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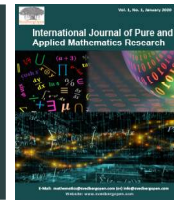
Discussion Paper

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Static, Topological Universe = Steady State + Big Bang

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Abstract

The manuscript consists of two parts: first is BOSON Co-Movement Results in a Static, Topological Universe and second is Positives and Negatives of the Steady State and Big Bang Theories in The 21st Century. There are two principal ideas here, I think. One is replacement of the Big Bang and its associated expanding universe, inflation, and multiverse with an infinite and eternal universe that is both static and topological. Another idea is unification—logically showing that General Relativity and $E = mc^2$ are united with quantum mechanics, electromagnetism with gravitation, mass with energy as well as space-time itself, and the idea that unification means the world's present mathematics is incomplete (and therefore at a disadvantage when proving unification). It's necessary to think of base 2 maths—a.k.a. electronics' strings of binary digits—as what are known as superstrings.

Keywords: *Mathematics, Quantized $E = mc^2$, Wave motion, Static universe, Topological space-time, Dark energy, Dark matter, Cosmology*

1. Boson Co-Movement Results in a Static, Topological Universe

This article disputes the idea that $1 + 1 = 2$ because a unified theory that has implications in physical terms for everything in space-time means $1 + 1 = 2$, and all our mathematics, is incomplete in a unified universe. Even Einstein's famous mass-energy equation $E = mc^2$ would be incomplete, requiring quantization, i.e., unification with the wave-particle duality of quantum mechanics. Einstein repetitively stressed that his mass-energy equation is strictly limited to observers co-moving with the object under study—that object could, for example, be a light beam. Moving in the same direction as light is no problem but how can anyone or anything move at the same speed? Like waves in a body of water, the particles (photons) of light and microwaves etc., that travel through space-time would have relatively little movement themselves. It's the disturbances from the sources of electromagnetism or gravitation (shock waves of fluctuating amplitudes and frequencies) that travel, exciting the pre-existing photons and gravitons that fill space-time. If there is little or no movement of photons and gravitons, the universe could not be expanding (or contracting) but its space and time is static. At first glance, the existence of "little" movement seems to be a loophole allowing a small amount of expansion or contraction of the universe. But there is no motion of the universe as a whole since no movement of photons and gravitons is a possibility. If there's no motion, there must be a change in direction (see next sentence). Cosmologists have naturally understood this to be a directional change in the cosmos as a whole, and this naturally translates into expansion or contraction. The directional change is at the opposite scale. It's a twist in the Mobius strip,

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a mathematical and topological constituent of every photon and graviton composing space-time. If the Mobius strip is a constituent of both photons and gravitons, union of electromagnetism and gravitation is suggested.

1.1. About Pure Maths

Many scientists have said mathematics is a universal language because $1 + 1 = 2$ no matter who you are. The trend in modern physics is towards a unified theory of the universe—starting with the unified theories of the 20th century (notably Einstein's) and extending to string theory and quantum gravity. What happens if a person in, say, the 24th century is raised believing in a unified theory that has implications in physical terms for everything in space-time? Would he or she think there is actually only one thing? Would (s)he think it's a mistake to add one apparently separate thing to another apparently separate thing to produce two, and that such addition is merely the result of the way the body's senses operate? (Our whole mathematical system is ultimately based on the idea that $1 + 1 = 2$, and would therefore be incomplete in a unified universe).

Assuming the maths humanity has developed does indeed apply to the universe, it cannot be totally in error—merely incomplete. Even Einstein's famous mass-energy equation $E = mc^2$ would be incomplete, requiring quantization, i.e., unification with the wave-particle duality of quantum mechanics (which has also been repeatedly verified by experiment). Duality says subatomic particles also exhibit wave-like properties while waves (e.g., electromagnetic) also possess particle-like properties. Concerning the former (particles), it's as if mass was composed of the coupling of the long-range gravitational and electromagnetic waves, in accord with the massgiving Higgs field being the result of coupling—this refers to theories where the role of the Higgs field is fulfilled by particular couplings (in this case, of the graviton and photon) (Tanabashi, M. *et al.*, 2006). And the completed $E = mc^2$ may be, as "About practical maths" suggests, $E = v = f.lambda = distance/duration = space/time = mc^2$.

1.2. About Practical Maths

The wave-particle duality mentioned in the section above can be described by starting with $v = f.lambda$ (wave velocity equals frequency times Greek letter lambda which denotes wavelength). Velocity (speed in a constant direction) of a collection of particles like a car equals distance divided by duration. Since distance is a measure that has to do with space while duration is a measure that has to do with time, it equals space divided by time (Brian Greene in "Speed", part of his "Space, Time and Einstein" course at http://www.worldscienceu.com/courses/1Zelements/YhF9pw).

Gravitational and electromagnetic wave motion (space-time motion) travels at c, the speed of light, i.e.,

$v = f.lambda = distance/duration = space/time = c$

A particle's velocity, whether the particle be a boson or fermion, is directly dependent on its energy—so it may be said that

$E = v = f.lambda = distance/duration = space/time = c$

This is not quite right since c represents energy alone, and space-time deals with mass-energy, so it's better to say

$E = v = f.lambda = distance/duration = space/time = me$

What about the ^{2} in $E = mc^2$? In later papers Einstein repetitively stressed that his mass-energy equation is strictly limited to observers co-moving with the object under study, and the ^{2} refers to this mutual motion. Co-movement is defined as: An inertial frame of reference[1] which happens to be moving in the same direction, at the same speed, as an object or an accelerated frame which we're examining.

In order for $E = mc^2$ to apply to the universe (and it does), observers must be able to co-move with anything being studied (even a light beam). Moving in the same direction is no problem but how can anyone or anything move at the same speed? The link between the quantum and macroscopic worlds would do more than unite the subatomic electrons with the wave motion in a pool of water. It also means the transverse wave motion of electromagnetic waves is identical to the transverse wave motion in a body of water. Present-day observers can never move at the speed which light covers in the vacuum of space-time, so the only way for observers and light to co-move is for the nature of electromagnetism to be revised.

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[1]　A frame of reference is a system of geometrical axes in which the size, position or motion of something is described. "Inertial" means objects in the frame are not being accelerated—they are at rest or they move at a constant velocity in a straight line.

Like waves of water, electromagnetic waves are known as transverse. Consequently, the particles (photons) of light and microwaves etc that travel through space-time would have relatively little movement themselves. It's the disturbances from the sources of electromagnetism (shock waves of fluctuating amplitudes and frequencies) that travel. (They go through the fields of energy filling the so-called vacuum). Since $E = mc^2$ only applies to photons when they are at rest, the equation can only describe photons that have no motion in one direction—the horizontal "line of propagation" in which the shock wave moves. The photons can only move in the vertical direction, perpendicular to the shock wave—if they move at all.

As Paul Camp, Ph.D. in theoretical physics, writes at https://www.quora.com/How-biq-is-a- photon—"A photon is a quantum of excitation of the electromagnetic field. That field fills all space and so do its quantum modes."

This is consistent with energy being transferred from one place to another (as wave motion) without involving an actual transfer of particles (little or no movement of photons). General Relativity says gravitation IS space-time, i.e., the gravitational field also fills all space, so the seeming motion of gravitational waves could also be due to fluctuations of shock waves' amplitudes and wavelengths causing excitations (called gravitons) in the field. These excitations cover 186,282 miles every second (Savard, 2009). The speed of light is based on an inch of exactly 2.54 cm and is exactly 186,282 miles, 698 yards, 2 feet, and 5 21 /127 inches per second).

The above ideas of gravitational and electromagnetic waves displaying little or no motion are 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 (Wheeler, 1955).

If there is little or no movement of photons and gravitons, the universe could not be expanding (or contracting) but its space and time is static. At first glance, the existence of "little" movement seems to be a loophole allowing a small amount of expansion or contraction of the universe. But there is no motion of the universe as a whole since it's possible for there to be no movement of photons and gravitons.

What is closing the loophole? If there's no motion, there must be a change in direction (see next sentence). Cosmologists have naturally understood this to be a directional change in the cosmos as a whole, and this naturally translates into expansion or contraction. The directional change is at the opposite scale. It's a twist in the Mobius strip, a mathematical and topological constituent of every photon and graviton composing space-time.

Electronics' binary digits (1's and 0's) can be used to draw a two-dimensional computer image of a Mobius strip. Two united Mobius strips create a three-dimensional Klein bottle (Polthier, 2003), that acts as a building block of space, time, forces' bosons and matter's fermions. This creates a supersymmetry (linkage) between fermions and bosons. A recent paper of Afshordi *et al.* (2017) says that in a holographic universe, all of the information in the universe is contained in two-dimensional packages trillions of times smaller than an atom. Therefore, trillions of Mobius strips could form a photon and trillions of more complex Klein bottles could form a more complex graviton (suggesting union of electromagnetism and gravitation).

2. Positives and Negatives of the Steady State and Big Bang Theories in the 21st Century

This novel hypothesis uses mathematics in the form of topology. The goal: to establish a "proof of concept" to which equations can be added, by anyone. It's concluded the Steady State, Big Bang, Inflation and Multiverse theories all ultimately fail and a topological model including bits (binary digits), Mobius strips, Klein bottles and Wick rotation works better. The failed cosmologies have impressive good points leading to the idea that they are all necessary stepping-stones. For example, the Big Bang is seen here as violation of the 1st Law of Thermodynamics but its supposed origin from quantum fluctuations is reminiscent of bits switching between 1 and 0. The topological hypothesis has potential to explain Dark Matter (DM), Dark Energy (DE) and electromagnetic-gravitational union. This model predicts (1) the universe's nature is binary and topological; (2) antigravitons are the quanta of dark energy; (3) dark energy has no connection with the expanding universe since there never was, nor will be, expansion or contraction (dark energy comprises dark matter—in some dimensions, dark matter's being composed of dark energy will follow $DE = DMc^2$: in others, it won't); (4) immortality; and (5) imprints in the Cosmic Microwave Background from gravitational waves will one day be detected unambiguously and not interpreted as evidence of inflation. The article "post-diets" Special Relativity's time dilation as well as existence of both curvature and flatness in space-time. Finally, the paper introduces what is called vector-tensor-scalar geometry—and extensions of Einstein's Gravity and Maxwell's Electromagnetism.

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3. Thermodynamics and Cosmic Origins

A nearly 60-year-old cosmology book, Bergamini (1964), says, "(The Steady State theory—proposed in the 1940s by Fred Hoyle, Hermann Bondi and Thomas Gold-states) new matter or energy has to be continuously created at a rate equal to the mass of one hydrogen atom in each quart of space every half-billion years. Anti-steady-state cosmologists object to this feature because scientifically there is no evidence that mass-energy can be created."

Modern science tells us that the observations and predictions of the Big Bang successfully replace the steady state. However, is not the Big Bang the ultimate example of creation of massenergy from nothing? (The 1st Law of Thermodynamics states that a body can only gain or lose heat by taking it from, or passing it to, its environment or another body—this is because energy can neither be created nor destroyed).

A much more recent cosmology book, Lewis and Barnes (2020), says, "Maybe (the Big Bang) was a true birth from nothing ..." That sentence finishes with "... or maybe our universe is the child of an older (and wiser?) pre-existing universe." That pre-existing universe would solve the problem of creation of our universe's mass-energy, but where did the pre-universe come from? (To those who say the pre-universe came from quantum fluctuation, there is more on this topic later.) Did the pre-existing universe originate from another universe which existed before it? We can repeat these steps endlessly but sooner or later we need to ask, "Where did the first, the original, universe come from? There would have been no creation of mass-energy from nothing back then either (unless the first universe had different laws of physics—as will be seen, this isn't an option in the hypothesis presented here).

The very first universe could originate naturally from knowledge gained in some part of this (our) universe's space and time. In other words, time wouldn't be linear (rectilinear) but cyclical (curvilinear), and the very first universe would actually be our universe. The knowledge would necessarily refer to General Relativity, Special Relativity, quantum mechanics and mathematics (this includes base 2 or binary maths, and topology a.k.a. rubber-sheet geometry).

4. Bits and Topology

Electronics' binary digits can be used to draw a two-dimensional computer image of a Mobius strip. Two united Mobius strips create a three-dimensional Klein bottle, Polthier (2003) that acts as a building block of space, time, forces' bosons and matter's fermions. This creates a supersymmetry (linkage) between fermions and bosons. A recent paper, Afshordi *et al.* (2017), says that in a holographic universe, all of the information in the universe is contained in two-dimensional packages trillions of times smaller than an atom. Therefore, trillions of Mobius strips could form a photon and trillions of more complex Klein bottles could form a more complex graviton (suggesting union of electromagnetism and gravitation).
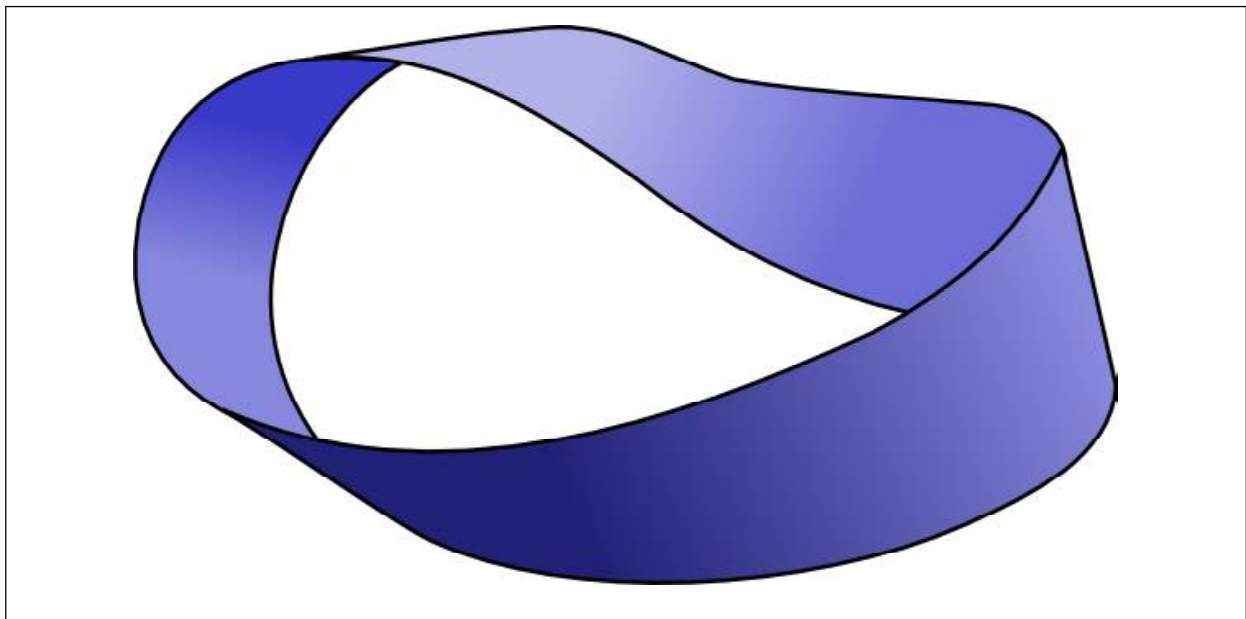

Figure 1: The Mobius Strip, Which is Two-Dimensional and Only has One Surface

Source: http://www.clker.eom/cliparts/3/7/a/9/1220546534781713951lummie_Mobius_Strip.svg.hi.png

The physicist and science historian Abraham Pais wrote that "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", Pais (1991). 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 paper. The doubled Mobius strips (doubled to form a Klein bottle) could be produced by the two-valued binary-digit system used in electronics. 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:

5. Dark Matter and Dark Energy

The electromagnetic and gravitational waves composing space-time rotate in a cycle. The waves rotate through the vertical y-axis* that is home to so-called Dark Matter and the Dark Energy composing it, and back to the horizontal x-axis' space-time. (As NASA's measurements reveal in the next paragraph, the composition of dark matter by dark energy is not as simple as energy = mass in all cases, i.e., it is not always similar to ordinary energy composing ordinary matter via $E = mc^2$.) 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 (everywhere and every when) and thus interfere with themselves, causing time to slow down significantly near the speed of light in a vacuum or under intense gravity.

*The dark matter/dark energy (DM/DE) residing at or near the Complex Number Plane's y-axis remains in space-time's curves (in gravity) so it gravitationally affects space-time on the x axis. But this exotic mass-energy lies perpendicular (or almost perpendicular) to each dimension of our instruments, and thus electromagnetically undetectable (at least at present). 5.5 rotations, each of ~ 65.45 degrees, means there would be 5 1/2 times as much dark matter as ordinary matter (or, to use NASA's number in NASA (2019), about 27% of the universe would be DM). Constant rotation keeps the x- and y-axes interactive but doesn't make more ordinary matter since the x-axis is restricted to $E = mc^2$ (the amount of available energy limits the production of matter). Mass-energy equivalence may not be $DE = DMc^2$ in every "dark" dimension. In some, there might be more "dark" energy available. It'd be possible for the universe to contain more than 5.5 times as much energy as our dimension. DE could be roughly 68% of the content of the cosmos.
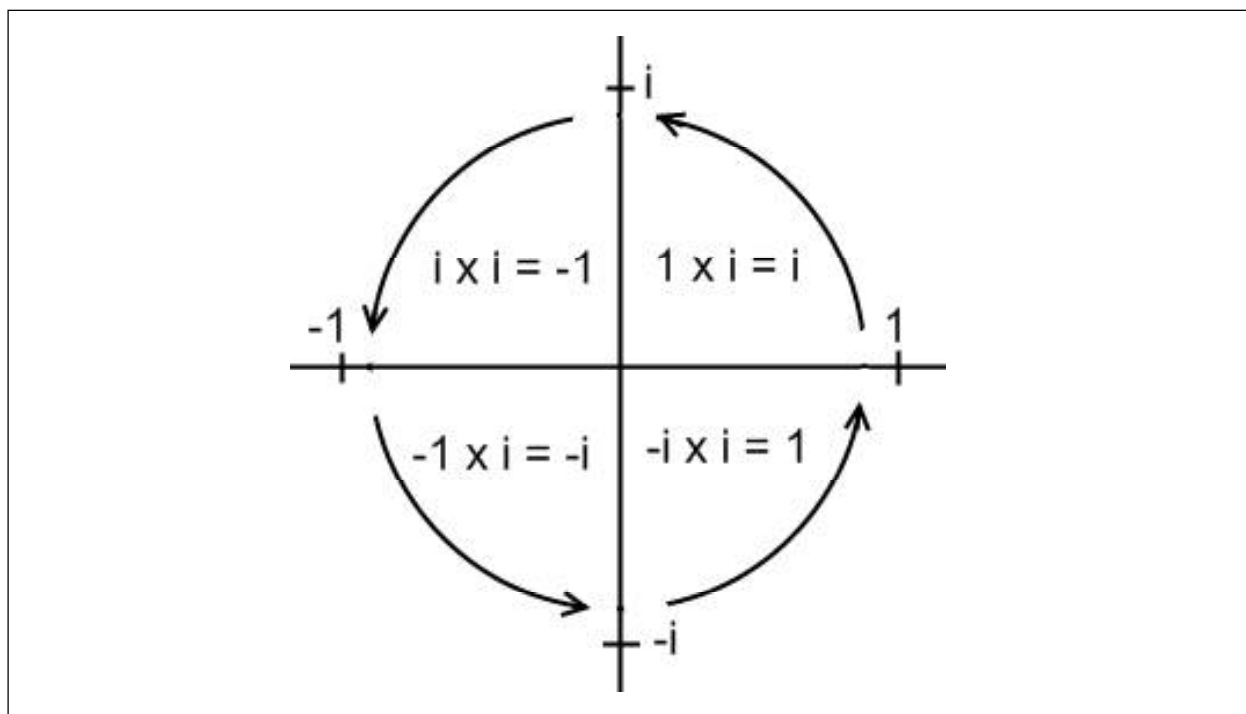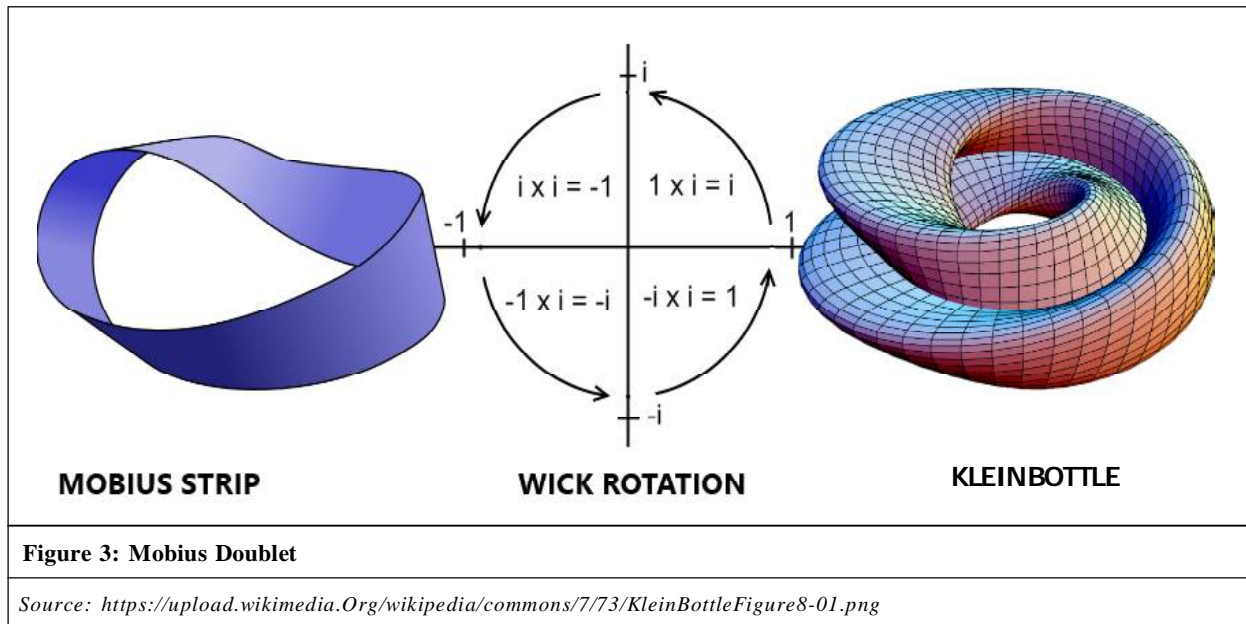

Figure 2: Wick Rotation

Note: "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." [Figure and quote from Welch (2015)].

6. Space-Time's Curvature and Flatness

This paper's conclusions, though unconventional in certain ways, are supported by Albert Einstein's General Relativity Theory which concluded that space-time is curved. Curvature of space-time (from it being constructed of the curvature of Mobius strips, Klein bottles, and Wick rotation) implies this range of allowable energies could be continuous and not restricted to certain bands. Since it's known the energy of 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). The Planck and WMAP satellites recently showed space-time to be extremely close to flat (WMAP, 2012).

See the portion of the diagram below which is a Figure 3, Klein bottle to help understand how curved space can be flat.

Figure 3: Mobius Doublet
Source: https://upload.wikimedia.Org/wikipedia/commons/7/73/KleinBottleFigure8-01.png

Note that the positive curvature fits together with the negative curvature to produce the outline of a doughnut which is technically flat (Janek, 2015). When many doublets are placed together, binary digits can fill in any gaps or voids in the same way that computers can morph a picture on a screen and extrapolate a small patch of blue sky to make a sky that's blue from horizon to horizon. Morphing by bits can also delete a single doublet's central "hole".

But the doublet doesn't become multiply connected like the doughnut. Merely the doughnut's outline is adopted—the doublet retains the property of being simply connected, a property necessary for space-time's infinity. (Informally, if an object in space consists of one piece—the constituent two Mobius strips now have the outline of one doughnut—and no longer has any "holes" that pass all the way through it, it is called simply-connected.

A flat universe that is also simply connected implies an infinite universe (Luminet and Lachi'eze-Rey, 1995). (In regions of space-time that are exclusively flat, light beams travel in straight lines and can go infinite distance without ever meeting). Since space and time are always unified, time is also infinite and the universe is eternal.

The lines beneath Figure 3 attempt to describe "quantum foam", the Planck-scale subatomic region where apparently continuous space and time may dissolve into superstrings—possibly, strings of 1's and 0's—whose fluctuations could be the source of everything in the universe.

7. Macroscopic Quantum Entanglement

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 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 every when. 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 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." New Scientist (2004). Though the effect is measured for distances in space, the inseparability of space and time means that moments of time can become entangled too (Brukner *et al.*, 2004). 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 every when), imprints in the microwave background caused by gravitational waves must be unavoidable. This recalls Background Imaging of Cosmic Extragalactic Polarization (BICEP) and the Keck Array—a series of experiments which aim to measure the polarization of the CMB. 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 paper predicts that imprints in the CMB from gravitational waves will one day be detected unambiguously and not interpreted as evidence of inflation.

8. The Static Non-Multiverse and Perspective

For the note below on the Figure 3 Klein bottle, I refer to Bourbaki (2005), Conway (1986), Gamelin (2001), Joshi (1983), and Spanier (1994).

"The doughnut is technically a flat Universe, but one that is connected in multiple places. Some scientists believe that large warm and cool spots in the Cosmic Microwave Background could actually be evidence for this kind of... (doughnut/Klein bottle)... topology" (Janek, 2015).

A flat universe that is also simply connected implies an infinite universe (Figure 3) Luminet and Lachi'eze-Rey (1995). The flat, non-big-bang universe that's being proposed therefore needs to be simply connected and not have any holes like the hole in the centre of Figure 3's Klein bottle. This is accomplished with the paragraph in the previous section that begins with "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". In classical science, the lack of distinction between inside and outside does refer only to the surface itself (potentially leaving the universe dependent on the Big Bang). When quantum mechanics comes into play, our universe becomes entangled and unified with any other part of the so-called multiverse - and there is nothing except our static universe.

A few problems associated with the Big Bang may simply be matters of perspective viz. antimatter, protogalaxies and the Lyman-alpha forest. The question of why the universe contains any matter assumes the very early universe had equal numbers of particles and antiparticles which annihilated each other. Big-Bang cosmologists have concluded there were roughly a billion and one protons for every billion antiprotons in the universe's first moments. But the problem of the amount of antimatter in the early universe almost disappears if the universe had no early period but is static and eternal. It becomes related to the "creation of mass-energy" issue. In Section 9, it is written "There is no violation of the First Law of Thermodynamics since no energy needs to be created and converted into mass. It is transformed into every known and unknown mass by the interaction of existing gravitational and electromagnetic energy via what this paper calls vector-tensor-scalar geometry." This idea can hardly be called new or untested. Not only does the Steady State theory speak of creation of mass-energy but the Big Bang theory itself is often presented as the creation of everything (space, time, matter, energy).

From the Big Bang's perspective, protogalaxies formed from the initial expansion of the universe and coalesced to become the larger galaxies. In a static universe, the smaller protogalaxies would still be seen since astronomy's instruments are looking further back in time as they look at more distant regions in space-time. When focused, say, 12 billion light years away, they would detect these clouds of material that coalesce into galaxies. When telescopes focus far beyond that, they see nothing. This is not because there is nothing to see earlier than the Big Bang. It is because light from galaxies that may be 100 billion light years distant (or infinitely more) has been redshifted out of range of our detectors.

The Lyman-alpha (Lya) line in hydrogen can be compared to a railway track. As you look further and further along a track, perspective naturally brings the two rails closer and closer together until they seem to meet at a point... a

"concentration", (they're actually still parallel). As we look at the distant universe and further back in time, we see more dense regions of hydrogen absorption lines (the Lyman alpha forest). Some cosmologists interpret this as evidence that the universe began in a Big Bang and 75% of the cosmos is composed of hydrogen. In a static universe, the hydrogen which spectroscopes are examining is simply becoming more and more concentrated by the laws of perspective. Perspective is any method whereby the illusion of depth is achieved on a flat surface (railway lines appearing to meet on the horizon at what is called the "vanishing point" is one of those various methods). Penguin (2006) Perspective therefore anticipates the Planck satellite by saying we live in a flat (nearly flat) universe. The methods consistent with the reference in the Section 1.2 which says that in a holographic universe, all of the information in the universe is contained in two-dimensional packages trillions of times smaller than an atom - and with this article's statements that we live in an already infinite, nearly flat universe (it also contains curves).

9. Quantum Fluctuation and Redshift Drift

It is correct to point out that this paper is proposing creation of mass-energy. However, there is no proposal of expanding (or contracting) space-time at a cosmic scale—and no proposal of creation from nothing. The Big Bang is often said to be creation from nothing but it is also referred to as creation from quantum fluctuations. Although many different processes might produce the general form of a black body spectrum, no model other than the Big Bang has yet explained the fluctuations. Such a model is being suggested now: these fluctuations are comparable to the switching between ones and zeros—switching between on and off—which occurs in a universe using binary pulses to produce Mobius strips, Mobius doublets (Klein bottles) and Wick rotation.

The universe's redshift could be seen not as galaxies receding from each other, but in Einsteinian terms of all space-time being a gravitational field in which gravitational redshift causes electromagnetic waves to become increasingly redshifted as distance increases. When light—not only the visible spectrum but all forms of electromagnetism—enters a gravitational well, it's deflected a very small amount (General Relativity calculates the refraction around the Sun to be 1.75 arc seconds). It's attracted to the mass at the center of the well then climbs out. After escaping from billions of gravity wells as it passes galaxies and stars and planets during its journey to Earth, light from a galaxy billions of light years away (which might begin its travels as blue light) expends much energy and could be shifted to its red phase. It would then be gravitationally redshifted enough to explain the redshift of distant galaxies without invoking the Big Bang and the supposed recessional velocities of those galaxies.

Redshift drift refers to the phenomena that redshift of cosmic objects is a function of time. The observed wavelength of light received from any distant source of photons—or source of electromagnetic or gravitational disturbance whose shock wave excites photons and gravitons in the space between Earth and the source—drifts from higher to lower frequencies. According to a calculation by astronomer Allan Sandage, this drift is one part in 10^{13} per day Sandage (1962). An expanding universe that originated in a Big Bang would obviously explain this drift. But if this paper is proposed topological model does indeed work better, it must be able to provide an explanation of drift that is just as feasible.

As noted at the beginning of this section, "It is correct to point out that this paper is proposing creation of mass-energy. However, there is no proposal of expanding (or contracting) space-time at a cosmic scale—and no proposal of creation from nothing." It is proposed that creation of mass-energy continually produces a greater number of gravitational wells for light to escape from gravitational redshifting it more today than yesterday and less today than tomorrow. There is no violation of the First Law of Thermodynamics since no energy needs to be created and converted into mass. It is transformed into every known and unknown mass by the interaction of existing gravitational and electromagnetic energy via what this article calls vector-tensor-scalar geometry.

This creation of mass does not eventually fill space with mass for two reasons: 1) space is literally infinite and can never be filled with mass, and 2) mass can be transmitted to different times or dimensions using future versions of virtual and augmented reality. A model of the cosmos might be built that uses pi and imaginary time, and resides in Virtual Reality (artificial, computer-generated simulation). The entanglement (quantum-mechanics style) in the simulated universe is unable to remain separate from the entanglement existing in our perceived reality because computers using so-called "imaginary time" (which is defined by numbers with the property $i^2 = -1$) remove all boundaries between the two universes. This enables them to become one Augmented Reality (known now as technology that layers computer-generated enhancements onto an existing reality, and seen here as the related layering of virtual reality onto other points in time or other dimensions). The poorly-named imaginary time of physics and mathematics unites with pi (both
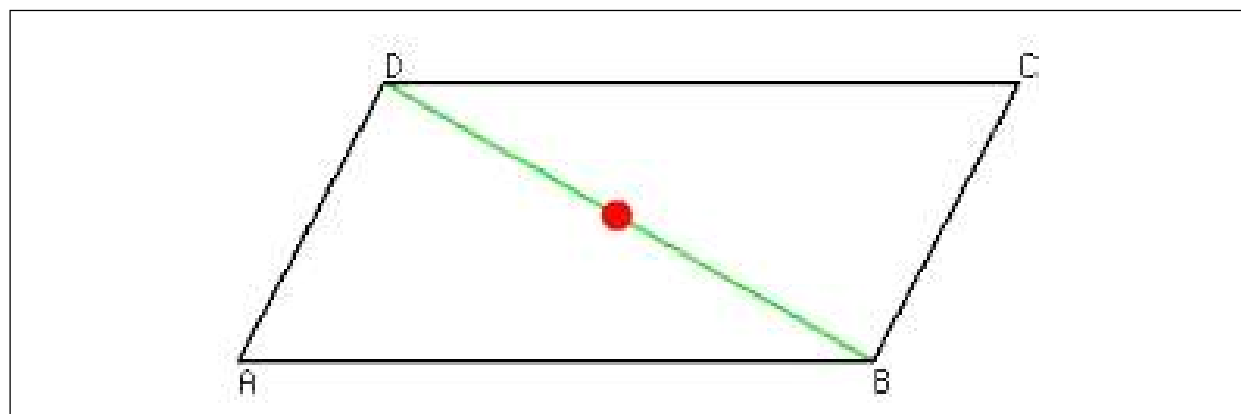
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Figure 4: VTS (Vector-Tensor-Scalar) Geometry

are necessary to generate a non-Big-Bang cosmos, i.e., an infinite universe which, because space and time can never be separated, is eternal: alone, unbounded imaginary time is finite). This manipulation of time, space, and the universe with virtual and augmented reality might possibly be produced by the two-valued binary-digit system used in electronics. The system could traverse a wormhole, or shortcut between folds in space and time, designed by humans of the far future. All points in space and all points in time are unified or entangled into one spacetime. Therefore, the augmented reality which is layered on "other" points in space-time actually isn't transmitted to other points—only one ever exists.

10. Vector-Tensor-Scalar (VTS) Geometry

10.1. Gravity, the Higgs and Jets

"Dust grains assemble by chemical bonding. Once they are sand or gravel sized, how they continue to stick is a mystery. Meter-sized rocks should spiral into the star rapidly due to disc drag (the gas orbits a little slower than the rocks as a pressure gradient partially supports it). Once rocks somehow get past these barriers, they collide with each other in a chaotic and random way assembling the planets" Australian National University (2012-2019).

The following method of building planets is preferred to collisions between rocks and dust in the disc because most planetary systems seem to outweigh the protoplanetary discs in which they formed, leaving astronomers to re-evaluate planet-formation theories (Astronomy, 2019).

Interaction of gravitation and electromagnetism produces a momentum in gravitons and photons (and a pressure which is known as mass). VTS geometry inspired by Einstein (1919). A vector is a quantity which possesses both magnitude and direction. Two such quantities acting on a point may be represented by two adjoining sides of a parallelogram, so that their resultant is represented in magnitude and direction by the diagonal of the parallelogram (AD and CD, for example, can symbolize the electromagnetic and gravitational vectors ... while the resultant green diagonal of DB substitutes for the interaction of those two forces). A scalar variable is representable by a position on a line, having only magnitude, e.g., the red dot on the diagonal, symbolic of the Higgs boson. A tensor is a set of functions which, when changing from one set of coordinates to another, are transformed in a precisely defined manner (e.g., changing from the coordinates of AD and CD to those of the green diagonal, or of the red dot, is a transformation performed in a particular way). Adapted from Macquarie (2001) two sides thus illustrate the graviton's spin 2 and the photon's spin 1. The resultant diagonal represents the interaction of the sides/vectors (1/2 = the spin one-half of every matter particle). Tensor calculus changes the coordinates of the sides and diagonal into the coordinates of a single (scalar) point on the diagonal. This scalar point is associated with particles of spin 0 (Klauber, 2018). If the mass produced during the photon-graviton interaction (the energy and momentum of photons and presently hypothetical gravitons produces a pressure we call mass*) happens to be 125 GeV/c², its union with spin 0 produces the Higgs boson. GeV/c² originates with $E = mc^2$ solved for m ($m = E/c^2$, or mass equals the Energy of 125 Giga-billion-electron Volts divided by the speed of light squared). The short version is that the mass of the Higgs particle is 125 GeV.

125 GeV/c² united with spin 0 means the central scalar point of the Higgs boson is related to the vector of the graviton's spin 2, and the Higgs field is therefore united with the supposedly unrelated gravitational field (together with the latter's constant interaction with the electromagnetic field).

*Material from a star could fall onto a neutron star, heating it up and causing it to emit radiation. Then the energy and momentum of the photons and presently hypothetical gravitons would be the interaction of electromagnetism (the charged particles and strong magnetism) with the neutron star's powerful gravity. The heating could produce gravitational and electromagnetic radiation which would produce the mass and quantum spin of subatomic particles—instead of only radiation being emitted, jets of matter would be emitted too (normally, the matter would be emitted as beams or jets from the neutron star's magnetic poles).

Vector-Tensor-Scalar Geometry hints that electromagnetic as well as gravitational waves may be detected since both types of waves may be involved with production of black holes' mass. Of course, electromagnetic radiation cannot escape the intense gravitation and the only way it could be accessed is via a truly universal entanglement—it would need to include macroscopic as well as quantum entanglement. All waves could then be put to work and give us many forms of energy-electrical, magnetic, radio, optical, X-ray, gravitational energy of various amplitudes, frequencies and phases.

10.2. Bosons and Planet/Black-Hole Formation

It must be remembered that referring to space alone is incomplete. Living in space-time, it is necessary to add some sentences about the time factor. The photon must interact with the graviton to produce the mass of the weak nuclear force's 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 (Richard Feynman, 20th century winner of the Nobel Prize in Physics, used reversal-of-time to explain antimatter) 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 – 1/2 +1/2 = the spin 1 of W and Z bosons). The strong nuclear force's gluon's quantum spin of 1 could arise in the same way as the spin 1 of weak-force bosons. The masslessness of gluons might be produced by retarded and advanced waves*** cancelling. They neutralize each other, producing a mass of zero and relating gluons to the Higgs boson whose zero quantity is its quantum spin.

** Hawking (1988) writes—"What the spin of a particle really tells us is what the particle looks like from different directions."

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.

Spin 1/2 is logically like a Mobius strip, though Hawking does not specifically say so. This is because a particle of matter has to be turned through two complete revolutions to look the same, and you must travel around a Mobius strip twice to reach the starting point.

*** "When we solve (19th century Scottish physicist James Clerk) Maxwell's equations for light, we find not one but two solutions: a 'retarded' wave, which represents the standard motion of light from one point to another; but also an 'advanced' wave, where the light beam goes backward in time. Engineers have simply dismissed the advanced wave as a mathematical curiosity since the retarded waves so accurately predicted the behavior of radio, microwaves, TV, radar, and X-rays. But for physicists, the advanced wave has been a nagging problem for the past century (Kaku, 2009).

The interacting gravity and electromagnetism produce mass, e.g., they can form a Higgs boson or the strong/weak nuclear forces' bosons as well as matter. On a cosmic level—if gravitational and electromagnetic waves focus on a protoplanetary disc surrounding a newborn star, the quantum spin of the particles of matter in the disc (1/2) could imprint itself on the waves' interaction and build up a planet layer by layer from vector-tensor-scalar geometry's one-divided-by-two interaction. If the waves focus on a region of space where there's no matter, the opposite interaction occurs and the graviton's spin 2 is divided by the photon's spin 1 to produce 2/1. The mass produced has the spin inherent in each of the gravitons composing space-time and could be an alternative, or complementary, method to supernovas for producing the gravitational waves making up black holes.

Quaternions were first described by Irish mathematician William Rowan (Hamilton, 1843). Hamilton defined a quaternion as the quotient of two vectors. In this case: the quotient of two vectors is 1/2, the division of the

electromagnetic vector (photonic quantum spin of 1) by the gravitational vector (gravitonic quantum spin of 2). In other words, the term "diagonal" (like 1/2, the result of these 2 vectors interacting) in VTS Geometry can be replaced with the term "quaternion". And the counterclockwise rotation of the (horizontal) x- and (vertical) y-axes in Wick Rotation can be viewed as either rotation into diagonal form or as a quaternion function.

Spinors—elements of a complex vector space that were introduced in geometry by Élie Cartan (1913)—can be viewed as the "square roots" of vectors. This indicates that spinors are a guide to the mathematical interactions between gravitation and electromagnetism outlined by the gravitational and electromagnetic vectors of Vector-tensor-scalar geometry.

11. Novel Results Derived from Einstein's Gravity

11.1. Ocean Tides

A lot has been said about gravitation, e.g., regarding dark matter and dark energy, curves and flatness in space-time, rotation, redshift, VTS geometry. It is thus appropriate to say a bit more about it. Albert Einstein thought of gravity as a push caused by the warping and curvature of space-time, not as a pull. How, then, can repelling or pushing gravity account for the apparent attraction of ocean tides towards the Moon? I believe Galileo's idea that the Earth's movements slosh its water needs to be joined with the idea of Isaac Newton and Johannes Kepler that the moon causes the tides.

"If a barge (carrying a cargo of freshwater) suddenly ground to a halt on a sandbar, for instance, the water pushed up towards the bow then bounced back toward the stern, doing this several times with ever decreasing agitation until it returned to a level state. Galileo realized that the Earth's dual motion—its daily one around its axis and its annual one around the sun—might have the same effect on oceans and other great bodies of water as the barge had on its freshwater cargo" Tyson (2002).

Gravity's apparent attraction can be summarized by the following—the momentum of the gravitons (united with far more energetic photons) carries objects towards Earth's centre at 9.8 m/s or 32 ft/s. The volume of the oceans on Earth
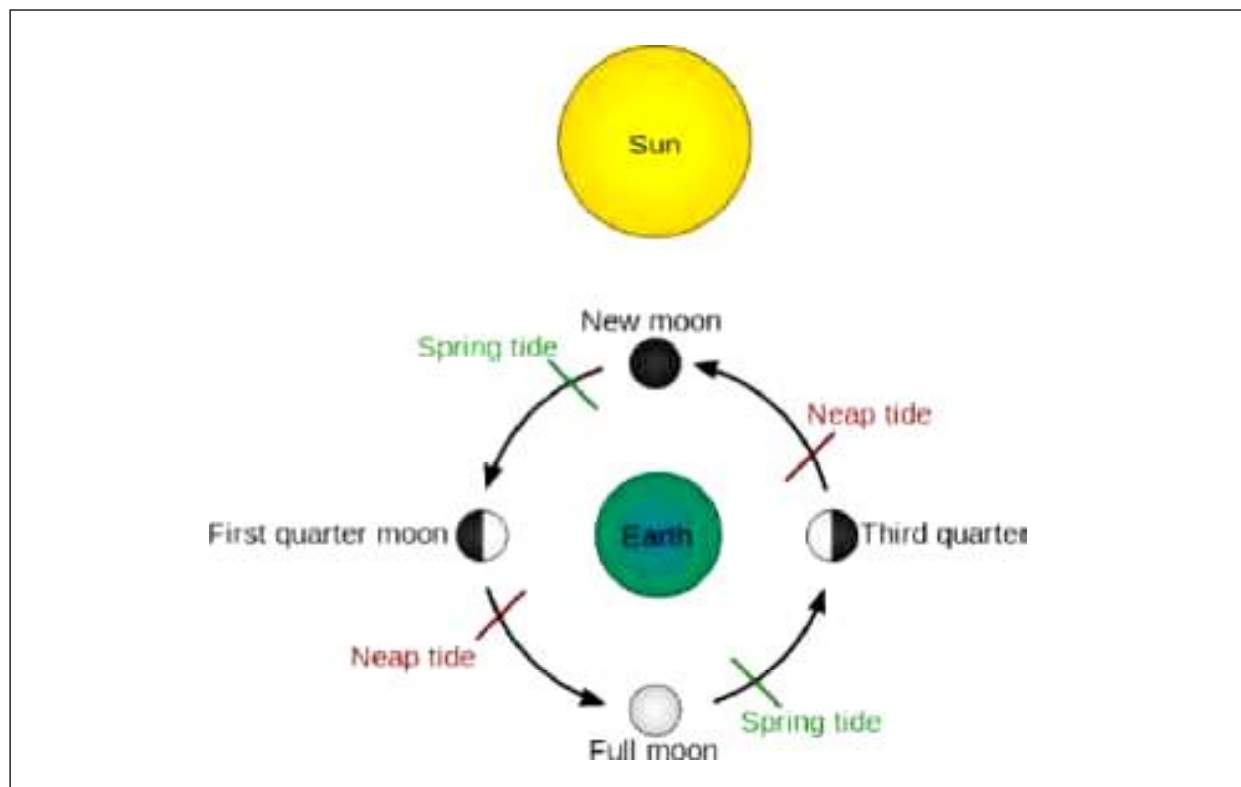

Figure 5: Tide Schematic

Note: Does explanation of spring and neap tides require combining the theories of Newton, Kepler and Galileo? – public domain image from https://en.wikipedia.Org/wiki/File:Tide_schematic.svg

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is estimated at nearly 1.5 billion cubic km (Van Nostrand, 2008). All this water is being pushed towards Earth's center at 32 feet per second every second. But the seafloor prevents its descent. So there is a recoil. This recoil is larger during the spring tides seen at full and new moon because Sun, Earth and Moon are aligned at these times.

The previous paragraph's alignment of Sun, Earth and Moon refers to their being lined up where the gravitational current is greatest (in the plane where planets and moons are created*)—and to more of the gravitational waves traveling from the outer solar system being captured (absorbed**) by the solar and lunar bodies, and less of them being available on Earth to suppress oceanic recoil (there are still enough to maintain the falling-bodies rate of 32 feet per second per second). At the neap tides of 1st and 3rd quarter; the sun, earth and moon aren't lined up but form a right angle and our planet has access to more gravitational waves, which suppress oceanic recoil to a greater degree. We can imagine the sun and moon pulling earth's water in different directions at neap tide but suppression is a more accurate description. If variables like wind/atmospheric pressure/storms are deleted, this greater suppression causes neap tides which are much lower than spring tides.

*A similar narrow plane, the consequence of gravitational currents, may be responsible for the orbits of many of the dwarf satellite galaxies of the Milky Way and Andromeda.

**In the Section 10.2 was this sentence, "On a cosmic level—if gravitational and electromagnetic waves focus on a protoplanetary disc surrounding a newborn star, the quantum spin of the particles of matter in the disc (1/2) could imprint itself on the waves ..." Such interaction with matter in a disc implies that gravity does not simply penetrate everything but is absorbed and re-radiated.

Let us apply this article's concept of gravity to a few other instances:

11.2. M-Sigma

The M-sigma relationship was only discovered in 2000 and is observational, meaning scientists noticed it first and are now trying to understand the cause. M refers to the mass of a galaxy's central black hole, and sigma stands for the speed at which stars fly about in the galaxy's bulge. The bigger the black hole, the faster the stars move—the greater is their velocity dispersion (Astronomy, 2016).

Gravitational waves would explain the simultaneous increase in black-hole mass I increase in stellar velocity dispersion. Some of the ocean waves passing an island are refracted—when they enter shallow water, they are refracted by friction with the mass of the seabed. They change direction and head towards the island, breaking onto its beaches. Similarly, gravitational waves are refracted and focus on the centre of a mass. In this case, the mass the waves are headed toward is the black hole, where they help form its composition (and increase the black-hole mass).

General Relativity proposes that the space-time composing the cosmos IS gravitation. Gravitational waves not only compose space-time but also so-called "imaginary" space-time (which is described with imaginary numbers such as i = square root of –1, exists on the Complex Number Plane's y-axis, can interact with our dimension on the x-axis, and is the possible domain of what are called dark matter and dark energy). The linear motion of waves headed towards the central black hole and striking stars' sides during the journey is converted into perpendicular velocity of the stars since the pertinent gravitational waves of imaginary time are at 90 degrees to the linear motion of waves headed towards the central black hole, though in the same plane (recall how we can picture imaginary time as another kind of time in the vertical direction when familiar time is a horizontal line, and also recall that x-axis space-time and y-axis space-time interact).

11.3. Geysers on Saturn's Moon Enceladus

'A small waterjet on Enceladus, an icy moon of Saturn, spews its fiercest eruptions when the moon is farthest from the planet, a new study suggests, but the overall gas output doesn't increase much during that time. The study points to a mystery in Enceladus' plumbing" Howell (2016).

In 1919, Albert Einstein submitted a paper to the Prussian Academy of Sciences asking "Do gravitational fields play an essential role in the structure of elementary particles?" If so, gravitational waves from deep space would focus on the centre of a planet's mass. When Enceladus is near Saturn, it would also be close to increased activity of the waves. The increased push from them would suppress emission of dust-sized water-ice grains, which is 3 times greater at the moon's farthest point because suppression is reduced there. Gas emission is also increased. Since this is not 3 times more, but only 20% more, a plumbing problem would be causing the discrepancy.

11.4. A Brief History of Gravity

In three dimensions, the gravitational force drops to 1/4 if one doubles the distance. In four dimensions it would drop to 1/8, and in five dimensions to 1/16. The positive direction on the x- axis (representing the length, width and depth of "real" space-time) is an extension of the negative direction on x (this may be called the 5th space dimension or complex space-time). Therefore, real gravity is perpetually amplified by complex gravity. Using science's figures, the amplification equals 1/4 multiplied by 1/4, i.e., doubling the distance in 5 space dimensions causes gravity to become 1/16 as powerful. It is not 1/4 multiplied by –1/4 since numbers have the same property regardless of direction on the Complex Number Plane (they increase in value). To conserve this sameness, the second one must be +1/4 if the first one is +1/4. Alternatively, the gravity's strength is reduced 4 times and this number is multiplied by another 4 to reduce it 16 times overall. In the 4th space dimension/2nd time dimension represented by the imaginary axis, this y-axis is half the distance (90 degrees) from the real x-axis that the complex x-axis is (the complex is removed 180 degrees). So gravitational weakening from doubling distance in 4 space dimensions = (reduction of 4 times multiplied by another reduction of 4 times) *I* 2, for an overall reduction of 8 times to a strength of 1/8.

11.5. Information Theory Conquers a Red Giant

In about 5 billion years the Sun is supposed to expand into a red giant and engulf Mercury and Venus and possibly Earth (the expansion would probably make Earth uninhabitable in less than 1 billion years). It's entirely possible that there may not even be a red giant phase for the Sun. This relies on entropy being looked at from another angle - with the apparent randomness in quantum and cosmic processes obeying Chaos theory, in which there's a hidden order behind apparent randomness. Expansion to a Red Giant could then be described with the Information Theory vital to the Internet, mathematics, deep space, etc. In information theory, entropy is defined as a logarithmic measure of the rate of transfer of information. This definition introduces a hidden exactness, removing superficial probability. It suggests it is possible for information to be transmitted to objects, processes, or systems and restore them to a previous state—like refreshing (reloading) a computer screen. Potentially, the Sun could be prevented from becoming a red giant and returned to a previous state in a billion years (or far less)—and repeatedly every billion years—so Earth could remain habitable permanently.

12. Novel Results from Maxwell's Electromagnetism

12.1. Newtonian Gravity and Retarded/Advanced Waves

Albert Einstein's equations in the theory of General Relativity say gravitational fields carry enough information about electromagnetism to allow James Clerk Maxwell's equations to be restated in terms of these gravitational fields. This was discovered by the mathematical physicist Rainich (1925). Following the phrasing of the opening sentence, Einstein's Gravity was discussed first—in the previous section—and Maxwell's Electromagnetism is the subject of this section.

In the Section 10.2, it was quoted that "When we solve (19th-century Scottish physicist James Clerk) Maxwell's equations for light, we find not one but two solutions: a 'retarded' wave, which represents the standard motion of light from one point to another; but also an 'advanced' wave, where the light beam goes backward in time." Thanks to George Yuri Rainich, it can be reasoned that gravitational—as well as electromagnetic—waves possess both advanced and retarded components. Advanced waves are usually discarded because they are thought to violate the causality principle: waves could be detected before their emission. On one level, I can appreciate that reasoning. But ultimately, I think it is an error that should be replaced by Isaac Newton's idea of gravity and the modern idea of quantum mechanics' entanglement. 17th century scientist Isaac Newton's idea of gravity acting instantly across the universe could be explained by the ability of gravitational waves to travel back in time. They thereby reach a point billions of light years away not in billions of years, but the advanced part of a gravitational wave would already be at its destination billions of years before it left its source*, and its journey is apparently instant.

*Arriving at its destination billions of years before it left its source is an absurd impossibility if we cling to the traditional view of time flowing in one direction from cause to effect. But it is plausible if we accept the Block Universe theory which developed from Special Relativity's non-simultaneity of events for different observers. In the Block Universe, all time coexists (the entire past, the present, and every point in the future all exist at once). Time can be visualized as a Cosmic DVD where our brains and consciousness's take the place of the DVD player's laser. Everything in the Cosmic DVD's time exists at once** but we're only aware of an extremely limited number of events at any instant (these make up our present). Gravitational waves arriving billions of years prior to emission can be compared to playing part of the Cosmic DVD in reverse. Waves travel from a later frame of the cosmic movie to an earlier frame.

** If different parts of this manuscript are combined, they show all time exists at once in reality. All mass is composed of gravitational and electromagnetic waves, according to vector-tensor-scalar geometry. Both types of waves possess retarded and advanced components which entangle all masses. Wick rotation (time) is built into the Mobius strips and Klein bottles composing electromagnetism's photons and gravitation's gravitons. Therefore, all time (the entire past and present and future) is united into one thing just as all space and all mass are united into one thing. VTS geometry says space and mass are united and physics already accepts that space and time are united. If space, mass, time, electromagnetism, and gravitation are all aspects of the same thing; that suggests the theory of quantum gravity truly exists. Mathematical equations would be just another aspect of the one thing—a tool—which people deem necessary to prove quantum gravity.

1's and 0's composing electromagnetic and gravitational waves would compose both "advanced" waves going back in time and "retarded" waves going forward in time. The retarded components with +x motion in time can obviously cancel the advanced components with –x motion in time, producing entanglement.

Stars and galaxies, etc., send us retarded light which, through spectroscopy, gives an approximate measurement of how long that light has been traveling (the distance to the astronomical body). The light includes an advanced component that reaches back into the past, producing a measurement that significantly exceeds the real distance. The farther away a star or galaxy is, the more the advanced part of waves from it will reach into the past, giving us a greater inaccuracy regarding its true distance. This increase is analogous to redshift increasing with distance. We might call it readshift – re(tarded) ad(vanced) shift.

When a dinosaur dies, the advanced gravitational and electromagnetic waves composing its particles would continue traveling back in time. By the time its bones or fossilized remains, or the surrounding rocks, were subjected to modern science's dating methods; those advanced waves might have gone so far back in time that the dating method says the dinosaur died 100 million years ago or more. Radioactive dating is thus a form of (advanced) gravitational-wave detection, just as LIGO—the Laser Interferometer Gravitational-wave Observatory—picks up (retarded) gravitational waves. Technology based on the way noise-cancelling headphones work might provide a more accurate reading of when the dinosaur lived. The headphones increase the signal-to-noise ratio by incorporating a microphone that measures ambient sound (noise), generating a waveform that is the exact negative of the ambient sound, and mixing it with any audio signal the listener desires. Generating a waveform that's the exact opposite of the advanced waves emitted by the deceased dinosaur should, at least partially, neutralize the advanced waves and restrict measurement to the retarded waves associated with the animal's decay.

Advanced waves also cause living creatures to age faster than they would without those waves, by extending the creatures' reach into the past (this is equivalent to having lived longer). Neutralizing the advanced waves should dramatically increase the health and lifespan of humans and all other species if it doesn't adversely affect anatomy and physiology, i.e., if the retarded waves which go forward in time are sufficient for normal structure and function.

12.2. Binary Digits, The Brain and The Universe

If the brain and the universe are ultimately composed of binary digits, we will some day be able to do the same things with the brain and universe that we now do with computers.

Figure 6: Mobius Matrix (Mobius Equals a, b, c, d, e Array)
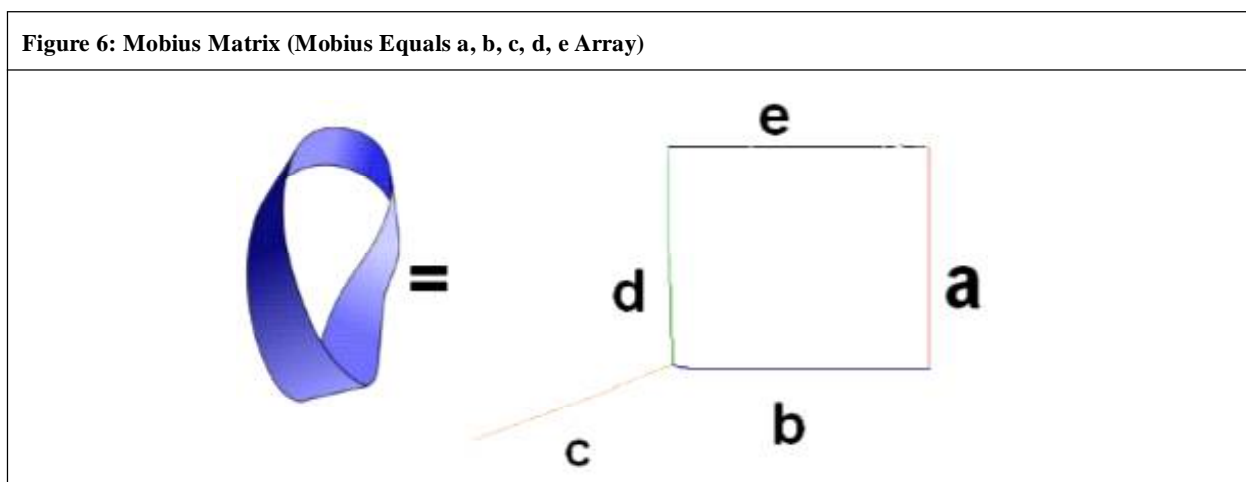
We will be able to record and share any information in any part of the brain. We will be able to transfer (download) the brain's contents into another body or an android—infinite times if necessary—and thus say hello to immortality.

When quantum mechanics and General Relativity are united into quantum gravity or the Theory of Everything, we will have access to everything in space and time. Then we can upload the products of the brain's frontal cortex anywhere to influence anything. We can either add to it (mimicking a computer's copy/paste function), remove (delete) part of it, or change the way it proceeds (reprogram it).

I do not think it'll be possible to change history or to reprogram something to behave differently from the way future history has recorded. This is because I believe time can be visualized as a Cosmic DVD where our brains and consciousness's take the place of the DVD player's laser. This is plausible if we accept the Block Universe theory which developed from Special Relativity's non-simultaneity of events for different observers. In the Block Universe, all time coexists (the entire past, the present, and every point in the future all exist at once). Everything in the Cosmic DVD's time exists at once but we're only aware of an extremely limited number of events at any instant (these make up our present).

12.3. Antigravitons are Quanta of Dark Energy + Immortality

Mathematics has three types of numbers—real, imaginary and complex. Real numbers are exemplified by 0, the positive numbers used in counting, and negative numbers. On a two dimensional "Complex Plane", Real Numbers are on the horizontal plane and Imaginary Numbers such as $i = $ sq rt (-1) are on the vertical plane. Complex Numbers can be easily identified as a combination of Real Numbers and Imaginary Numbers. Olivia (2011) Retarded gravitational and electromagnetic waves that go forwards in the horizontal plane of space-time can be termed real. Advanced waves that go backwards in space-time may be considered complex. The imaginary numbers of the vertical direction could describe waves in an "imaginary space-time"—space-time above the horizontal plane might be called Supers pace or Hyperspace while space-time below that plane would be Subspace.

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) 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 is going to include the Complex Plane's vertical "imaginary" axis in space-time (the "imaginary" realm is at a right angle to the 4 known dimensions of space-time, which all reside on the horizontal real plane). 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, existing in the particles of matter composing side a. In other words, a fundamental composition of matter is mathematics' topological Mobius, which can be depicted in space by binary digits creating a computer image. The twist needs to be exaggerated, with the upper right of the Mobius descending parallel to side "a" then turning perpendicular to it at approximately the level of the = sign, then resuming being parallel. Thus, 90 + 90 (the degrees between b and c added to the degrees between c and d) can equal 180, making a and d parallel. But 90 + 90 can also equal 90, making a and 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).

90 + 90 = 180 corresponds to the familiar composition of space-time (the presently hypothetical graviton) and $90 + 90 = 90^2$ corresponds to the antigraviton. That is, shock waves from space-time disturbances excite already-existing gravitons and antigravitons (and their photonic counterparts) to various frequencies. Dark energy is here postulated to be extra-dimensional, therefore the extra-dimensional antigraviton (extradimensional because it's described by 90 + 90 [90 + 90 – 90] = 90) can be the quantum unit of dark energy. Antigravitons—and their extension, dark energy—can thus be mistaken for "repelling gravitation" which causes the universe to expand from the Big Bang. In reality, dark energy and antigravitons would be involved in the production of dark matter—just as energy and gravitons are involved in the production of matter (recall Albert Einstein's $E = mc^2$ and Subsection 8.1's VTS Geometry). Antigravitons, like gravitons, are an arrangement of Klein bottles with each bottle being composed of two Mobius strips (the former described by 90 + 90 = 90, the latter by 90 + 90 = 180). Trillions of Mobius strips can be added to form photons—or those trillions can be separated into pairs, with each pair forming a Klein bottle and trillions of Klein bottles forming a graviton (see Section 2). James Clerk Maxwell's electromagnetic equations admit two solutions for light (retarded and advanced waves), and George Yuri Rainich's mathematics suggests the same two solutions apply to gravitational waves. Besides following the pattern 90 + 90 – 90 = 90, 90 + 90 = 90 might possibly also follow the pattern in Subsection 9.4 which discusses the

weakening of gravity when distance is doubled in the 4th space dimension/2nd time dimension represented by the imaginary axis—it would be $(90 + 90)/2 = 90$. In 3-dimensional (3-D) space, gravity includes gravitons and retarded waves (mainly). In connected 4-D space, it consists of antigravitons and advanced waves which contribute to the 3rd dimension. Regeneration of bodies and brains might be achieved by regular excitation of antigravitons composing advanced waves which reach into the past to a time when a person's body/brain was younger and healthier. When regeneration has been attained, the advanced waves could be neutralised to prevent them reaching further into the past which would be equivalent to having lived longer (see Subsection 10.1).

12.4. Intergalactic Robots and Neo-Telescopes

Unifying gravitation and electromagnetism has this consequence: A 2009 electrical-engineering experiment at America's Yale University, together with the ideas of Albert Einstein, tells us how we could travel to other stars and galaxies. An electrical engineering team at Yale demonstrated that, on silicon-chip and transistor scales, light can attract and repel itself like electric charges or magnets Li *et al.* (2009). This is the Optical Bonding Force. For 30 years until his death in 1955, Einstein worked on his Unified Field Theory with the aim of uniting electromagnetism (light is one form of this) and gravitation. Achievement of this means the quantum components (gravitons) of gravity/spacetime-warps between spaceships and stars could mimic the optical force and be attracted together, thereby eliminating distance (this, possibly acting in partnership with repulsion, could produce a wormhole, or shortcut between folds in space and time). If the gravitons are superposed and entangled, distances between both points in space and points in time are totally eliminated.

As stated in a robotics lesson, "the time variable t varies from 0 to 1, that is, 0 is less than or equal to t which < or = 1 (MATLAB, 2019). Therefore, this article's logic states that 0 may be equal to 1 (division by 1 is accepted, so why is not division by 0?) Since time is permanently united with space in physics, $0 = 1$ in space-time too. This is consistent with a proposed future theory of physics called Quantum Gravity; where Quantum Mechanics is united with General Relativity, Einstein's theory of gravity. A possible path to attainment of quantum gravity is realizing that all objects and events on Earth and in space-time are just one thing—like 0 equaling 1, and like the objects in a computer image seeming to be a lot of separate objects but really just being one thing (strings of binary digits). A spacecraft sitting on its Launchpad can be assigned $t = 0$, and its destination $t = 1$. Since $0 = 1$, reaching the destination takes the same time as reaching the Launchpad from the craft's position on the Launchpad (travel is instant). Robot motion can also be instant and not require interpolation, which is defined as "making the end of a robot arm move smoothly from A to B through a series of intermediate points". Of course, this is nonsense if viewed from classical mechanics. We need a mindset immersed in quantum mechanics which has been extended to macroscopic entanglement.

To finish on another technological note, the thing that's really needed to learn about the universe is better telescopes. Of course—when I say "better" telescopes, I'm referring to new technology and telescopes that do far more than merely intercept what my hypothesis calls "light waves" for convenience. To be precise, "light waves" would be disturbances in space-time which excite photons to visible-light frequencies. A photon is a quantum of excitation of the electromagnetic field. That field fills all space and so do its quantum modes. (This hypothesis says excited gravitons form gravitational waves.) The new-technology telescopes would use cancelling retarded and advanced waves to create entanglement of the scope with the universe $10^{1000000}$ light years away (or infinitely further).

Acknowledgment

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