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The Topological Universe's Topological Materials

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ABSTRACT

The part of this article dealing with topological insulators and topological superconductors was first written about two years ago - the ideas in the part about the topological universe originated six years ago or more. It's rather strange that I never put the two parts together in writing before. My belief in unification is unshakeable - I've been convinced for years that the universe must be composed of topology. Since Earth is part of the cosmos, entanglement means it must have topological materials. The reverse is also true: topological materials on Earth are well known to science - so in a unification, space and time inevitably possess topological composition.

Topological materials (topological insulators, topological superconductors) can be less mystifying if they're related to the paradigm-shifting deterministic view of quantum mechanics which is described in the universal topology (the "rubber-sheet geometry" of the cosmos): see my previous submission "Hypothesis of Quantum Gravity - Resulting from a Static, Topological Universe Resulting from the Positives and Negatives of the Steady State and Big Bang Theories" (1) (the first section of this present article is a quick summary of the relevant parts).

KEYWORDS

Binary digits, Mobius strips, Figure-8 Klein bottles, Dark matter, Dark energy, Topological insulators, Topological superconductors, Topological universe, Weyl fermion, Majorana fermion, Vector-tensor-scalar geometry, Higgs-like body/consciousness

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COSMIC BITS AND TOPOLOGY, WITH DARK MATTER/DARK ENERGY

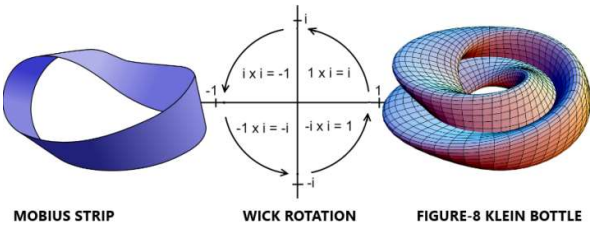

Fig. 1 – Mobius/Wick/Klein

In relation to Spin ½ being like a Mobius strip ... in 1924 the scientist Wolfgang Pauli was the first to propose a doubling of electron states due to a two-valued non-classical "hidden rotation". Extending the ideas of “doubling”, “two-valued” and “hidden rotation” from the quantum spin Pauli had in mind to the Mobius strip being a basic, fundamental unit of reality; it can be seen that Pauli’s proposal has an analogy to this article. The doubled Mobius strips – each strip is only two dimensional (2D) – could possibly be produced by the two-valued binary-digit system used in electronics traversing a wormhole, or shortcut between folds in space and time, designed by humans of the far future. These Mobius strips might then be used to form the universe, if a recent paper in ”Physical Review Letters” is correct when it says that in a holographic universe, all of the information in the universe is contained in 2D packages trillions of times smaller than an atom. (2)

(Just as the interference between two laser beams produces a three-dimensional holographic image, "holographic" would also have the accepted cosmological meaning of the entire universe being seen as two-dimensional information – from Mobius strips, according to this article - projected into the third and fourth dimensions we’re familiar with.) The binary digits give that cosmos Artificial Intelligence (AI), and two united Mobius strips create a three-dimensional figure-8 Klein bottle (3) that acts as a building block of space, time, forces’ bosons and matter’s fermions. This creates a supersymmetry (linkage) between fermions and bosons. Also - trillions of Mobius strips could form a photon and trillions of more complex figure-8 Klein bottles could form a more complex graviton (suggesting union of electromagnetism and gravitation), and electromagnetism's photons interact with gravitation's gravitons via vector-tensor-scalar geometry to form forces’ bosons and matter’s fermions.

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The Klein bottle is a closed surface with no distinction between inside and outside. Thanks to quantum mechanics' entanglement applying on macroscopic scales,* this doesn't refer only to the surface itself. What is supposed to be outside the thickness of the figure-8 Klein bottles composing our universe [either another universe in the multiverse or exterior void, and the interior multiverse member or hole) would be the same as what exists within that surface. This results in the space-time of our universe existing everywhere and everywhen. The relativistic universe is only infinite and eternal because of macroscopic entanglement – if entanglement could be removed, the universe would be finite in time and might originate in the Big Bang. The inside and outside of the universe are continuous when it's composed of Mobius strips and figure-8 Klein bottles - there cannot be other universes outside our infinite and eternal universe, and there's no universe with different laws of physics (such a state of supposed multiple universes is called the multiverse).

*"Physicists now believe that entanglement between particles exists everywhere, all the time, and have recently found shocking evidence that it affects the wider, 'macroscopic' world that we inhabit." (4). Though the effect is measured for distances in space, the inseparability of space and time means that moments of time can become entangled too. (5) The photons of the Cosmic Microwave Background (CMB) could be quantum-entangled with every other particle existing in space as well as time. Then the Background would be radiated from every direction in the sky without requiring a Big Bang. Particles of matter separated by billions of light years or more would interact, and experience similar temperatures and densities and curvature (or flatness) of space because of quantum entanglement. If gravitons are entangled with microwave photons (they would be if entanglement exists everywhere and everywhen), imprints in the microwave background caused by gravitational waves must be unavoidable. This recalls BICEP (Background Imaging of Cosmic Extragalactic Polarization) and the Keck Array - a series of experiments which aim to measure the polarization of the CMB. (6) Reports stated in March 2014 that BICEP2 had detected imprints from gravitational waves but cosmic dust is now considered the most likely explanation for the detected signal by many scientists. This article predicts that imprints in the CMB from gravitational waves will oneday be detected unambiguously and not interpreted as evidence of inflation.

The bottles possess a hidden rotation, now identified as adaptive Wick rotation, which gives a fourth dimension to space-time. This Wick rotation is consistent with Special Relativity's slowing of time (a.k.a. time dilation) because -

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The electromagnetic and gravitational waves composing space-time rotate in a circle. The waves rotate through the vertical y-axis that is home to so-called Dark Matter and the non-expanding universe's Dark Energy, and back to the horizontal x-axis' space-time. Since quantum mechanics says particles can be in two or more places at once, the photons and gravitons which make up the waves in space-time can be on the x- and y-axes simultaneously and thus interfere with themselves, causing time to slow down.

The relation of space (to be precise, spacetime) and matter was spoken of by French philosopher/mathematician/scientist Rene Descartes (1596-1650). Today I wish to discuss how the space-matter relation fits in with my idea that it's time for a new scientific paradigm. The equivalence of space and matter is something Albert Einstein also believed in. He wrote a paper in 1919 which asked if gravitation plays a role in the composition of elementary particles of matter. (7)

This present article agrees when, in Vector-Tensor-Scalar Geometry, it talks about gravitational-electromagnetic interaction forming the mass and quantum spin of particles (whether fermion, boson, or Higgs). Since General Relativity states that gravity is nothing more than the result of spacetime's curving, gravity is spacetime and the mass/quantum spin of particles can be regarded as space itself forming matter instead of as gravity playing a role in matter's composition. In other words, we have Descartes' space-matter relation.

In the not-surprising eventuality that Einstein is proven correct yet again (regarding his 1919 paper this time), his and Descartes' space-matter relation means the Law of Falling Bodies is not a simple case of the curvature of space-time pushing all material bodies towards something like a planet at equal speeds. Everything in space-time and the universe is part of a continuum where the gravitational energy of "empty" space interacts with the "concentrated" space we call mass. There should be a minuscule, presently unmeasurable difference in the rate of descent of more massive and less massive bodies. This is because a greater mass would, by definition, be a greater concentration of the gravitational waves pushing the object to the surface. (On the other hand, the more massive body possesses more inertia and requires a greater push – so it might fall at the same rate as the less massive body.)

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TOPOLOGICAL MATERIALS, WEYL AND MAJORANA FERMIONS, GEOMETRY, AND THE HIGGS-LIKE BODY/CONSCIOUSNESS

Topological materials (topological insulators, topological superconductors) can be less mystifying if they're related to the paradigm-shifting deterministic view of quantum mechanics which is described in the universal topology (the "rubber-sheet geometry" of the cosmos): see my previous submission "Hypothesis of Quantum Gravity - Resulting from a Static, Topological Universe Resulting from the Positives and Negatives of the Steady State and Big Bang Theories" at reference 1 (the first section of this present article is a quick summary of the relevant parts).

Now that I've written about space-time topology, let's address the down-to-earth (and partly demystified) application called topological materials -

A topological insulator is a material that behaves as an insulator in its interior but whose surface contains conducting states. However, the conducting surface is not the unique character of topological insulators, since the ordinary band insulators can also support conductive surface states. What is special is that the surface states of topological insulators are symmetry protected. Symmetry Protected Topological (SPT) Order is a kind of order in topological insulators where, if symmetry is preserved during the deformation undergone in topology, a phase transition from one state of matter to another must occur (in this case, between insulator and conductor). The General Theory of Relativity will be useful in this article. Specifically – the analogy of the theory's curvature of space-time to a rubber sheet. A small body like the Earth is said to warp space-time only a little and create a dimple in the sheet. A larger body such as the Sun curves space-time much more and forms a deep valley in the rubber. And a black hole is often pictured as warping space-time so much that it tears a hole through the rubber fabric. Transferring the analogy to the quantum realm – the motion of electrons can be visualized as their gliding across hills and valleys of pure energy (gravitational energy). This is because Einstein's Relativity says gravity is caused by the curvature of space-time. Therefore, gravity … gravitational energy … IS space-time. Materials that don't conduct electricity (insulators) have deep valleys which electrons struggle to escape from. In 2004, U.S.A. physicist Charles Kane noticed something strange in his computer simulations of electrons flowing through different materials: an insulator whose quantum state had the equivalent of a hole. Kane had not found the first quantum black hole but had discovered the first topological insulator – a then theoretical material that could conduct

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electricity on its surface but not within its interior. (In 2007, American physicist M. Zahid Hasan led the team that made the first 3D topological insulator).

About 90 years ago, while experimenting with the equations of quantum physics, German physicist Hermann Weyl showed that a massless and charged particle (now called the Weyl fermion) could theoretically exist. (8) In topological insulators, the hole in its quantum state causes electrons to come together and behave like a single particle called a Weyl fermion. The Weyl fermion can be related to Topological Insulators (TI), the Majorana fermion^ can be related to future quantum computers' Topological Superconductors (TS), while topological insulators and topological superconductors may be regarded as the (Mobius dependent) inverse of each other. This state of topological materials and "unnatural" fermions can be expressed by another phenomenon which is called here vector-tensor-scalar geometry: in which matter, and the Higgs boson, both emerge from photon-graviton interaction. This means the Higgs boson is related to the graviton, and the Higgs field is therefore united with the gravitational field (together with its constant interaction with the electromagnetic field).

^ The Majorana fermion was predicted in 1937 by Italian physicist Ettore Majorana playing with the same quantum math that had intrigued Weyl. Like a Weyl fermion, a Majorana fermion has no mass. It also has no charge, despite being made of a bunch of negatively charged electrons. (9)

If the shape of a Möbius strip (or the union of two strips into a Klein bottle) is preserved, phase transition must occur just as orientation-reversing curves occur in the Möbius and Klein (10)

The above works in both bosonic and fermionic systems - respectively, systems of force-carrying and matter particles. (11,12).

In Band Theory, bands describe the range of energies that an electron within the solid may have (the ranges it may not have are called band gaps or forbidden bands) (13,14,15)

Curvature (from space-time being constructed of Wick rotation, Mobius strips and figure-8 Klein bottles) implies this range of allowable energies could be continuous and not restricted to certain bands. Since it's known the energy of

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electrons can only have discrete values, these values (and space-time's curves) must be determined by discrete pulses (possibly, the binary digits of 1 and 0). Since bands and band gaps describe an electron's wave function,^ they are compatible with the following description: matter particles are described as spin 1/2 and need to be turned through two complete revolutions to look the same (16), plus it's necessary to travel around a Möbius strip twice to reach your starting point.

^ In quantum physics (description of nature at atomic and subatomic scales), the wave function is a mathematical description of the state of a quantum system. The most common symbols for a wave function are the Greek letters ψ or Ψ (lower-case and capital psi, respectively).

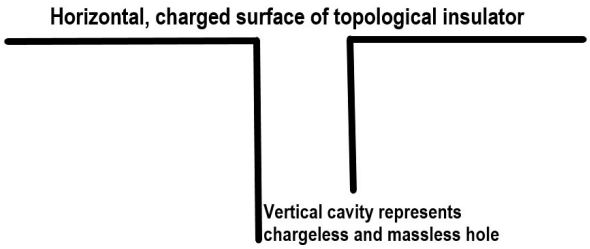

Fig. 2 – Mobius dependent Inversion of Fig. 3

Combining surface and cavity produces a charged, massless Weyl fermion.

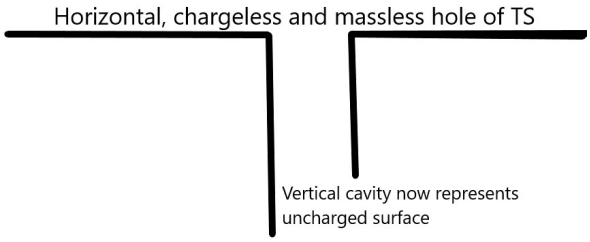

Fig. 3 – Mobius dependent Inversion of Fig. 2

Topological superconductors are like the topological Mobius strip,^ and only have one surface. The surface represented by the vertical cavity above is united with the chargeless, massless hole in Mobius-strip fashion and becomes an uncharged surface. Combining surface and hole produces a massless, uncharged Majorana fermion.

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^ Topological insulators can also be composed of Mobius strips but the union of tiny “cyclone” motions (the union in Mobius fashion of surface and cavity, or hole) is a topological quantum number (also called topological charge) that can be created or destroyed during the phase transition between insulator and superconductor.

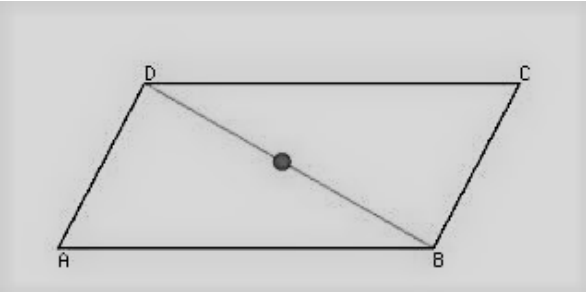

Fig. 4: Vector-Tensor-Scalar Geometry

Figure 2 becomes

Side DC of parallelogram = Vector 1 electrons

Side DA of parallelogram = Vector 2 electrons

The two vectors (two groups of charged electrons) interact to form the resultant diagonal DB (the electrons travel ADB and CDB, coming together to behave like a single charged particle called a Weyl fermion). Tensor calculus converts the points on the sides and diagonal into a single scalar point on a nominated side (say, in the centre of the diagonal). And the mass of the vector 1 electrons minus the mass of the vector 2 electrons [(x MeV/c^2) - (x MeV/c^2)] equals zero, and the massless Weyl.

Figure 3 becomes identical in shape to the above parallelogram. However, this time the electrons flow in the reverse direction to the ones in “diagram 9 becomes”. They go in the BD direction, then split and follow the paths DA and DC. This preserves information if one pathway is interfered with. They produce the chargeless Majorana since the negative vector-1 electrons minus the negative vector-2 electrons equal (-y) - (-y) = 0. The Majorana’s lack of mass is attributed to the same process by which the Weyl particle becomes massless (see previous paragraph).

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Why is subtraction essential? This appears to be a consequence of matter, and the Higgs boson, both emerging from photon-graviton interaction. Two adjoining sides of a parallelogram represent the vectors of the photon's spin 1 and the graviton's spin 2. The resultant diagonal represents the interaction of the sides/vectors (1÷2 = the spin ½ of every matter particle: and division is merely repeated subtraction e.g. 4 subtracted from 20 five times equals zero, therefore 20 ÷ 4 = 5). The scalar point that results is associated with a particle that only has magnitude, does not possess direction, and is associated with quantum spin 0. Should the mass produced by photon-graviton interaction be 125 GeV/c^2, its union with spin 0 means the Higgs boson is related to the graviton, and the Higgs field is therefore united with the gravitational field (together with the latter's constant interaction with the electromagnetic field).

To finish on a speculative note suggested by the above paragraph – if every particle in the body and brain emerges from interaction of photons and gravitons, is it possible that knowledge of this could liberate people from being a Higgs-PARTICLE-like point in space-time constantly? Could the body and consciousness also be capable of a Higgs-FIELD-like existence in which human potential expands throughout space and time to the same extent as the gravitational and electromagnetic fields whose excitations are gravitons and photons? As an application of Cosmic Consciousness, let's begin with Professor Stephen Hawking. He writes -

"If a complete unified theory was discovered, it would only be a matter of time before it was digested and simplified and taught in schools, at least in outline. We should then all be able to have some understanding of the laws that govern the universe and are responsible for our existence" (17)

A complete unified theory would not be restricted to mathematics, for that would make the theory incomplete. A complete theory would, by definition, affect everything in space-time. Affecting everything in time means future generations – and even what you and I would call past or present generations - would be able to learn how to intuitively access the knowledge of future centuries. Unification necessarily means today's scientific approach of viewing objects and events as separate will become limited to the way senses perceive objects and events. Separateness will belong to "classical" existence; and unification to "quantum mechanical" existence where all energy, matter, and events in space-time are entangled.

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