

INTEGRATING IMAGINATION WITH REALITY BECAUSE SCIENCE NEEDS A REBOOT

ABSTRACT

I have the most intense desire to understand how everything works (my main interest is cosmology). My feeling as I typed these hypotheses (ideas) has always been that they already exist (though, since physics' Unification appears to connect every point and time in the Cosmos, not on early 21st-century Earth in every case). And I'm just a student, learning about them.

Albert Einstein is quoted as saying,
"For knowledge is limited to all we now know and understand, while imagination embraces the entire world, and all there ever will be to know and understand."

Experiments and mathematics have done a superb job of integrating the human mind's reasoning abilities with the universe. I believe we have now reached the point where the separateness maths and experiments rely on must be surpassed. The trend of discoveries in physics is towards unification of the whole universe, and all time, into one thing ... one event. Start with 19th century scientist James Clerk Maxwell uniting electricity and magnetism into electromagnetism. Then consider Albert Einstein's attempt in the 20th century to unite electromagnetism with gravitation and produce a Unified Field Theory. Lastly, think of modern physics' dream to unite everything into the TOE (Theory of Everything). One day, the Unified Field or TOE will be successfully achieved and it might extend far beyond the wildest hopes of today's science.

In 1911 Vladimir Varićak asserted that length contraction is "real" according to Lorentz, while it is "apparent or subjective" according to Einstein. Einstein replied: "The author unjustifiably stated a difference of Lorentz's view and that of mine concerning the physical facts. The question as to whether length contraction really exists or not is misleading. It doesn't "really" exist, in so far as it doesn't exist for a comoving observer; though it "really" exists, i.e. in such a way that it could be demonstrated in principle by physical means by a non-comoving observer."

(a non-comoving observer is eg an experimenter in a scientific facility or medical lab)

Since "non-comoving" maths/experiments have done an excellent job of integrating our reasoning with the cosmos, my ideas relating to them will be referenced frequently and occupy the greatest portion of this article. However, "co-moving" with Unification now opens the door for other aspects of the mind, such as imagination and intuition, to become an essential part of our comprehension of the universe we live in. Albert Einstein once said, "The intuitive mind is a sacred gift and the rational mind is a faithful servant. We have created a society that honors the servant and has forgotten the gift."

Some readers will view this article as too far fetched. But that doesn't mean it can't be true. I'm fascinated by the distant future - so I started with known science and let my imagination see what that science could develop into. Someone from 200 years ago could have combined known science with imagination, and developed a picture of possibilities for today. In the early 1800's, it would have sounded impossibly far fetched ... but it might have come true. Maybe the imaginations of the few give other people goals to approach with baby steps – and goals that eventually come true.

"We need a very different view of basic physics. This is the time for radical, new ideas" (theoretical physicist Neil) Turok concluded in early October, 2015. He believes that this is a great time in human history for the revolution to occur. This article also extends the quantum scale and the wave-function to computer science and the cosmic scale - commenting on gravitational superconductivity, dark energy, dark matter, antimatter, the Big Bang and cosmological Inflation, Unification, Artificial Intelligence, black holes and many other topics.

Content -

COMPLEX NUMBER PLANE AND EXO-SPACETIME COMPUTERS

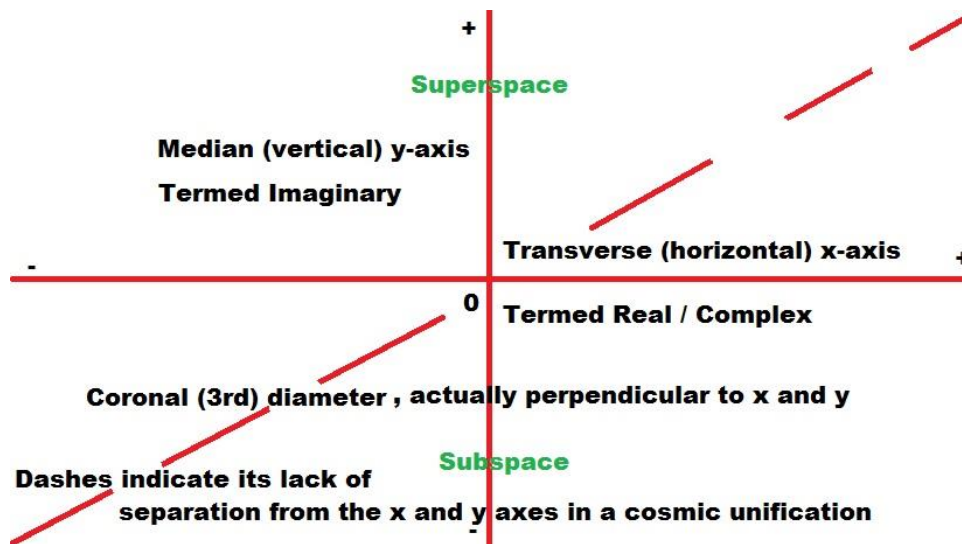
For more than a hundred and ten years, science has accepted the concept of space-time which was formulated by Russian-German mathematician Hermann Minkowski and unites one time dimension with three space dimensions. So-called imaginary time is a concept derived from special relativity and quantum mechanics. Geometrically, imaginary numbers are found on the vertical axis of the Complex Number Plane, allowing them to be presented perpendicular to the real axis. One way of viewing imaginary numbers is to consider a standard number line, positively increasing in magnitude to the right, and negatively increasing in magnitude to the left. At 0 on this x-axis (the so-called 'real' axis), a y-axis (the so-called imaginary axis) can be drawn with "positive" direction going up - "positive" imaginary numbers then increase in magnitude

upwards, and "negative" imaginary numbers increase in magnitude downwards. ("Positive" numbers increasing upwards correspond to superspace and imaginary time, while "negative" numbers increasing downwards describe subspace and imaginary time. *)

Visualize space-time as defined by a horizontal diameter, a vertical diameter, and a third diameter that's perpendicular to both of these. These represent the cardinal directions gravitational waves can travel. One direction along the horizontal axis corresponds to going forwards in time and is called "real". The reverse direction along the horizontal axis corresponds to going backwards in time and is called "complex".[^] The vertical axis represents the "imaginary time" described by the imaginary numbers of physics. The terms real, imaginary and complex come from the corresponding numbers in maths. Even if a computer in real space operated continuously for billions of years using imaginary time, its calculations would be retrieved instantly after they were entered into the computer because no period at all could elapse in our "real" time - a computer working in complex time delivers results at any desired point in the past. Since space-time includes infinitely-long numbers like Π (π), the sphere of space-time must be extended infinitely - meaning the universe would literally go on and on forever (not merely in terms of space but into the past and the future). As will be seen in **POINCARÉ CONJECTURE AND HUBBLE CONSTANT (H_0)**, this extension could involve figure-8 Klein bottles rather than an expanding universe that astronomer Edwin Hubble – popularly called the discoverer of universal expansion - never accepted.

[^] To introduce you to the idea of extra dimensions, consider this - 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". ("Are we missing a dimension of time?" By Roger Highfield, 10 Oct 2007, <http://www.telegraph.co.uk/news/science/large-hadroncollider/3309999/Are-we-missing-a-dimension-of-time.html>). "Physics of the Impossible" by Michio Kaku (Penguin Books, 2009) states on pp. 276-277, "When we solve (19th-century Scottish physicist James Clerk) Maxwell's equations for light, we find not one but two solutions: a 'retarded' wave (corresponding to real time), which represents the standard motion of light from one point to another; but also an 'advanced' wave (corresponding to complex time), 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." Suppose Einstein was correct about gravitational fields restating Maxwell's equations in terms of gravity.^{^^} Then gravitational waves would also have an "advanced" solution.

^ Einstein's equations say that in a universe possessing only gravitation and electromagnetism (paragraph three in **DARK ENERGY, DARK MATTER**), the gravitational fields carry enough information about electromagnetism to allow the equations of Maxwell to be restated in terms of these gravitational fields. This was discovered by the mathematical physicist George Yuri Rainich (1886 -1968). See Transactions of the American Mathematical Society **27**, 106 - Rainich, G. Y. (1925).



*Perhaps the real space/imaginary time combination – possible because of unification - is, to borrow a word from science fiction (and mathematics too), known as subspace. This could be interpreted in the diagram above as subspace having a definite position (represented in the sketch by a line). Superspace has a location too. Superspace is regarded in particle physics as the outcome of the theory of supersymmetry (SUSY) which relates the two classes of elementary particles – bosons (force-carrying particles) and fermions (particles of matter). This article relates bosons to fermions through binary digits and the Mobius strip. You have to go around this strip twice to arrive at your starting point - and matter particles have quantum spin described as $\frac{1}{2}$, which means they must be turned through two complete revolutions to look the same ("A Brief History of Time" by Stephen Hawking – Bantam Press, 1988, pp.66-67). In this article, superspace is the aggregate of all the spaces and includes sub-, real, and complex space. The world's largest and most powerful particle collider, the Large Hadron Collider (LHC) on the France-Switzerland border, has found no evidence for supersymmetry thus far and some physicists have decided to explore other ideas (Ellis, John: "The Physics Landscape after the Higgs Discovery at the LHC": 14 April 2015: [arXiv:1504.03654](https://arxiv.org/abs/1504.03654))

WARP 10 AND EXPLORING THROUGH ENTANGLING

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 ["Tunable bipolar optical interactions between guided lightwaves" by Mo Li, W. H. P. Pernice & H. X. Tang - Nature Photonics 3, 464 - 468 (2009)]. This is the "optical force". For 30 years until his death in 1955, Einstein worked on his Unified Field Theory with the aim of uniting electromagnetism (light is one form of this) and gravitation.

Achievement of this 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. Instantly traversing 700 light years in space enables a spaceship to arrive at a spot which a light beam could only reach by travelling for 7 centuries, putting the ship 7 centuries in the future. Movement forwards through hypertime is always in the "up" direction and, whether the trip is a relatively short one to Mars or one of countless billions of light years, absolutely no motion occurs in ordinary time's horizontal direction (Relativity's time dilation[^] implies time might be stopped, making travel instant). And the journey is thus instant. Another way of viewing this phenomenon would be to say the object (though macroscopic) is in 2 places at once. 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).

[^] Special Relativity shows that time slows down for anything moving, but this is only noticeable at significant fractions of the speed of light.

The subject of imaginary time is being discussed, and space-time is a unity that's united with another unity called hyperspace-hypertime. So in preference to saying warps of space are attracted together to eliminate distance, the focus can be placed on the temporal aspect - and we travel at 90 degrees to time as it's known. This reminds me of the episode on TV of "Star Trek: Voyager" where Lieutenant Tom Paris became the first person to fly at Warp 10 - at infinite speed, where the traveller's at every point in space at once. Lieutenant Paris said that when he reached Warp 10; he could see Voyager

and at the same time he could see inside the shuttle he piloted away from Voyager - he could even watch himself.

This little section may be regarded as a first step toward Star Trek's infinite speed. By travelling in the up (or down) direction in hypertime - one form of which is what physicists and mathematicians call "imaginary time" - the object (though macroscopic) is in 2 places at once viz the beginning and end of its journey. It would necessarily also be at every point between the start and finish. Suppose all the mass, electromagnetism, gravitation etc in space, and time, forms a Unification (discussed at various places throughout this article). Then, what could prevent the object from being, like Lieutenant Paris, at every point in space (actually, spacetime) at once?

Departure from Earth orbit and arrival in Mars or Pluto orbit can occur at the same time; avoiding cosmic and solar radiation, as well as muscle and bone weakening, resulting from extended space travel. Maybe the extremely high temperatures associated with planets like Venus and Mercury, or the extremely high pressures of Venus and Jupiter, can be overcome (balanced) by a spaceship simultaneously existing in the extreme coldness and near-vacuum of multiple regions of space near Earth while experiencing temperatures and pressures of opposite nature at other planets.

With a planet like Saturn, the lack of a solid surface and lack of oxygen might possibly be compensated for by explorers simultaneously being entangled with Earth. The cold is potentially compensated for by an "instant trip" from Earth to Saturn that includes not a gravitational slingshot but an "entanglement slingshot" through a region sufficiently close to the Sun.

I once read that Gene Roddenberry, Star Trek's creator, had a vision of extraterrestrials or life in future centuries which inspired his creation of the famous programs and movies. I always thought this couldn't be true; but now I wonder if Star Trek's creator, writers, actors, consultants etc are involved in more than a superb TV show (even if they aren't aware of it - see **MACROSCOPIC ENTANGLEMENT AND HYPNOSIS** with its sentence "the immense future in front of us is influencing our very limited present and our present selves").

DARK ENERGY (DE) AND DARK MATTER (DM)

This section offers insights into dark energy and dark matter gained from viewing them in relation to the Complex Number Plane.

According to "Quantum gas goes below absolute zero - Ultracold atoms pave way for negative-Kelvin materials" by Zeeya Merali (<http://www.nature.com/news/quantum-gas-goes-below-absolute-zero-1.12146>): the sub-absolute-zero gas might help solve a cosmic mystery because

"Another peculiarity of the sub-absolute-zero gas is that it mimics 'dark energy', the mysterious force that pushes the Universe to expand at an ever-faster rate against the inward pull of gravity."

It does not seem necessary to invoke the existence of dark energy. The force acting against gravity could be gravity. Specifically, the gravity we know would be "real" gravity and it would be opposed by "complex" gravity, also called antigravity.

The 2012 article "How Einstein Discovered Dark Energy" by Alex Harvey (<http://arxiv.org/pdf/1211.6338v1.pdf>) states,

"Recall that in 1918 the only elementary particles known were the electron and the proton. Physicists were attempting to understand why these were stable despite their internal electromagnetic repulsion. Most attempts were based solely on electromagnetic theory. For a review of these efforts see W. Pauli, 'Theory of Relativity', Pergamon Press, London (1958), see Part V, p.184 ff. 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."

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

That attempt is, unfortunately, universally regarded as a failure because scientists now explain atomic stability through the strong nuclear force. Einstein is said to have fallen out-of-touch with science by the time the nuclear forces were discovered. He disagreed with the alleged necessity of the trend to big, expensive experiments. But that doesn't mean he was out-of-touch. Give the man his due. He invented General Relativity only a handful of years prior to that 1919 paper. Is it so hard to believe he was way ahead of his time – even ahead of our time - when he combined gravitation with electromagnetism? The discovery of the nuclear forces would do nothing to change the validity of those gravitational field equations if the nuclear forces are not fundamental. If the cosmos is made of 1's and 0's[^], that possibility can be reconciled with gravitation

uniting everything simply by proposing that the theoretical gravitons composing gravity actually exist, and that they're made up of the binary digits. Maybe those digits can be rearranged by nature ... perhaps by a quantum-scale version of gravitational lensing, which can split the image of an astronomical object into several images ... rearranged into the particles constituting the other 3 forces (surrounding space-time's virtual particles and their produced digits are included in this rearrangement, to vary particle mass). If entirely accurate, this would make gravity the one truly fundamental force and besides making the nuclear forces non-fundamental, confirm Einstein's Unified Field.

^ Transformation of gravitational-electromagnetic interaction into matter could be via photons of electromagnetic waves and the hypothetical gravitons of gravitational waves being disturbances in electromagnetic and gravitational fields. These disturbances are known as virtual particles and are equivalent to energy pulses ("A Brief History of Time" by Stephen Hawking - Bantam Press 1988, p.69 relates the virtual photons which can never be directly detected to the real photons that are the energy pulses within light waves). Those pulses produce the binary digits of 1 and 0, encoding numbers - some of which (such as pi, e, $\sqrt{2}$) are infinitely-long. Matter particles [and even bosons like the Higgs, W and Z particles] are given mass by the energy of photons and gravitons interacting in "wave packets" (interaction within this term from quantum mechanics results in wave-particle duality). Production of the Higgs boson by gravitational-electromagnetic coupling means that interaction could more succinctly be called "the Higgs field". This is indeed plausible since alternative versions of Higgs theory still circulate in science in which the role of the Higgs field is played by various couplings (see M. Tanabashi; M. Harada; K. Yamawaki. Nagoya 2006: "The Origin of Mass and Strong Coupling Gauge Theories". International Workshop on Strongly Coupled Gauge Theories. pp. 227–241).

^^ There are two problems with wave-packet theory, according to "Quantum" by Manjit Kumar (Icon Books, 2008, pp.215-217). The solution to both appears to reside in the unification of space-time and its contents. That is - by the gravitational field and electromagnetism "creating" each other, their interaction producing matter and the 2 nuclear forces, and the motions of particles being what we call time. First, waves would spread out to such a degree that they'd have to travel faster than light in order for experiments to connect them with detection of a particle-like electron. Possible solution - this is only a problem if things are actually separate and not entangled. Second, applying Schrödinger's wave equation to helium (see **DATA IN A HELIUM ATOM = 3×10^{80} BYTES**) and other atoms led to an abstract multidimensional space that was impossible to visualize. Possible solution - the things written in **COMPLEX NUMBER PLANE**. In 3 dimensions; an object has length, width and height at right angles to each other. To enter the 4th dimension and go back or forward in time; we must travel perpendicular to length, width and height - all at once. Going forward in time has always

been a reality - by simply living, we go forward one day every day. So reality and the universe are multidimensional, even though only 3 dimensions can be visualized. Extra question - Could wave mechanics incorporate quantum spin? There are 2 forms of spin - classical (e.g. a rotating top) and quantum. The latter can't be explained classically but may possibly be explained by particles and space mutually affecting each other. According to General Relativity, matter causes a gravity field by its mass creating depressions in space that can be pictured as a flexible rubber sheet. Space could affect particles through its curvature (gravity) infiltrating particles, thus giving them quantum spin.

If real gravity is involved in ordinary matter's mass-production, complex gravity must be involved in the mass-production of other matter called "dark". One way of determining if dark matter belongs to a higher dimension would be to measure its gravitational effects in space dimensions (see "A Brief History of Time" by Stephen Hawking – Bantam Press 1988, pp. 164-165). In three dimensions, the gravitational force drops to 1/4 if one doubles the distance. In four dimensions (4th-dimensional hyperspace), it would drop to 1/8 and in five dimensions (5th-dimensional hyperspace) to 1/16. The positive direction on the x-axis (representing the 3 space dimensions of real space-time) is in continuous contact with the negative direction on x (the 5th space dimension of complex space-time). Therefore, real gravity is perpetually amplified by complex gravity. Using Professor Hawking's figures from the previous paragraph, the amplification equals $\frac{1}{4} \times \frac{1}{4}$ ie doubling the distance in 5 space dimensions causes gravity to become 1/16 as powerful. ^ It is not $\frac{1}{4} \times -\frac{1}{4}$ since numbers have the same property regardless of direction on the Complex Number Plane (they increase in value). To conserve this sameness, the second one must be $+\frac{1}{4}$ if the first one is $+\frac{1}{4}$. Alternatively, the gravity's strength is reduced 4 times and this number is multiplied by another 4 to reduce it 16 times overall. In the 4th space dimension/2nd time dimension represented by the imaginary axis, this y-axis is half the distance (90 degrees) from the real x-axis that the complex x-axis is (it's removed 180 degrees). So gravitational weakening from doubling distance in 4 space dimensions = (reduction of 4 times multiplied by another reduction of 4 times) / 2, for an overall reduction of 8 times to a strength of 1/8. Only 5 space dimensions can exist – along with real time, imaginary time and complex time.

DATA IN A HELIUM ATOM = 3×10^{80} BYTES

I'll start by quoting a few lines from the article "Lilliputian Storage Wars" by Elizabeth Svoboda, in Discover magazine's May 2012 issue -

"... Andreas Heinrich, a nanotechnologist at IBM's Almaden Research Center ... coaxed a cluster of 12 iron atoms to store one bit of data, consisting of either a 1 or a 0. Today's

oneday, surely be capable of simulation by some virtual-reality program. If everything is reduced to waves and Binary digiTS, people will someday be freed from their reliance on matter and will be able to use only waves and BITS for computation, transport etc – even existence itself. This reminds me of a movie I saw about Alexander the Great. Aristotle (played by Christopher Plummer) was teaching the young Alexander and said Greeks use their minds while other races rely on their senses, and what they can see and hear etc.

*Brownian motion or pedesis is the motion of particles suspended in a liquid or gas which results from their collision with atoms and molecules in the fluid. The existence of atoms was first proposed in ancient Greece about 2,500 years ago by Democritus and his teacher Leucippus. Albert Einstein published a paper in 1905 that explained the motion named after botanist Robert Brown, who observed the movements of pollen grains in water in 1827.

Objection -

Matter still appears necessary even if only waves and bits exist because the waves interact to produce, say, the matter of computers or food. In other words, you can't simulate without a material computer that creates the simulation, and you can't live without material food/fluids.

Solution -

Waves aren't compelled to affect each other as the energy of hypothetical gravitons and undetectable virtual photons (as opposed to the detectable, so-called real photons in light) combining in the Wave Packets of particles of matter. They can interact in another way – to form interference patterns and holograms of a multispectral nature. That is, the holograms use multiple parts of the spectrum. Not only light but also infrared and electric waves powerful enough – but not of excess power – to stimulate the nervous system into providing senses of touch, smell and taste. There would also be the radio and ultraviolet waves, X-ray and gamma rays, sound waves and gravitational waves associated with various Earthly and cosmic phenomena. Way back near the end of the 1980s, the magazine "Scientific American" reported that holograms have been made not only with visible light and X-rays, but also with microwaves and sound waves. There has been much progress since then, and much more progress lies ahead. With multispectral holograms, working computers can be simulated. So can the nutritious vitamins, minerals, proteins, fats, carbohydrates and water of foods. Even the neurons and glial cells of the brain and nervous system – as well as all other bodily cells – are capable of being simulated, thus forming an immaterial "spirit body".

"... if redshift are not primarily due to velocity shift ... the velocity-distance relation is linear, the distribution of the nebula is uniform, there is no evidence of expansion, no trace of curvature, no restriction of the time scale ... and we find ourselves in the presence of one of the principles of nature that is still unknown to us today ... whereas, if redshifts are velocity shifts which measure the rate of expansion, the expanding models are definitely inconsistent with the observations that have been made ... expanding models are a forced interpretation of the observational results"

— "Effects of Red Shifts on the Distribution of Nebulae" by *E. Hubble*, *Ap. J.*, 84, 517, 1936

Is it possible that the extension into infinite spheres of space-time by mathematical topology's figure-8 Klein bottles is "one of the principles of nature that is still unknown to us today"? It would replace the expanding-universe model which Hubble always disagreed with, and be the cause of redshift as well as the Hubble constant (alleged universal expansion has been measured to presently be approx. 74 kilometres per second per megaparsec: 74 k/s when a megaparsec – 3,260,000 light years - separates two points in space. See "Speed of Universe's Expansion Measured Better Than Ever" By Clara Moskowitz, SPACE.com Assistant Managing Editor | October 3, 2012 - <http://www.space.com/17884-universe-expansion-speed-hubble-constant.html#sthash.cKSz5cRH.dpuf>). Fractionated – see **Entangling the "real" universe with its computer simulation** - pulses of energy known as virtual particles form matter through gravitational-electromagnetic interaction, so extension does ultimately produce physical effects. These effects would understandably be initially interpreted in purely physical terms.

In physical terms, cosmological redshift is viewed as the result of bodies moving away from each other in an expanding universe. But when expansion is replaced by the closely related, yet definitely not identical, mathematical extension; this type of redshift could be seen as the result of more and more astronomical bodies manifesting from pre-existing energy ie the universe becoming what Georg Cantor called "an infinity of infinities". The farther away a body is located, the greater will be the weakening of its light due to absorption by gas and dust. This weakening causes lines in its light spectrum (the lines are caused by the presence of elements) to shift towards the lower frequency of the red end of the spectrum. If this is correct, then Doppler shifts – change in a radiation's frequency due to its source's approaching, or receding from, us – would not apply to the scale of the entire universe, even if they're valid for many millions of light-years. In the same way, the vanishing point of perspective (which causes railway tracks to apparently come together in the distance) has a certain validity since no eye can perceive otherwise. Using a telescope might extend that validity to many millions of light years. But on a large scale or greater distance, we all know that the railway tracks

never converge but remain parallel. Similarly, Doppler shifts could be inapplicable to the cosmos as a whole. Cosmological redshift could not be simply explained by an expanding universe, but might require this article's mathematical extension. Application of perspective and the vanishing point to the universe is compatible with observers affecting observations, as in the double slit experiment. It's also compatible with the mind's development of computer simulation entangled with past, present and future perspectives on the nature of the universe (a relative, not absolute, process which involves many different perspectives). The expanding universe of the Big Bang and Inflation would become an outdated "creation myth", and Einstein would have been correct to introduce the cosmological constant.

"When Einstein developed his theory of gravity in the General Theory of Relativity, he thought he ran into the same problem that Newton did: his equations said that the universe should be either expanding or collapsing, yet he assumed that the universe was static. His original solution contained a constant term, called the cosmological constant, which cancelled the effects of gravity on very large scales, and led to a static universe." ("The Expanding Universe" - <http://skyserver.sdss.org/dr1/en/astro/universe/universe.asp>)

Such a static universe (where the universe is constantly roughly the same on the largest scales) is consistent with the infinite, eternal universe of **STEADY STATE TOPOLOGY**. Picture spacetime existing on the surface of this doughnut which has rips in it. These rips can penetrate between surfaces, allowing you to travel in straight lines and avoid travelling along longer curves. These shortcuts belong in the hyperspace of **COMPLEX NUMBER PLANE**.

*This article relates bosons to fermions through binary digits and the Mobius strip. You have to go around this strip twice to arrive at your starting point - and matter particles have quantum spin described as $\frac{1}{2}$, which means they must be turned through two complete revolutions to look the same ("A Brief History of Time" by Stephen Hawking – Bantam Press, 1988, pp.66-67). Mobius strips are related to matter particles in the previous sentence and therefore exist on the subatomic, or quantum, scale. Joining two Mobius strips (or Mobius bands) forms a four-dimensional Klein bottle (<http://plus.maths.org/content/os/issue26/features/mathart/index>). Thus, the size of Figure-8 Klein Bottles would also be quantum. See the final paragraph of **NEGATIVE ABSOLUTE TEMPERATURE, LIFE AND COSMIC UNIFICATION** which speaks of pi, the Mobius, the Klein and so on being built in to the Cosmos – and entangled with, or part of, us.

ANTIMATTER RELATED TO DE, DM

^ Amplification increases the quantity of dark matter in relation to normal matter, too. In our observable universe, there is approximately 5 times as much dark matter as regular: "Planck Mission Brings Universe Into Sharp Focus":

http://www.nasa.gov/mission_pages/planck/news/planck20130321.html#.V1zEQ49OJjp.

Imagine laying a "floor" of real gravity which travels forward in time and contributes to formation of matter, then sliding a piece of furniture over it. The furniture represents complex gravity (antigravity) which travels back in time and results in antimatter - "Feynman's Theory of Antimatter" (part of

<http://www.upscale.utoronto.ca/PVB/Harrison/AntiMatter/AntiMatter.html>) says,

"An electron travelling backwards in time is what we call a positron."

"Physics of the Impossible" states on pp. 277-278: "These advanced waves were a mystery until they were studied by (20th-century American) physicist Richard Feynman, who revealed the true secret of antimatter: it's just ordinary matter going backward in time." He arrived at this conclusion by analyzing the work of Paul Dirac on the electron a few decades before, and finding something very strange. Kaku explains, "If he simply reversed the direction of time in Dirac's equation, the equation remained the same if he also reversed the electron charge. In other words, an electron going backward in time was the same as an antielectron going forward in time!"

The making of antimatter with particle accelerators

(<https://van.physics.illinois.edu/qa/listing.php?id=1172>) does not contradict the idea of time-travelling particles, for collisions in accelerators aren't just events in space: they occur in space-time. If this positron or antielectron keeps journeying back from some point in our future (where different warps in its constituent waves means it was matter), it becomes what we call dark matter when it has gone beyond our present.

When the furniture is pushed or pulled across the floor, the floor remains in position and resistance to motion is attributed to the furniture. In the same way, gravity's function is seemingly not disturbed but the resistance attributed to antigravity's motion is measured to be amplified 5 times. In other words, antigravity is slowed down to $1/5$ of gravity's speed and has 5 times longer to produce dark matter. This translates into there being 5 times as much dark matter as ordinary matter. So if antigravity is responsible for formation of antiparticles, why isn't the amount of antimatter also 5 times greater than normal matter? One of the great unsolved problems in physics is why the observable

universe is composed almost entirely of ordinary matter, as opposed to an even mixture of matter and antimatter.

Karsten Heeger, a professor of physics in the USA, says

“All the studies that have been done have not found enough difference between particles and anti-particles to explain the dominance of matter over anti-matter.”

- See more at: <http://news.wisc.edu/one-step-closer-uw-madison-scientists-help-explain-scarcity-of-anti-matter/>

Heeger's statement is consistent with particles and antiparticles being the same except for the small differences caused by the warping of their composing waves (differences called their passage through time). Picture time as a DVD. Every fraction of a second in the universe's infinite history and infinite future – the result of the cosmos being generated from infinite numbers like pi - exists right now just as surely as an entire DVD exists even though we only perceive sights and sounds from an extremely tiny portion of the disk at any interval. So antimatter spends virtually its entire existence as either matter or dark matter, and the amount of antimatter in the cosmos is correspondingly "extremely tiny".

A thought-provoking statement by "The Universe" - Life Nature Library, 1964, p.175 (when discussing the Steady State Universe) is that "... the amount of matter in (the Universe's space) is infinite and steadily growing more infinite." This relates to a statement by "mathsmanretired" - a British teacher with a B.A. in mathematics and M.Sc. in mathematical education – in "Can you add to infinity?" at <https://answers.yahoo.com/question/index?qid=20090106024304AA1Rv5q>. He said, "... infinity is a concept, not a number. Therefore the process of addition is undefined in this situation. You cannot treat infinity as if it were just a number." Adapted to the present discussion, this can mean an infinite number of subuniverses can be added to the already-infinite universe-as-a-whole during the past, present and future. Their addition merely involves numbers - it never increases the universe's size beyond the infinite. This brings to mind the work of German mathematician Georg Cantor (1845-1918) who wrote about an infinity of infinities, with one infinity being larger than another. He rejected the idea of an absolute infinity which would, to paraphrase mathsmanretired, treat infinity as if it were just a number (the number associated with an absolute infinity would be 1, as in one absolute infinity).

A reasonable objection to the "infinity of infinities" concept is that a smaller infinity is limited in size compared to a larger one. The idea of limits to infinity - which is an idea of limitlessness - is a contradiction. In the case of the universe and its subuniverses, think of the matter and energy composing them. The cosmos could be one absolute infinity of energy going on and on forever both in space and time. Sometimes the gravitational

energy and electromagnetic energy interact (perhaps because of temperature) to form matter. Sometimes the energies don't interact, possibly forming black holes. In these ways, infinity's energy content is absolute but its content of matter and mass can vary and allow an "infinity of infinities". Such a proposal conforms to the Law of Conservation which says neither matter nor energy can ever be created or destroyed - they only change form, including into each other - and the total energy/mass content of the cosmos is constant.

Macroscopic Entanglement's Consequences for World Peace, Hypnosis, the "cosmic DVD", Destiny ...

'Physicists now believe that entanglement between particles exists everywhere, all the time, and have recently found shocking evidence that it affects the wider, "macroscopic" world that we inhabit.' - "The Weirdest Link" (New Scientist, vol. 181, issue 2440 - 27 March 2004, page 32 - online at <http://www.biophysica.com/QUANTUM.HTM>). The same article says that Caslav Brukner, working with Vlatko Vedral and two other Imperial College researchers, has uncovered a radical twist. They have shown that moments of time can become entangled too. (<http://www.arxiv.org/abs/quant-ph/0402127>).

If humans are entangled with the whole universe, we'd have to be entangled with each other. On a mundane level, this gives us the potential for extrasensory, astrological and telekinetic abilities. On a higher level, it will eventually totally eliminate crime and war and domestic violence since nobody could harm anyone else without hurting themselves, and people don't normally desire to harm themselves in any way. Quantum entanglement of humans with every point in space-time would be a surreal experience. But we may already have some familiarity with another dreamlike experience that connects people in a strange way - hypnosis. A hypnotized subject seems to retain ultimate control and cannot be forced to do anything he or she is absolutely opposed to. Similarly, a person who's entangled with everyone else would be in final control of herself/himself, even able to preserve privacy.

Hypnosis might support a "mass formed from gravity" argument, too. If the atoms composing us are thought of as tiny bits of hard stuff, it'd be difficult for the waves of light and sound from a hypnotist or subliminal video to affect our brains and bodies. But theories of quantum mechanics, and by Albert Einstein, make me think matter is made of interacting gravitational and electromagnetic waves. Waves affect each other, so the light and sound waves can affect the gravitational and electromagnetic waves far more easily than if matter was made of "hard bits" - especially if you're a willing subject and want the hypnotist to influence your brain waves.

Does the future influence the past and our present? These conclusions are derived from my article "Exploring Aspects of Science While Wondering if the Future and Past Exist Right Now" (<http://vixra.org/abs/1605.0085>).

There are two approaches here -

1) 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 composing the universe*. These 1's and 0's correspond to the pits and land (or pits and bumps) of a DVD. If you gaze at the horizon, you're viewing things in space – on the surface of Earth, which is floating in space. But you know the world doesn't end at the horizon even though you can't see any further. You can't see anything that happened yesterday or tomorrow ie in space's indissoluble partnership with time. So why assume nothing presently exists beyond your time's horizon? Every fraction of a second in the universe's infinite history and infinite future exists right now just as surely as an entire DVD exists even though we only perceive sights and sounds from an extremely tiny portion of the disk at any interval. The consequence is that Einstein is formulating $E=mc^2$ somewhere – or Somewhere in Time – right now: and physics' hoped-for Unification is already an established fact somewhere. Our perceptions from a tiny fraction of the Cosmic DVD are called "the present". How could the time travel loved by theoretical physicists come to pass without this cosmic DVD, which would constitute an eternal present? I believe English physicist Julian Barbour has a similar understanding of time ("From Here to Eternity" by Tim Folger | Friday, December 01, 2000 – from the December 2000 issue of Discover Magazine - <http://discovermagazine.com/2000/dec/20-cover#.Usa9NNIW2bs>).

* Here's an extremely brief summary of the basic idea copied from "Exploring Aspects of Science ..." -

"Translation into matter could be via photons of electromagnetic waves and gravitons of gravitational waves being disturbances in electromagnetic and gravitational fields. These disturbances are known as virtual particles and are equivalent to energy pulses ('The Grand Design' by Stephen Hawking and Leonard Mlodinow - Bantam Press 2010, p.113) whose presence or absence of pulsing can be interpreted as the binary digits of 1 and 0 encoding numbers etc. Matter particles [and even bosons like the Higgs, W and Z particles] are given mass by the energy of photons and gravitons interacting in 'wave packets' (interaction within this term from quantum mechanics results in wave-particle duality)."

2) Another way of validating what might be called fate or destiny is via reality waves. Reality is wavelike (has a wave function) because of the universal gravitational and electromagnetic fields, and because matter is composed of interacting gravitational and electromagnetic waves. Some of the ocean waves passing an island are refracted -

when they enter shallow water, they're refracted by the mass of the seabed. They change direction and head towards the island, breaking onto its beaches. Similarly, reality waves should be refracted by masses residing at appropriate positions in the future - perhaps future versions of ourselves - and would converge on that future state. Therefore, the immense future in front of us is influencing our very limited present and our present selves. So though the past and present help build the future, the convergence of reality waves on the future means we're not completely free to make the future what we want it to be.

BAND-GAP IMPLANTS

Partial independence from a physical body may be possible via an immaterial body designed in the far future (next section). This necessarily involves much speculation and involves the development of an all-powerful, all-knowing, omnipresent human body composed of photons and gravitons, and quantum entangled with every point in space-time, for the purpose of overcoming the limits of biological bodies – or of biological bodies incorporating computer and robotic systems.

On the subject of biological bodies incorporating computer and robotic systems, here are a few paragraphs about band-gap implants -

Surely it'd be more convenient to travel to stars and galaxies, and through time, and achieve entangled immortality, by simply using our brain instead of relying on technology. Is this fantastic idea even remotely possible? How could we manipulate the unification and zero separation of all space-time? First, band-gap structures – then the unified field. Band-gap structures are more advanced than the Star Trek technology of replicators, transporters and starships. While these things can do what band-gap implants do, the implant technology is not external but is located solely within the brain. An even more advanced system - one that has the advantage of seeming more natural to many people – may be possible. That system would do everything band-gap implants do, but would rely solely on the entire universe and all space-time being a unification or unified field. Whatever anyone can think of can be done – as long as it doesn't violate the laws of physics (and the limits of physical law won't be understood for maybe a thousand years).

Morpho butterflies create colour by selectively adding and deleting certain wavelengths of light. Physicists have only recently devised comparable materials, called photonic band-gap crystals; and are now exploring their use in phone switches, solar cells and

antennas. No surprise, then, that some engineers are looking to the living world for the next generation of optic inspirations. ("Illuminated Life - Meet the true masters of optics: Animals that know a lot more about slicing, dicing, and twisting beams of light than we do" By George M. Whitesides, Felice Frankel – Discover Magazine, August 2005 issue). I believe advances in engineering and biology will enable humans, like the morpho butterfly, to selectively add and delete certain wavelengths of light. But the word "light" need not only refer to visible wavelengths. It can be extended and refer to any wavelength of the electromagnetic spectrum. Science accepts that radio, infrared, ultraviolet waves and X-rays as well as gamma radiation are all forms of light. Suppose matter acquires all its properties (including mass) by the superimposing of electromagnetic and gravitational waves. So the day will come when we can add or delete wavelengths of matter anywhere and anytime we choose!

I anticipate people will oneday have band-gap structures in their brains that are no bigger than a computer chip (these won't require surgical implantation, but simply downloading, because of the pre-existing unified and digital nature of all parts of the universe). Photonic band-gap crystals would, of course, only deal with light in its photonic forms (energy forms such as visible light or radio waves). The band-gap structures I have in mind would need to deal with forms like genes, so they could add or delete anything and everything we choose. They might accomplish this by acting similarly to a modem that acts on a scale billions of times smaller than a modem manufactured by nanotechnology, and would be capable of manipulating digitised matter. Then they could emulate computers' copy/paste function to add things; as well as their delete function, to remove things (now that's what I call genetic engineering!) This ability must only come to fruition in a future, ideal society: it would only be wasted and abused in the present warring and selfish world!

THE GODS, EXTRATERRESTRIALS AND EVOLUTION

In 1925, the Austrian physicist Wolfgang Pauli discovered the exclusion principle. This says two similar particles cannot have both the same position and velocity. If two electrons could have identical positions and velocities, they could all collapse into a roughly uniform, dense "soup". Protons and neutrons would do the same, and there would be no well-defined atoms. So we need the exclusion principle. Force-carrying particles like photons and gravitons do not obey the exclusion principle. [from "A Brief History of Time" by Stephen Hawking – Bantam Press, 1988, pp. 67-69]

So we might assume the immaterial body wouldn't be well-defined and would collapse into a ghostly soup. But perhaps a well-defined structure (a spirit body) can be built if

the photons are first "stopped" before they're collected and substituted for the body's particles. The beginnings of this technology may be underway [Palus, S. - "Turning Light into Matter - Physicists have created a device that binds photons together to form *light molecules*." - Thursday, March 13, 2014 (<http://discovermagazine.com/2014/april/6-how-to-make-light-matter>)]. Referring to reference 3, two photons end up sticking together and move forward just like a two-atom molecule.

^ The universe is the things in space and time and, since General Relativity says gravitation is the warping of space-time, the universe is a giant gravity field. Gravity does not need to travel – the gravitational field already exists everywhere. Nevertheless, any disturbance (from the waving of your hand to explosion of a supernova) will send ripples called gravitational waves through the universe. The universe is also a giant electromagnetic field. Electromagnetism is ubiquitous and doesn't need to travel, but any disturbance sends out electromagnetic waves. In this way, photons in the giant electromagnetic field which aren't travelling because of disturbances might be regarded as "already stopped".

"Many religions, from Hinduism to Gnostic Christianity to Mormon doctrine, teach that – as impious as it may sound – it is the goal of humans to *become* gods." ["Pale Blue Dot – A Vision of the Human Future in Space" by Carl Sagan - *Headline Book* (1995, p. 382)] The human body and brain might become immaterial and quantum entangled with all space and time (no doubt many people, even today, would call such invisible, endlessly powerful, entangled beings "supernatural"). A name used for God in the Old Testament is Elohim, which means the "plural majesty of the one god" i.e. the billions of earth's inhabitants** entangled with, and dispersed throughout, the united infinity of the universe and eternity of time. Such entanglement suggests extrasensory perception and telekinetic independence from technology are possible (and that there is truth in practices like astrology), despite modern science's objections which appear to be based on non-unification.

** Plus the inhabitants of countless billions of other worlds that will be colonized by humans who have adapted to, or been genetically engineered to fit, other worlds as they explore the universe of not only the future, but also of what we call the present and of what we term the past.

The famous French scientist Louis Pasteur (1822-1895) did more than invent pasteurization, the use of heat to preserve food by killing germs in it. He disproved spontaneous generation (a theory that life could come from nonliving things like dirt) and showed that living things come only from living things. Amino acids and other

molecules are obviously much more advanced than dirt, but dirt can't develop into amino acids. Similarly, any large lifeform is far more advanced than any amino acid. The consistent conclusion is that it must be impossible for a collection of amino acids and other molecules to *spontaneously* develop into a large lifeform. So ultimately, life (whether Earthly or extraterrestrial) had to originate with supremely advanced biotechnology forming a less advanced lifeform which gradually became more civilized. Evolution brilliantly describes adaptations and minor modifications, but is not the origin of life.

DEATH, INSTINCT, BIRTH AND THE BEATLES

Science, like music, is a creative enterprise. True creativity surely means looking at things we think we've known very well for centuries (like death and birth), and seeing something totally new. I think everything in the universe, as well as in every century, is really only one thing – a unification of gravitation and binary digits. So life and death can't be separate things. What we call death must really be continuation of life. If animals and humans are quantum entangled with every point in space-time, such a condition would allow animals to automatically, or instinctively, do and know things beyond their individual reasoning abilities. Think of the possibilities if this principle is applied to human consciousness. We could acquire knowledge that's presently considered unknowable! We could do things considered impossible! If only life exists, what we term "our lives" has to be continuation of a life we had prior to being born on this planet. Presumably, life before birth is identical to life after death. I think the unknowable and the impossible always exist because the knowledge we gain throughout history, and into future centuries, gradually builds into godlike abilities which transcend the barrier of time apparently only moving forwards. Einstein told us space and time are curved and warped. This allows evolution to be restricted to adaptations and relatively minor modifications within species. Their origin is plausibly explained by human biotechnology from centuries in the future finding its way into the distant past.

In 1964, Paul McCartney wrote "Yesterday", which has been called the best song of the 20th century and the No. 1 pop song of all time. The song was originally recorded by the Beatles for their 1965 album "Help!" Paul has said that, after he wrote it, he felt as though the song existed before and that he had stolen it. This is perhaps the most famous example in modern times of the "déjà vu" we've all experienced at some time. No doubt, it's also closely related to the dreams and inexplicable inspirations that have aided the work of musicians, scientists and inventors throughout the centuries (and continues in the present). Did Albert Einstein explain this phenomenon when he told us that space-time is warped? I've had to conclude that Yesterday did exist already. But it was never somebody else's song. It was the result of a time warp ... and came to the

Paul of the 1960s from a time different from when he had written it (maybe different by hours or a day, maybe years or much longer).

In the liner notes of his final album ("Brainwashed", released the year after his death in 2001), fellow Beatle George Harrison included these words from Hindu scripture (the Bhagavad Gita) –

"There never was a time when you or I did not exist. Nor will there be any future when we shall cease to be."

And in the 1970 song "Instant Karma!", John Lennon (yet another Beatle) wrote "Why on earth are you there When you're ev'rywhere"

(Did he mean

"Why on earth are you seemingly limited to one tiny segment of the Cosmic DVD When you're quantum entangled with the cosmos and occupy the disk's entirety")

[John was a lot better than me at keeping song lyrics short! But at least DVD rhymes with entirety ☺]

Anyway, I think the answer to John's question must be somehow comparable to the laser which reads a DVD. The laser could represent the consciousness in a brain and, just as the laser moves across the surface of the DVD, consciousness moves throughout all multidimensional space-time. If the universe is a Unification, your mind can experience the past or future by temporarily gaining access to the contents of your future brains (putting you "ev'rywhere"). Being distracted by what your senses perceive puts you back in your tiny bit of space where you experience a tiny fraction of the eternal present (you're "there").

Also see **WARP 10 AND EXPLORING THROUGH ENTANGLING**.

I don't know if we have no free will as in the paragraph about the cosmic DVD, or very little free will as in the paragraph about reality waves. I suspect the answer is "very little". Even if we live in a cosmic DVD, DVD's don't spontaneously appear out of nothing – people have to produce, direct, write, compose music, and act in them. Either way; though I'm responsible for writing this article (and its mistakes, as well as good points), I had to write it. It's my destiny. If I didn't write it for some reason; anybody else with enough curiosity and imagination regarding its topics – plus sufficient persistence and spare time - could have typed it.

GRAVITY

Some of the ocean waves passing an island are refracted - when they enter shallow water, they're refracted by the mass of the seabed. They change direction and head towards the island, breaking onto its beaches. Similarly, gravitational waves are refracted and focus on the centre of a mass. Exerting a force on that centre (a push) in partnership with the extremely energetic electromagnetic waves they produce, the gravitation builds up more mass concentrically with the centre to create a subatomic particle or a planet. Newton's mathematics describes the gravitational force very well even though he describes gravitation as an attractive pull. Einstein says it's a push. To quote from the article "Gravitation" by Robert F. Paton, MS PhD in "The World Book Encyclopedia" (Field Enterprises Educational Corporation, 1967): "(Bodies) merely follow the line of least resistance through the hills and valleys of the curved space that surrounds other bodies. Objects that fall to the earth, for example, are not "pulled" by the earth. The curvature of space time around the earth forces the objects to take the direction on toward the earth. The objects are pushed toward the earth by the gravitational field rather than pulled by the earth."

As the refracted gravitational wave passes, part of it is diverted by mass (the more mass, the more gravity is diverted; though the International Space Station weighs around 400 tons, it has tiny mass compared to any planet and produces so-called weightlessness while black holes – ranging from about 3 solar masses for the smallest stellar variety to billions of solar masses for supermassive black holes in galaxy centres – have so much mass and diverted gravity that light pushed into them may be unable to escape).

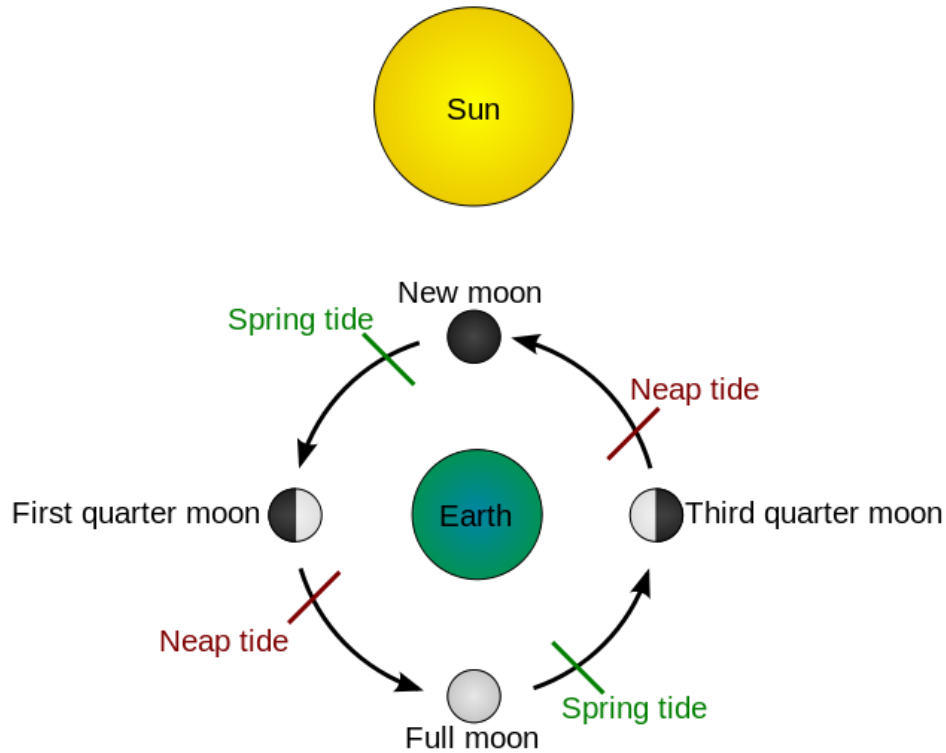
Entering a black hole on anything except a very special pathway into it is predicted to cause you to be shredded into long, thin pieces – a process called spaghettification, and caused by the black hole's tidal forces (differences in its gravitational effect on an object's nearer and more distant ends). The relatively insignificant gravitational forces associated with Earth push your head and feet down without any noticeable difference, though the difference does exist. Experimenters have shown that a clock on the ground floor of a building 25 metres tall runs more slowly than one near its top, and attributed the difference to gravitational effects ("The Cosmos", a 1988 book in the series "Voyage Through the Universe": Time-Life Books Inc., p.50). Assuming you fall feet first - the extreme gravitational waves associated with a black hole push your head towards the hole with tremendous force but are vastly magnified by addition of many more waves in the 5 or 6 feet between one end of you and the other. This results in your feet being much, much closer to the black hole's centre and you become a long, thin strand of "space-ghetti" ☺

How, then, can repelling or pushing gravity account for the apparent attraction of ocean tides towards the Moon? I believe such an idea of gravity requires the idea of 17th-century scientists Isaac Newton and Johannes Kepler that the moon causes the tides, to be joined with Galileo's idea that the Earth's movements slosh its water. According to "Galileo's Big Mistake" by Peter Tyson - Posted 10.29.02 (<http://www.pbs.org/wgbh/nova/earth/galileo-big-mistake.html>) -

"If a barge (carrying a cargo of freshwater) suddenly ground to a halt on a sandbar, for instance, the water pushed up towards the bow then bounced back toward the stern, doing this several times with ever decreasing agitation until it returned to a level state. Galileo realized that the Earth's dual motion—its daily one around its axis and its annual one around the sun—might have the same effect on oceans and other great bodies of water as the barge had on its freshwater cargo."

Gravity's apparent attraction can be summarized by the following - gravitation is absorbed into wave packets and the inertia of the gravitons (united with far more energetic photons) carries objects towards Earth's centre at 9.8 m/s or 32 ft/s. The mass of the oceans on Earth is estimated at nearly 1.5 billion cubic kilometres ["Ocean Volume and Depth" – Van Nostrand's Scientific Encyclopedia, 10th edition 2008]. All this water is being pushed towards Earth's centre at 32 feet per second every second. But the seafloor prevents its descent. So there is a recoil, 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 previous paragraph's alignment of Sun, Earth and moon therefore refers to their being lined up where the gravitational current is greatest (in the plane where planets and moons are created) - and to more of the gravitational waves travelling from the outer solar system being captured 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 feet per second per second). At the neap tides of 1st and 3rd quarter; the sun, earth and moon aren't lined up but form a right angle and our planet has access to more 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 greater suppression causes neap tides which are much lower than spring tides.



(figure number 1 - This "tide schematic" is a public domain image from https://en.wikipedia.org/wiki/File:Tide_schematic.svg)

After absorption (whether in oceans, in space, or anywhere else), most of the gravity waves are used in building and refreshing mass and forces. The remnant is re-radiated from stars, planets, interstellar gas and dust, etc. It's radiated as gravitational waves (a Gravity Wave Background, challenging the idea that the traditional form of Cosmic Inflation was necessary to generate gravitational waves) which have lost most of their energy or strength during formation of mass and electromagnetic/strong nuclear/weak nuclear forces (returning to the weak strength we're familiar with). Maybe the gravitational force is split into the other 3 forces by means of quantum gravitational lensing, whose non-subatomic-scale counterpart can split the image of an astronomical object into several images. Since gravity can produce electromagnetism, it's also radiated as all types of electromagnetic waves – including an infrared background whose heat output exceeds that of the stars alone, in addition to a microwave background. The latter challenges the idea that existence of the cosmic microwave background proves the universe began with the traditional Big Bang. The basic problem with science's understanding of the Big Bang seems to be that everyone believes time only exists in one version (see 3 time dimensions/5 space dimensions, and Professor Itzhak Bars, in **COMPLEX NUMBER PLANE**).

If a star only received the input of gravitational waves from deep space entering it, there would be no limit to its potential growth. Since it also radiates mass-forming gravitational waves, there is a limit to the growth. 99% of the solar system's mass / gravitational waves / gravity are associated with our star, so the gravitational push on Earth from its sphere may be slightly greater than the push from the waves originating in deep space. The waves from deep space are a possible unrecognized contributing factor to the Pioneer anomaly, where the Pioneer spacecraft near the solar system's edge are a few thousand kilometres closer to the Sun than predicted. In the end, our planet's orbit would be growing slowly larger. According to "Secular Increase of Astronomical Unit from Analysis of the Major Planet Motions, and Its Interpretation" in "Celestial Mechanics & Dynamical Astronomy", Volume 90, Issue 3-4, 2004, pp. 267-288 by Krasinsky, G.A. and Brumberg, V.A.; the distance between Sun and Earth is growing by approx. 15 centimetres per century. The two authors attribute this increase of the Astronomical Unit (AU – the average distance between Earth and the Sun) to dark energy. As this article has shown, the increase may be gravitational.

Gravity's a push and the reverse motion of complex gravity causes complex gravity to act in the reverse manner - as a pull. In real space-time, the Sun lies in a depression or valley, and the Earth rolls towards it. We could say gravity pushes ... gravitational waves push ... Earth to the Sun. But in complex space-time, the Sun instead sits on a high hill, and the Earth rolls away from it. We could say complex gravity pulls ... complex gravitational waves pull ... Earth away from the Sun (like science fiction's tractor beam[^]). The depression of real gravity and the hill of complex gravity fit together like closed, positive curvature of a sphere neatly fits into the open, negative curvature of a saddle (see the diagram of a figure-8 Klein bottle, and its caption, in **STEADY STATE TOPOLOGY**). Through their union, they ultimately cancel each other to produce the flatness of infinity.^{^^} In regard to the increasing AU, speaking of pushing gravity and its waves is accurate. So instead of attributing increase of the Astronomical Unit to dark energy, it can be attributed to the push of gravity and gravitational waves or the pull of complex gravity and complex gravitational waves. In regard to the increasing AU, speaking of pushing gravity and its waves is accurate. So instead of attributing increase of the Astronomical Unit to dark energy, it can be attributed to the push of gravity and gravitational waves or the pull of complex gravity and complex gravitational waves.

^{^^} Before it becomes infinite in size with corresponding flat curvature, the universe's shape is dictated by the shape of the figure-8 Klein bottles composing it ie both bottle and cosmos are roughly spherical and possess closed, positive curvature on small scales. The negative curvature of open, saddle-shaped space is also integrated into the bottles and cosmos. This makes it possible for an "imaginary" space – and thanks to the indissoluble union of the various forms of space and time – an imaginary time to extend 90 degrees from the "surface" of real (and complex) space-time, rather like the pommel

protruding from the front of a saddle. Imaginary time's existence is no longer confined to mathematics but now has physical being. This article relates bosons (force-carrying particles) to fermions, or matter particles, through binary digits and the Mobius strip. You have to go around this strip twice to arrive at your starting point - and matter particles have quantum spin described as $\frac{1}{2}$, which means they must be turned through two complete revolutions to look the same. Mobius strips are related to matter particles in the previous sentence and therefore exist on the subatomic, or quantum, scale. Joining two Mobius strips (or Mobius bands) forms a four-dimensional Klein bottle. Thus, the size of Figure-8 Klein Bottles would also be quantum.

When Isaac Newton described gravitation as a pull attracting objects, was his genius unconsciously reaching into the 21st century and anticipating complex gravity? Newton's idea of gravity acting instantly across the universe could be explained by complex gravity's ability to travel back in time, and thereby reach a point billions of light years away not in billions of years, but apparently instantly. It could even arrive at that point sooner than instantly. However, that is not a violation of cause and effect. The complex gravitational wave cannot affect a spot at any distance until it begins its journey ... until it begins travelling back in time.

^ "Star Trek style 'tractor beam' created by scientists"

(<http://www.bbc.com/news/uk-scotland-tayside-central-21187598> - 25 January 2013) says, "A real-life 'tractor beam', which uses light to attract objects, has been developed by scientists." It's only used on microscopic objects. Dr Tomas Cizmar, research fellow in the School of Medicine at the University of St Andrews, says

"Eventually this could be used to separate white blood cells, for example. Unfortunately there is a transfer of energy. On a microscopic scale that is OK, but on a macro scale it would cause huge problems. It would result in a massive amount of heating of an object, like a space shuttle. So trapping a space ship is out of the question."

The technology was improved. **"Physicists create reversible laser tractor beam"** (<http://www.cnet.com/news/physicists-create-reversible-laser-tractor-beam/> - October 19, 2014) says, "Physicists have built a tractor beam out of lasers that can both repel and attract objects across distances 100 times farther than previously possible. (It) was able to move particles 0.2 mm in diameter distances up to 20 cm (7.87 in)".

This is not the only type of tractor beam. **'Tractor beam' grabs beads with sound waves** (<http://www.bbc.com/news/science-environment-34647921> - 27 October 2015) says, "Engineers in the UK have developed a system that can grab, hold and move small objects without touching them, using 'holograms' made of sound waves."

Sound doesn't travel in space, and the lasers will take forever to reach the size of spaceships (if they ever reach that scale). So if the goal is to trap a space shuttle later this century, complex gravitational waves might be the way to go.

BINARY STARS PLUS CORONAL MASS EJECTIONS

When I read the article "Astrophysics: Illuminating brown dwarfs" by Adam P. Showman - Nature 533, 330–331 (19 May 2016), one sentence in particular transfixed me - "The gravity from the white dwarf distorts the shape of the brown dwarf and leads to a trickle of mass from the companion, which slowly accretes onto the white dwarf." Looking at this from a new perspective gives a "new" understanding of the force of gravity. I put the word new in quotation marks because it isn't really new - just an updating of Newtonian gravity that takes relativistic gravity into account.

Now for gravitational interaction between the white and brown dwarfs: Recalling the interactions regarding Earth's ocean tides, both dwarf stars (and their centres) could be the destination of incoming gravitational waves. Their surfaces would recoil from their denser cores. As stated in the paragraph about the International Space Station and black holes: the more mass, the more gravitational waves are diverted. The recoil from the more massive white dwarf's core is suppressed by the far greater wave activity reaching it, and is unnoticeable. The brown dwarf receives far fewer suppressing waves and recoil causes part of it to fly into space (actually, space-time) and, because "the objects are so close that they orbit each other every 78 minutes", a "trickle of mass from (it) slowly accretes onto the white dwarf." So Newton's statements that gravity depends on the masses of objects and the distance between them is conserved.

Part of the brown dwarf flying into space-time and a trickle of mass from it accreting onto the white dwarf is reminiscent of a coronal mass ejection (CME), a large release of plasma (ionized gas) from the Sun. CMEs often originate from active regions on the Sun's surface, such as groupings of sunspots. Recent research has shown that magnetic reconnection (the sudden rearrangement of magnetic field lines when two magnetic fields are brought together) is closely associated with CMEs – see American Physical Society. "Coronal mass ejections: Scientists unlock the secrets of exploding plasma clouds on the Sun." ScienceDaily. ScienceDaily, 14 November 2010. <www.sciencedaily.com/releases/2010/11/101108071925.htm>. Reconnection releases energy stored in the magnetic fields.

SUNSPOTS AND MINI ICE AGES

"Sunspots form because the sun's equator rotates more quickly than its poles. Being "frozen" into its gases, the magnetic field lines of the sun stretch, twist, are drawn out into loops and erupt through the sun's surface, forming sunspots. Recent observations from the Solar and Heliospheric Observatory [SOHO] using sound waves traveling below the Sun's photosphere [local helioseismology] have been used to develop a three-dimensional image of the internal structure below sunspots. These observations show that there is a powerful downdraft underneath each sunspot, forming a rotating vortex that concentrates the magnetic field and creates intense, heat-trapping magnetism. The distorted magnetic loops don't have to break through the sun's surface or photosphere but can remain within, forming the rotating vortex. (The Maunder Minimum*, and other mini ice ages, could be due to the heat-trapping magnetic field lines of the sun not erupting through the sun's surface, and not forming sunspots.)

*The Maunder Minimum of observations of extremely low sunspot activity from 1645 to 1715 (named after the solar astronomer Edward W. Maunder [1851-1928]) coincided with the middle – and coldest part – of the Little Ice Age during which Europe and North America and perhaps much of the rest of the world saw glaciers advance and rivers freeze.

CORONAL HEATING PLUS BICEP2

Whether they break through the sun's surface and form a sunspot or not, the magnetic loops are exposed to incoming gravitational waves. Faraday's Law says an induced electric current is produced by a changing magnetic field. The theory of supersymmetry (SUSY) attempts to relate the two classes of elementary particles – bosons (force-carrying particles) and fermions (particles of matter). This article modifies that as-yet-unsuccessful theory and relates bosons to fermions through binary digits and the Mobius strip. You have to go around this strip twice to arrive at your starting point - and matter particles have quantum spin described as $\frac{1}{2}$, which means they must be turned through two complete revolutions to look the same ("A Brief History of Time" by Stephen Hawking – Bantam Press). So a changing magnetic field could produce an induced current, not of electrons in a conductor, but of infrared photons travelling along magnetic field lines. The inductor of that infrared current would be gravitational waves causing magnetic reconnection[^] and release of energy stored in the magnetic fields. This energy can flow along magnetic field lines and heat the corona (the Sun's outer atmosphere)[^] or, via $E=mc^2$ solved for mass ie $m=E/c^2$, take the shape of CMEs or gas flowing from one binary star to another (a binary star is a system of two stars in which one star revolves round the other or both revolve round a common centre).

Physically, the process is described as the gravitational-electromagnetic reaction (from incoming waves interacting with magnetic fields in sunspots) producing matter. And if gravitation combined with electromagnetism produces matter, the inquiring mind must wonder if the 2 nuclear forces (the strong and the weak) operating in matter could also be their products. Gravity and electromagnetism would then be the only fundamental forces. Gravity does not need to travel – the gravitational field already exists everywhere. Nevertheless, any disturbance (from the waving of your hand to explosion of a supernova) will send ripples called gravitational waves through the universe. The universe is also a giant electromagnetic field. Electromagnetism is ubiquitous and doesn't need to travel, but any disturbance sends out electromagnetic waves. In this way, photons in the giant electromagnetic field which aren't travelling because of disturbances might be regarded as "already stopped". Electromagnetism's property of existing everywhere naturally means things like microwaves must be everywhere, and there would be a Cosmic Microwave Background whether the Big Bang and Inflation occurred or not. The electromagnetic field's superposition on the gravity field also means gravitational imprints would be found in the microwave background by experiments like BICEP2.

^ The proposed ability of gravitational waves to cause magnetic reconnection is twofold: a) the observation problems with the magnetic dynamo theory (look ahead to the second-last paragraph of **PLANETARY MAGNETIC FIELDS**) suggest that the cause of reconnection does not lie solely with the supposed product of dynamos ie magnetic fields, and b) electromagnetism may not be dissimilar to gravitation (in the sense of photons and gravitons being different compositions of 1's and 0's). See **GSC (GRAVITATIONAL SUPER CONDUCTIVITY) AND COSMOLOGY**.

^^ Wikipedia's article "Corona" says, *"The high temperatures require energy to be carried from the solar interior to the corona by non-thermal processes, because the second law of thermodynamics prevents heat from flowing directly from the (cooler) solar photosphere, or surface, at about 5800 K (degrees Kelvin), to the much hotter corona at about 1 to 3 MK (parts of the corona can even reach 10 MK)." MK = million Kelvin.* Transmission of energy along magnetic field lines does not involve direct flow and is a non-thermal process. The most likely explanations of coronal heating are the wave heating and magnetic reconnection theories, though neither theory has been able to completely account for the extreme coronal temperatures. This article combines elements of both – speaking of the energy from gravitational waves causing magnetic reconnection and release of energy stored in the magnetic fields.

THE GEODYNAMO AND PLANETARY MAGNETIC FIELDS

People are taught that the cause of Earth's magnetic field is the geodynamo, also called the magnetic dynamo theory. The heat from the solid inner core puts the liquid outer core in motion, and the movements of the outer core's electrically conducting fluids (such as molten iron) generate the planet's magnetic field. Electrically conducting fluids occur in the Sun, other stars and most planets – and are the scientifically accepted mechanism for magnetic fields. However, the planet Mercury suggests this process is not entirely accurate. Is it possible to propose a plausible alternative? The proposal here has both Earthly and Space components - it is still linked to the nature of, and motions in, the core plus it refers to the phenomenon of zero electrical resistance known as superconductivity as well as the recent discovery of gravitational waves.

Incoming gravitational waves release electromagnetic energy stored in sunspots. This is converted into coronal heating, or by $m=E/c^2$ into CMEs and gas streaming between binary stars. The metals in Earth's core are associated with plenty of electromagnetic energy eg infrared waves associated with the core's heat. Gravitational waves (involved in production of the core's mass) compress the electric components in these waves, causing nearly all the magnetic components to be expelled (like superconductivity's Meissner effect) and form our planet's magnetic field. This process links the field to the nature of, and motions in, the core. Also, the Meissner effect of superconductivity plus the gravitational waves – or, electromagnetism plus gravitation - serves as an important paradigm for the generation mechanism of a mass. Wikipedia's article "Higgs mechanism" says,

"In the Standard Model of particle physics, the **Higgs mechanism** is essential to explain the generation mechanism of the property "mass" for gauge bosons. Without the Higgs mechanism, or some other effect like it, all bosons (a type of fundamental particle) would be massless, but measurements show that the W^+ , W^- , and Z bosons actually have relatively large masses of around $80 \text{ GeV}/c^2$." Combine it with the article's version of SUSY and masses for fermions – particles of matter – become possible.

An objection to this alternative to the magnetic dynamo is this sentence: High temperature superconductors are known for not displaying the Meissner effect. There are three plausible paths to loopholes concerning the objection –

1) "Para-meissner effect in high-temperature superconductors" by Keshav N. Shrivastava ("Solid State Communications" - Volume 90, Issue 9, June 1994, Pages 589-594), and

2) According to the article "superconductivity" in "Penguin Encyclopedia Edited by David Crystal" (Penguin Reference Library, 2006): this is "the property of zero electrical resistance, accompanied by the expulsion of magnetic fields (the Meissner effect),

exhibited by certain metals, alloys, and compounds when cooled to below some critical temperature, typically less than -260 degrees C. Both effects must be present for true superconductivity."

3) "All about superconductivity" (<http://supraconductivite.fr/en/index.php?p=supra-levitation-meissner-more>) states, "The superconducting state is characterized by two properties: no electric resistance ($R = 0$) and no magnetic field ($B = 0$). Those are two independent properties: neither is the consequence of the other."

Since both of the independent zero-resistance and Meissner properties need to be present for true superconductivity to exist, Earth's core can generate a magnetic field via the Meissner effect (**technically, a high temperature para-meissner field**) without being a superconductor.

"Magnetic Fields" (<http://www.astronomynotes.com/solarsys/s7.htm>) says, "Recall from the [beginning of the Electromagnetic Radiation chapter](#), that a magnetic field can be produced by circulating electrical charges. A theory called the magnetic dynamo theory says that the magnetic field is produced by swirling motions of liquid conducting material in the planet interiors. Materials that can conduct electricity have some electrical charge that is free to move about. Such materials are called *metallic* and are not necessarily shiny solids like copper, aluminum, or iron. Jupiter and Saturn have a large amount of hydrogen that is compressed so much it forms a liquid. Some of that liquid hydrogen is in a state where some of the electrons are squeezed out of the atoms and are free to move around."

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

Perhaps this section of ***INTEGRATING IMAGINATION WITH REALITY*** will supply a plausible alternative to the magnetic dynamo theory and not overlook a crucial process. What does this alternative say about magnetic-field reversals? As motions in planetary cores vary, the polarity of fields can vary because gravity waves compress relocated portions and change orientation of the expelled magnetism.

MAGNETARS AND BLACK HOLES

In our Milky Way galaxy's Westerlund 1 star cluster, there's a magnetar - neutron star with an extremely strong magnetic field - whose progenitor was a star about 40 times the mass of the Sun. This behemoth should have collapsed to form a black hole, not a magnetar. The answer to this puzzle seems to lie with a companion star called Westerlund 1-5 that is now escaping the cluster. Mass was transferred from the magnetar progenitor to Westerlund 1-5, allowing its companion to shrink to a size that allowed a magnetar to be born instead of a black hole. ["A VLT/FLAMES survey for massive binaries in Westerlund 1" by J. S. Clark, B. W. Ritchie, F. Najarro, N. Langer and I. Negueruela - A&A ("Astronomy & Astrophysics") 565, A90 (2014)].

This magnetar could be explained as the reverse of superconductivity/Meissner (SCM). In SCM, electromagnetism's electric component is compressed and the magnetism expelled. Referring to the diagram in **COMPLEX NUMBER PLANE** gives more detail about compression – when an electric wave is diverted from the x-axis to the y-axis representing the 4th spatial dimension, there is no wave motion in real time. This means there can be no amplitude or frequency except at the point marked 0 - the electric wave is "flattened" by imaginary time and gives rise to superconductivity because the electric component no longer follows a long, curved path in Euclidean geometry. Its path is now linear and follows the shortest distance between two points.

In the magnetar, magnetism is compressed[^] and the electric field is expelled. Just as mass was transferred from the magnetar progenitor to Westerlund 1-5 and is now escaping the cluster, much of the electrical component may have accompanied the mass and is leaving with the companion. The universe doesn't consist of space-time and nothing else. Everything else in the **COMPLEX NUMBER PLANE**, including imaginary time, infuses every quantum of it. Some unknown orientation^{^^} of magnetars to each dimension in this complex seems to allow their compressed magnetism to avoid losing power (compression is due to incoming gravitational/electromagnetic waves). Instead, magnetars' magnetic fields become intensely strong: perhaps by expanding to occupy much of the "length" of the y-axis representing imaginary time. When that strength is detected on Earth, it would appear to take place in ordinary space-time because space-time is all we know. Multidimensionality is unproven, even though it may be everywhere and everywhen.

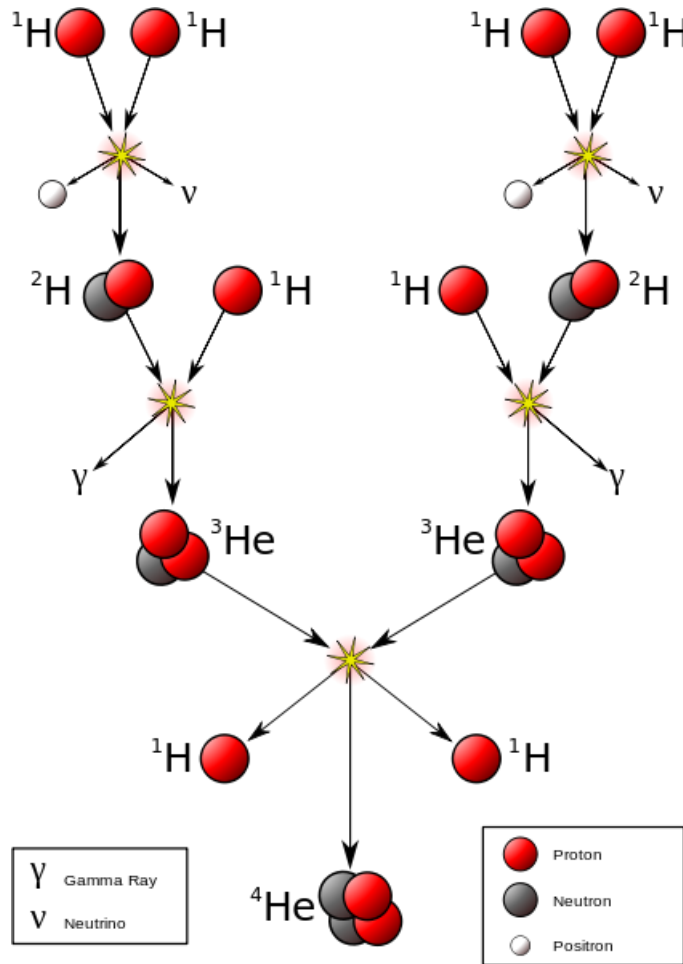
^ In becoming superconductive, the electric wave is compressed to point 0 ie it's concentrated there and becomes more efficient. In magnetars, the magnetic wave is concentrated at 0 and its greater efficiency in this case equates with extreme strength.

^^ Possibly, this orientation is related to quantum spin, which might plausibly be explained by particles and space mutually affecting each other. According to General Relativity, matter causes a gravity field by its mass creating depressions in space that can be pictured as a flexible rubber sheet. Space could affect particles through its curvature (gravity) infiltrating and helping to form particles. In this case, orientation to the axes of wave motion described by the **COMPLEX NUMBER PLANE** would depend on the warping or distortion of the waves composing particles.

The (again unknown) multidimensional orientation of black holes* may avoid siphoning or leakage of their magnetic, electrical or gravitational properties into places like imaginary time. All their qualities stay in known space-time, making them incredible concentrations of gravity. Electromagnetism bestows the property of charge on black holes, and combining electromagnetism with gravity might be responsible for their mass. As **PLANETARY MAGNETIC FIELDS** said, "... the Meissner effect of superconductivity plus the gravitational waves – or, electromagnetism plus gravitation - serves as an important paradigm for the generation mechanism of a mass."

* If orientation depend(s) on the warping or distortion of the waves composing particles, black holes composed entirely of gravitational and electromagnetic waves would not be composed of particles of matter. Their particles would be gravitons and photons.

REVISED HYPOTHESIS ABOUT PROTON-PROTON REACTION



Science's presently-accepted version of pp chain (**Attribution: [Borb](#)**) In the core of stars the size of the Sun, or smaller, energy is released through sequences of nuclear reactions that convert hydrogen into helium. The primary reaction is thought to be the fusion of two protons, emitting an electron neutrino.

Revised hypothesis -

Modifications to the first and second parts of this process are proposed. In the first, one of the protons absorbs virtual particles which increase mass and account for its transformation to a neutron. In the second, tritium forms before decaying into helium-3 (allowing increased emission of electron neutrinos to reduce the solar neutrino problem). Tritium is formed in nuclear reactions ("Penguin Encyclopedia's "tritium" article) – and the Sun uses nuclear reactions.

The first step in the proton-proton reaction involves the fusion of two protons, releasing a positron and an electron neutrino as one proton changes into a neutron. The mass[^] of the proton is 938.27 MeV/c^{^2} while the neutron is 939.57 MeV/c^{^2}. The proton transforms into a more massive neutron by absorption of virtual particles. A virtual particle is not a particle at all - it refers to a disturbance in a field eg gravitational or electromagnetic. They are equivalent to energy pulses (0).

[^] Particle mass is calculated from Einstein's $E=mc^2$. When solved for mass, it equals $m=E/c^2$. MeV (Mega, or one million, electron Volts) is actually a unit of energy ... and that is divided by c^2 (the velocity of light squared).

Neutrons absorb these virtual particles directly from their environment. This absorption destabilizes the balance between forces in the atomic nucleus and can lead to an atom of radioactive uranium-235 which possesses 92 protons and, thanks to mass increase via absorption of the energy of virtual particles, 143 neutrons.[^] Detailed models of decay normally point to transformation of quarks within protons and neutrons. But as a well-known book [1] puts it, "It is certainly possible that some alien beings ... would make the same experimental observations that we do, but describe them without quarks." So let's describe observations not with quarks, but with a more basic quantum process that says all particles are comprised of virtual particles.

[^] Regarding the question of length contraction in Special Relativity - Einstein wrote in 1911, "It doesn't 'really' exist, in so far as it doesn't exist for a co-moving observer; though it 'really' exists, i.e. in such a way that it could be demonstrated in principle by physical means by a non-comoving observer." (Einstein, Albert [1911]. "Zum Ehrenfestschen Paradoxon. Eine Bemerkung zu V. Varičaks Aufsatz". *Physikalische Zeitschrift* 12: 509–510) This would apply to the mass increase also predicted by the Special Relativity Theory i.e. in atoms with high atomic number and high nuclear charge, orbiting electrons that attain velocities corresponding to a considerable fraction of the speed of light ["Lawrencium bridges a knowledge gap" by Andreas Türler - *Nature* **520**, 166–167 (09 April 2015) doi:10.1038/520166a] both do and don't undergo mass increase. Mass increase really exists and "could be demonstrated in principle by physical means by a non-comoving observer" (by experiments performed by scientists). In this case, Relativity's implications for the properties of atoms would cause some inner orbitals to contract and, in turn, other orbitals to expand. This would account for gold's yellow colour and mercury being liquid at room temperature ["Lawrencium bridges a knowledge gap"]. At the same time, mass increase doesn't really exist "for a co-moving observer" i.e. a scientist moving along with an electron would see the particle's energy content remain identical (there'd be no mass increase), and wouldn't see or detect any change in the energy levels of the electron orbits (they wouldn't contract or expand). In

the case of an electron having no mass increase, the increase would take the form of a neutron.

According to Hans Bethe, who was awarded the Nobel Prize in 1938 for his work on stellar nucleosynthesis [2] - the deuteron formed above is, in the second step of the reaction, fused with another proton to form helium-3 (emitting a gamma ray).

It's shown above how a proton can transform into a neutron. If this recurs at the second stage of the Sun's reaction, the result wouldn't be He-3's two protons plus one neutron. It'd be one proton plus two neutrons i.e. tritium. Once more, an electron neutrino is emitted (because of the instability caused by introducing absorbing neutrons).

Experiments found that the number of electron neutrinos arriving from the Sun was between one third and one half the number predicted. This became known as the solar neutrino problem and is largely or completely resolved by emission of twice as many electron neutrinos. The number could then match the prediction. However, the number of detected electron neutrinos would still be lacking because of neutrino oscillation (electron neutrinos converting into muon neutrinos and tau neutrinos during flight) [3]. There are a number of nuclear as well as non-nuclear processes that produce gamma rays. Tritium is known to decay into helium-3 (I suggest it's radioactivity is due to introduction of two virtual-particle-absorbing neutrons and the consequent instability).

Finally, in agreement with accepted theory: two helium-3 atoms fuse, forming an atom of helium-4 and emitting two protons that allow the proton-proton reaction to begin anew.

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NEGATIVE ABSOLUTE TEMPERATURE, LIFE AND COSMIC UNIFICATION

To give a brief explanation of negative temperature, here's what Simple English Wikipedia says on the subject (https://simple.wikipedia.org/wiki/Negative_temperature):

"In physics, absolute zero (0°K) is one of the coldest temperatures. At that point, subatomic particles stop moving (entropy is at its minimum). Certain things can reach temperatures below absolute zero, known as negative temperatures. This is very difficult to do (the FAQ below says laser beams, a magnetic field and a vacuum chamber are employed), and only very small objects can reach negative temperatures. It might seem absurd, but things at negative temperatures are actually hotter than things at positive temperatures (above absolute zero). If something with a negative temperature comes in contact with a positive-temperature object, heat will go from the negative object to the positive. This is because temperature is a trade-off between energy and entropy. If you add energy to a positive-temperature object, it will increase in entropy. If you add energy to a negative-temperature object, it will decrease in entropy. Many objects cannot achieve negative temperatures, because adding energy to them will increase their entropy. Only very small things discussed in quantum mechanics can reach this state." I also refer you to Frequently Asked Questions by two authors of the original paper (<https://www.quantum-munich.de/research/negative-absolute-temperature/>). The FAQ has a link to their paper at the top of the page.

"Energy and Order in Biological Systems" (<http://hyperphysics.phy-astr.gsu.edu/hbase/thermo/bioentropy.html>) asks: "The concept of entropy and the second law of thermodynamics suggest that systems naturally progress from order to disorder. If so, how do biological systems develop and maintain such a high degree of order?" Could this high degree of order result from living things being negative-temperature systems that have gravitational and electromagnetic energy constantly added to them? As Wikipedia says in the quote above: "If you add energy to a negative-temperature object, it will decrease in entropy" (entropy may be regarded as disorder). The statement "Only very small things discussed in quantum mechanics can reach this state" would then be inadequate. Living things, as well as quantum things, would decrease in entropy when energy is added. In other words, the quantum and macroscopic worlds are united.

"If something with a negative temperature comes in contact with a positive-temperature object, heat will go from the negative object to the positive." That means the bodies of all living organisms can sooner or later pass all their energy to the environment - their bodies will wear out and perish if not refreshed by energy. The fact that life also has positive temperature suggests that life and the Universe (life's environment) are not separate in a physical sense but are united. They could merely be different manifestations of one gravitational-electromagnetic field. It also implies that life doesn't need to ever end. In the beginning of this article, I referred to never-ending numbers such as pi and how they might be built into the fabric of space-time via virtual particles being energy pulses that result in binary digits which encode pi, e, $\sqrt{2}$ etc. If endless transcendental numbers are built into the basic structure of the Universe, isn't it possible that the Cosmos extends infinitely in space and, since space can never exist apart from time, that it reaches eternally into the past and eternally into the future? And if life is not physically separate from its cosmic environment, our lives would never end (our bodies might, but even those might have the potential to go on forever).

In the concluding chapters of "Contact" by Carl Sagan (Century Publishing, 1986), much is devoted to pi. True, it's a novel - a work of fiction. But as the front flap says, "It is a novel which carries the reader to the stars, without ever making us doubt that this is the way it will be." Page 430 tells us, "The universe was made on purpose ... As long as you live in this universe, and have a modest talent for mathematics, sooner or later you'll find it (pi being in the fabric of space) ... There is an intelligence that antedates the universe." But don't rush off to church just yet! This intelligence may well be home-grown. In the TV program "Custom Universe – Finetuned For Us?" (Australian Broadcasting Corporation's "Catalyst", August 29 2013), 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" (as well as, this author thinks, the electronic energy pulses known as virtual particles) "that allow for the existence of minds in the first place. Sounds bizarre, but quantum physics actually allows that kind of thing."

True to the nonlinear nature of time (it's arranged in Einstein's warps and curves), it's also correct that gravity is a product of electromagnetism – in the form of electronic pulses of energy from computers connected to sources of electrical power manifesting as virtual gravitons. Does this mean gravitation and electromagnetism constitute 2 fundamental forces, and that only the strong and weak nuclear forces are "expelled" from fundamentalism by gravitational superconductivity? If time was linear and always operated in a straight line; the origin of life, the universe and everything must be with God or be the result of quantum fluctuations and evolution. But since time is nonlinear, origins can be with anybody who has computers (even humanity).

There may be an explanation of life, the universe and everything which doesn't involve time travel and nonlinear time. A computer simulation of the universe that's made of 1's and 0's might generate infinity because some of the numbers in the simulation could be infinitely long numbers like pi and e. Pi, plus things like the Mobius and Klein, would be built-in to the cosmos (including electrons and quantum phenomena), like it says in Carl Sagan's "Contact". Admittedly, Dr. Sagan's book is a work of fiction, but its reference to pi could still be included in a simulation. The simulated universe would then incorporate spatial and temporal infinity - and could include immortality if the programmer(s) wanted it to. Comprehending the idea of infinity really is a very hard concept to wrap your head around. If we achieved this, we'd understand the simulation we built (and would, because of the quantum-mechanical rules present in our cosmos and also programmed into this simulated universe, be entangled with it ... and part of it). What would it be like to stand outside this infinite, simulated universe which I called mini-infinity: and outside its extra dimensions, too. Part of my brain is saying this just isn't possible. But another part is fascinated by the idea of stepping outside the infinite.

Entangling the "real" universe with its computer simulation

Buddha, founder and leader of the Buddhist religion, believed each person must find peace and freedom from suffering by following what is called the Noble Eightfold Path. Presented here is an Eightfold Path to "Using a certain type of computer simulation of the Universe to completely understand the real Universe". A line or two about each Universal path is in this introduction. It's up to the reader to decide how noble they are.

Admittedly, this Universal Eightfold Path may sound too speculative for some. But there's a place for speculation in cosmology. The universe is too big to put in a lab so experiments can be performed on it. The best we can do is build a simulation of it in that lab which is the result of imagination, intuition and speculation grounded in the laws of science. Hopefully, the programmed model will agree with what is known and offer plausible explanations of the unknown.

(1) Create binary digits (bits) with computer energy-pulses that are divided into smaller units and call the fractionated[^] pulses "virtual particles". Then create mass and matter by causing the virtual particles to interact.

^ A famous book relates the virtual photons which can never be directly detected to the real photons that are detectable as waves of light. [Hawking, Stephen (1988) - "A Brief History of Time", p.69. Bantam Press] Fractionation may be necessary to differentiate detectable, and presumably more energetic, "real" photons from undetectable (less energetic?) virtual photons. Consider division of matter and division of energy. Any object you look at can a) be divided into atoms and molecules; then b) subdivided into protons, neutrons and electrons; then c) the protons and neutrons of the atomic nucleus can be further subdivided into quarks. At this fundamental quark level, some words from the book "The Grand Design" are pertinent - "It is certainly possible that some alien beings ... would make the same experimental observations that we do, but describe them without quarks." [Hawking, Stephen and Mlodinow, Leonard (2010) - "The Grand Design" p.49. Bantam Press]. Following the example of matter, energy like a sunbeam or gravity wave has now a) been divided into their quanta (supposedly smallest units) of the photon and still hypothetical graviton. Is it possible that the photon could b) be fractionated (subdivided) into virtual photons? Finally, all virtual particles might c) be further subdivided into electronics' bits of 1 and 0. This may be the most fundamental level, where the same experimental observations might be described with different methods eg as Hawking radiation's creation and annihilation of photons, or with the base-2 mathematics of bits.

(2) Build simulation of universe using bits, Möbius strips and figure-8 Klein bottles.

(3) Make simulation infinite and eternal by including some infinitely-long numbers like pi, which are encoded by the bits.

(4) As computer hardware and software develop, the simulated cosmos has more and more decimal places of pi built into its structure and function. Modern computers have calculated pi to over 10^{13} (13 trillion, 300 billion) digits [A. Yee (2016): "y-cruncher - A Multi-Threaded Pi-Program": <http://www.numberworld.org/y-cruncher>]. Suppose this outputted number is fed back into the simulation as input. This gives an approximation of infinity/eternity. Repeatedly looping later calculations from output to input continuously refines the approximation, resulting in what mathematician Georg Cantor called "an infinity of infinities" over a century ago. [W. Purkert, H. Ilgands (1985) - "Georg Cantor: 1845–1918". Birkhäuser. ISBN 0-8176-1770-1] Now suppose engineers warp space-time so the functioning of the computer's processor takes place in the so-called imaginary time spoken of in Complex Number Plane. If warping is looped so results emerge in so-called real time, its calculations would be retrieved instantly after they were entered into the computer because billions of years might pass in imaginary time yet no period at all could elapse in our real time - and a presently unbelievably long value for pi could be obtained instantaneously. Diverting the processor's working to the

Number Plane's complex time means results are available at any desired point in the past. A second processor could use imaginary time to instantly calculate not closer and closer to the value of an infinite number, but to instantly "draw a line" farther and farther into the distant past. In a cosmic unification where everything is connected, warping could merge the path in imaginary time with that in complex time so the "drawn line" would be more than a calculation. It would make the infinity of the past (or at least a superb approximation of it) into reality. Bending vertical imaginary time towards horizontal "real" time instead of horizontal "complex" time translates into an infinite future.

(5) Quantum mechanics suggests distance is actually an illusion: quantum entanglement links particles in space-time regardless of how many light years of space (and perhaps regardless of how many 365-day years of time) separate them. A qubit is the basic element of information in quantum computing - just as "bit" is an abbreviation for "binary digit" in ordinary computers, "qubit" stands for "quantum bit" in quantum computers. Everything in time and space is part of the same computer program, and is entangled/unified into a qubit on quantum and macroscopic scales. This puts hidden order into apparent disorder (a fundamental principle of Chaos theory).

(6) Professor Stephen Hawking says that boundaries exist in real time but don't exist in imaginary time. [Hawking, Stephen (1988) - "A Brief History of Time" p.39. Bantam Press] Entanglement in the simulation is unable to remain separate from the quantum-mechanical entanglement existing in our reality because imaginary time removes all boundaries between the two universes. They naturally merge, influencing each other and becoming one.

(7) What we call expansion of the universe is therefore actually extension of the simulation's bits, Mobius strips and figure-8 Klein bottles. This scenario agrees that 20th-century astronomer Edwin Hubble was correct when he never accepted the expanding-universe interpretation of his work. [Hubble, Edwin (1936) - "Effects of Red Shifts on the Distribution of Nebulae" in Ap. J. 84: 517]

(8) The poorly-named imaginary time of physics and mathematics unites with pi (both are necessary to generate an infinite universe) and with the simulated-real hybridization of the universe to free it of boundaries and make it literally infinite. There really are boundaries in real time and it must hypothetically be possible to step outside the universe if only real time exists. But if imaginary time also exists, it is not possible to step outside the universe coz the boundaries simply aren't there and the universe never

ends (neither in space nor in time).

ELECTRIC WAVES AND SUPERCONDUCTIVITY

With more than three space dimensions, the electrical forces that cause electrons to orbit round the nucleus of an atom would behave in the same way as gravitational forces. The electrons would either escape from the atom or spiral into its nucleus. In either case, atoms as we know them could not exist (see "A Brief History of Time" by Stephen Hawking – Bantam Press 1988, p.165). How can electrical force behave in the same way as gravitational force in extra space dimensions? The strength has to be reduced a trillion trillion trillion times because an electromagnetic wave is 10^{36} times more powerful than a gravitational wave. Referring to the diagram in **COMPLEX NUMBER PLANE** – when an electric wave is diverted from the x-axis to the y-axis representing the 4th spatial dimension, there is no wave motion in real time. This means there can be no amplitude or frequency except at the point marked 0 - and the electric wave has lost virtually all power, being "flattened" by imaginary time and giving rise to superconductivity.

The Cooper pair state is responsible for superconductivity, as described in the BCS theory developed by John Bardeen, Leon Cooper, and John Schrieffer for which they shared the 1972 Nobel Prize. A Cooper pair or BCS pair is 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. These have some bosonic properties – properties similar to photons, gravitons and the Higgs boson. Bosons, at sufficiently low temperature, can form a Bose–Einstein condensate which is an example of **macroscopic quantum phenomena** (quantum behavior at the macroscopic scale, rather than at the atomic scale where quantum effects are prevalent). The best-known examples of macroscopic quantum phenomena are superfluidity and superconductivity. The fact that bosons can form a Bose–Einstein condensate which is related to superconductivity hints at superconductivity being a wave-function phenomenon. Also, the Complex Number Plane of mathematics in conjunction with the so-called Imaginary Time of physics suggests this wave-function might find practical application beyond abstract maths and could be multidimensional having "real", "imaginary" and "complex" types. The explanation of superconductivity by means of Cooper pairs confirms the validity of wave-particle duality.

According to the article "superconductivity" in "Penguin Encyclopedia Edited by David Crystal" (Penguin Reference Library, 2006): this is "the property of zero electrical resistance, accompanied by the expulsion of magnetic fields (the Meissner effect),

exhibited by certain metals, alloys, and compounds when cooled to below some critical temperature, typically less than -260 degrees C. Both effects must be present for true superconductivity."

Regarding zero electrical resistance: An electromagnetic wave can have its electrical part compressed, through eg introduction of copper-and-oxygen compounds called cuprates or use of hydrogen sulfide (speaking of molecules as well as waves refers to quantum mechanics' wave-particle duality). If compression is sufficient; the electric component no longer follows a long, curved path in Euclidean geometry. Its path is now linear and follows the shortest distance between two points. In other words, a superconductor that operates at room temperature and normal atmospheric pressure has been manufactured. Any resistance would, like a rock in a stream causing water to flow around it, lengthen the distance and mean the compound is not a perfect superconductor.

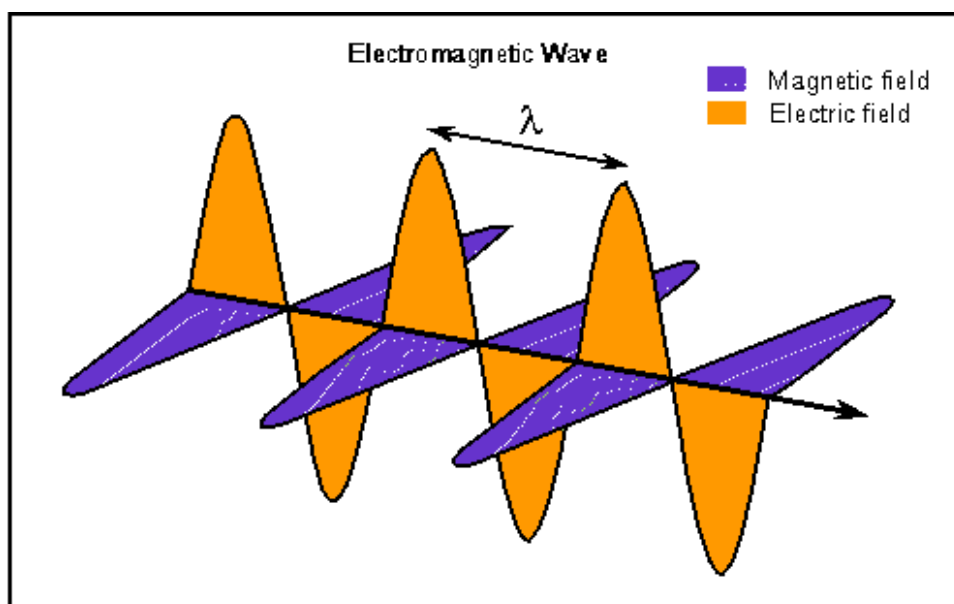


figure number 2 - an electromagnetic wave showing electric and magnetic fields, and the wavelength (λ) which is the distance between crests of a wave. Courtesy of nrao.edu

Regarding the Meissner effect: Think of the electromagnetic wave relativistically. To do that, it must be shown that electromagnetism is not dissimilar from the gravitation of General Relativity, which is a purpose of the section below. In General Relativity, the simple analogy of space-time being regarded as a rubber sheet is commonly used. Instead of resorting to complex and lengthy relativistic mathematics, we can simply

picture an electromagnetic wave as made of rubber. Compressing the electric component will force the magnetic component to bulge outwards ie there will be no magnetic field within the superconductor, only an external magnetic field. An externally-applied magnetic field also conforms to the bulging outwards and is expelled from within the superconductor.

GSC (GRAVITATIONAL SUPER CONDUCTIVITY) AND COSMOLOGY

Now recall **DARK ENERGY, DARK MATTER** and the binary digits of 1 and 0, plus Albert Einstein's "Spielen Gravitationfelder in Aufbau der Elementarteilchen eine Wesentliche Rolle?" (**Do gravitational fields play an essential role in the structure of elementary particles?**), Sitzungsberichte der Preussischen Akademie der Wissenschaften, (Math. Phys.), 349-356 (1919) Berlin].

A 2009 electrical-engineering experiment at America's Yale University demonstrated that, on silicon-chip and transistor scales, light can attract and repel itself like electric charges or magnets ["Tunable bipolar optical interactions between guided lightwaves" by Mo Li, W. H. P. Pernice & H. X. Tang - Nature Photonics 3, 464 - 468 (2009)]. Einstein believed electromagnetism (light is one form of this) and gravitation were related. Then the presently hypothetical gravitons of gravitation could also attract and repel at quantum scales. Maybe the relation is in the form of photons and gravitons being different compositions of 1's and 0's.

If electromagnetism is not dissimilar to gravitation (in the sense of photons and gravitons being different compositions of 1's and 0's), gravitational waves must also give rise to a version of superconductivity (SC). SC means there's no resistance regarding electrons – GSC means there's no resistance regarding gravitons. Just as resistance to electron flow is reduced, or electrons are totally unimpeded, in SC; in GSC all gravitons can flow together[^] into a singularity and delete distance. The binary digits generated by the virtual gravitons (virtual particles called gravitons) form a qubit*. The digits form the qubit at any temperature or pressure, and provide access of a person or device to all multidimensional space-time.

[^] In 1925, the Austrian physicist Wolfgang Pauli discovered the exclusion principle [Hawking, S. W. – "A Brief History of Time" – Bantam Press, 1988, pp. 68-69]. This says two similar particles cannot have both the same position and velocity. If two electrons could have identical positions and velocities, they could all collapse into a roughly uniform, dense "soup". Protons and neutrons would do the same, and there would be no

well-defined atoms. So we need the exclusion principle. Force-carrying particles like photons and gravitons do not obey the exclusion principle, and there is no limit to the number that can exist in one spot.

*If the cosmos is made of 1's and 0's (bits), it would a) have AI or artificial intelligence like, but infinitely more powerful than, that of computers or androids; and b) may not be composed of separated stars, people and so on; but all space and time could be entangled in a qubit if all forms of distance are removed (a qubit is the basic element of information in quantum computing - just as "bit" is an abbreviation for "binary digit" in ordinary computers, "qubit" stands for "quantum bit" in quantum computers).

Electrical superconductors aren't necessarily always in use, so gravitational superconductance isn't either. At those times when the qubit is being realized, GSC means Isaac Newton's concept of gravity acting instantaneously across the universe is correct. Gravity transmitted instantly, and gravity travelling at light speed, both exist (they're in two frames of reference). This is reminiscent of Einstein's statement, '(Length contraction) doesn't "really" exist, in so far as it doesn't exist for a comoving observer; though it "really" exists, i.e. in such a way that it could be demonstrated in principle by physical means by a non-comoving observer.' (Einstein, Albert [1911]. "Zum Ehrenfestschen Paradoxon. Eine Bemerkung zu V. Varičaks Aufsatz". *Physikalische Zeitschrift* 12: 509–510). The qubit is perpetually realized inside black holes and they therefore provide constant access to all multidimensional space-time. (They're portals to other regions of time and space within the infinite, eternal universe – see the article "Soft Hair on Black Holes" by Stephen W. Hawking, Malcolm J. Perry, and Andrew Strominger (*Phys. Rev. Lett.* 116, 231301 – Published 6 June 2016) which speaks of black holes being portals to other universes.

Recall earlier proposals that gravitation may be the universe's one fundamental force, being the basis of mass (and the two nuclear forces) which it forms in conjunction with another force that's essentially the same[^] - because its quantum, the photon, is merely a re-formation of the 1's and 0's composing gravity's quantum, the graviton. Necessarily embracing the Meissner effect of SC, GSC's equivalent might be to "expel" electromagnetism and the nuclear forces from fundamentalism (or at least the nuclear forces - see last part of **NEGATIVE ABSOLUTE TEMPERATURE, LIFE AND COSMIC UNIFICATION**). If 3 forces are expelled, this unifies the cosmos using the single fundamental force of gravitation. If 2 forces are expelled, the cosmos is unified by the nonlinear action of gravity and electromagnetism being responsible for the existence of each other (2nd last paragraph of **NEGATIVE ABSOLUTE TEMPERATURE, LIFE AND COSMIC UNIFICATION**). And if everything is composed of 1's and 0's, all objects and events in the time, space and dimensions of the cosmos are also linked or entangled.

Entanglement and the qubit dispose of Cosmic Inflation's idea that the uniformity in the cosmos means particles in the universe must have once been in physical contact. And without the need for the universe to be materially tiny (it can be infinite and eternal since infinitely-long numbers are built into it), there's no need for a Big Bang theory. Such an infinite universe could be "created"^{^^} by **STEADY STATE TOPOLOGY**.

^{^^} the Law of Conservation says neither matter nor energy can ever be created or destroyed - they only change form, including into each other - and the total energy/mass content of the cosmos is constant.

STEADY STATE TOPOLOGY

The beginning of a Steady State Universe draws on mathematics' topology, or rubber-sheet geometry. The topology takes the form of electronics' binary digits (1's and 0's) composing 2 Möbius strips which are united into a figure-8 Klein bottle constituting a "sub"universe. The encoding of infinitely-long irrational and transcendental numbers like pi, e, $\sqrt{2}$ by the digits produces an infinite series of sub-universes (an infinite universe).^{*} And other subs can naturally affect our own 13.8 billion-year-old subcosmos. ("Our Mathematical Universe" by cosmologist Max Tegmark – Random House/Knopf, January 2014 believes the universe has a mathematical foundation).

^{*} For what I see as potential support for this maths, I thank "The origins of space and time" by Zeeya Merali ("Nature" 500, 516–519: 28 August 2013) which supplied the info that Rafael Sorkin - a physicist at the Perimeter Institute in Waterloo, Canada - postulates that the building blocks of space-time are simple mathematical points that are connected by links. He calls his theory Causal Sets.

Binary digits are proposed to be the Hidden Variables which "are an interpretation of quantum mechanics based on the belief that the theory is incomplete and that there is an underlying layer of reality that contains additional information about the quantum world. This extra information is in the form of the hidden variables, unseen but real quantities. The identification of these hidden variables would lead to exact predictions for the outcomes of measurements and not just probabilities of obtaining certain results." ("Quantum" by Manjit Kumar - Icon Books, 2008 - p. 379)

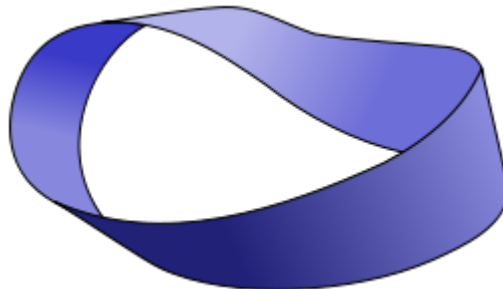
String theory – the best known hypothesis of modern physics searching for the universe's Theory of Everything - says everything's composed of tiny, one-dimensional strings that vibrate as clockwise, standing, and counterclockwise currents (p. 84 of "Workings of the Universe" by Time-Life Books, 1991). We can visualize the tiny, one

dimensional, so-called Virtual Particles that fill all space and are really pulses of energy. We can visualize them generating binary digits of 1 and 0 (base 2 mathematics)* that form 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. (The curving of what we call space-time sounds very strange, but I think it can actually be explained by modelling space-time’s construction on the Mobius strip that can be represented by giving a strip of paper a half-twist of 180 degrees before joining its ends.)

* Physicist Brian Greene’s “...projection of that ... reality that is ... akin to a holographic movie” [The Hidden Reality” by Brian Greene - Knopf [January 25, 2011] and quantum physicist David Bohm’s “...projections from another dimension ... that is beyond both space and time” [“David Bohm’s Holographic Universe” - <http://www.spaceandmotion.com/Physics-David-Bohm-HolographicUniverse.htm>] could be interpreted as “projections of binary digits from a 5th-dimensional hyperspace which become matter, energy and space-time in the known 4 dimensions”. According to Wikipedia, GEO600 is a gravitational wave detector located near Sarstedt in the South of Hanover, Germany. On January 15, 2009, it was reported in New Scientist (“Our world may be a giant hologram”) that some yet unidentified noise that was present in the GEO600 detector measurements might be because the instrument is sensitive to extremely small quantum fluctuations of space-time affecting the positions of parts of the detector. This claim was made by Craig Hogan, a scientist from Fermilab. Should the noise be definitely linked to extremely small quantum fluctuations, it could be seen as support for my idea of binary digits forming space-time. “SEARCHING FOR THE HOLOGRAPHIC UNIVERSE - Physicist Aaron Chou keeps the Holometer experiment—which looks for a phenomenon whose implications border on the unreal—grounded in the realities of day-to-day operations.” By Leah Hesla (<http://www.symmetrymagazine.org/article/april-2014/searching-forthe-holographicuniverse>)

Mobius Loop (source:

http://www.polyvore.com/mobius_strip_public_domain_clip/thing?id=72360021)

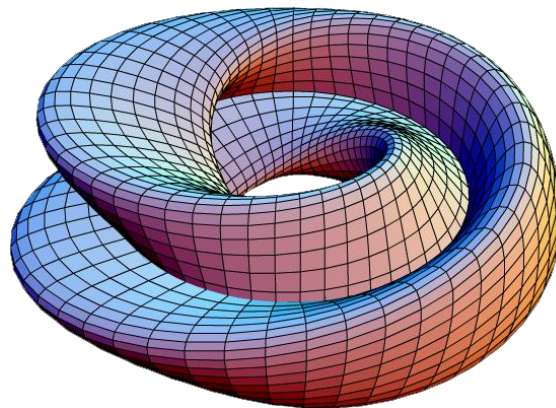


Joining two Mobius strips (or Mobius bands) forms a four-dimensional Klein bottle
(<http://plus.maths.org/content/os/issue26/features/mathart/index>)

Figure-8 Klein Bottle (source:

<http://commons.wikimedia.org/wiki/File:KleinBottleFigure8-01.png>) Note that the reddish positive curvature fits together with the bluish negative curvature to produce the flat curvature of space-time's infinity/eternity. See later in this section where figure-8 Klein bottles can be made into plausible subunits of a flat and infinite universe, the latter part of **GRAVITY** which speaks of positive and negative complementing, and the illustration halfway down the page "The Curvature of the Torus"

(<http://www.win.tue.nl/~rvhassel/Onderwijs/Tensor-ConTeX-Bib/Examples-diff-geom/Torus-diff-geom/curv-torus.pdf>).



And each Klein bottle can become an observable (or "sub") universe: figure-8 Klein bottles resemble spiral galaxies, and appear to have the most suitable shape to form subuniverses. This connection of the 2 Möbius strips can be made with the infinitely long irrational and transcendental numbers. Such an infinite connection translates into an infinite number of tangible figure-8 Klein bottles which are subuniverses. They're tangible because the numbers result from the virtual particles making up the universal G-EM (Gravitational-ElectroMagnetic) field. And the gravitons also help compose matter. The infinite numbers make the cosmos as a whole* 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.

* That is: the cosmos beyond our 13.8-billion-year-old subuniverse.

For the note below on the figure-8 Klein bottle, I refer to – a) Bourbaki, Nicolas (2005). Lie Groups and Lie Algebras. Springer b) Conway, John (1986). Functions of One Complex Variable I. Springer c) Gamelin, Theodore (January 2001). Complex Analysis. Springer d) Joshi, Kapli (August 1983). Introduction to General Topology. New Age

Publishers e) Spanier, Edwin (December 1994). Algebraic Topology. Springer Informally - if an object in space consists of one piece and does not have any "holes" that pass all the way through it, it is called simply-connected. A doughnut (and the figure-8 Klein bottle it resembles) is "holey" and not simply connected (it's multiply connected). The universe appears to be infinite (more info in "Infinite Universe" by Bob Berman - "Astronomy", Nov. 2012), being flat on the largest scales and curved on local scales (from far away, a scene on Earth can appear flat, yet the curves of hills become apparent up close). A flat universe that is also simply connected implies an infinite universe [Luminet, Jean-Pierre; Lachi`eze-Rey, Marc - "Cosmic Topology" - Physics Reports 254 (3): 135–214 (1995) [arXiv:gr-qc/9605010](https://arxiv.org/abs/gr-qc/9605010)]. So it seems the infinite universe cannot be composed of subunits called figure-8 Klein bottles (flat universes that are finite in extent include the torus and Klein bottle).

But gaps in, 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. This makes space-time relatively smooth and continuous - and gets rid of holes, making these types of Klein subunits feasible. The Klein bottle is a closed surface with no distinction between inside and outside. There cannot be other universes outside our infinite and eternal universe – there's only one cosmos.

Gravitational waves and Cosmic rays

Does the diagram of gravitational waves (in "Dawn of a new astronomy" by M. Coleman Miller - <http://www.nature.com/nature/journal/v531/n7592/full/nature17306.html>) explain the origin of cosmic rays ("Cosmic rays beyond the knees" by Andrew M. Taylor - <http://www.nature.com/nature/journal/v531/n7592/full/531043a.html>)? The following article is inspired by a paper Einstein submitted to the Prussian Academy of Sciences asking "Do gravitational fields play an essential role in the structure of elementary particles?" ["Spielen Gravitationsfelder in Aufbau der Elementarteilchen eine Wesentliche Rolle?", Sitzungsberichte der Preussischen Akademie der Wissenschaften, (Math. Phys.), 349-356 (1919) Berlin]

Intuitive origin of highest-energy cosmic rays

Electromagnetic waves are normally regarded as very different from gravitational waves. **GSC (GRAVITATIONAL SUPER CONDUCTIVITY) AND COSMOLOGY** states, "electromagnetism is not dissimilar to gravitation (in the sense of photons and gravitons

being different compositions of 1's and 0's)". Therefore, as the black holes spoken of in "Dawn of a new astronomy" spiral together, the increasing frequency of the gravitational waves could correspond to blueshifting – not, in this case, of lines in its light's spectrum which correspond to particular elements but of the wavelength. This variant of blueshifting would cause the wavelength to become that of radio waves of ever-increasing energy, then microwaves, infrared rays, visible light, ultraviolet light, X-rays, gamma rays, finally culminating in extreme-energy cosmic rays, which can have energies exceeding 10^{20} eV or 100 billion billion electron volts). Though cosmic rays consist of protons and electrons and ions, wave-particle duality means electromagnetic waves (like gamma rays) exhibit particle-like properties, and can become cosmic rays.

Mathematical origin of highest-energy cosmic rays

An alternative method of viewing blueshifts steadily increasing through the electromagnetic frequencies to culminate in cosmic rays is this -

When black holes merge, their gravitational compositions merge into a concentrated mass. Also taking place during the merger is the frequency-increase depicted in "Dawn of a new astronomy". This results in strain (the fractional changes in distance produced at our distance) of 10^{-21} which equals about 1/200 of a proton's radius. Since this number refers to our distance from the black-hole merger, it should be related to that other dimensionless quantity GM/Rc^2 , which measures the importance of gravity for an object of mass M and radius R (G is Newton's gravitational constant and c is the speed of light). The Sun contains more than 99% of our solar system's mass. Since this article deals with gravitation and mass (in the form of cosmic rays), it seems appropriate to take the sun's value for GM/Rc^2 . Since our star is only approximately in Earth's precise location, that value should be approximated (10^{-6} sounds satisfactory for the moment).

The unknown quantity is how many times the gravitational production of matter translates into the distance between us and the black-hole merger. We need to know how many times "gravitational production of matter" will go into "changes in distance produced at our distance". 10^{-21} divided by 10^{-6} equals 10^{-15} . Visualize taking a tour of the universe in an elevator that starts at the scale of 10^0 or 1 - the scale full of everyday phenomena such as people, cars, cats and dogs. At the scale of 10^{-15} is that constituent which comprises about 90% of cosmic rays, the proton. (See "Unravelling the Mind of God: Mysteries at the Frontier of Science" by Robert Matthews - Virgin Books, 1992, pp.2-3). The Sun's value for GM/Rc^2 is better approximated as 2×10^{-6} , so the proton size must be halved. Referring to the mention above of "1/200 of a proton's radius", we have ended up with not that figure nor that of a proton's diameter - but with a single proton's radius. Though 10^{-15} is a million times greater than 10^{-21} , it must be remembered that the scale of 10^{-15} corresponds to just one proton.

Origin of lower-energy cosmic rays

Of course, this solar system does not receive merely one proton. It receives one proton per unit area of the merged black hole, which adds up to the vast number in the cosmic rays. Other particles are created too - the proton is presented here as the primary representative of their genesis.

Blueshifting might be caused by the extreme energies of a massive star collapsing to form a supernova. "In 2013, scientists discovered that cosmic rays - charged particles travelling near the speed of light - get their energy by travelling back and forth over the edges of supernova remnants" ["Solving the mystery of Cosmic Rays" by Angela Olinto - Astronomy magazine, April 2014].

Blueshifts could result in extreme-energy cosmic rays, and the acquisition of energy (by travelling back and forth over the edges of supernova remnants) spoken of in "Solving the mystery of Cosmic Rays" would actually be negative acquisition, or depletion of energy. As ultra-high-energy cosmic rays travel back and forth over the edges of supernova remnants, they might lose energy. The constant collisions with other particles make them slow down and become "ordinary" cosmic rays i.e. the wave-particle duality of ultra-high-energy rays is "redshifted" and they become ordinary cosmic rays. Energies could decrease from the most energetic ray ever detected - 3×10^{20} eV by the Fly's Eye detector in Utah, USA (in 1991) to a "mere" 10^7 or 10^8 eV.

WHEREFORE ART THOU, QUARKS AND GLUONS, INFLATION AND BIG BANG?

^ When Einstein penned $E=mc^2$, he used c (c^2) to convert between mass units and energy units (which, to me, appears to mean "between particles in space and the motion of those particles which is known as time") . 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 waves with a strength of 10^1 are, via quantum 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). 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). What about the strong nuclear force carried by particles called gluons?

In the Standard Model of particle physics, the strong force holds quarks together to form protons and neutrons. Prof. Hawking says, "It is certainly possible that some alien

beings ... would make the same experimental observations that we do, but describe them without quarks." [Stephen Hawking, Leonard Mlodinow – “The Grand Design” – Bantam Press, 2010, p. 49]. I’m going to turn into that book’s alien being and describe observations without quarks - but with a more basic quantum process that says space and all particles are, ultimately, composed of virtual particles and bits and maths. In the possible absence of quarks, it may also be possible that experimental observations can be described without gluons. No quarks or gluons may mean the strong nuclear force itself can be described with virtual particles and bits and maths. Expelled from fundamentalism by gravitational superconductivity's Meissner effect, the strong force may be merely a product of gravitation (or of gravitation plus electromagnetism).

After absorption by atoms, the depleted remnant of the gravity waves is re-radiated from stars, planets, interstellar gas and dust, etc. It’s radiated as gravitational waves (a Gravity Wave Background, challenging the idea that the traditional form of Cosmic Inflation was necessary to generate gravitational waves) which have lost most of their energy or strength during formation of mass and electromagnetic/strong nuclear/weak nuclear forces (returning to the weak strength we're familiar with). Maybe the gravitational force is split into the other 3 forces by means of quantum gravitational lensing, whose non-subatomic-scale counterpart can split the image of an astronomical object into several images. Since gravity can produce electromagnetism, it’s also radiated as all types of electromagnetic waves – including an infrared background whose heat output exceeds that of the stars alone, in addition to a microwave background. The latter challenges the idea that existence of the cosmic microwave background proves the universe began with the traditional Big Bang. The basic problem with science's understanding of the Big Bang is that everyone believes time only exists in one version (see 3 time dimensions/5 space dimensions, and Professor Itzhak Bars, in **COMPLEX NUMBER PLANE**).

If a star only received the input of gravitational waves from deep space entering it, there would be no limit to its potential growth. Since it also radiates mass-forming gravitational waves, there is a limit to the growth. 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 from the waves originating in deep space. The waves from deep space are a possible unrecognized contributing factor to the Pioneer anomaly, where the Pioneer spacecraft near the solar system's edge are a few thousand kilometres closer to the Sun than predicted. In the end, our planet’s orbit would be growing slowly larger. According to “Secular Increase of Astronomical Unit from Analysis of the Major Planet Motions, and Its Interpretation” in "Celestial Mechanics & Dynamical Astronomy”, Volume 90, Issue 3-4, 2004, pp. 267-288 by Krasinsky, G.A. and Brumberg, V.A.; the distance between Sun and Earth is growing by approx. 15

centimetres per century. The two authors attribute this increase of the Astronomical Unit (AU – the average distance between Earth and the Sun) to dark energy.

Gravity's a push and the reverse motion of complex gravity causes complex gravity to act in the reverse manner - as a pull (see picture from "Universe Today" below). In real space-time, the blue "Sun" lies in a depression or valley, and the brown "Earth" rolls towards it. We could say gravity pushes ... gravitational waves push ... Earth to the Sun. But in complex space-time, the blue "Sun" instead sits on a high hill, and the brown "Earth" rolls away from it. We could say complex gravity pulls ... complex gravitational waves pull ... Earth away from the Sun. In regard to the "Universe Today" picture, it'd be convenient, though less accurate, to say gravity and gravitational waves push Earth away (because the push is "towards the Sun"). In regard to the increasing AU, speaking of pushing gravity and its waves is accurate. So instead of attributing increase of the Astronomical Unit to dark energy, it can be attributed to the push of gravity and gravitational waves or the pull of complex gravity and complex gravitational waves. When Isaac Newton described gravitation as a pull attracting objects, was his genius unconsciously reaching into the 21st century and anticipating complex gravity?

DISTANCE = 0, EINSTEIN'S UNIFIED FIELD THEORY, AND TRAVEL INTO PAST ALL CONTAINED WITHIN $E=MC^2$

I think $E=mc^2$ supports this idea of deleting distance – between hypothetical multiple universes in the above section ie it deletes the multiverse. To be fair, this article does propose multiple (indeed, infinite) subuniverses or observable universes – and some people could legitimately call each one of these a complete universe that's part of a multiverse. The formula is, of course, Albert Einstein's famous equation relating energy, mass and the speed of light [Einstein, A. (1905) - "Ist die Trägheit eines Körpers von seinem Energieinhalt abhängig?" ("Does the inertia of an object depend upon its energy content?" - Annalen der Physik 18 (13): 639-643]:

Let's represent the masslessness of photons by 0 (zero), and also the masslessness of the theoretical gravitons by zero. Should theories developed from Einstein's 1919 paper regarding mass be proven correct one day ie that mass results from photon-graviton interaction, we can replace the m with zero. This results in $E=0*c^2$ ie outside familiar circumstances, it is possible for E to equal 0. Having reduced the equation to nothing but E , $m=0$ and $c^2=0$ which means $m=c^2$. At first glance, $m=c^2$ seems to be saying mass exists at light speed. But the absence of E (energy) refers to there being no interaction of light energy and gravitational energy, and therefore no mass. If mass cannot be produced, mass-producing space-time/gravity must be described by zero.

The zeroness of space-time/gravity does not mean they don't exist. It means we can appear to relocate matter and information superluminally, or travel into the past and future, because distance equals zero and can be eliminated from both space and time.

In the preceding paragraph, it's shown that $m=c^2$ when $E=0$ ie when no interaction of light energy and gravitational energy exists (see the next section "What's a Black Hole?") Describing spacetime by zero gives the impression that it doesn't exist. It obviously does, so the conclusion that zero means distance can be eliminated is accurate. Distance obviously exists, too. It is merely suggested that it's possible to delete it.

When distance is eliminated, more than the space between objects is deleted (this allows intergalactic travel). Space within objects can be deleted, too (permitting a singularity to have zero size). Therefore, removing distance easily unifies everything in space-time into one thing - a product of the gravitational field. All past and future universes are unified with the present cosmos (is this the real meaning of the word "multiverse"?)

$E=mc^2$ may have led Einstein to his General Relativity and Unified Field theories, to give physical meaning (in the form of gravitation) to the mathematics. As far as I know, he never specifically mentioned such a connection. Was Einstein as ignorant of the magnitude of his accomplishment as the rest of us?

"Physics of the Impossible" by Michio Kaku (Penguin Books, 2009) states on pp. 276-277, "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." Suppose Einstein was correct about the gravitational fields carrying enough information about electromagnetism to allow Maxwell's equations to be restated in terms of these gravitational fields. Then gravitational waves would also have an "advanced" solution.

$E=mc^2$, when viewed as $E=0$ and $m=c^2$, also supports this article's statement that gravitational ripples proceed in the "reverse" direction along the horizontal axis (not in so-called 'real' time, but in 'complex' time. This is because $m=c^2$, and those two can only create 0^* if, purely for example, m represents the retarded wave of light travelling

forward in time - and, again purely for example, c^2 represents the advanced wave of gravitation travelling backward in time. If mass and matter are products of gravitational-electromagnetic interaction, matter can also travel into the past.

*E = no distance between: electromagnetic and gravitational energy (because of rearrangement of binary digits composing photons and gravitons); resultant mass including matter (along with its nuclear forces); space and time (their warps are gravity ... and also because of imaginary time); any dimensions (because of the multi-directionality of gravitational waves in both space contexts and time contexts). More detailed explanations are distributed throughout this article.

Hawking Radiation Predicts Universe Is Electronic In Nature

In September 1973, while visiting Moscow, cosmologist Stephen Hawking discussed black holes with two Soviet experts, Yakov Zeldovich and Alexander Starobinsky. They convinced him that, according to the quantum mechanical uncertainty principle, rotating black holes should emit particles. Hawking improved the mathematics and found that non-rotating black holes should also emit them. They're matter-antimatter pairs of particles; are called Hawking radiation; and aren't actually emitted by the black hole itself, but from just outside the hole's boundary or event horizon.

Regarding the position and velocity of a particle – the uncertainty principle says that the more accurately one of these quantities is known, the less accurately the other is known. In regard to a field, such as a gravitational or electromagnetic field – the more precisely the field's value is known, the less precisely its rate of change with time is known (and vice versa). There must be quantum fluctuation, or a certain amount of uncertainty, in the field. To quote from "A Brief History of Time" by Stephen Hawking – Bantam Press, 1988, p.106 - "One can think of these fluctuations as pairs of particles of light or gravity that appear together at some time, move apart, and then come together again and annihilate each other. These particles are virtual particles ... one member of the pair will be a particle and the other an antiparticle (the antiparticles of light and gravity are the same as the particles)."

The explanations in the following paragraphs reveal another way of thinking about the fluctuations. The analogy to fluctuating virtual particles is –

1) undetectable, virtual photons "appear together" as detectable, real photons (this state can be interpreted as one condition in a binary state and it could be represented as 1)

2) then they "move apart", are not joined into photons and are standing for 0

3) then the virtual photons "come together again and annihilate each other" ie they end their existence as virtual photons and become what are called real photons representing the binary digit 1.

In other words, Hawking radiation describes pulsing (on-off-on) which can be interpreted as the binary digits 1-0-1, and this allows the universe to be electronic in nature.

To start the explanations, consider division of matter and division of energy. Any object you look at can a) be divided into atoms and molecules; then b) subdivided into protons, neutrons and electrons; then c) the protons and neutrons of the atomic nucleus can be further subdivided into quarks. At this fundamental quark level, some words from the book "The Grand Design" are pertinent - "It is certainly possible that some alien beings ... would make the same experimental observations that we do, but describe them without quarks." [Stephen Hawking, Leonard Mlodinow – "The Grand Design" – Bantam Press, 2010, p. 49] Following the example of matter, energy like a sunbeam or gravity wave has now a) been divided into their quanta (supposedly smallest units) of the photon and still hypothetical graviton. Is it possible that the photon could b) be fractionated (subdivided) into virtual photons? Finally, all virtual particles might c) be further subdivided into electronics' bits of 1 and 0. This may be the most fundamental level, where the same experimental observations might be described with different methods eg as creation and annihilation of photons, or with the base-2 mathematics of bits.

Here are a few details from "A Brief History of Time" (BHT) by Stephen Hawking or "The Grand Design"(GD) by Stephen Hawking and Leonard Mlodinow:

The virtual particles filling "empty" space are not really particles at all. They're fluctuations in a field, such as a gravitational or electromagnetic field (BHT: pp.105-106). In an electromagnetic field, the fluctuations are called virtual photons and cannot be observed directly with a particle detector. Photons that are detectable, eg as light waves, are called real photons (BHT: p.69). Virtual particles have energy, however (GD: p.113).

Now for a few of my conclusions from the above – in a gravitational field or gravitational wave, the quantum fluctuations or virtual particles would be the hypothetical gravitons. These cannot be detected by present-day detectors: maybe the Large Hadron Collider - the world's most powerful particle collider, partly in France and partly in Switzerland -

can do it oneday ... maybe it can't. Virtual photons are likewise undetectable for now but if a number of them combine, they would form an electromagnetic field of real photons and become pulses of energy which would be detectable. If virtual photons combine with gravitons, the coupling produces both an electromagnetic and a gravitational field. The electromagnetic field affects our senses – light reaching our eyes is a form of electromagnetism, and the field can bestow a sense of touch by resisting pressure from, say, a finger ie the field's charges can repel charges in the finger's particles. What do we call something we can see and touch? It's a mass, or a piece of matter. The gravitational field produced by the gravitational waves acting on the matter gives it gravity.

In computers, a pulse of electricity can represent "on" and the bit 1. Absence of a pulse can stand for "off" and 0. Page 106 of "A Brief History of Time" says quantum fluctuations can be thought of as particles appearing together at some time, then moving apart. In the electromagnetism presented here, the analogy is that virtual photons create binary digits by either amalgamating into photons and representing 1, or are not joined into photons and are standing for 0.

"Higgs field" in Simple English Wikipedia (https://simple.wikipedia.org/wiki/Higgs_field) sums up scientific opinion by saying, "If the Higgs field did not exist ... gravity would not exist because mass would not be there to attract other mass." Astronomer Carl Sagan (1934-1996) once said, "At the heart of science is an essential balance between two seemingly contradictory attitudes—an openness to new ideas, no matter how bizarre or counterintuitive they may be, and the most ruthless skeptical scrutiny of all ideas, old and new." [The Demon-Haunted World: Science as a Candle in the Dark (1997), 304] I'm sure most readers agree that current understanding of the Higgs field should not be blindly accepted for any reason – even that of the Higgs having a 50-year history that recently won a Nobel prize. And that the bizarre new ideas in this article deserve to be fairly considered.

Instead of saying gravity is the result of mass, this article says mass is the result of gravity (acting in partnership with electromagnetism). Production of the Higgs boson by gravitational-electromagnetic coupling means the Higgs field might actually be that interaction. This is indeed plausible since alternative versions of Higgs theory still circulate in science in which the role of the Higgs field is played by various couplings (see M. Tanabashi; M. Harada; K. Yamawaki. Nagoya 2006: "The Origin of Mass and Strong Coupling Gauge Theories". International Workshop on Strongly Coupled Gauge Theories. pp. 227–241). Wikipedia also sums up scientific opinion with "Light that passes through (the Higgs field) gains energy, not mass, because it is a wave." This explanation appears deficient since all particles, including light's photons, possess

wave-particle duality and aren't simply waves or particles. The overlooking of wave-particle duality casts more doubt on current Higgs understanding. A better explanation for light's gaining energy, not mass, appears to be that a photon consists of a number of virtual photons while the property of mass requires virtual photons to interact with gravitons. A group of gravitons – which are virtual particles – could merge into a "macro graviton" detectable by the Large Hadron Collider.

The implication of virtual photons transferring energy to photons is that light doesn't pass through a field that is independent of it ... and the photons are passing through the universal gravitational/electromagnetic field. Gravity does not need to travel – the gravitational field already exists everywhere. Nevertheless, any disturbance (from the waving of your hand to explosion of a supernova) will send ripples called gravitational waves through the universe. Recall the 4th paragraph's statement that at the most fundamental level, all virtual particles might be further subdivided into electronics' bits of 1 and 0. This means gravitons and virtual photons would ultimately be related as rearrangements of the other's binary digits. The universe is then not only a giant gravitational field but also a giant electromagnetic field. Electromagnetism is ubiquitous and doesn't need to travel, but any disturbance sends out electromagnetic waves. $E=mc^2$ solved for mass is $m=E/c^2$, so amount of mass produced (m) equals the energy from graviton-photon interaction (E) divided by c^2 , the velocity of gravitons and photons which are equal (c^2 or squared refers to co-movement and interdependence of the particles' interactions and velocities).

AFTERTHOUGHTS:

SEISMIC TOMOGRAPHY REPLACES COMPUTER TOMOGRAPHY

"Vast forces underfoot" by Andrew Robinson - Nature volume 528, 3 December 2015 speaks of shock waves sent through the earth by earthquakes. The second paragraph says "Developments in seismology ... have ranged ... to global seismic tomography." This is what we need to save us from those short-sighted doctors who perpetually order one computer-tomography (CT) scan after another, even for now healthy patients. They naturally want to monitor patients in case disease returns, but the low doses of radiation build up and could negatively affect future health. A harmless scan using seismic tomography could image the body's interior in a similar manner to the way it uses earthquake waves to image the earth's interior. This possibility may be beyond today's technology but it might utilize vibrations caused by pulsing of the blood in arteries, or perhaps the jostling of atoms called Brownian movement.

NEO-ONCOLOGY

Why do oncologists try to kill every last cancer cell? I believe a very limited number of malignant cells are normal in every body, even a baby's. Throughout life, normal cell division invariably goes wrong occasionally and results in a few mutated or cancerous cells. This only becomes a problem when the immune system is unable to eliminate them, allowing them to accumulate and form a cancerous tumour. One or two cells by themselves are not a cause of worry. As for treating solid tumours (or their non-solid counterparts, such as in leukemia), consider this possibility for future decades -

Cancer cells are incredibly difficult to eradicate completely. So let's take a lesson from the martial arts and use their own strength against them. Let them live - but only after they've been bioengineered to mutate back into healthy, functional cells and tissues that reproduce at a normal rate. This possibility occurred to me because a) while most mutations are harmful, a tiny number are not harmful; and b) researchers are already able to change cells and tissues into different cells and tissues e.g. skin into sperm; or artificial gametes (eggs and sperm)[1] into a totipotent[2], fertilized cell that has the potential to give rise to any and all human cells; such as brain, liver, blood or heart cells (as well as giving rise to the complete embryo and fetus).

References

[1] "Artificial gametes: new paths to parenthood?" [PDF]. Journal of Medical Ethics 31: 184–186. <http://m.jme.bmj.com/content/31/3/184.full>

[2] "Stem Cell Classification" - http://biomed.brown.edu/Courses/BI108/BI108_2002_Groups/pancstems/stemcell/stemcellclassversatility.htm

SCIENCE FICTION, SCIENCE AND HUMAN POTENTIAL

Referring to the program "Catalyst" on the ABC (Australian Broadcasting Corporation) and its edition on Tuesday, 1 March 2016 "SCIENCE OF SCI FI FILMS – FACT OR FICTION?" (<http://www.abc.net.au/catalyst/stories/4415534.htm>) -

Is what we presently call science even capable of helping us to fulfill human potential? Albert Einstein is quoted as saying, "For knowledge is limited to all we now know and

understand, while imagination embraces the entire world, and all there ever will be to know and understand." Today's science has a lot of knowledge, and can measure and manipulate things WAY below the nanoscale. But when it comes to "all there ever will be to know and understand", science's lack of imagination frankly worries me. The program on Catalyst said,

"NARRATION Also, science-fiction can give a false sense of how science progresses." To this, Professor Lawrence Krauss added, "One of the things that always amazes me in Star Trek is having a problem and they get the engineers to gather around and they solve the problem within an hour. Whereas in the real world, as a scientist, it can take decades and baby steps to make any major progress."

What about science's own work on the Unified Field Theory and Theory of Everything? Accomplished completely, these must surely allow any problem to be solved immediately (if not sooner). Apparently, modern science wants to forever restrict itself so access to all knowledge in space-time is off-limits. In this way, it'd limit the Theory of Everything to a Theory of Almost Nothing and could make sure progress is in baby steps that take decades.

The imagination seen in sci fi may be a much better indicator of where your potential, and mine, truly lie. For example - look at "Star Trek: The Next Generation" and the alien being named Q who has godlike powers and believes humans may even exceed his own abilities in the eons to come (at present, he has trouble dealing with our limited view of the universe and our slowness to accept change). Or look at another alien character in Star Trek: TNG called The Traveller. He believes the power of the mind is unified with physical reality, and demonstrated this by moving the starship Enterprise many millions of light years in mere seconds. He was also teaching his knowledge to a human he deemed most worthy, a young ensign on the Enterprise by the name of Wesley Crusher.

If science can learn from sci fi, there is hope for it as these lines from the Catalyst program show - "NARRATION But perhaps one of the key benefits of sci-fi is it helps make the future seem more possible." To which Dr. Katie Mack adds, "Like with (the movie) The Martian, you know, you see this landscape, it's depicted as a place you can go, an achievable goal. And so I think a lot of times people see these kinds of depictions in science-fiction and that makes it seem more achievable and it makes it seem like more of a goal that they can work toward."

Cataracts, Alzheimer's and Golgi apparatus

A pamphlet issued by RANZCO (Royal Australian and New Zealand College of Ophthalmologists) says cataracts in the eyes are a result of ageing. This is true but surely it's possible to be more specific. Maybe the affliction can be traced all the way back to uncorrected mutations in DNA (DeoxyriboNucleic Acid). The proteins manufactured from the defective DNA would also be defective, possibly clumping together and becoming more tightly packed. In the eye, this leads to the lens becoming cloudy and preventing light from being clearly focused on the retina ie to cataracts.

Even if the DNA is healthy, cataracts could originate with defects of the cell's Golgi apparatus. The Golgi organelle wraps and despatches, or packages, proteins which are made by the ribosomes on the cell's endoplasmic reticulum. With ageing, proteins aren't folded correctly by Golgi bodies. This makes them stick together and, in the lens of the eye, reduce transparency to form a cataract.

Cataracts can be related to Alzheimer's disease and other forms of dementia. Incorrectly folded proteins can also result in insoluble plaques of amyloid-beta protein forming between neurons and causing Alzheimer's disease ("Alzheimer's Disease: The Challenge of the Second Century"* by Holtzman, D. M., Morris, J. C. & Goate, A. M. *Sci. Transl. Med.* 3, 77sr1 [2011]).

* The term Second Century is used because the disease was first described in 1906, by German neurologist Alois Alzheimer (1864-1915). The current theory of involvement of an inheritable factor in certain forms could be in agreement with the damaged DNA mentioned above.

THE AMBIGUITY OF MENTAL ILLNESS

Here's something for us all to think about - is mental illness really mental illness? Perhaps it is and isn't at the same time. If the result of a brain injury or defect, mental illness is really mental illness. If the result of insights into Unification of everything in space-time which make coping with the limited view of present reality difficult, so-called mental illness is due to one frame of reference imposing its outlook on a higher frame that might be called Cosmic Consciousness ("*Cosmic Consciousness: A Study in the Evolution of the Human Mind*" by Richard Maurice Bucke M.D. - first published 1901 by Innes & Sons, published by E. P. Dutton & Co. Inc. 1969 - https://en.wikipedia.org/wiki/Cosmic_Consciousness).

In 1911 Vladimir Varićak asserted that length contraction is “real” according to Lorentz, while it is “apparent or subjective” according to Einstein [1]. Einstein replied: “The author unjustifiably stated a difference of Lorentz’s view and that of mine concerning the physical facts. The question as to whether length contraction really exists or not is misleading. It doesn’t “really” exist, in so far as it doesn’t exist for a comoving observer; though it “really” exists, i.e. in such a way that it could be demonstrated in principle by physical means by a non-comoving observer.” [2]

The trend of discoveries in physics is towards unification of the whole universe, and all time, into one thing ... one event. Start with 19th century scientist James Clerk Maxwell uniting electricity and magnetism into electromagnetism. Then consider Albert Einstein's attempt in the 20th century to unite electromagnetism with gravitation and produce a Unified Field Theory. Lastly, think of modern physics' dream to unite everything into the TOE (Theory of Everything). One day, the Unified Field or TOE will be successfully achieved and it might extend far beyond the wildest hopes of today's science. Just suppose that what we call mental illness results from insights into the unification, with the insights producing inability - to a greater or lesser degree - to cope with what society deems normal activity. For example - look at the conditions listed in "In the blink of an I" by Douwe Draaisma (Nature journal - 6 August 2015). (This article is a review of the book "The Man Who Wasn't There" by Anil Ananthaswamy - Dutton, 2015.)

An epileptic seizure originating in the brain's temporal lobe and giving an ecstatic feeling of oneness with the world might be a link to the true nature of reality: an insight into the unification of space-time that is unfortunately accompanied by a change in brain waves that is not compatible with normal activity. The loss of self in Alzheimer's, and scrambling of self in schizophrenia, could similarly result from insight into universal unification in which the self has no existence separate from anything or any other self. Regrettably, the knowledge of the schizophrenia or Alzheimer's patient has come too soon - before they can understand it, or integrate it into their life. Their psychology and social lives are ruined - their hormones and biochemistry are upset. As for autism, how can anyone easily intuit the mental states of others when torn between society's belief that there is no other way and reality telling them only one mind[^] can ever exist when all time and the entire universe are unified.

[^] British quantum physicist David Bohm (1917-1992) asserted that the tangible reality of our everyday lives is really a kind of illusion, like a holographic image (<http://www.spaceandmotion.com/Physics-David-Bohm-Holographic-Universe>). He said our brains are smaller pieces of the larger hologram, and that they contain the whole knowledge of the universe. Each mind always contains the whole picture, but with an unclear perspective i.e. its knowledge is “complete, though distorted”. I think this must

mean each of our brains would actually be parts of the cosmos whose imagination, emotions, reasoning etc cannot be separated from the nature of the cosmos. The undistorted view of the unified universe's "one mind" would be the Artificial Intelligence spoken of in **GSC (GRAVITATIONAL SUPER CONDUCTIVITY) AND COSMOLOGY**. This AI functions on all scales – the cosmic and astronomical, the cellular and subatomic ... and would completely occupy the human brain, giving us much in common with computers and robots.

Someone living in the far future would have incorporated unification into the daily life they lead as a seemingly distinct individual. Returning to the early paragraph about Einstein explaining length contraction - they could therefore be seen as a co-moving observer with unification (rather than as a non-comoving observer who believes in separateness eg an experimenter in a scientific facility or medical lab). There would be a different evaluation of what we term illness. Not just mental, but also physical disease or injury, must necessarily be viewed alternatively if every mind and body is part of one thing and one event, and can never possess the separateness our unreliable senses attribute to them. For example - death and life would no longer be distinct, and future application of cosmic unification could mean that even potentially fatal injury or disease must always return to normal, healthy function.

This different evaluation and alternative view relate to the process being more holistic. In today's medicine, PNI (psychoneuroimmunology) is interaction of a person's psychology, neurology and immunology ie of the mind, nervous system and immune system. PNI can be regarded as a more holistic approach than any one of its 3 components. Similarly, the non-separateness of minds and bodies represents an even more holistic quantum-mechanical approach in which healing can be conducted without consideration of distance (neither space's light-years nor time's centuries are impenetrable barriers). Einstein always maintained that quantum mechanics (QM), though not incorrect, is incomplete. He famously called its ideas "spooky action at a distance" and would likewise have denied medicine's potential to heal at a distance. However, the decades since his death have repeatedly seen quantum mechanics confirmed experimentally. While our understanding of QM may indeed be incomplete, I like to think that Einstein in his afterlife has decided that "spooky action at a distance" is possible after all ... and so is distance healing. To a non-comoving observer (such as someone living today, who has not seen unification verified), mental and physical illness truly exist - that is, in such a way that they could be demonstrated in principle by physical means (like, in the early 21st century, a test in a hospital or an experiment in a lab).

References

[1] Miller, A.I. [1981], "Varičak and Einstein", Albert Einstein's special theory of relativity. Emergence (1905) and early interpretation [1905–1911], Reading: Addison–Wesley, pp. 249–253.

[2] Einstein, Albert [1911]. "Zum Ehrenfest'schen Paradoxon. Eine Bemerkung zu V. Varičak's Aufsatz". Physikalische Zeitschrift 12: 509–510

DARK-MATTER TRANSGENDERS

Is it reasonable to ask if a transgender person in the early 21st century has actually become a member of the opposite sex? I think society regards asking this as a lack of compassion. Nevertheless, I'm curious about the science. Most transgenders are born male and decide to become female - so I'll talk about those.

It's certainly true that a male who takes estrogen and antiandrogens for years will have his thoughts and feelings feminized. And this, along with surgeries, can make him look feminine. But at the risk of unintentionally upsetting all the transgender people out there, I wonder what would happen if they mailed some of their body's cells to a lab for genetic testing. Surely the test must reveal that they still have the genes of a male. If they didn't, they could throw away their estrogen.

It seems to be impossible to fully transition with today's limited medical technology. Referring to TV's long-running soap "The Bold and the Beautiful" and its transgender character Maya - in future decades, medical technology will doubtless become capable of changing the genes in every cell. This will allow Myron (Maya's name at birth) to choose a female genetic profile, and to truly be Maya. Science of the 22nd century might even allow a future Maya to travel back into the past and get born as a girl* - as long as her birth didn't change the number of female births known for the desired location and period of time.

* Only time will tell if this idea works in practice. Start with stem cells - the totipotent variety. "When a sperm cell and an egg cell unite, they form a one-celled fertilized egg. This cell is totipotent, meaning it has the potential to give rise to any and all human cells, such as brain, liver, blood or heart cells." ("Stem Cell Classification" - http://biomed.brown.edu/Courses/BI108/BI108_2002_Groups/pancstems/stemcell/stem

[cellsclassversatility.htm](#)) A totipotent cell can develop into the entire body. Maybe a genetically engineered totipotent cell (with female chromosomes in this case) could be produced[^] from Maya's body and implanted^{^^} in a past/present uterus or future artificial womb. Such implantation depends on future capabilities to transmit matter and information through space and/or time.

[^] Artificial gametes (sperm and egg cells made in a medical lab) are gametes derived from stem cells. They may be a reproductive technique for same-sex couples. ("Artificial gametes: new paths to parenthood?" [PDF]. Journal of Medical Ethics 31: 184–186. <http://m.jme.bmj.com/content/31/3/184.full>) When combined, the artificial sperm and artificial ovum form a totipotent zygote (fertilized cell).

^{^^} Recall **ANTIMATTER RELATED TO DE, DM** - "Physics of the Impossible" states on pp. 277-278: "These advanced waves were a mystery until they were studied by (20th-century American) physicist Richard Feynman, who revealed the true secret of antimatter: it's just ordinary matter going backward in time." If this positron or antielectron keeps journeying back from some point in our future (where different warps in its constituent waves mean it was matter), it becomes what we call dark matter when it has gone beyond our present. So matter-antimatter annihilation could be prevented when a totipotent cell from the future is implanted in a present-day uterus. Sending it further into the past first alters the warping of its constituent waves in such a way that it changes from antimatter into dark matter. Now recall what was said in **ELECTRIC WAVES** -

With more than three space dimensions, the electrical forces that cause electrons to orbit round the nucleus of an atom would behave in the same way as gravitational forces. The electrons would either escape from the atom or spiral into its nucleus. In either case, atoms as we know them could not exist (see "A Brief History of Time" by Stephen Hawking – Bantam Press 1988, p.165).

And there would only be subatomic particles in hyperspace. However, it seems that this limitation can be overcome. To be consistent, hyperspace and hypertime must form a union as surely as the space and time we're familiar with are united into science's accepted space-time. If the universe is a Cosmic Unification, a transgender or spacecraft or computer (many, many atoms) is not restricted to the hyperspace-hypertime union but can use hypertime eg imaginary time while using "real" space. Now using only 3 space dimensions, electrical forces don't behave like gravitational forces and atoms do exist.

AMBIGUOUS CHOLESTEROL

“The interior surfaces of the heart and blood vessels are covered with endothelial cells, which reduce friction. When the blood becomes turbulent, endothelial cells divide much faster than normal. The division creates gaps in the coating of the vessel, allowing platelets and cholesterol to attach and form rough patches, and plaque begins to form.” [“Principles of Physics: A Calculus-Based Text, Volume 1” by Raymond A Serway, John W Jewett - Wadsworth Publishing Co Inc, 2011, p.499] This degeneration is arteriosclerosis, with the rough patches causing blood clots. With increasing age, the liver produces more and more cholesterol in an effort to keep the cells lining the blood vessels in an elastic state* (culminating in excessive, and potentially dangerous, levels of cholesterol that could block arteries).

* A textbook employed worldwide [“Essentials of Human Anatomy and Physiology” (Tenth Edition) by Elaine N. Marieb - Pearson Education Limited 2014, p.80] says, “The cholesterol helps keep the cell membrane fluid.”

Lowering cholesterol reduces attachment of this lipid to the vessel. But it doesn’t affect other arteriosclerotic causative factors like platelets, endothelial cells and blood flow. Also - reduction of cholesterol, and fluidity, in cell membranes would increase friction between vessel walls and passing blood plasma/cells, eventually leading to rough patches and degeneration of vessels. Therefore; cholesterol-lowering drugs alter the pathway to, but do not cure or prevent, arteriosclerosis.

So, cholesterol problems appear to be unavoidable. However, **THE AMBIGUITY OF MENTAL ILLNESS** reveals otherwise. It says, “Not just mental, but also physical disease or injury, must necessarily be viewed alternatively if every mind and body is part of one thing and one event, and can never possess the separateness our unreliable senses attribute to them. For example - death and life would no longer be distinct, and future application of cosmic unification could mean that even potentially fatal injury or disease must always return to normal, healthy function.”

GASTRIC-BYPASS SURGERY AND TYPE-2 DIABETES

Why does gastric-bypass surgery have sustained beneficial effects on type-2 diabetes? Making a small pouch in the stomach then connecting it to the lower part of the small intestine means most of the absorbing area for nutrients like glucose (the lining of the small intestine) is bypassed. The “adipocentric model” proposes that excess fat causes

diabetes, perhaps by making other cells resistant to insulin. "Time to think differently about diabetes" by Francesco Rubino - Nature, Vol. **533**, 26 May 2016, p.460 states; "We now know that the dramatic effects of surgery on diabetes are not just a consequence of weight loss." However, a possible analogy is that a constant excess of glucose overwhelms insulin's ability to do its job and this overwhelming is called resistance. Gastric-bypass-surgery patients can stop taking diabetes medications because insulin's ability to do its job is no longer overwhelmed, reducing what is called resistance and even causing normal response to insulin by cells.

"Knifeless" approaches that may one day replace quite invasive surgeries seem to require an interdisciplinary approach - with input from maths, physics and a paper Einstein wrote only 4 years after publishing General Relativity. For more than a hundred and ten years, science has accepted the concept of space-time which was formulated by Russian-German mathematician Hermann Minkowski and unites one time dimension with three space dimensions. So-called imaginary time is a concept derived from special relativity and quantum mechanics. Geometrically, imaginary numbers are found on the vertical axis of the Complex Number Plane, allowing them to be presented perpendicular to the real axis. One way of viewing imaginary numbers is to consider a standard number line, positively increasing in magnitude to the right, and negatively increasing in magnitude to the left. At 0 on this x-axis (the so-called 'real' axis), a y-axis (the so-called imaginary axis) can be drawn with "positive" direction going up - "positive" imaginary numbers then increase in magnitude upwards, and "negative" imaginary numbers increase in magnitude downwards.

Visualize space-time as defined by a horizontal diameter, a vertical diameter, and a third diameter that's perpendicular to both of these. These represent the cardinal directions gravitational waves* can travel. One direction along the horizontal axis corresponds to going forwards in time and is called "real". The reverse direction along the horizontal axis corresponds to going backwards in time and is called "complex".[^] The vertical axis represents the "imaginary time" described by the imaginary numbers of physics. The terms real, imaginary and complex come from the corresponding numbers in maths. Even if a computer in real space operated continuously for billions of years using imaginary time, its calculations would be retrieved instantly after they were entered into the computer because no period at all could elapse in our "real" time - a computer working in complex time delivers results at any desired point in the past.

*[See Albert Einstein's "Spielen Gravitationfelder in Aufbau der Elementarteilchen eine Wesentliche Rolle?" (**Do gravitational fields play an essential role in the structure of elementary particles?**), Sitzungsberichte der Preussischen Akademie der Wissenschaften, (Math. Phys.), 349-356 (1919) Berlin]. Also - "Physics of the

Impossible" by Michio Kaku (Penguin Books, 2009) states on pp. 276-277, "When we solve (19th-century Scottish physicist James Clerk) Maxwell's equations for light, we find not one but two solutions: a 'retarded' wave (corresponding to real time), which represents the standard motion of light from one point to another; but also an 'advanced' wave (corresponding to complex time), 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." Suppose Einstein was correct about gravitational fields restating Maxwell's equations in terms of gravity. Then gravitational waves would also have an "advanced" solution.

^ To introduce you to the idea of extra dimensions, consider this - 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". ("Are we missing a dimension of time?" By Roger Highfield, 10 Oct 2007, <http://www.telegraph.co.uk/news/science/large-hadroncollider/3309999/Are-we-missing-a-dimension-of-time.html>).

Using the above paragraphs, the gravitational waves and mass of a patient would not be restricted to the "real" space-time we're familiar with. Conceivably, the real space the patient is in could be combined with imaginary time so any pre-diabetic symptoms would never worsen because no period at all could elapse in our "real" time. Or real space might be joined with complex time – this conceivably allows symptoms to actually regress and vanish.
