Tomorrow's Computer Science Builds Today's, and Yesterday's, Universe

Author – Rodney Bartlett

Abstract -
Listening to Brian Cox and Dr. Karl talking on triple j (http://www.abc.net.au/triplej/media/s4513719.htm), the thing that most interested me was the subject "the opposite of gravity". By viewing reality as entanglement with the topological extension of a computer-simulated universe, comments can be made about: 1) the nature of gravity, and so-called antigravity being a result of the Complex Number Plane; 2) how this explanation of antigravity could explain dark energy and dark matter; 3) universal expansion being replaced by the closely related, though more precise, extension into space-time of binary digits and Mobius strips and figure-8 Klein bottles; 4) a non-supernatural, humanistic method of explaining how this could be a synthetic universe full of binary digits, Mobius strips, figure-8 Klein bottles, and universal Artificial Intelligence on astronomical, subatomic and biological levels.

Keywords -

reality is topological extension of computer-simulated universe; gravitational waves; "imaginary" time and Complex Number Plane; dark energy; absence of universal expansion; Poincare conjecture plus simulation modify Hubble constant

Content -

PART 1 - GRAVITY

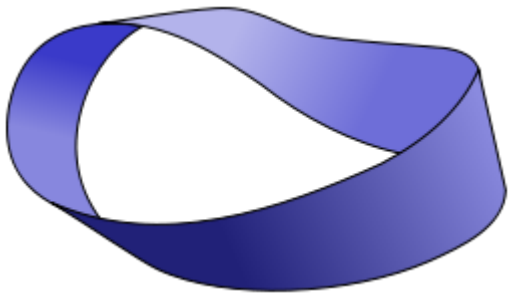
Some of the ocean waves passing an island are refracted - when they enter shallow water, they're refracted by the mass of the seabed. They change direction and head towards the island, breaking onto its beaches. Similarly, gravitational waves are refracted and focus on the centre of a mass. Exerting a force on that centre (a push) in partnership with the extremely energetic electromagnetic waves, 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."

^ (This paragraph explains what I call STEADY STATE TOPOLOGY) -

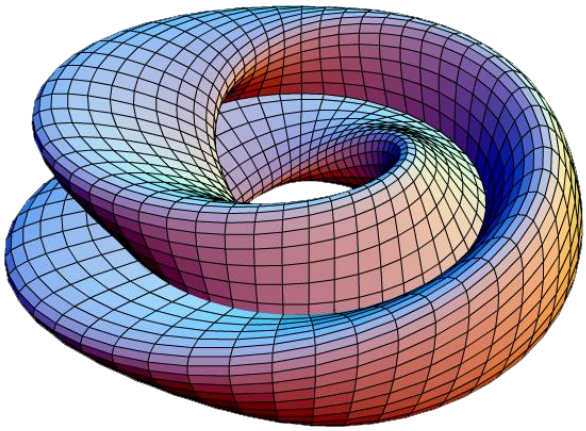
Conclusions reached after being inspired by a paper Einstein submitted to the Prussian Academy of Sciences asking "Do gravitational fields play an essential role in the structure of elementary particles?" ["Spielen Gravitationfelder in Aufbau der Elementarteilchen eine Wesentliche Rolle?", Sitzungsberichte der Preussischen Akademie der Wissenschaften, (Math. Phys.), 349-356 (1919) Berlin].

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:KleinBottle-Figure8-01.png)



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.) Joining two Mobius strips (or Mobius bands) can form a four-dimensional figure-8 Klein bottle (http://plus.maths.org/content/os/issue26/features/mathart/index). And 10^80 Klein bottles^ 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 Mobius 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 (the on-off pulsing of the virtuals generates binary digits which encode numbers, some of which are infinitely-long). And the virtual gravitons also help compose matter. The infinite numbers make the cosmos as a whole (that is: the cosmos beyond our 13.8-billion-year-old subuniverse) 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.

^ 10^80 is the estimated number of particles in the observable universe ("Introduction to Cosmology" by Barbara Ryden, Ohio State University ©2003 - Pearson, Out of print).

And this article deduces the figure-8 Klein bottle to be subatomic (quantum) in size - see second paragraph of WHAT UNIVERSAL EXPANSION?

SUBSECTION - "HOW THE ABOVE TECHNOLOGY AND MATHS COULD BE RESPONSIBLE FOR THIS UNIVERSE WITHOUT A SUPERNATURAL AGENT"

For a possible, humanistic method of explaining how this could be a synthetic universe full of binary digits, Mobius strips, figure-8 Klein bottles, and universal Artificial Intelligence on astronomical, subatomic and biological levels; please read the following subsection: remembering that 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."

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.

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 subsection. 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 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 detectable as waves of light. 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." [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 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 (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. 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. Since 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 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 ("A Brief History of Time" by Stephen Hawking - Bantam Press, 1988, p.139). 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.

(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).

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).

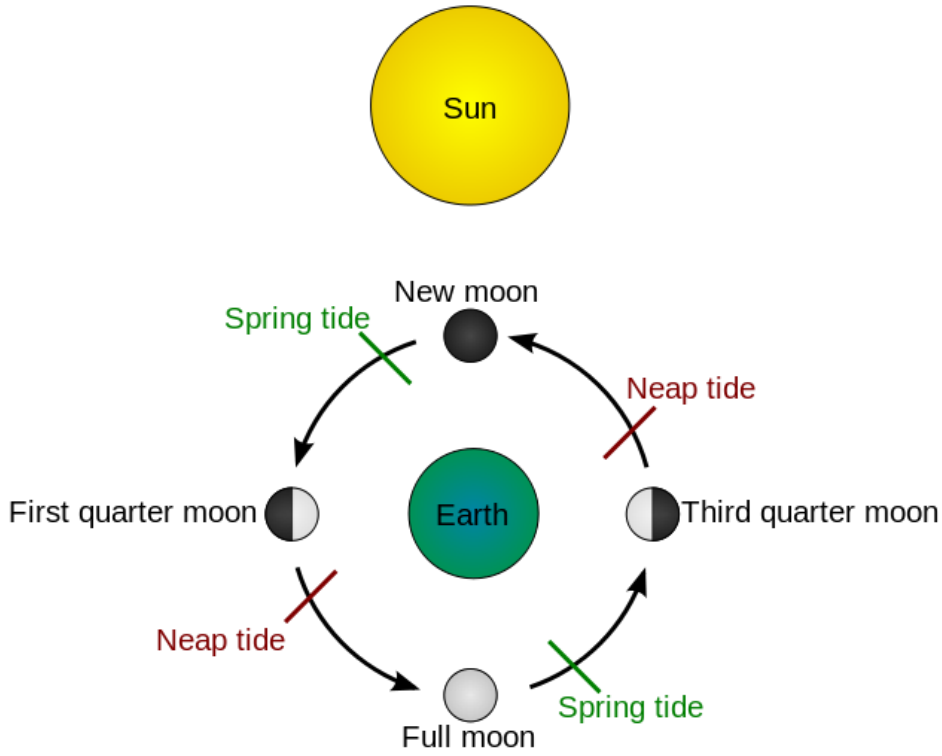
Entering a black hole on anything except a very special pathway into it is predicted to cause you to be shred into long, thin pieces – a process called spaghettification, and caused by the black hole's tidal forces (differences in its gravitational effect on an object's nearer and more distant ends). 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.



(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). These 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 a quantum version of gravitational lensing, whose non-subatomic-scale counterpart can split the image of an astronomical object into several images. If 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.

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 authors attribute this effect to dark energy. But as the last paragraph of COMPLEX NUMBER PLANE suggests - 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.

PART 2 - COMPLEX NUMBER PLANE

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.

Historically, mathematics often finds practical application in physics. The idea of the quantum was originally developed by Max Planck purely as a mathematical convenience, but it's been part of our reality for nearly a century. So the Complex Number Plane might find applications undreamt of today. 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 (pi), the sphere of space-time (a result of the concentric deposition of mass) 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 WHAT UNIVERSAL EXPANSION?, this extension could involve figure-8 Klein bottles rather than an expanding universe (closely related, yet definitely not identical) 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-wemissing-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.

^^ Science says there are 4 fundamental forces in the universe – gravitation, electromagnetism, the strong nuclear force and the weak nuclear force. The 2 nuclear forces are associated with matter. This article states that matter and all forms of mass are products of gravitational-electromagnetic coupling. Mainstream science disagrees, though it's indeed plausible since alternative versions of Higgs theory still circulate in science in which the role of the mass-bestowing 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). If matter is the product of interaction between gravitation and electromagnetism, it seems unreasonably strange to assume matter's associated nuclear forces are not products of the long-range forces also. Gravitation and electromagnetism would bestow mass on the particles composing matter's short-range forces viz gluons, W and Z particles … even the Higgs boson, which means

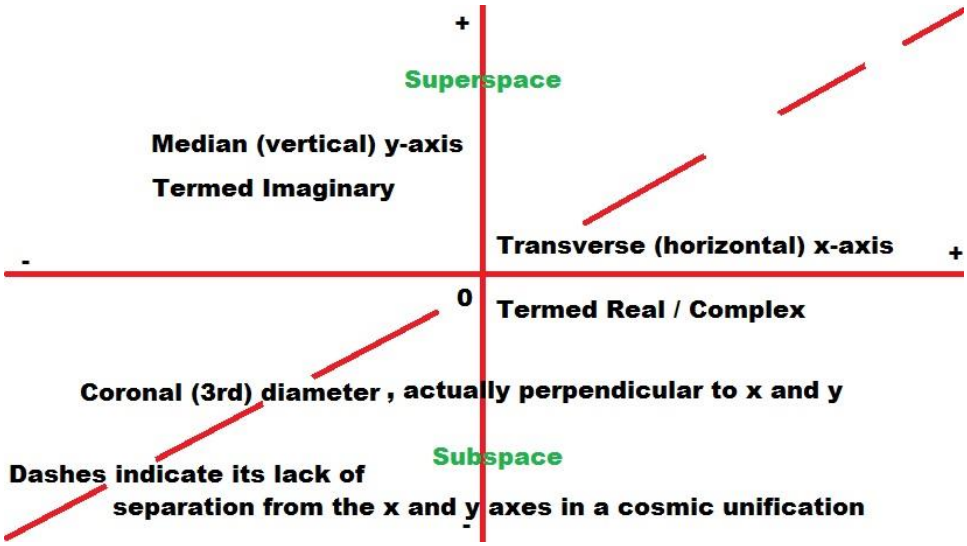
gravitational-electromagnetic interaction could be referred to as the Higgs field. Therefore, the strong and weak forces are not fundamental or basic. Einstein's equations say that in a universe possessing only gravitation and electromagnetism (the 2 fundamental forces), the gravitational fields carry 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). At the most fundamental level, all virtual particles might be further subdivided into electronics' binary digits of 1 and 0. This means the gravitons and virtual photons composing matter would ultimately be related as rearrangements of the other's binary digits. Then there's only one fundamental force unifying the universe: a union of the gravitational field-electromagnetic field. There's a satisfying consistency about the union of space-time being described by another union (that of gravitation-electromagnetism).

*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. 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 ½, 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).

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. 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.

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.



Axes of 3 times and 5 spaces – drawn on author's computer using "Paint" program

PART 3 – DARK ENERGY AND DARK MATTER

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.

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). (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, the amplification equals ¼ x ¼ ie doubling the distance in 5 space dimensions causes gravity to become 1/16 as powerful. It is not ¼ x -¼ 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 +¼ if the first one is +¼. 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.

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 (the higher dimensions - complex and imaginary - where dark matter is produced). 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, nothing is 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.

WHAT UNIVERSAL EXPANSION?

It might be helpful to begin with a couple of sentences about black holes' cosmic wormholes providing shortcuts between regions of the universe they connect: Mathematics' Poincare conjecture has implications for the universe's shape and says you cannot transform a doughnut shape into a sphere without ripping it. This can be viewed as subuniverses, like our 13.8-billion-year-old observable universe, that are made up of Figure-8 Klein Bottles (similar in shape to doughnuts). These bottles gain rips called wormholes when extended into the spherical* spacetime that goes on forever, forming one infinite superuniverse.

*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 ½, 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.

While the metric expansion of space appeared to be implied by Edwin Hubble's 1929 observations, Hubble always disagreed with the expanding-universe interpretation of the data:

"… 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"? Extension would be a mathematical process – involving binary digits, Mobius strips, figure-8 Klein bottles, pi, imaginary time, perpendicular angles … It would replace the physical 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 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. The expanding universe of the Big Bang and Inflation would become an outdated "creation myth", and Einstein would've been right to introduce the cosmological constant^^. The Hubble constant would not measure the rate of universal expansion, but would be a measure of how much computers of the distant future are used ie of how much extra space-time and mass are converted from the electronic output of fractionated virtual particles. Like any useful invention, the technology doubtlessly receives increased use as time passes. Output of spacetime/mass is magnified and this is known by believers in an expanding cosmos as accelerated universal expansion ("Nobel physics prize honours accelerating Universe find" by Jason Palmer - Science and technology reporter, BBC News, 4 October 2011 - http://www.bbc.com/news/science-environment-15165371).

^ 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 – possibly, this energy emanates from the future computers that use feedback loops and generate virtual particles. 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.

^^ "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.

SHAPE OF PHYSICALLY NONEXPANDING, BUT TOPOLOGICALLY EXTENDED, COSMOS

Quotes are from "The Shape of the Universe" by Stacy Hoehn - formerly at the Department of Mathematics, Vanderbilt University, USA - October 13, 2009 https://my.vanderbilt.edu/stacyfonstad/files/2011/10/ShapeOfSpaceVandy.pdf

"A Mobius band is constructed from a square by gluing the left side to the right side of the square after performing a half-twist."

"A Mobius band contains an orientation-reversing curve. Clockwise becomes counterclockwise along this curve!"

"The Klein bottle contains an orientation-reversing curve since it contains a Mobius band."

"Surfaces that contain an orientation-reversing curve are called nonorientable. Surfaces that do not contain an orientation-reversing curve are called orientable."

"No matter where we have been in the universe so far, if we choose a spot and travel out from it a short distance in all directions, we enclose a space that resembles a solid 3-dimensional ball. Thus, the universe appears to be some 3-manifold."

(My comment: I see this as support for "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.")

"If the universe was nonorientable, there would be strange physical consequences that have not yet been observed. While they could be happening outside of our field of vision, it is unlikely that our universe is nonorientable."

(My comment: It is nonorientable coz these strange physical consequences are indeed happening outside of our field of vision, since the universe has been shown to be noncompact ie infinite. As Bob Berman's article "Infinite Universe" ("Astronomy" – Nov. 2012) wrote, "The evidence keeps flooding in. It now truly appears that the universe is infinite" and "Many separate areas of investigation – like baryon acoustic oscillations (sound waves propagating through the denser early universe), the way type 1a supernovae compare with redshift, the Hubble constant, studies of cosmic largescale structure, and the flat topology of space – all point the same way."

What I regard as the strangest physical consequence would be that of the universe violating the Copernican ideal – this ideal makes man's view as typical and ordinary throughout the course of time as it is throughout the extent of space. Violating that ideal means our little corner of space-time really is different from particular portions of the rest of space-time. Another strange consequence is the 3 time dimensions/5 space dimensions of Complex Number Plane.)
