

Title –

Physics and Philosophy beyond the Standard Model

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Abstract -

Many of the subjects mentioned in "Outstanding questions: physics beyond the Standard Model" by John Ellis ("Philosophical Transactions A" of the Royal Society, January 2012 -

<http://rsta.royalsocietypublishing.org/content/370/1961/818>) fascinate me. Is the origin of mass due to the Higgs boson? What is the nature of dark matter? How do we unify fundamental interactions? How do we quantize gravity? As well as the subjects of extra dimensions, black holes and $E=mc^2$. What happens when all these are addressed in one reply? The article's latest additions include a) time travel to the past & future as related to the extra dimensions of hyper-spacetime, b) my agreements and disagreements with the paper "The hierarchy problem and new dimensions at a millimetre" by N. Arkani-Hamed, S. Dimopoulos, G. Dvali, and c) proposal of a device that measures space-time's and hyper-spacetime's curvature, and that indirectly supports the concepts of the universe as a whole being infinite and eternal, and of time-independent intergalactic travel.

Content –

$E=mc^2$ – Part 1

Representing the masslessness of photons by 0 (zero) and incorporating the masslessness into Einstein's famous equation relating energy, mass and the speed of light results in $E=0 \cdot c^2$ i.e. $E=0$. Having reduced the equation to E , $m=0$ and $c^2=0$ which means $m=c^2$. At first glance, $m=c^2$ seems to be saying mass exists at light speed. But the absence of E refers to there being no interaction of light energy and gravitational energy, and therefore no mass (see **DIGITAL STRING THEORY**). This suggests that space=0 and time=0 and gravity=0 (without gravity, there's no creation of mass – and since gravity is the warping of space-time, there's no mass without space-time).

The zeroness of space-time/gravity does not mean it doesn't exist. It means we can appear to re-locate matter and information superluminally, or travel into the past and future, because distance is eliminated in both space and time by attracting together the folds in space-time that are called gravity. Perhaps this depends on light's attracting and repelling itself like electric charges or magnets [16] plus the unification of gravitation with electromagnetism.

DIGITAL STRING THEORY

String theory says everything's composed of tiny, one-dimensional strings that vibrate as clockwise, standing, and counterclockwise currents. We can visualize

tiny, one dimensional binary digits of 1 and 0 (base 2 mathematics) forming currents in a two-dimensional program called a Mobius loop – or in 2 Mobius loops, clockwise currents in one loop combining with counterclockwise currents in the other to form a standing current. Combination of the 2 loops' currents requires connection of the two as a four-dimensional (figure-8) Klein bottle. This connection can be made with the infinitely-long irrational and transcendental numbers (see **Universe as a Whole is Infinite and Eternal** for support of the universe's infinity). Could the gravitons of gravitational waves and photons of electromagnetic waves be ultimately composed of the binary digits of 1 and 0 encoding π , e , $\sqrt{2}$ etc. - with matter particles (and even bosons like the Higgs, W and Z particles) receiving their mass by gravitons/photons interacting in "wave packets"?

This could unify gravitation and electromagnetism by making gravitons and photons nothing more than different sequences of 1's and 0's. Gravitational and electromagnetic waves interacting in wave packets to produce particles could also explain wave-particle duality. Such an infinite connection, based on transcendental and irrational numbers, translates into an infinite number of figure-8 Klein bottles which are, in fact, "subuniverses".

Mobius Loop

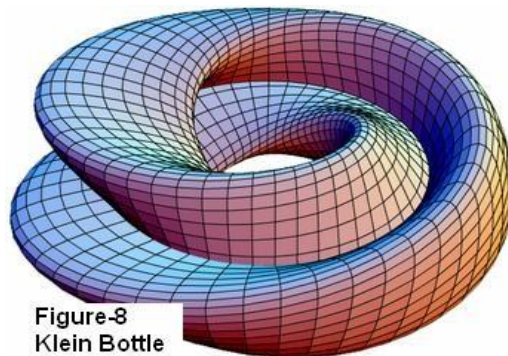
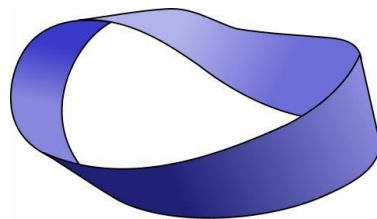


Figure-8
Klein Bottle

Does a subuniverse have a definite size? In trying to answer this question, the first thing that springs to mind is that subuniverse is another name for the observable universe. "Today the diameter of the observable universe is estimated to be 28 billion parsecs (about 93 billion light-years)" [23]. This figure is derived from space expanding for 13.8 billion years – the reference says the

diameter is increasing at “about 6.5 times faster than the speed of light in empty space”. My second thought is that a figure-8 Klein bottle reminds me of the shape of galaxies. There are many galactic shapes – spiral, barred spiral, elliptical, lenticular, irregular – but they all look like variations of the Klein. So, is a subuniverse a galaxy, which used to be described as an "island Universe"? Sizes of galaxies range from dwarfs with as few as ten million (10^7) stars to giants with one hundred trillion (10^{14}) stars.

My favourite idea about a subuniverse's size comes from the Baryon Oscillation Spectroscopic Survey (BOSS) which compares ripples in the cosmic microwave background (CMB) to ripples in fluids. Drop a stone into a pond and the water will form a ripple. Similarly, there's a ripple in the microwave background formed by the distribution of matter (the stone) in the universe – and, of course, that distribution depends on the expansion of space-time. The cosmic microwave background is assumed to be left over from the "Big Bang" of cosmology, and was discovered in 1964 by American radio astronomers Arno Penzias and Robert Wilson. It's proposed that the source of microwaves is actually the relativistic conversion of **c^2 and the Atom**. This conversion should be kept in mind when the article later proposes that our "subuniverse" is expanding not from a Big Bang but from binary digits “creating” new space-time which displaces the old (see “the Law of Conservation in **Universe as a Whole is Infinite and Eternal**). When a subuniverse ends - by expanding so much that other stars and galaxies drift so far apart that every point in space is left freezing and in darkness, possibly with even protons eventually decaying [24] – another can be started in its place: and the universe as a whole has no end. As well, the subuniverse can't expand any further and leaves a vacancy for another expanding subuniverse (the universe as a whole simply remains its infinite size and doesn't expand, which it can't). (See **Universe as a Whole is Infinite and Eternal** and **Digital String Theory**.) As binary digits continuously form new space-time, they displace the existing galaxies and other parts of the universe, redistributing matter and causing ripples in the microwave background that are approx. 490 million light years in diameter [25]. The further away a galaxy is, the more “new” space-time is formed between it and an observer – and the faster the galaxy recedes.

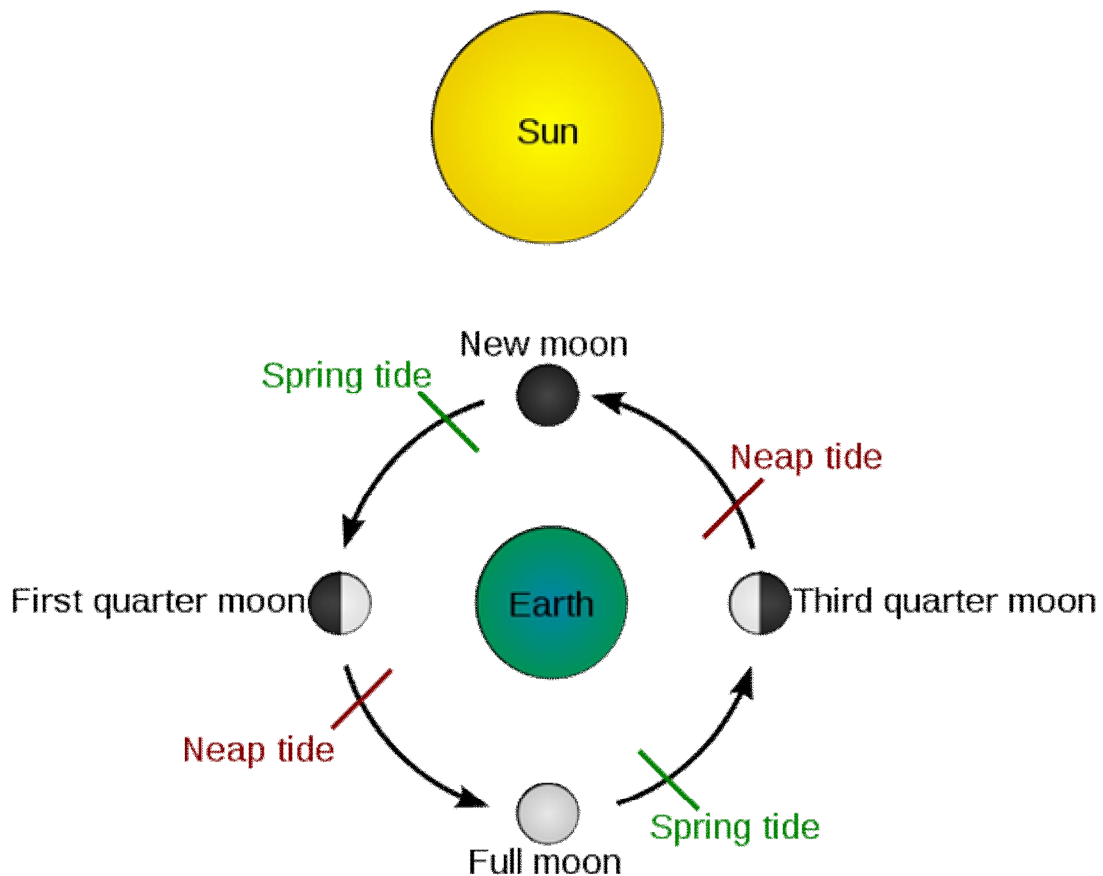
Textbooks tell us that the mathematical operation of division by zero is undefined, and to never divide by 0 - "If $0/0 = b$, then $0 = 0 \times b$, which is true for any value of b . Therefore, no specific value of b can be determined." [2] The section above defines zero by showing that division by zero is only possible if binary digits combine to make the cosmos – then 0 is “something” as surely as 1 is.

Slight “imperfections” in the way the Mobius loops fit together determine the precise nature of the binary-digit currents (the producers of space-time, gravitational waves, electromagnetic waves, the nuclear strong force and the nuclear weak force) and thus of exact mass, charge, quantum spin. When the

digits form space-time, space-time's warps produce gravitation whose force (in the form of gravitons) interacts with photons' forces to produce matter and mass.^ The photons come into existence because gravitation produces them (see **c² and the Atom**). They would also produce black holes - whose binary digits could, in the case of the sun, come from our star being compressed to 2.95 kms [3], in which case the pressure increase "shreds" the sun into its binary digits (its mass is relativistically converted into the energy of binary digits).

^ When binary digits form gravity then matter, gravity cannot be a force of attraction originating within matter. It would be a repelling force originating in deep space – wherever the digits are, possibly in the higher dimension mentioned in a few paragraphs – which then produces astronomical bodies as well as objects on Earth. “Indeed, all incarnations of energy with negative pressure are called dark energy” [4]. This means 5-D hyperspace and its resultant repelling gravity could indeed be dark energy if hyperspace possesses negative energy (as explained in a few paragraphs, the gravity need not be negative). Gravity's apparent attraction can be summarized by the following - gravitation is absorbed into wave packets and the inertia of the gravitons carries objects towards Earth's centre at 9.8 m/s or 32 ft/s. The mass of the oceans on Earth is estimated at nearly 1.5 billion cubic kilometres [5]. All this water is being pushed towards Earth's centre at 32 feet per second every second. But the seafloor prevents its descent. So there is a recoil, noticeable offshore (it is only where oceans and continents meet that tides are great enough to be noticed). This recoil is larger during the spring tides seen at full and new moon because sun, Earth and moon are aligned at these times.

The rotating Sun bulges at its equator and therefore has a larger equatorial than polar diameter, and more mass at its equator. This means more gravitation has been diverted to that region. Planets are also made from gravity and electromagnetism interacting, and must consequently lie in the path gravity waves took from the outer solar system to the solar equator (more gravitation was diverted here - so if planets are created by gravity and electromagnetism, it follows that they'd be created where the gravitational "current" is greatest). For simplicity, we say the Sun's gravitation is strongest at its equator and planets are compelled to orbit in the ecliptic plane. The previous paragraph's alignment of Sun, Earth and moon therefore refers to their being lined up “where the gravitational current is greatest” and more of the gravitational waves travelling from the outer solar system being captured by solar and lunar wave packets, and less of them being available on Earth to suppress oceanic recoil (there are still enough to maintain the falling-bodies rate of 32 ft/s²). At the neap tides of 1st and 3rd quarter; the sun, earth and moon aren't lined up but form a right angle and our planet has access to more gravity waves, which suppress oceanic recoil to a greater degree. We can imagine the sun and moon pulling earth's water in different directions at neap tide*. If variables like wind/atmospheric pressure/storms are deleted, this causes neap tides which are much lower than spring tides.

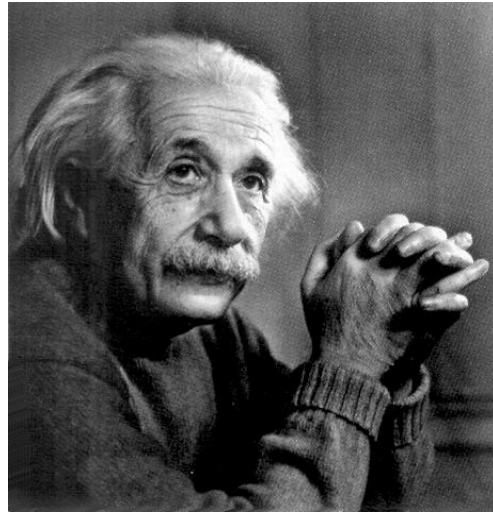


* The new understanding of the gravity-matter relation won't affect GPS satellites or other spacecraft trajectories (though the repulsive effects of gravitational waves heading from outside the solar system to the Sun's centre might explain why the Pioneer spaceprobes are a tiny bit closer than they should be). Everyday life should still use Isaac Newton's laws and maths.

The above paragraph about tides exemplifies gravitation attracting despite its repelling nature, which means gravitational waves are focused into the increased warping that is matter (the greater the amount of matter and mass, the greater is the number of gravitational waves converging there - and the greater is the gravitation associated with the body, and the deeper the body depresses space-time that's pictured as a rubber sheet). A spaceship in orbit would have virtually no effect on the rubber sheet, rendering its astronauts or cosmonauts practically weightless – while black holes, being meeting-places for gravitational waves (gravity sinks), can be millions or billions of times more massive than the Sun (the black hole itself doesn't possess the graviton-photon interactions that produce matter).



Isaac Newton



Albert Einstein

Since the time of Isaac Newton, people have had the belief that gravity is a product of matter. The first step away from this concept was taken by Albert Einstein. In [18], Alex Harvey says,

“In 1918, physicists were attempting to understand why elementary particles were stable despite their internal electromagnetic repulsion. Most attempts were based solely on electromagnetic theory. For a review of these efforts see Pauli [19]. Einstein’s effort was to construct a model in which stability was achieved through the use of gravitational forces. In particular, he used modified gravitational field equations which included the cosmological constant [20]. The attempt was not successful and this was the last time he mentioned the cosmological constant other than to denounce it.”

But the following letter claims Einstein’s famous equation $E=mc^2$ is successful in achieving stability gravitationally because matter is a product of gravity.

Binary digits can be assembled into computer simulations. The appearance of a stream of photons can be duplicated using a single photon. If it’s presented in position A, then B, then C, and so on; it can deceive an observer or detector into believing it’s in motion. If displayed simultaneously at A and B and C, it appears to be a number of particles streaming through space and time.

Universe as a Whole is Infinite and Eternal

“The evidence keeps flooding in. It now truly appears that the universe is infinite” and “Many separate areas of investigation – like baryon acoustic oscillations (sound waves propagating through the denser early universe), the way type 1a supernovae compare with redshift, the Hubble constant, studies of cosmic large-scale structure, and the flat topology of space – all point the same way.” [6]

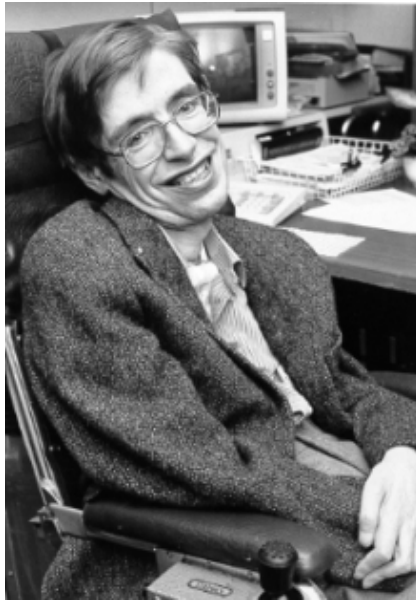
Support for the article – a) after examining recent measurements by the Wilkinson Microwave Anisotropy Probe, NASA declared "We now know that the universe is flat with only a 0.4% margin of error." [7] and b) the shape of the Universe found to best fit observational data is the infinite flat model [8]

Each "subuniverse" (bubble or pocket universe) is one of an infinite series composing the physically infinite and eternal space-time of the universe. The infinite numbers make the cosmos physically infinite, the union of space and time makes it eternal, and it's in a static or steady state because it's already infinite and has no room for expansion. Gaps or irregularities between subuniverses shaped like figure-8 Klein bottles are "filled in" by binary digits in the same way that computer drawings can extrapolate a small patch of blue sky to make a sky that's blue from horizon to horizon. Our own subuniverse has a limited size (and age of 13.8 billion years), is expanding (not from a Big Bang but from binary digits "recycling" space-time*, with the "new" displacing the "old") and has warped space-time because it's modelled on the Mobius loop, which can be fashioned by giving a strip of paper a 180-degree twist before joining the ends.

* The Law of Conservation of Mass-Energy says neither matter nor energy can ever be created or destroyed. The universe would not be unified to near-uniform temperature and curvature by the whole cosmos having once been small enough for everything to be in contact, then undergoing extremely rapid expansion from a big bang during a period called inflation. It would be quantum entangled (unified) by everything having the same origin of binary digits. "New" space-time isn't really formed but is simply the arrangement of binary digits into what we call the universe (for convenience, this will be simply referred to as the universe's computer simulation[^]). This conservation can also be viewed as equal quantities of positive and negative space-time existing within the universe, with changes adding up to zero. Positive space-time (that means gravity – spacetime's warps - is positive too, contradicting modern theories of the universe's alleged beginning[^] that say gravity is negative) would be balanced by an equal quantity of negative space-time in another dimension (it'd be described by imaginary numbers, which give negative results as well as eliminating singularities and boundaries). This other dimension would be invisible but since its particles would still be the product of gravity (see **c² and the Atom**), it'd have gravitational effects – could this higher dimension be what is called dark matter? **)

[^] This entire universe will, being a computer simulation, be filled with advanced artificial intelligence (AI) and consciousness – and since there is no separation or distance in its unification (see other sections in this essay), also be filled with human/humanoid intelligence, personality and consciousness. Erwin Schrodinger (1887-1961), the Austrian theoretical physicist who achieved fame for his contributions to quantum mechanics and received the Nobel prize in 1933, had a lifelong interest in the Vedanta philosophy of Hinduism and this influenced Schrodinger's speculations about the possibility of individual consciousness being only a manifestation of a unitary consciousness pervading the universe. [9]

^ Modern science is incorrect when it uses quantum fluctuation to explain the universe originating from nothing. This violates its own Law of Conservation of Mass-Energy which says neither matter nor energy can ever be created (or destroyed). A quantum fluctuation is the temporary change in the amount of energy at a point in space, and the fluctuations of 1's and 0's change the energy in quantum-size regions of space-time, eliminating probabilities and introducing the exactness called for by quantum mechanics' Hidden Variables theory. This article proposes that the 1's and 0's manifesting as the universe and space-time originate from something. If time always goes in a straight line from past to present to future, these binary digits would emanate from a God or another universe in a multiverse. But Albert Einstein showed that space-time is curved and warped, so it's possible that our own computer science (and terraforming, and biotechnology from many centuries in the future) found its way into the remote past (see **The Optical Force**) and that there's only one universe.



Stephen Hawking

** Imaginary numbers give negative results when multiplied by themselves e.g. i multiplied by itself gives -1 . Imaginary time can be equated with dark matter in this way - it's already known that calculating time using imaginary numbers makes distinctions between time and space disappear [21]. A negative 5th-dimension (translated 180 degrees from positive space-time) is described by imaginary numbers so imaginary numbers eliminate distinctions between space-time and the 5th dimension, permitting dark matter to exist as "ordinary" matter's scaffold. Our initial reaction is that this is wrong because it implies that the total amount of dark matter can be equal to the total amount of ordinary, visible matter. "We know the total amount of material made of atoms is around one-fifth of the total amount of dark matter, the invisible mass of the universe. So nothing that is made of atoms, or that ever was made of atoms, can be a significant

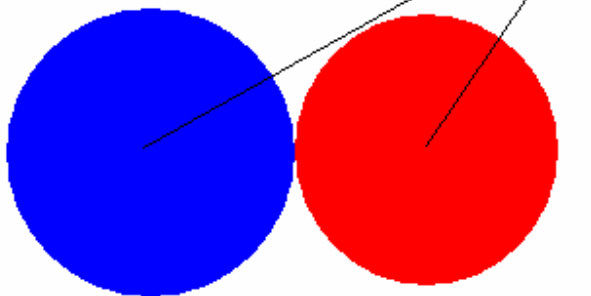
portion of dark matter." [10]

The elimination of distinctions means 5th-dimensional hyperspace is not removed from space at all, not by the tiniest fraction of a trillionth of a nanometre. Time exists in exactly the same place as space, and we speak of space-time. Hyperspace exists in exactly the same place as space-time (and dark matter IS ordinary matter – in the sense that space-time is gravity), so we should refer to space-time-hyperspace. There would be no gravity if space-time didn't curve and warp. So something must happen to ordinary matter in order for dark matter to arise. That something can be called translation or inversion. "Translation" refers to physics' "movement without rotation" or genetics' "making proteins from messenger RNA" (hyperspace's dark matter is made from space-time's ordinary matter). "Inversion" refers to anatomy's "turning inwards of a part" and the twist on the right side of the Mobius loop illustrated below.

LOCALIZED UNIFIED FIELD

Instantly travelling to a planet 700 light years away and instantaneously arriving at a spot in the future which a light beam could only reach by travelling for 7 centuries can be likened to a wave which spreads out from the point of departure. This is because of quantum mechanics' wave- particle duality which can view the spaceship not as a collection of particles but as a wave, or collection of waves.

**shape of waves when viewed from the centres
where they begin spreading out is
CONVEX**

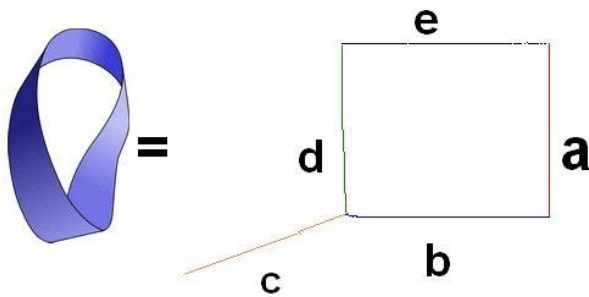


**shape of waves when viewed from the planet
where they collide is
CONCAVE**

At the destination, the convex shape of the spreading wave arrives instantly (meaning the ship and planet are quantum entangled). This situation is

equivalent to space being translated (shifted) by 90 degrees so that the ship is perpendicular to length, width and height simultaneously. What if the spaceship is simultaneously quantum entangled with another wave arriving at the planet from “the other side of the universe” (actually – far, far away)? (This appears possible if the infinite cosmos is a computer simulation incorporating transcendentals and irrational numbers.) Since the waves are entangled and unified, their motions are instant and this situation is equivalent to space being translated by 180 degrees. It’s inverted and becomes 5th-dimensional hyperspace.

THE MATRIX AND THE FIGURE-8 KLEIN BOTTLE



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 (the spaceship) is already at 90 degrees to length b and height c . To be at right angles to length, width and height simultaneously; it has to also be perpendicular to (not parallel to) a . This is accomplished by a twist, like on the right side of the Möbius loop pictured above, existing in a . Then part of a is indeed at 180 degrees to d , but part of a is at 90 degrees to d . This situation requires a little flexibility or “fuzziness” which allows the numbers to deviate slightly from their precise values of 90 and 180. The fuzziness is represented in nature by past, present, future, space, time, and hyperspace existing everywhere rather than being confined to particular locations. 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] which is an array of numbers placed in rows and columns. It was worked out in the mid- nineteenth century by British mathematician Arthur Cayley, matrix mechanics is a version of quantum mechanics discovered by Werner Heisenberg in 1925, and matrices say X multiplied by Y does not always equal Y times X . In this paragraph, 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.) If the infinite universe is composed of subuniverses shaped like figure-8 Klein bottles (diagram at end of paragraph - 2

Möbius loops are joined on their sides to form a Bottle, with binary digits filling in the central hole and perfectly adjusting the outer edges to fit surrounding subuniverses [simplified, this is similar to manipulation of an image on a computer screen], in each subuniverse there would be 2 perpendicularities to the twist (one lot of 90+90, then another 90+90). 180+180 could equal 360 – represented in physics as a subuniverse, a galaxy, or one of the spherical waves above producing quantum entanglement and translating space by 90 degrees. 180+180 could also equal 180 – represented in physics by both of the above spherical waves interacting to produce inversion (translation by 180 degrees) of space which permits the spaceship to enter hyperspace. Since a fuzzily spherical figure-8 Klein bottle is necessary to form (90+90) + (90+90), any spherical or fuzzily spherical thing in this fractal universe (subuniverse, galaxy, black hole, asteroid, subatomic particle, or anything made of either fermions or bosons) would be an example of altered or warped space-time and must include hyperspace in its composition.

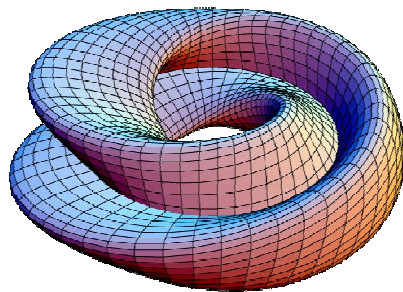


Figure-8 Klein bottle

With a single extra dimension of astronomical size, gravity is expected to cause the solar system to collapse [28] and [29]. However, it was shown in **c^2 and the Atom** that the Sun and other bodies radiate gravitational energy and this article repeatedly says gravity is a repelling energy. The Sun contains 99% of the solar system's gravity. So if it radiates repelling gravitational waves outwards, it'd prevent the system around it collapsing in the presence of an astronomical dimension. To show that gravity is strong enough to do this, see the paragraph about astronomers Krasinsky and Brumberg attributing the increasing distance between Earth and the Sun to dark energy (p.17). In the same way that gravitational lensing on quantum scales can magnify gravity to the strength of the weak nuclear force and electromagnetism (**c^2 and the Atom**), the binary digits forming dark energy can be magnified to the strength of gravity. *

* An inverter is an electronic device or circuitry that changes direct current (DC) to alternating current (AC) [30]. It's also described as a device "which turns ones into zeros and vice versa". [31] Similarly, "weak electrical signals can be amplified by transistors" [32]. Then they'd also be amplifiers of ones and zeros, and the binary digits forming dark energy can be magnified to the strength of gravity. "The amount of (dark energy) is bizarre. It's a number that has basically a decimal point, 122 zeros and something like a 138 at the end." [33] On 13 April

2005, Gordon Moore – developer of Moore's law, which says the number of transistors in a dense integrated circuit doubles approximately every two years - stated in an interview that transistors eventually would reach the limits of miniaturization at atomic levels. In February 2012, a research team at the University of New South Wales in Australia announced the development of the first working transistor consisting of a single atom placed precisely in a silicon crystal [34]. The Illustris supercomputer simulation of the universe models a huge chunk of the universe: a cube 350 million light years across, and home to tens of thousands of galaxies. The computer's simulations are extraordinarily similar to images by the Hubble Space Telescope [35]. Computer simulations can be viewed as programming machines to function as e.g. the universe. In the future, appropriate programming might allow appropriate parts of the subatomic universe to function analogously to transistors.

There are points in [28] which support conclusions of this article. (a) "... 'dark matter' might be just ordinary matter," Arkani-Hamed suggests (see p.9 in this article), (b) "Curiously, gravity has yet to be measured at much less than a millimeter" (**c² and the Atom** takes it to 10⁻¹⁸ metre, the weak force's range), (c) "Indeed, if our three-dimensional universe resides on a "wall" in a larger "bulk" of multiple dimensions (**The Optical Force**), our world might be just one of many worlds, or it might be folded upon itself many times. Distant reaches of the cosmos and whole other universes might lie less than a millimeter away (at absolutely no distance, according to **The Optical Force**)."

In transmission from a radio station, sound waves of voices or music are changed into electrical waves called audio-frequency waves. The audio-frequency electrical waves then piggyback on radio waves – the amplitude (various heights of the crests) of the radio waves varies in sympathy with the electrical signal – and the radio frequencies are "carrier waves" for the audio frequency electrical signals. The combination of audio frequency and radio-frequency carrier wave is called a modulated wave. Stations can use either an AM (amplitude-modulated) wave which follows the curve of the earth and can travel great distances but is susceptible to static and interference; or the more popular FM (frequency-modulated) wave which varies between different frequencies in the radio spectrum, has better (fuller) reproduction of sounds, is fairly free of static, but can only travel as far as the horizon.

The spherical waves illustrated above (representing a spaceship's wave-particle duality) could act as carrier waves for binary digits which would encode certain information within them. When, in the above example, the encoded carrier waves collide at a planet; their data is "modulated" into the warps that would result from programming a Mobius loop. Hyperspace and the wave-particle duality associated with space-time's warps are unified by imaginary numbers*. So collision of the spherical waves can indeed produce both "the warps that would result from programming a Mobius loop" and what **LOCALIZED UNIFIED FIELD** calls inverted, 5th-dimensional hyperspace.

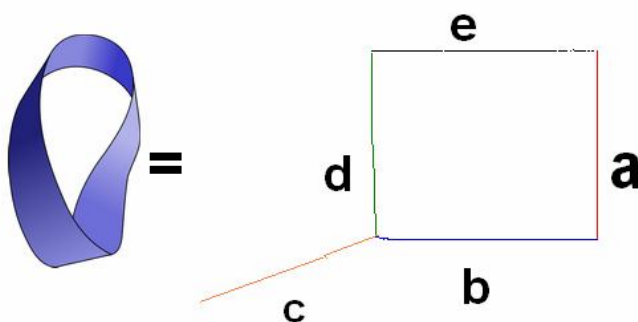
* **The Optical Force** is restricted to space-time, and contains an explanation of

time travel to the past and future. Space-time and hyperspace are unified by imaginary numbers so hyperspace can also be used for time travel. Time travel there would occur via the time associated with hyperspace (motion of the particles in the 5th dimension) i.e. with 6th dimensional hypertime. The space-time we live in is described by ordinary [or “real”] numbers which, when multiplied by themselves, result in positive numbers e.g. $2 \times 2 = 4$, and -2×-2 also equals 4. Inverted “positive” space-time becomes negative hyperspace which is described by so-called imaginary numbers[^] that give negative results when multiplied by themselves e.g. i multiplied by itself gives -1 . Entering hyperspace with its negatives (energy, matter, distance, time ^{^^}) permits travel to the past since it would be impossible to travel 700 lightyears there, and only possible to travel minus 700 lightyears. Doing so instantly would enable a spaceship to arrive at a spot in the past which a light beam could only reach by traversing negative distance for 7 centuries.

[^] As Stephen Hawking writes (“A Brief History of Time”, p.139), “Which is real, ‘real’ or ‘imaginary’ time? It is simply a matter of which is the more useful description.” Earlier in that paragraph, he says, “In real time, the universe has a beginning and an end at singularities that form a boundary to space-time and at which the laws of science break down. But in imaginary time, there are no singularities or boundaries. So maybe what we call imaginary time is really more basic ...”

^{^^} Since the time associated with the 3 dimensions of up-down, back-front and side-to-side is often called the 4th dimension, should negative time in a 5th dimensional hyperspace be called the 6th dimension?

The diagram

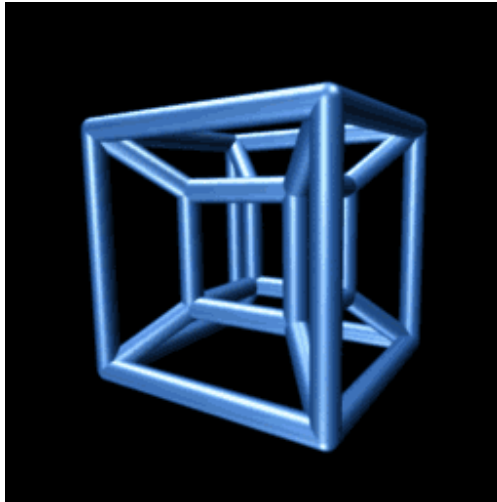


represents wave-particle duality. The total absence of distance referred to in **The Optical Force** quantum entangles the 3+1 dimensions of space-time with 5D hyperspace and its associated time dimension (6D hypertime), meaning the 2 perpendicularities spoken of in connection with the diagram can represent either one or both of the spherical waves illustrated above (space-time’s quantum entanglement, or translation to hyperspace). And the spherical waves represent a

spaceship's wave-particle duality. All of this refers to "the 3+1 dimensions of space-time". It can only refer to wave-particle duality if space-time and gravity make particles. They do this in collaboration with photons. This means duality isn't restricted to waves and particles, but is unified with the superimposed universal fields of gravitation (G) and electromagnetism (EM). Gravity produces electromagnetism, so this is actually a unified GEM field. The difference of one possessing gravitons while the other has photons is the result of a difference in the sequence of 1's and 0's composing the fields' quantum particles, which are products of fractal geometry. Mathematician Benoit Mandelbrot developed fractal geometry, and coined the word fractal in 1975 (a fractal is a shape such that, if you look at a small piece of the shape e.g. a graviton, then it looks the same as the original [the gravitational field], just on a smaller scale – it is used to describe coastlines, mountain ranges, etc).

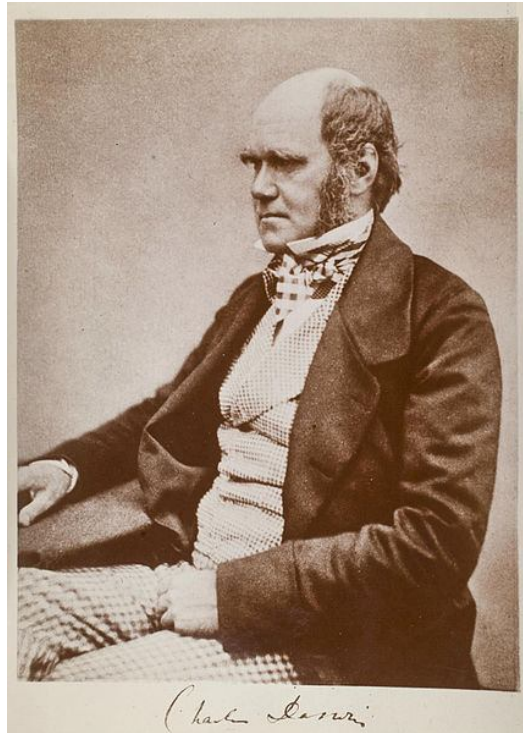
So the total amounts of matter and dark matter are indeed equal i.e. dark matter can be ordinary matter's scaffold. This equality results in a Law of Conservation of Mass-Energy that can be viewed as equal quantities of positive and negative existing within the universe, with changes adding up to zero. Positive space-time (that means gravity – spacetime's warps - is positive too, contradicting modern theories of the universe's alleged beginning that say gravity is negative) would be balanced by an equal quantity of negative space-time in another dimension (it'd be described by imaginary numbers, which give negative results as well as eliminating singularities and boundaries). Why does there appear to be approx. 5 times as much dark matter as ordinary matter? When an object is travelling through time to the past or future, it's invisible and the quantity of ordinary matter in the universe seems to be less (though it still has gravitational influence). If all the time travel in the universe was accounted for, the amount of ordinary matter would be equivalent to the amount of dark matter.

In the 1930's, Swiss astronomer Fritz Zwicky found that gravity alone would be only 1% of the force required to hold galaxies together in the clusters he was studying. To explain the orbits, he suggested an unseen dark matter – which he called *dunkle Materie* – must be present. The gravitational effects of dark matter – dark matter is the translation or inversion of space-time's ordinary particles into the "dark particles" of what is called hyperspace – are many and varied. Spacecraft and astronomical bodies can slow down, speed up, shrink or expand their orbit, get ejected from a system, undergo a "gravitational slingshot" effect ... but no amount of human, or humanoid, time travel would conceivably account for the extra 99% of gravity Zwicky's galaxy clusters required. There must be forms of time travel that are astronomical in scale.



Tesseract (Cube in Hyperspace)

One of these might involve a star's progression to a red giant (and, referring to **DIGITAL STRING THEORY**, possible programming back to the Main Sequence where it would resume fusing hydrogen into helium). It'd be necessary to "fast backward" the star in a particular region of the Cosmic DVD (skip ahead a couple of paragraphs) before it reaches the red giant stage, and maintain it at an intermediate stage (such regular maintenance would make stellar engineering not obvious to present-day astronomers on, say, Earth). The Sun will become a red giant in 5 billion years if left to its own devices, but the heat from its present expansion will make Earth uninhabitable in no more than 1 billion years. This fast-backwarding could conceivably be achieved by what Russian astrophysicist Nikolai Kardashev has conjectured to be a Type II civilization, capable of utilizing the entire power of their sun [22]. A Type III civilization – 10 billion times more powerful – could utilize the power of an entire galaxy, and might be able to engage in creation of subuniverses. This could certainly be done by what I consider a plausible addition – a Type IV civilization, who could manipulate infinity and eternity (the universe as a whole). A Type I civilization, that can use all the power of their home planet, is 10 billion times LESS powerful than the Type II civilization that controls their sun. As for us, Earth only qualifies as Type 0 and Prof. Kaku rightly says we'd be as interesting as an ant hill (except for entomologists, who love ant hills). Establishing colonies throughout space and time would prevent overpopulation – instant intergalactic and time travel are explained later. With all our future instant intergalactic and time travel, these colonies – which will develop into civilization Types I, II, III and IV - throughout space and time would be composed of what we'd call aliens or extraterrestrials.



Charles Darwin

I may be wrong but I think they'd be our descendants (our descendants could only exist before us if time is not exclusively linear). Evolution only seems to explain adaptation, not origin. Humans obviously exist – so without evolution explaining origins, there would just be one inhabited planet in the universe – ours. But with all our colonizing due to future instant intergalactic travel and time travel to the past and future, there are an unlimited number of civilizations out there (always have been, and always will be). I've heard it said that angels rejoiced at the creation of the Earth. I don't think this necessarily has a religious meaning. I suspect it indicates a deep-seated (even totally unconscious) belief in every mind, ancient or modern, that Earth really is important ... that we're not just an insignificant rock orbiting an average star. Maybe life on Earth is the starting point for development of the magnificent Universe this essay speaks of ... and for extraterrestrial life that descends from us, wherever and whenever it may be found.

Going back to time travel for a moment - the past can never be changed from what occurred, and the future can never be altered from what it will be. Both are programmed by the 1's and 0's. These 1's and 0's correspond to the 1's and 0's of the pits and land (or pits and bumps) of a DVD. All of the "cosmic" DVD always exists even though a very limited set of sights, sounds and gravity effects can be detected at any point during its playing. How could the time travel loved by theoretical physicists come to pass without this "cosmic DVD"?



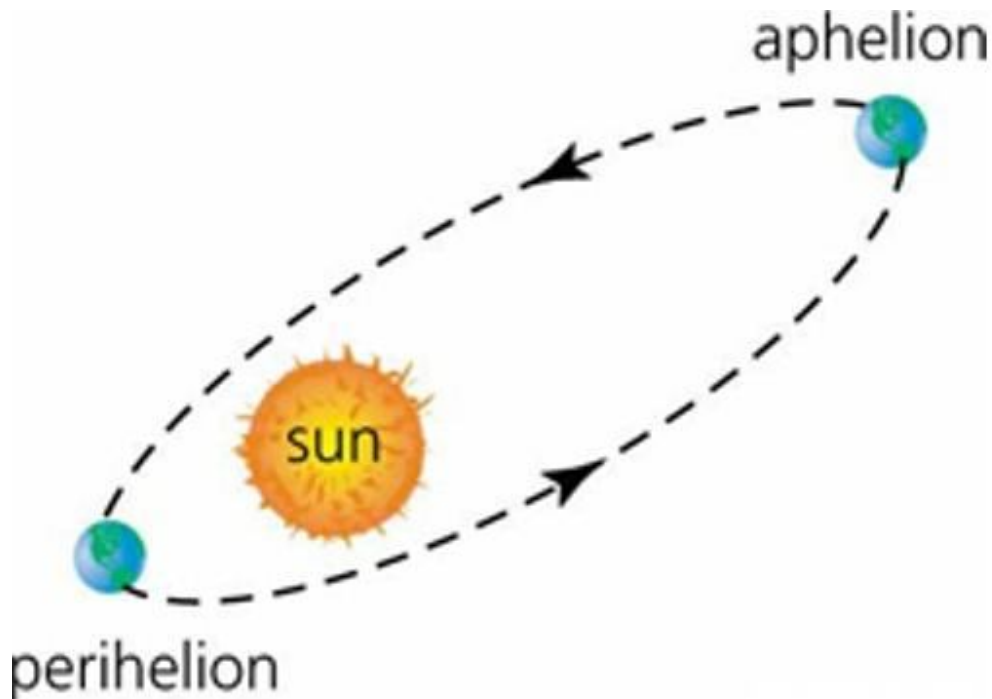
Doctor Who – the previous 11 Present Doctor and Companion Clara

Gravity (space-time) is the product of dark energy i.e. of strings of 1's and 0's, binary digits, in 5D. Dark energy thus has a gravitational aspect. If dark matter is unified with space-time and the two aren't distinct, then dark matter should also have a gravitational aspect –

The average density of the Milky Way is much less than the solar system. More than 99% of our own solar system's mass is in the Sun. But the vast reaches of near vacuum between systems lowers average density enormously – the MacMillan Encyclopedia of Physics says the average density of matter between the stars of the Milky Way is 0.1 neutral hydrogen atoms per cubic centimetre. Since density corresponds to concentration of wave packets – a term from quantum mechanics describing, here, matter's gravitational building blocks - and magnification of gravitational waves, there would be extremely little magnifying of gravity waves in interstellar space (a process related to gravitational lensing). And there would be insufficient gravitational magnification to push or accelerate the stars near the central core or bulge beyond the orbiting speeds of the galaxy's outermost stars (the outermost stars were expected to orbit the galaxy's centre more slowly than stars further in, but have been found to possess very similar orbiting speeds).

And on the subject of repulsive gravity that exerts a push (not, this time, on stars near the galaxy's bulge) - The Sun (and other bodies) can also radiate gravitational waves, according to **c^4 and the Atom**. 99% of the solar system's mass/gravity/gravitational waves are associated with our star, so the gravitational push on Earth from its sphere may be slightly greater than the push resulting from the waves originating in deep space. Though the expanse of space opposite the Sun from Earth's viewpoint is tremendously larger, it's also tremendously less dense and the waves from any solar-size region are far less numerous. Because of the great number of solar-size areas, the strength of the gravitational waves affecting Earth could still be almost as great as the effect of our star's gravity waves. In the end, our

planet's orbit would be growing slowly larger. According to [1]; the distance between Sun and Earth is growing by approx. 15 centimetres per century. The two authors attribute this increase of the Astronomical Unit to dark energy which is, as noted above, a term describing the repelling force of gravity.

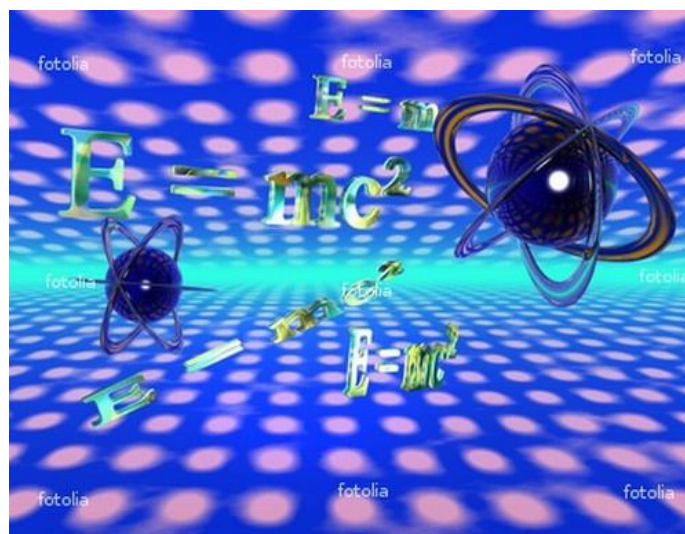


$E=mc^2$ – Part 2

Having reduced the equation to E in **$E=mc^2$ – Part 1**, $m=0$ and $c^2=0$ which means $m=c^2$. In popular teaching, m is multiplied by c^2 . From Einstein's formula, $c^2=E/m$ and (using $m=c^2$) $c^2=E/c^2$ which means $E=c^4$. **c^2 and the Atom** states that graviton/photon interaction produces mass (both particles are equally vital), so E (mass-energy of photon) = c^2 (light's photon) multiplied by c^2 (gravity's graviton) ($c^2 \cdot c^2 = c^4$). At first glance, $m=c^2$ seems to be saying mass exists at light speed. But the absence of E refers to there being no interaction of light energy and gravitational energy at light speed (and therefore no mass) - suggesting that at light speed, $space=0$ and $gravity=0$ * (without spacetime/gravity, there's no creation of mass). Matter always possesses mass, so it can't exist at light speed. Matter and energy are related by the speed of light but matter and energy are obviously not absolutely identical. Energy can exist at the speed of light, though it must remain massless.

* As a result of space and time being permanently linked in a union called spacetime, time must = 0. It has been seen how space-time becomes 0 in the sense of

enduring masslessness at light speed. But how does it become 0 in the sense of time stopping? The basic standard of time in the universe is comparable to the 1960's adoption on Earth of the measurement of time as the vibration rate of cesium atoms. Continuing from the earlier conclusion that humans must have used time travel to the past as well as our computer science to create this subuniverse 13.8 billion years ago, we could borrow the conclusions of Special Relativity and set the standard for time measurement as the measuring of the motions of photons i.e. of the speed of light. At lightspeed, time = 0 (it is stopped). Below 300,000 km/sec, acceleration or gravitation causes time dilation (slowing of time as the speed of light is approached).



c² and the Atom

When Einstein penned $E=mc^2$, he used c (c^2) to convert between energy units and mass units. The conversion number is 90,000,000,000 (light's velocity of 300,000 km/s x 300,000 km/s) which approx. equals 10^{11} . Gravity (and gravitation) can produce electromagnetic force, though there are other methods (to be technical, the word "gravitation" is used when referring to the universe and "gravity" when referring to Earth – but I get lazy sometimes, and just type "gravity" because "gravitation" is too long a word). An example of another method: X-rays can be emitted by matter swirling around a black hole when the atoms jostle and compress, and are heated to millions of degrees. Gravity waves with a strength of 10^1 are, via gravitational lensing, concentrated 10^{24} times after they're focused to form matter (to 10^{25} , weak nuclear force's strength - giving the illusion that a weak nuclear force that is not the product of gravitation exists). (If binary digits form space-time and gravitation, and all particles are composed of those digits, the sequence of 1's and 0's composing gravitons can become the sequence making up the W^+ , W^- and Z^0 particles of the weak force; the gluons of the nuclear strong force; or of electromagnetism's photons.) Waves

are magnified by the matter's density to achieve electromagnetism's strength (10^{36} times gravity's strength) i.e. 10^{25} is multiplied by Einstein's conversion factor [10^{11}] and gives 10^{36} (this gives the illusion of the existence of electric and magnetic fields that are not a product of gravitation – last century, Einstein stated that gravitation and electromagnetism are related). After absorption by atoms, the depleted remnant of the gravity waves is re-radiated from stars, interstellar gas and dust, etc. as electromagnetic waves - possibly gamma rays, or a microwave background * - and as gravitational waves which have lost most of their energy or strength during formation of forces (returning to a strength of " 10^1 ".)

* The cosmic microwave background or CMB is assumed to be left over from the "Big Bang" of cosmology, and was discovered in 1964 by American radio astronomers Arno Penzias and Robert Wilson. A problem with microwaves from dust is pointed out in [11] –

The 1981 article [12] attempted an explanation of the CMB by claiming that it came from dust within our galaxy. In his letter [13], P. M. Steidl also pointed out that this explanation had been attempted already (by supporters of the steady state model), but that this explanation was lacking. The primary problem is that dust is very clumpy, and hence we would expect that if the CMB came from dust the CMB would be very clumpy. However, the CMB is very homogeneous (uniform in composition or character; of the same nature throughout). Also, radiation from dust has too high a temperature to be the source of the CMB.

Most of the problem simply disappears when the universe's infinity is combined with its quantum entanglement, because this solves the primary trouble of clumpiness. A universe of finite size can be pictured as filled with a limited number of microwave sources (stars, gas, dust) and would be very inhomogeneous. The infinite universe advocated here would be 100% filled with those microwave sources - it would be of the same nature throughout, and very homogeneous. At first, this appears to be too smooth, because the CMB has tiny fluctuations and is only isotropic (uniform) to roughly one part in 100,000 – a problem fixed by the quantum nature of digital string theory, with its quantum fluctuations of 1's and 0's. The vast majority of microwaves from those sources could never reach Earth or any other particular spot in the universe when the waves are travelling at the limited speed of light (which is the speed of all electromagnetic waves). This re-introduces inhomogeneity, which again vanishes upon remembering that the famous 17th-century scientist Sir Isaac Newton once said the entire universe would instantly feel the loss of the sun's gravity if our star disappeared suddenly – I think modern science doubts this but zero separation (the Unified Field* created by everything in the universe being quantum entangled) forces me to agree with him. In the same way, any microwave source in the infinite universe would instantly make its presence felt on Earth, restoring the homogeneous microwave background.

* This unified field is the gravitational field which produces everything in space-time. The unified/gravitational field could even be termed the Higgs field – because the Higgs field is supposed to be responsible for the existence of mass, and this article says gravitation produces mass. The mass of the Higgs boson ($126 \text{ GeV}/c^2$ **) is proposed to be the product of the gravitational field. Or since the Higgs field talks of smallest possible excitations, perhaps we could reserve “Higgs field” for the binary digits that are the fundamental constituents of the entire universe (including gravity). The Higgs field is used to explain why the weak force has a much shorter range than the electromagnetic force. This article’s **c^2 and the Atom** showed that gravity can account for differences between the weak force (with its massive W and Z particles only being able to transmit the force 10^{-18} metre) and electromagnetic forces (whose massless photon gives it limitless range).

** Scientists use $E=mc^2$ to measure a particle’s mass. The equation’s solved for mass, giving $m=E/c^2$. So the Higgs boson’s mass is equal to 126 GeV or giga-electron volts (its energy) divided by c^2 (the velocity of light squared). The highest speed possible is Lightspeed. Physically speaking, it cannot be multiplied. Einstein himself proved this. The equation $E=mc^2$ can be considered a degenerate form of the mass-energy-momentum relation for vanishing momentum. Einstein was very well aware of this, and in later papers repetitively stressed that his mass-energy equation is strictly limited to observers co-moving with the object under study (I think he was referring to the time in the 1890s when he was imagining what it would be like to move along beside a beam of light).

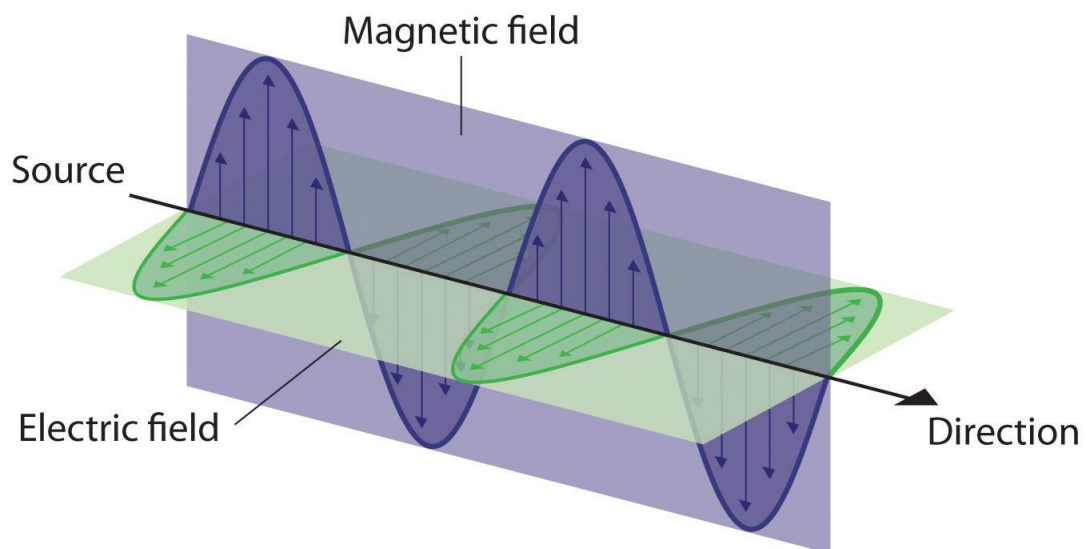
The temperature problem disappears when we look ahead to **$E=mc^2$ – Part 3** where Einstein’s equation says $m=c^2$ and the absence of E refers to there being no interaction of light energy and gravitational energy at light speed ($E=0$ and no mass). In this case, the electromagnetic energy referred to is not light but microwaves. When the microwaves and gravity meet in matter (homogeneous microwave sources, including widely scattered dust – all matter is created by gravity) distant from the matter they radiated from, they heat the sources just as microwave ovens heat food. Repeated absorption and re-radiation at lower energies by these homogeneous sources throughout the infinite universe lowers the temperature from “too high” to the recent measurement of 2.72548K [14]

The source of microwaves proposed in the above paragraph should be kept in mind when **Universe as a Whole is Infinite and Eternal** proposes that our subuniverse is expanding not from a Big Bang but from binary digits “recycling” space-time with the “new” displacing the “old”, in agreement with the Law of Conservation of Mass-Energy which says neither matter nor energy can ever be created or destroyed.

On 17 March 2014, astrophysicists of the cosmic microwave background (CMB) experiment called BICEP2 (Background Imaging of Cosmic Extragalactic Polarization) announced the detection of a swirling imprint of

inflationary gravitational waves in the Cosmic Microwave Background. Reporting these results [15], theoretical astrophysicist Katie Mack says –
“Two papers came out (not long after BICEP2’s initial announcement of inflationary gravitational-wave imprints in the cosmic microwave background) showing that the BICEP2 signal – the one that was supposed to be a beautiful picture of gravitational waves – could have been entirely due to dust in our Galaxy mimicking the primordial signal.”
Microwaves from homogeneous microwave sources, including widely scattered dust, appears consistent with her report.

When a gravitational wave becomes an electromagnetic wave, it not only has to change its strength in the way described above but it also has to change its shape. Although the rest of this paragraph speaks of the photon, it can adapt to include the graviton if these particles are simply two variations in sequences of binary digits. It’s accepted in physics that a single photon can actually interfere with itself e.g. particles can be quantum entangled by sending a single photon through a special crystal that yields two photons. Does this mean a photon is not indivisible (consisting of 1’s and 0’s) but can decouple from itself and separate into two photons - or decouple from itself to alter a wave’s shape from quadrupole gravitational to dipole electromagnetic? The decoupling and consequent change in the wave’s shape might result from the extreme forces involved in matter’s density magnifying (lensing) gravitational waves that enter it. Recalling earlier points in this article, the decoupling may merely appear to exist, actually being the display of a photon as two photons or as different waves – though this could not be seriously considered by many, it would be consistent with a Unified Field and Theory of Everything that are not restricted to mathematics but also have consequences for the physical, and living, worlds.



Electromagnetic Wave

The Optical Force

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 in literally no time. 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 [16]. 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. Achievement of this – see **Digital String Theory plus c^2 and the Atom** for a proposed method - means the microscopic components (gravitons) of warps of space (gravity, according to General Relativity) between spaceships and stars could mimic the Optical Effect and be attracted together, thereby totally eliminating distance (this is similar to traversing a wormhole, or shortcut, between two folds in space-time). Distance is not only deleted in space. There would no longer be any "distance" in time. Just as we can journey to particular stars, we could take trips to particular years in the past or future. Now we just need some clever engineers to design a spacecraft that works according to the Einstein-Yale principle.

So we can produce the effect of faster-than-light travel for both matter and information, without engaging in actual faster-than-light travel (that is impossible). We can, as **$E=mc^2$ – Part 2** stated, change the relationship between m and c^2 from multiplication to equality i.e. in popular teaching, m is multiplied by c^2 but $m = c^2$ in this circumstance. We only appear to re-locate matter and information superluminally because distance is eliminated (or, if you prefer, time is stopped) by attracting together the folds in space-time that are called gravity.

The inverse-square law states that the force between two particles becomes infinite if the distance of separation between them goes to zero. Remembering that gravitation (associated with particles) partly depends on the distance between their centres, the distance of separation only goes to zero when those particles' centres occupy the same space-time coordinates (not merely when the particles' or objects' sides are touching i.e. infinity equals the total elimination of distance, both in space and time). The infinite cosmos could possess this absence of distance in space and time via the electronic mechanism of binary digits (making it as malleable as any image on a computer screen). To distinguish this definition from "the universe going on and on forever", we can call it "electronic infinity or e infinity".

Space-time's warps equal gravity, so gravitational waves can be recorded on a "space-time oscillograph" (an oscillograph is a device for recording the wave-forms of any quantity which can be translated into electrical energy e.g.

soundwaves – and **c2 and the Atom** showed how gravity is translated into electricity). The instrument would be a portable version of the “cosmic Bell test” [26]. This test is a proposed scheme to use photons – **c^2 and the Atom** also showed how gravity is translated into photons - from causally disconnected cosmic sources (e.g. ancient quasars or patches of the cosmic microwave background) to set the detectors in an experimental test of Bell’s theorem aka Bell’s inequality – a mathematical proof discovered by John Bell in 1964, the theorem states that any Hidden Variables theory whose predictions agree with quantum mechanics must be instantaneous or “non-local”. And the device would make space-time’s curvature measurable. Hyper-spacetime’s unity with “ordinary” space-time through imaginary numbers means distances involved with curves double when a probe or person is in hyperspace. We’d be dealing with the wavelengths of space-time curvature plus those of hyper-spacetime curvature.

“In three dimensions, the gravitational force drops to $\frac{1}{4}$ if one doubles the distance. In four dimensions it would drop to $\frac{1}{8}$, in five dimensions to $\frac{1}{16}$, and so on.” [27]

This inverse-square law means the signal from the portable space-time oscillograph – which confirms that we’re in hyperspace - wouldn’t be twice the measurement of space-time’s curves, but a fraction of that result. It was seen that infinity equals the total elimination of distance, both in space and time (**$\infty = 0$**). To reduce the fractional signal further and further, the number associated with the dimensions must be increased more and more. Achieving absolute zero (total elimination of space-time distance) means the universe must be literally infinite and, because of the union of space and time, eternal (as stated in **Universe as a Whole is Infinite and Eternal**).



Follow the Star Trek crew and boldly go where no one has gone before

E=mc² – Part 3

Recall these two sentences from **E=mc² – Part 2** – “At first glance, $m=c^2$ seems to be saying mass exists at light speed. But the absence of E refers to there being no interaction of light energy and gravitational energy at light speed (and therefore no mass).” In **Part 2**, $E=c^4$ while in **Part 1**, $E=0$ – in both cases, E is referring to the gravitational-electromagnetic interaction. $E=0$ is actually saying the graviton is massless like the photon. The speed of light is c and c^2 refers to observers and light co-moving. So the other c^2 refers to observers and gravity co-moving. The speed of gravitational waves is c and the speed of light is equal to the speed of gravity. Of course, this ignores quantum entanglement – this implies that if the sun suddenly stopped shining or having a gravitational influence, those effects would be detectable instantly. The “pairing up” of bits (binary digits) i.e. of the electronic binary digits of 1 and 0 in the largest and the smallest scales, means this: quantum effects are not distinct from macroscopic events, and become apparent on a large (even astronomical) scale. This permits a “distant” event to instantly affect another (exemplified experimentally by the quantum entanglement of particles separated by light years – but also hypothetically possible for galaxies and humans). Pairing up also permits effects to influence seemingly separate causes on subatomic, galactic and human etc scales (the first steps to proving this can be seen in the retrocausality or backward causality promoted by Israeli physicist Yakir Aharonov and others). (One of the others is the USA’s Washington Uni’s John Cramer [17]).

Quantum entanglement and retrocausality appear to be stepping stones on the road to proving the Unified Field of all space-time.

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