MULTIDIMENSIONAL, WAVE-FUNCTION SUPERCONDUCTIVITY AND COSMOLOGY

Author – Rodney Bartlett

Abstract -

The Cooper pair state is responsible for superconductivity, as described in the BCS theory developed by John Bardeen, Leon Cooper, and John Schrieffer for which they shared the 1972 Nobel Prize. A Cooper pair or BCS pair is a pair of electrons (or other fermions) bound together at low temperatures in a certain manner first described in 1956 by American physicist Leon Cooper. These have some bosonic properties – properties similar to photons, gravitons and the Higgs boson. Bosons, at sufficiently low temperature, can form a Bose–Einstein condensate which is an example of **macroscopic quantum phenomena** (quantum behavior at the macroscopic scale, rather than at the atomic scale where quantum effects are prevalent). The best-known examples of macroscopic quantum phenomena are superfluidity and superconductivity. The fact that bosons can form a Bose–Einstein condensate which is related to superconductivity hints at superconductivity being a wave-function phenomenon. Also, the Complex Number Plane of mathematics in conjunction with the so-called Imaginary Time of physics suggests this wave-function might find practical application beyond abstract maths and could be multidimensional having "real", "imaginary" and "complex" types. The explanation of superconductivity by means of Cooper pairs confirms the validity of wave-particle duality.

This article also extends the quantum scale and the wave-function to computer science and the cosmic scale - commenting on gravitational superconductivity, dark energy, dark matter, antimatter, the Big Bang and cosmological Inflation, Unification, Artificial Intelligence, and black holes.

Keywords -

Superconductivity; gravitational superconductivity; Big Bang; dark energy; dark matter; antimatter; black holes; Unification; Artificial Intelligence
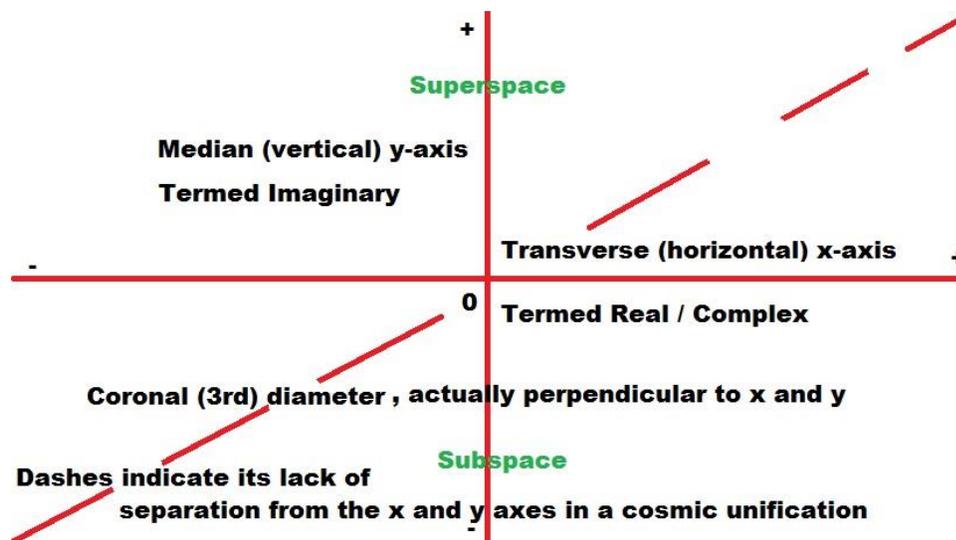
Content -

COMPLEX NUMBER PLANE

So-called imaginary time is a concept derived from special relativity and quantum mechanics. Geometrically, imaginary numbers are found on the vertical axis of the Complex Number Plane, allowing them to be presented perpendicular to the real axis. One way of viewing imaginary numbers is to consider a standard number line, positively increasing in magnitude to the right, and negatively increasing in magnitude to the left. At 0 on this x-axis (the so-called 'real' axis), a y-axis (the so-called imaginary axis) can be drawn with "positive" direction going up - "positive" imaginary numbers then increase in magnitude upwards, and "negative" imaginary numbers increase in magnitude downwards. ("Positive" numbers increasing upwards correspond to superspace and imaginary time, while "negative" numbers increasing downwards describe subspace and imaginary time.*) Visualize space-time as defined by a horizontal diameter, a vertical diameter, and a third diameter that's perpendicular to both of these. These represent the cardinal directions gravitational waves can travel. One direction along the horizontal axis corresponds to going forwards in time and is called "real". The reverse direction along the horizontal axis corresponds to going backwards in time and is called "complex".^ The vertical axis represents the "imaginary time" described by the imaginary numbers of physics. The terms real, imaginary and complex come from the corresponding numbers in maths.

^ "Physics of the Impossible" by Michio Kaku (Penguin Books, 2009) states on pp. 276-277, "When we solve (19th-century Scottish physicist James Clerk) Maxwell's equations for light, we find not one but two solutions: a 'retarded' wave (corresponding to real time), which represents the standard motion of light from one point to another; but also an 'advanced' wave (corresponding to complex time), where the light beam goes backward in time. Engineers have simply dismissed the advanced wave as a mathematical curiosity since the retarded waves so accurately predicted the behavior of radio, microwaves, TV, radar, and X-rays. But for physicists, the advanced wave has been a nagging problem for the past century." Suppose Einstein was correct about gravitational fields restating Maxwell's equations in terms of gravity.^^ Then gravitational waves would also have an "advanced" solution.

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

+

Superspace

Median (vertical) y-axis

Termed Imaginary

-

Transverse (horizontal) x-axis +

0 **Termed Real / Complex**

Coronal (3rd) diameter , actually perpendicular to x and y

Subspace

Dashes indicate its lack of
separation from the x and y axes in a cosmic unification

-

*Perhaps the real space/imaginary time combination – possible because of unification - is, to borrow a word from science fiction (and mathematics too), known as subspace. This could be interpreted in the diagram above as subspace having a definite position (represented in the sketch by a line). Superspace has a location too. Superspace is regarded in particle physics as the outcome of the theory of supersymmetry (SUSY) which relates the two classes of elementary particles – bosons (force-carrying particles) and fermions (particles of matter). This article relates bosons to fermions through binary digits and the Mobius strip. You have to go around this strip twice to arrive at your starting point - and matter particles have quantum spin described as 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)

DARK ENERGY (DE) AND DARK MATTER (DM)

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

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

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

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

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

"Recall that in 1918 the only elementary particles known were the electron and the proton. Physicists were attempting to understand why these were stable despite their internal electromagnetic repulsion. Most attempts were based solely on electromagnetic theory. For a review of these efforts see W. Pauli, 'Theory of Relativity', Pergamon Press, London (1958), see Part V, p.184 *ff.* Einstein's effort was to construct a model in which stability was achieved through the use of gravitational forces. In particular, he used modified gravitational field equations which included the cosmological constant."

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

That attempt is, unfortunately, universally regarded as a failure because scientists now explain atomic stability through the strong nuclear force. Einstein is said to have fallen out-of-touch with science by the time the nuclear forces were discovered. He disagreed with the alleged necessity of the trend to big, expensive experiments. But that doesn't mean he was out-of-touch. Give the man his due. He invented General Relativity only a handful of years prior to that 1919 paper. Is it so hard to believe he was way ahead of his time – even ahead of our time - when he combined gravitation with

electromagnetism? The discovery of the nuclear forces would do nothing to change the validity of those gravitational field equations if the nuclear forces are not fundamental. If the cosmos is made of 1's and 0's^, that possibility can be reconciled with gravitation uniting everything simply by proposing that the theoretical gravitons composing gravity actually exist, and that they're made up of the binary digits. Maybe those digits can be rearranged by nature ... perhaps by a quantum-scale version of gravitational lensing, which can split the image of an astronomical object into several images … rearranged into the particles constituting the other 3 forces (surrounding space-time's virtual particles and their produced digits are included in this rearrangement, to vary particle mass). This makes gravity the one truly fundamental force and besides making the nuclear forces non-fundamental, confirms Einstein's Unified Field.

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

If real gravity is involved in ordinary matter's mass-production, complex gravity must be involved in the mass-production of other matter called "dark". One way of determining if dark matter belongs to a higher dimension would be to measure its gravitational effects in space dimensions (see "A Brief History of Time" by Stephen Hawking – Bantam Press 1988, pp. 164-165). In three dimensions, the gravitational force drops to 1/4 if one doubles the distance. In four dimensions (4th-dimensional hyperspace), it would drop to 1/8 and in five dimensions (5th-dimensional hyperspace) to 1/16. The positive direction on the x-axis (representing the 3 space dimensions of real space-time) is in continuous contact with the negative direction on x (the 5th space dimension of complex space-time). Therefore, real gravity is perpetually amplified by complex gravity. Using Professor Hawking's figures from the previous paragraph, the

amplification equals 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.

ANTIMATTER RELATED TO DE, DM

^ Amplification increases the quantity of dark matter in relation to normal matter, too. In our observable universe, there is approximately 5 times as much dark matter as regular: "Planck Mission Brings Universe Into Sharp Focus": http://www.nasa.gov/mission_pages/planck/news/planck20130321.html#.V1zEQ49OJjp. Imagine laying a "floor" of real gravity which travels forward in time and contributes to formation of matter, then sliding a piece of furniture over it. The furniture represents complex gravity (antigravity) which travels back in time and results in antimatter - "Feynman's Theory of Antimatter" (part of http://www.upscale.utoronto.ca/PVB/Harrison/AntiMatter/AntiMatter.html) says,

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

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

The making of antimatter with particle accelerators (https://van.physics.illinois.edu/qa/listing.php?id=1172) does not contradict the idea of time-travelling particles, for collisions in accelerators aren't just events in space: they

occur in space-time. If this positron or antielectron keeps journeying back from some point in our future (where different warps in its constituent waves means it was matter), it becomes what we call dark matter when it has gone beyond our present.

When the furniture is pushed or pulled across the floor, the floor remains in position and resistance to motion is attributed to the furniture. In the same way, gravity's function is seemingly not disturbed but the resistance attributed to antigravity's motion is measured to be amplified 5 times. In other words, antigravity is slowed down to1/5 of gravity's speed and has 5 times longer to produce dark matter. This translates into there being 5 times as much dark matter as ordinary matter. So if antigravity is responsible for formation of antiparticles, why isn't the amount of antimatter also 5 times greater than normal matter? One of the great unsolved problems in physics is why the observable universe is composed almost entirely of ordinary matter, as opposed to an even mixture of matter and antimatter.

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

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

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

Heeger's statement is consistent with particles and antiparticles being the same except for the small differences caused by the warping of their composing waves (differences called their passage through time). Picture time as a DVD. Every fraction of a second in the universe's infinite history and infinite future – the result of the cosmos being generated from infinite numbers like pi - exists right now just as surely as an entire DVD exists even though we only perceive sights and sounds from an extremely tiny portion of the disk at any interval. So antimatter spends virtually its entire existence as either matter or dark matter, and the amount of antimatter in the cosmos is correspondingly "extremely tiny". Should antigravity's speed only be 1/5 of gravity's, the effect of real gravity on the cosmos would be far greater than that of complex gravity. It would cause universal expansion if real gravity is actually a repelling force, which the next section hopes to demonstrate. As the years pass, more and more dark matter will build up "behind" us ie in our past, adding resistance to the effects of complex gravity and increasing the repelling effects of real gravity. Expansion of parts of the infinite universe accelerates^, possibly displacing – or even causing contraction in - other unobserved parts. The present observable universe might be undergoing accelerating expansion today and contraction due to displacement by other "sub"universes tomorrow^^.

^ ("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).

^^ See 1) "Cosmic evolution in a cyclic universe" by Paul Steinhardt and Neil Turok - Phys. Rev. D **65**, 126003 [2002]

2) "Will Our Universe Collide With a Neighboring One?" By Zeeya Merali - October 2009 http://discovermagazine.com/2009/oct/04will-our-universe-collide-with-neighboring-one#.UY3YTKL-Gbs)

3) Narlikar, J. V., Burbidge, G., & Vishwakarma, R. G. (2007). Cosmology and cosmogony in a cyclic universe. Journal of Astrophysics and Astronomy, **28**, pp. 67–99

4) "Concentric circles in WMAP data may provide evidence of violent pre-Big-Bang activity" by V.G.Gurzadyan, R.Penrose (http://arxiv.org/abs/1011.3706)

(Submitted on 16 Nov 2010)

An alternative to the whole idea of displacement is never-ending expansion:

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

A reasonable objection to the "infinity of infinities" concept is that a smaller infinity is limited in size compared to a larger one. The idea of limits to infinity - which is an idea of limitlessness - is a contradiction. In the case of the universe and its subuniverses, think

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

GRAVITY

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

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

Entering a black hole on anything except a very special pathway into it is predicted to cause you to be 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.
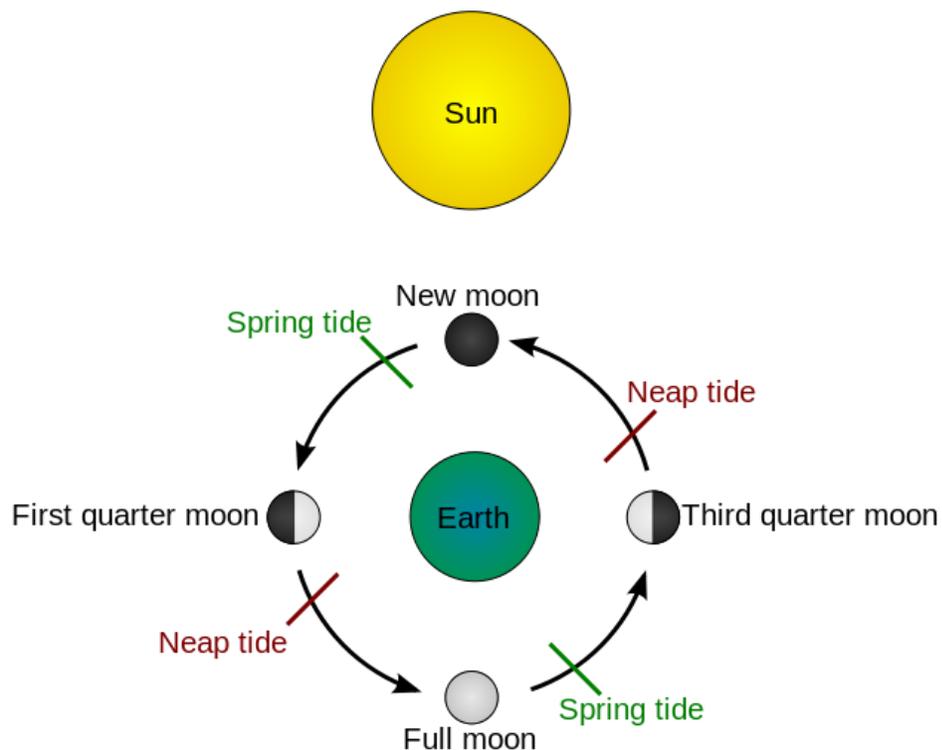
After absorption (whether in oceans, in space, or anywhere else), most of the gravity waves are used in building and refreshing mass and forces. The remnant is re-radiated from stars, planets, interstellar gas and dust, etc. It's radiated as gravitational waves (a Gravity Wave Background, challenging the idea that the traditional form of Cosmic Inflation was necessary to generate gravitational waves) which have lost most of their energy or strength during formation of mass and electromagnetic/strong nuclear/weak nuclear forces (returning to the weak strength we're familiar with). Maybe the gravitational force is split into the other 3 forces by means of quantum gravitational lensing, whose non-subatomic-scale counterpart can split the image of an astronomical object into several images. Since gravity can produce electromagnetism, it's also

radiated as all types of electromagnetic waves – including an infrared background whose heat output exceeds that of the stars alone, in addition to a microwave background. The latter challenges the idea that existence of the cosmic microwave background proves the universe began with the traditional Big Bang. The basic problem with science's understanding of the Big Bang seems to be that everyone believes time only exists in one version (see 3 time dimensions/5 space dimensions, and Professor Itzhak Bars, in **COMPLEX NUMBER PLANE**).

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

Gravity's a push and the reverse motion of complex gravity causes complex gravity to act in the reverse manner - as a pull. In real space-time, the Sun lies in a depression or valley, and the Earth rolls towards it. We could say gravity pushes … gravitational waves push … Earth to the Sun. But in complex space-time, the Sun instead sits on a high hill, and the Earth rolls away from it. We could say complex gravity pulls … complex gravitational waves pull … Earth away from the Sun (like sci-fi's tractor beam^). 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?

^ **"Star Trek style 'tractor beam' created by scientists"**
(http://www.bbc.com/news/uk-scotland-tayside-central-21187598 - 25 January 2013) says, "A real-life 'tractor beam', which uses light to attract objects, has been developed

by scientists." It's only used on microscopic objects. Dr Tomas Cizmar, research fellow in the School of Medicine at the University of St Andrews, says

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

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

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

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

ELECTRIC WAVES

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

SUPERCONDUCTIVITY

According to the article "superconductivity" in "Penguin Encyclopedia Edited by David Crystal" (Penguin Reference Library, 2006): this is "the property of zero electrical resistance, accompanied by the expulsion of magnetic fields (the Meissner effect), exhibited by certain metals, alloys, and compounds when cooled to below some critical temperature, typically less than –260 degrees C. Both effects must be present for true superconductivity."

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

Regarding the Meissner effect: Think of the electromagnetic wave relativistically. To do that, it must be shown that electromagnetism is not dissimilar from the gravitation of General Relativity, which is a purpose of the section below. In General Relativity, the simple analogy of space-time being regarded as a rubber sheet is commonly used. Instead of resorting to complex and lengthy relativistic mathematics, we can simply picture an electromagnetic wave as made of rubber. Compressing the electric component will force the magnetic component to bulge outwards ie there will be no magnetic field within the superconductor, only an external magnetic field. An externally-applied magnetic field also conforms to the bulging outwards and is expelled from within the superconductor.

GSC (GRAVITATIONAL SUPER CONDUCTIVITY) AND COSMOLOGY

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

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

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

^ In 1925, the Austrian physicist Wolfgang Pauli discovered the exclusion principle [Hawking, S. W. – "A Brief History of Time" – Bantam Press, 1988, pp. 68-69]. This says two similar particles cannot have both the same position and velocity. If two electrons could have identical positions and velocities, they could all collapse into a roughly uniform, dense "soup". Protons and neutrons would do the same, and there would be no well-defined atoms. So we need the exclusion principle. Force-carrying particles like photons and gravitons do not obey the exclusion principle, and there is no limit to the number that can exist in one spot.

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

Electrical superconductors aren't necessarily always in use, so gravitational superconductance isn't either. At those times when the qubit is being realized, GSC means Isaac Newton's concept of gravity acting instantaneously across the universe is correct. Gravity transmitted instantly, and gravity travelling at light speed, both exist

(they're in two frames of reference). This is reminiscent of Einstein's statement, '(Length contraction) doesn't "really" exist, in so far as it doesn't exist for a comoving observer; though it "really" exists, i.e. in such a way that it could be demonstrated in principle by physical means by a non-comoving observer.' (Einstein, Albert [1911]. "Zum Ehrenfestschen Paradoxon. Eine Bemerkung zu V. Variĉaks Aufsatz". Physikalische Zeitschrift 12: 509–510). The qubit is perpetually realized inside black holes and they therefore provide constant access to all multidimensional space-time. (They're portals to other regions of time and space within the infinite, eternal universe – see the article "Soft Hair on Black Holes" by Stephen W. Hawking, Malcolm J. Perry, and Andrew Strominger (Phys. Rev. Lett. 116, 231301 – Published 6 June 2016) which speaks of black holes being portals to other universes.

Recall earlier proposals that gravitation may be the universe's one fundamental force, being the basis of mass (and the two nuclear forces) which it forms in conjunction with another force that's essentially the same^ - because its quantum, the photon, is merely a re-formation of the 1's and 0's composing gravity's quantum, the graviton. Necessarily embracing the Meissner effect of SC, GSC's equivalent might be to "expel" electromagnetism and the nuclear forces from fundamentalism. This unifies the cosmos using the single fundamental force of gravitation. And if everything is composed of 1's and 0's, all objects and events in the time, space and dimensions of the cosmos are also linked or entangled. Entanglement and the qubit dispose of Cosmic Inflation's idea that the uniformity in the cosmos means particles in the universe must have once been in physical contact. And without the need for the universe to be materially tiny (it can be infinite and eternal since infinitely-long numbers are built into it), there's no need for a Big Bang theory. Such an infinite universe could be "created"^^ by the scenario starting after ^ and ^^

^ When Einstein penned E=mc^2, he used c (c^2) to convert between mass units and energy units (which, to me, appears to mean "between particles in space and the motion of those particles which is known as time") . The conversion number is 90,000,000,000 (light's velocity of 300,000 km/s x 300,000 km/s) which approx. equals 10^11. Gravity waves with a strength of 10^1 are, via quantum gravitational lensing, concentrated 10^24 times after they're focused to form matter (to 10^25, weak nuclear force's strength - giving the illusion that a weak nuclear force that is not the product of gravitation exists). Waves are magnified by the matter's density to achieve electromagnetism's strength (10^36 times gravity's strength) i.e. 10^25 is multiplied by Einstein's conversion factor [10^11] and gives 10^36 (this gives the illusion of the existence of electric and magnetic fields that are not a product of gravitation).

^^ Science's Law of Conservation has known since the 19th century that neither matter nor energy can ever be destroyed or created - they only change form.

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

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

Binary digits are proposed to be the Hidden Variables which "are an interpretation of quantum mechanics based on the belief that the theory is incomplete and that there is an underlying layer of reality that contains additional information about the quantum world. This extra information is in the form of the hidden variables, unseen but real quantities. The identification of these hidden variables would lead to exact predictions for the outcomes of measurements and not just probabilities of obtaining certain results." ("Quantum" by Manjit Kumar - Icon Books, 2008 - p. 379)
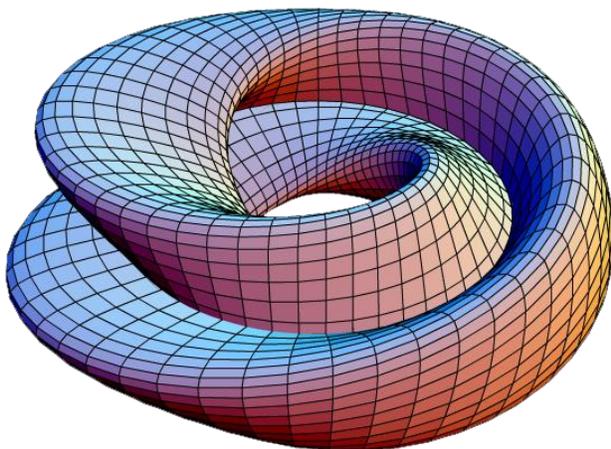
String theory – the best known hypothesis of modern physics searching for the universe's Theory of Everything - says everything's composed of tiny, one-dimensional strings that vibrate as clockwise, standing, and counterclockwise currents (p. 84 of "Workings of the Universe" by Time-Life Books, 1991). We can visualize the tiny, one dimensional, so-called Virtual Particles that fill all space and are really pulses of energy. We can visualize them generating binary digits of 1 and 0 (base 2 mathematics) that form currents in a two-dimensional program called a Mobius loop – or in 2 Mobius loops, clockwise currents in one loop combining with counterclockwise currents in the other to form a standing current. (The curving of what we call space-time sounds very strange, but I think it can actually be explained by modelling space-time's construction on the Mobius strip that can be represented by giving a strip of paper a half-twist of 180 degrees before joining its ends.)

Mobius Loop (source: http://www.polyvore.com/mobius_strip_public_domain_clip/thing?id=72360021)
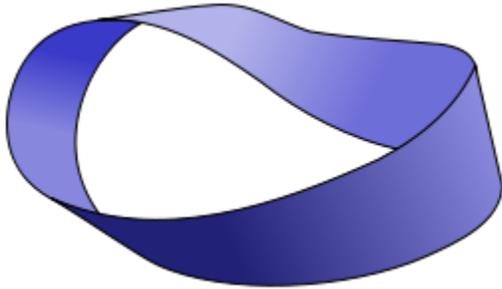
Joining two Mobius strips (or Mobius bands) forms a four-dimensional Klein bottle (http://plus.maths.org/content/os/issue26/features/mathart/index)

Figure-8 Klein Bottle (source: http://commons.wikimedia.org/wiki/File:KleinBottleFigure8-01.png)

And each Klein bottle can become an observable (or "sub") universe: figure-8 Klein bottles resemble spiral galaxies, and appear to have the most suitable shape to form subuniverses. This connection of the 2 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. And the gravitons also help compose matter. The infinite numbers make the cosmos as a whole* physically infinite, the union of space and time makes it eternal, and it's in a static or steady state because it's already infinite.

* That is: the cosmos beyond our 13.8-billion-year-old subuniverse, which is apparently expanding from the energy of virtual particles becoming spacetime or matter, and displacing parts of the universe beyond.

For the note below on the figure-8 Klein bottle, I refer to – a) Bourbaki, Nicolas (2005). Lie Groups and Lie Algebras. Springer b) Conway, John (1986). Functions of One Complex Variable I. Springer c) Gamelin, Theodore (January 2001). Complex Analysis. Springer d) Joshi, Kapli (August 1983). Introduction to General Topology. New Age Publishers e) Spanier, Edwin (December 1994). Algebraic Topology. Springer

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

But gaps in, or irregularities between, subuniverses shaped like figure-8 Klein bottles are "filled in" by binary digits in the same way that computer drawings can extrapolate a small patch of blue sky to make a sky that's blue from horizon to horizon. This makes space-time relatively smooth and continuous - and gets rid of holes, making these types of Klein subunits feasible. The Klein bottle is a closed surface with no distinction between inside and outside. There cannot be other universes outside our infinite and eternal universe – there's only one cosmos.