 10^{27} kg
R_i = initial core radius = 0.286$R_\odot$ = 198970200 m

assuming logarithmic relationship between mass and radius contraction, the contraction may be approximated from the rate of Jupiter contraction:

$$\frac{dR}{dt} = \frac{10^{\frac{M_i}{M_J}}}{3^{\frac{R_i}{R_J}}} \frac{dR_J}{dt} = -7.29401291 * 10^{-8}\, \frac{m}{s}$$

M_J = Jupiter mass = 1.89819 * 10^{27} kg
R_J = Jupiter radius = 71492000 m
dR_J/dt = rate of Jupiter contraction = -3.17 * 10^{-11} m/s

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Note that the equation above is not correct for *isolated* bodies such as Jupiter, it should rather be used for Jupiter-like cores of stars. Contraction inside the star is significantly faster due to higher rates of energy loss with the presence of outer gravitational maxima and slower rotation.

giving energy radiation of:

$$\frac{dU_r}{dt} = 2.9233705 * 10^{21} \frac{J}{s}$$

and time to spend all fuel:

$$\Delta t = \frac{3G(M_i - M)^2}{10R_i} \left(\frac{dU_r}{dt}\right)^{-1} = 1218751736351319\, s = 38619912\, years$$

M = current core mass = 2.951797 * 10^{27} kg

From this one can calculate core radius at the end of the cycle (all fuel spent):

$$R = R_i - \Delta t \frac{dR}{dt} = R_i - (M_i - M)^2 \frac{R_i}{{M_i}^2} = 0.158221\, R_\odot = 110074291\, m$$

$R_\odot$ = Sun surface radius = 695700000 m

With current core radius at 0.2 $R_\odot$, amount of fuel left is:

$$\frac{0.2 - 0.158221}{0.286 - 0.158221} = 0.327 \approx \frac{1}{3}$$

It is unlikely though that all fuel is spent during the cycle, total amount spent is probably equal to 2/3 (equivalent to fusion), in which case the cycle period is:

$$\Delta t_{re} = \frac{2}{3}\Delta t = 25746608\, years$$

and the core is at the end of a cycle.
The obtained core cycle period agrees well with the hypothesized 2nd order cycle period of the Solar System (≈ 26 million years).
Since the 2nd order cycle period is also equal to periodicity of impacts and extinctions on Earth and other planets, all these Solar events are likely synchronized - once the core fuel is exhausted, additional fuel is provided by the outer half of the Sun at the same time equal quantity of its own fuel is replaced with new mass (from impactors?).
Gravitational stress may even create relative wormholes through core/surface sunspots enabling direct consumption of new mass by the core.
Note that, with core radius oscillation, its time independent radius is obtained from the volumetric superposition of 0.2 $R_\odot$ and 0.286 $R_\odot$ cores:

$$\frac{4}{3}\pi R^3 - \frac{4}{3}\pi {R_c}^3 = \frac{4}{3}\pi {R_i}^3 - \frac{4}{3}\pi R^3$$

$$R^3 = \frac{{R_i}^3 + {R_c}^3}{2} = \frac{(0.286^3 + 0.2^3){R_\odot}^3}{2}$$

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$$R = \sqrt[3]{\frac{(0.286^3 + 0.2^3)}{2}} R_\odot = 0.25 R_\odot = \frac{1}{4} R_\odot$$

Such oscillation must be present on standard scale too - thus, all results obtained from measurements of nuclear observables may be understood as superpositions in time and/or space, however, in reality these are not constants, rather statistical mean state of evolving phenomena. Regardless of scale, no equally evolved (identical) phenomena can exist at two points in time, nor can they exist at multiple points in space. De-localization may seem possible through stretching of [a point in] space/time, however, this is fragmenting (quantizing) the phenomena and its space. Even if it remains strongly entangled, it is never, as a whole, at multiple points in space/time, although, with energy applied, de-localized space may collapse to one of the fragmented points.

Unlike the core, the outer part of the Sun is most likely powered by fusion.

However, it too must have constitutional mass and fuel mass fraction of real mass (excess mass).

Most likely, fuel mass is equal to the previously calculated relativistic energy (CMB relative) of the Sun. In that case, time to spend the fuel is:

$$\Delta t = \frac{m}{m_p} * \frac{E_r}{4} * \frac{1}{P} * N = \frac{1.18437729 * 10^{29}\, kg}{1.67265 * 10^{-27}\, kg} * \frac{4.32 * 10^{-12}\, J}{4} * \frac{1}{3.8 * 10^{26}\, \frac{J}{s}} * \frac{2}{3}$$

$$\Delta t = 4.25 * 10^9\, years$$

The value is in agreement with the hypothesized 1st order cycle and it is likely equal to previously calculated real age of Earth (4.29±0.05 * 10^9 years), suggesting the Solar System is at the end of the 1st order cycle.

Note that the calculated age is exactly 1/3 of the obtained age of the observable universe in one class of measurements (Lensedquasars/Near) - 12.75 * 10^9 years (also in agreement with more recent bTFR measurements[189]), supporting the cycling hypothesis (this would be the end of a 3rd cycle).

Gravitational stress of the 1st order must be order(s) of magnitude larger than that of the 2nd order.

Likely, at the end of a 1st order cycle, Sun's outer graviton briefly loses some momentum (relative to CMB) inverting spin in the process. It *falls* into a lower energy level, closer to the galactic centre. Afterwards, it starts expanding again consuming hydrogen fuel as it returns to the current state again (process may be relatively equivalent to initial inflation).

Note that the reason for discrepancy in measurements of the age of the universe (Hubble constant) could be the same as in the case of the age of Earth. I have previously hypothesized cyclic time compression (evolution inflation, due to gravitational stress), with coupled periods of 1.512 and ≈26 million years. With the next larger period being T_u = 4.25 Gy, its time compression should be:

$$\Delta t_{c_u} = \frac{\Delta t_{c_x}}{T_x} T_u = \frac{24751.794\, y}{1512000\, y} 4.25 * 10^9\, y = 69573495.04\, years$$

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where Δt_{c_x} is the previously calculated compression of time with a single Tx (1512000 years) pulse.
Now one can calculate how much overestimated is the currently accepted age of the observable universe T_{img} = 13.799 ± 0.021 * 10^9 years:

$$\sigma_{T_{img}} = \left\lfloor \frac{T_{img}}{T_u} \right\rfloor \left[\Delta t_{c_u} + \left(\Delta T_{E_{img}} - T_u \right) \right] = 1.07872048512 \pm 0.05 * 10^9 \, years$$

where $\Delta T_{E_{img}}$ (4.54±0.05 * 10^9 years) is the currently accepted age of Earth.
This gives for the real age of the universe:

$$T = T_{img} - \sigma_{T_{img}} = 12.72027951488 \pm 0.071 * 10^9 \, years$$

resolving the discrepancy.

Another interesting solution is obtained if the fuel amount is equal to real mass of the Sun calculated with the assumption of, across Solar System, invariant, real $\hbar_{mg}$ *constant*:

$$m = \frac{\hbar_{mg}}{g} = \frac{6.968267285 * 10^{20} \, N}{274 \, m/s^2} = 2.543163243 * 10^{18} \, kg$$

For N = 2/3 (here, the other 1/3 would be the solar wind), time needed to spend this fuel is:

$$\Delta t = \frac{m}{m_p} * \frac{E_r}{4} * \frac{1}{P} * N = \frac{2.543163243 * 10^{18} \, kg}{1.67265 * 10^{-27} \, kg} * \frac{4.32 * 10^{-12} \, J}{4} * \frac{1}{3.8 * 10^{26} \, \frac{J}{s}} * \frac{2}{3}$$

$$\Delta t = \frac{2}{3} * 4321249.297 \, s = 33.3 \, days$$

For N = 1/2:

$$\Delta t = \frac{1}{2} * 4321249.297 \, s = 25 \, days$$

This solution is not plausible as it requires continuous hydrogen uptake from interstellar medium. While charged protons and electrons may be absorbed at Sun's poles (at least at times) and could be combined to form hydrogen at the centre (assuming the Sun is not ideally neutral and has gravitational holes at poles - at least periodically opened, although the charges could also be inefficiently transferred inside as electric current), energy bandwidth is not sufficient to power the Sun.
Interestingly, the solution (with N = 2/3) is close to the polar rotation period of the Sun (N = 1/2 gives equatorial period) where the uptake would happen.
However, although unlikely in a stable state, this is likely the feeding method at the end/beginning of the 1st order cycle (4.25 * 10^9 years cycle). Once the spin momentum collapses into a two-dimensional form, the Sun's maximum will be extremely charged. With an extremely strong non-homogeneous magnetic field it would be able to acquire required mass efficiently and quickly.
Differential rotation of the Sun could be a fossilized evidence of spin collapse, suggesting it breaks into multiple quanta in the form of concentric rings (oppositely charged rings must have anti-aligned spin to conserve the magnetic field).

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Such fossil is perhaps more evident on Jupiter, where wind velocities are correlated with gravity. The extremely stable and *static* cyclones on Jupiter's poles indicate that it may have small gravitational holes open today.
However, if these are open, small gravitational gaps or indentations should also exist between layers associated with each ring quanta. Strong magnetic field and measurements of gravity do support this theory, although the indentations would have to be extremely small - if gravitational disturbances are not due to standard (U_0) scale matter, as currently interpreted (in which case they would be the fossil of the *healing* process).

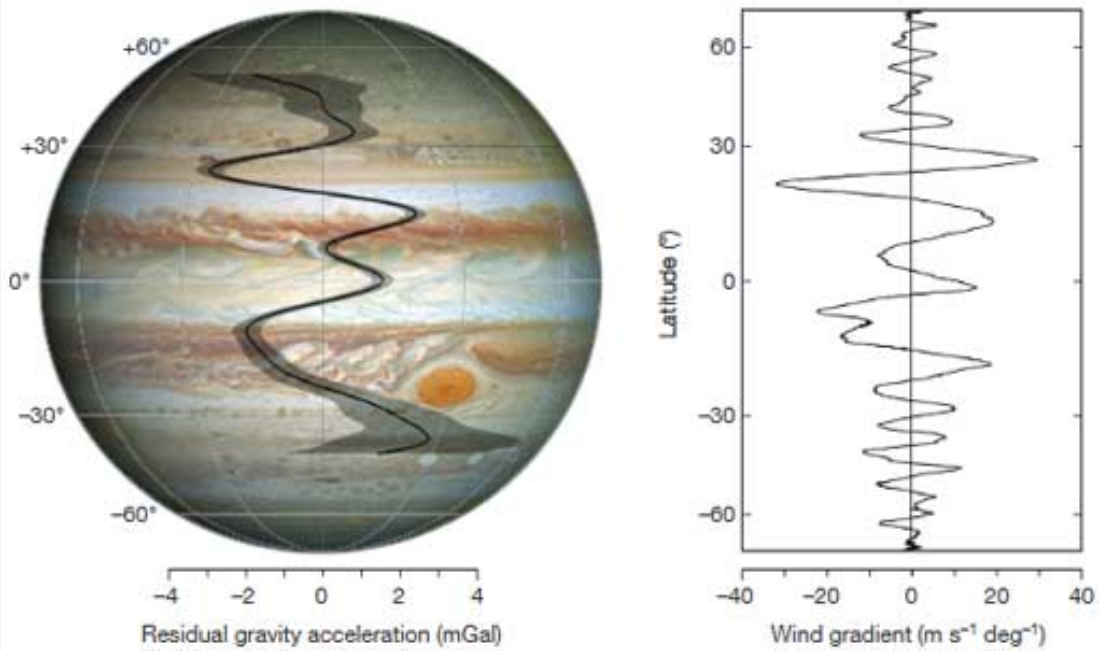

Figure 32. Jupiter gravity disturbances and wind gradient[190]

The cells of all living species are regenerating on a periodic basis, for example, 1/3 of hippocampal neurons in humans and mice is exchanged during the lifetime[191], thus, the cellular regeneration in the Sun should not be surprising, whether it is food or constitutional mass.
Capacity for real mass below the Sun's surface may be full, but all mass orbiting the Sun may be considered as its real mass.

However, it is obviously not fuel mass, rather constitutional or symbiotic mass.

The 3rd order period of the Solar System cycle may be related to this mass through the mass barycentre of the system.

I have previously calculated the neutral gravitational mass equivalent for the surface plasma at the equator which would make its angular velocity Keplerian.

The source for this energy may be the motion of the barycentre.

In any case, if one assumes that conversion between neutral and electro-magnetic component of the general force of the Sun is also periodic and that such energy replaces fusion reactions in equivalent way, the period of *recharge* is:

$$\Delta t = \frac{m_{re}}{m_p} * \frac{E_r}{4} * \frac{1}{P} * N = \frac{4.042341 * 10^{25}\, kg}{1.67265 * 10^{-27}\, kg} * \frac{4.32 * 10^{-12}\, J}{4} * \frac{1}{3.8 * 10^{26}\, \frac{J}{s}} * \frac{2}{3}$$

$$\Delta t = 45790644230537\, s = 1451018\, years$$

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and it is in good agreement with the hypothesized 3rd cycle period (a fraction of mass N = 0.6946847 would yield the hypothesized value - 1512000 years).

In comparison with living beings, one might notice a problem of exhausted fuel - what happens with the *ash* from fusion reactions (end products of fusion)?
There are couple of solutions:

1. the ash is ejected periodically,
2. the ash forms the constitutional mass.

Time compression at the end of Solar System cycles implies gravitational stress of Solar System maxima.
While the 2nd solution may be plausible during initial formation of the Sun, at least at the end of one of the cycles some mass must be ejected out from the Sun.
It certainly seems *easier* than in case of planets, as unlike the planets, the Sun does not have a solid [real] mantle to block the explosion (although terrestrial planets may be interpreted as Sun's mantle they are in a collapsed form with plenty of space in between).
The *ash* content depends on the cycle period, being mostly Helium in smaller cycles but with heavier elements formed in explosions at the end of larger cycles.
A full collapse of the graviton is a collapse of a 3-dimensional spherical neutral form into 2-dimensional charged form. Since the surface graviton of the Sun is entangled with Mars' graviton, at the time of collapse, two ring maxima are aligned and the ejection of *ash* is probably not isotropic, rather targeting Mars.
At that point, both the Sun and Mars have a significant (extreme) magnetic field generated by charged maxima so Mars would likely attract ferromagnetic/charged ejecta from the Sun.
The Fe covered surface of Mars could be interpreted as the evidence for this.
Note that the collapse involves change of spin of the gravitons. First, the holes are opening on the poles of the spherical Sun maximum while the axial tilt starts increasing, the poles of the Sun and Mars are only briefly fully aligned before the equilibrium of stable spin states is reached.
Thus, most mass is ejected in the first and last moments of the spin change, through the *equilibrium poles* - out of the Solar System.
Note that the magnetic field is weakest at these times, as it increases, the momentum of particles is curved and aimed at Mars.

16.3. As a living organ[ism]

Considering the energy output (metabolic rate) of P = 3.8 * 10^{26} W, the standard relation between metabolic rate and mass[192]:

$$\frac{P}{0.0484259259\frac{day*W}{kcal}} = 70 * M^{\alpha}$$

gives 0.86 for the α exponent (M = total mass of the sun = 1988500 * 10^{24} kg). For a mammalian organ this would be between a kidney and a liver[193], suggesting an embryonic stem cell in the process of differentiation.

17. Inflation and dark energy

According to CR, observable universe cannot be absolute - if it had a beginning it was a relative beginning and if it was inflated it was inflated from a relative, not absolute, singularity.

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The inflation thus did not proceed from a single point, and with inflation of large scale gravitons, effectively, large scale structures could have been inflated as well. Galaxies probably start with the inflation of a supermassive graviton, which afterwards deflates (probably in steps - through discrete energy levels) to a stable [ground] state. In any of these states, graviton may be interpreted as a supermassive black hole. The energy lost with deflation probably consists of gravitons, which then, in similar fashion (inflation/deflation) create planetary systems. Inflation of galaxies and planetary systems may be considered as inflation of universes, even if they have similar properties.

This hypothesis enables a relatively fast evolution of galaxies and planetary systems between equilibrium states, suggesting that one may have to look very far in order to detect large differences between distant and near galaxies.

UPDATE 2023.02.26
Multiple analyses of data obtained by the James Webb Space Telescope (JWST) confirm[194] this hypothesis[195].

In any case, the theory implies that masses of early galaxies should be dominated by central supermassive black holes, while, in developed galaxies, *vice versa* should be true.

If planetary systems are equivalents of standard atoms in a particular state (pressure/temperature), observable universe becomes a gas of extremely low density. Dark energy, if it exists, is thus simply the energy of gas expansion due to scaled pressure/temperature change. Galaxies are then simply large scale quantum vortices.

Black holes and other living gravitational wells of U_1 scale can be understood as vacuum quanta, increasing in strength with inflation and causing contraction of constituent matter, with stretched space (at times of inflation of space, not expansion) between them creating (inflating) new gravitational wells between galaxies.

It seems that dark energy is not stretching space rather *creating* new space (energy density of space remains constant). This is consistent with gas-like expansion, thus, the observable universe should be cooling down. However, *creation* of new space cannot be instant and should be preceded by stretching of space (vacuum quanta) with stretched space returning to initial state eventually (creation should be understood as relative - new space may be inflated from smaller scale or added from space external to observable universe).
Here, stretching vacuum quanta should be large scale vacuum quanta (eg. large scale gravitons or gravitational maxima of black holes). Thus, correlation should exist between dark energy and black hole sizes. If expansion is not slowing down the growth of black holes should be continuous (although probably in oscillating manner).
Indeed, recent analyses support the notion that growth of black holes is proportional to dark energy[196].

The expansion of the observable universe has been questioned before and there are results consistent with a non-expanding, Euclidean universe[197] regarding some phenomena previously considered to favour expanding universe, although none solve all the problems - eg. increasing redshift with distance or time dilation of distant events.

Some recent analyses suggest that the expansion of the observable universe is not accelerating[198] and the redshift previously used as evidence for acceleration should be attributed to local "bulk flow" instead.

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If photons have rest mass on some scale, as CR implies, energy will be lost with distance (if not replenished periodically). If the mechanism for energy loss from distant galaxies is not scattering of light through interactions with standard (U_0 scale) matter, the interactions must be involving smaller scales of photon energy components. These are causing changes in values of momentum relatively independent of wavelength, and without affecting direction significantly. Photons, having mass, must have a range - which then explains decreasing brightness with distance.

However, even these interactions cannot explain time dilation, which apparently has been observed in Type Ia supernovae[199].

Signatures of time dilation have also been found in gamma-ray bursts but with lower confidence[200].

In any case, the current accelerating expansion or at least its magnitude should be questionable. Observations also suggest that small scale effects on photon energy are oscillating with distance - consistent with hypothesized oscillation of photon mass, which, periodically results in acceleration rather than deceleration of photons. The oscillation must be correlated with properties of space. If there is no significant loss of energy, energy of the photon may be kept relatively constant through these interactions.

18. Stability of elements

Structure of U_0 elements seems to be entangled with the configuration of the *parent* U_1 universe. This also makes the stability of isotopes dependent on this configuration.

The stability curve and decay rates of individual isotopes thus may change strongly in transition from one cycle state to another, but the rates should also oscillate in equilibrium.

Stable isotopes are concentrated along this curve:

$$N(P,t) = \left\lfloor P * \left[1 + \left(\frac{N_{max}}{P_{max}} - 1\right) * \frac{P}{P_{max}}\right] + \sigma_T \right\rceil$$

$$\sigma_T = \left[-(C_1 * C_2) * \left(\frac{C_2}{C_1} - 1\right) + (C_2 - C_1) * \frac{t}{\Delta_t} * (C_1 + C_2)\right] * \frac{P}{P_{max}}$$

$$\sigma_T = \left[(C_1 * C_2 - {C_2}^2) + ({C_2}^2 - {C_1}^2) * \frac{t}{\Delta_t}\right] * \frac{P}{P_{max}}$$

where N = N_0 is the number of neutrons, P = P_0 = Z is the number of protons of the isotope and P_{max} is the maximal number of protons for a stable element (for the Solar and equivalent systems, P_{max} = 82, corresponding to Pb - lead). σ_T is the small shift in value of N due to weak evolution through state lifetime (Δ_t).

$$\frac{P_{max}}{N_{max}} = \frac{N_1}{P_1}$$

$$P_{P_{max}/N_{max}} = \left\lfloor EH_{N_1/P_1}(P_s, N_{P_{max}/N_{max}}) \right\rceil$$

where N_1 is the number of neutrons and P_1 the number of protons of the parent system - U_1.

P_s is the atomic number (number of protons) of the most stable element - element with maximal number of stable isotopes.

$P_{P_{max}/N_{max}}$ is the atomic number of the element lying on the N(P,t) curve with P/N ratio equal to P_{max}/N_{max}.

For the Solar System, in state 6p4n:

$$\Delta_t = 1.51 * 10^6 \text{ years}$$

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$$\frac{P_{max}}{N_{max}} = \frac{2}{3}$$

$$P_{2/3} = \left\lfloor EH_{4/6}(P_s, N_{2/3}) \right\rceil$$

$$C_1 = 2\,,\ C_2 = 3$$

Note that constants C_1 and C_2 are the same as those determined in chapter *Earth, as a living organ[ism] - Age, lifespan and the 3rd order period - Speed of time*.

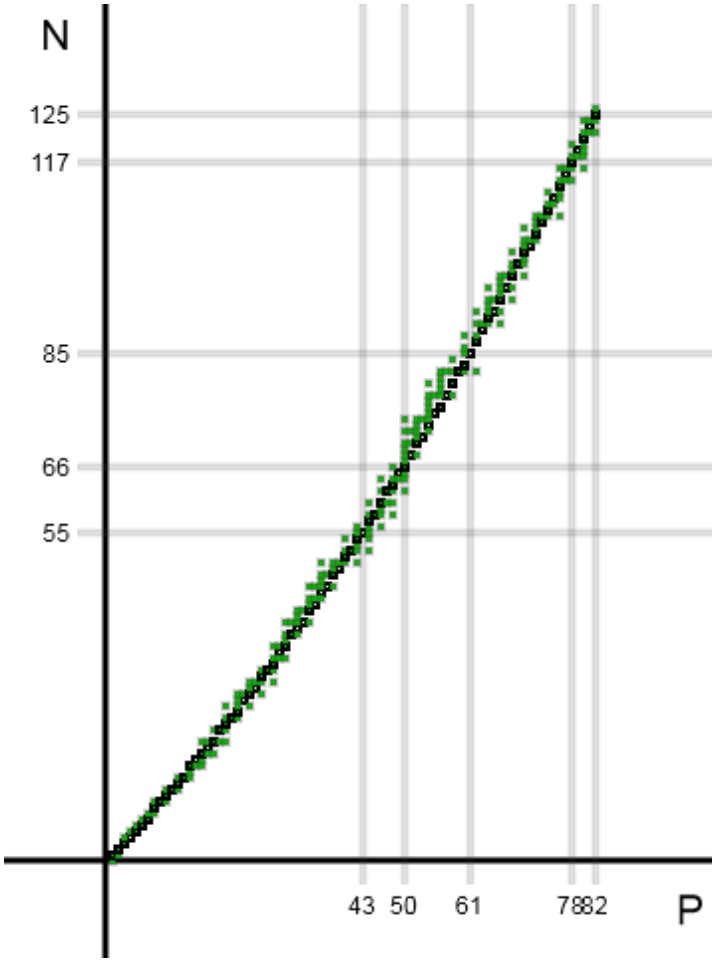

Figure 33. Stable isotopes of the Solar System in state 6p4n at t > 1495840 years

Figure 33 shows all stable isotopes of the Solar System (green) and the N(P,t) curve (black). Note the following:

- for t > 1495840 years ($t \approx \Delta_t$), the isotope lying on the curve with P/N ratio exactly equal to 2/3 is Pt-195 (Platinum, P = 78). The placement of other Platinum isotopes is symmetric relative to the curve,

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- for σ_T = 0 (t = 3/5 Δ_t), the $P_{2/3}$ isotope is Pb-205 (Lead, P = 82). At t = 3/5 Δ_t this was a stable isotope. 1/3 of other stable isotopes are above the curve, 2/3 below,
- for t = 4/5 Δ_t the $P_{2/3}$ isotope is Hg-200 (Mercury, P = 80). 1/3 of other stable isotopes are above the curve, 2/3 below,
- the ratio of horizontal to vertical distance between Lead-205 and Platinum-195 is (82 - 78) / (123 - 117) = 4/6 = 2/3,
- the ratio of horizontal to vertical distance between Lead-205 and Hg-200 is (80 - 78) / (120 - 117) = 2/3,
- at t $\approx \Delta_t$, Tin (Sn, P = 50) has the highest number of stable isotopes (10). Tin isotope lying on the curve is Sn-116 (50 protons, 66 neutrons). 2/3 of other stable Tin isotopes is above the curve, 1/3 is below,
- at t $\approx \Delta_t$, the only elements without stable isotopes are Tc (Technetium, P = 43) and Pm (Promethium, P = 61). The isotopes lying on the curve are Tc-98 and Pm-146. Vertical distance from Sn-116 to Tc-98 is equal to horizontal distance from Sn-116 to Pm-146.

19. Electric gravity

According to CR, electric and gravitational forces are interchangeable components of general force. This exchange may not be limited to annihilation or mass oscillation events.

Inside the atom, force field between negative and positive charges is neutralized and this electromagnetic potential may be exchanged with gravitational potential (which may be interpreted as annihilation of coupled field components).

Thus, a Hill sphere radius (r_H) of an atom could be correlated with its charge radius.

$$r_H = R\sqrt[3]{\frac{m}{3M}}$$

This gives, for Carbon-12 atom with nucleus mass m = 1.992646883 $\times$ 10^{-26} kg inside the gravity field of Earth (M = 5.972 $\times$ 10^{24} kg) at R = 6371 km (surface):

$$r_H = 66 \times 10^{-12}\, m = 66\, pm$$

This is in agreement with experimentally obtained radius of 70 pm (±5 pm). Calculation for other elements of the periodic table yields similar results.

Note that Hill radius is different for different isotopes of the same element while experimentally obtained atomic radii are charge radii and thus independent of the number of neutrons (radius represents the orbit of the outermost electron). In example, for Carbon-14 the obtained value is 69.5 $\times$ 10^{-12} m, and even closer to 70 pm if one calculates using equatorial radius of Earth instead of mean volumetric (a possible indicator that the Solar System soul was a part of a ^{14}(C-N-O) cycle in a previous incarnation).

Figure 34 shows experimentally obtained radius (green) and calculated Hill sphere at R = 6371 km (black) for all stable isotopes. Evidently, radii are not only correlated but values of covalent radii oscillate about the Hill radii, confirming the entanglement of U_0 and U_1.

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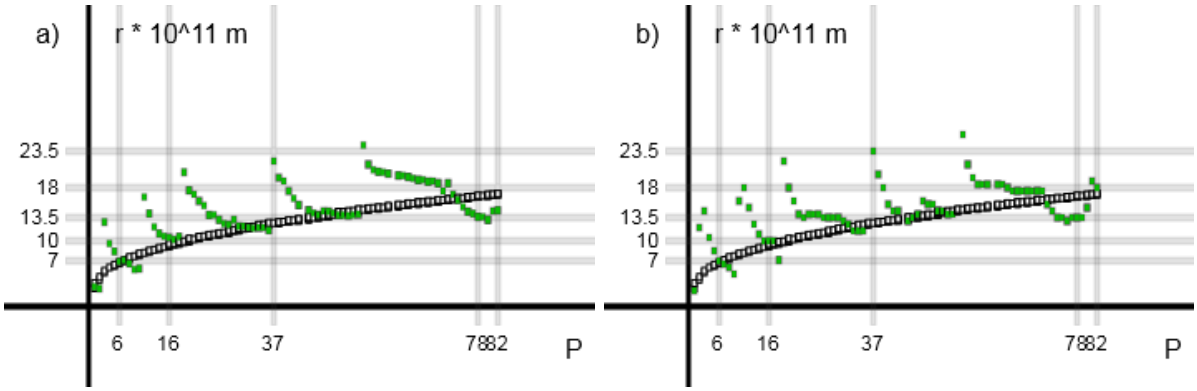

Figure 34. Calculated Hill sphere and measured radius for stable isotopes: a) data from 2008. b) data from 1964.

Comparing data from 1964.[201] and 2008.[202] shows a compression of radii and convergence to Hill radii - such changes are expected in CR (no constants) and these should probably be accelerating as the Solar System approaches the end of the current state.

Figure 35 shows the experimentally obtained radius (green squares) and calculated Hill sphere at R = 6371 km (black squares) for isotopes with neutron number adjusted to match the charge radius.

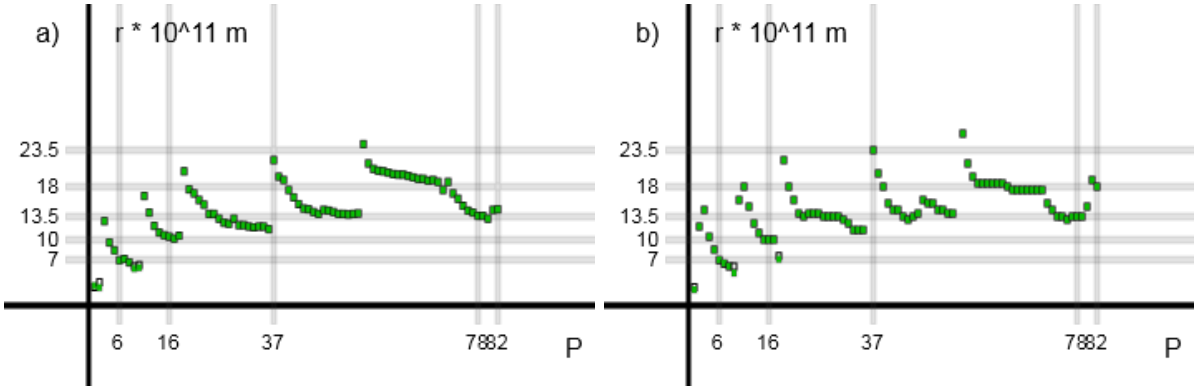

Figure 35. Calculated Hill sphere (adjusted) and measured radius for stable isotopes: a) data from 2008. b) data from 1964.

In calculations above, atomic mass has been quantized by u = 1.66053907 $\times$ 10^{-27} kg (atomic mass constant) with integer number of protons P and neutrons N [m = (P + N) $\times$ u] so Hill radii are quantized too. The overlap of Hill radii with charge radii in Figure 35 shows that charge radius is quantized too (there is a number of neutrons N for which the Hill radius will match the charge radius).

Figure 36 shows the number of neutrons N used with each element to obtain Hill radius equal to charge radius.

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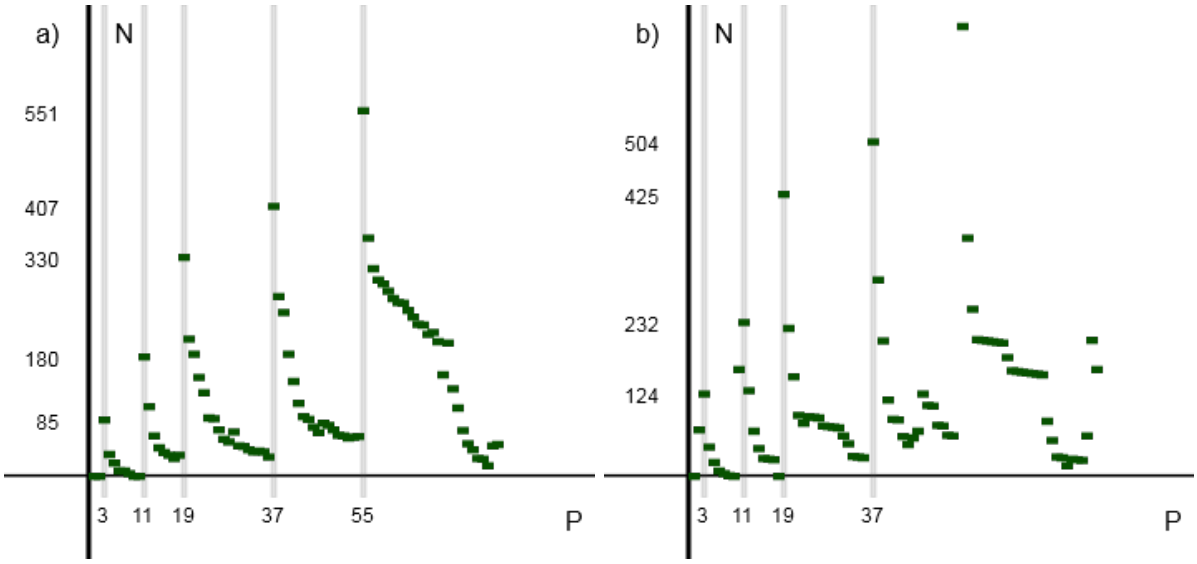

Figure 36. Isotopes used in Figure 36 calculation: a) data from 2008. b) data from 1964.

From above figures it is obvious that elements (atoms) can be grouped into shells the same way as electrons are grouped within atoms.

Grouping is shown in Table 42. There are two possibilities - either the shells L, M and N are doubled or the grouping is reflected after the N shell, so shells O, P and Q contain the same number of elements such as shells N, M and L, respectively. Note that in case of alternative (Og) grouping, no elements beyond Og are theoretically possible - otherwise another shell would be present between He and Li.

Table 36. Grouping of elements

n	shell (alt shell)	entanglement	elements	total elements = $2n^2$
1	K	-	1-2 (H - He)	2
2	L	Q	3-10 (Li - Ne)	8
2	L (Q)	L	11-18 (Na - Ar)	8
3	M	P	19-36 (K - Kr)	18
3	M (P)	M	37-54 (Rb - Xe)	18
4	N	O	55-86 (Cs - Rn)	32
4	N (O)	N	87-118 (Fr - Og)	32

Note that no elements beyond Oganesson (Og) have been found (or synthesized) to date, despite numerous attempts.

Gravitational constant G is not dimensionless and therefore not invariant to vertical scale transformation.

On the standard atom scale U_0, gravitational constant for a completely neutralized general force can be derived from previously obtained orbital momentum of the Carbon-10 outermost electron (in Solar System equivalent state):

$$\frac{mv^2}{r} = G\frac{Mm}{r^2}$$

$$v^2 = G\frac{M}{r}$$

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$$M = \frac{\text{Sun mass}}{\text{Neptune mass}} \times m$$

$$G = G_{00} = v^2 \frac{r}{M} = 1.234879253 \times 10^{27} \frac{m^3}{kgs^2}$$

$v = v_{U_0} = 5.585837356 * 10^5$ m/s
$r = r_{U_0} = 70 * 10^{-12}$ m

where m, v, r are components of the outermost electron orbital momentum (mass, velocity, radius).

If one now, equalizes electric with gravitational force (for photon/graviton mass > 0 [Yukawa, Proca[203]]):

$$k_0 Q^2 \left(\frac{1}{r^2} + \frac{\mu_\gamma}{r} \right) e^{(-\mu_\gamma r)} = G_{00} m^2 \left(\frac{1}{r^2} + \frac{\mu_n}{r} \right) e^{(-\mu_n r)}$$

discarding μ / r factors due to being practically equal and equal to 0 on both sides (expecting large r):

$$\mu_n - \mu_\gamma = \frac{1}{r} \ln \left(\frac{G_{00}\, m^2}{k_0\, Q^2} \right)$$

$$\frac{M_n c_n}{\hbar_n} - \frac{M_\gamma c_\gamma}{\hbar_\gamma} = \frac{1}{r} \ln \left(\frac{G_{00}\, m}{k_0\, Q} \right)$$

$$\frac{c_n}{\hbar_n} = \frac{c_\gamma}{\hbar_\gamma} = \frac{c}{\hbar}$$

$$M_n - M_\gamma = \frac{\hbar}{c} \frac{1}{r} \ln \left(\frac{G_{00}\, m^2}{k_0\, Q^2} \right)$$

$\hbar$ = reduced Planck's constant = $1.054573 * 10^{-34}$ Js
c = $2.99792458 * 10^8$ m/s
k_0 = Coulomb constant = $8.9875517873681764 * 10^9$ Nm^2/C^2
Q = electron charge = $1.60217733 * 10^{-19}$ C
M_γ = photon mass
M_n = U_0 graviton mass

Using previously obtained photon mass $M_\gamma = 2 \times 9.10938356 * 10^{-73}$ kg and carbon graviton mass $M_n = 2 \times 1.663337576 * 10^{-68}$ kg in CR, this gives:

$$r = 1.3032821975 \times 10^{26}\, m$$

as the distance in space when two forces become equal - basically the range of gravity for graviton mass roughly equal to M_n.

As shown previously, components of general force, charge and mass are exchangeable through inflation/deflation of momentum components (even in neutral particles, the amount of gravitational mass can increase at the expense of charge *mass*, with particle remaining neutral). Nature of the force can thus oscillate.
Taking into account error margins, obtained distance is equal to the radius of observable universe, assuming currently accepted [img] age ($13.799 * 10^9$ years), constant speed of light and flat space:

$$r = c\Delta t = 2.99792458 \times 10^8 \times 13.799 \times 10^9 \times 365.25 \times 24 \times 60 \times 60 = 1.305 \times 10^{26}\, m$$

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The fact that the obtained distance is equal to the radius of observable universe is unlikely a coincidence.

Distance in space here can be interpreted as distance in time and the obtained distance can be interpreted as the time when both forces were unified, after which point gravitational force diverged from electro-magnetic force and started evolving *separately* (G decreased over time) on standard scale. This implies that the gravitational *constant* G is proportional to space curvature (or density/pressure of space).

Divergence is common in evolution but it is also common that it affects only one form of energy - the other remaining relatively constant.

Assuming Coulomb's constant remained relatively constant, G must have changed scale, either through inflation of neutral gravitons (decreasing space curvature on U_0 scale, increasing space curvature on U_1 scale) or deflation of neutral gravitons (decreasing space curvature on U_0, increasing space curvature on U_{-1}). In some prior divergence event, the Coulomb's constant likely have changed scale. On any scale then, these changes can be interpreted as exchange of one potential for the other. This implies diverse inversion between adjacent scales (vertical energy levels) - eg. while on one scale space is contracting, on the other it's probably expanding, on one scale gravity dominates, on other electro-magnetism, etc.

Gravitons of scale U_1 are thus strongly entangled with gravitons of U_{-1} scale - in other words, U_{-1} gravitons form the space of U_1 gravitons. Similarly, U_{-2} gravitons form the space of U_0 gravitons (here though, electro-magnetic force dominates). Standard scale particles (U_0 gravitons) can be entangled with U_1 and U_{-1} gravitons, but this entanglement is weak so the two can exist independently of each other - naked curvature (dark matter) is the evidence for this. This weak entanglement may also be interpreted as *lazy* synchronization. Between strongly entangled scales synchronization is effectively *real-time*, between weak (or anti-correlated) scales synchronization (in space/time) may never happen. If the observable universe is expanding exponentially, without decreasing energy density, this would suggest that additional energy is dominantly the energy on *non-gravitational* scales (U_0, U_{-2}). In other words, the observable universe is dominantly feeding on real mass (or expanding space dominated by electro-magnetism). But is the universe expanding at conventionally assumed rates? Photons are U_{-1} particles and, according to CR, must have mass. Even though they are weakly entangled with U_0 particles (intergalactic space is mostly devoid of standard atoms, while it is full of photons) they will still lose energy to U_{-2} particles as these are present in between the atoms, forming their space. Density of U_{-2} particles is decreasing with distance from atoms, however, they will still absorb photon energy, the only question is how much - to what degree are they responsible for the photon redshift? In extreme cases, expansion of a universe can be a complete illusion.

Note that standard graviton neutrinos should travel a bit faster than photons through U_{-2} space as they effectively don't interact with electro-magnetic fields. But they will be slowed down more than photons near gravity sources (U_{-1} fields). In gravitational wells at full capacity, where energy density of U_{-2} space is equal to energy density of U_{-1} space, photons and graviton neutrinos of equal energy may travel at the same speed. Similar is true for non-localized electron neutrinos, even though they are much more massive. The probability for interaction (localization) is proportional to sensitivity (which is generally proportional to pressure and inversely proportional to energy density) and high frequencies (energies) are more prone to pressure increase through self-interaction, increasing sensitivity. Thus, a particle with higher rest mass may travel faster than a particle with lower rest mass if it is, with equal energy, less localized or less prone to localization.

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Taking into account the scaled extremely low density and temperature of the observable universe (it's a large scale gas), evidently it is a [part of a] discontinuity, possibly a graviton between layers of, relatively, dense large scale matter.

If its angular velocity is equal to c, it is also a black hole maximum (escape velocity = $\sqrt{2}$ c) for standard particles.

Thus, light coming from large distances may be the light *reflected* off of the firewall, providing a window to the past of inner content. This would explain the correlation of apparently spatially separated phenomena (galaxies) - these may not be images of different phenomena separated in space, but one separated in time.

Indeed, given its density, the radius of the observable universe is the Schwarzschild radius, suggesting it is a black hole[204]. Note however, that this would be a black hole [radius] for particles of U_{-1} scale and larger but not for particles of U_{-2} scale and lower (though it can be the effective black hole for these particles where they are strongly entangled with U_0 particles).

There are couple of problems here for conventional theories.
If observable universe is a black hole its mass should be concentrated at the singularity. This singularity is supposed to be in the form of a 1-dimensional point (for a non-rotating black hole) or a 2-dimensional ring (for a rotating black hole) - both having 0 volume. However, observable universe is, obviously, volumetric.
Another problem is that the centre of this black hole should be nearby. If that is so, and one allows real volume, this should obviously be a non-rotating black hole.
However, the assumption here is that density beyond the observable universe is much lower (even equal to 0, by conventional absolutism). To resolve the paradoxes, the density beyond the observable universe should be the same as it is inside. If it is the same, we are not living in a large scale black hole. If it is bigger, the problem for conventional theories remains, so the assumption is that density remains the same (equal to critical density, preserving perfectly flat space).
This is what I believe as well, observable universe is a part of larger structure. But not the infinite one, it is a part of a large scale graviton which at some point is surrounded by higher density mass.
This still does not answer the question why is the observable radius of the universe such that with the density it has it would be a black hole if it would be isolated?
The answer is in the photon. If it has mass, it has a range, and if that mass is the mass calculated in CR, that range is roughly equal to the observable universe. With oscillation of mass taken into account, it is equal to observable universe. Now the question becomes, why does the photon has such range (mass) that enclosed density gives a Schwarzschild radius?
Obviously, the answer is - the enclosed mass is the black hole for the photon. Radius of the photon expands as it travels, it collapses only with absorption, but it cannot expand indefinitely as the enclosed mass is dragging it down. At the time the relative event horizon (range) is reached the photon must either collapse locally (localize at the relative event horizon) and form U_{-1} scale space in the form of a *static* photon (it remains *static* until it couples with an U_0 scale particle and eventually gets re-emitted) or invert momentum and collapse back toward the point of emission. Given the low density of [U_0 particles] in intergalactic space, there's a significant probability the photon will be effectively reflected back once the range is reached. If the observable universe is expanding slower than the speed of light and energy density remains constant, at some point, some distant objects must become illusions - they are the reflected images of closer objects at times these were younger. Range of a photon (or graviton, in general) thus depends on the density of a relative universe (and pressure, in case of rotating universes).

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Since that range depends on rest mass as well, density and pressure must be relative as well. Black holes are relative. Speed of information is relative, for a massless carrier particle it would be equal to infinity (its range). Everything is, completely, relative.
What is a *static* photon?
The average speed of standard photon expansion (radial velocity) should be equal to standard speed of light ($c = c_0$), with dragging by the enclosed mass, its radial velocity is being exchanged for angular velocity. With radial velocity equal to 0, the photon is orbiting enclosed mass at the standard event horizon, with orbital speed equal to the standard speed of light, which is also the Keplerian velocity (escape velocity is $\sqrt{2}$ c). Such orbiting particles are, in CR, called *static* particles. Non-coupled *static* particles are dark matter particles. Note that photons, or gravitons in general, can have different energies and, thus, different ranges. More massive particles will have lower ranges and if these are standard photons or standard gravitons, with radial velocities roughly equal to c, they will orbit roughly at the standard speed of light (c) even if that velocity is not Keplerian for the enclosed mass. The orbital speed can become Keplerian with coupling, when the *static* particle will exchange some orbital momentum for a more localized (spin) momentum. The orbits of non-coupled *static* particles (or effective gravitons) are relatively unstable, however, their density will be kept relatively constant with constant replenishment, as long as the system is not losing energy.
Note that *static* particles can annihilate to particles of larger scale. In this way, dark matter can be converted to ordinary matter. Annihilation of *static* particles at the relative event horizon is the mechanism for evaporation of black holes, where, due to asymmetry in the pressure of space, the part of energy lost is bigger than the part conserved.

Note that, fixing the gravitational constant G_{00} to

$$G_{00} = 1.257920328 \times 10^{27} \frac{m^3}{kgs^2}$$

one obtains this:

$$\frac{G_{00}m}{k_0 Q} = K^{-1}{\mu_0}^{-1} = {\mu_0}^{-1}$$

$$c^2 = 4\pi \frac{G_{00}m}{Q} K = 4\pi \frac{G_{00}m}{Q}$$

where μ_0 is the vacuum permeability (magnetic) constant and K = 1 C/m.

One can now obtain k and Q for the U_1 scale (Solar System):

$$\frac{k_1 {Q_1}^2}{G_{10}{m_1}^2} = \frac{k_0 {Q_0}^2}{G_{00}{m_0}^2}$$

$$k_1 = \frac{k_0 {Q_0}^2}{G_{00}{m_0}^2} G_{10} \frac{{c_1}^4}{16\pi^2 {G_{10}}^2} {K_1}^{-2} = \frac{k_0 {Q_0}^2}{G_{00}{m_0}^2} \frac{{c_1}^4}{16\pi^2 G_{10}}$$

Using $G_{10} = 6.674 * 10^{-11}$ m^3/kgs^2 and previously obtained $c_1 = 2.930445979 * 10^6$ m/s:

$$k_1 = 3.95052951 * 10^{38} \frac{Nm^2}{C^2}$$

$$Q_1 = 10001.92779151\, C \approx 1 \times 10^4\, C$$

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Ranges on U_1 scale:

$$M_{\gamma_1} - M_{n1} = \frac{\hbar_1}{c_1}\frac{1}{r}\ln\left(\frac{G_{10}\, m_1}{k_1\, Q_1}\right)$$

$$\hbar_1 = \frac{h_{m2}}{2\pi} = 7.95683841 \times 10^{40}\, Js$$

Using $m_1 = 1.02413 \times 10^{26}$ kg and previously obtained $M_{n_1} = 1.663337576 \times 10^{-26}$ kg, $M_{\gamma_1} = 9.10938356 \times 10^{-31}$ kg, the distance where two forces become equal, $r = 1.0059686 \times 10^{62}$ m $\approx 1 \times 10^{62}$ m.

Note that, if one fixes m_1 to

$$m_1 = 0.99026311 \times 10^{26}\, kg \approx 1 \times 10^{26}\, kg$$

one obtains this:

$$\frac{G_{10}\, m_1}{k_1\, Q_1} = K_2\, M_p = M_p$$

where $M_p = 1.6726218977 \times 10^{-27}$ kg is the mass of the standard proton. This suggests that the proton mass (as well as magnetic permeability) depends on the ratio between gravitational and electro-magnetic force [extremes]. Interestingly, the minimum mass of the oldest surviving primordial black hole is about 10^{12} kg[205], and it would have the size of a proton[204] (or neutron). Difference between this mass and the mass of a standard proton is equal to the difference in strength between electro-magnetic and gravitational force between a standard proton and electron. This would suggest that neutrons (or proton/electron pairs) are evaporated black holes but with gravitational force (mass) exchanged for electro-magnetic one in the process (without the exchange the mass of a proton would be on the order of 10^{12} kg).

> The evaporation process is not linear. In case of Hawking radiation, the rate of evaporation increases with decreasing mass. The proton or atom radius (roughly), however, probably represents the limit of evaporation of energy on the scale of standard radiation. The proton may still be evaporating, but on smaller scale, which may be hardly measurable from our reference frame.
> Note that this can be interpreted as transition between discrete vertical energy levels. According to CR, standard protons do represent such energy level. These levels are relatively stable so the proton may not be evaporating at this point. In any case, equilibrium in CR implies mass oscillation about the level mean (with oscillating energy here being of smaller scale than standard radiation).

Note that the difference in masses between standard electrons (or up/down quarks) and standard photons is on the order of difference in strength between electro-magnetic and gravitational force between electrons and quarks. This then suggests that electrons and quarks are vertically excited photons (or half-photons).

The question then is - are protons still evaporating? If so, they should still be losing mass (or decreasing local G, depending on interpretation) and increasing electro-magnetic strength (making them harder to fuse, among other things) if the exchange is ongoing as well. Indeed, experiments done over time confirm decreasing mass in protons[206] (although oscillation cannot be excluded as well).

Exchange, however, should not have significant impact on neutral atoms (interactions between positive and negative charge) but it should impact interactions between equal charges. Intergalactic space dominated by plasma would be affected as ions would be, over time, pushing each other apart with increasing strength as gravitational attraction is replaced with electro-magnetic repulsion. If, in the process, new energy is being inflated as well (eg. in the form of U_{-2} particles, forming polarized

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space of standard ions) this could then explain the universe's expansion (dark energy). Since the rate of this exchange cannot be absolutely constant, it also explains the change of Hubble *constant* with distance.

If this exchange is happening on standard scale it is probably happening on other scales as well, eg. electro-magnetic force could still be exchanging for gravity on U_1 scale which would then imply energy inflation on U_{-1} scale (graviton neutrinos forming space of U_1 particles). This would be effectively constrained to galaxies and may explain excess dark matter in them.

If this is happening in stars, however, the effect may be balanced with increased loss of mass due to higher thermal energy of plasma (with increasing electro-magnetic repulsion).

Thus, solar winds may be increasing in strength with time while the real mass in stars is effectively being exchanged for img mass (dark matter). The more dark matter there is in stars the less there is fusion fuel. Dark matter should also be present in planets. When not taken into account, this could lead to severe misinterpretation of seismic profiles, especially where multiple gravitational maxima exist (where dark matter should be most concentrated).

20. Relation of G variation to Sun's discontinuities

Equalizing the strength of electric and gravitational force between two free particles (positron and electron), disregarding small mass of carrier particles:

$$k_0 \frac{Q^2}{r^2} = G \frac{M^2}{r^2}$$

$$\frac{1}{4\pi\varepsilon_0} Q^2 = GM^2$$

yields the following value for the gravitational *constant* G:

$$G = \frac{k_0 Q^2}{M^2} = 2.78025476 * 10^{32} \frac{m^3}{kgs^2}$$

k_0 = 8.9875517873681764 * 10^9 Nm^2/C^2
Q = 1.60217733 * 10^{-19} C
M = 9.10938356 * 10^{-31} kg

In CR, gravitational *constant* G changes with scale. But it may also be modified with neutralization of EM force, when k_0 decreases, while G increases.

This enables the gravitational force to be, in extreme cases, if not periodically, a prevailing force in the atom, rather than EM force.

I have previously calculated G relative to a neutralized ^{10}C atom in Solar System equivalent conditions, assuming Keplerian motion:

$$G_{00} = v^2 \frac{r}{M} = 1.29864745 * 10^{27} \frac{m^3}{kgs^2}$$

v = 5.5550351679 * 10^5 m/s
r = 70 * 10^{-12} m
M = 1.663337576 * 10^{-26} kg

where m, v and r are components of the orbital angular momentum of the outermost electron.

Calculated G (G_{00}) is now only 5 orders of magnitude smaller than G required for gravity to be equal in strength to EM force between an electron and a positron.

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But instead of G increasing, one may assume that k_0 decreases by 5 orders of magnitude, or more precisely by this amount:

$$\Delta k = \frac{G}{G_{00}} = 2.140884935 * 10^5$$

I have previously calculated that G_1 (U_1.G) is $5.731534632 * 10^{-6}$ m^3/kgs^2, which is, relative to G_0 ($6.674 * 10^{-11}$ m^3/kgs^2), an increase of:

$$\Delta G = \frac{5.731534632 * 10^{-6}}{6.674 * 10^{-11}} = 8.58785531 * 10^4$$

which is also the ratio between real mass $m_{re} \approx M$ ($5.97 * 10^{24}$ kg) and img mass $m_{img} = m$ ($6.95 * 10^{19}$ kg) of Earth.

There are multiple possible interpretations:

- the G_1 and img mass had the calculated values from the beginning of Earth formation, acquired U_0 scale mass (standard atoms) then completely filled the gravitational well (G_1 $m_{img} = G_0$ m_{re}) - this is the shielding interpretation,
- G_1 is equal to G_0 but img mass (U_{-1} scale dark matter) was initially roughly equal to current total mass (M) while real mass was roughly 0, during formation img mass was then mostly exchanged (eg. through annihilation) for real mass so now the real mass is roughly equal to M,
- img mass remained constant, but G_1 was effectively exchanged for real mass (with deflation of the graviton associated with G_1), settling at the scale/value of G_0.

But what was the initial G of Earth's graviton before localization, assuming dominance of electromagnetism?

According to the above, it should have been:

$$G_i = \frac{5.731534632 * 10^{-6}}{\Delta k} = 2.677180141 * 10^{-11} \frac{m^3}{kgs^2}$$

If Earth's U_1 graviton has been extracted from the Sun, as hypothesized, one can then get its original radius using this constant:

$$r = \sqrt{\frac{G_i M}{g}} = 440784499.323\, m \approx 440785\, km$$

M = img mass of the Sun = $1.988500 * 10^{30}$ kg
g = gravity of the maximum = 274 m/s^2

The above assumes that, prior to collapse, Earth's naked graviton mass/gravity were roughly equal to Sun's mass/gravity. But, with the collapse, the mass was exchanged for the inflation of G_i to G_1. Some mass was lost in the process, as expected for a decrease in energy level.

This agrees very well with the hypothesis of entanglement of discontinuities with inner planetary orbitals:

$$\frac{r}{R} \approx \frac{r_E}{r_M} \approx \frac{2}{3}$$

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R = Sun radius = 695700 km
r_E = Earth orbital = 149.6 * 10^6 km
r_M = Mars orbital = 227.92 * 10^6 km

The discontinuity (r/R = 0.63) is evident through the profile of rotational velocities of the Sun:

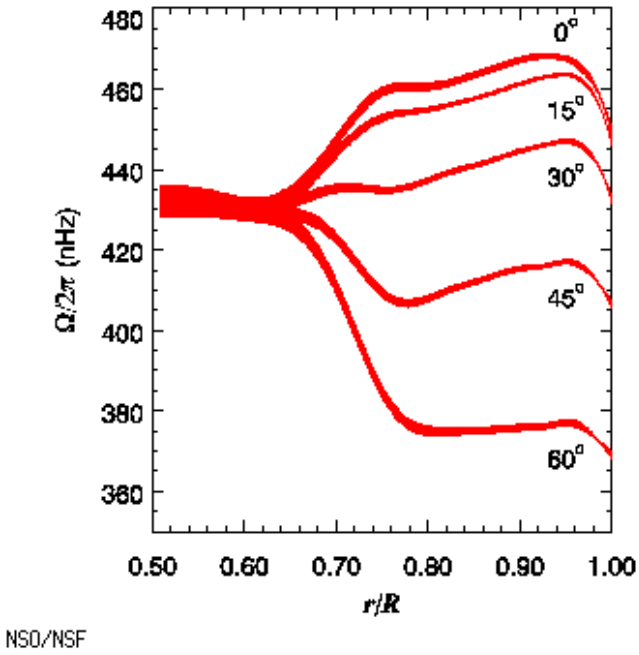

Figure 37. Sun rotation rates[207]

Above this discontinuity is the tachocline (transition region between the radiative and convective layer of the Sun), a major source of the Sun's magnetic dipole, analogous to the region of charge above Earth's inner core.

The hypothesis of neurogenesis, assuming pending neurogenesis on Earth and completed neurogenesis on Mars and other terrestrial planets, explains why Earth is the only one with an active surface magnetic dipole. The connection of tachocline with 0.63R discontinuity would suggest:

1. its position is not permanent and it moves between discontinuities, corresponding to the planet with ongoing neurogenesis,
2. possible multiple active discontinuities and associated tachoclines in the past, initially at maximum, or
3. current position is the place of birth of all planetary embryos (cores).

The 2nd hypothesis here is most plausible - the tachocline is active as long as the magnetic dipole of the corresponding planet is active (the two phenomena are synchronized).

However, if the tachocline is localized to 0.71R[208] and distance between the tachocline and the discontinuity is scaled from Earth (distance between the charge radius and gravitational maximum), the associated discontinuity is at:

$$r = \frac{1206115}{1705704} 0.71R = 0.5R \approx \frac{1}{\sqrt{2}} 0.71R$$

which would be a discontinuity associated with Venus.

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In that case the tachocline is the location of a charge radius associated with a 0.5R gravitational maximum and, assuming equal g-factor, such charge radius should also be located at:

$$r = \frac{1705704}{1206115} R = 983868.265\,km \approx \sqrt{2}R$$

In this case though, the g-factor of a neutron might be more appropriate, yielding r = 1.111507303 * 10^6 km (and a mirror at 444533.257 km = 0.639R).

Note that the 0.71R tachocline is 3/4 of 0.94R, which according to Figure 37 seems to be another discontinuity or a fossilized *initial* Sun radius.

Such fossil is also visible at 0.75R, which should be a discontinuity in 4p6n state.

The 0.63R (2/3 of 0.94R) is also a fossil, as the current location associated with Earth is 0.66R.

Note that 0.63R discontinuity is, similarly to 0.4R (2/5 R) discontinuity, weak (unstable) - it may not always be present in the rotational profile of the Sun.
The 0.63R has been revealed in *seismic* analysis (periodic, 1.3y signal), and possibly the 0.4R discontinuity too (noted as a low significance bump in rotation variability between 0.2R and 0.6R)[209].

Sun's GM product has increased 0.06% due to relativistic energy relative to CMB, so initial radius at 0.94R implies that surface radius changes proportionally:

$$R = \frac{R_0}{\sqrt{1 - \frac{v^2}{{c_1}^2}}}$$

for previously obtained c_1 = 2.93 * 10^6 m/s and v = v_s + v_p = 996 km/s, gives R_0 = 654271.142 km = 0.94 R.

Note 1:

This is analogous to the decrease of Bohr radius due to relativistic mass of the electron. Bohr radius:

$$a_0 = \frac{\hbar}{m_e c \alpha}$$

using relativistic mass:

$$a_{rel} = \frac{\hbar\sqrt{1 - \frac{v_e^2}{c^2}}}{m_e c \alpha}$$

It follows:

$$\frac{a_{rel}}{a_0} = \sqrt{1 - \frac{v_e^2}{c^2}}$$

Here, however, the radius of the atom is decreasing with the relativistic mass of electron, while the radius of the nucleus must increase with the relativistic mass of the gravitational maximum.

Note 2:

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Although GM changes proportionally to R, differential rotation can shift discontinuities. Effectively, for the polar regions of the Sun, change is proportional with R^2:

$$R^2 = \frac{{R_0}^2}{\sqrt{1 - \frac{v^2}{{c_1}^2}}}$$

This gives R_0 = 0.97 R, and, according to Figure 37, it is indeed the correct value for polar regions. Note that the same discontinuity (0.97 R) can be obtained is one assumes that gravity of Sun's surface graviton is invariant to changes in energy levels. In that case, with the loss of accumulated CMB kinetic energy, radius of the Sun decreases to 0.97 R.
If this discontinuity is correlated with the energy of real mass, and if decrease in radius has passed 0.97 R in all regions apart from high polar region, the collapse of the surface graviton to 0.97 R should be imminent.
Note also that with the end of 1st order cycle, collapse to 0.97 R may be intermediary to larger collapse (up to core radius). Note that, taking the shift of 0.03 R into account, 0.63 R discontinuity becomes 0.66 R.
Note also that orbits of planets have been shifted equally, as shown in Table 43.

Shifting of planetary orbits heightplanet	distance from the Sun r [10^9 m]	r/r_M	initial r/r_M	shift
Mercury	57.91	0.25	0.28	-0.03
Venus	108.21	0.47	0.5	-0.03
Earth	149.6	0.66	0.63	+0.03
Mars	227.92	1	0.97	+0.03

The Earth had thus moved from 0.63 r_M to 0.66 r_M, while Venus moved equally but in opposite direction, from 0.5 to 0.47. Mars moved from 0.97 to 1 r_M and Mercury too moved accordingly.

21. Gyro-Magnetic Ratio and Its Correlation with Earth/Moon

The gyro-magnetic ratio of a particle is the ratio of its magnetic moment to its angular momentum:

$$\gamma = \frac{\mu}{L}$$

With the assumption that mass and charge have equal momentum:

$$\gamma = \frac{\mu}{L} = \frac{q}{2m}$$

where q, m are charge and mass of the particle, respectively.

Measurements show that this is not valid for quantum particles such as electron. Thus, a dimensionless factor g_e (g-factor) was introduced:

$$\gamma = \frac{q}{2m} g_e$$

The factor has been attributed to quantum effects which do not exist in classical (intuitive) reality - point particles with intrinsic magnetic moment (no rotation).

The notion of point particles having any properties is in itself problematic, let alone existence of different point particles with different properties. However, if such particles could exist, due to scale invariance, they would have to exist on bigger scales too. No such thing has ever been *observed* in reality - all magnetic fields are produced by moving charges of objects having a real radius.

Thus, intrinsic magnetic momentum is not intuitive, but intrinsic rotation of charge (producing the momentum) at finite radius greater than 0 is.

In CR there is also no intrinsic coupling of matter and gravity, and since charge field is a polarized gravitational field, the g-factor can be explained simply by a difference in distribution (or angular

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momenta) of gravitational mass and charge mass within the particle, preserving the intuitive concepts of reality.

Complete relativity not only allows speeds faster than light (information carrier mass is scale dependent) but implies such speeds must exist at some scale, thus the required superluminal rotation of charge (implied at certain radii) in particles such as an electron is not an issue either.

The absolute (invariant) speed limit is not a dimensionless constant and thus is counter-intuitive in complete relativity, but, in this case, the required speed would be valid even in the context of General Relativity (charge is at rest relative to rotating space) if it would incorporate relative scale invariant curvature of space.

Magnetic moment μ and angular momentum L:

$$\mu = IA = \frac{qv_c}{2\pi r_c} \times \pi {r_c}^2$$

$$L = mv_m \times r_m$$

where v_c, r_c are the charge orbital velocity and radius, respectively, and v_m, r_m are the mass orbital velocity and radius, respectively.

The factor g_e is thus:

$$g_e = \frac{v_c \times r_c}{v_m \times r_m}$$

Being dimensionless, it should be scale invariant relative to particle flavour.

This means that the value of g_e for electron and positron is equal to g_e of Earth, as Earth is a large scale Dirac fermion equivalent (obviously not a point particle unless taken relatively), albeit in an environment where its fermionic nature is effectively annihilated.

Assuming such initial conditions where charge radius is in the outer core (current conditions represent fossilized initial conditions) where gravity was equal to g_c = 137 m/s^2 and gravitational mass radius was roughly the current *inner core* radius g_m (274 m/s^2 gravity), with equal rotation period (and angle between v and r vectors):

$$g_e = \frac{v_c \times r_c}{v_m \times r_m} = \frac{{r_c}^2}{{r_m}^2} = \frac{g_m}{g_c} = 2$$

Note that it was assumed that mass is not a homogeneous solid body with radius r_m but, like the charge, a particle or a stream of particles concentrated in a ring of radius r_m. This should be true for initial conditions, although in reality the mass is never concentrated in a ring rather a tube so the g-factor is a bit larger than 2.

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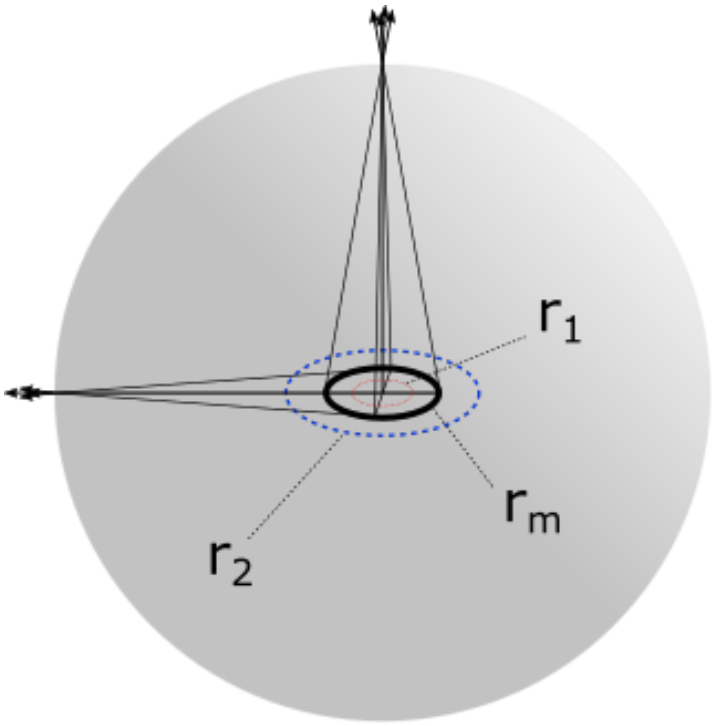

Figure 38. Mass and charge radii of charged bodies

Since gravitational potential is not isotropic, gravitational acceleration at any point is a vector sum of accelerations induced by vacuum quanta forming the ring:

$$g = \sum_{k=1}^{n} \vec{g_k} = \sum \frac{G_0 M_0}{\vec{dr}^2}$$

In case of equatorial and polar gravity vector components parallel to surface cancel out. Equatorial gravity is thus:

$$g = \sum_{k=1}^{n} \frac{G_0 M_0}{\left[R_e - r_m \cos\left(k\frac{2\pi}{n}\right)\right]^2}$$

where R_e is the equatorial radius.

Polar gravity:

$$g = \sum_{k=1}^{n} \frac{G_0 M_0}{{R_p}^2} = n\frac{G_0 M_0}{{R_p}^2}$$

where R_p is the polar radius.

Deriving G_0M_0 product with equatorial gravity fixed to 9.798 m/s^2 and calculating polar gravity, for n >= 5, gives 9.34 m/s^2.

This is smaller than measured, so the Earth must be a composite of 2 positrons (or positron equivalents), as hypothesized.

Note that I have previously hypothesized that the shape of a gravitational maximum with charge neutralization is transforming from a ring like to sphere surface form.
Here, it is assumed that ring form is preserved, for the sake of proving fossilization of initial conditions.

With 2 particles in the same state, energy splits into two levels:

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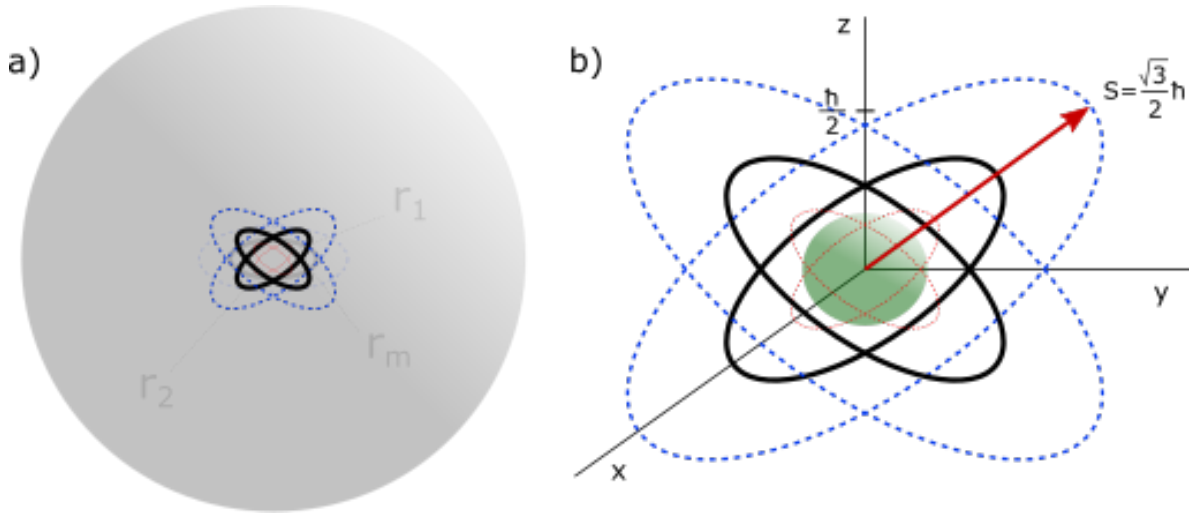

Figure 39. Mass and charge radii of two charged bodies sharing a single state

In such state, two charges are deflected from the equator by this angle:

$$\Delta\varphi = \sin^{-1}\frac{1}{\sqrt{3}} = 35.2643896827547^\circ$$

Charges are thus separated by 2*35.2643896827547° = 70.5287793655094° (two magnetic north poles on Jupiter seem to be separated by this angle, confirming its 2e configuration).

Confirmation of this configuration of Earth comes from the state of the Moon (Luna) and non-alignment of Earth's north and south magnetic poles.

Initial total obliquity of Luna relative to Earth's equator is 23.44° + 5.14° + 6.68° = 35.26°, equal to $\Delta\phi$.

The Moon orbits one of Earth's positrons and its obliquity shows that it is built about one of the collapsed gravitons of this positron.

One can thus expect this positron to have smaller contribution to gravity and charge of Earth. Further splitting of energy levels due to carbon configuration can also be expected, so number of quanta should be 6 in one positron and 5 in the other (1 is in the Moon).

It appears that, in the collapse, 6.68° of Luna's obliquity to Earth's equator has been exchanged for obliquity to Luna's own orbital plane, this can be due to influence from another body, but, since the *loss* of one quantum causes asymmetry in charge distribution it is more likely that this is the exact amount by which the inner positron decreased its angle to Earth's equator.

Thus, one can expect the orbital plane of this positron to be aligned with the orbital plane of the Moon.

This can then be interpreted as redistribution of charges on the plane, rather than loss. The Moon is thus the reason why Earth still has a dipole magnetic field - with symmetric anti-aligned positron spins the magnetic dipole would be cancelled.

Bigger moons and/or an increased number of moons (with distinct gravitational wells) of outer planets with stronger magnetic fields are thus no surprise and indicate core asymmetry if the spins are anti-aligned (note that a symmetric core does not indicate a planet has no moons, rather that it has the same number of them on each orbital plane).

But rather than the extraction of the Moon core from Earth, in the current, progressive evolution a reverse scenario is more plausible.

Even if the first positron was not fragmented from the beginning, massive extinctions that happened on Earth suggest the second one arrived quantum by quantum on a periodic basis.

There were 5 massive extinctions and there are 5 quanta of the positron in the core, 1 in the Moon.

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As the mammal brain has 6 layers, with 6th layer sparsely populated, the theory of neurogenesis is strongly aligned with this hypothesis. Note that the sparse neuron cell population of the 6th layer now indicates an underdeveloped layer - the direct cause for this is the distance of the Moon.

Since this distance is variable it explains variation in intelligence among individuals. A Moon in perigee at the point of formation of the 6th brain layer would increase general intelligence (at the time of formation of other layers would probably impact other skills).
This is not a big increase, but enough to create a difference and allow weak evolution of intelligence, as brain structure is a genetic factor.
Current increasing Moon distance and the fact that our brain size started decreasing 10-15k years ago support the hypothesis of such entanglement.
As the Moon fuses with Earth, one can thus expect a strong evolution of the 6th layer in brains of species (including the brain of Earth itself).
One must now ask whether the position of other planets and the Sun impact the development? Most likely, but not as much.
Interesting is the fact that one has 5 vital organs - these are thus likely entangled with other 5 quanta of the positron associated with the Moon, so variation in the state of these can be determined by organic variation between individuals. Strong disturbance could thus cause mutation in evolution.
Thus, one can not only expect our 6th brain layer to expand during the next strong evolution event, but also a new vital organ (a 6th sense) and mutation of a body into new species.

22. Conclusion

The aim of this paper was to provide good evidence for Complete Relativity, which, I am convinced, it has succeeded in. Indeed, the analysis reveals plenty of high correlation and equivalence between small scale and large scale systems that cannot be easily dismissed as coincidence.

Strong correlation of Earth's mantle layers with major extinction events is a strong evidence for planetary neurogenesis, or at least for a precursor of it (from which neurogenesis evolves). The existence of a discontinuity at 100 km depth even suggests that the formation of a mantle discontinuity precedes surface extinction. This shows that surface extinctions are coded events, which, however, is not surprising for a neurogenesis of an evolving life-form (one would expect for a brain layer to be at least roughly formed before neurons migrate to that layer).

Some questions remain, however, and there are predictions and hypotheses that require additional experiments and observation to be confirmed or refuted. All other existing models of phenomena are based on conventional, established theories for which we even know must be wrong. Interpretation of many things we do see, let alone the things we do not see, is guesswork, and inevitably relative. Therefore, one should be allowed to dream beyond the established. For, who knows, maybe some of us, dream fundamental reality. At least roughly. Perhaps the fundamentals, some of us are trying to understand, even require us to question for the answer to exist.

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