Matter, Antimatter, Dark Matter and Space-Time Travel in a Renormalized, Paradoxically Still Infinite and Eternal, Universe with Extra Macro-Dimensions

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Abstract -

When his paper regarding mathematical formulas creating reality was submitted to a scientific journal and rejected as being too speculative, U.S. cosmologist Max Tegmark showed the rejection letter to his friend John Wheeler (1911-2008), a Princeton theoretical physicist. Wheeler said, “Extremely speculative? Bah!” Then he reminded Tegmark that some of the original papers on quantum mechanics were also considered extremely speculative. After Wheeler sent the journal his objection to their objection, Tegmark's paper was published.

This paper of mine can also be seen as a "too speculative" extension of Werner Heisenberg's matrix version of quantum mechanics. In particular, the part equating the Mobius strip to a,b,c,d,e and being a relation of matrix mathematics – and the part which says Brouwer's Fixed Point Theorem shows the universe must be infinite and eternal (the universe may seem unrelated to the quantum world, but the former is composed of the latter and this article's cosmology is a direct outgrowth of matrix mechanics).

What is the Dark Matter that holds together galaxies and galaxy clusters? Nobody knows. Some say it's gravitational, and requires modification of Einstein's General Relativity. Some say it's a form of matter, consisting of dark particles. Those ideas are combined here with 20th-century physicist Richard Feynman's interpretation of advanced and retarded waves. (Feynman found that adding the contributions of advanced and retarded waves creates a consistent quantum theory called QED -

Quantum Electrodynamics - in which the terms that might violate causality cancel precisely.) I believe LIGO (the Laser Interferometer Gravitational-wave Observatory) will build on Richard Feynman's QED and his love of "advanced" waves that travel backwards in time. There should be several applications of this extension of QED:

(1) Radioactive dating of dinosaur fossils, ancient rocks, and Earth itself should all result in readings that are many times less - at least a thousand (for dinosaurs), to nearly a million (for Earth).

(2) Health might be dramatically improved and lifespan dramatically increased.

(3) United with electronic binary digits, cosmic topology and mathematical Wick rotation; extra large-scale dimensions could be discovered - and these dimensions joined with matter and mass, space and time into one ***physical*** space-time unification.

(4) Matter, antimatter and dark matter should become viewed as different aspects of one thing when combined with advanced waves, Wick rotation and the mathematical Matrix.

(5) Maths like Brouwer's Fixed Point Theorem and so called "imaginary" time agree that space-time can be seen as one literally infinite and eternal "block" universe containing all the past as well as the entire future (the Cosmic Microwave Background and redshift objections are addressed).

(6) The new maths in this article tells us that our present maths is incomplete within a unified universe, is therefore relied upon too much, and is incapable of producing a successful theory of Quantum Gravity (unification of quantum mechanics and Einstein's theory of gravity, general relativity). Paradoxically, "new maths" also says $\infty = 0$ (the infinity of the universe's size equals the zero-ness of space-time/gravity) and points to a new physics. Science seems to avoid infinity at all costs – equating it with zero will give scientists many more headaches. Maybe they could accept infinity if $\infty = 0$ was viewed as the ultimate form of renormalization – a renormalization that, thanks to $E=mc^2$,

doesn't reduce the infinite size of the universe but reduces the distances in space and between times to zero.

INTRO

The main evidence for the existence of Dark Matter is that galaxies would fly apart instead of rotating if they did not contain a large amount of unseen matter. ("The redshift of extragalactic nebulae", Fritz Zwicky's first paper on this topic, appeared in 1933 in the obscure journal Helvetica physica acta, vol. 6, p. 110) What is Dark Matter? Nobody knows. Some say it's gravitational, and requires modification of Einstein's General Relativity. Some say it's a form of matter, consisting of dark particles. Those ideas are combined here with 20th-century physicist Richard Feynman's interpretation of advanced and retarded waves. (Feynman found that adding the contributions of advanced and retarded waves creates a consistent quantum theory called QED - Quantum Electrodynamics - in which the terms that might violate causality cancel precisely.) Cancellation of causality's violation might also be viewed through Isaac Newton's idea of gravity and the modern idea of 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. Instantaneous effect over large distances is known as quantum mechanics'

entanglement and has been repeatedly verified experimentally. If the retarded (forwards) wave component travels in positive space, the advanced (backwards)

component corresponds to an equal amount of negative distance. The forwards and backwards movement in time can cancel to produce a quantum (and macroscopic) entanglement that eliminates the need for the Big Bang's and Cosmic Inflation's solution that the universe is roughly the same everywhere on large scales because everything was once in contact in a tiny space.

This article believes radioactive dating is a form of gravitational-wave detection (of the waves' advanced component).^ LIGO - the Laser Interferometer Gravitational-wave Observatory - is regarded as a detector of retarded gravitational waves. A gravitational

wave cycles or oscillates between its advanced and retarded states as a result of Wick rotation.

^ If a dinosaur died mere thousands of years ago, the advanced gravitational and electromagnetic waves composing its particles - see 4th paragraph in "Time, Space, and Wick Rotation" - would continue travelling back in time. By the time its surroundings, bones or fossilized remains 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 80 million years ago or more. Radioactive dating is thus a form of (advanced) gravitational-wave detection, just as LIGO - Barish, Barry C.; Weiss, Rainer (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 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. ("Noise-cancelling Headphones" - https://en.wikipedia.org/wiki/Noise-cancelling_headphones) 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. This would restrict measurement of the age of the dinosaur fossil to the retarded gravitational and electromagnetic waves which go forward in time and are associated with the amount of radioactive decay occurring between the animal's death in the past and measurement in the present. 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 the equivalent of having been alive for more years). Neutralizing the advanced waves should dramatically increase the health and lifespan of dinosaurs, humans and all other species if it doesn't adversely affect anatomy and physiology ie if the retarded waves alone are sufficient for normal structure and function.

Article

OUR INCOMPLETE MATHS CANNOT PRODUCE QUANTUM GRAVITY

About pure maths -

Many scientists have said mathematics is a universal language because 1+1=2 no matter who you are. The trend in modern physics is towards a unified theory of the universe -

starting with the unified theories of the 20th century (notably Einstein's) and extending to string theory and quantum gravity. What happens if a person in, say, the 24th century is raised believing in a unified theory that has implications in physical terms for everything in space-time? Would he or she think there is actually only one thing? Would (s)he think it's a mistake to add one apparently separate thing to another apparently separate thing to produce two, and that such addition is merely the result of the way the body's senses operate? (Our whole mathematical system is ultimately based on the idea that 1+1=2, and would therefore be incomplete in a unified universe.) 1+1=2 doesn't apply in a unified universe, thus it can never produce Quantum Gravity.

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 unification with the wave-particle duality of quantum mechanics (which has also been repeatedly verified by experiment). Duality says subatomic particles also exhibit wave-like properties while waves (e.g. electromagnetic) also possess particle-like properties. Concerning the former (particles), it's as if mass was composed of the coupling of the long-range gravitational and electromagnetic waves, in accord with the mass-giving Higgs field being the result of coupling - this refers to theories where the role of the Higgs field is fulfilled by particular couplings (in this case, of the graviton and photon - see M. Tanabashi; M. Harada; K. Yamawaki. Nagoya 2006: "The Origin of Mass and Strong Coupling Gauge Theories". International Workshop on Strongly Coupled Gauge Theories. pp. 227–241). And the completed $E=mc^2$ may be, as this article's final section "About practical maths" suggests when it uses wave-particle duality,

$E = v = f\lambda = distance/duration = space/time = mc^2$.

TIME, SPACE, AND WICK ROTATION

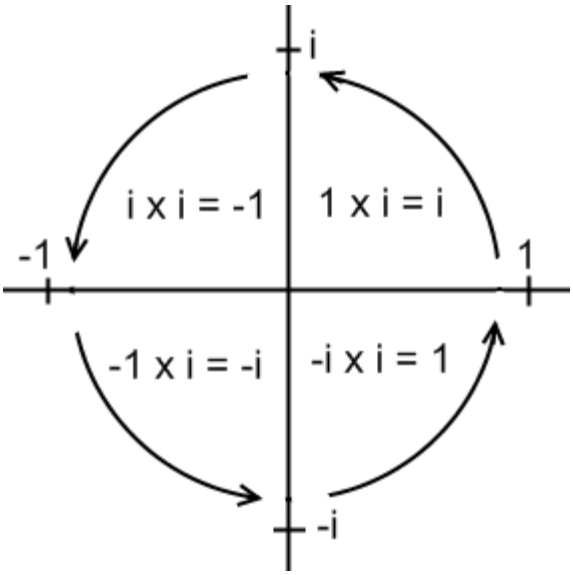

Figure 1 – Wick rotation

"The complex plane (with its horizontal "real" axis and vertical "imaginary" axis) 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 "The Meaning of Imaginary Time: Creativity's Dialog with Timelessness" Posted on July 15, 2015 by Kerri Welch <https://textureoftime.wordpress.com/2015/07/15/the-meaning-ofimaginary-time/>

Following Einstein's example of turning Planck's mathematical quanta (which, for years, Planck and all other scientists considered purely mathematical) into explanation of the physical photoelectric effect, the Wick rotation used to describe imaginary time may be transformed from mathematical "trickery" to physical meaning, and provide a modern way to unite space and time (and imaginary time) into one space-time.

Stephen Hawking writes in "A Brief History of Time" – Bantam Press, 1988, pp.66-67:

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

Particles of matter like the proton and electron have spin 1/2, which means these particles must be turned through 2 complete revolutions to look the same – and, not coincidentally, you must go round a Mobius strip twice to reach your starting point. It

seems plausible that the particular values of quantum spin could be determined by another set of particular values viz those in electronics' BITS or BInary digiTS, which always take the form of either 1 or 0. First, the 1's and 0's are programmed to form the shape of a Mobius strip, which is merely two-dimensional (2-D). The paper “From Planck Data to Planck Era: Observational Tests of Holographic Cosmology” by Niayesh Afshordi, Claudio Corianò, Luigi Delle Rose, Elizabeth Gould, and Kostas Skenderis: Phys. Rev. Lett. 118, 041301 (2017) - Published 27 January 2017 (https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.118.041301) - says, In a holographic universe, all of the information in the universe is contained in 2D packages trillions of times smaller than an atom. ("Holographic" could refer to the interference between gravitational and electromagnetic waves [see next paragraph], while "2D packages trillions of times smaller than an atom" could refer to Mobius strips.)

Then two strips must be joined to make a 4-D Klein bottle which has length, width, depth and the 4th dimension of movement in time ("Imaging maths - Inside the Klein bottle" by Konrad Polthier (http://plus.maths.org/content/os/issue26/features/mathart/index). The type of Klein bottle formed would appear to be the figure-8 Klein. A diagram of many figure-8 Klein bottles would show that their positive curvature (on the spherical parts) fits together with their negative curvature (on saddle-shaped parts) to cancel and produce, on a cosmic scale, the flat curvature of space-time ("The WMAP science team has nailed down the curvature of space to within 0.4% of 'flat' Euclidean." - "Wilkinson Microwave Anisotropy Probe" - https://map.gsfc.nasa.gov/). When you have trillions of Mobius and figure-8 Klein elements assembled, you can follow the theory of the mass-giving Higgs field being the result of various couplings (M. Tanabashi; M. Harada; K. Yamawaki. Nagoya 2006: "The Origin of Mass and Strong Coupling Gauge Theories". International Workshop on Strongly Coupled Gauge Theories. pp. 227–241). An implication of a 1919 paper by Einstein is that the coupling is between gravitons and photons. That paper is "Do gravitational fields play an essential role in the structure of elementary particles?" ("Spielen Gravitationsfelder im Aufbau der materiellen Elementarteilchen eine wesentliche Rolle?" by Albert Einstein - Sitzungsberichte der Preussischen Akademie der Wissenschaften, [Math. Phys.], 349-356 [1919] Berlin). With trillions of Mobius and figure-8 Klein elements assembled, an appropriate number of photons and gravitons must be included to give the matter what we call mass.

Supersymmetry (SUSY) proposes a relationship between bosons and fermions. Some scientists believe supersymmetry is a failed theory. A new approach would be proposing that the Mobius strip is a fundamental constituent of both fermions and bosons - and

therefore unites all particles (of matter and of energy) into one space. The inner and outer surfaces of a Mobius form one **continuous** strip. Constant movement of these surfaces – as well as of the four-dimensional figure-8 Klein bottle, which is a union of two Mobius strips - is carried out by the programmed-in Wick rotation's **continuous** cycling between real and imaginary time. Therefore, the Mobius strip combined with Wick rotation and imaginary time provides a modern way to unite space and time (and imaginary time) into one space-time. In the above diagram of Wick rotation; the side of the Complex Plane's so-called real axis extending to the right of the origin or centre is, in space-time, also known as the retarded axis going into the future - while the side extending to the left is the advanced plane going to the past.

MATRIX VALIDATES TOPOLOGICAL, ADVANCED-WAVE COSMOLOGY

The matter and dark matter are the same thing since Wick rotation causes cycling between the retarded waves popularly associated with matter and the advanced waves commonly associated with dark matter. This cycling is reminiscent of Feynman's speculation - with his thesis adviser John Wheeler - that perhaps the entire universe is a unification in which just one particle zigzags back and forth in time. Feynman concluded that antimatter is simply ordinary matter going backwards in time (what is termed "matter-antimatter annihilation" occurs when that particle reverses direction in time). The precise cancellation Feynman found for the contributions of advanced and retarded waves explains why antiparticles don't vanish into the past (the oscillations into retarded waves keep restoring their travel into the future). This time-reversal involving antimatter implies the existence of antimatter is related to the concept of dark matter's advanced waves. The retarded waves might be eliminated somehow (perhaps their wave motion is suppressed by other, incoming gravitational or electromagnetic waves - or the waveform might be cancelled by the opposing crests and troughs of an anti-wave, similar to the workings of noise-cancelling headphones). Then advanced waves would take control and propel the original matter beyond its antimatter stage and completely into the past, where it becomes what we call dark matter. It continues to affect our present and future gravitationally (not electromagnetically) as long as space-time exists because, as General Relativity says, gravity is the curvature of space-time ie space-time IS gravity.

There appears to be a problem with these ideas. How can matter and antimatter differ (they have opposite electrical charges) if both are composed of precisely cancelling advanced and retarded waves? The problem is solved by 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.

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

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

Figure 2 – Matrix multiplication

From <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 (Icon Books 2008, pp. 193-194) 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. [2001] "Great Physicists: The Life and Times of Leading Physicists from Galileo to Hawking" - Oxford: Oxford University Press, p. 269)

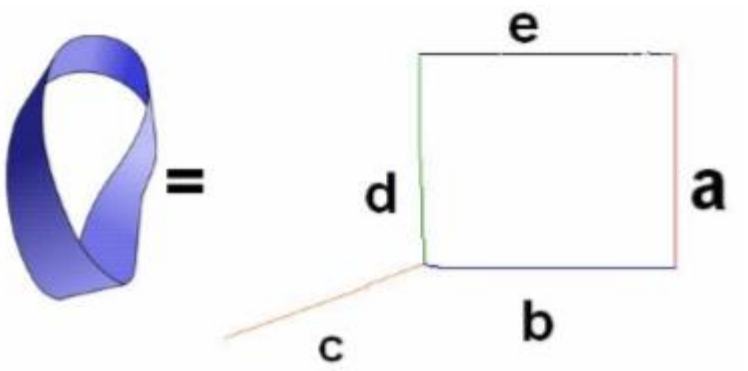

Figure 3 – Mobius equals a,b,c,d,e array

Width a is perpendicular to the length (b or e) which is perpendicular to height c. How can a line be drawn perpendicular to c without retracing b's path? By positioning it at d, which is then parallel to (or, it could be said, at 180 degrees to) a. d is already at 90 degrees to length b and height c. **d has to be at right angles to length, width and height simultaneously if it's going to include the Complex Plane's vertical imaginary axis in space-time (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 pictured above, existing in a. The twist needs to be more exaggerated than the illustrated one, with the upper right of the Mobius descending parallel to side "a" then turning perpendicular to it at approximately the level of the = sign. Thus, 90+90 (the degrees between b & c added to the degrees between c & d) can equal 180, making a & d parallel. But 90+90 can also equal 90, making a & d perpendicular. (Saying 90+90=90 sounds ridiculous but it has similarities to the Matrix [of mathematics, not the action-science fiction movie]. 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.

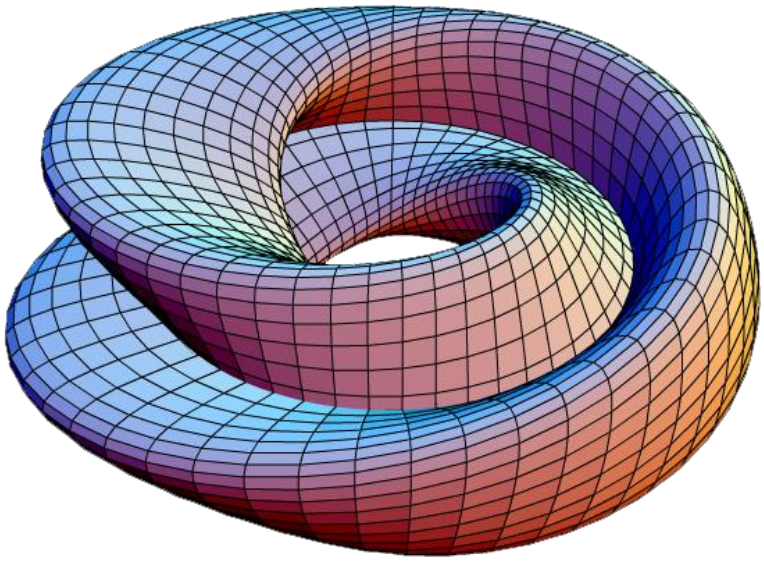

Figure 4 – Mobius Doublet (figure-8 Klein bottle) The universe may be composed of an infinite number of doublets (diagram above - 2 Mobius strips are joined on their sides to form Bottle), with binary digits filling in the central hole and perfectly adjusting the outer edges to fit [this is similar to manipulation of an image on a computer screen].

SUMMARY

The answer to how matter and antimatter can differ if both are apparently composed of precisely cancelling advanced and retarded waves (the cancellation occurs according to physicist Richard Feynman's Quantum Electrodynamics) is that, consistent with matrix multiplication, the contributions of the retarded + advanced waves of matter ≠ the contributions of the advanced + retarded waves of antimatter. Advanced waves can take over and send the original matter beyond its antimatter stage and completely into the past, where it becomes dark matter and continues to affect our present and future gravitationally as long as space-time exists because, as General Relativity says, gravity is the curvature of space-time ie space-time IS gravity.

Referring to the diagram where a Mobius strip = a, b, c, d, e:

This article proposes that the Mobius is a building block of every particle in the universe, whether it's a particle of matter (such as a proton or electron) or a particle of force or energy (like a photon or graviton). Inspired by matrix maths, the paragraph beneath that diagram says that 90 + 90 = 180 or 90. Since this weird maths takes place on the Mobius strip's quantum scale, it's in agreement with Heisenberg's matrix mechanics.

And like quantum mechanics, it asserts that common sense has no possibility of arriving at a complete understanding of the world.

Referring to the diagram of Wick rotation -

A better picture of the universe can be visualised if we imagine both the horizontal, real axis and vertical, imaginary axis are 3-dimensional and not limited in their extension. Then a "block" universe exists – a four-dimensional (3 space + 1 time) block of space-time containing all the past, and the entire future. The real, known space and time (and unknown imaginary time described by Wick rotation and imaginary numbers) are united into one space-time. Known space and time cannot be separated, so it's likely that imaginary time is permanently joined with imaginary space. I don't like describing something that may exist with the word imaginary. The imaginary space above the origin or centre of the Wick-rotation diagram might be better referred to as hyperspace or superspace, and that below the origin as subspace. Since real and imaginary space-time are united into one space-time, the positions of hyperspace and subspace must be fluid and permeate the whole of space-time. They cannot be restricted to certain points above or below the origin. Another way of looking at this is to say the origin point itself moves. 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.

"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)." (Francis E. Su, et al. 'Brouwer Fixed Point Theorem', *Math Fun Facts,* http://www.math.hmc.edu/funfacts)

This paragraph shows that the Fixed Point agrees with the universe being infinite and eternal – a state this article's next section proposes using imaginary time (not purely mathematical, but made physical) and infinite numbers. If the origin point moves around, it could be associated with the Fixed Point Theorem's sloshing. It could also be equated with our present knowledge of quantum mechanics because it's exact position is indeterminate. Returning to the above paragraph's statement about real and imaginary axes not being limited in their extension - the origin is also known as the centre (of the Complex Plane used in Wick rotation). If the centre moves around, it can only retain its identity as the centre by remaining infinitely far from a hypothetical edge. A diagram of the Complex Plane used in Wick rotation is obviously finite but it's possible the universe is infinite. Then the origin or Fixed Point is infinitely far from a supposed

edge to the universe before movement or sloshing - and wherever it moves to, it remains an infinite distance from that edge. That is, the universe would literally be infinite in size. And since time can't be separate from space, the cosmos is eternal too.

PARADOXICAL PS - Creation Of The Infinite, Eternal Cosmos Using Electronic BITS, Pi And Imaginary Time

Most scientists don't believe there can be a rational explanation for an infinite, eternal universe. They much prefer ideas like the Big Bang, the multiverse and random quantum fluctuations causing everything to pop into existence from nothing. Our concept of time as something that only goes from past to future makes the thought of creating an infinite, eternal cosmos unacceptable – a paradox which is seemingly absurd. But as 20th-century Danish physicist Niels Bohr said, “How wonderful that we have met with a paradox. Now we have some hope of making progress.” If he's correct, then absurd ideas about the universe may, when investigated, turn out to well-founded or true.

Like the surface of the Earth, the universe's imaginary time has no boundaries (you can go around the world without falling over any edge). But, also like Earth, it is finite unless pi or another infinite number is incorporated into each and every part - numbers could be encoded into parts using the BITS (BInary digiTS, 1's and 0's) of electronics. With infinite numbers and Wick rotation encoded into the building blocks called Mobius strips, a universe perfused with both imaginary time and infinite numbers is comparable to a never-ending number of Cosmic DVD's on planes extending infinitely in every possible direction (not just the horizontal and vertical planes of Wick rotation's Complex Plane).

Professor Stephen Hawking says that boundaries and singularities exist in real time but don't exist in imaginary time. (Stephen Hawking, 1988, 'A Brief History of Time', p. 139. *Bantam Press*) 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.

What about the Cosmic Microwave Background that supposedly proves the Big Bang theory? (Penzias, A. A.; Wilson, R. W. [1965]. "A Measurement of Excess Antenna Temperature at 4080 Mc/s". The Astrophysical Journal. 142 [1]: 419–421) Or what about the astronomical redshift that supposedly means the universe is expanding? The answer to the microwave objection can be summed up in one sentence - "The quantum entanglement of microwaves with all of space-time means the Cosmic Microwave Background radiation fills the entire sky and is not produced by the Big Bang as most scientists believe (quantum entanglement has been repeatedly confirmed experimentally)."

To answer the redshift problem almost as briefly - In astrophysics, gravitational redshift or Einstein shift is the process by which electromagnetic radiation originating from a source that is in a gravitational field is reduced in energy and in frequency / increased in wavelength, or redshifted to the red end of the spectrum. Since General Relativity says gravity is just another term for the curvature of space-time, the gravitational field out of which proceeds a particular measurement of electromagnetic redshift is not limited to a particular galaxy or galaxy cluster but spans (indeed, is) the whole of space-time. The farther away a galaxy is, the greater is the amount of gravitation which any electromagnetic radiation has to traverse. So the electromagnetism weakens more than expected and the gravitational redshift, which is larger than anticipated, naturally increases with distance. All of the redshift not due to the Doppler effect is gravitational redshift, which is always grounded in space-time-spanning gravity. It never indicates universal expansion, which would make it what is called cosmological redshift and would require space-time and gravitation to be separate things.

ABOUT PRACTICAL MATHS

To give some more detail about why there's no cosmic expansion -

The wave-particle duality mentioned above can be described by starting with $v=f\lambda$ (wave velocity, m/s). Velocity 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

$v = f\lambda$ = distance/duration = space/time = c (equation 1)

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

$E = v = f\lambda$ = distance/duration = space/time = c (equation 2)

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

$E = v = f\lambda$ = distance/duration = space/time = mc (equation 3)

What about the 2 in E=mc2? In later papers Einstein repetitively stressed that his mass-energy equation is strictly limited to observers co-moving with the object under study.

In order for E=mc2 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 is reported to cover 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.

'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)

The link between the quantum and macroscopic worlds means the transverse wave motion of electromagnetic waves is identical to the transverse wave motion in a body 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. Like waves of water, electromagnetic waves are 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.

As Paul Camp, Ph.D. in theoretical physics, writes -

"A photon is a quantum of excitation of the electromagnetic field. That field fills all space and so do its quantum modes."("How big is a photon?" - 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 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 speed of light - or according to this article, coverage of excitations - is based on an inch of exactly 2.54 cm and is exactly 186,282 miles, 698 yards, 2 feet, and 5 21/127 inches per second.)(Savard, John. "From Gold Coins to Cadmium Light". 2009-11-14. WebCite: http://www.quadibloc.com/other/cnv03.htm)

The above ideas of gravitational and electromagnetic waves displaying little or no motion are a new interpretation of John Wheeler's geon or "gravitational electromagnetic entity", an electromagnetic or gravitational wave which is held together in a confined region by its own nature.(Wheeler, J. A. (January 1955). "Geons". Physical Review. 97 (2): 511 - *doi:10.1103/PhysRev.97.511*)

Since Einstein's mass-energy equation is strictly limited to observers co-moving with the object under study, "squared" must be added to the mass/light-speed part of this article's equation -

$E = v = f\lambda$ = distance/duration = space/time = mc^2 (equation 4)

Simplified by removal of the middle elements, this becomes E=mc2

(any other result would suggest the inventor of Relativity was wrong).

E=mc^2 seems to tell us that all distances in space, and time, can be completely eliminated (permitting us to instantly reach anywhere in space-time). Einstein wrote a 1919 paper titled "Do gravitational fields play an essential role in the structure of elementary particles?" (it suggests electromagnetism is the other contributor to mass). Today's world answers the paper's question with "no" but, out of curiosity, let's ask what happens if the answer is "yes". The masslessness of photons, and also the masslessness of the theoretical gravitons, could be represented by 0 (zero). Then mass could result from photon-graviton interaction, and we could replace the m with zero. This results in E=0*c^2 ie outside familiar circumstances (such as in black holes), it is possible for E to equal 0. Having reduced the equation to nothing but E, m=0 and c^2=0 which means m=c^2. E=0 and m=c^2 are necessary for black holes to be portals to other regions of time and space within the universe [black holes are regarded as portals in a paper co-authored by the well-known cosmologist Stephen Hawking ("Soft Hair on Black Holes" by Stephen W. Hawking, Malcolm J. Perry, and Andrew Strominger (Phys. Rev. Lett. 116, 231301 – Published 6 June 2016)]. At first glance, m=c^2 seems to be saying mass exists at light speed. But the absence of E (energy) refers to there being no interaction of electromagnetic energy and gravitational energy, and therefore no mass. If mass cannot be produced, Einstein's paper suggests mass-producing space-time/gravity must be described by zero. The zero-ness of space-time/gravity does not mean it doesn't exist … it obviously does. It means we can relocate matter and information superluminally, or travel into the past and future, because distance equals zero and can be eliminated from both space and time.

NEW MATHS AND NEW PHYSICS

I understand the need to use mathematics. Unfortunately, as my attachment points out, the maths used today is incomplete, and is therefore relied on more than it should be. This article contains several examples of "new" maths that appears reliable in establishing "new" physics (quotation marks are used because they aren't really new but are building on previous maths and physics).

Some things are given physical application to space-time itself e.g. base-2 mathematics (BITS or BInary digiTS), Wick rotation (used to describe imaginary time), the topological

Mobius strip and Mobius doublet (figure-8 Klein bottle). Then there's 1+1≠2 (1+1=2 doesn't apply in a unified universe and can never produce a successful theory of Quantum Gravity). Paradoxically, this new maths tells us ∞= 0 (the infinity of the universe's size equals the zero-ness of space-time/gravity) and points to a new physics. Science seems to avoid infinity at all costs – equating it with zero will give scientists many more headaches. Maybe they could accept infinity if ∞= 0 is viewed as the ultimate form of renormalization – a renormalization that doesn't reduce the infinite size of the universe but reduces the distances in space and between times to zero. If there's no movement of photons and gravitons, the universe could not be expanding. And non-expansion eliminates the need for repelling Dark Energy that makes the universe expand.

This new maths may only be considered seriously by most people after future technology has applied it to new versions of space-time travel in which the infinity of the universe can be crossed in zero time ... and after this article has disappeared into history. Our present slow rockets aren't very convenient for travel to the stars and galaxies. I can see 3 better ways - each is faster than the previous one. (1) is the controversial EmDrive which, through future application of Maxwell's and Einstein's theories as well as the Transactional Interpretation of Quantum Mechanics, may not only see huge benefits for spaceflight but also huge benefits to many areas of life for the average person who never journeys to space. (2) is the combining of a 2009 electrical-engineering experiment at America's Yale University with the ideas of Albert Einstein to produce a type of wormhole, or shortcut through space-time. (3) is mathematical and results in instantly reaching your destination in space or time – the use of the Brouwer Fixed Point Theorem in future space-time travel.

(1) HOW EM DRIVE MAY WORK

The website Reddit says 'EmDrive (also known as an RF resonant cavity thruster) is a purported reactionless propulsion technology, which would - if true - revolutionize space travel and the world economy. After nearly 20 years since its "invention", there is no

compelling empirical evidence that it works as described* despite ample testing of a relatively simple design and all theoretical explanations for the so-called EmDrive effect are completely at odds with our most fundamental theoretical knowledge of physics.' (https://www.reddit.com/r/EmDrive/). Australian astrophysicist Prof. Alan Duffy says, "If this rocket really doesn't need fuel to create thrust then that would be the end of physics as we know it." That's a very interesting statement - and an accurate one, too. Let's try to produce an explanation for how the EM drive might work without using alternatives such as fuel, thermal expansion ... or, as is written in "Why does the Impossible Thrust work" by J.R. Croc, P. Castro, M. Gatta, L. Gurriana (2017, http://vixra.org/pdf/1706.0283v1.pdf), the pilot waves of eurhythmic physics (real physical waves – not probability waves – of nonlinear quantum physics). An explanation for how the EmDrive might work without using alternatives "… would be the (beginning) of physics as we (don't) know it". Incidentally, my previous references to bits or binary digits agree with the idea of real physical waves opposed to mere probability waves. Binary digits are proposed to be the Hidden Variables which "are an interpretation of quantum mechanics based on the belief that the theory is incomplete and that there is an underlying layer of reality that contains additional information about the quantum world. This extra information is in the form of the hidden variables, unseen but real quantities. The identification of these hidden variables would lead to exact predictions for the outcomes of measurements and not just probabilities of obtaining certain results." ("Quantum" by Manjit Kumar - Icon Books, 2008 - p. 379)

*This invention by British engineer Roger Shawyer is 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.

The beginning of the solution proposed here is with 19th-century scientist Michael Faraday's experiments with electricity and magnetism (which, later that century, James Clerk Maxwell mathematically unified into a theory of electromagnetism that includes light). The existence of both advanced waves (which travel backwards in time) and retarded waves (which travel forwards in time) as admissible solutions to Maxwell's equations was explored in the Wheeler–Feynman absorber theory of last century. Also, the transactional interpretation of quantum mechanics (TIQM) says waves are both retarded and advanced. The waves are seen as physically real, rather than a mere mathematical device.

And "Physics of the Impossible" by Michio Kaku (Penguin Books, 2009) states on p.276, "When we solve 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."

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 ie 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.

Many people believe the reason a jet aircraft is propelled forward is because its exhaust pushes against the air outside. This cannot be the reason a spaceship moves forward in the vacuum of space where there is no air. The spaceship's movement is attributed to the 3rd law of motion. But what exactly is the 3rd law? Does it need to simply be accepted as a mysterious abstraction which "just is" the way things work? Could there be an explanation in physics for why a rocket in space behaves the way it does? Planets, stars, galaxies are constantly in motion. In an infinite universe existing eternally, that motion guarantees any point in the remotest depths of space would have once been occupied by dense matter for the rocket's exhaust to push against. If the rocket fuel and exhaust is composed of gravitational and electromagnetic waves which have components going back in time, the exhaust must inevitably and perpetually push against some form of dense, undetectable (dark) matter. Also, some microwaves in an EmDrive would travel back in time to produce, via the 3rd law, a thrust forward.

ITS OTHER SCIENTIFIC APPLICATION

Four years after publishing General Relativity, Einstein published a paper that asked "Do gravitational fields play an essential role in the structure of elementary particles?" ["Spielen Gravitationsfelder im Aufbau der materiellen Elementarteilchen eine

wesentliche Rolle?"] by Albert Einstein - Sitzungsberichte der Preussischen Akademie der Wissenschaften [Math. Phys.] 349-356 [1919] Berlin. That paper was published in an attempt to clarify the inner workings of the atom. (See the 2012 article “How Einstein Discovered Dark Energy” by Alex Harvey (https://arxiv.org/pdf/1211.6338v1.pdf). But it might well apply to EmDrive's second app.

Albert 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 - "Transactions of the American Mathematical Society" 27, 106 - Rainich, G. Y. (1925). Therefore, gravitational waves also have a "retarded" component and an "advanced" component. They can travel forward or backward not only in space, but in time too.

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 their composition (in ways yet to be discovered).

(2) ELECTRICAL ENGINEERING AND SPACE-TIME WARPS

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 [“Tunable bipolar optical interactions between guided lightwaves” by Mo Li, W. H. P. Pernice & H. X. Tang - Nature Photonics 3, 464 - 468 (2009)]. This is the “optical 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. My sources for my belief that this union will be achieved include Einstein's paper "Do gravitational fields

play an essential role in the structure of elementary particles?" and two references to the similarities between gravitation and electromagnetism: (1) "Electromagnetic and Gravitational Waves: the Third Dimension" by Gerald E. Marsh, Argonne National Laboratory (Ret) - https://arxiv.org/pdf/1101.2247 states,

"The motion of a set of test particles under the influence of a plane gravitational wave differs considerably from the electromagnetic case. Yet, there are similarities: not only do both have two independent polarization states, but when one includes the longitudinal motion, the surface associated with the motion of a charged particle responding to an elliptically polarized wave is similar to the constant phase surfaces of a set of particles driven by a plane gravitational wave; in both cases the latter surfaces derive their longitudinal motion from trigonometric double angle functions."

(2) According to "Similarity Between Gravitation and Electrostatic Forces" by mathematician and physicist Ron Kurtus (5 December 2010 - http://www.school-for-champions.com/science/gravitation_electrostatic.htm#.Wkw9dcs_5Ah) - (under the heading "Gravitomagnetism"), he states that

"An analogy of gravitational and electromagnetic fields is seen by comparing the Einstein Field Equations from the General Theory of Relativity with Maxwell's Field Equations for electrical and magnetic fields."

Achievement of this means the quantum components (gravitons) of gravity/spacetime-warps between spaceships and stars could mimic the Optical Effect and be attracted together, thereby partially eliminating distance (this is similar to traversing a wormhole, or shortcut, between two folds in space-time).

(3) BROUWER FIXED-POINT THEOREM

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 instantly 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 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 backward in time, acting instantly across the universe and being entangled with any selected point in space-time.

ABOUT THE AUTHOR

The author prefers to work alone and is interested in philosophy as well as all the sciences – especially cosmology, Relativity, physics, quantum mechanics, electronics, biology and space-time travel. Mathematics was also included in his university courses.