Implications of Time-Invariant Space Model in Fundamental Physics and Cosmology

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Article

Implications of Time-Invariant Space Model in Fundamental Physics and Cosmology

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Abstract: Time is what we measure with clocks. With clocks, we measure the duration of material change tuning in space. Material change runs in space only, time, as duration enters existence when measured. Time is an emergent physical reality that enters existence when measured by the observer. No measurement means no time. The motion does not require time. Motion requires only space and the physical object that moves in space, which is time-invariant. There is no physical past; there is no physical future. Past and future exist only in the human mind. Humans, we experience time-invariant space as NOW. The entire universe exists and develops into NOW.

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1. Introduction

Let's take an example of uniform motion. We have a physical object moving in the universal space from point A to point B. The distance between A and B is 1 meter. Duration of motion is 10 seconds. Consequently, the velocity of motion is 0,1 m/s. Based on elementary perception we can take that in this case universal space S is a set, and a moving object O, distance d, time t, and velocity v are subsets of set S as follows in Eq. (1) below:

$$S: \{O, d, t, v\} \qquad (1).$$

Time t is the subset of space S as expressed in Eq. (2).

$$t \subset S \qquad (2).$$

Out of Eq. (1) and Eq. (2) follows, the distance of motion, the duration of motion, and the velocity of motion exist in space. Motion as we believed in physics since its beginning does not happen in time. The motion happens only in space. Time as duration of motion also happens in space. That time is the 4th dimension of space is a persistent scientific illusion. Time is the subset of space; time is not a physical part of space and cannot influence space in any manner. Technically, we can say that universal space is time-invariant [1].

Time as duration enters existence as an emergent physical entity when measured by the observer. No measurement of the velocity of motion means no time. We experience in physics that motion happens in time because we experience motion in the frame of linear time that has its origin in the neuronal activity of the brain [2]. There is no "cosmological time" running in the universe and there is no "arrow of time". The universe does not exist in time, and time does not run in the universe. Only changes run in the universe, and when change is measured, we get time as an emergent physical reality, which is the result of the measurement done by the observer [3]. Rovelli also suggested that time has no physical existence and should be abandoned as a fundamental physical reality [4,5]. Barbour also suggested that time has no physical existence [6]. Despite undeniable proof that time has no physical existence, in fundamental physics it is still thought that motion requires time. A profound scientific discovery is that motion does not require time. For the existence of motion, only two things are needed: space and a material object that moves in space. When we measure motion with clocks, we get duration. This has crucial consequences in cosmology, namely, there is no physical past and no physical future, there is no cosmological time, there is no flow of time, and there

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is no arrow of time; change in the universe runs in time-invariant space that we humans experience as NOW.

Fundamental time is the numerical order of material change that runs in time-invariant space. The basic unit of fundamental time is Planck time. Events in the universe run one after the other, only in the sense of numerical order, not in the sense of one after the other in some physical time. Emergent time as duration enters the existence when measured by the observer. Every emergent time is the sum of Planck times [3]. Physical events run in time-invariant space and have no intrinsic duration. Duration enters existence when measured. This needs to be understood profoundly to progress fundamental physics and cosmology.

The model of time reversal symmetry (T-symmetry) has no physical correspondence in the physical world. The equation of time symmetry (3) below has no physical meaning:

$$T : t \rightarrow -t \qquad (3).$$

The model of space-time, where the past is represented as the negative time $-t$ and the future is represented as the positive time $+t$, has no support in human observation and experimental results. In physics, we do not have a single proof that negative time exists, and it is time we abandon this idea. The same applies to the symmetry in time. There is no symmetry in time because there is no negative time and there is no positive time; there is no past and there is no future.

Son, father, and grandfather are born in the same time-invariant space. Sure, the grandfather is born before the father, and the father is born before the son. But "before" and "after" have only mathematical reality in the sense of numerical order. For example, grandfather died in 1944, father died in 1980, and son died in 2024. All three have lived in the same time-invariant space. Between their deaths, there is no distance in some physical time. Dinosaurs lived in the same time-invariant space in which we live.

Time-invariant superfluid universal space is the medium of entanglement EPR-type [1]. Every elementary particle in the universe is entangled with every other particle via time-invariant space. Information transfer in time-invariant space is immediate. When a photon is moving through the time-invariant space, the velocity of information transfer has a light speed.

2. Implications of Time-Invariant Space Model on Gravitational Physics, Black Hole Physics, and Cosmology

The idea that space and time are warping and causing gravity was never experimentally proved. Gravity is a pushing force of time-invariant superfluid quantum space. Light is bending because of the variable energy density of superfluid space. Extension of the principle of equivalence of mass and energy on time-invariant superfluid quantum space shows that gravity is a pushing force of superfluid space; see equation (4) below [7]:

$$E = mc^2 = (\rho_{PE} - \rho_{cE})\, V \qquad (4),$$

where ρ_{PE} is Planck energy density of superfluid space in intergalactic areas, ρ_{cE} is the energy density of superfluid space in the centre of a given object and V is the volume of the object. The difference between energy densities $(\rho_{PE} - \rho_{cE})$ generates gravity force. Gravitational mass m_g and inertial mass m_i can be expressed as follows in equation (5) below [7]:

$$m_g = m_i = \frac{(\rho_{PE} - \rho_{CE})\, V}{c^2} \qquad (5).$$

When in interstellar space, a spaceship accelerates with $9.8 ms^{-2}$, the astronaut has the same experience as he would stand on the Earth's surface. This is because protons in the composite spaceship interact with the superfluid space, and this diminishes additionally the energy density of space in the spaceship, which becomes the same as on the Earth's surface. Sbitnev developed a model where protons are vortexes of superfluid space [8]. The relativistic energy of the proton, when accelerated close to the light speed, is 7460 times bigger than its energy where the proton is at rest. The relativistic proton is integrating the energy of superfluid space in its vortex.

Relativistic mass is given by the following equation (6) below:

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$$m = \gamma m_0 \qquad (6),$$

where $\boldsymbol{\gamma}$ is the Lorentz factor, and m_0 is the rest mass. Combining equations (4) and (6) we can express the Lorentz factor as follows in the following equation (7) below:

$$\gamma = \frac{(\rho_{PE} - \rho_{cE})\, V}{m_0 c^2} \qquad (7).$$

The higher the velocity of the physical object, the bigger the relativistic delta energy density and the bigger the value of the Lorentz factor. Equation (7) shows that the Lorentz factor depends on the relativistic delta energy density $(\rho_{PE} - \rho_{cE})$ of the moving object. The mathematical formalism above is observer-invariant. It is valid for all observers, regardless of their position or velocity. Relativistic mass is the result of a moving object's interaction with the superfluid quantum space [9]. The kinetic energy of every moving physical object is the energy of the superfluid space that is integrated into protons. For example, the protons of a falling stone integrate the superfluid space energy. When a stone crashes on the ground, this energy is released as electromagnetic energy in the form of heat and light.

Gravity force between two objects is generated by their gravitational masses. This can be expressed as follows in equation (8) below:

$$F_g = \frac{m_{1g} m_{2g}\, G}{r^2} \qquad (8).$$

Two physical objects create an area of superfluid space with lower energy density. Two physical objects create an area of superfluid space with lower energy density. Outer space with higher energy density pushes toward lower energy density where physical objects are situated. This pushing force of space is the gravitational force. Physical objects are 3-dimensional; superfluid space is 4-dimensional. 3D physical objects are somehow trapped in 4D space. Physical objects are not emitting or receiving a gravity force. The idea that physical objects emit or receive gravitational force is flawed. Also, the idea that physical objects are curving space is flawed [7]. Gravity originates in fundamental symmetry between the mass of the given object and the diminished energy density of timeless superfluid space in its center.

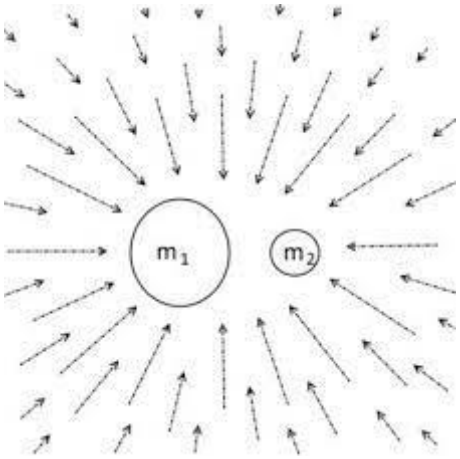

Figure 1. Gravity is a pushing force of superfluid space.

NASA measured in 2014 that universal time-invariant superfluid space has a Euclidean shape, which means that the universal space is flat and infinite in its spatial dimension [10]. The geometrization of gravity in GR has no physical meaning [11]. Gravitational singularity in the center of black holes proposed by Penrose [12] is a flawed model that contradicts fundamental postulates of physics and mathematics. Gravity inside the event horizon follows Newton's shell theorem, as it is valid in all stellar objects [11].

In AGN, the energy density of superfluid space is so low that atoms that compose matter become unstable and fall apart into elementary particles that form stellar jets. Active galactic nuclei are

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rejuvenating systems of the universe, which is eternal, a non-created system in a permanent dynamic equilibrium. The only universe that exists is the one we can perceive NOW; the idea about some initial explosion in some distant physical past in which the universe started is just human imagination [13].

When the James Webb Space Telescope (JWST) discovered six galaxies that were too massive to fit into Bing Bang cosmology [14], there was a good point to recognize the Big Bang as a history of physics. The article was published on 22 February 2023. On 7 July 2023, the article was published in MNRAS, where the new age of the universe was calculated: 26.7 billion years [15]. Five months after the discovery of the JWST rocked Big Bang cosmology to its core, a paper appeared that seemingly saved the Big Bang cosmology model. Since 1931, hundreds of articles have been published in renowned journals about Big Bang cosmology. Today's cosmology science has no power enough to admit that for almost a hundred years, cosmology has been wrong. To admit this error, one needs courage. Cosmology science today has an immense interest in keeping Big Bang cosmology artificially alive because of a lack of courage and scientific integrity.

Frankly, Big Bang cosmology has no necessary attributes to be considered science. An initial explosion of the mathematical point out of nothing where density, pressure, and temperature were infinite is not falsifiable and does not deserve to be called a scientific theory. The idea that CMBR is proving Big Bang cosmology is false. A given signal can move only through time-invariant space; it cannot come from some remote physical time that is non-existent. CMBR is the radiation of existent universal time-invariant superfluid space [13].

3. Discussion

In 1999, Barbour announced the next revolution of physics in his book “The End of Time – The Next Revolution of Physics” [16]. 25 years have passed, and fundamental physics and cosmology are still stuck in the old paradigm. In the last 25 years, numerous articles proved that time is not the 4th dimension of space and has no physical reality. The scientific community still did not accept this indisputable fact. Still, articles are published in high-ranked journals of physics where time is meant to be the 4th dimension of space. Top physicists are not willing to admit that the common interpretation of relativity theory is wrong: time is not the 4th dimension of space. In today's physics, we are still living in space and time, although time is non-existent. Here is the main barrier to physics development.

Physicists are still experiencing physical reality through the linear psychological time that exists only in the scientific mind. They think time is running on its own in physical reality, although time is running only in their minds. The step out of the mind and so out of the time requires an awakening of the observer. Advances in fundamental physics and cosmology require the exploration of consciousness. The awakened observer is consciousness itself. Consciousness is fully aware that events in the universe run in time-invariant (timeless) space, where there is always and only NOW [1]. Erwin Schrödinger's famous quote is a herald of the coming paradigm shift in physics: “Eternally and forever there is only now, one and the same now; the present is the only thing that has no end”.

The relational quantum mechanics statement is that different observers can experience differently the same sequence of events: “According to ref [1], the founding principle of RQM is the idea that ‘in quantum mechanics different observers may give different accounts of the same sequence of events.’ RQM has undergone significant development since this original proposal, but the basic idea remains the same: different observers may assign different quantum states to a given system and moreover in such cases all of the different assignations are equally correct, because the quantum state assigned to a system describes not only the system itself but also the relation between the system and the observer assigning the state. There exist other interpretations of quantum mechanics which take a similar view on the relational nature of quantum states [2–6] but typically these accounts regard (conscious) observers as playing some sort of privileged role. On the other hand RQM is built on strong naturalistic intuitions, and therefore in RQM the term ‘observer’ is understood in a broad sense which allows that any physical system can be an ‘observer,’ so we don’t have to accept that consciousness plays any fundamental role.” [17]. The idea that different observers

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can experience an event differently is already present in Special Relativity. The idea is flawed; the fact is that all observers in all different inertial systems experience a given event identically. In the famous experiment, when the train is passing the station, the clock on the train has a lower rate than the clock in the station. And this is valid for both observers. The relative rate of clocks is "observer invariant"; it depends only on the variable energy density of superfluid space. The GPS is proving this without any doubt. Clocks on the satellites run at the same rate for all observers. If not so, the GPS could not work properly [18].

The well-known equation (9) below confirms that the 4th dimension of SR is not temporal, it is spatial:

$$X4 = ict \qquad (9).$$

The product of time, velocity, and imaginary number i is an imaginary spatial distance. This was the original version of Albert Einstein. The simplification that follows should not happen, namely, removing i, and considering that the velocity of light c is constant and can be written as 1. Einstein's Relativity Theory speculates on the existence of "proper time" and "coordinate time" for each inertial system. In the physical reality, there is no proper time and there is no coordinate time. The only phenomena that exist are different "proper velocities", clocks run in "time-invariant space and their relative rate is valid for all observers. The relative rate of clocks is the technicality based on the variable energy density of superfluid space and is observer-invariant [18].

4. Conclusions

The only progress of science was and will be forever the doubt. Today, we are teaching students worldwide that time is the 4th dimension of space. Nobody is willing to ask himself about the actual existence of time as the 4th dimension of space. The result is that we are stuck in the old paradigm of the existence of some hypothetical physical past and future, and consequently, there is no progress. The progress of physics is in the minds of those who are still able to doubt. Time as the 4th dimension of space is a simplification that should be abolished from physics.

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