MATHEMATICAL NATURE OF GRAVITY

By Rodney Bartlett

Abstract -

General Relativity says gravity is a push caused by space-time's curvature. Combining it with $E=mc^2$ results in distances being totally deleted from space-time/gravity by future technology, and in expansion or contraction of the universe as a whole being eliminated. The road to these conclusions has branches shining light on supersymmetry and superconductivity.

Advanced waves are usually discarded by most scientists because they're thought to be detectable before even being emitted, and thus to violate causality. Richard Feynman found that adding the contributions of advanced and retarded waves creates a consistent quantum theory called Quantum Electrodynamics in which the terms that might violate causality cancel precisely. Here, causality's violation is viewed through Isaac Newton's idea of gravity and the modern idea of entanglement. Just as advanced waves are usually discarded, few physicists or mathematicians will venture to ascribe a physical meaning to Wick rotation and "imaginary" time. Here, that maths (when joined with Mobius-strip and Klein-bottle topology) unifies space

and time into one space-time, and allows construction of what may be called "imaginary computers".

Starting with the previous version of this article (Matter, Antimatter, Dark Matter and Space-Time Travel in an Infinite and Eternal Universe with Extra Dimensions), this gained an Altmetric Score of 1: high-level measure of the quality and quantity of online attention that it has received as research output. From start to finish, this article consists of the best parts of my layman-style ORCID and paperback contributions over the last 12 years and includes a reference to those contributions.

Keywords:

gravitation; cosmology; supersymmetry; topology; Mobius strip; figure-8 Klein bottle; matrix; $E=mc^2$; advanced and retarded waves; Wick rotation; imaginary time; imaginary computers; dark matter; higher dimensions; binary digits; space-time travel; non-expanding universe; supersymmetry; superconductivity; radioactive dating; electromagnetism

Article -

1 - WICK ROTATION, BITS AND COSMIC TOPOLOGY

Consider the Wheeler-Feynman absorber theory(1) and Transactional Interpretation of Quantum mechanics.(2) These speak of "retarded" electromagnetic waves going forward in time and "advanced" waves going backwards in time. Einstein's gravitational equations contain enough information about electromagnetism to allow electromagnetism equations to be restated in terms of these gravitational fields,(3) giving gravity retarded and advanced components too.

"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." ^ (4)

^ 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 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.

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'.(5) 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.

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'. (6) Could Prof. Bars' second dimension of space be imaginary (in the sense of i = $\sqrt{-1}$) space which is united with imaginary time the same way ordinary space and time are joined? And in the unification of a quantum gravity

universe, the real and imaginary would be connected (quantum gravity is the anticipated unification of quantum mechanics with Einstein's theory of gravity – General Relativity).

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

Figure 1 – MATRIX MULTIPLICATION - *From <https://en.wikipedia.org/wiki/Matrix_(mathematics)> This Wikipedia diagram is not used to support a scientific claim, but merely as an example of what basic matrix multiplication looks like.* The matrix, a rectangular array of numbers or symbols placed in rows and columns has a long history possibly going back 3,000 years to its 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.
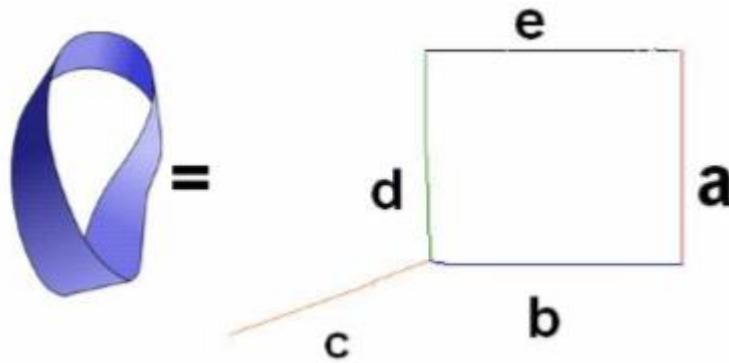
Figure 2 – MOBIUS MATRIX (Mobius equals a,b,c,d,e array) - Width d has to be at right angles to lengths b & e, the other width of a, & height c simultaneously if it's going to include the Complex Plane's vertical imaginary axis in space-time (the imaginary realm is at a right angle to the 4 known dimensions of space-time, which all reside on the horizontal real plane). This is accomplished by a twist, like on the right side of the Mobius strip pictured above. The twist needs to be more exaggerated than the illustrated one, with the upper right of the Mobius descending parallel to side "a" then turning perpendicular to it at approximately the level of the = sign. Thus, 90+90 (the degrees between b & c added to the degrees between c & d) can equal 180, making a & d parallel. But 90+90 can also equal 90, making a & d perpendicular. (Saying 90+90=90 has similarities to the Matrix of mathematics. The first 90 plus the second 90 does not always equal the second 90 plus the first 90). The conclusion is that the Mobius strip is a basic, fundamental unit of physical reality. The conclusion will be elaborated on below in the part regarding base-2 maths (binary digits), the Mobius strip and the figure-8 Klein bottle. Referring to the later subheading "**SUPERSYMMETRY AND WICK ROTATION**", the basic nature of the Mobius applies to both the boson particles of gravitation and the fermion particles

of physicality's matter in known space-time/so-called "dark" matter in higher-dimensional "imaginary" spacetime.

Following Albert Einstein's example of turning Max Planck's quanta (which, for years, Planck and all other scientists considered purely mathematical) into explanation of the physical photoelectric effect, the Wick rotation used to describe imaginary time may be transformed from mathematical "trickery" to physical meaning, and provide a modern way to unite space and time (and imaginary space-time's Dark Matter) into one space-time.
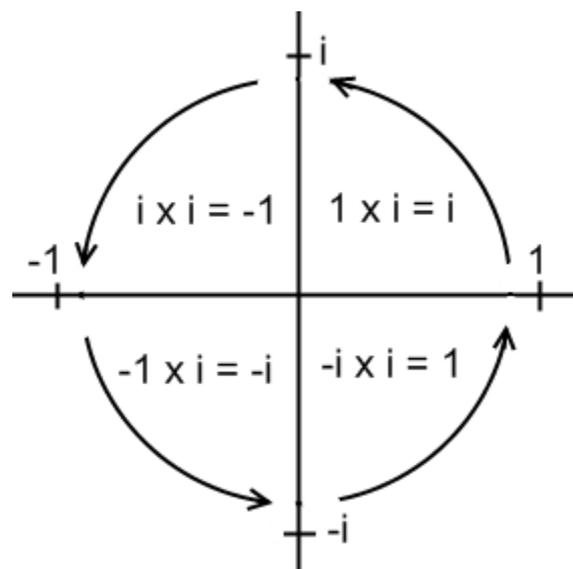
Figure 3 – WICK ROTATION: "The complex plane reveals i's special relationship with cycles via the circle of i, also known as Wick rotation. Whenever a point on the complex plane is multiplied by i, it moves a quarter rotation around the origin or center of the plane."(7)

"What the spin of a particle really tells us is what the particle looks like from different directions."(8)

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). To use words from a recent paper -

In a holographic universe, all of the information in the universe is contained in 2D packages trillions of times smaller than an atom.(9)

(I believe "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. In this way - 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 projected into three dimensions.)

Figure   4:   MOBIUS   STRIP   (source:
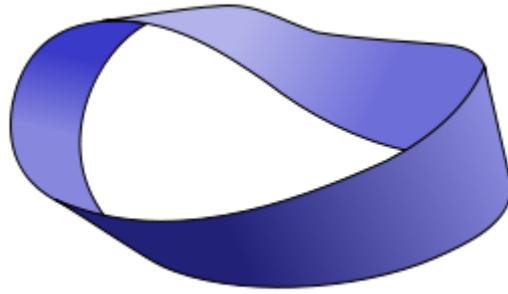
Then two strips must be joined to make a 4-D Klein bottle(10) which has length, width, depth and the 4th dimension of movement in time. The type of Klein bottle formed would appear to be the figure-8 Klein. A diagram of many figure-8 Klein bottles would show that their positive curvature (on the spherical parts) fits together with their negative curvature (on saddle-shaped parts) to cancel and produce, on a cosmic scale, the flat curvature of space-time(11). 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(12). An implication of a 1919 paper by Einstein is that the coupling is between gravitons and photons.(13). 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. (Subatomic particles must possess quantum mechanical wave-particle duality if they're composed of gravitational plus electromagnetic waves. Duality also says waves possess particle-like properties ie the waves are composed of gravitons and photons, a property consistent with supersymmetrical relationship between bosons and fermions – and necessary for spacetime unification.)

Figure 5: MOBIUS DOUBLET (FIGURE-8 KLEIN BOTTLE) (source: https://upload.wikimedia.org/wikipedia/commons/7/73/KleinBottle-Figure8-01.png)
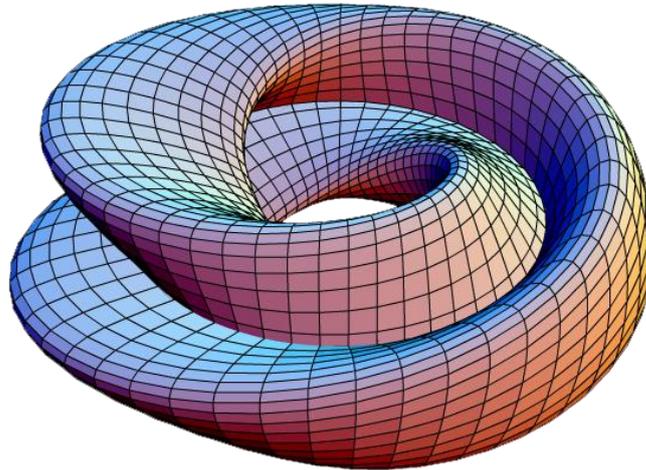
Note that, when considering many bottles, the reddish positive curvature fits together with the bluish negative curvature to produce the flatness implying space-time's infinity (and since time can't be distinct from space, its eternity). Science seems to avoid infinity at all costs – equating it with zero will give scientists many more headaches.

Maybe they could accept infinity if $\infty_= 0$ is viewed as the ultimate form of renormalization – a renormalization that doesn't reduce the infinite size of the universe but, thanks to $E=mc^2$, reduces the distances in space and between times to zero.

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". Since photons and gravitons exist everywhere in space-time, they can interact without motion from one spot to another ($E=mc^2$ only applies to motionless photons). The masslessness of interacting photons and gravitons results in E=0*c^2 ie in bizarre physics like black holes, E can equal 0. Having reduced the equation to nothing but E, m=0 and c^2=0 which means m=c^2. The absence of E (energy) refers to there being no interaction of electromagnetic and gravitational energy, and therefore no mass. If mass cannot be produced, Einstein's paper implies mass-producing space-time/gravity must be zero. It obviously exists, so its zero-ness can mean we can relocate matter and information superluminally, or travel into the past and future, because distance can equal zero and can be eliminated from both space and time.

2 - SPACE-TIME TRAVEL IN RENORMALIZED INFINITY

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. The first 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. The second 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. The third 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.

2 (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.' (14) A couple of years ago, on a blog page which no longer exists, Australian astrophysicist Prof. Alan Duffy said, "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 (15), 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." (16)

*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.

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.

2 (1) (1) - 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?" That paper was published in an attempt to clarify the inner workings of the atom. (17) 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. 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 (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. (18) 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 1919 paper "Do gravitational fields play an essential role in the structure of elementary particles?" and German mathematician/theoretical physicist Hermann Weyl's 1918 attempt to attempt to model the electromagnetic field and the gravitational field as geometrical properties of spacetime. My belief in their union also includes two references to the similarities between gravitation and electromagnetism: (a) "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."(19)

(b) "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." (20)

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).

2 (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).' (21)

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.

3 - SCIENTIFIC "CREATION" OF THE UNIVERSE AND MORE ABOUT ITS NON-EXPANSION

An additional meaning of space-time/gravity equaling zero is that the constant value states the universe cannot be expanding or contracting (an entire eternally infinite universe can never expand or contract). 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). Nor can there be an actual boundary between infinite eternity and any finite point in space-time where/when "creation" might occur. But, also like Earth, the universe's imaginary time 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. (22) 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? (23) 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.

4 - ABOUT PRACTICAL MATHS

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

Wave-particle duality can be described by starting with v=fλ (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. (24) Gravitational and electromagnetic wave motion (space-time motion) travels at c, the speed of light ie

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

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

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

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

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

What about the "squared" 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.

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 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.' (25)

Though the effect is measured for distances in space, the inseparability of space and time means that moments of time can become entangled too. (26)

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."(27)

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. (28)

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. (29)

Since Einstein's mass-energy equation is strictly limited to observers co-moving with the

light beam under study, "squared" must be added to the mass/light-speed part of this

article's equation -

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

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

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

To sum up, photons can be at rest in an electromagnetic wave (it's the shock waves or fluctuating amplitudes and frequencies that travel). Since $E=mc^2$ only applies to the photon when it's at rest, the equation does indeed apply to the cosmos – and consequently, so do $E=0$ and $m=c^2$ which negate distance in space-time as well as stating the universe cannot be expanding or contracting.

5 – SUPERSYMMETRY, SUPERCONDUCTIVITY, WICK ROTATION AND RADIOACTIVE DATING

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**. Recalling how photons can be at rest in an electromagnetic wave, it's possible for electrons to be at rest in a superconductor. 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. (30) John Bardeen commented - "The idea of paired electrons, though not fully accurate, captures the sense of it." (31) His comment about the idea of paired electrons not being fully accurate can mean that superconductivity is, at least partly, a wave motion not involving the motion of particles.

The inner and outer surfaces of a Mobius form a continuous strip in space – unification of space with time requires a temporal continuity. This is carried out by Wick rotation's continuous cycling between what are called real and imaginary **time** – a property programmed^ into the Mobius strip. Therefore, the Mobius strip combined with Wick rotation and imaginary time provides a modern way to unite space and time (and imaginary space-time's dark matter) into one **space-time**. (The continuously curved Mobius surface + continuous Wick rotation = curvature of space-time.) This revised supersymmetry says gravitons (the most basic parts of gravity and gravitational waves) are cycling or oscillating between real, poorly named imaginary, and complex time. So the waves themselves must be cycling too - between the retarded, imaginary and advanced states. Like ocean waves diverted towards the mass of an island, the primary focus of mass-contributing gravitational waves – only the retarded state would be detected by instruments such as LIGO, the Laser Interferometer Gravitational-wave Observatory - must be a galaxy's center because they help form a supermassive black hole there (electromagnetism would be the other contributor of mass, according to Einstein's 1919 paper).

^ In a science TV program,(32) Dr. Graham Phillips reported that "the physicist and writer Paul Davies thinks the universe is indeed fine-tuned for minds like ours. And who fine-tuned it? Not God but minds from the future, perhaps even our distant descendants, that have reached back through time ... and selected the very laws of physics that allow for the existence of minds in the first place. Sounds bizarre, but quantum physics actually allows that kind of thing."

This article believes radioactive dating is a form of gravitational-wave detection (of the waves' advanced component).^ LIGO - the Laser Interferometer Gravitational-wave Observatory (33) - 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 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 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. (34) 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.

6 - APPLIED WICK ROTATION AS "IMAGINARY" COMPUTERS

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).

The imaginary computer (IC) is, naturally, in horizontal real-time. However, its processing is warped into vertical imaginary-time (IT). The IT extensions could potentially go on for great distances. So the IC could perform voluminous processing without any ordinary, real time passing at all. Periodically, the output of the processing is looped back to the computer on the horizontal plane. Using this technique, even one of today's digital machines could produce fantastic, unbelievable results in virtually no

time. These warps and loops are viable because they're inspired by Einstein's Special Relativity – and they propose the use of space-time warping which, though in its infancy, is a technology being worked on today by places like NASA.

Figure 6 - APPLIED WICK ROTATION AS "IMAGINARY" COMPUTER
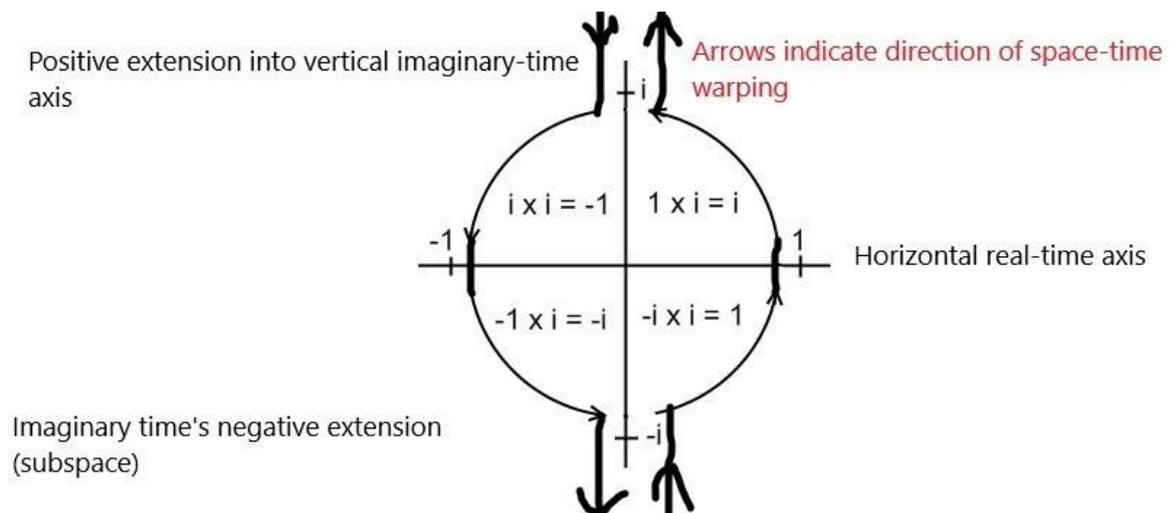
This article is compiled from the best parts of my layman-style ORCID and paperback contributions over the last 12 years. (see reference 35)

Acknowledgments

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