

Topological Insulators And Topological Magnetic Fields in a Topological Cosmos

Author – Rodney Bartlett

Abstract -

Fate has me doing the reverse of what "viXra Info" says (<http://vixra.org/info>). It states, "Acceptance onto viXra is just a first step which needs to be followed up by submitting to a journal ..." I first sent this article to a couple of journals, got rejected, then – to secure my place as the first submitter of these ideas (as far as I know) - I adapted it for "The founders of viXra (who) believe that the universal right of free speech applies to all works of science and all researchers should be allowed to place their ideas in public view for scrutiny."

For decades, I've had an unshakeable belief in physics' Unification of everything in space and time. This caused me to decide that topological materials on Earth, and topological fields surrounding some astronomical bodies, must co-exist with a universal topology. This leads to a non-expanding universe. Edwin Hubble, the astronomer credited with discovery of cosmic expansion, always believed "expanding models are a forced interpretation of the observational results." A topological cosmology allows us to, in his words, "find ourselves in the presence of one of the principles of nature that is still unknown to us today". (see "Effects of Red Shifts on the Distribution of Nebulae" by E. Hubble, Ap. J., 84, 517, 1936).

The subjects of unification and topology should be of interest to nonspecialists because a) the trend of modern physics is towards finding a unified theory (new physics) that explains everything – matter from the subatomic to the cosmic scale, all forces, quantum mechanics, relativity, and b) the subject of topology won the Nobel Prize for Physics in 2016. Also included is a subsection proposing the existence of zero compactified dimensions with 8 macroscopic dimensions (5 of space, 3 of time), and solution of the dark energy and dark matter problems by reference to gravitation and the Complex Number Plane made physical.

Introduction

I'd like to start this article by referring to the Real Reality Shows – a series of videos by Astronomy magazine's editor David J. Eicher. ["The Real Reality Show" by David J.

Eicher (<http://www.astronomy.com/search?q=real+reality>)] The one titled "Let's Cut the UFO Crap" (March 4, 2015) says, "Face it, folks - it's a very, very big universe." This is the universally accepted view on Earth ... it's so accepted that people regard it as heresy to obey the scientific principle of questioning everything. However, it's known that our senses and brains are subject to illusions of optical, and other sensory, nature. Is it so impossible that what we call distance - whether it be in space or time - is illusory? Our scientific probes and instruments must always confirm this illusion, for they're extensions of our nature. If a topological cosmology should lead to unification of everything from the quantum level through the biological level to the cosmic level, the insights of that unification would not be restricted to mathematics but would be physical. Unification can correct this illusion that has both served us, and deceived us, throughout all of history - allowing us to bypass the vast distances in space/"distances" between past, present and future to make this a very, very tiny universe.

In recent years, I've been manipulating $E=mc^2$ and it occurs to me that Einstein's equation predicts the elimination of distance. Thus, the insights of unification have been with us ever since the equation was published 112 years ago. We just never realized it. Perhaps it'd be in the best interests of modern science if the world took a fresh look at Einstein's Unified Field Theory. John Wheeler and Charles Misner claimed Einstein succeeded ["Classical physics as geometry" by Charles Misner and John Wheeler - the "Annals of Physics" - Volume 2, Issue 6, December 1957, Pages 525–603]. At the same time, the world should reconsider the paper which seems to have served as a bridge between General Relativity and Unified Field Theory - "Spielen Gravitationsfelder 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.

How does Einstein's equation predict the elimination of distance? 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 e.g. in black holes, 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 (space-time's curvature equals gravity and gravitational fields play an essential role in the structure of elementary particles). The zeroness of space-time/gravity does not mean they don't exist (they obviously do). It means we can

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.

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"?)

Keywords -

Topology; Extra dimensions; Dark energy; Dark matter; Non-expanding universe; Entanglement

Article -

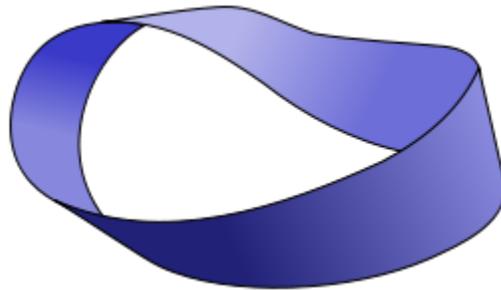
Topological Cosmology

While the expansion of space appeared to be confirmed 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." [1]

It seems to me that the universe is not physically expanding from a Big Bang at all. It appears to be undergoing topological extension in a Steady State. Computers' binary digits could be encoded by the quantum fluctuations/energy pulses called Virtual Particles which fill space-time. When a fluctuation/pulse is "on", it corresponds to the binary digit "1" - when "off", to the digit "0". This encoding is possible because the motions of virtual particles may not be random but may obey Chaos theory's principle of "order within apparent disorder" (chaos theory is sometimes called the third most important discovery of recent science, after Relativity and quantum mechanics). The digits are 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 and electromagnetic fields gives tangible form to. The above would only necessitate a God if time was exclusively a straight line. Since Einstein showed that space and time are curved, it's within the potential of future humanity to be responsible for the universe's existence. Including the poorly-named imaginary time[^] of physics and mathematics in humanity's electronic creation makes the universe free of boundaries and literally infinite. Stephen Hawking writes, "In real time, the universe has a beginning and an end at singularities that form a boundary to space-time and at which the laws of science break down. But in imaginary time, there are no singularities or boundaries. So maybe what we call imaginary time is really more basic ..." [2]

^ When Max Planck originated the idea of quanta to solve the ultraviolet catastrophe, I'm sure that idea (like so-called "imaginary" time) was initially thought of as a mathematical trick. Albert Einstein thought differently about quanta, and developed his explanation for the photoelectric effect. So it appears entirely possible that imaginary time and the Complex Number Plane will find practical application in the future, at which point they'll cease being mathematical trickery and analytic continuation. Imaginary time will be a real, large-scale thing: with the word imaginary being only a poorly chosen adjective, and a relic from history.



Möbius Strip

Is it possible that the extension by mathematical topology's figure-8 Klein bottles is, in Edwin Hubble's words, "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 measurements of redshift and the Hubble constant. This constant would, in reality, measure topological extension rather than physical expansion. Regarding photons (e.g. microwave photons) alleged to be leftover from the Big Bang - they could be weakened by collisions with dust, gas and stars etc; and wavelengths would be redshifted by (perceived) distance to microwave wavelength from a higher, possibly gamma-ray, wavelength).

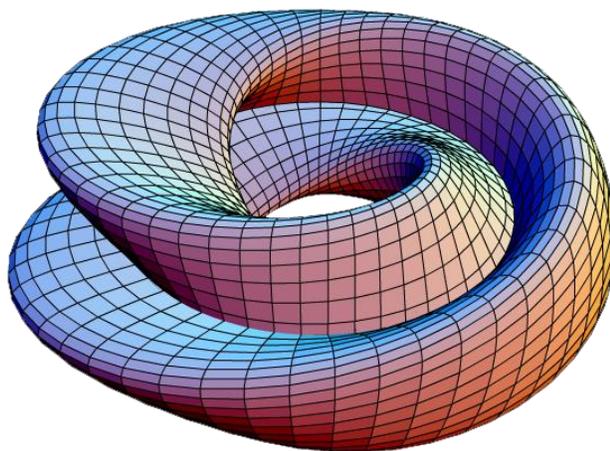


figure-8 Klein bottle

A diagram of many figure-8 Klein bottles would show that their positive curvature (the red, spherical parts) fits together with their negative curvature (the light blue, saddle-shaped parts) to cancel and produce the flatness of space-time's infinity/eternity (Hubble's "no trace of curvature"). Referring to mathematics' Complex Number Plane[^]: 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 "imaginary" time; to extend 90 degrees from the "surface" of real, flat space-time. In this way, imaginary time gains reality and is no longer a mere mathematical trick.

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

For the note below on the figure-8 Klein bottle, I refer to [3] [4] [5] [6] [7] -

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 ... (doughnut/figure-8 Klein bottle) ... topology" [8] - see later (in next paragraph) where figure-8 Klein bottles can be made into plausible subunits of a flat and infinite universe.

A flat universe that is also simply connected implies an infinite universe. [9] So it seems the infinite universe cannot be composed of multiply-connected subunits called figure-8 Klein bottles. But positive and negative curvatures can complement each other's shape, and 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 figure-8 Klein bottles simply connected, and plausible subunits of the universe's composition.

On the subject of feasibility:

"If the universe was nonorientable ie if it contained orientation-reversing curves such as the Möbius and Klein, 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." [10]

[My comment: It can indeed be nonorientable if these strange physical consequences are happening outside of our field of vision i.e. if the universe is 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 spacetime (those different parts would still have binary digits / Mobius strips / figure-8 Klein bottles as their basis). Another strange consequence is the extra dimensions of time and space. [see subsection titled "The Dark Universe and the 8 Dimensions")]

* “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.” [11]

The Klein bottle is a closed surface with no distinction between inside and outside. The inside and outside of the universe are continuous when it's composed of Mobius strips and figure-8 Klein bottles - there cannot be other universes outside our infinite and eternal universe (such a state of multiple universes is called the multiverse). The above paragraphs seem to explain astronomer Alex Filippenko's statement, "there's something important missing in our physical understanding of the universe." [12]

The Dark Universe and the 8 Dimensions

Referring to John Cramer's Transactional Interpretation of Quantum Mechanics/the Wheeler-Feynman absorber theory (which state that waves travelling forward in time, and waves travelling back in time, are both admissible solutions of James Clerk Maxwell's equations regarding light and electromagnetism):

The Complex Number Plane could unify various phenomena in the following way – electromagnetic waves could travel forwards in time along the right-hand direction of its x-axis (the "real" axis, which includes General Relativity's space-time curvature exerting a push on objects that is called gravity). And they could travel back in time in the left-hand direction (on the "complex" axis).^ Albert Einstein's equations say that in a universe possessing only gravitation and electromagnetism (which means the strong and weak nuclear forces would not be fundamental but would be products of gravitational-electromagnetic interaction), the gravitational fields carry enough information about electromagnetism to allow the equations of

James Clerk Maxwell to be restated in terms of these gravitational fields. This was discovered in 1925 by the mathematical physicist George Yuri Rainich.

^ When Isaac Newton described gravitation as a pull attracting objects – as opposed to Relativity's push - 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 (we describe this as entanglement). 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.

So there are 'advanced' gravitational waves going back in time ... these could be called antigravity. Antigravity has been equated with dark energy and, if real gravity is involved in ordinary matter's mass-production,^ 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".

^ See a paper Einstein submitted to the Prussian Academy of Sciences asking "Do gravitational fields play an essential role in the structure of elementary particles?" [13] In this case, matter and mass – like the nuclear forces they're associated with – would be products of gravitational-electromagnetic interaction.

One way of determining if dark matter belongs to a higher dimension would be to measure its gravitational effects in space dimensions ("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 $\frac{1}{4} \times \frac{1}{4}$ ie doubling the distance in 5 space dimensions causes gravity to become 1/16 as powerful. It is not $\frac{1}{4} \times -\frac{1}{4}$ since numbers have the same property regardless of direction on the Complex Number Plane (they increase in value). To conserve this sameness, the second one must be $+\frac{1}{4}$ if the first one is $+\frac{1}{4}$. Alternatively, the gravity's strength is reduced 4 times and this number is multiplied by another 4 to reduce it 16 times overall. In the 4th space dimension/2nd time dimension represented by the imaginary axis, this y-axis is half the distance (90 degrees) from the real x-axis that the complex x-axis is (it's removed 180 degrees). So gravitational weakening from doubling distance in 4 space dimensions = (reduction of 4 times multiplied by another reduction of 4 times) / 2, for an overall reduction of 8 times to a strength of 1/8. Only 5 space dimensions can exist – along with real time, imaginary time and complex time.

End of Subsection

Topological Magnetic Fields

The best known method for generating a magnetic field around an astronomical body is called the magnetic dynamo. In this model, the field is produced by motion of electrically conducting material e.g. iron and nickel in Earth's core, or liquid hydrogen which has metallic and conducting properties under the intense pressure in Jupiter's or Saturn's core.

Another method is called (by me) the M&M, or Meissner/Mobius, effect. This relies on the subject which won the Nobel Prize for Physics in 2016 viz topological materials. A planet's magnetism can result from the Meissner effect (expulsion of magnetism, most commonly associated with superconductivity). The planet isn't required to be a superconductor, because the Meissner effect may be due to another branch in the field of condensed matter physics – that of topological materials. Magnetism can be expelled as a result of following the Mobius-based structure of space-time. The Mobius strips cause fields to follow their form, and to reverse orientation ie the magnetism begins within the planet and reverses to become an expelled Meissner field that lies outside the planet.

M&M offers the possibility of surface magnetism being a Meissner effect generated by the topological materials in their depths. Of course, this paragraph is not referring directly to the Mobius-based structure of space-time. It refers to the Mobius-based structure of astronomical bodies. This reference relies on a paper published by Albert Einstein just under a century ago. [13] Since General Relativity says gravitational fields are produced by the curving of space-time, Einstein's paper could be reworded as "Does space-time play an essential role in the structure of elementary particles?" ... and thus in the structure of certain astro bodies.

Topological Insulators

A topological insulator is a material that behaves as an insulator in its interior but whose surface contains conducting states. However, the conducting surface is not the unique character of topological insulators, since the ordinary band insulators can also support conductive surface states. What is special is that the surface states of topological insulators are symmetry protected. Symmetry Protected Topological (SPT) Order is a kind of order in topological insulators where, if symmetry is preserved during the deformation undergone in topology ("rubber-sheet geometry"), a phase transition from one state of matter to another must occur (in this case, from insulation to conduction). In other words, if the shape of a Möbius strip - or the union of two strips into a four dimensional Klein bottle - is preserved, phase transition must occur just as orientation-reversing curves occur in the Möbius and Klein. [10] The above works

in both bosonic and fermionic systems - respectively, systems of force-carrying and matter particles. [14] [15]

In Band Theory, bands describe the range of energies that an electron within the solid may have (the ranges it may not have are called band gaps or forbidden bands). [16] [17] [18] Curvature (from space-time being constructed of Möbius strips and figure-8 Klein bottles) implies this range of allowable energies could be continuous and not restricted to certain bands. Since it's known the energy of electrons can only have discrete values, these values (and space's curves) must be determined by discrete pulses of energy (the binary digits of 1 and 0). Since bands and band gaps describe an electron's wave function, they are compatible with the following description: matter particles are described as spin 1/2 and need to be turned through two complete revolutions to look the same [19], plus it's necessary to travel around a Möbius strip twice to reach your starting point.

It therefore appears that electrons and all particles of matter could possibly be composed of Möbius strips. A step up from the Möbius would see the strips combine into figure-8 Klein bottles before reaching the scale of subatomic particles, and a step down could see the strips becoming programs consisting of electronics' binary digits 1 and 0 ordered (organized) in the shape of the Möbius. Let's borrow a few ideas from string theory's ideas of everything being ultimately composed of tiny, one-dimensional strings that vibrate as clockwise, standing, and counterclockwise currents [20]. One Möbius-strip program could be coded clockwise, another anticlockwise, and their interaction would produce a standing current of streaming binary digits as well as AI (artificial intelligence) on quantum, biological and cosmic scales.

The theory of supersymmetry (SUSY) attempts to relate the two classes of elementary particles – bosons (force-carrying particles) and fermions (particles of matter). This commentary relates fermions and bosons to the Möbius strip via Professor Hawking's book "A Brief History of Time". 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. [21] So the commentary doesn't relate fermions to bosons through SUSY but through the Möbius (SUSY.2), which means the structure of e.g. light's photons and gravity's (presently hypothetical) gravitons is also nonorientable - each of them includes the orientation-reversing curve of the Möbius strip and the Klein bottle (topological cosmology advocates the figure-8 version of Klein bottle).

References

[1] "Effects of Red Shifts on the Distribution of Nebulae" by E. Hubble, Ap. J., 84, 517, 1936

[2] "A Brief History of Time" by Stephen Hawking - Bantam Press, 1988, p.139

[3] Bourbaki, Nicolas (2005). "Lie Groups and Lie Algebras". Springer

[4] Conway, John (1986). "Functions of One Complex Variable I". Springer

- [5] Gamelin, Theodore (January 2001). "Complex Analysis". Springer
- [6] Joshi, Kapli (August 1983). "Introduction to General Topology". New Age Publishers
- [7] Spanier, Edwin (December 1994). "Algebraic Topology". Springer
- [8] ("What Shape is the Universe?" by Vanessa Janek: (May 11, 2015)
(http://www.universetoday.com/120157/what-shape-is-the-universe/#google_vignette)
- [9] Luminet, Jean-Pierre; Lachi`eze-Rey, Marc - "Cosmic Topology" - Physics Reports 254 (3): 135–214 (1995) www.arXiv:gr-qc/9605010
- [10] "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>)
- [11] "Infinite Universe" by Bob Berman: "Astronomy" – Nov. 2012
- [12] "Universe expanding faster than expected" by Korey Haynes - Astronomy Magazine's October 2016 issue, p.11
- [13] Albert Einstein, "Do gravitational fields play an essential role in the structure of elementary particles?" ("Spielen Gravitationfelder in Aufbau der Elementarteilchen eine Wesentliche Rolle?", Sitzungsberichte der Preussischen Akademie der Wissenschaften, [Math. Phys.], 349-356 [1919] Berlin).
- [14] Zheng-Cheng Gu, Xiao-Gang Wen, "Tensor-Entanglement-Filtering Renormalization Approach and Symmetry Protected Topological Order", Phys. Rev. B80, 155131 [2009]
- [15] Frank Pollmann, Erez Berg, Ari M. Turner, Masaki Oshikawa, "Symmetry protection of topological order in one-dimensional quantum spin systems", Phys. Rev. B85, 075125 [2012]
- [16] "Energy levels and energy bands" (ecee.colorado.edu/~bart/book/eband2.htm)
- [17] "The energy band diagram of the Metal-Oxide-Silicon (MOS) Capacitor"
(ecee.colorado.edu/~bart/book/moseb.htm)
- [18] "Band diagram" (https://en.m.wikipedia.org/wiki/Band_diagram)

[19] "A Brief History of Time" by Stephen Hawking (Bantam Press, 1988): pp.66-67

[20] "Workings of the Universe" by Time-Life Books: 1991, p.84

[21] Ellis, John: "The Physics Landscape after the Higgs Discovery at the LHC": 14 April 2015:
www.arXiv:1504.03654)