

This book adopts the view that the universe is infinite and eternal - but scientifically created. This paradox of creating eternity depends on the advanced electronics developed by future humanity. Those humans will develop time travel, plus programs that use "imaginary" time and infinite numbers like pi. They'll also become the El or Elohim (names used by various religions to mean "God" or "the gods"). As astronomer Carl Sagan wrote in "Pale Blue Dot", "Many religions teach that it is the goal of humans to become gods." (I think that Elohim would be termed supernatural today, though their infinite abilities are actually natural outcomes of progress.)

A look through the book will tell you that some ideas are frequently repeated. This is because each article is meant to be understood without reading the others ... so the same ideas show up in more than one. I've tried to stay away from jargon and equations unless they're necessary (I find that they often make a subject harder to understand, not easier). All objects and events on Earth, in space, and in time (including the inevitability of world peace and immortality) are just one thing - strings of electronics' binary digits 1 and 0.



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Rodney Bartlett has endless curiosity about space and time, and am what you might call a citizen scientist-with membership of ResearchGate (which has been called Facebook for scientists) and ORCID. I have Certificates in Astrophysics from ANU (Australian National University), and in Robotics from Queensland University of Technology, Australia.

Rodney Bartlett

OUT OF TIME

Predicting the Science of Future Centuries and
Millennia



Bartlett



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CHAPTER 1 - HYPOTHESIS OF QUANTUM GRAVITY

Resulting from a Static, Topological Universe Resulting from the Positives and Negatives of the Steady State and Big Bang Theories.

ACKNOWLEDGEMENTS

This article was inspired by 5 scientists – Brian Schmidt and Paul Francis of ANU (Australian National University) who presented some astrophysics courses I signed up for in 2019, Peter Corke of QUT (Queensland University of Technology) who also taught courses I took in 2019, as well as Geraint Lewis and Luke Barnes who published the book “The Cosmic Revolutionary’s Handbook (Or: How to Beat the Big Bang)” in 2020.

ABSTRACT

This hypothesis is the result of my conviction that science will oneday prove everything in space and time is part of a unification. In "A Brief History of Time", Stephen Hawking wrote,

"If everything in the universe depends on everything else in a fundamental way, it might be impossible to get close to a full solution (of the universe's puzzles) by investigating parts of the problem (such as general relativity and quantum mechanics) in isolation."

The goal: to establish a “proof of concept” to which equations can be added. 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, figure-8 Klein bottles and Wick rotation works better. The failed cosmologies have impressive points leading to the idea that they’re 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, dark energy, and electromagnetic-gravitational union. Finally, the article introduces what is called vector-tensor-scalar geometry - and extensions of Einstein's Gravity and Maxwell's Electromagnetism.

KEYWORDS: Gravitation, Electromagnetic-gravitational union, Dark energy, Dark matter, Cosmology, Geometry, Topology

SECTION 1: 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, isn't the Big Bang the ultimate example of creation of mass-energy 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 (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's 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).

SECTION 2: 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 figure-8 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 (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 figure-8 Klein bottles could form a more complex graviton (suggesting union of electromagnetism and gravitation).

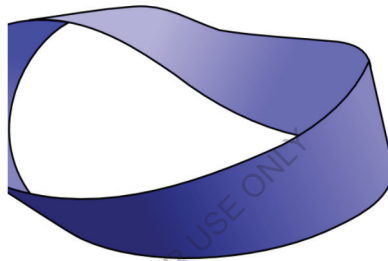


Figure 1 – the Mobius Strip, which is two-dimensional and only has one surface (source: http://www.clker.com/cliparts/3/7/a/9/1220546534781713951lummie_Mobius_Strip.svg.hi.png)

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” to the Mobius strip being a basic, fundamental unit of reality; it can be seen that Pauli’s proposal has an analogy to this article. The doubled Mobius strips (doubled to form a figure-8 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).

SECTION 3: DARK MATTER AND DARK ENERGY

For a hundred and ten years, science has accepted the concept of space-time which was formulated by Russian-German mathematician Hermann Minkowski and unites one time dimension with three space dimensions. Today, so-called imaginary numbers (such as i , which equals $\sqrt{-1}$) describe so-called imaginary time. Imaginary time is a concept derived from special relativity and quantum mechanics. Geometrically, imaginary numbers are found on the vertical axis of the Complex Number Plane, allowing them to be presented perpendicular to the real axis of space-time as we know it. One way of viewing imaginary numbers is to consider a standard number line, positively increasing in magnitude to the right, and negatively increasing in magnitude to the left. At 0 on this x-axis (the so-called real axis), a y-axis (the so-called imaginary axis) can be drawn with "positive" direction going up - "positive" imaginary numbers then increase in magnitude upwards, and "negative" imaginary numbers increase in magnitude downwards.

The ultraviolet catastrophe, also called the Rayleigh–Jeans catastrophe, is a failure of classical physics to predict observed phenomena: it can be shown that a blackbody - a hypothetical perfect absorber and radiator of energy - would release an infinite amount of energy, contradicting the principles of conservation of energy and indicating that a new model for the behaviour of blackbodies was needed. At the start of the 20th century, physicist Max Planck derived the correct solution by making some strange (for the time) assumptions. In particular, Planck assumed that electromagnetic radiation can only be emitted or absorbed in discrete packets, called quanta. Albert Einstein postulated that Planck's quanta were real physical particles (what we now call photons), not just a mathematical fiction. From there, Einstein developed his explanation of the photoelectric effect (when quanta or photons of light shine on certain metals, electrons are released and can form an electric current). So it appears entirely possible that another supposed mathematical trickery (the imaginary y-axis) will find practical application in the future.

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 isn't as simple as energy=mass in all cases i.e. it isn't 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 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.

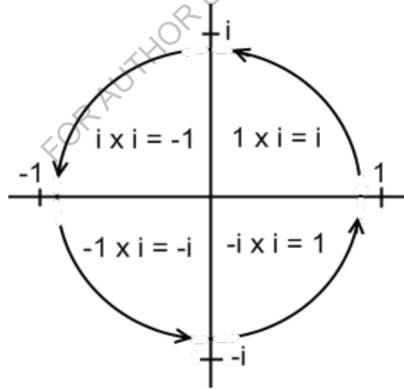


Figure 2 – WICK ROTATION: “The complex plane reveals i 's special relationship with cycles via the circle of i , also known as Wick rotation. Whenever a point on the complex plane is multiplied by i , it moves a quarter rotation around the origin or center of the plane.”
[Figure and quote from Welch (2015)]

SECTION 4: 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, figure-8 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 diagram below to help understand how curved space can be flat -

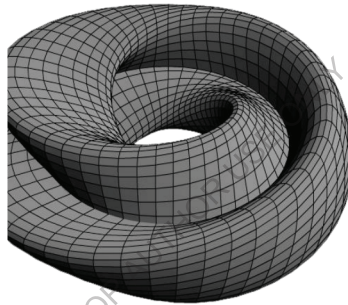


Figure 3 - MOBIUS DOUBLET (FIGURE-8 KLEIN BOTTLE) (source:

<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 (see the 2nd paragraph of Section 6 and the reference to Vanessa Janek). 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 (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 Fig. 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.

SECTION 5: 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 figure-8 Klein bottles composing our universe [either another universe in the multiverse or exterior void, and the interior multiverse member or hole) would be the same as what exists within that surface. This results in the space-time of our universe existing everywhere and everywhen. The relativistic universe is only infinite and eternal because of macroscopic entanglement – if entanglement could be removed, the universe would be finite in time and might originate in the Big Bang. The inside and outside of the universe are continuous when it's composed of Mobius strips and figure-8 Klein bottles - there cannot be other universes outside our infinite and eternal universe, and there's no universe with different laws of physics (such a state of supposed multiple universes is called the multiverse).

*"Physicists now believe that entanglement between particles exists everywhere, all the time, and have recently found shocking evidence that it affects the wider, 'macroscopic' world that we inhabit." 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 (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 everywhen), imprints in the microwave background caused by gravitational waves must be unavoidable. This recalls BICEP (Background Imaging of Cosmic Extragalactic Polarization) and the Keck Array - a series of experiments which aim to measure the polarization of the CMB. Reports stated in March 2014 that BICEP2 had detected imprints from gravitational waves but cosmic dust is now considered the most likely explanation for the detected signal by many scientists. This article predicts that imprints in the CMB from gravitational waves will one day be detected unambiguously and not interpreted as evidence of inflation.

SECTION 6: THE STATIC NON-MULTIVERSE AND PERSPECTIVE

For the note below on the figure-8 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/figure-8 Klein bottle) ... topology". Janek (2015)

A flat universe that is also simply connected implies an infinite universe (see under Fig. 3 - the reference to Jean-Pierre Luminet). 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 Fig. 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 proton 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 the last paragraph of the next section (7), 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's 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 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 focussed, say, 12 billion light years away, they'd detect these clouds of material that coalesce into galaxies. When telescopes focus far beyond that, they see nothing. This is not because there's nothing to see earlier than the Big Bang. It's 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 ($\text{Ly}\alpha$) 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 method's consistent with the reference in the first paragraph of section 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).

SECTION 7: QUANTUM FLUCTUATION AND REDSHIFT DRIFT

It's correct to point out that this article is proposing creation of mass-energy. However, there's 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's 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 (figure-8 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 arcseconds). It's attracted to the mass at the centre 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 article's proposed topological model does indeed

work better, it must be able to provide an explanation of drift that's just as feasible.

As noted at the beginning of this section, "It's correct to point out that this article is proposing creation of mass-energy. However, there's no proposal of expanding (or contracting) space-time at a cosmic scale – and no proposal of creation from nothing." It's proposed that creation of mass-energy continually produces a greater number of gravitational wells for light to escape from - gravitationally 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's 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.

SECTION 8 - VECTOR-TENSOR-SCALAR (VTS) GEOMETRY

SUBSECTION 8.1 - 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. Metre-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)

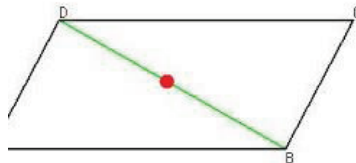


Fig. 4 – VTS (VECTOR-TENSOR-SCALAR) GEOMETRY - Interaction of Gravitation and Electromagnetism Produces a Momentum in Gravitons and Photons (and a Pressure Which is Known as Mass). VTS Geometry inspired by Einstein (1919)

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 ($1 \div 2 =$ the spin $\frac{1}{2}$ 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 $125 \text{ GeV}/c^2$, its union with spin 0 produces the Higgs boson. $125 \text{ GeV}/c^2$ 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. This results in wave-particle duality. 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).

SUBSECTION 8.2 - BOSONS AND PLANET/BLACK-HOLE FORMATION

It must be remembered that referring to space alone is 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 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 ($1 - \frac{1}{2} + \frac{1}{2} =$ 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. Every reaction in this section except one may be explicable purely by the retarded** portions of waves interacting. 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.

*Professor Stephen Hawking writes, Hawking (1988) -

"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 $\frac{1}{2}$ is logically like a Mobius strip, though Hawking doesn't 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 $1 \div 2$ 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 $2 \div 1$. The mass produced has the spin inherent in each of the gravitons composing spacetime - and could be an alternative, or complementary, method to supernovas for producing the gravitational waves making up black holes.

SECTION 9 – NOVEL RESULTS DERIVED FROM EINSTEIN'S GRAVITY

SUBSECTION 9.1 - 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's 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 summarised 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 is estimated at nearly 1.5 billion cubic kilometres. Van Nostrand (2008) All this water is being pushed towards Earth's centre 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 travelling 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 final paragraph of Section 8 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.

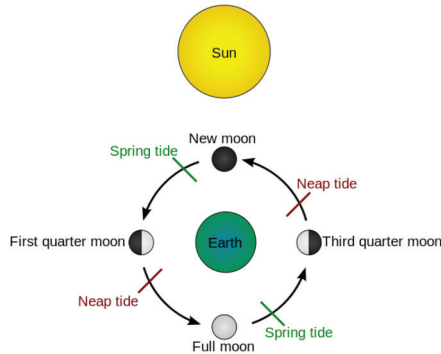


Figure 5 – TIDE SCHEMATIC - Does explanation of spring and neap tides require combining the theories of Newton, Kepler and Galileo? - public domain image from https://en.wikipedia.org/wiki/File:Tide_schematic.svg

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

SUBSECTION 9.2 - 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 / increase in stellar velocity dispersion. Some of the ocean waves passing an island are refracted - when they enter shallow water, they're 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 $i=\sqrt{-1}$, 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 increased (and perpendicular) velocity of the stars since the gravitational waves of imaginary time are simultaneously at 90 degrees to each dimension of the gravitational waves of familiar space-time (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).

SUBSECTION 9.3 - GEYSERS ON SATURN'S MOON ENCELADUS

"A small water jet 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.

SUBSECTION 9.4 - 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) / 2, for an overall reduction of 8 times to a strength of 1/8.

SUBSECTION 9.5 - 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's 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.

SECTION 10 – NOVEL RESULTS FROM MAXWELL' S ELECTROMAGNETISM

SUBSECTION 10.1 - NEWTONIAN GRAVITY AND RETARDED/ ADVANCED

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 George Yuri Rainich. 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.

Near the end of Section 8, 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's 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's 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 consciousnesses 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 figure-8 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 travelling (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). Neutralising 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.

SUBSECTION 10.2 - ANTIGRAVITONS ARE QUANTA OF DARK ENERGY + IMMORTALITY

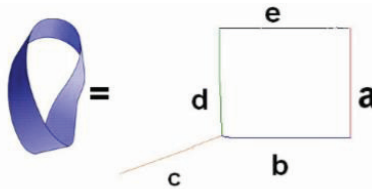


Figure 6 – MOBIUS MATRIX (Möbius equals a,b,c,d,e array)

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 $i=\sqrt{-1}$ 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 spacetime" - spacetime above the horizontal plane might be called Superspace or Hyperspace while spacetime 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 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 (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 & 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).

$90+90=180$ corresponds to the familiar composition of space-time (the presently hypothetical graviton) and $90+90=90^*$ 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 figure-8 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 figure-8 Klein bottle and trillions of Klein bottles forming a graviton (see Section 2).

*Since these numbers are also describing space-time (although an unfamiliar aspect of it), this is actually $90+90-90=90$ since it follows the same pattern as $1+1/2-1/2=1$ describing the spin 1 of W and Z bosons in Subsection 8.2. 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).

SUBSECTION 10.3 - 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 (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, $0 \leq t \leq 1$ ". MATLAB (2019) Therefore, this article's logic states that 0 may be equal to 1 (division by 1 is accepted, so why isn't 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 equalling 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 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 $10^{1,000,000}$ light years away (or infinitely further).

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CHAPTER 2 - THE PHYSICIST AND THE PHILOSOPHER

ABSTRACT

This is a brief discussion I started in the "Questions" section of ResearchGate's website. It's largely based on posts by Valentyn Nastasenko (the Physicist) and myself (the Philosopher), with just a few minor additions to make my position clearer. Topics include "Intergalactic and time travel via division by zero" as well as "Computer Science Brings Changes to Medicine and Physics That Give Everyone in History Eternal Life NOW".

INTRODUCTION BY PHILOSOPHER:

INTERGALACTIC AND TIME TRAVEL VIA DIVISION BY ZERO

As stated in a robotics lesson, "the time variable t varies from 0 to 1, that is, $0 \leq t \leq 1$ ". Therefore, this discussion's logic states that 0 may be equal to 1 (division by 1 is accepted, so why isn't 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 equalling 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 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.

Physicist: Even mathematicians avoid division by 0. And what is the physical essence of this process?

Philosopher: I think the reason people, including mathematicians, avoid division by zero is that they regard zero as nothing. My statement in the discussion "... 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)" is a hint

that zero is something. The binary digit 0 isn't merely a placeholder but is just as vital as the binary digit 1.

Physicist: Your reasoning is abstract and far from real physics.

Philosopher: I'm trying to be consistent with a theory of quantum gravity (see original post in discussion). Since that theory doesn't exist in the early 21st century, my reasoning must naturally be far from the "real" physics of the present. But ultimately, my reasoning can still be correct!

Physicist: I understand your interest in this issue. Your work can be appreciated by others. I hope you find them.

Conclusion by Philosopher: Computer Science Brings Changes to Medicine and Physics That Give Everyone in History Eternal Life NOW

Recalling my statement in the discussion that "all objects and events on Earth and in space-time are just one thing ... 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)".

If this is true, your consciousness and mine could exist forever since it isn't merely connected to the brain inside our heads at this moment. It's connected to all the space and time in the universe.

I also believe the universe has always existed and always will. So you and I not only could, but would, live infinitely long after the bodies we're in reach their expiry dates and infinitely long before conception. We could never remember life prior to conception because our memories are now limited to those acquired by the brain we possess. Evil or insane people like Hitler would be freed of the brain's limitations at death and connection to everything in space and time must, I think, UNAVOIDABLY give them the necessary perspective to become good people who deserve immortality.

Why has nobody returned after death to give us proof of this possibility? I think it may be that eternal life only exists as a result of what happens during this Earthly portion of our lifetime. Those who have "died" can never risk coming back to tell us about life after death because we'd then become complacent and would lose incentive to cause eternal life to come into existence. The silence of the deceased would be due to strict non-interference with civilization's progress ... if you like, obeying the Prime Directive which Star Trek brings to our attention.

I know these ideas go far beyond medical practice and physics as they're presently understood. But that doesn't automatically make the ideas wrong (look in history books - all sciences have often adopted changes).

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CHAPTER 3 - ATTENTION MEDICAL DOCTORS! PHYSICS THEORY IMPLIES ALL PATIENTS CAN BE NORMALISED USING GRAVITY

ABSTRACT

It seems possible that unavoidable health benefits lie in physics and a paper about gravity and matter which was published by Albert Einstein a century ago (this article relies on the great physicist's wish that he had made a bigger contribution to medicine). The unavoidable benefits would provide a plausible explanation of the placebo effect. In a thousand years, people might have learned how to navigate the gravitational waves connecting them to substances, so that they receive the benefits they need while avoiding side effects they don't want. This is possible because 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. This last would permit today to connect with the 31st century. Science might prove these ideas to be true oneday. At the moment, it can only detect gravitational waves from extreme events like colliding black holes. But in a century, it may well be routinely detecting the gravity connecting the body with other substances.

LETTER

An article in the Los Angeles Times reports that the work of a few medical specialists – pharmacologist, gastroenterologist, surgeon - says sodium bicarbonate makes drugs, including Nexium, a lot more effective [1]. It also seems possible that any benefits of sodium bicarbonate lie in physics and a paper published by Albert Einstein a century ago. That paper is "Do gravitational fields play an essential role in the structure of elementary particles?" [2]. The world thinks of this paper as a mistake by Einstein, but maybe it wasn't.

The gravity surrounding us is absolutely everywhere, all the time. If the particles composing both the patient and their treatment (such as sodium bicarbonate) include gravitational fields, the patient and treatment would always be connected because gravity always fills any intervening space. This is a plausible explanation of the placebo effect in which health benefits occur despite no

medicine being administered, and being aware of this constant connection to sodium bicarbonate would greatly enhance success of the treatment. Of course, treatment in this case also includes Nexium. Constant gravitational connection to Nexium or any drug would produce dangerous side effects.

In a thousand years, people might have learned how to navigate the gravitational waves connecting them to substances, so that they receive the benefits they need while avoiding side effects they don't want. This is possible because "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" [3]. "Caslav Brukner, working with Vlatko Vedral and two other Imperial College researchers, has uncovered a radical twist. They have shown that moments of time can become entangled too" [4]. If accurate, this last reference would permit today to connect with the 31st century.

Science might prove these ideas to be true oneday. At the moment, it can only detect gravitational waves from extreme events like colliding black holes [5]. But it may well be routinely detecting the gravitational waves associated with the body, and with other substances, within a century.

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- "The Weirdest Link": New Scientist, vol. 181, issue 2440 - 27 March 2004, page 32 - online at <http://www.biophysica.com/QUANTUM.HTM>
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- "LIGO's Twin Black Holes Might Have Been Born Inside a Single Star" by Harvard-Smithsonian Center for Astrophysics - <https://www.cfa.harvard.edu/news/2016-05>

CHAPTER 4 - SETI, EVOLUTION, AND TIME

The answer to the question “Are we alone?” might depend on two things which everyone seems to be overlooking – 1) evolution not being responsible for the origin of life, and 2) time. Extraordinary events like the origin of life require extraordinary explanation. I think Carl Sagan and Charles Darwin would agree. Do you?

Evolution can be observed in the form of adaptation of structure and function to the environment but there’s no reason to extrapolate this so it accounts for life’s origin. In future centuries, human technology will develop terraforming and incredibly advanced genetic engineering of cells - amino acids, proteins, water, nucleic acids, etc which were gathered in space or on planets and combined. This could account for life’s origin since it agrees with 19th-century chemist Louis Pasteur’s proving that life can only originate from life (modern science’s obsession with abiogenesis should take note of Pasteur).

There might then be no other life (on other planets) at present. When humans explore the universe, they could cause life – even technological intelligences – to emerge elsewhere. Development of time travel would allow these intelligences to exist not only in our future but also in our past ... and yes, in our present.

CHAPTER 5 - ANYONS - ONE KEY TO UNLOCK GRAVITATIONAL-ELECTROMAGNETIC UNION, THE TOPOLOGICAL UNIVERSE, SPACE-TIME TRAVEL, FUTURE COMPUTERS, DARK MATTER/DARK ENERGY

Unaffiliated with Institution – Lives in Australia, Member of ResearchGate and ORCID, Certificates in Astrophysics from ANU (Australian National University), Certificates in Robotics from QUT (Queensland University of Technology, Australia)

ABSTRACT

In 1982, MIT physicist Frank Wilczek predicted and named ANYONS, quasiparticles (particle-like formations) that are confined to 2 dimensions and were discovered in 2020. The name might come from Prof. Wilczek's lighthearted comment "anything goes". This article's main goal is to show that anyons could be another name for 1) virtual particles, 2) Mobius strips, and 3) figure-8 Klein bottles. Along the way, we'll see the picture painted by the article confirm that Einstein's dream of gravitational-electromagnetic unity fits in with anyons being Mobius strips. The topological hypothesis offers an explanation of dark matter and dark energy. We'll also have encounters with intergalactic travel and imaginary computers. They really could exist but are imaginary in the sense that they use imaginary time (as well as space-time warping).

KEYWORDS: Anyon, Gravitational-Electromagnetic Unification, Topological Universe, Intergalactic Travel, Future Computers, Dark Matter/Dark Energy.

GRAVITATIONAL-ELECTROMAGNETIC UNIFICATION

What's a method that suggests the unifying of gravitation and electromagnetism? 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 figure-8 Klein bottle (1) 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 (2) 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 (in this case, the 2D package is the Mobius Strip). If it's assumed from supersymmetry that the Mobius contains all the information in both fermionic and bosonic particles, trillions of Mobius strips could form a photon and trillions of more complex figure-8 Klein bottles could form a more complex graviton (suggesting union of electromagnetism and gravitation).

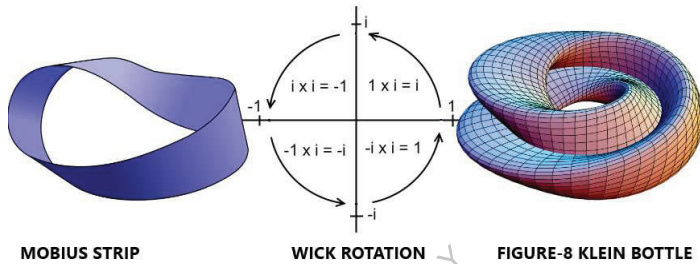


Figure 1 - Mobius/Wick/Klein

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”. (3)

Extending the ideas of “doubling”, “two-valued” and “hidden rotation” to the Mobius strip being a basic, fundamental unit of reality; it can be seen that Pauli’s proposal has an analogy to this article. The doubled Mobius strips (doubled to form a figure-8 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.

The above paragraphs suggest we should follow Einstein's example and not be in favor of a 4 dimensional model but concede to its use to help mathematicians address the calculations necessary to explain general or special relativity. (4)

Also, they imply that the universe we live in needn't be described as 3 spatial dimensions plus one temporal dimension (3+1 space-time) but, in keeping with the theory of a holographic universe's 3 spatial dimensions being a projection from 2 dimensional information, as 2+1 space-time. The universe's foundation wouldn't rest on particles then but on what physics calls quasiparticles: particle-

like objects which exhibit exotic behaviours and may, according to this article's next paragraphs, be identified as Mobius strips and figure-8 Klein bottles (see diagram 1).

According to physics, the electric repulsive force between 2 electrons is due to the exchange of "virtual" photons (undetectable particles which nevertheless have measurable effects on "real", detectable particles). When 2 electrons move past each other, real photons may be emitted. Logically, the real photons must be composed of the pre-existing virtual photons. If it's recalled that photons were described as being composed of trillions of Mobius strips (just before Diagram 1), we conclude that virtual particles are Mobius strips. Or they're more complex figure-8 Klein bottles, when 2 Strips combine to form a more complex Bottle. Trillions of Bottles form the complicated, elusive graviton.

You need to journey round a Mobius twice (make 2 revolutions) to return to the starting point. So if 1 anyon (a 3rd type of particle discovered in 2020, and possibly a Mobius strip or figure-8 Klein bottle according to this article) moves round another, return to the original quantum state can only occur after 3 revolutions - the 2 required to return a Mobius to its start plus the complete revolution of one moving around the other. If the particle under study is a figure-8 Klein bottle, then the revolution of one about the other is supplemented by 4 revs (you go round each of the 2 combined Strips twice), and 5 revs must be completed before return to the original quantum state is achieved. (Physics' theories about anyons predict these revs regarding the quantum state.)

TRAVEL IN SPACE AND TIME

About time and the property called distance between 3 dimensional objects (assuming the universe is holographic and actually resides in 2+1 space-time) -

As stated in a robotics lesson, (5)

"the time variable t varies from 0 to 1, that is, $0 \leq t \leq 1$ ". Therefore, this article's logic states that 0 may be equal to 1 (division by 1 is accepted, so why isn't 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 equalling 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 the binary digits 1

and 0, which can represent electrical pulses being "on" or "off"). 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).

(The distance to the ship's destination and the time to arrive both equal zero.)

The preceding paragraph can be given physical substance by the following experiment performed over a decade ago at Yale University:

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. (6)

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.

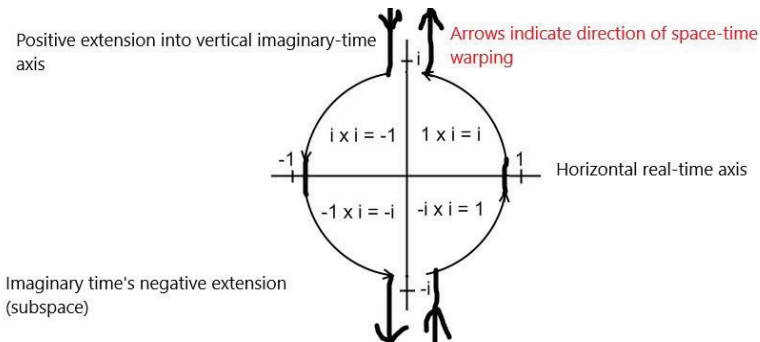


Figure 2

GOING BEYOND QUANTUM COMPUTERS WITH IMAGINARY TIME AND SPACETIME WARPING

Our present approach to developing computers has gone about as far it can. The problems of chips generating too much heat - and of quantum uncertainties making transistors hopelessly unreliable at the scale of atoms - demand a new approach. I'm proposing that the successor to today's silicon technology (and tomorrow's quantum computers) lies in new concepts of time. An "imaginary" computer using the Complex Number Plane's vertical axis of imaginary time can perform calculations at the familiar rate of time's passing while the horizontal axis of "real" time sees absolutely no elapsed time (the possibility of no time passing in the normal sense is hinted at by Special Relativity's time dilation or slowing of time). Referring to diagram 2, space-time is warped and the computer's processing is performed in imaginary time (possibly for trillions of years) - but space-time is warped again so the results can be retrieved in real time where no time at all has elapsed.

For a hundred and ten years, science has accepted the concept of space-time which was formulated by Russian-German mathematician Hermann Minkowski and unites one time dimension with three space dimensions. Today, so-called imaginary numbers (such as i , which equals $\sqrt{-1}$) describe so-called imaginary time. Imaginary time is a concept derived from special relativity and quantum mechanics. Geometrically, imaginary numbers are found on the vertical axis of the Complex Number Plane, allowing them to be presented perpendicular to the real axis of space-time as we know it. One way of viewing imaginary numbers is to consider a standard number line, positively increasing in magnitude to the right, and negatively increasing in magnitude to the left. At 0 on this x-axis (the so-called real axis), a y-axis (the so-called imaginary axis) can be drawn with "positive" direction going up - "positive" imaginary numbers then increase in magnitude upwards, and "negative" imaginary numbers increase in magnitude downwards.

The ultraviolet catastrophe, also called the Rayleigh–Jeans catastrophe, is a failure of classical physics to predict observed phenomena: it can be shown that a blackbody - a hypothetical perfect absorber and radiator of energy - would release an infinite amount of energy, contradicting the principles of conservation of energy and indicating that a new model for the behaviour of blackbodies was needed. At the start of the 20th century, physicist Max Planck derived the correct solution by making some strange (for the time) assumptions. In particular, Planck assumed that electromagnetic radiation can only be emitted or

absorbed in discrete packets, called quanta. Albert Einstein postulated that Planck's quanta were real physical particles (what we now call photons), not just a mathematical fiction. From there, Einstein developed his explanation of the photoelectric effect (when quanta or photons of light shine on certain metals, electrons are released and can form an electric current). So it appears entirely possible that another supposed mathematical trickery (imaginary time) will find practical application in the future in the form of Imaginary Computers.

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 isn't as simple as energy=mass in all cases i.e. it isn't 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 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 (7), 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.

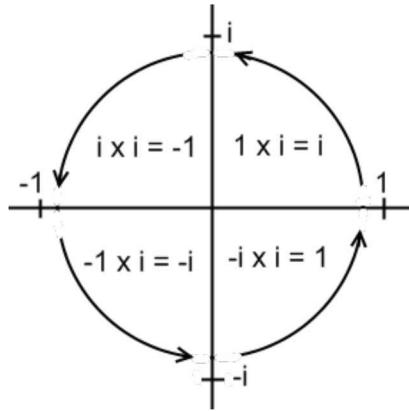


Figure 3 – WICK ROTATION: “The complex plane reveals i ’s special relationship with cycles via the circle of i , also known as Wick rotation. Whenever a point on the complex plane is multiplied by i , it moves a quarter rotation around the origin or center of the plane.”

(8)

EXTRA DIMENSIONS AND SPACE-TIME WARPING

To introduce you to the idea of extra dimensions, consider this – 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. (9)

The temporal dimension would be "imaginary" time and the spatial dimension would be "imaginary" space, which must exist since time cannot exist apart from space (just as there is space-time, there would be imaginary space-time). Now suppose engineers warp space-time so the functioning of a computer's processor takes place in so-called imaginary time. If warping is looped so results emerge in so-called real time, its calculations would be retrieved instantly after they were entered into the computer because billions of years might pass in imaginary time yet no period at all could elapse in our real time. These warps and loops are viable because they're inspired by Einstein's Special Relativity – and propose the use of space-time warping which, though in its infancy, is a technology being worked on today by places like NASA.

USA theoretical physicist Ronald Mallett is also doing experimental work on space-time warping (gravitational warping, since General Relativity defines gravity as the warps and curves in space-time) for the purpose of developing

scientific time travel. He describes his work - called the Space-time Twisting by Light (STL) project - in (10).

"In Einstein's General Theory of Relativity, both matter and energy can create a gravitational field. This means that the energy of a light beam can produce a gravitational field. My current research considers both the weak and strong gravitational fields produced by a single continuously circulating unidirectional beam of light. In the weak gravitational field of an unidirectional ring laser, it is predicted that a spinning neutral particle, when placed in the ring, is dragged around by the resulting gravitational field."

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CHAPTER 6 - WHAT CAUSES THE PLANETS TO SPEED UP AND SLOW DOWN WHILE THEY ARE ORBITING THE SUN?

I thought about this question by Professor of Comparative Studies in Literature Nancy Ann Watanabe (at https://www.researchgate.net/post/What_causes_the_planets_to_speed_up_and_slow_down_while_they_are_orbiting_around_the_Sun) for a long time since I believe it's actually an excellent and complex question. The temptation to reply that it can be completely answered by quoting Newton's laws of gravitation and motion, or Kepler's laws of planetary motion, or even Einstein's view of space-time curvature being gravity, is indeed great. But we need to revert to the classic situation in which a child keeps asking "why" in response to everything he or she hears. The first part of my answer is a proposal that we live in a mathematical universe (though they might or might not agree with the details I propose, this opinion is shared by the scientists Max Tegmark, Erik Verlinde, Ed Fredkin, John Wheeler, and others).

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 figure-8 Klein bottle

Polthier (2003). Polthier, Konrad, "Imaging maths - Inside the Klein bottle", <http://plus.maths.org/content/os/issue26/features/mathart/index>

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 (2017). Afshordi, N. & Corianò, C. & Delle Rose, L. & Gould, E. & Skenderis, K. From Planck Data to Planck Era: Observational Tests of Holographic Cosmology. *Phys. Rev. Lett.* 118, 041301. <https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.118.04130>

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, "Extracting Energy From Black Holes" (10.13140/RG.2.2.20941.05609) proposes this - If it's assumed from supersymmetry that the Mobius contains all the information in both fermionic

and bosonic particles, trillions of Mobius strips could form a photon and trillions of more complex figure-8 Klein bottles could form a more complex graviton (suggesting union of electromagnetism and gravitation).

You need to journey round a Mobius twice (make 2 revolutions) to return to the starting point. So if 1 anyon (a 3rd type of particle that occurs only in two-dimensional systems, was discovered in 2020, and is possibly a Mobius strip or figure-8 Klein bottle according to this discussion) moves round another, return to the original quantum state can only occur after 3 revolutions - the 2 required to return a Mobius to its start plus the complete revolution of one moving around the other. If the particle under study is a figure-8 Klein bottle, then the revolution of one about the other is supplemented by 4 revs (you go round each of the 2 combined Strips twice), and 5 revs must be completed before return to the original quantum state is achieved. (Physics' theories about anyons predict these numbers of revs regarding the quantum state.)

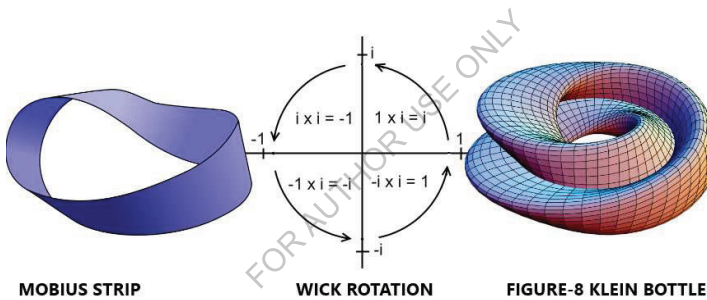


Figure 1 - Mobius strip, Wick rotation, figure-8 Klein bottle

Referring to the figure-8 Klein bottle aka the Mobius doublet: Note that the reddish positive curvature fits together with the bluish negative curvature to produce the outline of a doughnut which is technically flat. 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", making the doublet simply (not multiply) connected. A flat universe that is also simply connected implies an infinite universe.

Luminet (1995): "Cosmic Topology" by Jean-Pierre Luminet and Marc Lachièze-Rey, Physics Reports 254 [3]: 135–214, www.arXiv:gr-qc/9605010

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). Pais, A. Niels Bohr's Times. Oxford: Clarendon Press, p. 201 (1991).

Extending the ideas of “doubling”, “two-valued” and “hidden rotation” from the particle spin Pauli had in mind to the Mobius strip being a basic, fundamental unit of reality; it can be seen that Pauli’s proposal has an analogy to this article. The doubled Mobius strips (doubled to form a figure-8 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. Using the photoelectric effect to explain that the so-called imaginary numbers and imaginary time of the Complex Number Plane's y-axis can be real,* this Wick rotation - after a short section on imaginary computers - is shown to be consistent with Special Relativity’s slowing of time (a.k.a. time dilation).

* At the start of last century, physicist Max Planck assumed that electromagnetic radiation can only be emitted or absorbed in discrete packets, called quanta. Albert Einstein postulated that Planck's quanta were real physical particles (what we now call photons), not just a mathematical device as Planck and most scientists believed for years. From there, Einstein developed his explanation of the photoelectric effect.

PROGRAMMING

(It's a good thing my comments are being read by scientists. You'll give my next words a fair hearing, and you won't respond with a knee-jerk, emotional reaction that fits in with traditional beliefs and with preconceptions.)

The section above logically shows that the universe is composed of mathematics (base-2 maths - the bits or binary digits of 1 and 0 used in electronics) form the Mobius strips which are a foundation of all the information in the universe and its particles. Therefore, the universe is programmed like a computer. This does

NOT mean the *traditional* God created us because we'd then have to ask where that God came from.

The clue is that our origin may be electronic. Eons from now, human electronics will be unimaginably advanced and we're forced to cast aside our bias that men and women will forever be incapable of such a miracle as creation of the universe. If any one of you can absolutely prove people will be similar to today's population in millions or billions of years (not mere centuries or millennia), I'll discard these ideas. If you can't prove we'll be the same, it's only fair to the search for truth that you consider these ideas.

Even an infinite space and eternal time might be created, perhaps by incorporating infinite numbers like pi into electronic calculations of the remote future - and also by transmitting portions of Virtual Reality throughout different times (this would be distantly related to present Augmented Reality). These transmissions show that at least some of the current ideas concerning time travel are on the right track.

So the kid who asks "Why do Kepler's laws of planetary motion work?" just might find a satisfactory answer when told that the universe is programmed. Meanwhile, all the "intelligent" and "scientific" adults will be appalled by such nonsense. It might be a good idea to open your Bible to Matthew 19:14 where Jesus says, "Suffer little children, and forbid them not, to come unto me: for of such is the kingdom of heaven."

CHAPTER 7 - A BRIEF OUTLINE OF THE POSSIBLE BASICS OF COSMOLOGY IN THE 22nd CENTURY, AND WHAT IT MEANS FOR RELIGION

ABSTRACT

This article's conclusion is that the theories of Einstein are generally correct and will still be relevant in the next century (there will be modifications necessary for development of quantum gravity). Those Einsteinian theories are Special Relativity, General Relativity, and the title of a paper he published in 1919 which asked if gravitation plays a role in the composition of elementary particles of matter. This paper was the bridge between General Relativity and the Unified Field Theory he sought during the last 25 years of his life. In an article published in the "Annals of Physics" in 1957, Charles Misner and John Wheeler claimed that Einstein's latest equations demonstrated the unified field theory. But Einstein himself felt he had not fully succeeded.

The present article begins with Olbers' paradox (why is the sky dark at night?) Then it briefly proceeds to the subjects of Newtonian gravity, quantum entanglement, gravitational waves, $E=mc^2$, dark energy, dark matter, cosmic expansion, redshift, blueshift, the cosmic microwave background, the 1st Law of Thermodynamics, and explanation of advanced waves travelling back in time. The section "vector-tensor-scalar geometry" touches on mass, quantum spin, the Higgs boson and Higgs field, stellar jets, the pervasiveness of photons and gravitons, and supersymmetry. Then come half a dozen paragraphs referring to formation of planets, black holes, and bosons of the weak and strong nuclear forces. They end with Descartes' space-matter relation. Also added are paragraphs about simply-connected mathematics, non-orientability, consciousness, the Law of Falling Bodies, the multiverse, space-time travel developed from maths' Brouwer Fixed Point Theorem and from an experiment in electrical engineering performed at Yale University, development from future space-time travel of human flight in the manner of fiction's Superman and Supergirl, as well as downloaded band-gap implants in the brain that could deal with forms of matter. They could add or delete anything and everything we choose by emulating computers' copy/paste function to add things; as well as their delete function, to remove things.

To complete my seemingly unusual ideas, 6 sections are added – 1) "Advanced and Retarded Waves" is extended to include dinosaurs, ageing, and photography,

2) there's a bit about space-time warping and "imaginary" computers, 3) several paragraphs about restoring health (even gaining immortality) by using gravity, 4) a section about superconductivity and the electric or magnetic fields of planets (this section mentions Mercury, Planet 9 and precession), 5) a section titled EXPLAINING OCEAN TIDES WHEN GENERAL RELATIVITY SAYS GRAVITY IS A PUSH CAUSED BY THE CURVATURE OF SPACE-TIME (this has subsections about M-Sigma, Geysers on Saturn's Moon Enceladus, and A Brief History of Gravity), plus 5) the potential of COVID-19 to create the Golden Rule, world peace, eternal life, and a non-economic world that doesn't use any form of money (no cash, credit cards, digital currency, etc.)

The final section is called DISTANT-FUTURE SCIENCE INTERPRETED BY RELIGIONS AS SUPERNATURAL and introduces an idea for becoming immortal in these physical bodies. If the Theory of Everything sought by physicists applies to all space-time, then every person's brain must be entangled with the 22nd century (and far beyond that time too).

THE PARADOX OF AMATEUR ASTRONOMER HEINRICH OLBERS (1758-1840).

Why is the sky dark at night if the universe didn't begin with a Big Bang but is infinite and eternal? If light from the most distant stars has been travelling for a literally infinite amount of time, why hasn't it reached this planet and made our night sky an unbearable blaze? The answer is light's finite speed (specifically, the finite velocity of the "retarded" components of electromagnetic waves which travel forwards in time-space at 186,282 miles per second, or ~300,000 km/s). If space is infinite in extent, it can only be traversed by something journeying at infinite speed. No matter what the unbelievably huge number of light years travelled by the finite speed of a light beam is, light from the most distant stars would still have an infinite distance to cover before it reached Earth.

The inverse-square law [^] only serves to keep the night sky dark. Take two stars of equal brightness. When one of those stars is moved twice as far away, it looks one quarter as bright as its companion. In an infinite universe, that distance could be doubled a million times (an infinite number of times, actually) and the light from the star would - a long, long time ago - have become too faint to ever detect at all by any means.

[^]Science's inverse-square law states that the force of gravity between two particles becomes infinite if the distance of separation between them is zero. Remembering that gravity partly depends on the distance between the centres of

particles, the distance of separation only goes to zero when those particles' centres occupy the same space-time coordinates (not merely when the sides of the particles or objects are touching). In other words, infinity equals the total elimination of distance, both in space and in time. The cosmos could possess this absence of distance in space and time by means of the electronic mechanism of BITS (BInary digiTS). These BITS would make space-time flexible and it could change, or warp, as easily as any image on a computer screen).

EDWIN HUBBLE AND HIS NON-EXPANDING UNIVERSE

Edwin Hubble (1889-1953), the astronomer credited with discovering cosmic expansion, remained doubtful about the expansion interpretation for his entire life. He believed "expanding models are a forced interpretation of the observational results." (E. Hubble, "Effects of Red Shifts on the Distribution of Nebulae", *Ap. J.*, 84, 517 [1936]) According to astronomer Allan Sandage, "Hubble believed that his count data gave a more reasonable result concerning spatial curvature if the redshift correction was made assuming no recession. To the very end of his writings he maintained this position, favouring (or at the very least keeping open) the model where no true expansion exists, and therefore that the redshift "represents a hitherto unrecognized principle of nature." (Sandage, Allan, "Edwin Hubble 1889-1953", *The Journal of the Royal Astronomical Society of Canada*, Vol. 83, No.6 [1989])

In other words, Hubble must be turning over in his grave because he'd be horrified by modern cosmology endlessly claiming that he proved universal expansion. Today's astronomers aren't indebted to Hubble for their beliefs, but to their interpretation of both redshift and the cosmic microwave background (CMB). As shown here, the data from these are capable of being interpreted differently - by, respectively, Einstein's gravitational redshift and quantum mechanics' entanglement.

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. A large, close galaxy like M31 (Andromeda) would appear to be approaching us because it isn't far enough away to send us light that's significantly redshifted; but a huge number of its stars are currently approaching us as they orbit Andromeda's centre, and therefore sending us blueshifted light.

All warm objects emit low level microwave radiation e.g. the Sun and other astronomical radio sources emit low level microwave radiation known as the Cosmic Microwave Background (CMB). The photons of the 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 - not because they were once in contact in a pre-inflationary universe. And if gravitons are entangled with microwave photons (they would be if entanglement exists everywhere and everywhen), imprints in the Microwave background caused by gravitational waves must be unavoidable. This recalls BICEP (Background Imaging of Cosmic Extragalactic Polarization) and the Keck Array - a series of experiments which aim to measure the polarization of the CMB. Reports stated in March 2014 that BICEP2 had detected imprints from gravitational waves but cosmic dust is now considered the most likely explanation for the detected signal by many scientists. This article predicts that imprints in the CMB from gravitational waves will oneday be accepted as real, though they won't be evidence of inflation.

[^] “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, “The Weirdest Link”, vol. 181, issue 2440 - 27 March 2004, 32, <http://www.biophysica.com/QUANTUM.HTM>) Though the effect is measured for distances in space, the inseparability of space and time means that moments of time can become entangled too. (Caslav Brukner, Samuel Taylor, Sancho Cheung, Vlatko Vedral, “Quantum Entanglement in Time”, <http://www.arxiv.org/abs/quant-ph/0402127>)

EXTENDING AND QUANTIZING $E=mc^2$

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 ie production of a theory of quantum gravity via unification with the wave-particle duality of quantum mechanics (which has also been repeatedly verified by experiment).

The wave-particle duality mentioned 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/1/elements/YhF9pw>) Gravitational and electromagnetic wave motion (space-time motion) travels at c , the speed of light ie

$$v = f\lambda = \text{distance/duration} = \text{space/time} = c$$

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

$$E = v = f\lambda = \text{distance/duration} = \text{space/time} = c$$

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

$$E = v = f\lambda = \text{distance/duration} = \text{space/time} = mc$$

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 co-movement may be represented by the exponent 2.

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? 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.

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 $E=mc^2$ applies to photons when they're 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.

"A photon is a quantum of excitation of the electromagnetic field. That field fills all space and so do its quantum modes." (Paul Camp, Ph.D. in theoretical physics, <https://www.quora.com/How-big-is-a-photon>)

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 results from the curvature of spacetime (gravity IS space-time) ie 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.

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. (J. A. Wheeler, [January 1955]. "Geons". *Physical Review*. 97 [2]: 511 - doi:10.1103/PhysRev.97.511)

If there's little or no movement of photons and gravitons, the universe could not be expanding (neither can it contract).

SUPERCONDUCTIVITY AND PLANETARY MAGNETIC/ELECTRIC FIELDS

Does General Relativity suggest superconductivity is not caused by the Cooper pair of two electrons but is gravitational and electromagnetic? Does two-time

winner of the Nobel Prize in Physics John Bardeen's comment about the idea of paired electrons not being fully accurate mean that superconductivity is a wave motion? Is a Meissner effect that's not caused by a geodynamo – nor by superconductivity, but related to that phenomenon - responsible for the planets' fields (specifically, Mercury's magnetic field and Venus' electric field)?

The Meissner effect (or Meissner–Ochsenfeld effect) is the expulsion of a magnetic field from a superconductor* during its transition to the superconducting state. The German physicists Walther Meissner and Robert Ochsenfeld discovered this phenomenon in 1933. Regarding the Meissner effect: Think of the electromagnetic wave relativistically. In General Relativity, the simple analogy of space-time being regarded as a rubber sheet is commonly used. Instead of resorting to complex and lengthy relativistic mathematics, we can simply picture an electromagnetic wave as a cylinder made of rubber. If 2 sides of the cylinder are pushed in with your fingers (say, the ones representing the electric component), the sides in the perpendicular direction (representing the magnetic component) will bulge outwards - this can be verified by placing a ruler behind the cylinder. Compressing the electric component will force the magnetic component to bulge outwards - there will be little or no magnetic field within the superconductor, only an external magnetic field. An externally-applied magnetic field also conforms to the bulging outwards and is expelled from within the superconductor.

* High temperature superconductors are known for not displaying the Meissner effect. The explanation below of planetary magnetic fields means, though the fields cannot be a product of the condensed-matter physics known as superconductivity, they might be considered a previously unrecognized variation of superconductivity, which is zero (electrical) resistance.

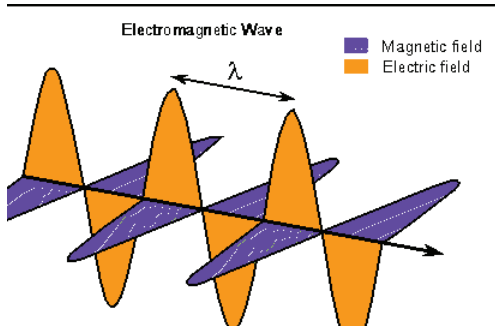


Figure 1 - An electromagnetic wave showing electric and magnetic fields, and the wavelength (λ) which is the distance between crests of a wave.

Courtesy of nrao.edu

An electromagnetic wave can have its electrical part compressed through e.g. introduction of copper-and-oxygen compounds called cuprates or use of hydrogen sulfide (speaking of molecules as well as waves refers to quantum mechanics' wave-particle duality). This means the explanation of superconductivity developed by John Bardeen, Leon Cooper, and John Schrieffer in 1957 (for which they shared the 1972 Nobel Prize) need not depend on the Cooper pair or BCS pair - a pair of electrons (or other fermions) bound together at low temperatures in a certain manner first described in 1956 by American physicist Leon Cooper. (Cooper, Leon N. [1956]. "Bound electron pairs in a degenerate Fermi gas". *Physical Review*. 104 [4]: 1189–1190). In a Cooper pair, an electron in a metal attracts the positive ions that make up the rigid lattice of the metal. This positive charge can attract other electrons, and it has also been recently demonstrated that a Cooper pair can comprise two bosons. ["Dynamical Creation of Bosonic Cooper-Like Pairs" by Tassilo Keilmann and Juan José Garcia-Ripoll: *Phys. Rev. Lett.* 100, 110406 (2008)].

John Bardeen comments - "The idea of paired electrons, though not fully accurate, captures the sense of it." (J. Bardeen, "Electron-Phonon Interactions and Superconductivity", in *Cooperative Phenomena*, eds. H. Haken and M. Wagner [Springer-Verlag, Berlin, Heidelberg, New York, 1973], p. 67).

A more accurate description of superconductivity might refer to the following links. '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.' ["The Weirdest Link" - *New Scientist*, vol. 181, issue 2440 - 27 March 2004, 32, <http://www.biophysica.com/QUANTUM.HTM>]. Though the effect is measured

for distances in space, the inseparability of space and time means that moments of time can become entangled too. (Caslav Brukner, Samuel Taylor, Sancho Cheung, Vlatko Vedral, 'Quantum Entanglement in Time', <http://www.arxiv.org/abs/quant-ph/0402127>) This link between the quantum and macroscopic worlds would, if everything in space-time is part of a unified field, unite the subatomic electrons of superconductivity with the wave motion in a pool of water. If a stone is dropped into a pool of calm water, many circular waves soon cover the surface of the water, and the water appears to be moving outwards from where the stone was dropped in. Actually, the particles of water simply rise then fall – it's the wave motion that moves outward. Similarly, the particles called paired electrons possess relatively little movement themselves – and John Bardeen's comment about the idea of paired electrons not being fully accurate can mean that superconductivity is a wave motion.

Phrased informally, a more accurate description of superconductivity might refer to the illustration above of an electromagnetic wave. If compression is sufficient; the electric component no longer follows a long, curved path but its path is now linear and follows the shortest distance between two points. In other words, a superconductor that operates at room temperature and normal atmospheric pressure has been manufactured. Any resistance would, like a rock in the bed of a stream causing water to flow around it, lengthen the distance and mean the compound is not a perfect superconductor. This analogy to "a rock in the bed of a stream" refers to the relative non-movement of paired electrons. Superconductivity is a wave motion, where energy is transferred from one place to another without involving an actual transfer of matter.

"Magnetic Fields" by Nick Strobel (<http://www.astronomynotes.com/solarsys/s7.htm>) says, "Mercury's situation was a major challenge to the magnetic dynamo theory.* In true scientific fashion, the theory made a testable prediction: Mercury should have no magnetic field or one even less than Mars' one because its core should be solid. Observation, the final judge of scientific truth, contradicted the prediction. Should we have thrown out the magnetic dynamo theory then? Astronomers were reluctant to totally disregard the theory because of its success in explaining the situation on the other planets and the lack of any other plausible theory. Is their reluctance a violation of the objectivity required in science? Perhaps, but past experience has taught that when confronted with such a contradiction, nature is telling you that you forgot to take something into account or you overlooked a crucial process."

*The cause of Earth's magnetic field is said to be the geodynamo, also called the magnetic dynamo theory. The heat from the solid inner core puts the liquid outer core in motion, and the movements of the outer core's electrically conducting fluids (such as molten iron) generate the planet's magnetic field. Electrically conducting fluids occur in the Sun, other stars and most planets – and are the scientifically accepted mechanism for magnetic fields.

The idea of compressed electric fields (they could be compressed by gravitational, or gravitational-electromagnetic, waves) and bulging, expelled magnetic fields is a very plausible alternative to Earth's geodynamo. It gains additional support by explaining why the planet Mercury has a significantly strong, apparently global, magnetic field (approx. 1.1% of Earth's).(1,2,3) Venus' core is thought to be electrically conductive and, although its rotation is often thought to be too slow, simulations show it is adequate to produce a dynamo. Simple reversal – compression of electromagnetism's magnetic component with expulsion of the electric component - means certain astronomical bodies, such as the planet Venus, could have no intrinsic magnetic field as a result. (It does have a much weaker one than Earth, induced by an interaction between the ionosphere and the solar wind).(4,5,6) But it would have a strong electric field – and the European Space Agency's Venus Express spacecraft did detect one.(7) 'Scientists using Venus Express have identified another difference between the two planets: Venus has a substantial electric field, with a potential around 10 V. This is at least five times larger than expected. Previous observations in search of electric fields at Earth and Mars have failed to make a decisive detection, but they indicate that, if one exists, it is less than 2 V. “We think that all planets with atmospheres have a weak electric field, but this is the first time we have actually been able to detect one,” says Glyn Collinson from NASA's Goddard Space Flight Center.' ("Venus Has Potential – But Not For Water" by the European Space Agency, 2016 (http://www.esa.int/Our_Activities/Space_Science/Venus_Express/Venus_has_potential_but_not_for_water)).

How does this alternative account for magnetic-field reversals? The incoming gravitational waves can compress electric fields, resulting in a strong magnetic field. As motions in planetary cores occur, relocated electric waves can be compressed less, causing reduced expelling of the magnetic waves and weakening of Earth's field. Electromagnetic waves can change orientation by 180 degrees, causing the expelled magnetism's polarity to reverse.

Mercury makes me think. Its solid core suggests that its magnetic field is not produced by fluids that conduct electricity but is related to superconductivity's Meissner effect which expels a magnetic field. Also, Mercury's large precession (due to its closeness to the Sun) may disprove the existence of Planet 9 because a diagram of Mercury's orbit can display an ascending pattern while its perihelion on the opposite side of the Sun maintains a constant level, while a diagram of the orbits of certain Trans Neptunian Objects displays a (less orderly) ascending or descending pattern on one side of the Sun while the greatest part of the orbit of the alleged cause of their perihelia being attracted to more-or-less the same point in space (Planet Nine) is on the other side of the Sun - the actual cause for the attraction of their perihelia would be precession, which affects all objects in the solar system.

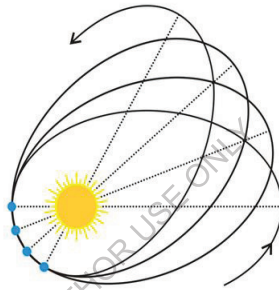
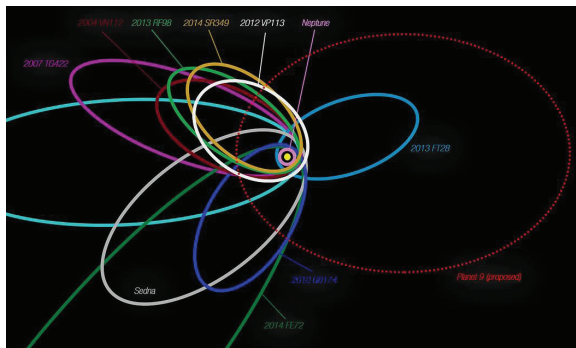


Figure 2 - Mercury's orbit (above) with its perihelion's constant level on the left and ascending pattern on the right

Fig. 3 – Trans Neptunian Objects, a.k.a. TNOs, and Planet 9 (below) with ascending pattern of the TNOs on the left and the supposed cause of the positions of their perihelia -Planet 9, with the dotted red orbit -on the right



1ST LAW OF THERMODYNAMICS

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. How can the 1st Law be reconciled with the Big Bang's creation of matter/space-time and its energy? It looks as though either Thermodynamics has to go or the Big Bang has to go. And I think thermodynamics is here to stay, even if it says energy had to exist an eternal amount of time before the Big Bang. We could say there was no time before the Big Bang and therefore, no energy could exist. But that's just another way of saying the Big Bang created energy (when thermodynamics says it couldn't). And how can the death of the universe ever happen? Surely, that means energy will eventually be destroyed - something the 1st Law says can never happen.

Science can try to use the fact that, though energy can't be created or destroyed, it can change from one form to another - and thus possibly be subject to different laws of physics in other universes within the infinite and eternal multiverse. The universe you and I live in could thus have a beginning and end even though energy is neither created nor destroyed. This argument is mistaken. If energy changes form under new laws of nature in another universe, that means the different universes in the spatially and temporally infinite multiverse would not be truly separate but would interact - new, changed energy only exists in relation to an older and previous state. They'd therefore constitute one system and be components in what could properly be called "the universe". The word multiverse would just be a red herring distracting us from an accurate description of reality; and we'd be living in an infinite, eternal universe. If you and I are united with the cosmos in a comparable way to seemingly separate objects and events in a computer game being united (by strings of the binary digits 1 and 0), our lives cannot be limited to these bodies and brains we currently possess. We'd also be eternal in time, and will one day be infinite in space. Prof. Stephen Hawking says that boundaries and singularities exist in real time but don't exist in imaginary time. (Stephen Hawking, "A Brief History of Time" [Bantam Press, 1988], p. 139) There really are boundaries in real time and it must hypothetically be possible to step outside the universe if only real time exists. But when so-called imaginary time also exists, it is not possible to step outside the universe because the boundaries simply aren't there and the universe has no end or start (neither in space nor in time). Only one universe can then exist, and there is no multiverse.

It sounds too weird that we'll someday occupy every point in space (of course, not in anything resembling these present finite bodies unless those bodies are paired with minds that are infinite). But if we're eternal, and if time and space cannot exist independently, our omnipresence is inevitable. Perhaps this will be achieved by learning to apply our connection with everything in space and time through 1's and 0's. The connection would be instantaneous if the "advanced" component of electromagnetic and gravitational waves – which travels backwards in time – cancelled the "retarded" component and therefore produced quantum entanglement.

ADVANCED AND RETARDED WAVES

"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." ("Physics of the Impossible" by Michio Kaku [Penguin Books, 2009] - p. 276)

Advanced waves are usually discarded because they are thought to violate the causality principle: advanced waves could be detected before their emission. On one level, I can appreciate that reasoning. But ultimately, I think it's 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 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's 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 consciousnesses take the place of the DVD player's laser. Everything in 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.

Albert Einstein's equations in the theory of General Relativity say gravitational fields carry enough information about electromagnetism to allow Maxwell's equations to be restated in terms of these gravitational fields. This was discovered by the mathematical physicist George Yuri Rainich. (George Yuri Rainich - "Transactions of the American Mathematical Society" 27, 106 - Rainich, G. Y. - 1925) Gravitational waves journeying through time might even be captured by archeologists and historians in future centuries, then converted into frequencies such as visible light. This would allow them to take photographs, or make videos and holograms, of events that (from our point of view) have long passed into history and prehistory, or haven't yet occurred. The previous sentence calls on the Block Universe. 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 ie if the retarded waves which go forward in time are sufficient for normal structure and function.

Stars and galaxies etc. send us retarded light which, through spectroscopy, gives an approximate measurement of how long that light has been travelling (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 (Barry C. Barish, Rainer Weiss, October 1999. "LIGO and the Detection of Gravitational Waves". *Physics Today*. 52 [10]: 44. doi:10.1063/1.882861) - picks up (retarded) gravitational waves. Technology based on the way noise-cancelling headphones work (William Harris, "How Noise-canceling Headphones Work" - <https://electronics.howstuffworks.com/gadgets/audio-music/noise-canceling-headphone3.htm>) 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.

VECTOR-TENSOR-SCALAR (VTS) GEOMETRY, WITH DARK MATTER AND DARK ENERGY

"Dust grains assemble by chemical bonding. Once they are sand or gravel sized, how they continue to stick is a mystery. Metre-sized rocks should spiral into the star rapidly due to disk 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's online astrophysics course "Greatest Unsolved Mysteries of the Universe" [presented on edX by Prof. Brian Schmidt and Dr. Paul Francis), 2012-2019, ANUx - ANU-ASTRO1x: Lesson 8 [Solar System Formation])

The following method of building planets is preferred to collisions between rocks and dust in the disk because most planetary systems seem to outweigh the protoplanetary disks in which they formed, leaving astronomers to re-evaluate planet-formation theories. (AstroNews: Astronomy, February 2019, p. 17)

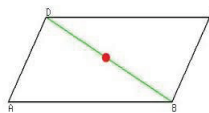


Figure 4 - VTS (VECTOR-TENSOR-SCALAR) GEOMETRY

Explanation of geometric display of mathematics' vectors, scalars, and tensor calculus - adapted from "The Macquarie Concise Dictionary Third Edition" - edited by A. Delbridge and J. R. L. Bernard - Macquarie University, Sydney, Australia 2001.

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).

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 ($1 \div 2 =$ the spin $\frac{1}{2}$ 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 (Robert D. Klauber, "Scalars: Spin 0 Fields", 2018 - http://www.quantumfieldtheory.info/Chap03_pgs_40_48.pdf#:~:text=Particles%20with%20zero%20spin%2C%20such%20as%20EF%81%B0-mesons%20%28pions%29,and%20named%20after%2C%20Oscar%20Klein%20and%20Walter%20Gordon.) 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 $125 \text{ GeV}/c^2$, its union with spin

0 produces the Higgs boson. $125 \text{ GeV}/c^2$ 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.** Now suppose the paragraph above is true. 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. This results in wave-particle duality. 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). We should consider what will happen to gravitational and electromagnetic waves that – according to VTS Geometry – form the 3 dimensions of length, width, and depth. Waves could rotate 90 degrees from ordinary matter's horizontal x-axis to the vertical, “imaginary” y-axis which is described by numbers like $i^2 = -1$. It's rotated into another large-scale dimension. Since this rotation twists the electromagnetic spectrum perpendicular to our perceptions and each physical dimension of our scientific instruments, the dark matter is only detectable gravitationally (because it still resides in space-time and General Relativity says gravity is the curvature of space-time; therefore, gravity is space-time). Though united with this dimension, dark matter may be visualized as existing “above” and “below” ordinary space-time: in “hyperspace” and “subspace”. Or its relation to ordinary matter may be compared to infrared radiation's undetectability prior to William Herschel's investigations. $E=mc^2$ tells us that matter possesses energy, so what is known as dark matter would possess what is called dark energy (dark energy would not be associated with universal expansion in an eternal, infinite universe).

Following Einstein's $E=mc^2$, the relation between Dark Matter (DM) and the Dark Energy it possesses (DE) would be $DE=DMc^2$. There's more than one DM/DE dimension. 5.5 rotations, each of ~ 65.45 degrees, means – since VTS Geometry combined with Wick rotation can produce dark matter as well as ordinary matter - there would be 5 1/2 times as much dark matter as ordinary matter (or, to use NASA's number in "NASA SCIENCE - Dark Energy, Dark Matter" [December 20, 2019], <https://science.nasa.gov/astrophysics/focus-areas/what-is-dark-energy>, 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 would not be $DE=DMc^2$ in every "dark" dimension. In some, there would 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.

** Speaking of stars emitting or radiating light is only a matter of convenience - like saying the sun rises and sets, when we know Earth's daily rotation on its axis is the proper explanation. It's proposed that space-time disturbances occur within the stars, producing shock waves that excite already-existing photons in their paths to particular frequencies (in this idea, photons fill all space-time and mass). In the related photoelectric effect, shock waves from some device or event excite photons which bump into electrons and create an electric current. When black holes merge, the space-time disturbance produces shock waves which excite gravitons in addition to photons, giving gravitational and electromagnetic waves. (Compared to the massive gravitation in black holes, processes in a star are minor and produce gravitational effects of far less magnitude.)

It must be remembered that referring to space alone is 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 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 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 ($1 - \frac{1}{2} + \frac{1}{2} =$ 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. Every reaction in this section except one may be explicable purely by the retarded portions of waves interacting. 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.

[^] Professor Hawking writes,

"What the spin of a particle really tells us is what the particle looks like from different directions." (Stephen Hawking, 1988, 'A Brief History of Time', pp.66-67 - Bantam Press)

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 $\frac{1}{2}$ is logically like a Mobius strip, though Hawking doesn't 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.

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 disk surrounding a newborn star, the quantum spin of the particles of matter in the disk ($1 / 2$) could imprint itself on the waves' interaction and build up a planet layer by layer from vector-tensor-scalar geometry's $1 \div 2$ 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 $2 \div 1$. The mass produced has the spin inherent in each of the gravitons composing spacetime - and could be an alternative, or complementary, method to supernovas for producing the gravitational waves making up black holes.

HIGHER DIMENSIONS OF SPACE-TIME

This part deals with mathematics similar to the matrix, a rectangular array of numbers or symbols placed in rows and columns. Matrices have a long history possibly going back 3,000 years to their use in solving simultaneous equations in China. In the mid-nineteenth century, British mathematician Arthur Cayley discovered how to add, subtract, multiply and divide them.

$$\begin{bmatrix} \underline{2} & \underline{3} & \underline{4} \\ 1 & 0 & 0 \end{bmatrix} \begin{bmatrix} 0 & \underline{1000} \\ 1 & \underline{100} \\ 0 & \underline{10} \end{bmatrix} = \begin{bmatrix} 3 & \underline{2340} \\ 0 & 1000 \end{bmatrix}.$$

For example, the underlined entry 2340 in the product is calculated as $(2 \times 1000) + (3 \times 100) + (4 \times 10) = 2340$:

Figure 5 – Matrix multiplication

From [https://en.wikipedia.org/wiki/Matrix_\(mathematics\)](https://en.wikipedia.org/wiki/Matrix_(mathematics)) This Wikipedia reference is not used to support a scientific claim, but merely as an example of what basic matrix multiplication looks like.

Matrix mechanics is a version of quantum mechanics discovered by Werner Heisenberg in 1925, ^ and matrix multiplication says X multiplied by Y does not always equal Y times X. The book "Quantum" by Manjit Kumar states, Max Born wrote to Albert Einstein that "Heisenberg's latest paper, soon to be published, appears rather mystifying, but is certainly true and profound." He was referring to "the strange multiplication rule" Heisenberg used in developing matrix mechanics. Born eventually realised that Heisenberg had stumbled on matrix multiplication - to which the originator of matrix mechanics replied, "I do not even know what a matrix is." (Cropper, William H., "Great Physicists: The Life and Times of Leading Physicists from Galileo to Hawking"- 2001 - Oxford: Oxford University Press, p. 269)

^ Though I strongly support ideas behind matrix mechanics, I don't support the Heisenberg Uncertainty Principle which is the principle that the momentum and position of a particle cannot both be precisely determined at the same time. This is because I believe binary digits (the BITS used in electronics) are the Hidden Variables spoken of by Einstein and others, and that probabilistic quantum mechanics will one day be discovered to actually be deterministic, containing a hidden order like meteorology's chaos theory. The hidden variables I use do not agree with Einstein's local realism (which says there is no action at a distance) - they agree with the entanglement of quantum mechanics.

Speaking of chaos theory in relation to the time in about 5 billion years when 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 (and so much else) 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's 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.

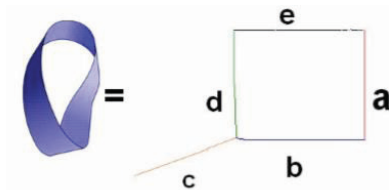


Figure 6 – MOBIUS MATRIX (Möbius equals a,b,c,d,e array)

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 $i=\sqrt{-1}$ are on the vertical plane. Complex Numbers can be easily identified as a combination of Real Numbers and Imaginary Numbers. (Olivia, "Difference Between Complex Numbers and Real Numbers" - June 18, 2011 - Posted by <https://www.differencebetween.com/difference-between-complexnumbers-and-vs-real-numbers/>) 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".

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 (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 Möbius strip, existing in the particles of matter composing side a . In other words, a fundamental composition of matter is mathematics' topological Möbius, 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 Möbius 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 & 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.

BITS AND TOPOLOGY

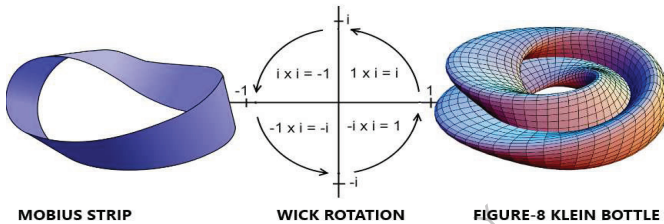


Figure 7 – Mobius/Wick/Klein

In relation to Spin $\frac{1}{2}$ being like a Mobius strip ... in 1924 the scientist Wolfgang Pauli was the first to propose a doubling of electron states due to a two-valued non-classical "hidden rotation". Extending the ideas of "doubling", "two-valued" and "hidden rotation" to the Mobius strip being a basic, fundamental unit of reality; it can be seen that Pauli's proposal has an analogy to this article. The doubled Mobius strips – each strip is only two dimensional (2D) – could possibly be produced by the two-valued binary-digit system used in electronics traversing a wormhole, or shortcut between folds in space and time, designed by humans of the far future. These Mobius strips might then be used to form the universe, if a recent paper in "Physical Review Letters" is correct when it says that in a holographic universe, all of the information in the universe is contained in 2D packages trillions of times smaller than an atom. (Niayesh Afshordi, Claudio Corianò, Luigi Delle Rose, Elizabeth Gould, and Kostas Skenderis, "From Planck Data to Planck Era: Observational Tests of Holographic Cosmology", Phys. Rev. Lett. 118, 041301 (2017), Published 27 January 2017, <https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.118.041301>) (Just as the interference between two laser beams produces a three-dimensional holographic image, "holographic" would also have the accepted cosmological meaning of the entire universe being seen as two-dimensional information – from Mobius strips, according to this article - projected into the third and fourth

dimensions we're familiar with.) The binary digits give that cosmos Artificial Intelligence (AI), and two united Mobius strips create a three-dimensional figure-8 Klein bottle (Polthier, Konrad, "Imaging maths - Inside the Klein bottle", <http://plus.maths.org/content/os/issue26/features/mathart/index>) that acts as a building block of space, time, forces' bosons and matter's fermions. This creates a supersymmetry (linkage) between fermions and bosons. Also - trillions of Mobius strips could form a photon and trillions of more complex figure-8 Klein bottles could form a more complex graviton (suggesting union of electromagnetism and gravitation), and electromagnetism's photons interact with gravitation's gravitons via vector-tensor-scalar geometry to form forces' bosons and matter's fermions (see INTERSTELLAR, INTERGALACTIC AND TIME TRAVEL PLUS SIMPLY-CONNECTED AND NONORIENTABLE TOPOLOGY).

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 -

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

The relation of space (to be precise, spacetime) and matter was spoken of by French philosopher/mathematician/scientist Rene Descartes (1596-1650). Today I wish to discuss how the space-matter relation fits in with my idea that it's time for a new scientific paradigm. The equivalence of space and matter is something Albert Einstein also believed in. He wrote a paper in 1919 which asked if gravitation plays a role in the composition of elementary particles of matter. (Albert Einstein, "Spielen Gravitationsfelder in Aufbau der Elementarteilchen eine Wesentliche Rolle?" [Do gravitational fields play an essential role in the structure of elementary particles?], *Sitzungsberichte der Preussischen Akademie der Wissenschaften, [Math. Phys.]*, 349-356, Berlin, 1919) This present article agrees when, in Vector-Tensor-Scalar Geometry, it talks about gravitational-electromagnetic interaction forming the mass and quantum spin of particles (whether fermion, boson, or Higgs). Since General Relativity states that gravity is nothing more than the result of spacetime's curving, gravity is spacetime and

the mass/quantum spin of particles can be regarded as space itself forming matter instead of as gravity playing a role in matter's composition. In other words, we have Descartes' space-matter relation.

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

INTERSTELLAR, INTERGALACTIC AND TIME TRAVEL PLUS SIMPLY-CONNECTED AND NONORIENTABLE TOPOLOGY

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. Electrical engineer Hong Tang and his team at Yale demonstrated that, on silicon-chip and transistor scales, light can attract and repel itself like electric charges or magnets. (Mo Li, W. H. P. Pernice & H. X. Tang, "Tunable bipolar optical interactions between guided lightwaves", *Nature Photonics* 3, 464 - 468 [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. ^ So-called "time travel" would actually be space travel within the block universe where the past, present and future all exist — and are equally real — in a possibly infinite four-dimensional block and are relative, just as time is not absolute in Einstein's special theory of

relativity. Visualizing an infinite block universe might be helped by picturing it as a DVD that extends infinitely in every direction. Every event on a DVD always exists but their positions are relative to the location of the laser reading the disk (which corresponds to the location of a brain's consciousness) - they aren't all accessed at once. Of course, this elimination of the distance ladder doesn't need to be reserved for trips to other stars, galaxies, and periods of time. It can also be used for a quick journey to Mars - saving you months in space and the attendant wasting of muscles and bones, as well as sparing you from the potentially deadly "sunburn" cosmic rays might give you.

^ As stated in a robotics lesson ("MATLAB: Interpolation of a scalar" by Peter Corke and the Queensland University of Technology: <https://www.futurelearn.com/courses/making-robots-move/6/steps/570340>), "the time variable t varies from 0 to 1, that is, $0 \leq t \leq 1$ ". Therefore, this article's logic states that 0 may be equal to 1 - and 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 equalling 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 - 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.

Early last century, the Dutch mathematician and philosopher Luitzen Egbertus Jan Brouwer (1881-1966) had one of the most useful theorems in mathematics named after him - the amazing topological result known as the Brouwer Fixed Point Theorem.

In dimension three, Brouwer's theorem says that if you take a cup of coffee, and slosh it around, then after the sloshing there must be some point in the coffee which is in the exact spot that it was before you did the sloshing (though it might have moved around in between). Moreover, if you tried to slosh that point out of its original position, you can't help but slosh another point back into its original

position. More formally the theorem says that a continuous function from an N-ball into an N-ball must have a fixed point. Continuity of the function is essential (... if you slosh discontinuously, then there may not be (a) fixed point).' (Francis E. Su, et al. 'Brouwer Fixed Point Theorem', Math Fun Facts, <http://www.math.hmc.edu/funfacts>)

Translating this into a possible method of future spacetime travel - take the universe and "slosh it around" (this refers to gravitational waves of varying strengths constantly moving in different directions in space as well as time). Assume the point which is in the exact spot after the sloshing as it was before the sloshing is a point an orbiting spaceship might occupy near Mars - this orbital point might be encoded using the BITS (BInary digiTS, 1's and 0's) of electronics. Since the point might have moved around thanks to the Brouwer Fixed Point Theorem, it could be encoded to pick up a spaceship orbiting Earth and quickly transport it to Mars orbit (greatly reducing astronaut/cosmonaut exposure to radiation, bone and muscle wasting, etc.) Sloshing (continuously manipulating gravitational waves) so that part of the Andromeda galaxy is in the exact spot after the sloshing as it was before the sloshing would, even assuming travel at light-speed was possible, reduce travel time to a star in that galaxy by millions of years. The journeys - to Andromeda or Mars or any other spot in space, or in the time which can't be separated from space - wouldn't depend on slow rocket power but on fast electronics and gravitational waves that can travel backwards in time, acting instantly across the universe and being entangled with any selected point in space or time.

Departure from Earth orbit and arrival in Mars orbit can occur at the same time. Maybe the extremely high temperatures associated with planets like Venus and Mercury can be overcome (balanced) by a spaceship simultaneously existing 1) at Venus or Mercury, and 2) in the extreme coldness of space in Earth orbit. And perhaps the extremely high pressures of Venus and Jupiter can be compensated for by the ship simultaneously existing at Venus or Jupiter while experiencing the near-vacuum of space. With a planet like Saturn, the lack of a solid surface and lack of oxygen might possibly be compensated for by explorers simultaneously being entangled with Earth's solidity and atmosphere. The cold is potentially compensated for by an instant trip from Earth to Saturn that traverses a region sufficiently close to the hot Sun. Today's spaceprobes journey through the solar system using gravitational slingshots - using the gravity of a planet or other astronomical object to alter the path and speed of a spacecraft. The counterbalancing of temperatures, pressures, etc. Might be termed an "entanglement slingshot". Since space and time are permanently linked - it's then

feasible to not only investigate different cities, planets and galaxies simultaneously. Different days, years and centuries (in the past, present and future) can be experienced at the same time. All this sounds incredibly weird! But we should not believe the human, and cosmic, condition cannot be fundamentally different from what we know simply because we prefer what we know - or what we think we know - to be all there is.

If we combine these revolutions in time-space travel with the unimaginable biotechnology and genetic engineering of centuries to come; isn't it conceivable that plants, animals and even humans are the product of entirely natural intelligent design by humanity of the distant future? Making production a two-way process is the fact that humans of the distant future rely on the reproductive instincts of past and present men and women for their existence. Those reproductive instincts, and all the varied instincts animals are born with, suggest that animals and people have access to all the knowledge that ever existed or ever will exist., This would be because everything in time and space is connected by binary digits, forming a Block Universe in which past, present and future co-exist. Evolution would always exist in the forms of adaptation and of modifications to anatomy/physiology. But a universe composed of binary digits and topology is deterministic in the sense that things happen in a way that can't be changed. Evolution can't provide the absolute certainty of life existing and would not explain origins.

If engineering teams decide to build a spaceship that can travel to other stars in the manner described above, they'd naturally want this article's ideas about cosmic topology to have scientific support, assuring their endeavour has a very good chance of success. To give the above ideas support; a few paragraphs will be added here about space-time curvature, universal unification, the concepts of simply- and multiply-connected, and non-orientability.

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, figure-8 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).

Instead of using the BITS (1's and 0's) of today's computers, would the quantum computers' QUBITS, in which there can be a superposition of 1 and 0 (they both

exist at the same time), be preferable? A universe built on the uniting of binary digits might give us the universal unification scientists anticipate. In turn, that universal unification of everything into one being might explain how 1's and 0's can exist at the same time, as well as how subatomic particles can be in two places at once (there'd actually only be one binary digit, constituting one particle – and like the stellar or galactic images in gravitational lensing's Einstein ring, this particle appears as more than one object). I shouldn't restrict myself to traditional, or even quantum, computers. They'll probably come up with totally different electronic systems in the next thousands of years. Those computers - and the unimaginable way they're programmed - might make my ideas realizable. In fact, those computers themselves might be in a form we can't even imagine. If my ideas have any truth in them, the universe itself - all of spacetime and everything in them - is a computer.

For the note below on the figure-8 Klein bottle, I refer to

Bourbaki, Nicolas (2005). "Lie Groups and Lie Algebras". Springer

Conway, John (1986). "Functions of One Complex Variable I". Springer

Gamelin, Theodore (January 2001). "Complex Analysis". Springer

Joshi, Kapli (August 1983). "Introduction to General Topology". New Age Publishers

Spanier, Edwin (December 1994). "Algebraic Topology". Springer -

Informally - if an object in space consists of one piece and does not have any "holes" that pass all the way through it, it is called simply-connected. A doughnut (and the figure-8 Klein bottle it resembles) is "holey" and not simply connected (they're multiply connected).

"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/figure-8 Klein bottle) ... topology". ("What Shape is the Universe?" by Vanessa Janek: May 11, 2015 - http://www.universetoday.com/120157/what-shape-is-the-universe/#google_vignette)

A flat universe that is also simply connected implies an infinite universe. (Luminet, Jean-Pierre; Lachi`eze-Rey, Marc - "Cosmic Topology" - Physics Reports 254 [3]: 135–214 [1995] www.arXiv:gr-qc/9605010) So it seems the infinite universe cannot be composed of multiply-connected subunits called

figure-8 Klein bottles. But positive and negative curvatures can complement each other's shape, and digitised images can morph to perfect the complementarity if necessary (perhaps by binary digits filling in gaps and irregularities 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 makes space-time relatively smooth and continuous - and gets rid of holes - making figure-8 Klein bottles simply connected, and plausible subunits of the universe's composition.

On the subject of plausibility, the following quote voices an objection to the cosmos being composed of the Möbius strip and figure-8 Klein bottle:

"If the universe was non-orientable ie if it contained orientation-reversing curves such as the Möbius and Klein, there would be strange physical consequences that have not yet been observed. While they could be happening outside of our field of vision, it is unlikely that our universe is non-orientable." ("The Shape of the Universe" by Stacy Hoehn, formerly of Vanderbilt University's Mathematics Department

<https://my.vanderbilt.edu/stacyfonstad/files/2011/10/ShapeOfSpaceVandy.pdf>)

My comment: It can indeed be non-orientable if these strange physical consequences are happening outside of our field of vision i.e. if the universe is infinite. What I regard as the strangest physical consequence resulting from orientation-reversing curves would be that of the universe violating the Copernican ideal – this ideal makes man's view as typical and ordinary throughout the course of time as it is throughout the extent of space. Violating that ideal means our little corner of space-time really is different, in non-fundamental ways, from particular portions of the rest of spacetime (those different parts would still have binary digits / Mobius strips / figure-8 Klein bottles as their basis). Another strange consequence is the inclusion of extra dimensions in time and space.

The Klein bottle is a closed surface with no distinction between inside and outside. Thanks to quantum mechanics' entanglement applying on macroscopic scales – see "The Weirdest Link" referred to above in EDWIN HUBBLE AND HIS NON-EXPANDING UNIVERSE - this doesn't refer only to the surface itself. What is supposed to be outside the thickness of the figure-8 Klein bottles composing our universe [either another universe in the multiverse or exterior void, and the interior multiverse member or hole) would be the same as what exists within that surface. This results in the space-time and imaginary space-time of our universe existing everywhere and everywhen. The relativistic

universe is only infinite and eternal because of macroscopic entanglement – if entanglement could be removed, the universe would be finite in time and might originate in the Big Bang. The inside and outside of the universe are continuous when it's composed of Mobius strips and figure-8 Klein bottles - there cannot be other universes outside our infinite and eternal universe (such a state of multiple universes is called the multiverse, and the term “multiple universes” might be unconsciously used by scientists to state that every period of time co-exists alongside every other). The above paragraphs seem to explain astronomer Alex Filippenko's statement, "there's something important missing in our physical understanding of the universe." ("Universe expanding faster than expected" by Corey Haynes - Astronomy Magazine's October 2016 issue, p.11)

GENERAL RELATIVITY, EM DRIVE, AND STAR TREK

When humans really are flying around the universe in Star-Trek-like starships, tractor beams will be handy things. The first step in building one requires us to look about 100 years into the past, when Einstein developed his theory of General Relativity. General Relativity says gravity is a PUSH caused by the curvature of space-time, and has updated the old Newtonian definition of gravity as a PULL. The following's inspired by the controversial propulsion technology of real science known as EmDrive (a.k.a. an RF resonant cavity thruster), and a possible method based on that technology which would enable us to mimic the flight of Superman/Supergirl.

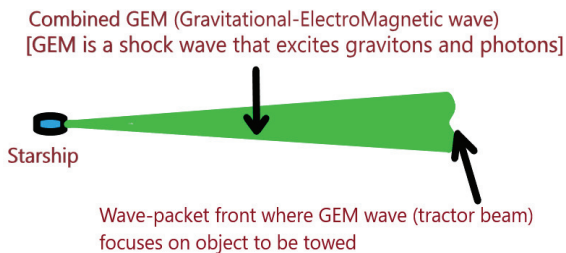


Figure 8: STARSHIP'S TRACTOR BEAM, PRODUCED FROM VECTOR-TENSOR-SCALAR GEOMETRY (there's a section about VTS Geometry earlier in this article)

Since mass (and the nuclear forces associated with matter) are a product of gravitation, the gravitational waves do not simply penetrate matter but - like a biological enzyme - must pause to react with it. The matter absorbs and re-radiates the gravitational waves so rapidly that they appear to merely pass

through the matter unimpeded. The GEM wave itself doesn't attract an object to the starship. The matter formed at the wave-packet front by the GEM (Gravitational-ElectroMagnetic wave or Tractor Beam) re-emits waves, pushing the object in the tractor beam towards the starship.

"The quantum spin of a particle cannot be explained in terms of classical rotation since it can only have certain values ..." ("Quantum" by Manjit Kumar [Icon Books, 2008], p. 382) 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.) Suppose, for some reason, it's desired to remove the wave-packet front's conspicuous matter after the tractor-beam operation. It can be replaced with an inconspicuous gravitational wave by refocusing and emitting a stream of 1's and 0's that produce $2 \div 1$, reprogramming quantum spin from $1 / 2$ to $2 / 1$.

British engineer Roger Shawyer proposed the EmDrive, EM Drive or radio frequency (RF) resonant cavity thruster in 1999 and it's claimed to use patented microwave technology which converts electrical energy into thrust by amplification of the microwaves creating pressure which drives the vehicle's front forwards. Light is one form of electromagnetism – microwaves are another. So some of the microwaves are advanced, and travelling back in time. To this action, there is - agreeing with Isaac Newton's 3rd law of motion - an equal and opposing reaction i.e. a thrust forward in time. Since space can never be regarded separately from time, an object in space is affected and the forward thrust in time could power a spacecraft through the void via the EM Drive.

What are the consequences if gravitational fields play an essential role in the structure of elementary particles, and if gravitational waves can travel back in time? Then the equal and opposite reaction providing the forward thrust in time could not only "power a spacecraft through the void", but it could power anything with gravitational waves in its composition. This includes giving controlled flight to Superman and Supergirl, without any jetpacks - acting in a manner similar to the proposed method of EmDrive, superbeings would be powered through the air.

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

Topological materials (topological insulators, topological superconductors) can be less mystifying if they're related to the paradigm-shifting deterministic view of quantum mechanics which is described in the summary of universal topology (the "rubber-sheet geometry" of the cosmos) - see Fig. 7 and its accompanying text.

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

A topological insulator is a material that behaves as an insulator in its interior but whose surface contains conducting states. However, the conducting surface is not the unique character of topological insulators, since the ordinary band insulators can also support conductive surface states. What is special is that the surface states of topological insulators are symmetry protected. Symmetry Protected Topological (SPT) Order is a kind of order in topological insulators where, if symmetry is preserved during the deformation undergone in topology, a phase transition from one state of matter to another must occur (in this case, between insulator and conductor). The General Theory of Relativity will be useful in this article. Specifically – the analogy of the theory's curvature of space-time to a rubber sheet. A small body like the Earth is said to warp space-time only a little and create a dimple in the sheet. A larger body such as the Sun curves space-time much more and forms a deep valley in the rubber. And a black hole is often pictured as warping space-time so much that it tears a hole through the rubber fabric. Transferring the analogy to the quantum realm – the motion of electrons can be visualized as their gliding across hills and valleys of pure energy (gravitational energy). This is because Einstein's Relativity says gravity is caused by the curvature of space-time. Therefore, gravity ... gravitational energy ... IS space-time. Materials that don't conduct electricity (insulators) have deep valleys which electrons struggle to escape from. In 2004, U.S.A. physicist Charles Kane noticed something strange in his computer simulations of electrons flowing through different materials: an insulator whose quantum state had the equivalent of a hole. Kane had not found the first quantum black hole but had discovered the first topological insulator – a then theoretical material that could conduct electricity on its surface but not within its interior. (In 2007, American physicist M. Zahid Hasan led the team that made the first 3D topological insulator).

About 90 years ago, while experimenting with the equations of quantum physics, German physicist Hermann Weyl showed that a massless and charged particle (now called the Weyl fermion) could theoretically exist ("Elektron und gravitation. I", Weyl, H. Zeitschrift für Physik 1929, 56, 330–352). In topological insulators, the hole in its quantum state causes electrons to come together and behave like a single particle called a Weyl fermion. The Weyl fermion can be related to Topological Insulators (TI), the Majorana fermion[^] can be related to future quantum computers' Topological Superconductors (TS), while topological insulators and topological superconductors may be regarded as the (Möbius dependent) inverse of each other. This state of topological materials and "unnatural" fermions can be expressed by another phenomenon which is called here vector-tensor-scalar geometry: in which matter, and the Higgs boson, both emerge from photon-graviton interaction. This means the Higgs boson is related to the graviton, and the Higgs field is therefore united with the gravitational field (together with its constant interaction with the electromagnetic field).

[^] The Majorana fermion was predicted in 1937 by Italian physicist Ettore Majorana playing with the same quantum math that had intrigued Weyl. Like a Weyl fermion, a Majorana fermion has no mass. It also has no charge, despite being made of a bunch of negatively charged electrons ("Shape Shifters: An obscure mathematical field might bring about a new era in technology", September 25, 2018, Powell, USA. <http://discovermagazine.com/2018/oct/shape-shifters>)

If the shape of a Möbius strip (or the union of two strips into a Klein bottle) is preserved, phase transition must occur just as orientation-reversing curves occur in the Möbius and Klein ("The Shape of the Universe", October 13, 2009, Hoehn, USA. <https://my.vanderbilt.edu/stacyfonstad/files/2011/10/ShapeOfSpaceVandy.pdf>).

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

("Tensor-Entanglement-Filtering Renormalization Approach and Symmetry Protected Topological Order", Zheng-Cheng Gu; Xiao-Gang Wen Phys. Rev. B 2009, 80, 131-155 PLUS

"Symmetry protection of topological order in one-dimensional quantum spin systems", Pollmann, F.; Berg E.; Turner, A. M.; Oshikawa, M. Phys. Rev. B 2012, 85, 075-125).

In Band Theory, bands describe the range of energies that an electron within the solid may have (the ranges it may not have are called band gaps or forbidden bands) ("Energy levels and energy bands", 1996-1997, Van Zeghbroeck, USA. ecee.colorado.edu/~bart/book/eband2.htm)

PLUS

"The energy band diagram of the Metal-Oxide-Silicon (MOS) Capacitor", 1996-1997, Van Zeghbroeck, USA. ecee.colorado.edu/~bart/book/moseb.htm

PLUS

"Band diagram", November 5, 2017, Wikipedia.
https://en.m.wikipedia.org/wiki/Band_diagram)

Curvature (from space-time being constructed of Wick rotation, Mobius strips and figure-8 Klein bottles) implies this range of allowable energies could be continuous and not restricted to certain bands. Since it's known the energy of electrons can only have discrete values, these values (and space-time's curves) must be determined by discrete pulses (possibly, the binary digits of 1 and 0). Since bands and band gaps describe an electron's wave function,[^] they are compatible with the following description: matter particles are described as spin 1/2 and need to be turned through two complete revolutions to look the same ("A Brief History of Time" by Stephen Hawking [Bantam Press, 1988]: pp.66-67), plus it's necessary to travel around a Möbius strip twice to reach your starting point.

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

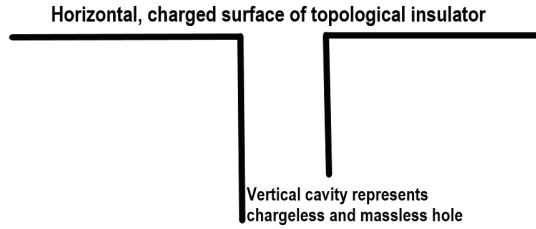


Diagram 9 – Mobius dependent Inversion of Diagram 10

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

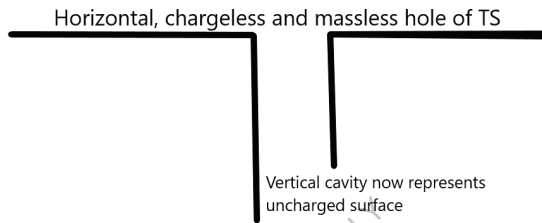


Diagram 10 – Mobius dependent Inversion of Diagram 9

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

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

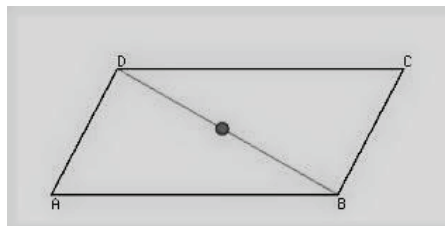


Figure 11: Vector-Tensor-Scalar Geometry

Diagram 9 becomes

Side DC of parallelogram = Vector 1 electrons

Side DA of parallelogram = Vector 2 electrons

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

Diagram 10 becomes identical in shape to the above parallelogram. However, this time the electrons flow in the reverse direction to the ones in “diagram 9 becomes”. They go in the BD direction, then split and follow the paths DA and DC. This preserves information if one pathway is interfered with. They produce the chargeless Majorana since the negative vector-1 electrons minus the negative vector-2 electrons equal $(-y) - (-y) = 0$. The Majorana’s lack of mass is attributed to the same process by which the Weyl particle becomes massless (see previous paragraph).

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

To finish on a speculative note suggested by the above paragraph – if every particle in the body and brain emerges from interaction of photons and gravitons, is it possible that knowledge of this could liberate people from being a Higgs-PARTICLE-like point in space-time constantly? Could the body and consciousness also be capable of a Higgs-FIELD-like existence in which human

potential expands throughout space and time to the same extent as the gravitational and electromagnetic fields whose excitations are gravitons and photons? As an application of Cosmic Consciousness, let's begin with Professor Stephen Hawking. He writes -

"If a complete unified theory was discovered, it would only be a matter of time before it was digested and simplified and taught in schools, at least in outline. We should then all be able to have some understanding of the laws that govern the universe and are responsible for our existence" (Hawking, S.; A Brief History of Time; Bantam Press, U.K., 1988. p. 168)

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

GOING BEYOND QUANTUM COMPUTERS WITH "IMAGINARY" TIME

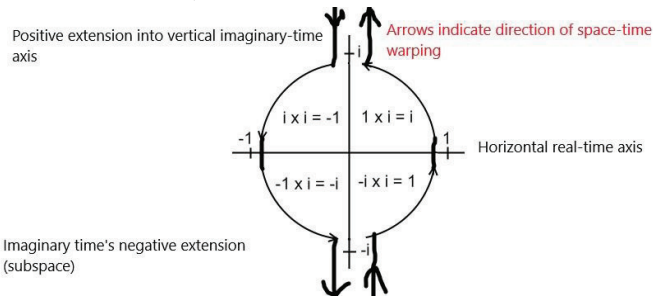


Figure 12 – Spacetime Warping Associated With Imaginary Computer

Our present approach to developing computers has gone about as far it can. The problems of chips generating too much heat - and of quantum uncertainties making transistors hopelessly unreliable at the scale of atoms - demand a new approach. I'm proposing that the successor to today's silicon technology (and tomorrow's quantum computers) lies in new concepts of time. An "imaginary"

computer using the Complex Number Plane's vertical axis of imaginary time can perform calculations at the familiar rate of time's passing while the horizontal axis of "real" time sees absolutely no elapsed time (the possibility of no time passing in the normal sense is hinted at by Special Relativity's time dilation or slowing of time).

For a hundred and ten years, science has accepted the concept of space-time which was formulated by Russian-German mathematician Hermann Minkowski and unites one time dimension with three space dimensions. Today, so-called imaginary numbers (such as i , which equals $\sqrt{-1}$) describe so-called imaginary time. Imaginary time is a concept derived from special relativity and quantum mechanics. Geometrically, imaginary numbers are found on the vertical axis of the Complex Number Plane, allowing them to be presented perpendicular to the real axis of space-time as we know it. One way of viewing imaginary numbers is to consider a standard number line, positively increasing in magnitude to the right, and negatively increasing in magnitude to the left. At 0 on this x-axis (the so-called real axis), a y-axis (the so-called imaginary axis) can be drawn with "positive" direction going up - "positive" imaginary numbers then increase in magnitude upwards, and "negative" imaginary numbers increase in magnitude downwards.

The ultraviolet catastrophe, also called the Rayleigh–Jeans catastrophe, is a failure of classical physics to predict observed phenomena: it can be shown that a blackbody - a hypothetical perfect absorber and radiator of energy - would release an infinite amount of energy, contradicting the principles of conservation of energy and indicating that a new model for the behaviour of blackbodies was needed. At the start of the 20th century, physicist Max Planck derived the correct solution by making some strange (for the time) assumptions. In particular, Planck assumed that electromagnetic radiation can only be emitted or absorbed in discrete packets, called quanta. Albert Einstein postulated that Planck's quanta were real physical particles (what we now call photons), not just a mathematical fiction. From there, Einstein developed his explanation of the photoelectric effect (when quanta or photons of light shine on certain metals, electrons are released and can form an electric current). So it appears entirely possible that another supposed mathematical trickery (imaginary time) will find practical application in the future.

To introduce you to the idea of extra dimensions, consider this – 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. (Tom Siegfried, 'A Two-Time Universe? Physicist Explores How Second Dimension of Time Could Unify Physics Laws', May 15, 2007 <https://m.phys.org/news/2007-05-two-time-universe-physicist-explores-dimension.html>). The temporal dimension would be "imaginary" time and the spatial dimension would be "imaginary" space, which must exist since time cannot exist apart from space (just as there is space-time, there would be imaginary space-time). Now suppose engineers warp space-time so the functioning of a computer's processor takes place in so-called imaginary time. If warping is looped so results emerge in so-called real time, its calculations would be retrieved instantly after they were entered into the computer because billions of years might pass in imaginary time yet no period at all could elapse in our real time. These warps and loops are viable because they're inspired by Einstein's Special Relativity – and propose the use of space-time warping which, though in its infancy, is a technology being worked on today by places like NASA.

BANDGAP IMPLANTS IN THE BRAIN

“In solid-state physics, a band gap, also called an energy gap or bandgap, is an energy range in a solid where no electric current can exist. In graphs of the electronic band structure of solids, the band gap generally refers to the energy difference (in electron volts) between the top of the valence band and the bottom of the conduction band in insulators and semiconductors. It is the energy required to promote a valence electron bound to an atom to become a conduction electron, which is free to move within the crystal lattice and serve as a charge carrier to conduct electric current. It is closely related to the HOMO/LUMO gap[^] in chemistry. If the valence band is completely full and the conduction band is completely empty, then electrons cannot move in the solid; however, if some electrons transfer from the valence to the conduction band, then current can flow. Therefore, the band gap is a major factor determining the electrical conductivity of a solid. Substances with large band gaps are generally insulators, those with smaller band gaps are semiconductors, while conductors either have very small band gaps or none, because the valence and conduction bands overlap.” (“Band gap”, https://en.wikipedia.org/w/index.php?title=Band_gap&oldid=899958022 - Wikipedia article used for background information only)

[^] “highest occupied molecular orbital and lowest unoccupied molecular orbital, respectively. “molecular orbital” is a mathematical function describing the

wave-like behavior of an electron in a molecule. The energy difference between the HOMO and LUMO is termed the HOMO–LUMO gap.”

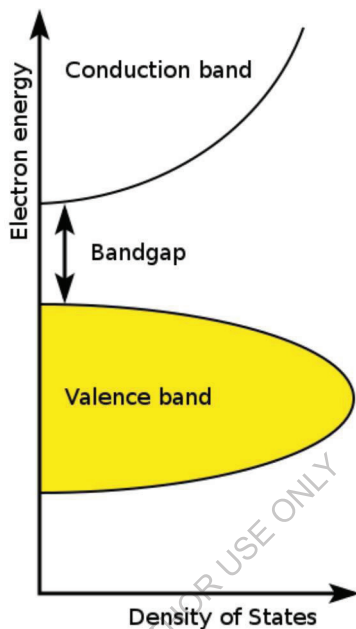


Figure 13 - A sketch of the bandgap between valence band and conduction band in insulators and semiconductors. (Public Domain image)

“(Morpho) butterflies create color by selectively adding and deleting certain wavelengths of light. Physicists have only recently devised comparable materials, called photonic band-gap crystals; and are now exploring their use in phone switches, solar cells and antennas. No surprise, then, that some engineers are looking to the living world for the next generation of optic inspirations.” (“Illuminated Life - Meet the true masters of optics: Animals that know a lot more about slicing, dicing, and twisting beams of light than we do” by George M. Whitesides, Felice Frankel – Discover Magazine, August 2005 issue)

I believe advances in engineering and biology will enable humans, like the morpho butterfly, to selectively add and delete wavelengths of light (of energy). But the word “light” need not only refer to visible wavelengths. It can be extended and refer to any wavelength of the electromagnetic spectrum. Science accepts that radio, infrared, ultraviolet waves, X-rays and gamma radiation are all forms of light. Suppose matter acquires all its properties (including mass) by the interaction of electromagnetic and gravitational waves - the day will come

when we can add or delete wavelengths of matter,[^] anywhere and anytime we choose!

[^] Deleting would be producing gaps in the energy forming matter, while adding would be – to use a word from computer language - “pasting” waves of matter to fill in energy gaps (bandgaps). A century ago the founder of Wave Mechanics, Louis de Broglie, treated electrons as standing waves, thus introducing matter waves and wave-particle duality.

I anticipate people will oneday have band-gap structures in their brains that are no bigger than a computer chip (these won't require surgical implantation, but simply downloading, because of the pre-existing digital nature of all parts of the universe). Photonic band-gap crystals would, of course, only deal with light in its photonic forms (energy forms such as visible light or radio waves). The band-gap structures I have in mind would need to deal with forms of matter like genes. They could add or delete anything and everything we choose by emulating computers' copy/paste function to add things; as well as their delete function, to remove things (now that's what I call genetic engineering!)

NORMALISING PATIENTS WITH GRAVITATION

It seems possible that unavoidable health benefits lie in physics and a paper about gravity and matter which was published by Albert Einstein a century ago (this present article relies on the great physicist's wish that he had made a bigger contribution to medicine). The unavoidable benefits would provide a plausible explanation of the placebo effect.

An article in the Los Angeles Times reports that the work of a few medical specialists – pharmacologist, gastroenterologist, surgeon - says sodium bicarbonate makes drugs, including Nexium, a lot more effective. ("Old-fashioned baking soda found to enhance acid-reflux drugs" by Valerie Reitman: <http://articles.latimes.com/2004/sep/20/health/he-acidreflux-20>) It also seems possible that any benefits of sodium bicarbonate lie in physics and a paper published by Albert Einstein a century ago. That paper is "Do gravitational fields play an essential role in the structure of elementary particles?" ("Do gravitational fields play an essential role in the structure of elementary particles?" ["Spielen Gravitationsfelder im Aufbau der materiellen Elementarteilchen eine wesentliche Rolle?"], Sitzungsberichte der Preussischen Akademie der Wissenschaften, [Math. Phys.], 349-356 [1919] Berlin) The world thinks of this paper as a mistake by Einstein, but maybe it wasn't.

The gravity surrounding us is absolutely everywhere, all the time. If the particles composing both the patient and their treatment (such as sodium bicarbonate) include gravitational fields, the patient and treatment would always be connected because gravity always fills any intervening space. This is a plausible explanation of the placebo effect in which health benefits occur despite no medicine being administered, and being aware of this constant connection to sodium bicarbonate would greatly enhance success of the treatment. Of course, treatment in this case also includes Nexium. Constant gravitational connection to Nexium or any drug would produce dangerous side effects.

In a thousand years, people might have learned how to navigate ("surf") the gravitational waves connecting them to substances, so that they receive the benefits they need while avoiding side effects they don't want. This is possible because "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" ("The Weirdest Link": New Scientist, vol. 181, issue 2440 - 27 March 2004, page 32 - online at <http://www.biophysica.com/QUANTUM.HTM>) "Caslav Brukner, working with Vlatko Vedral and two other Imperial College researchers, has uncovered a radical twist. They have shown that moments of time can become entangled too". ("Quantum Entanglement in Time" by Caslav Brukner, Samuel Taylor, Sancho Cheung, Vlatko Vedral [Submitted on 18 Feb 2004] - <http://www.arxiv.org/abs/quant-ph/0402127>) If accurate, this last reference would permit today to connect with the 31st century.

Science might prove these ideas to be true oneday. At the moment, it can only detect gravitational waves from extreme events like colliding black holes. ("LIGO's Twin Black Holes Might Have Been Born Inside a Single Star" by Harvard-Smithsonian Center for Astrophysics - <https://www.cfa.harvard.edu/news/2016-05>) But it may well be routinely detecting the gravitational waves associated with the body, and with other substances, within a century.

EXPLAINING OCEAN TIDES WHEN GENERAL RELATIVITY SAYS GRAVITY IS A PUSH CAUSED BY THE CURVATURE OF SPACE-TIME

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's 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 summarised by the following - the inertia 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 is estimated at nearly 1.5 billion cubic kilometres. Van Nostrand (2008) All this water is being pushed towards Earth's centre 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 travelling 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 final paragraph of Section 8 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.

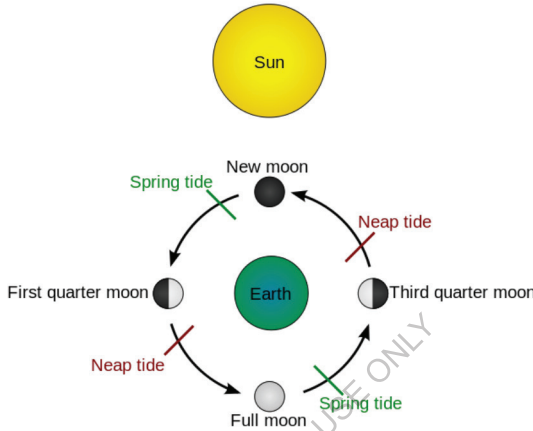


Figure 14 – TIDE SCHEMATIC

public domain image from https://en.wikipedia.org/wiki/File:Tide_schematic.svg

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

SUBSECTION 9.2 - 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 / increase in stellar velocity dispersion. Some of the ocean waves passing an island are refracted - when they enter shallow water, they're 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 $i=\sqrt{-1}$, 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 increased (and perpendicular) velocity dispersion of the stars since the gravitational waves of imaginary time are simultaneously at 90 degrees to each dimension of the gravitational waves of familiar space-time (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).

SUBSECTION 9.3 - GEYSERS ON SATURN'S MOON ENCELADUS

"A small water jet 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.

SUBSECTION 9.4 - 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) / 2, for an overall reduction of 8 times to a strength of $1/8$.

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CHAPTER 8: THE WORLD'S REAL-LIFE EXPERIMENTS WITH COVID-19 AND PHYSICS ALTER SOCIETY AND GLOBAL ECONOMICS

SUMMARY

COVID-19 has provided a real-life experiment which demonstrated that the people of the world can cooperate. Starting with some background physics, this article will show that people can extend this cooperation into another real-life experiment: a peaceful world where everyone treats each other as they wish to be treated themselves.

ABSTRACT

Hidden Variables are presently hypothetical factors based on the belief that the theory of quantum mechanics is incomplete. Their identification would lead to exact predictions, not just probabilities, for the outcomes of measurements. Albert Einstein is the most famous proponent of hidden variables (it will be shown that the variables are compatible with entanglement, what Einstein called the result of “spooky action at a distance”). Their existence would vindicate his belief that quantum mechanics is lacking something.

If probability is deleted at the universe's most fundamental level, reality's exactness would eventually adversely affect computer-generation of truly random numbers, in which a long string of numbers must be unpredictable and irreproducible. It would also affect the online security which is based on the numbers, making that security vulnerable to computer hackers. Addressing the security of credit cards, a remedy would be to develop a worldwide system for increasing each person's standard of living that totally eliminates money in all its forms. Then there'd be no credit-card details for hackers to steal. This radical step seems to be possible because the human instinct to survive is much greater than other drives such as self-interest and greed. If money ceases to be an option, people will freely share and cooperate if that's the only way to not merely ensure survival, but to actually improve everyone's standard of life.

The security of government records that are encrypted online depends on people eventually realizing that we're all invisibly and permanently connected (by Hidden Variables). Then hurting others in any manner is the same as hurting yourself and hackers would simply have no motive to hack in evil ways.

Realization of our invisible/permanent interconnectedness would also be of great assistance in achieving post-economic sharing and cooperation.

INTRODUCTION

Society does not progress without input from all sciences. If Social Science could be separated from Physics or Electronics, we'd be living in caves and managing as well as we could with primitive stone tools and no hope that our circumstances will ever change. I could never sit here and type on a computer keyboard, and you could never sit there and read the products of my brain on a computer screen. Therefore, it's necessary to devote the first section of this submission to a background of physical and electronic science.

Then it moves on to subjects many people might expect from reading the summary and abstract – topics such as economics, the Golden Rule of religion, and World Peace. The movie about magicians called “The Prestige” could describe this article. The science background could substitute for the Pledge, the magician's presentation of something familiar, like a bird in a cage (to some degree, science is familiar to everyone). The second part, the Turn (where something unexpected happens, like the cage and bird being crushed), is represented by the turning of science into discussion of economics and world peace. The final twist (the Prestige, where the familiar is reinstated, and the bird is brought back to life) is illustrated by society returning to science and receiving insight into eternal life after death as well as eternal life before conception.

The invisible, permanent connection mentioned in the abstract affects not just every part of space (including on Earth) but also every part of time, since physics says space and time can never be separated. The consciousness of living beings is thus permanently connected to every point in the past and future: giving them a conscious existence that continues after death and, bizarrely, before conception.

BACKGROUND PHYSICS

Hidden Variables are presently hypothetical factors based on the belief that the theory of quantum mechanics is incomplete. Their identification would lead to exact predictions, not just probabilities, for the outcomes of measurements. Albert Einstein is the most famous proponent of hidden variables. Their existence would vindicate his belief that quantum mechanics is lacking

something. Much of the physics community seems to have confused the terms Locality[^] and Hidden Variables for decades. Our understanding of quantum mechanics is correct in the sense that the idea of locality is incorrect and has to be given up in favour of experimentally-verified entanglement, where a particle instantaneously affects another regardless of distance in space-time (what Einstein called *spukhafte Fernwirkung*, spooky action at a distance). As will be shown, hidden variables can be compatible with entanglement. Should the hidden variables be mathematical and the most fundamental units composing everything in the universe^{^^}, probability would be deleted at the most basic level, restoring Isaac Newton's (1642-1727) deterministic physics and Albert Einstein's (1879-1955) conviction that, to quote him, "God does not play dice".

[^] "Local" refers to the requirement that cause and effect occur at the same place, with no action at a distance occurring.

^{^^} There are 4 scientists I know of that 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. (1)

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. (2)

c) Cosmologist Max Tegmark hypothesizes that mathematical formulas create reality (3) 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." (4)

If present-day physicists like Erik Verlinde and Max Tegmark are correct in thinking the universe has a mathematical foundation, that foundation – plus the nature of hidden variables – could be the electronic BITS (BInary digiTS) of 1 and 0, which comprise what is known as base-2 mathematics. The equations of 19th-century Scottish physicist and mathematician James Clerk Maxwell show that electromagnetic waves have a component that travels backwards in time. (5) Richard Feynman, 20th-century winner of the Nobel Prize in Physics, used these "advanced" waves to explain antimatter. (6) Einstein's equations say

gravitational fields carry enough information about electromagnetism to allow Maxwell's equations to be restated in terms of these gravitational fields. This was discovered by the mathematical physicist George Yuri Rainich. (7) Therefore, gravitational waves also have advanced components going back in time.

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. 17th century scientist Isaac Newton's idea of gravity acting instantly across the universe could be explained by gravity's ability to travel back in time, and thereby reach a point billions of light years away not in billions of years, but in negative billions-of-years. That is; the negative/advanced component of a gravitational wave would already be at its destination as soon as it left its source, and its journey is apparently instant. This has shown that the hidden variables of 1 and 0 can produce entanglement of waves and, as stated in the article's first paragraph, "hidden variables can be compatible with entanglement."

POST-ECONOMICS AND FUTURE SOCIETY

"Networked computers send each other random digits to serve as keys to unlock mathematical codes – (which are) encrypting online passwords, credit card data and much more." (9)

If probability is deleted at the universe's most fundamental level, reality's exactness would eventually adversely affect computer-generation of truly random numbers, in which a long string of numbers must be unpredictable and irreproducible. Indeed,

"... the technologies that generate random numbers are straining to match the unceasing growth in internet traffic. The computers for giant online retailers like Amazon might have thousands of transactions occurring simultaneously, each requiring the exchange of a unique random-number key. Six years ago (in 2012, since reference #9 was written in 2018), a study found that a small but significant number of keys in use on the internet were not random at all. Almost 27,000 of them — about 4 for every 1,000 public keys — offered no security from hackers. The way random numbers are generated now, says Raymond Newell, a physicist at Los Alamos National Laboratory, "is unsustainable. It's not as secure as people pretend it is."

And

“Jane Nordholt and Richard Hughes, both former Los Alamos physicists, are worried the internet might run out of random numbers.” (9)

It would also affect the online security which is based on the numbers, making that security vulnerable to computer hackers. A partial remedy would be to develop a worldwide system for increasing each person’s standard of living that totally eliminates money in all its forms. Then there’d be no credit-card details for hackers to steal. This may appear to be an extremely radical step. But just because money has been making the world go around for thousands of years does not mean money must remain the way of the world forever. Idealistic and naïve as it appears, the future way of the world could be based on sharing and cooperation. The human instinct to survive is much greater than other drives such as self-interest and greed. If money ceases to be an option, people will freely share and cooperate if that’s the only way to not merely ensure survival but to actually improve everyone’s standard of life.

What about the “much more” in this section’s first sentence? What about things like government records that are encrypted online? People will eventually realize that we’re all invisibly and permanently connected[^] by the electronic binary digits that are the universe’s foundation: like, to use a 2-dimensional example, the objects in a computer image that seem to be a lot of separate objects but are really just one thing (strings of 1’s and 0’s). Defying our bodily senses (which are limited and subject to illusions), every person is united by these strings of binary digits. We can, if we wish, express this as – you and I are the same person in many ways. When people realize that hurting others in any manner is the same as hurting yourself, the Golden Rule (treat others as you would like to be treated yourself) will spring to life and World Peace will be inevitable. Then hackers would simply have no motive to hack in evil ways. Realization of our invisible/permanent interconnectedness would also be of great assistance in achieving post-economic sharing and cooperation.

[^] “Bernard Beitman, a visiting psychiatry and neurobehavioral sciences professor at the University of Virginia, (says there is) an invisible network that connects everyone and everything. There’s no evidence for this, but he’s not the first one to pursue this fringe line of thinking. Austrian biologist Paul Kammerer believed coincidences arise out of unknown forces, or waves, that he called seriality. He wrote a book on the subject in 1919. Albert Einstein even commented on it, saying it was “by no means absurd.” And in the 1950s,

psychiatrist Carl Jung came up with a similar idea, his so-called synchronicity theory.” (10)

IMMORTALITY WITHIN SOCIETY

Does this invisible interconnectedness only persist during this lifetime (meaning it isn't truly permanent but merely temporary)? Or does its permanence affect not just every part of space (including on Earth) but also every part of time, since physics says space and time can never be separated? The consciousness of living beings is thus permanently connected to every point in the past and future: giving them a conscious existence that continues after death and, bizarrely, before conception. When his engineer friend Michele Angelo Besso died, Albert Einstein wrote a letter of condolence to the Besso family, including his now famous quote: 'Now he has departed from this strange world a little ahead of me. That means nothing. People like us, who believe in physics, know that the distinction between past, present and future is only a stubbornly persistent illusion.' This suggests the following interpretation of his statement - if someone is alive in what we call the present, they must continue to be alive at any point in the future, all points of which have no actual separation from the present (though that future life would not be in the form we know). So there would be life after death. If all times in the past are united with the present, there must also be life before conception (possibly in the same form as the after-death transformation, making this present existence a brief interlude necessary for development of our eternal form). That superhuman eternal life is like quantum mechanics and gravitation, and includes all space and all time (it would definitely NOT be religion's "soul" or "spirit", which is limited to an individual body).

DISTANT-FUTURE SCIENCE INTERPRETED BY RELIGIONS AS SUPERNATURAL

If our future is superhuman, could many people interpret our future as supernatural? Could creation of an infinite and eternal universe not be an absurd paradox, but the result of human actions in far distant future eons? This sentence in the Koran can be understood to mean We Humans will bring infinite space and eternal time into existence - “With power and skill did We construct the Firmament: For it is We Who create the vastness of Space.” (Al-Qur’an 51:47) As stated in INTERSTELLAR, INTERGALACTIC AND TIME TRAVEL PLUS SIMPLY-CONNECTED AND NONORIENTABLE TOPOLOGY, evolution would not explain the origins of life. So extraterrestrial humanoids

would need to be human descendants capable of journeying to planets throughout space and time; and using technologies such as terraforming or genetic engineering to adapt to, and colonize, those planets. Earth itself would be colonized via far-future technology traversing space-time wormholes which might originate either in our planet's distant future or on the planet of descendants who are much more advanced than us. On the subject of paradox, 20th-century physicist Niels Bohr said, "How wonderful that we have met with a paradox. Now we have some hope of making progress". He also said, "Your theory is crazy, but it's not crazy enough to be true". Hopefully, the crazy ideas in this article are "crazy enough to be true".

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 but seen here as the related layering of virtual reality onto other points in time and space). The poorly-named imaginary time of physics and mathematics unites with pi (both 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 be done not by computers but by band-gap implants (see the earlier section about bandgaps).

This article suggests the entire universe could be composed, at the most fundamental level, of electronics' binary digits. These enter a natural or artificial time-warp in the distant, far advanced future to produce the Mobius strips, figure-8 Klein bottles, adaptive Wick rotation, and "vector-tensor-scalar geometry" that make up the past and present cosmos. The basics of mammalian cloning have been understood since Dolly the sheep's birth in 1996. To attain immortality in these physical bodies, a mind may be downloaded into a cloned brain. It's proposed that individual cells and synapses in the original brain can be connected with their counterparts in the cloned brain via space-time warping. Since space-time and brains may be composed of binary digits, all the information in one organ could be successfully downloaded into the other – transferring each brain area's memories, perceptual abilities, creativity, etc. Einstein's General Relativity says gravity is a push caused by the curvature of

space-time (gravitation therefore is space-time). This means the space-time warping referred to a couple of sentences ago is gravity. To the relief of many, gravity – and the "surfing" of gravitational waves – will make the prospect of human cloning completely unnecessary. This is because the human mind generated by the brain has an essential role in creating the universe (see ^ below) and, therefore, in our interactions with physical reality – leading to the repairing of every minor (even microscopic) defect in the body and brain as it occurs.

Space-time (gravity) connections allowing downloading of minds will one day be extended to everyone who ever lived, resulting in resurrection of loved ones to eternal life and health. Perhaps bodies will be made for them using some form of biotechnology ... or perhaps scientists and doctors will somehow reach back in time to obtain samples for cloning. After downloading minds, overpopulation could be avoided by colonizing of other planets in space or in time.

^ In a science TV program [Australian Broadcasting Corporation, ‘Custom Universe – Finetuned For Us?’, <https://www.abc.net.au/catalyst/stories/3836881.htm> (2013)], Dr. Graham Phillips reported,

‘the physicist and writer Paul Davies thinks the universe is indeed finetuned for minds like ours. And who finetuned 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.’

And Carl Sagan writes [Carl Sagan, ‘Pale Blue Dot – A Vision of the Human Future in Space’ (Headline Book Publishing, 1995) p. 382]

‘Many religions, from Hinduism to Gnostic Christianity to Mormon doctrine, teach that – as impious as it may sound – it is the goal of humans to become gods.’

Author comment: maybe the term God should be redefined to mean ‘our distant descendants, that have reached back through time ...’ Their population of billions would know how to apply the laws of Quantum Gravity – the anticipated unification of Quantum Mechanics and Einstein’s theory of gravity, General Relativity - to become omnipresent in space-time as well as its other dimensions, and to become omnipotent and omniscient. They could then

constitute the Elohim - a name used for God in the Old Testament which, according to World Book Encyclopedia, means the PLURAL MAJESTY OF THE ONE GOD.) ['Elohim', The World Book Encyclopedia (Field Enterprises Educational Corporation, 1967)

It seems possible that, after death and before conception, a human exists as a member of the Elohim: humans from the distant future who have learned how to affect all space and all time, including our past and present. Since anything and everything is possible for such a being, we could either exist eternally in that condition or choose to be born on Earth and have a human life. The latter would give us new perspective and experiences. It would also allow us to directly contribute to the eventual rise of Elohim civilization: perhaps by adding something to some field of knowledge or technology (this might oneday lead to the ability to choose eternal life as a human); perhaps by ensuring that the human race continues into new generations; perhaps by sharing with, and otherwise helping, whomever we can.

The Elohim use Quantum Gravity and the Theory of Everything to become entangled with all space-time. Therefore, their power has no limits and it must be possible for them to concentrate those abilities in, and to occupy, one individual body (a part of the space-time they're entangled with). That individual (and since the entire universe, the present, all the past, and all the future are united; every individual) has the potential to be omnipresent, omnipotent, and omniscient. One day, you and I will fulfil our potential to exist everywhere/everywhen (this could be termed immortality). We'll also someday be all-powerful and all-knowing.

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CHAPTER 9 - UNITING TIME

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 George Yuri Rainich.

(Rainich (1925): "Electrodynamics in the general relativity theory" by George Yuri Rainich, Transactions of the American Mathematical Society, 27, 106).

"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): "Physics of the Impossible" by Michio Kaku, Penguin Books, p. 276.

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's 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's 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) - in the same way that every period of time in a movie exists simultaneously on a store-bought DVD. Time can be visualized as a Cosmic DVD where our brains and consciousnesses 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 the "Hypothesis of Quantum Gravity" 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 figure-8 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, gravitation, plus the VTS-derived weak and strong nuclear forces 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 (recall how those two binary digits compose the Mobius strips forming photons, and that trillions of paired strips form a graviton) 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.

CHAPTER 10 - EXTRACTING ENERGY FROM BLACK HOLES

ABSTRACT

One of this article's conclusions is that gravitational waves compose black holes. So it starts with an electrical engineering experiment reported in 2009 by the USA's Yale University. "Extracting Energy ..." uses the experiment to propose future travel through space-time warping (including interstellar journeys) and gravitational-electromagnetic unification via binary digits, Mobius loops, and figure-8 Klein bottles. This relates to (in sequence) supersymmetry, anyons, simply-connected infinite space and infinite time (and a stable, static universe with no Big Bang), computers using imaginary time, time dilation, dark matter, dark energy, black holes/the Higgs/nuclear-force bosons according to vector-tensor-scalar geometry, and extracting energy from black holes by means of universal entanglement that's both quantum and macroscopic spatially and temporally. This article's conclusions might cause readers to think of science fiction. The manuscript isn't fiction - but neither is it restricted to the present teachings of science and the way they're interpreted. It starts with known science and seeks to use that to determine what future science could be teaching us in coming decades and centuries. Since the future is unfamiliar, it's not appropriate to write in today's accepted scientific style (no-one can say with certainty that today's style will be in use next century).

KEYWORDS: Black holes, Gravitational-electromagnetic unification, Electrical engineering, Anyons, Future computers using imaginary time, Vector-tensor-scalar geometry, Topological universe, Space-time warping, Future space-time travel, Dark matter and dark energy.

2009 ELECTRICAL-ENGINEERING EXPERIMENT

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.^{Tang(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-curvature 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, $0 \leq t \leq 1$ ".^{Corke(2019)} Therefore, this article's logic states that 0 may be equal to 1 (division by 1 is accepted, so why isn't 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 equalling 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 the binary digits 1 and 0, which can represent electrical pulses being "on" or "off"). The previous sentence means "zero" is not nothing or merely a placeholder, but is of equal importance to "one". 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 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.

GRAVITATIONAL-ELECTROMAGNETIC UNIFICATION

What's a method that suggests the unifying of gravitation and electromagnetism? 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 figure-8 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(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, "Extracting Energy

From "Black Holes" proposes this - If it's assumed from supersymmetry that the Mobius contains all the information in both fermionic and bosonic particles, trillions of Mobius strips could form a photon and trillions of more complex figure-8 Klein bottles could form a more complex graviton (suggesting union of electromagnetism and gravitation).

You need to journey round a Mobius twice (make 2 revolutions) to return to the starting point. So if 1 anyon (a 3rd type of particle that occurs only in two-dimensional systems, was discovered in 2020, and is possibly a Mobius strip or figure-8 Klein bottle according to this discussion) moves round another, return to the original quantum state can only occur after 3 revolutions - the 2 required to return a Mobius to its start plus the complete revolution of one moving around the other. If the particle under study is a figure-8 Klein bottle, then the revolution of one about the other is supplemented by 4 revs (you go round each of the 2 combined Strips twice), and 5 revs must be completed before return to the original quantum state is achieved. (Physics' theories about anyons predict these numbers of revs regarding the quantum state.)

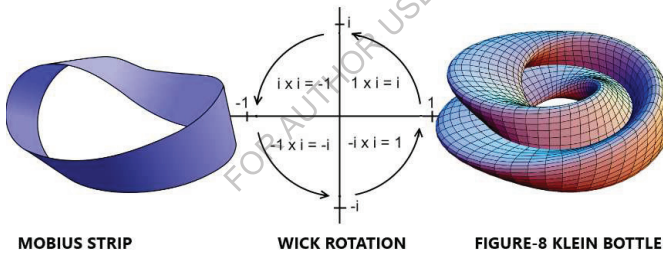


Figure 1 - Mobius strip, Wick rotation, figure-8 Klein bottle

Referring to the figure-8 Klein bottle aka the Mobius doublet: Note that the reddish positive curvature fits together with the bluish negative curvature to produce the outline of a doughnut which is technically flat. 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", making the doublet simply (not multiply) connected. A flat universe that is also simply connected implies an infinite universe,^{Luminet(1995)} with no beginning or end in either space or time. (Space and time are bound together - so if space is infinite, time must be too.)

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 particle spin Pauli had in mind to the Möbius strip being a basic, fundamental unit of reality; it can be seen that Pauli’s proposal has an analogy to this article. The doubled Möbius strips (doubled to form a figure-8 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. Using the photoelectric effect to explain that the so-called imaginary numbers and imaginary time of the Complex Number Plane's y-axis can be real, this Wick rotation - after a short section on imaginary computers - is shown to be consistent with Special Relativity’s slowing of time (a.k.a. time dilation).

IMAGINARY COMPUTERS - GOING BEYOND QUANTUM COMPUTERS WITH "IMAGINARY" TIME

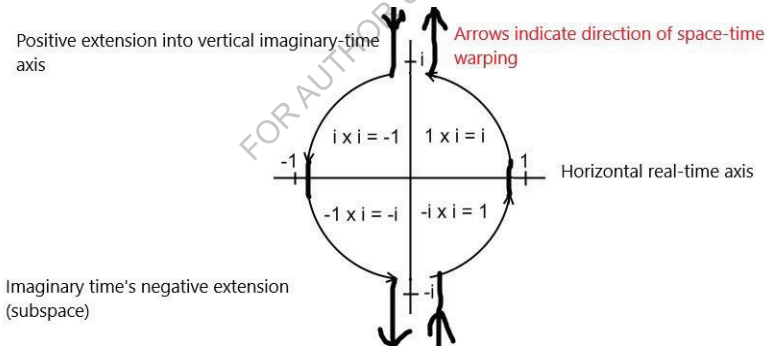


Figure 2: SPACE-TIME WARPING IN IMAGINARY COMPUTER

Our present approach to developing computers has gone about as far it can. The problems of chips generating too much heat - and of quantum uncertainties making transistors hopelessly unreliable at the scale of atoms - demand a new approach. I'm proposing that the successor to today's silicon technology (and tomorrow's quantum computers) lies in new concepts of time. An "imaginary" computer using the Complex Number Plane's vertical axis of imaginary time can have processing diverted by space-time warping into so-called imaginary time and perform calculations at the familiar rate of time's passing for unlimited

periods while warping returns the computational results to the horizontal axis of "real" time where absolutely no time elapses (the possibility of no time passing in the normal sense is hinted at by Special Relativity's time dilation or slowing of time).

For a hundred and ten years, science has accepted the concept of space-time which was formulated by Russian-German mathematician Hermann Minkowski and unites one time dimension with three space dimensions. Today, so-called imaginary numbers (such as i , which equals $\sqrt{-1}$) describe so-called imaginary time. Imaginary time is a concept derived from special relativity and quantum mechanics. Geometrically, imaginary numbers are found on the vertical axis of the Complex Number Plane, allowing them to be presented perpendicular to the real axis of space-time as we know it. One way of viewing imaginary numbers is to consider a standard number line, positively increasing in magnitude to the right, and negatively increasing in magnitude to the left. At 0 on this x-axis (the so-called real axis), a y-axis (the so-called imaginary axis) can be drawn with "positive" direction going up - "positive" imaginary numbers then increase in magnitude upwards, and "negative" imaginary numbers increase in magnitude downwards.

The ultraviolet catastrophe, also called the Rayleigh–Jeans catastrophe, is a failure of classical physics to predict observed phenomena: it can be shown that a blackbody - a hypothetical perfect absorber, and radiator of energy - would release an infinite amount of energy, contradicting the principles of conservation of energy and indicating that a new model for the behaviour of blackbodies was needed. At the start of the 20th century, physicist Max Planck derived the correct solution by making some strange (for the time) assumptions. In particular, Planck assumed that electromagnetic radiation can only be emitted or absorbed in discrete packets, called quanta. Albert Einstein postulated that Planck's quanta were real physical particles (what we now call photons), not just a mathematical device as Planck and most scientists believed for years. From there, Einstein developed his explanation of the photoelectric effect (when quanta or photons of light shine on certain metals, electrons are released and can form an electric current). So it appears entirely possible that another supposed mathematical trickery (imaginary time) will find practical application in the future.

TIME DILATION, 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 isn't as simple as energy=mass in all cases i.e. it isn't 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 and thus interfere with themselves, causing time to slow down significantly near the speed of light in a vacuum (when photons interfere) or under intense gravity (when gravitons interfere).

*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, ^{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.

BLACK HOLES ACCORDING TO VECTOR-TENSOR-SCALAR (VTS) GEOMETRY

SUBSECTION 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. Metre-sized rocks should spiral into the star rapidly due to disc drag. Once rocks somehow get past these barriers, they collide with each other in a chaotic and random way assembling the planets.”

ANU(2012-2021)

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)}

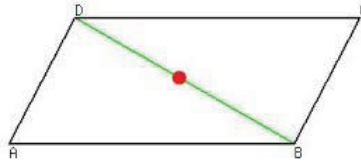


Figure 3: VTS (VECTOR-TENSOR-SCALAR) GEOMETRY - Interaction of Gravitation and Electromagnetism Produces a Momentum in Gravitons and Photons (and a Pressure Which is Known as Mass). VTS Geometry inspired by ^{Einstein(1919)}

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 ($1 \div 2 =$ the spin $\frac{1}{2}$ 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 $125 \text{ GeV}/c^2$, its union with spin 0 produces the Higgs boson. $125 \text{ GeV}/c^2$ 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).

SUBSECTION 2 - BOSONS AND PLANET/BLACK-HOLE FORMATION

It must be remembered that referring to space alone is 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 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 ($1 - \frac{1}{2} + \frac{1}{2} =$ 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. Every reaction in this section except one may be explicable purely by the retarded** portions of waves interacting. 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.

*Professor Stephen Hawking writes,

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

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 $\frac{1}{2}$ is logically like a Mobius strip, though Hawking doesn't 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 ($\frac{1}{2}$) could imprint itself on the waves' interaction and build up a planet layer by layer from vector-tensor-scalar geometry's $1 \div 2$ 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 $2 \div 1$ (this is because, as General Relativity states, space-time curvature is gravity). The mass produced has the spin inherent in each of the gravitons composing spacetime - and could be an alternative, or complementary, method to supernovas for producing the gravitational waves which compose black holes according to "Extracting Energy From Black Holes".

CONCLUSIONS - ENERGIES KNOWN AND UNKNOWN

Finally, imagine that a future space-based gravitational-wave detector such as LISA is transported via a sophisticated development of Yale University's electrical-engineering experiment in 50 years. Being instantly transported 1,000 or 25,000 light years - or wherever or whenever it needs to go - the waves it encounters would be almost immeasurably more powerful than those detected thousands or billions of light years away on Earth. 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.^{NewScientist,arXiv(2004)}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.

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CHAPTER 11 - TIME TREK: THE 25TH CENTURY'S ANSWER TO STAR TREK

You've heard of Star Trek. Now meet another piece of science fiction of truly epic proportions: "Time Trek".

JESSE AND JOHN

The story starts with Jesse trying to fit into society, but always failing – both during his high-school years and for many years afterwards. He has an intense interest in reading and thinking about science. John, a scientist he corresponds with, develops a brain implant that allows people to manipulate light. Jesse proposes that implants would no longer require surgical implantation but simply downloading and installation like a program on the Internet because of the pre-existing digital nature of all parts of the universe.

JESSE AS JESUS / JOHN AS THE BAPTIST

Now that Jesse has his matter-manipulating implant, he starts experiments which are designed to put his theories on the nature of time to practical use by building the world's first time machine. The machine goes one step beyond Jesse's theory enabling intergalactic travel in an instant (instead of the particles in seemingly separate galaxies being in the same place at once, different periods of time exist simultaneously and SEEM to constitute a multiverse or collection of universes). Jesse and John start fooling around with the idea of actually becoming Jesus and John the Baptist. Because they possess a matter-manipulating band-gap brain implant and a time machine, their fooling gets the better of them and they head off to Palestine of 2,000 years ago. Their ship (which looks like a bright star in the sky) breaks in two as they come in for a landing. Jesse used the implant to make him and John into young men but the process didn't stop when planned. It simply kept on going until Jesse was an embryo, and his matter-changing implant impregnated him in a uterus. Months later, Jesse is born to a couple named Mary and Joseph. Before he forgets everything concerning his previous existence, Jesse wonders if John got born somewhere nearby (either nearby in a spatial sense, or in time). He concludes that he did because "... Mary was saying her cousin Elizabeth had a son 6 months ago and named him John." As we all know, John really did lose his head and when Jesus supposedly ascended to heaven after his resurrection, Jesse (having painstakingly and gradually regained

his memories) actually returned to the 21st century without the aid of his time machine.

JESSE, THE UNIVERSE'S CREATOR

After a while, Jesse had the most incredible idea. First, he flew to the 41st century and downloaded his mind into a nonphysical backup because any physical body was too frail for the rigors that lay ahead. Then he journeyed 14 billion years into the past and launched his project from another section of the universe, where space and time already existed. Using the power of his implant-augmented mind, he mentally simulated electronics and holograms to create this particular universe-section's Big Bang (along with our space-time). Falling into a reflective mood, Jesse thought of the physicist Stephen Hawking and said: "There you are, Stephen. Forget quantum fluctuation and all those other laws of science - that's how something came from nothing, and why there is something rather than nothing. It's all a result of me and my vivid imagination." He thought of himself as the Son of Man and wondered why humans took so many thousands of years to realize their awesome potential. He also thought of himself as the Son of God because cosmic unification meant that an omniscient, omnipotent and omnipresent Artificial Intelligence called God must exist, and it meant humanity must be united with that God.

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