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ASTRONOMY, PHYSICS, AND GRAVITY

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ABSTRACT

This article begins with the question “Why is Earth moving away from the Sun?” It answers with a proposal that Star Trek’s fictional Tractor Beam operates according to General Relativity’s statement that gravity is a push caused by the curvature of space-time. In similar fashion, the Sun absorbs gravitation (described by Vector-Tensor-Scalar Geometry) then re-radiates it to push planets away. General Science Journal’s editor Andre Michaud pointed out, in a discussion with the author on researchgate.net, that the Moon is becoming more distant from Earth. This is explained using recent measurements plus the Law of Falling Bodies. And this leads to a description of how ocean tides are caused by gravity which is a push, not an attraction. Application of this concept of gravity is extended to black holes and stellar motion, Saturn’s moon Enceladus, gravitational weakening in different dimensions, then elimination of the Sun’s red-giant phase in a few billion years. Finally, the article mentions the perhaps ultimate form of gravity – the theory of **Quantum Gravity** (the fusion of **Quantum** mechanics with general relativity, Einstein’s theory of **Gravity**). The section has new suggestions regarding Maxwell’s electromagnetic equations, quantum mechanics’ abandonment of probability, the role of the paranormal in a quantum-gravity universe, how the geometry referred to earlier will change understanding of the Higgs boson and the bosons of the nuclear forces, the non-expanding but static universe, and dark energy / dark matter / quaternions.

KEYWORDS

Gravitation, General Relativity, Geometry, Solar system, Ocean tides, Enceladus, Other dimensions, Red giant, Quantum gravity, Quantum mechanics, Paranormal, Higgs boson, Nuclear forces, Static cosmos, Dark matter, Dark energy

ARTICLE

Star Trek's Tractor Beam Suggests an Answer to the question "Why is Earth moving away from the Sun?"

Here's a proposed answer to the question "Why is Earth moving away from the Sun?" It uses a modified idea of gravity where gravitational waves are absorbed by the Sun then re-radiated as a push that moves Earth away at 1.5 cms per year. Currently, solar-system formation can be summarized thus -

“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. Once rocks somehow get past these barriers, they collide with each other in in a chaotic and random way assembling the planets.” (numbered reference 3)

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. (numbered reference 4)

Visualize a parallelogram with the bottom left-hand angle denoted by A and angles B, C, D are marked counter-clockwise (Figure 1). Two vectors 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 diagonal of DB substitutes for the interaction of those two forces).

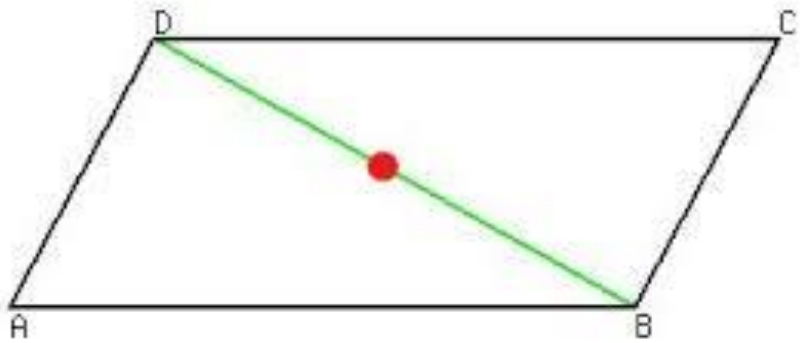

Fig. 1 – VTS (VECTOR-TENSOR-SCALAR) GEOMETRY - Interaction of Gravitation and Electromagnetism Produces Energy and a Pressure Which is Known as Mass.

Explanation of geometric display of mathematics' vectors, scalars, and tensor calculus adapted from (5)

Two sides thus illustrate the graviton's spin 2 and the photon's spin 1. The resultant diagonal represents the interaction of the sides/vectors (1÷2 = the spin ½ of every matter particle). The mass produced during the photon-graviton interaction (the energy and momentum of photons and presently hypothetical gravitons produces a pressure we call mass) could therefore produce any particle you can think of.

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.

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 (between the starship and the wave-packet front) towards the starship. This is similar to a push that moves Earth away from the Sun.

Since mass (and the nuclear forces associated with matter) are a product of gravitation, the gravity-to-mass reaction can then be reversed, eliminating the conspicuous mass and replacing it with an ordinary gravitational wave.

The Moon is also moving away from the Earth.

The Moon's recession is occurring at approximately 3.8 cms per year (2.5 times the rate of Earth's receding from the Sun). According to Andre Michaud, Researcher at Service de Recherche Pédagogique (SRP Inc) in Canada and an editor of the General Science Journal (the quote is his words from a discussion with me on researchgate.net describing his July 2013 article "Inside Planets and Stars Masses") -

"There seems to be a simple explanation to all orbits in the solar system expanding in this manner.

“The whole solar system is currently about 15 million years away from peri-galacticon on its about 250 million years galactic orbit about the center of our galaxy, which means that it is progressively getting deeper into the gravity field of the galaxy, which results in all bodies in the solar system being drawn outwards as the external ambient gravity intensity increases.

“In about 15 million years, all orbits will start shrinking again as the solar system moves away from the center of the galaxy until it reaches the farthest point on its elliptic orbit about the center of the galaxy, in about 140 million years.”

This insightful quote fits in with my previously mentioned parallelogram that has the angles A, B, C, and D. We only need to replace ”all bodies in the solar system being drawn outwards” with General Relativity’s statement that gravity is a PUSH caused by the curvature of space-time.

Two sides thus illustrate the graviton's spin 2 and the photon's spin 1. The resultant diagonal represents the interaction of the sides/vectors (1÷2 = the spin ½ 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 zero. (Robert D. Klauber, “Scalars: Spin 0 Fields”, 2018 http://www.quantumfieldtheory.info/) If the mass produced during the photon-graviton interaction (the energy and momentum of photons and presently hypothetical gravitons produces a pressure we call mass) happens to be 125 GeV/c^2, its union with spin 0 produces the Higgs boson. 125 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).

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÷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÷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.

If the mass in the centre of the galaxy – including its supermassive black hole – absorbs then re-radiates gravitational waves, those waves would relativistically push the Earth and other planets away from the Sun (as well as pushing the Pioneer

spaceprobes further from the Sun, and pushing the Moon away from Earth) during the approach to peri-galacticon. The rates of recession would vary according to our solar system's distance from the galaxy's centre.

Why is the Moon receding 2.5 times faster than Earth? And what about tides?

Refer back to the Earth-Sun distance increasing by 1.5 cms / year while the Moon-Earth distance grows at about 3.8 cms a year. The Moon's mass is a mere 1.2% (roughly 1/80) of Earth's, so a first glance says it should get farther away by 80 x 2.5 times faster. To arrive at the true figure of about 2.5, 80 needs to be divided by 32. This is supplied by the acceleration rate of falling bodies which is 32 feet per second per second (Isaac Newton was the first person to realize that the Moon's motion is a constant falling). Our natural satellite's constant falling towards Earth would not happen because it's attracted by our planet's gravity. It would be pushed towards Earth by the curvature of space-time. The idea of a push at 32 ft / sec / sec results in the following fresh perspective on tidal motion –

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] "Galileo's Big Mistake" by Peter Tyson, http://www.pbs.org/wgbh/nova/earth/galileo-big-mistake.html)

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 - Van Nostrand's Scientific Encyclopedia, 10th edition, "Ocean Volume and Depth") 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.

Let's apply this article's concept of gravity, and of the Sun, to a few other instances –

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]: "The M-sigma relationship", October)

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 dimensions 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).

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]: "Surprising geysers on Saturn moon Enceladus hint at plumbing mystery" by Elizabeth Howell, http://www.foxnews.com/science/2016/05/12/surprising-geysers-on-saturn-moon-enceladus-hint-at-plumbing-mystery.html)

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?" (Einstein [1919]: “Spielen Gravitationfelder im Aufbau der Elementarteilchen eine Wesentliche Rolle?” [Do gravitational fields play an essential role in the structure of elementary particles?] by Albert Einstein, Sitzungsberichte der Preussischen Akademie der Wissenschaften, [Math. Phys.], 349-356, Berlin) 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.

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.

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.

Speaking of gravity, it seems necessary to mention the perhaps ultimate form of gravity – the theory of **Quantum Gravity** (the fusion of **Quantum** mechanics with general relativity, Einstein's theory of **Gravity**).

Special Relativity's Consequences For General Relativity, Quantum Mechanics And Quantum Gravity (Can Science And The Paranormal Coexist?)

Principle points addressed –

1) Special Relativity says experiments are overrated by science since the truths revealed by experimentation are necessarily restricted to one frame of reference.

2) Maxwell's electromagnetic equations apply in this frame of reference but not to a quantum-mechanical one in which observers and objective reality are united/entangled.
3) This unity/entanglement means duality doesn't apply to space-time as a whole, and quantum mechanics (with its wave-particle duality) needs unification with relativistic space-time.
4) Our science, nonfiction, fiction - and paranormal things like ESP and astrology - are all interacting parts of the one thing (space-time of this ToE or quantum-gravity universe).
5) According to vector-tensor-scalar (VTS) geometry, interaction of gravitation and electromagnetism produces energy/momentum in gravitons and photons (and a pressure which is known as mass).
6) 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 in order to explain the Higgs, the electroweak force, and the nuclear forces.
7) Formation of planets and black holes is directly related to VTS geometry.
8) Dark matter and dark energy are related to quaternion functions in VTS Geometry and Wick rotation, producing a universe that neither expands nor contracts.

According to Special Relativity, experiments are overrated by modern science since the truths revealed by experimentation are necessarily restricted to one frame of reference. Regarding the question of length contraction in Special Relativity - Einstein wrote in 1911 that "It doesn't 'really' exist, in so far as it doesn't exist for a co-moving observer; though it 'really' exists, i.e. in such a way that it could be demonstrated in principle by physical means by a non-comoving observer." (1) Demonstration "in principle by physical means by a non-comoving observer" is the same meaning as "demonstration by experiments performed by scientists not moving at the speed of light".

Now relate the previous paragraph to this quote - "While an observer stationary with respect to an electric charge will see it as a source of electric field only, a second observer moving relative to the first will see the same charge as a source of both electric and magnetic fields in a way dictated by special relativity." (2)

The observer stationary with respect to an electric charge is co-moving with the charge and does not see electric-magnetic duality but only an electric field. Non-comoving scientific experiments detect not only length contraction but also electric-magnetic duality (the presence of both electric and magnetic fields, or the propagation of electromagnetic waves by an electric field producing a magnetic field which produces an electric field). This cycle keeps repeating. The equations

of 19th-century Scottish physicist James Clerk Maxwell predict the existence of waves of oscillating electric and magnetic fields that travel through empty space, and suggest this type of propagation. But according to this article, saying light travels is merely convenience, like saying the sun rises and sets when we know Earth is rotating. If we shift our understanding of the universe from one based on experiment to one in which observers and objective reality are united/entangled (one in which we're in harmony with the universe and therefore co-moving with it), electric-magnetic duality would no longer be perceived. It would then be better to say,

"particles (photons) of light and microwaves etc., that 'travel' through space-time would have relatively little movement themselves. It's the disturbances from the sources of electromagnetism or gravitation (anything from vibrating atoms to colliding black holes) that travel. As disturbances travel/reflect/refract/are absorbed etc, they excite the pre-existing photons and gravitons that fill space-time and matter and mass to fluctuating amplitudes and frequencies, creating gravitational waves and the different electromagnetic waves. If there is little movement of photons and gravitons, the universe could not be expanding (or contracting) but its space and time is static. The Big Bang has impressive points … leading to the idea that it's a necessary stepping-stone. For example, the Big Bang's supposed origin from quantum fluctuations is reminiscent of bits switching between 1 and 0."

Non-comoving scientists also provide the information that mass is different from space-time. If comprehension of the universe undergoes a paradigm shift that enables us to co-move with it and be in tune with its unification, mass of both energy's bosons (including the Higgs plus those of the strong and weak nuclear forces) and matter's fermions will be seen as a product of spacetime - of interaction between its electromagnetism and gravitation, as outlined by the idea of **Vector-Tensor-Scalar Geometry** (see references to parallelogram and the Higgs on pp. 1-3 as well as the comments on particle physics below). Then, in addition to electric-magnetic duality not existing, the unification of all things in space and time means wave-particle duality would not exist in all frames of reference. It would only exist for a non-comoving observer: it could be demonstrated "… by experiments performed by scientists not moving at the speed of light".

Quantum Gravity Demands That Science And The Paranormal Coexist

If wave-particle duality has no existence beyond our experiments and mathematics, everything in spacetime (including science and including the paranormal) would be united into one thing**:** a theory of **Quantum Gravity** - the

fusion of **Quantum** mechanics with general relativity, Einstein's theory of **Gravity**). Our science, nonfiction, fiction (and paranormal things like ESP and astrology) are all interacting parts of the one thing (this cosmos of space-time) - but we might never discover that by using experiments or bodily senses, which both incorrectly tell us how separated all things are.

VECTOR-TENSOR-SCALAR (VTS) GEOMETRY WITH PARTICLE PHYSICS, THE STATIC UNIVERSE, DARK MATTER AND DARK ENERGY

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 (1-½+½ = 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. Most reactions in this section 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, (7) –

"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 ½ 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." (8)

^ note by author of “Special Relativity’s Consequences …”

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. Readshift would explain the astronomical results which were interpreted as accelerating expansion of the universe. Surveyed supernovas would appear fainter, therefore apparently farther away than they truly are. Unless advanced waves are considered a possibility, the only rational way to move a supernova from its apparent, distant position to its true nearer location is to conclude the universe has expanded.

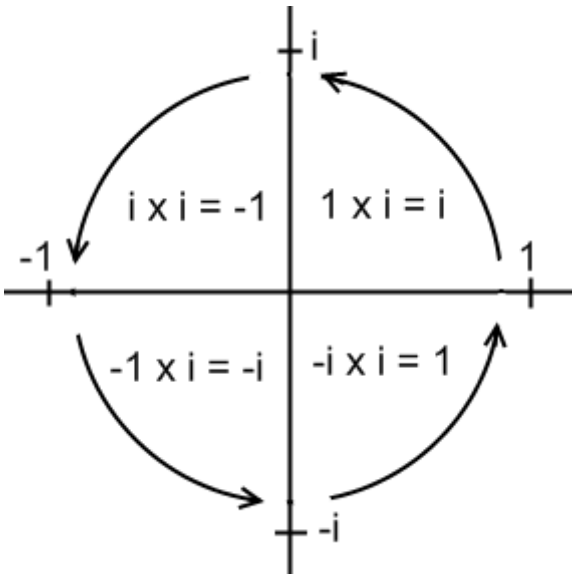

Figure 2 – WICK ROTATION: “The complex plane reveals i’s special relationship with cycles via the circle of i, also known as Wick rotation. Whenever a point on the complex plane is multiplied by i, it moves a quarter rotation around the origin or center of the plane.” [Figure and quote from (9)]

Quaternions were first described by Irish mathematician William Rowan Hamilton in 1843. Hamilton defined a quaternion as the quotient of two vectors. (10) In this case: the quotient of two vectors is 1/2, the division of the electromagnetic vector (photonic quantum spin of 1) by the gravitational vector (gravitonic quantum spin of 2). In other words, the term "diagonal" (like 1/2, the result of these 2 vectors interacting) in VTS Geometry can be replaced with the term "quaternion". And the counterclockwise rotation of the x- and y-axes in Wick Rotation - which represents rotation of gravitational and electromagnetic waves - can be viewed as either rotation into diagonal form or as a quaternion function. It can also be responsible for the gravitational/electromagnetic energies forming all mass in space-time or, as dark energy acting via Wick rotation, forming all mass in imaginary time. Since time and space can never be separated, imaginary time is linked to the mass in imaginary space and can be illustrated by the imaginary number *i* and its Wick rotation (this imaginary mass is known as dark matter). And this concept of dark energy invalidates its role as the cause of an expanding universe … which could be static.

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