Particle Physics and a Steady State Cosmos

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Preprint Abstract -

This article is a combination of two rejected essays I wrote for the journals "Nature Physics" and "Physics Essays" (the journal versions didn't include this explanatory "Preprint Abstract"). Here's a copy of the rejection letter from the editor of "Physics Essays" which I found very encouraging, except for his comment that "the speculative component of your paper is too predominant".

Dear Dr. Bartlett:
I have concluded the examination of your paper and certainly enjoyed the imagination and conviction behind the concepts that you propose. Unfortunately, I had to conclude that the speculative component of your paper is too predominant, and the journal Physics Essays is not the best outlet for your ideas.

I think that your paper should be exposed to the scrutiny and appreciation of a readership different from that of Physics Essays. I strongly encourage you to submit it to another journal, where surely it will be accepted. In any case, I am grateful that you submitted it first to Physics Essays.

My best regards,
Sincerely yours,
Emilio Panarella

My article must appear to be obviously incorrect.

Not only is the graviton undiscovered, but there are decades of evidence stating that no relation exists between that graviton and the Higgs boson. There's nearly a century of

science stating the bosons of the weak nuclear force are independent of the gravitons of gravitation and aren't formed by them ie the weak force can't be unified with gravity. And saying gravity is involved with matter's creation has been nonsense ever since Newton established the reverse.

The odds against anyone writing a short article that correctly contradicts the above are tremendously great. But it's accepted that the graviton probably does exist and that it will be discovered eventually. In this age when many confidently pursue a Theory of Everything, does it make sense to cling to the idea that gravitons and Higgs bosons can have no relation?

Einstein even published a paper in 1919 which he titled "Does gravitation play an essential role in the structure of elementary particles?" It can be argued that discovery of the nuclear forces invalidated that paper. However, Einstein's remarkable intuition might well have discerned that gravitons could play an essential role in the structure of the bosons of the nuclear forces. And instead of being purely mathematical in form, why couldn't the Theory of Everything use vector-tensor-scalar geometry to make gravitation play an essential role in the structure of elementary particles of matter?

Science today seems to be overly dependent on observation and experiment. These are certainly extremely valuable but the search for knowledge of how the universe works must leave plenty of room for concepts developed by the mind. These mental constructs, while ideally capable of confirmation by experiments and observations, are not subject to the severe limitations and easy deceptions which the bodily senses are. All scientific detectors and instruments – no matter how grand – are enhancements of the senses, and are restricted to the technology of a particular era. The mind, though admittedly capable of great errors, is also able to see infinitely farther than the senses and far beyond present technology. It can see areas that are pure science fiction today, but might well be confirmed by a future civilization. For example, the claim near the end of this article that everything in the universe is infinite and eternal is the result of prior work with vector, tensor and scalar quantities in the fields of Higgs bosons, matter particles and bosons of the nuclear forces. It should not be dismissed merely because it contradicts present knowledge. Every advance contradicted accepted understanding at some stage. The same leeway deserves to be extended to the ideas that the universe is scientifically fine-tuned and neither contracts nor expands.

Journal Abstract -

It has been reported that astronomers using NASA's Hubble Space Telescope and the European Space Agency's (ESA) Gaia space observatory "have made the most precise measurement to date of the universe's expansion rate. The results further fuel the mismatch between measurements for the expansion rate of the nearby universe, and those of the distant, primeval universe -- before stars and galaxies even existed. This so-called 'tension' implies that there could be new physics underlying the foundations of the universe." (1) Combining BITS (BInary digiTS) with topology and the vector-tensor-scalar relationship results in the tension referred to being resolved by expansion or contraction of the universe as a whole being eliminated. This lack of expansion or contraction overturns the Big Bang, cosmic inflation and Roger Penrose's Conformal Cyclic Cosmology.

Keywords -

Cosmology, Electromagnetism, Gravitation, Higgs boson, Vector-tensor-scalar geometry, Cosmic non-expansion, Extra large-scale dimensions, Supersymmetry, Wick rotation, Topology, Weak-force bosons, Strong-force gluons, Matter, Quantum spin, Mass, Charge, Time, Block universe, Infinite and eternal Earth

Article -

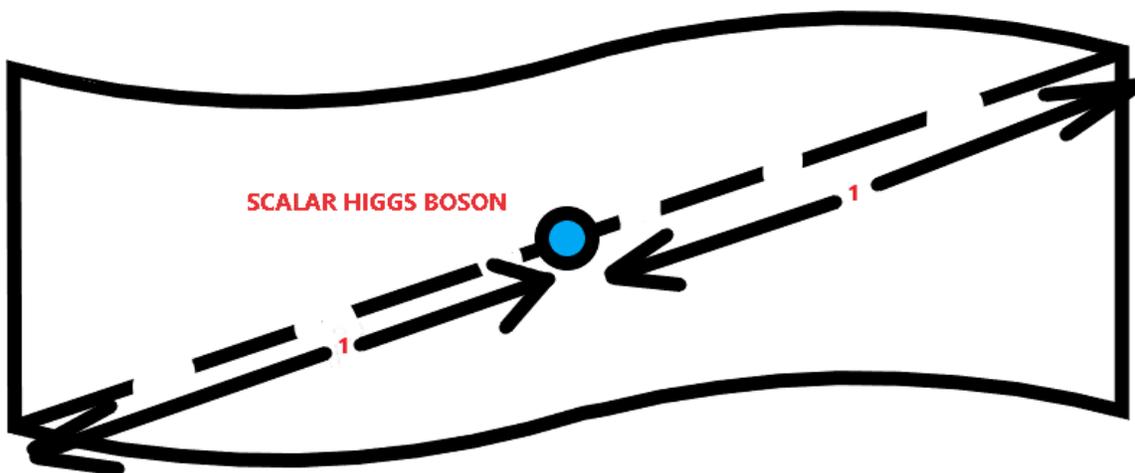## SECTION 1 - MATTER, AND THE HIGGS BOSON, EMERGING FROM PHOTON-GRAVITON INTERACTION

SCALAR HIGGS BOSON

1

1

Figure 1 -

VISUALIZING QUANTUM SPIN AND VECTOR/TENSOR/SCALAR QUANTITIES

(drawn by author using Microsoft's "Paint" program)

 A *vector* is a quantity which possesses both magnitude and direction. Two such quantities acting on a point (represented by the blue and black Scalar Higgs boson) may be represented by two sides of a parallelogram (one horizontal plus one vertical), so that the resultant diagonal (dashed line) also represents the vectors. The two sides and diagonal thus illustrate the graviton's spin 2 and the photon's spin 1.

When changing from one set of coordinates to another, a *tensor* is a set of functions which are transformed in a precisely defined manner. When changing from the above figure's diagonal to its point (the Higgs), transformation is in the precise manner of the photon revolving once (through 360 degrees) to look the same^ – illustrated by either of the red 1's in the diagram. The other 1 represents that particle's continuous interaction with the graviton which simultaneously turns through 180 degrees (half a revolution) TWICE. Subtracting 1 from 1 (half the diagonal from its other half) leaves the spin 0 of the Higgs boson.

^ Professor Hawking writes,

"What the spin of a particle really tells us is what the particle looks like from different directions." (2)

Spin 1 is like an arrow-tip pointing, say, up. A photon has to be turned round a full revolution of 360 degrees to look the same.

Spin 2 is like an arrow with 2 tips - 1 pointing up, 1 down. A graviton has to be turned half a revolution (180 degrees) to look the same.

Spin 0 is like a ball of arrows having no spaces. A Higgs boson looks like a dot: the same from every direction.

Richard Feynman concluded that antimatter is simply ordinary matter going backwards in time (what is termed "matter-antimatter annihilation" occurs when those particles reverse direction in time). (3) The particles and antiparticles involved in annihilation vanish but the mass-energy of gamma-ray photons, neutrinos, and sometimes less-massive particle–antiparticle pairs remains. This matter-antimatter can exist because division can be solved by repeated subtraction e.g. 4 subtracted from 20 five times equals zero, therefore $20 \div 4 = 5$. With energy particles, the photon's revolution minus the graviton's two half-revolutions equals the Higgs boson's zero spin, leading to E=0. If the graviton's spin is repeatedly subtracted from the photon's spin, this leads to negative values/negative energy (zero and negative energy are addressed by the following diagram and paragraph), but can also be thought of as photon spin being divided by graviton spin and producing matter particles of spin 1 / 2. In other words, photon-graviton interaction forms the emergent property of mass (just as hydrogen-oxygen interaction produces wetness) and the Higgs boson is merely a by-product of the former interaction (relating the graviton and Higgs boson). The use of 1 / 2 in both instances gives the fermions and bosons a form of symmetry. Photon spin is divided by graviton spin in the case of fermions, and the graviton completes half-revolutions (180 degrees) when speaking of bosons. The result is a **scalar field** - completely described by its magnitude, without direction, and associated with spin-0 particles. It is representable by a position on a line which, in the diagram above, is the central blue and black dot on the diagonal.

SECTION 2 - DO DARK MATTER AND DARK ENERGY BELONG TO ANOTHER LARGE-SCALE DIMENSION?
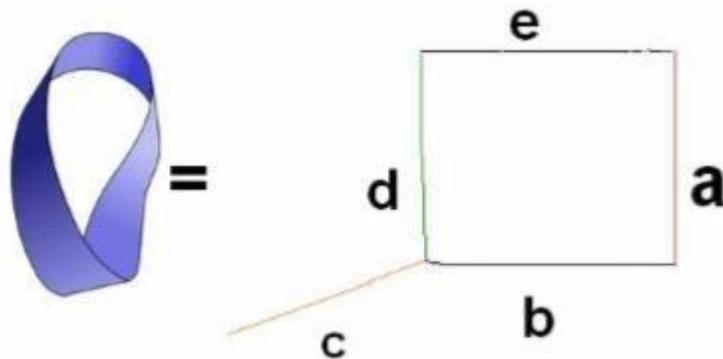
Figure 2 – MOBIUS MATRIX (Mobius equals a,b,c,d,e array)

Width a is perpendicular to the length (b or e) which is perpendicular to height c. How can a line be drawn perpendicular to c without retracing b's path? By positioning it at d, which is then parallel to (or, it could be said, at 180 degrees to) a. d is already at 90 degrees to length b and height c. **d has to be at right angles to length, width and height simultaneously if it's going to include the Complex Plane's vertical imaginary axis in space-time (see Fig. 3 - the imaginary realm is at a right angle to the 4 known dimensions of space-time, which all reside on the horizontal x-axis).** In other words, d has to also be perpendicular to (not parallel to) a. This is accomplished by a twist, like on the right side of the Mobius strip pictured above. The twist needs to be more exaggerated than the illustrated one, with the upper right of the Mobius descending parallel to side "a" then turning perpendicular to it at approximately the level of the = sign. Thus, 90+90 (the degrees between b & c added to the degrees between c & d) can equal 180, making a & d parallel. But 90+90 can also equal 90, making a & d perpendicular. (Saying 90+90=90 sounds ridiculous but it has similarities to the Matrix [of mathematics, not the action-science fiction movie] in which X multiplied by Y does not always equal Y times X. The first 90 plus the second 90 does not always equal the second 90 plus the first 90 because 90+90 can equal either 180 or 90. The Mobius Matrix can perform the impossible in another dimension of making (a) and (d) perpendicular instead of parallel. In a mathematical universe; mass can be at right angles when, according to present ideas, only parallelism should be possible. It's logical that energy can be zero, or even negative, when – according to present ideas - only positivity should be possible.
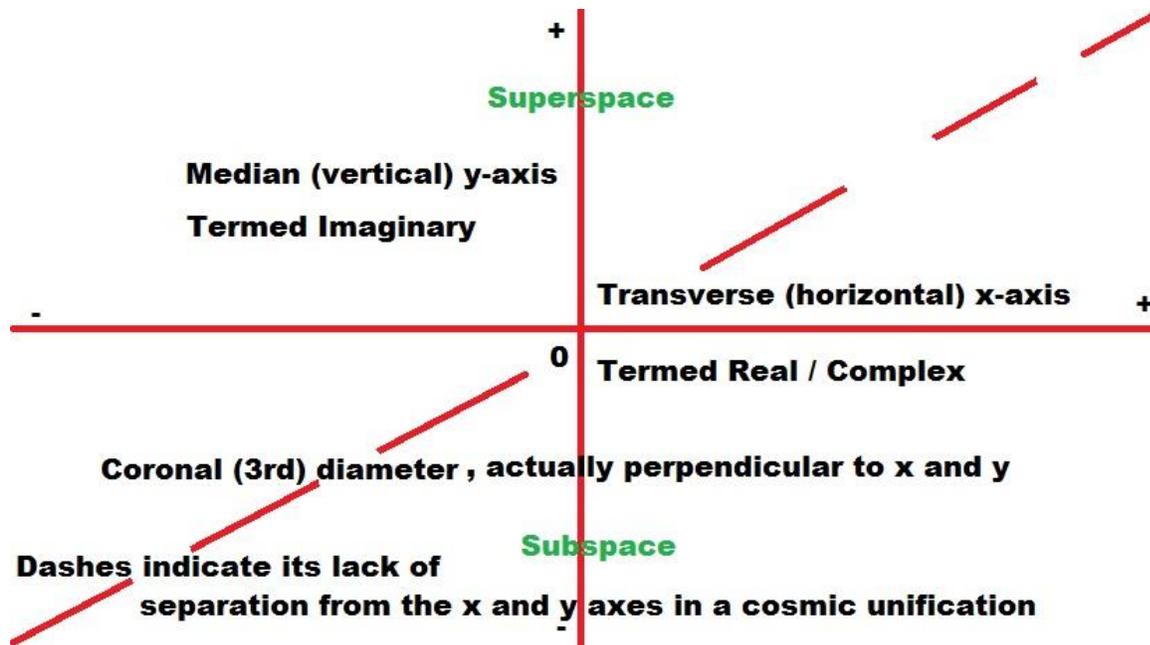
Figure 3 – COMPLEX PLANE'S X-AXIS (DESCRIBED BY "REAL" NUMBERS) AND Y-AXIS (DESCRIBED BY "IMAGINARY" NUMBERS)

On the subject of other large-scale dimensions of space-time**:** Professor Itzhak Bars of the University of Southern California in Los Angeles says,

'one whole dimension of time and another of space have until now gone entirely unnoticed by us'. (4)

SECTION 3 - THE WEAK FORCE'S W AND Z BOSONS, PLUS THE STRONG FORCE'S GLUONS

It must be remembered that Fig. 1 refers to space alone, and is therefore incomplete. Living in space-time, it's necessary to add some sentences about the time factor. The photon must interact with the graviton to produce the mass of W and Z bosons. To produce their quantum spin, the photon's spin 1 needs to react with the graviton's spin 2. That is, the photon's turning through one complete revolution needs to be combined

with the graviton's being turned through two half-revolutions. Incorporating the time factor as a reversal of time in the middle of the interaction: a gravitonic half revolution is subtracted from the photonic full revolution then the graviton's time-reversal adds a half revolution (1-½+½ = the spin 1 of W and Z bosons), The W^+ and W^- have masses of approx. 80 GeV/c^2, the Z's mass is approx. 91 GeV/c^2, and the Higgs boson is approx. 125 GeV/c^2. The particles absorb energy from the virtual particles^ filling space, time, and matter as they travel. Prior to being recognizable as W bosons, the 1-½+½ particles journey about 64% the distance of the Higgs through time while the particles recognized as Z bosons travel about 73% as far as the Higgs. The spin 1 / 2 particles referred to in "MATTER, AND THE HIGGS BOSON, EMERGING FROM PHOTON-GRAVITON INTERACTION" primarily travel different (infinitesimal) distances in space^^, gaining energy and mass from virtual particles. Since virtual particles produce mass and photons and gravitons interact to produce mass, virtual particles could be the building blocks of photons and gravitons.

^ A virtual particle is a transient fluctuation that, though it exhibits some of the characteristics of an ordinary particle, is not a particle at all and cannot be detected in experiments. However, they're known to exist because they have the measurable effect of giving rise to forces between particles of matter. This article equates virtual particles with the electronic binary digits that are transient and only exist as either a 1 or 0 for an extremely brief time eg as a computer image changes.

Where do virtual particles originate? In a science TV program (Australian Broadcasting Corporation's 'Catalyst', 'Custom Universe – Finetuned For Us?', August 29 2013 - http://www.abc.net.au/catalyst/stories/3836881.htm), Dr. Graham Phillips reported that "the physicist and writer Paul Davies thinks the universe is indeed fine-tuned for minds like ours. And who fine-tuned it? Not God but minds from the future, perhaps even our distant descendants, that have reached back through time ... and selected the very laws of physics that allow for the existence of minds in the first place. Sounds bizarre, but quantum physics actually allows that kind of thing."

How do virtual particles originate? A model of the cosmos might be built that uses pi and imaginary time, and resides in Virtual Reality (an artificial, computer-generated simulation or recreation of a real life environment or situation). Entanglement in the simulation is unable to remain separate from the quantum-mechanical and macroscopic entanglement existing in our perceived reality because imaginary time removes all boundaries between the two universes. They naturally merge, influencing each other and becoming one Augmented Reality (a technology that layers computer-generated enhancements atop an existing reality in order to make it more meaningful through the

ability to interact with it). The poorly-named imaginary time of physics and mathematics unites with pi (both are necessary to generate an infinite universe - alone, unbounded imaginary time is finite).

^^ These infinitesimal distances in space could be partly or completely accounted for by the rapid vibrations of atoms and particles. How can the infinitesimal distances in time that are characteristic of subatomic processes be visualized? Visualizing the Complex Plane with its horizontal x-axis, vertical y-axis, and origin or centre - a gravitational wave cycles or oscillates between its advanced (towards the left and the past) or retarded (towards the right and the future) states as a result of the Wick rotation innate to bosons and matter's fermions (the y-axis represents so-called "imaginary" time).

Why should two W bosons exist – one with positive electric charge and one with negative?

"Analyzing (Paul) Dirac's original work on the electron, (Richard) Feynman found something very strange. If he simply reversed the direction of time in Dirac's equation, the equation remained the same if he also reversed the electron charge. In other words, an electron going backward in time was the same as an antielectron going forward in time! ... Feynman had found the reason that nature allowed these backward-in-time solutions: they represented the motion of antimatter."

It was shown above how time-reversal provides an explanation for the quantum spin of W and Z bosons. Adapting Feynman's actions - reversing the particles' direction in time would, instead of keeping an equation the same, unite the three bosons into one particle (keep the particle the same) if the charge is also reversed. In other words, there's only one boson of the weak nuclear force. The different charges manifest as the W bosons' emission or absorption of electrons or positrons and the neutral Z boson's non-involvement in this emission or absorption. The reversed direction in time and reversed charges belong to the so-called W-plus and W-minus particles, with the transition point between direction in time being known as the so-called Z boson.

The gluon's quantum spin of 1 could arise in the same way as the spin 1 of weak-force bosons. The photon's turning through one complete revolution needs to be combined with the graviton's being turned through two half-revolutions. Incorporating the time factor as a reversal of time in the middle of the interaction: a gravitonic half revolution is subtracted
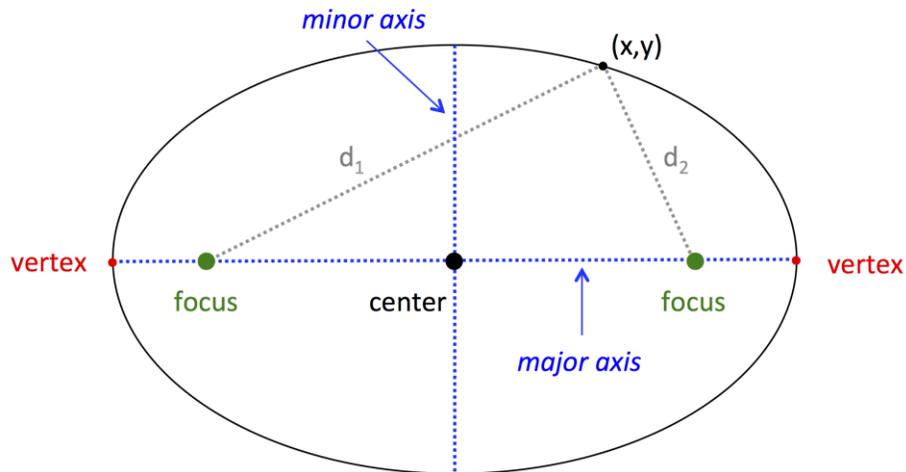
from the photonic full revolution then the graviton's time-reversal adds a half revolution (1-½+½ = the spin 1).

The gluon's neutral charge is accounted for by Feynman's reversal of the time direction keeping equations the same as long as the charge is also reversed. If the gluon begins existence with one charge (either negative or positive), the time-reversal adds the opposite charge without eliminating the initial charge. Negative plus positive (or positive plus negative) results in neutrality. If the gluon begins life as neutral, it would have no charge for time-reversal to alter. Gluons are **vector bosons** (particles with spin 1**:** photons and weak-force particles are also vector bosons). In the vector calculus used here, visualize the parallelogram in Fig. 1 as a square with 4 sides of equal length. One horizontal side equals either a positive or negative electric charge, with an adjoining vertical side (of the same length) representing the opposite – equally strong - charge. The resultant diagonal of those two sides can be pictured as a boat being driven in, say, the vertical direction across a river while simultaneously being pushed horizontally by the river's fast-flowing current. In terms of electric charge, a negative or positive horizontal side is a vector combined with the vector of opposite charge on an adjoining vertical side. The resulting diagonal is neutral.

Gauge invariance means that certain transformations of a field do not change the energy of the field at all. This makes it difficult to add a mass term, because a mass term tends to push the field toward the value zero. In quantum field theory, unbroken gauge invariance (a field's energy never changes) requires that bosons have zero mass. Phrased in terms of this section's first paragraph, gluons are very restricted in their travel through space-time and are relatively fixed – not gaining energy. The same relative fixation applies to the short-range weak-force bosons of spin 1 as well as the supposedly long-range electromagnetic photons of spin 1. The phenomenon called an electromagnetic wave would not be travelling photons but would be a traveling shock wave from a disturbance in space-time that causes successive stationary excitations of photons, covering 186 282 miles every second. A "gravitational wave" would be a disturbance in space-time that causes excitations of gravitons, similarly traveling at what is called "the speed of light" (this is a new interpretation of John Wheeler's geon or "gravitational electromagnetic entity", an electromagnetic or gravitational wave which is held together in a confined region by its own nature). (5)

SECTION 4 –

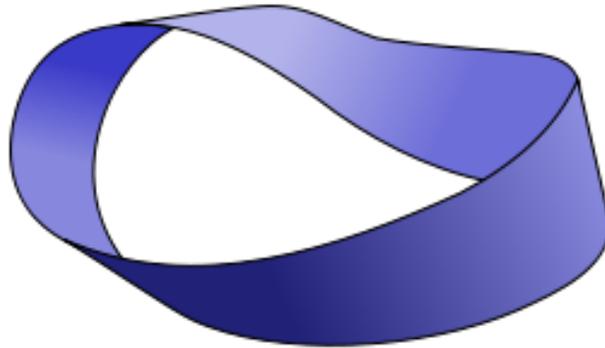# V-T-S, ELLIPSES AND MOBIUS STRIPS

Figure 4 – ELLIPSE

The Greek mathematician Archimedes (287-212 BC) was the first to succeed in calculating the ratio between the diameter and circumference of a circle: pi (π). He did it by drawing two polygons (many-sided figures), one just inside and one just outside the circle so they closely followed the circle's shape, then calculating the lengths of the polygons' perimeters. Archimedes calculated π as 22/7 and this has been vastly extended by today's electronic computers. At the time of writing, the latest world record for π has 22.4 trillion digits. It was worked out in November 2016 by Peter Trueb. (6) Between 1609 and 1619, German mathematician / astronomer / scientific astrologer Johannes Kepler developed his 3 laws of planetary motion. The 1st one states that the orbit of a planet around the Sun is an ellipse, not a circle. The parallelogram of Fig. 1 can be converted by the morphing ability of computer programming so it closely follows the elliptical shape in Fig. 4, and the ellipse can continue to morph into the shape of Fig. 5's Mobius Strip which, as seen from Fig. 2 and the paragraph below it, is a fundamental constituent of the universe.

Figure   5   -   Mobius   Strip   (source:

These four scientists support the idea of the universe being composed of information/mathematics:

a) In 1990, John Wheeler (1911-2008) suggested that information is fundamental to the physics of the universe. According to this "it from bit" doctrine, all things physical are information-theoretic in origin. (7)

b) Erik Verlinde says gravity is not a fundamental force of nature, but an emergent phenomenon. In the same way that temperature arises from the movement of microscopic particles, gravity emerges from the changes of fundamental bits of information, stored in the very structure of spacetime. (8)

c) Cosmologist Max Tegmark hypothesizes that mathematical formulas create reality (9)

d) "Pioneered (in the late 1980's) by Rafael Sorkin, a physicist at the Perimeter Institute in Waterloo, Canada, the theory (causal sets) postulates that the building blocks of space-time are simple mathematical points that are connected by links, with each link pointing from past to future." (10)

It seems plausible that the particular values of quantum spin could be determined by another set of particular values viz those in electronics' binary digits, which always take the form of either 1 or 0. (Electronics could thus insert Artificial Intelligence and defiance of the Uncertainty Principle into everything from the subatomic scale through the

biological to the astronomical.^) First, the 1's and 0's form the shape of a Mobius strip, which is merely two-dimensional (2-D). To use words from a recent paper -

In a holographic universe, all of the information in the universe is contained in 2D packages trillions of times smaller than an atom. (11)

("Holographic" would 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 three dimensions we're familiar with.)

^ Binary digits are proposed to be the Hidden Variables which "are an interpretation of quantum mechanics based on the belief that the theory is incomplete and that there is an underlying layer of reality that contains additional information about the quantum world. This extra information is in the form of the hidden variables, unseen but real quantities. The identification of these hidden variables would lead to exact predictions for the outcomes of measurements and not just probabilities of obtaining certain results." (12)
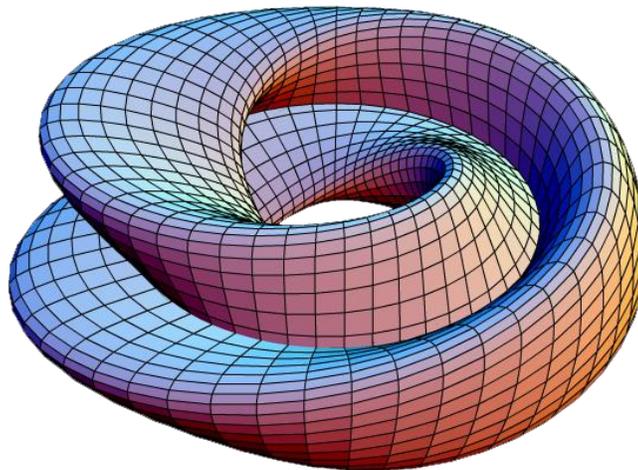
SECTION 5 –

DOUBLETS, SUPERSYMMETRY, WICK ROTATION, AND SIMPLY-CONNECTED

Then two strips must be joined to make a 4-D Klein bottle (13) which has length, width, depth and, when Wick rotation is programmed into the strips as a subroutine (see Figure 7), the 4th dimension of movement in time. The type of Klein bottle formed would appear to be the figure-8 Klein. A diagram of many figure-8 Klein bottles would show that their positive curvature (on the spherical parts) fits together with their negative curvature (on saddle-shaped parts) to cancel and produce, on a cosmic scale, the flat curvature of space-time (14). When you have trillions of Mobius and figure-8 Klein elements assembled, you can follow the theory of the mass-giving Higgs field being the result of various couplings. (15) This theory has lost popularity since the Higgs boson was discovered. But an implication of a 1919 paper by Einstein called "Do gravitational fields play an essential role in the structure of elementary particles?" (16) is that the coupling is between gravitons and photons. That could mean coupling is between the Mobius strip and the figure-8 Klein bottle (these exist on a level between photons/gravitons and 1's/0's, being built up into the particles and composed of the binary digits). With trillions of Mobius

and figure-8 Klein elements assembled, these (now respectively called photons and gravitons) must interact to give matter what we call the emergent property of mass - similar to hydrogen and oxygen combining to give water what we call wetness. This proposed link between the Mobius strip and the Mobius doublet (figure-8 Klein bottle) would also be a link between the photon and graviton, suggesting unification of electromagnetism with gravitation. It also confirms Erik Verlinde's idea that gravity is an emergent property (emerging from mathematics).

Figure 6 - MOBIUS DOUBLET (FIGURE-8 KLEIN BOTTLE) (source: https://upload.wikimedia.org/wikipedia/commons/7/73/KleinBottle-Figure8-01.png) Note that, when considering many bottles, the reddish positive curvature fits together with the bluish negative curvature to produce the flatness implying space-time's infinity and, since space and time are always unified, its eternity. (In flat space-time, light beams travel in straight lines and can go infinite distance without ever meeting.)

Following Albert Einstein's example of turning Max Planck's quanta (which, for years, Planck and all other scientists considered purely mathematical) into explanation of the physical photoelectric effect, the Wick rotation used to describe imaginary time may be transformed from mathematical "trickery" to physical meaning, and provide a modern way to unite space and time into one space-time.
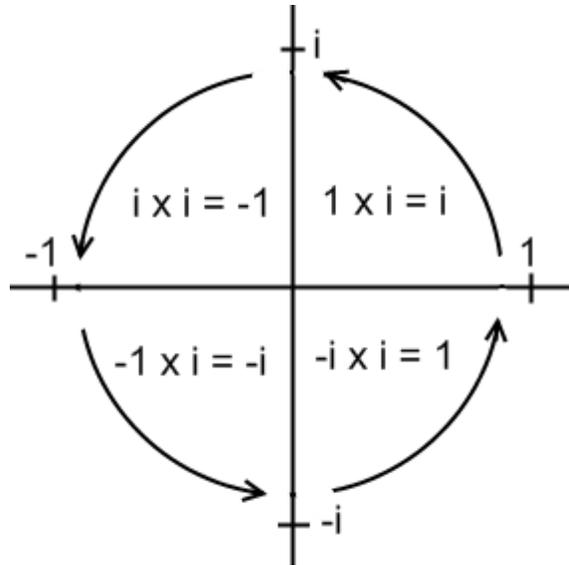
Figure 7 – WICK ROTATION: "The complex plane reveals i's special relationship with cycles via the circle of i, also known as Wick rotation. Whenever a point on the complex plane is multiplied by i, it moves a quarter rotation around the origin or center of the plane."(17)

Supersymmetry (SUSY) proposes a relationship between bosons and fermions. Some scientists believe supersymmetry is a failed theory. A new approach would be proposing that the Mobius strip is a fundamental constituent of not only fermions (particles of matter) but also of bosons (particles of energy) - and therefore unites all particles.

The inner and outer surfaces of a Mobius form a continuous strip in space – unification of space with time requires a temporal continuity. This is carried out by Wick rotation's continuous cycling between what are called real and imaginary time – a property programmed into the Mobius strip. Therefore, the Mobius strip combined with Wick rotation and imaginary time (represented as the vertical direction on mathematics' Complex Number Plane) provides a modern way to unite space and time into one space-time. (The continuously curved Mobius surface + continuous Wick rotation = curvature of space-time.)
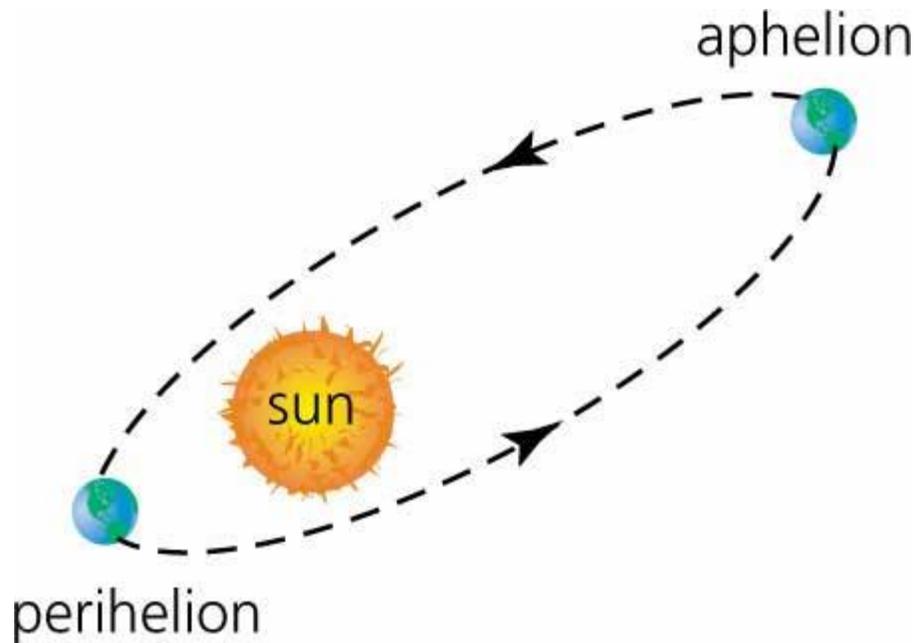
Referring to the infinite universe (see text associated with Figure 6) - a flat universe that is also simply connected implies an infinite universe. (18) So it seems the infinite universe cannot be composed of subunits called figure-8 Klein bottles (flat universes that are finite in extent include the torus and Klein bottle). But the changing of the Klein

bottle's shape by binary digits composing photons and gravitons mimics the process of gaps in, or irregularities between, figure-8 Klein bottles being "filled in" by binary digits in the same way that computer drawings can extrapolate a small patch of blue sky to make a sky that's blue from horizon to horizon. This ensures the positive and negative shapes in different figure-8 Klein bottles are precisely united, and makes space-time relatively smooth and continuous as Einstein thought. Plus - it gets rid of holes, making figure-8 Klein subunits feasible.

SECTION 6 -

V-T-S AND EARTH'S ORBIT

The Danish physicist Niels Bohr is reported to have said last century, "Your theory is crazy, but it's not crazy enough to be true." This article reaches a final conclusion that is, in a word, crazy. But the conclusion appears to be inescapable if mathematics has any value. So maybe the article is crazy enough to be true - Archimedes and Kepler combine to show that the vector-tensor-scalar relationship can substitute Earth (and its living or non-living parts, which are all composed of the universe's fundamental Mobius strips morphed from Fig. 1's parallelogram) for the Higgs boson and extend it into the infinite and eternal Unified Field of the Block Universe Albert Einstein believed in.

Figure 8 – PERIHELION AND APHELION (The difference between perihelion and aphelion is only approx. 3% in reality – it's greatly exaggerated in this illustration. Perihelion [closest point to Sun] is about 147.1 million kilometres [91.4 million miles] in early January – aphelion is about 152.1 million kilometres [94.5 million miles] in early July.

Recalling that the parallelogram of Fig. 1 can be converted into the elliptical shape in Fig. 4, it can also transform into Earth's elliptical orbit which means the vector / tensor / scalar relationship applies to this planet. The vector can be the magnitude and direction of the orbiting Earth itself. It and a second vector (Earth 6 months later in its orbit – more about this very soon) are represented by two sides of the parallelogram as well as by the resultant diagonal. The central point cannot be occupied by the Sun – it could if our planet's orbit was perfectly circular – or, since we're now discussing planetary spin and not quantum spin, by the Higgs boson. Being represented by the diagonal, Earth is naturally also represented by the diagonal's central point. Adding the geometrical objects of vector and tensor resulted in the object termed scalar. Successful conversion of Fig. 1's parallelogram to Fig. 8's ellipse, followed by tensor analysis, means our planet is also a scalar object. It has magnitude but no direction and, looking back to Section 1, half its diagonal can be subtracted from the other half. This reduces the innumerable spins of particles composing the planet to an aggregate of a boson possessing spin 0. Such particles have no restriction on the number of them that occupy the same quantum state. This lack of restriction is compatible with Earth having no

direction. This state is only possible if it has magnitude occupying a literally infinite and eternal amount of space-time, thus having no need of direction and being capable of possessing the same quantum state as any other material or immaterial body. Since they'd accommodate Earth's infinity, the former would similarly reduce the innumerable spins of particles composing them to an aggregate of a boson possessing spin 0 (they'd only possess magnitude and would be scalar, infinite bodies). Occupying all time, vector-1 Earth must be united with vector-2 Earth (the one existing 6 months later in its orbit).

This unified field – of all Earths being united with all others, and of everything in the universe being reduced to a spin 0 boson - may compose the "block universe" Einstein believed in**:** a multi-dimensional block of space-time containing all the past, and the entire future. So although we only see one Earth at one instant in time; it's within the realm of possibility that it, and everything else, is not finite but is infinite and superposed and actually existing in more than one place - even everywhere in spacetime.

The condition of everything being infinite, superposed and existing everywhere/everywhen in space-time completely removes the need for any kind of universal contraction or expansion (and removes any need for the Big Bang, Cosmic Inflation, or Conformal Cyclic Cosmology). (19)

It sounds very strange because every object and event anywhere in space or time would be entangled with and capable of affecting any other object/event. However, it might add some common sense to quantum mechanics which has been repeatedly verified by experiment but makes no sense at all if we cling to the notion of finite, separate objects and events.

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