Mechanism for Possible Electronic Creation of the Universe and its Infinity of Time

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Abstract -

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, and manifesting the pulses as virtual gravitons (the quanta of gravity). This provides a possible, electronic 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, remembering that in a TV program it was 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." [Phillips G (August 29 2013) "Custom Universe – Finetuned For Us?" in Australian Broadcasting Corporation's "Catalyst" program]

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 about pi in "Contact" by Carl Sagan (1986) - Century Publishing, p.430. 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.

The above is a fascinating idea! But without backup from science, it can't be considered seriously. That's why the below sections - about physics, cosmology and mathematics – are essential in an article devoted to computer science. Unfortunately, we live in a world that's in love with putting everything in strict categories. That would quickly put an end to this article, if it were not for interdisciplinary science. The emerging understanding that the different branches of science are interconnected and rely on each other is what this article is all about. However, there are signs that science has not yet put into practice what it preaches. These ideas have been universally rejected by science journals for years - either without explanation, or because I don't know how to write in a manner

they consider acceptable. But in my opinion, the science is still valid. So I'll submit my ideas to the "International Journal of Advanced Computer Science and Applications", and trust that computer science is more enlightened than other branches.

Keywords -

Simulation; virtual reality; dark energy; dark matter; black holes; radioactive dating; gravity; mathematics; the shape of space-time; imaginary time.

INTRODUCTION

A paradigm shift in science is a fundamental change in its concepts and practices. “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 strives towards that revolution by addressing many topics – including dark energy, dark matter, black holes, radioactive dating, gravity, mathematics, the shape of space-time, and imaginary time. 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 over a century. So imaginary time and the Complex Number Plane might find applications undreamt of today.

^ **The ultraviolet catastrophe**, also called the **Rayleigh–Jeans catastrophe**, is a failure of classical physics to predict observed phenomena: it can be shown that a blackbody - a hypothetical perfect absorber and radiator of energy - would release an infinite amount of energy, contradicting the principles of conservation of energy and indicating that a new model for the behaviour of blackbodies was needed. At the start of the 20th century, physicist Max Planck derived the correct solution by making some strange (for the time) assumptions. In particular, Planck assumed that electromagnetic radiation can only be emitted or absorbed in discrete packets, called quanta. Albert Einstein postulated that Planck's quanta were real physical particles (what we now call photons), not just a mathematical fiction. From there, Einstein developed his photoelectric effect (when quanta or photons of light shine on certain metals, electrons are released and can form an electric current).

My ideas initially suggested gravitation (G) is the universe's only fundamental force and that electromagnetism (EM), as well as the strong and weak nuclear forces, are products of G. While the latter part has been retained, the fundamental force is now seen as a gravitational-electromagnetic (G-EM) union. This union of the different waveforms could be made possible by rearrangement of gravitons' binary digits (bits) into the bits of 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) [details in **TOPOLOGY**]. Rearrangement could be achieved by a quantum-scale version of gravitational lensing, which can split the image of an astronomical object into several images. The G-EM union/field is counterintuitive – even

ridiculous, absurd, impossible to some people – since gravitation is so weak (EM is 10^36 times as powerful, and the Strong Nuclear Force is a hundred times stronger again ie 10^38 times as powerful). The solution is infinity. Even the weakest force, when infinitely multiplied, has literally no limit to its power. It can produce another universal force that is measured, at distances tiny compared to infinity ie any distance, to be approximately 10^36 times stronger^. Such strangeness may be necessary to fulfil Albert Einstein's dream of uniting G and EM, then unifying all space-time into a single Unified Field. Obeying the Pauli Exclusion Principle that says there is no limit to the number of photons and presently hypothetical gravitons that can be exchanged (those particles are limitless in number), the Unified Field would be the G-EM field. 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 second-generation instrument of the "Background Imaging of Cosmic Extragalactic Polarization" experiment).

^ "For instance, at the distance of 3×10^{-18} meters, the electromagnetic α is closer to 1/128 than its long-distance value of about 1/137." ["The Strengths of the Known Forces" by theoretical physicist Matt Strassler [May 31, 2013] - http://profmattstrassler.com/articles-and-posts/particle-physicsbasics/the-known-forcesof-nature/the-strength-of-the-known-forces/]. The Internet's free encyclopedia, Wikipedia, defines α (the fine-structure constant) this way: In physics, the fine-structure

constant, also known as Sommerfeld's constant, commonly denoted α (the Greek letter alpha), is a fundamental physical constant characterizing the strength of the electromagnetic interaction between elementary charged particles.

HOW HUMAN CREATION OF THE UNIVERSE COULD BE ACHIEVED ELECTRONICALLY

(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 S (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 S, Mlodinow L (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 [Yee A (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. [Purkert W, Ilgauds H (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.

^ 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). Also consider the 3 time-dimensions and 5 space-dimensions this article proposes in the explanation and diagram of imaginary time and the Complex Number Plane in **INTRODUCTION** as well as **DARK ENERGY AND DARK MATTER**. Our present approach to developing computers has gone about as far it can. The problems of chips generating too much heat - and of quantum uncertainties making transistors hopelessly unreliable at the scale of atoms - demand a new approach. I'm proposing that the successor to today's silicon technology is not quantum computers or spintronics, but lies in new concepts of time.

(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 which, after Relativity and quantum mechanics, has been called the 3rd most important theory of the 20th century). And if everything is composed of 1's and 0's; all objects and events in the time, space and higher 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 **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

(6) Professor Stephen Hawking says that boundaries exist in real time but don't exist in imaginary time. [Hawking S (1988) "A Brief History of Time", p.139. 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 E (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).

THE GODS, EXTRATERRESTRIALS AND EVOLUTION

If humanity becomes capable of creating the cosmos with its infinite past and infinite future, that does not necessarily mean there is no God -

"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)]

Waves aren't compelled to affect each other as the energy of hypothetical gravitons and undetectable virtual photons combining in the Wave Packets of particles of matter. [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]. 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 to stimulate the nervous system as well as every bodily sense. In a twist to science's Holographic Universe theory; 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 infinitely more progress lies ahead. With multispectral holograms, working computers will eventually be simulated. So shall 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 – will oneday be capable of being simulated, thus forming an immaterial "spirit body".

The human body and brain might become immaterial, and 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. it can be interpreted to mean 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.

^ 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 the starship Voyager and at the same time he could see the shuttle he piloted away from Voyager. The following may be regarded as a first step toward Star Trek's infinite speed. The Complex Number Plane has a leftward direction on the horizontal X axis which is called the "complex axis" and corresponds to backwards motion in time. The direction to the right on X is called the "real axis" and corresponds to forward motion in time, while the vertical Y axis intersecting the X axis represents the so-called Imaginary Time derived from Special Relativity and quantum mechanics. (more explanation of these axes, and a diagram, in **INTRODUCTION** and **DARK ENERGY AND DARK MATTER**). Movement forwards through hypertime's imaginary time is always in the Complex Number Plane's “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). 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. Then, what could prevent the object from being, like Lieutenant Paris,

entangled with every point in space (actually, spacetime) at once?

** Plus the inhabitants of countless billions of other worlds that will be colonized in the past and far future as well as the present and near future by humans who use imaginary time (a version of time travel) and have adapted to, or been genetically engineered to fit, other worlds as they explore the universe. Any complicated form of life – humanoid, animal or plant – anywhere in space would have to evolve into existence, unless human biotechnology and genetic engineering of future centuries produced it. The evolution proposed by Charles Darwin is indeed wonderful, and the Miller-Urey Experiment of 1952 made amino acids (which are relatively simple, and are the building blocks of protein) from inorganic material and by natural causes in a lab. Indeed, many molecules – including sugars and amino acids – have been found in space. But evolution appears limited. In a biological sense, the Theory of Evolution certainly explains adaptations and modifications in both one-celled and multicellular forms of life. But believing it also explains the origins of large lifeforms may be unwarranted extrapolation. It takes an idea that accounts for some parts of life and, since it's the only scientific explanation we currently have, assumes it accounts for all parts of life. Any large lifeform is far more advanced than any amino acid. My 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 and gradually become more civilized.

"The biological process which led to intelligent life on earth was a fluke that is unlikely to

have been repeated anywhere else in the universe, claims Professor Brian Cox."

Read more: http://www.dailymail.co.uk/sciencetech/article-2809183/We-universe-Professor-Brian-Cox-says-alien-life-impossible-humanity-unique.html#ixzz4Jm4HkZQD

Prof. Cox may be correct about intelligent life originating on Earth only. However, saying the biological process leading to that was a fluke suggests he believes evolution was the originator. Advanced genetic engineering/biotechnology would result from centuries of careful theorizing and experimenting – it could never be a fluke if it originates intelligent life. On one hand, he's right – on the other (about evolution producing humans), he's wrong as far as I can tell.

DARK ENERGY AND DARK MATTER

An article in "Scientific American" - "Physics Confronts Its Heart of Darkness" by Lee Billings (August 31, 2016: https://www.scientificamerican.com/article/physics-confronts-its-heart-of-darkness/) - suggests that a more plausible explanation of dark matter may be necessary. The idea of dark matter seems to be the result of science not understanding gravity. Michio Kaku states in "Physics of the Impossible": Penguin Books, pp. 276-277 that:

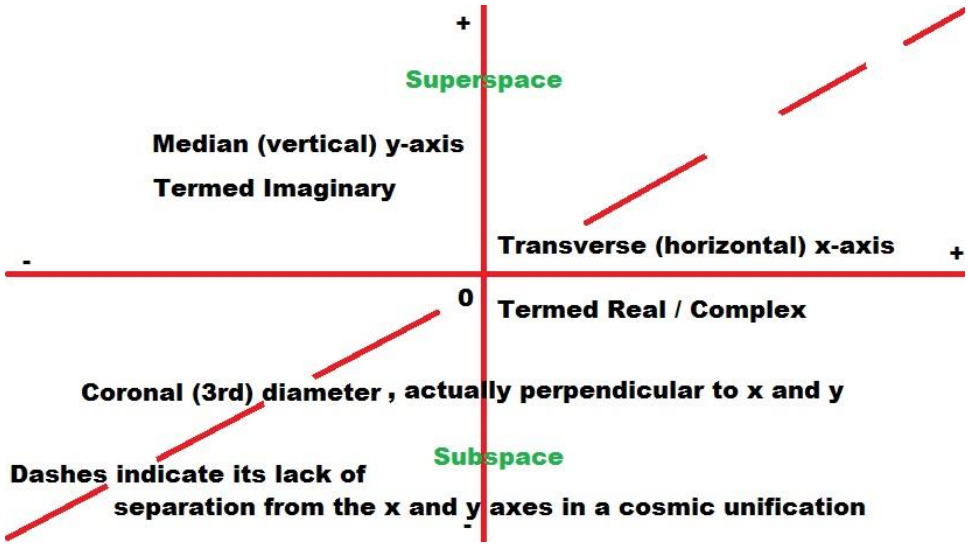
"When we solve Maxwell's equations for light^, we find not one but two solutions: a

'retarded' wave (corresponding to so-called real time), 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."

^ Actually, for electromagnetic waves ... which include radio waves, microwaves, infrared rays, visible light, ultraviolet waves, X-rays and gamma rays. [James Clerk Maxwell (1831 – 1879) was a Scottish physicist and mathematician whose most notable achievement was to describe electricity, magnetism, and light as manifestations of the same phenomenon.]

Einstein's equations say that in a universe possessing only gravitation and electromagnetism*, the gravitational fields carry enough information about electromagnetism to allow the equations of Maxwell to be restated in terms of these gravitational fields. So there are 'advanced' gravitational waves going back in time ... these are known as antigravity (comment begins at 3rd paragraph of **SHAPE OF SPACE**). Antigravity could be called dark energy and, if real gravity is involved in ordinary matter's mass-production (last paragraph of subsection), antigravity would conceivably be involved in the mass-production of other matter called "dark" (which would not be WIMPs, sterile neutrinos, axions or any particles that travel forwards in time). Does dark matter belong to a higher dimension where antigravity - gravitational

waves going back in time - exists on the "complex axis". (This is the leftward direction on the horizontal X axis of the Complex Number Plane. The direction to the right on X is called the "real axis" and corresponds to forward motion in time, while the vertical Y axis intersecting the X axis represents the so-called Imaginary Time derived from Special Relativity and quantum mechanics.)



Complex Number Plane with the right direction on the X axis representing real time with its space dimensions of length, width and height - the left direction on X depicting the 5th space dimension/3rd time dimension of complex space-time – the Y axis representing the 2nd (imaginary) time/4th dimension of imaginary space - and the 3rd (coronal or Z) diameter that is not separate from X/Y and adds no extra dimensions

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, 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.

* 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. [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]. This paper was written prior to the discovery of the nuclear forces. However, it seems to imply to modern science that the 2 nuclear forces are not fundamental but, like the matter they're associated with, are products of gravitational-electromagnetic interaction (which produces the mass of W and Z particles). This agrees with theories 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.

RADIOACTIVE DATING

Every type of radioactive dating (eg potassium-argon or uranium-lead etc to date rocks, carbon14 to date organic material) produces erroneous results since it does not include

gravitation playing a role in matter, nor the travelling back in time of gravitational waves. If all the radiation and emitted particles from a radioactive meteorite used to date the solar system were going forward in time, the result certainly could approximate 4.5 billion years old. If 100% of the rays and particles were going back in time, they could be measured to converge on a point in time that coincides with the meteorite's coming into being – and the solar system's age would be calculated to be zero. In reality, some waves/particles are going forward and some are travelling backwards. So the truth is that our Sun and planets etc are aged somewhere between zero any-kind-of-units and 4.5 billion years.

Now it's time for a break so the concept of infinity can be briefly discussed in the title "Gravity" (in-depth discussion occurs later in **SHAPE OF SPACE**):

GRAVITY

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. The increase may actually 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 spherical portion of space-time neatly fits into the open, negative curvature of a saddle-shaped (hyperboloid) part of space-time. Like the pommel protruding from the front of a saddle, negative curvature can cause an "imaginary" space and imaginary time to extend/be extruded 90 degrees from the "surface" of real, flat space-time. This makes imaginary time a real phenomenon, and no longer purely mathematical. Through their union, positive and negative curvature ultimately cancel each other on the largest scales to produce the flatness of infinity/eternity.

^ 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." 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.

RETURN TO "RADIOACTIVE DATING"

Earlier, it was stated that "… our Sun and planets etc are aged somewhere between zero any-kind-of-units and 4.5 billion years." Space-time has been proposed as infinite - a concept which includes both the numbers 4.5 billion and 0. So strangely, there really can be zero time between events.^ What does it mean if there is 0 time between what is observed in the present fraction of a second and the events infinitely distant in the future or past? It must mean everything is occurring at once. We're unaware of practically all of it because human brains reach perspective's vanishing point (a visual example is that of railway lines converging in the distance – a multisensory example may be inability to perceive anything beyond a particular location on a DVD's long spiral track of data). And the scientific instruments/spaceprobes designed by those brains eventually reach their

vanishing point too – though science's devices are less limited since they see further into space and the subatomic world, and they detect in more wavelengths. Even though it might be impossible to sense or detect anything beyond a particular spot on a DVD's track, the entire disk nevertheless exists. A finite DVD is a poor analogy to the infinite universe, but the correct change in perspective allows complete information to be obtained from either (to see everything happening at once).

^ The union of space-time means there can also be zero time between any bodies in space ie zero distance. This applies to any form of distance - between (and within) eg atoms in chemical or nuclear reactions, planets and stars and galaxies … and people. All measurements – radar, astronomical, geological, mathematical, medical etc – are erroneous because they only include a fraction of the Complex Number Plane. Gravitational and electromagnetic waves travel in the standard real, imaginary and complex coordinates of a simple, two dimensional diagram of the Plane – as well as every direction between them. But technology tries to reach conclusive answers by measuring nothing except the so-called "real" part. **Past and present mathematics and science are built on the idea of separateness, and the way our senses reveal the world to us. So zero time/zero distance will be mistakenly understood as nonsensical garbage unless a paradigm shift towards cosmic unification can be accepted**.

In the case of the DVD, thousands of people could view a different second of the movie. Then a variation of astronomy's interferometry could be used – interferometry is the process of combining the waves detected by multiple instruments (say, radio telescopes) to learn more than a single radio telescope can reveal. The gravitational and electromagnetic waves composing each person's brain are combined so one brain (yours) can access all info on the disk. In the case of the cosmos, everything in space-time could be unified by those waves. Causes and effects would be restricted to communicating at the velocity of light – identical to the velocity of gravitational and other electromagnetic waves – if time only moved forwards ie if only "real" time existed. But time also moves backwards ie "complex" time exists. So waves from a cause can travel back in time to an effect, thus creating its effect instantly in a process called entanglement (entanglement can be quantum or macroscopic). If your brain and body is entangled with all time and all space,^ you'll be able to learn and do things considered impossible. '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). 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).

^ In other words - "If the distances between bodies in time is zero, and if the distances

between bodies in space is zero" (time and space must have the same property regarding distance if they're permanently linked as space-time). Sharing the same property means the distinction between space and time is eliminated (such deletion is a property of imaginary time - “A Brief History of Time” by Stephen Hawking: Bantam Press, 1988, p.134).

BLACK HOLES AS PORTALS TO OTHER SPACE-TIME REGIONS

Using the real axis of the Complex Number Plane means infinity can include positive numbers like 4.5 billion (years or light years). Using the axes of hyperspace (complex or imaginary) means infinity can include negative 4.5 billion years or light years. The previous subsection said there really can be zero time between events in time and zero distance between bodies in space. How does this "space-time zeroness" manifest? The binary states of on-off, or of increased energy-decreased energy, in pulsations of the virtual particles (gravitons) filling space-time can be represented by the electronic binary digits (bits) of 1 and 0. Just as "bit" is an abbreviation for "binary digit" in ordinary computers, "qubit" stands for "quantum bit" in quantum computers. The qubit is perpetually realized inside black holes because their gravitational and electromagnetic waves possess both forward and backward motion in time, cancelling to produce the zero time/zero distance called entanglement. And they therefore provide constant access to all other regions of space-time. (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.

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 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. In a Black Hole, these energies reside together but temperature within a black hole is extraordinarily close to absolute zero. The coldness prevents gravitons and photons interacting to form matter – in this case, clouds of dust and gas that can condense into stars. 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.

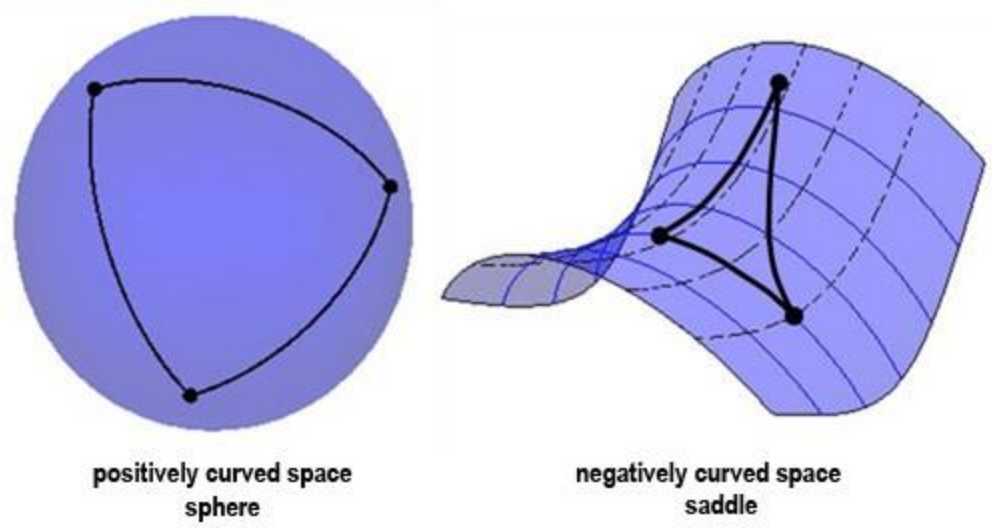
E=mc^2, when viewed as E=0 and m=c^2, also supports this article's statement that gravitational ripples proceed in the "reverse" direction along the horizontal axis (not in so-called 'real' time, but in 'complex' time. This is because m=c^2, and those two can only create 0* if, purely for example, m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

SHAPE OF SPACE

Space-time is not like the surface of positively-curved Earth: it is not finite but without boundary. This is because, as explained below, positive curvature fits together with negative curvature to cancel on the largest scales and produce the flatness of space-time's infinity/eternity.



Thanks to https://www.quora.com/What-does-the-universe-is-flat-mean

Astronomers love the ideas of the Big Bang and expanding universe. It's possible that the universe is not physically expanding at all - but is undergoing the closely related, yet definitely not identical, process of mathematical extension. Computers' binary digits are encoded by the quantum fluctuations/energy pulses called Virtual Particles which fill space-time. They're coded into the form of two-dimensional programs shaped as Mobius strips which are joined as four-dimensional figure-8 Klein bottles (this process accounts for General Relativity's curvature of space-time). The bottles are extended from math form to structures in space-time that the energy of gravitational-electromagnetic interaction gives tangible form to. This would only necessitate a God if time was exclusively a straight line like the Complex Number Plane's real time or complex time. Since Einstein showed that space and time are curved (they bend from the real/complex axis to include the imaginary axis), it's within the potential of future humanity.

When people hear the word "antigravity", many tend to think of the phrase "expanding universe". It's possible that the universe is not physically expanding at all - but is undergoing the closely related, yet definitely not identical, process of mathematical extension.

Let's start with a short summary of black holes' cosmic wormholes which provide shortcuts between regions of the time and space 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 the universe being made up of Figure-8 Klein Bottles. Described informally rather than in the strict conformity of mathematical formalism, these are similar in shape to doughnuts: joining a pair of two-dimensional Mobius strips forms a four-dimensional Klein bottle (http://plus.maths.org/content/os/issue26/features/mathart/index). The cosmos gains rips called wormholes when extended into a spherical spacetime that goes on forever, forming one infinite universe (see **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 (higher dimensions of space-time) of mathematics' Complex Number Plane. 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 … there is no evidence of expansion, no trace of curvature … 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

TOPOLOGY

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. A diagram of many figure-8 Klein bottles would show that their positive curvature (on the spherical parts) fits together with their negative curvature (on saddle-shaped parts) to cancel and produce the flat curvature of space-time's infinity/eternity. Like the pommel protruding from the front of a saddle, negative curvature can cause an "imaginary" space – and thanks to the indissoluble union of spatial plus temporal phenomena – the well-

established science concept of imaginary time; to extend 90 degrees from the "surface" of real, flat space-time.

Mobius Loop (source: http://www.polyvore.com/mobius_strip_public_domain_clip/thing? id=72360021)

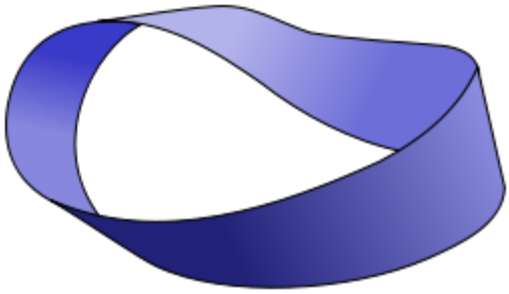
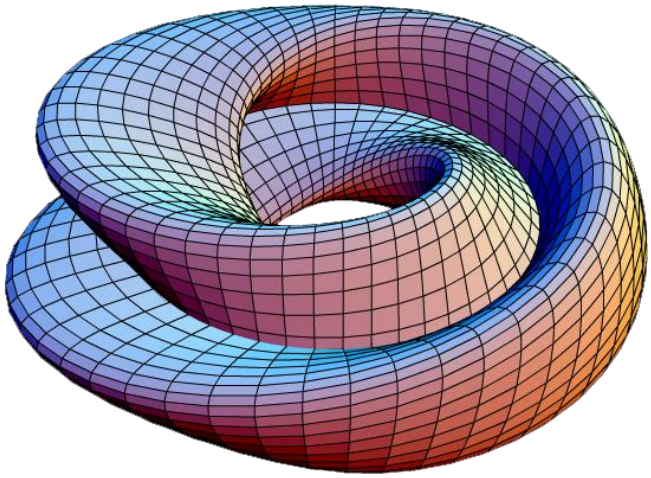


Figure-8 Klein Bottle (source: http://commons.wikimedia.org/wiki/File:KleinBottleFigure8-01.png) Note that, when considering many bottles,^ the reddish positive curvature fits together with the bluish negative curvature to produce the flatness of space-time's infinity/eternity.



^ 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). 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. 10^80 is the estimated number of particles in the observable universe ("Introduction to Cosmology" by Barbara Ryden, Ohio State University ©2003), so there would be at least 10^80 figure-8 Klein bottles in the observable universe. 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). Some scientists believe that large warm and cool spots in the Cosmic Microwave Background could actually be evidence for this kind of topology - see later in this paragraph where figure-8 Klein bottles can be made into plausible subunits of a flat and infinite universe. The universe appears to be infinite,^ being flat on the largest scales and curved on local scales (from a great distance, 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]. 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 positive and negative curvatures can complement each other's shape, and the mathematical figures of digitised images can morph to perfect the complementarity if necessary (perhaps by binary digits filling in gaps and irregularities 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. 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.

* On the subject of feasibility, some quotes from "The Shape of the Universe" by Stacy Hoehn, formerly of Vanderbilt University's Mathematics Department (https://my.vanderbilt.edu/stacyfonstad/files/2011/10/ShapeOfSpaceVandy.pdf - October 13, 2009) are offered as support - (1) "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." (2) "A Mobius band contains an orientation-reversing curve. Clockwise becomes counterclockwise along this curve!" (3) "The Klein bottle contains an orientation-reversing curve since it contains a Mobius band." (4) "Surfaces that contain an orientation-reversing curve are called nonorientable. Surfaces that do not contain an orientation-reversing curve are called orientable." (5) "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. 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, in non-fundamental ways, from particular portions of the rest of space-

time (those different parts would still have binary digits/Mobius strips/figure-8 Klein bottles as their basis). Another strange consequence is the 3 time dimensions/5 space dimensions of Complex Number Plane.]

^ “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.” ("Infinite Universe" by Bob Berman - "Astronomy”, Nov. 2012)

^ continued - "The Beginning of Time" by Stephen Hawking (http://www.hawking.org.uk/the-beginning-of-time.html) says, "… the theory that the universe has existed forever is in serious difficulty with the Second Law of Thermodynamics. The Second Law states that disorder always increases with time. Like the argument about human progress, it indicates that there must have been a beginning. Otherwise, the universe would be in a state of complete disorder by now …" Cosmic unification via the gravitational field overcomes this objection. Taking matter as an example - mass, electromagnetic energy and the strong and weak nuclear forces are capable of greatly varying degrees of renewal (from the microscopic to regeneration of a liver/rib to eventual total renewal) if matter and its properties result from the cosmic gravitational field.

^ continued - 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's quantum (the hypothetical graviton) is split into the quantum particles of 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 (as the above paragraph put it, "if matter and its properties result from the cosmic gravitational field"), 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. "Fermi (Space Telescope) detected the burst (the first detection of gravitational waves on September 14, 2015) just 0.4 seconds after LIGO detected gravitational waves, and from the same general area of the sky. However, the European INTEGRAL gamma-ray satellite did not confirm the signal. Even if the Fermi detection is a false alarm, future LIGO (Laser Interferometry Gravitational-wave Observatory) events should be monitored for accompanying light irrespective of whether they originate from black hole

mergers. Nature can always surprise us," says (astrophysicist Avi) Loeb." Dr. Loeb's quote is from "LIGO's Twin Black Holes Might Have Been Born Inside a Single Star" by Harvard-Smithsonian Center for Astrophysics: https://www.cfa.harvard.edu/news/2016-05

REFERENCES (ALSO INCLUDED AT APPROPRIATE POSITIONS IN TEXT)

[1] Paton R (1967) Gravitation article in The World Book Encyclopedia. Field Enterprises Educational Corporation

[2] Einstein A (1919) Spielen Gravitationfelder in Aufbau der Elementarteilchen eine Wesentliche Rolle? in Sitzungsberichte der Preussischen Akademie der Wissenschaften (Math. Phys.) Berlin 349-356

[3] Polthier K, Imaging maths - Inside the Klein bottle. http://plus.maths.org/content/os/issue26/features/mathart/index

[4] Time-Life Books (1991) Workings of the Universe 84

[5] Ryden B, Ohio State University (2003) Introduction to Cosmology. Pearson

[6] Bourbaki N (2005) Lie Groups and Lie Algebras. Springer

[7] Conway J (1986) Functions of One Complex Variable I. Springer

[8] Gamelin T (January 2001) Complex Analysis. Springer

[9] Joshi, K (August 1983) Introduction to General Topology. New Age Publishers

[10] Spanier E (December 1994) Algebraic Topology. Springer

[11] Luminet J-P, Lachi`eze-Rey M (1995) Cosmic Topology. Physics Reports 254 (3): 135–214. arXiv:gr-qc/9605010

[12] Berman B (Nov. 2012) Infinite Universe. Astronomy. http://www.astronomy.com/magazine/bob-berman/2012/09/infinite-universe

[13] Phillips G (August 29 2013) Custom Universe – Finetuned For Us? in Australian Broadcasting Corporation's Catalyst program

[14] Sagan C (1986) Contact 430. Century Publishing

[15] Hawking S (1988) A Brief History of Time 69. Bantam Press

[16] Hawking S, Mlodinow L (2010) The Grand Design 49. Bantam Press

[17] Yee A (2016) y-cruncher - A Multi-Threaded Pi-Program.

http://www.numberworld.org/y-cruncher

[18] Purkert W, Ilgauds H (1985) Georg Cantor: 1845–1918. Birkhäuser. ISBN 0-8176-1770-1

[19] Hawking S (1988) A Brief History of Time 139. Bantam Press

[20] Hubble E (1936) Effects of Red Shifts on the Distribution of Nebulae in Ap. J. 84: 517

[21] Time-Life Books (1988) The Cosmos 50

[22] Tyson P (10.29.02) Galileo's Big Mistake". http://www.pbs.org/wgbh/nova/earth/galileo-big-mistake.html

[23] (2008) Ocean Volume and Depth. Van Nostrand's Scientific Encyclopedia, 10th edition

[24] Krasinsky G, Brumberg V (2004) Secular Increase of Astronomical Unit from Analysis of the Major Planet Motions, and Its Interpretation. Celestial Mechanics & Dynamical Astronomy Volume 90: Issue 3-4: 267-288. DOI: 10.1007/s10569-004-0633-z

[25] Highfield R (10 Oct 2007) Are we missing a dimension of time?" http://www.telegraph.co.uk/news/science/large-hadroncollider/3309999/Are-wemissing-a-dimension-of-time.html

[26] Kaku M (2009) Physics of the Impossible 276-277. Penguin Books

[27] Tanabashi M, Harada M, Yamawaki K (2006) The Origin of Mass and Strong Coupling Gauge Theories. International Workshop on Strongly Coupled Gauge Theories. Nagoya 227–241

[28] Rainich G (1925) Transactions of the American Mathematical Society 27: 106

[29] Hawking S (1988) A Brief History of Time 66-67. Bantam Press

[30] Ellis J (14 April 2015) The Physics Landscape after the Higgs Discovery at the LHC. arXiv:1504.03654

[31] Hawking S (1988) A Brief History of Time 164-165. Bantam Press

[32] Moskowitz C, SPACE.com (October 3, 2012) Speed of Universe's Expansion Measured Better Than Ever. http://www.space.com/17884-universe-expansion-speed-hubble-constant.html#sthash.cKSz5cRH.dpuf)

[33] Palmer J, BBC News (4 October 2011) Nobel physics prize honours accelerating Universe find. http://www.bbc.com/news/science-environment-15165371

[34] Life Nature Library (1964) The Universe 175

[35] mathsmanretired, Yahoo.com (2008) Can you add to infinity? https://answers.yahoo.com/question/index?qid=20090106024304AA1Rv5q

[36] Sloan Digital Sky Survey (SDSS) The Expanding Universe. http://skyserver.sdss.org/dr1/en/astro/universe/universe.asp

[37] "The Shape of the Universe" by Stacy Hoehn, formerly of Vanderbilt University's Mathematics Department (https://my.vanderbilt.edu/stacyfonstad/files/2011/10/ShapeOfSpaceVandy.pdf - October 13, 2009)
