

Relation Between Matter, Antimatter and Dark Matter in an Infinite Universe with Extra Dimensions

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Abstract -

What is the Dark Matter that holds together galaxies and galaxy clusters? Does causality (the law of cause and effect) really depend on the arrow of time only ever flying from the past to the present to the future? Or is that merely a way of thinking we've gotten used to - with the universe not caring about our temporal biases, and creating entanglement of all things in space-time through time going back and forth? In order to lay the groundwork for the relation between matter and antimatter and dark matter, I found it necessary to repeat earlier ideas about binary digits / Mobius strips / figure-8 Klein bottles / Wick rotation. I don't enjoy repeating myself – readers want new thoughts presented to them. But all these are required for the extra so called "imaginary" dimension to escape being a mathematical oddity, and to manifest as part of space-time. These ideas might seem to be going from strange to stranger, but they're validated by Werner Heisenberg's matrix version of quantum mechanics as well as the mathematics of matrix multiplication. The article ends with a few paragraphs summing up the relation between matter, antimatter, dark matter and extra dimensions. In the process, the Fixed Point Theorem is used logically to show that the cosmos must be infinite and eternal. This necessitates a Paradoxical PS attempting a rational explanation for an infinite, eternal universe (the Cosmic Microwave Background and redshift objections are addressed).

Article -

INTRO

The main evidence for the existence of Dark Matter is that galaxies would fly apart instead of rotating if they did not contain a large amount of unseen matter. ("The redshift of extragalactic nebulae", Fritz Zwicky's first paper on this topic, appeared in 1933 in the obscure journal *Helvetica physica acta*, vol. 6, p. 110) What is Dark Matter? Nobody knows. Some say it's gravitational, and requires modification of Einstein's General Relativity. Some say it's a form of matter, consisting of dark particles. Those ideas are combined here with 20th-century physicist Richard Feynman's interpretation of advanced and retarded waves. (Feynman found that adding the contributions of advanced and retarded waves creates a consistent quantum theory called QED - Quantum Electrodynamics - in which the terms that might violate causality cancel precisely.) Cancellation of causality's violation might also be viewed through Isaac Newton's idea of gravity and the modern idea of entanglement:

17th century scientist Isaac Newton's idea of gravity acting instantly across the universe could be explained by gravity's ability to travel back in time, and thereby reach a point billions of light years away not in billions of years, but in negative billions-of-years. That is; the negative/advanced component of a gravitational wave would already be at its destination as soon as it left its source, and its journey is apparently instant.

Instantaneous effect over large distances is known as quantum mechanics'

entanglement and has been repeatedly verified experimentally. If the retarded (forwards) wave component travels in positive space, the advanced (backwards) component corresponds to an equal amount of negative distance. The forwards and backwards movement in time can cancel to produce a quantum (and macroscopic) entanglement that eliminates the need for the Big Bang's and Cosmic Inflation's solution that the universe is roughly the same everywhere on large scales because everything was once in contact in a tiny space.

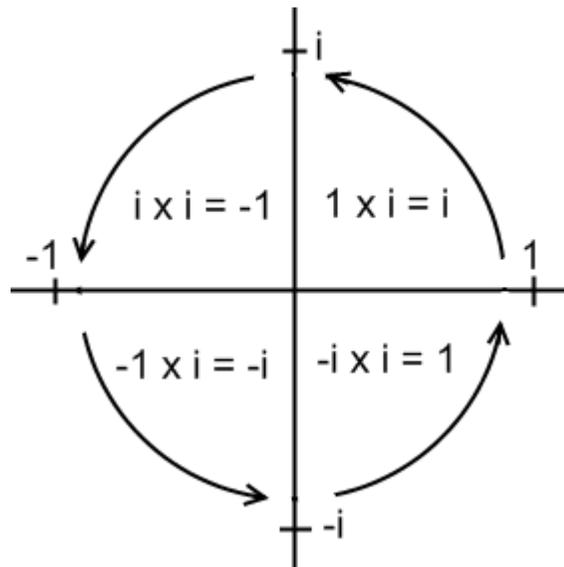
This article believes radioactive dating is a form of gravitational-wave detection (of the waves' advanced component).^ LIGO - the Laser Interferometer Gravitational-wave

Observatory - is regarded as a detector of retarded gravitational waves. A gravitational wave cycles or oscillates between its advanced and retarded states as a result of Wick rotation.

^ If a dinosaur died mere thousands of years ago, the advanced gravitational and electromagnetic waves composing its particles - see 4th paragraph in "Time, Space, and Wick Rotation" - would continue travelling back in time. By the time its surroundings, bones or fossilized remains were subjected to modern science's dating methods, those advanced waves might have gone so far back in time that the dating method says the dinosaur died 80 million years ago or more. Radioactive dating is thus a form of (advanced) gravitational-wave detection, just as LIGO - the Laser Interferometer Gravitational-wave Observatory (Barish, Barry C.; Weiss, Rainer (October 1999). "LIGO and the Detection of Gravitational Waves". *Physics Today*. **52** (10): 44. [doi:10.1063/1.882861](https://doi.org/10.1063/1.882861)) - picks up (retarded) gravitational waves. Technology based on the way noise-cancelling headphones work might provide a more accurate reading of when the dinosaur lived. The headphones increase the signal-to-noise ratio by incorporating a microphone that measures ambient sound (noise), generating a waveform that is the exact negative of the ambient sound, and mixing it with any audio signal the listener desires. ("Noise-cancelling Headphones" - https://en.wikipedia.org/wiki/Noise-cancelling_headphones) Generating a waveform that's the exact opposite of the advanced waves emitted by the deceased dinosaur should, at least partially, neutralize the advanced waves. This would restrict measurement of the age of the dinosaur fossil to the retarded gravitational and electromagnetic waves which go forward in time and are associated with the amount of radioactive decay occurring between the animal's death in the past and measurement in the present. Advanced waves also cause living creatures to age faster than they would without those waves - by extending the creatures' reach into the past (this is the equivalent of having been alive for more years). Neutralizing the advanced waves should dramatically increase the health and lifespan of dinosaurs, humans and all other

species if it doesn't adversely affect anatomy and physiology ie if the retarded waves alone are sufficient for normal structure and function.

TIME, SPACE, AND WICK ROTATION



"The complex plane (with its horizontal "real" axis and vertical "imaginary" axis) reveals i 's special relationship with cycles via the circle of i , also known as Wick rotation. Whenever a point on the complex plane is multiplied by i , it moves a quarter rotation around the origin or center of the plane."

Figure and quote from "The Meaning of Imaginary Time: Creativity's Dialog with Timelessness" Posted on July 15, 2015 by Kerri Welch

<https://textureoftime.wordpress.com/2015/07/15/the-meaning-ofimaginary-time/>

Following Einstein's example of turning Planck's mathematical quanta into the physical photoelectric effect, the Wick rotation used to describe imaginary time may be

transformed from mathematical "trickery" to physical meaning, and provide a modern way to unite space and time (and imaginary time) into one space-time.

Stephen Hawking writes in "A Brief History of Time" – Bantam Press, 1988, pp.66-67:

"What the spin of a particle really tells us is what the particle looks like from different directions."

Particles of matter like the proton and electron have spin $1/2$, which means these particles must be turned through 2 complete revolutions to look the same – and, not coincidentally, you must go round a Mobius strip twice to reach your starting point. It seems plausible that the particular values of quantum spin could be determined by another set of particular values viz those in electronics' BITS or Binary digITS, which always take the form of either 1 or 0. First, the 1's and 0's are programmed to form the shape of a Mobius strip, which is merely two-dimensional (2-D). The paper "From Planck Data to Planck Era: Observational Tests of Holographic Cosmology" by Niayesh Afshordi, Claudio Corianò, Luigi Delle Rose, Elizabeth Gould, and Kostas Skenderis: Phys. Rev. Lett. 118, 041301 (2017) - Published 27 January 2017 (<https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.118.041301>) - says, In a holographic universe, all of the information in the universe is contained in 2D packages trillions of times smaller than an atom. ("Holographic" could refer to the interference between gravitational and electromagnetic waves [see next paragraph], while "2D packages trillions of times smaller than an atom" could refer to Mobius strips.)

Then two strips must be joined to make a 4-D Klein bottle which has length, width, depth and the 4th dimension of movement in time ("Imaging maths - Inside the Klein bottle" by Konrad Polthier

(<http://plus.maths.org/content/os/issue26/features/mathart/index>). The type of Klein bottle formed would appear to be the figure-8 Klein. 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, on a cosmic

scale, the flat curvature of space-time ("The WMAP science team has nailed down the curvature of space to within 0.4% of 'flat' Euclidean." - "Wilkinson Microwave Anisotropy Probe" - <https://map.gsfc.nasa.gov/>). When you have trillions of Mobius and figure-8 Klein elements assembled, you can follow the theory of the mass-giving Higgs field being the result of various couplings (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). An implication of a 1919 paper by Einstein is that the coupling is between gravitons and photons. That paper is "Do gravitational fields play an essential role in the structure of elementary particles?" ("Spielen Gravitationsfelder im Aufbau der materiellen Elementarteilchen eine wesentliche Rolle?" by Albert Einstein - Sitzungsberichte der Preussischen Akademie der Wissenschaften, [Math. Phys.], 349-356 [1919] Berlin). With trillions of Mobius and figure-8 Klein elements assembled, an appropriate number of photons and gravitons must be included to give the matter what we call mass.

Supersymmetry (SUSY) proposes a relationship between bosons and fermions. Some scientists believe supersymmetry is a failed theory. A new approach would be proposing that the Mobius strip is a fundamental constituent of both fermions and bosons - and therefore unites all particles (of matter and of energy) into one space. The inner and outer surfaces of a Mobius form one **continuous** strip. Constant movement of these surfaces – as well as of the four-dimensional figure-8 Klein bottle, which is a union of two Mobius strips - is carried out by the programmed-in Wick rotation's **continuous** cycling between real and imaginary time. Therefore, the Mobius strip combined with Wick rotation and imaginary time provides a modern way to unite space and time (and imaginary time) into one space-time. In the above diagram of Wick rotation; the side of the Complex Plane's so-called real axis extending to the right of the origin or centre is, in space-time, also known as the retarded axis going into the future - while the side extending to the left is the advanced plane going to the past.

MATRIX VALIDATES TOPOLOGICAL, ADVANCED-WAVE COSMOLOGY

The matter and dark matter are the same thing since Wick rotation causes cycling between the retarded waves popularly associated with matter and the advanced waves commonly associated with dark matter. This cycling is reminiscent of Feynman's speculation - with his thesis adviser John Wheeler - that perhaps the entire universe is a unification in which just one particle zigzags back and forth in time. Feynman concluded that antimatter is simply ordinary matter going backwards in time (what is termed "matter-antimatter annihilation" occurs when that particle reverses direction in time). The precise cancellation Feynman found for the contributions of advanced and retarded waves explains why antiparticles don't vanish into the past (the oscillations into retarded waves keep restoring their travel into the future). This time-reversal involving antimatter implies the existence of antimatter is related to the concept of dark matter's advanced waves. The retarded waves might be eliminated somehow (perhaps their wave motion is suppressed by other, incoming gravitational or electromagnetic waves - or the waveform might be cancelled by the opposing crests and troughs of an anti-wave, similar to the workings of noise-cancelling headphones). Then advanced waves would take control and propel the original matter beyond its antimatter stage and completely into the past, where it becomes what we call dark matter. It continues to affect our present and future gravitationally (not electromagnetically) as long as space-time exists because, as General Relativity says, gravity is the curvature of space-time ie space-time IS gravity.

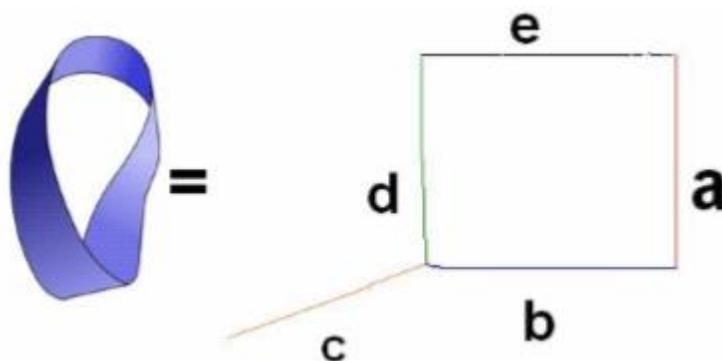
There appears to be a problem with these ideas. How can matter and antimatter differ (they have opposite electrical charges) if both are composed of precisely cancelling advanced and retarded waves? The problem is solved by mathematics similar to the matrix, a rectangular array of numbers or symbols placed in rows and columns. Matrices have a long history possibly going back 3,000 years to their use in solving simultaneous equations in China. In the mid-nineteenth century, British mathematician Arthur Cayley discovered how to add, subtract, multiply and divide them.

For example, the underlined entry 2340 in the product is calculated as $(2 \times 1000) + (3 \times 100) + (4 \times 10) = 2340$:

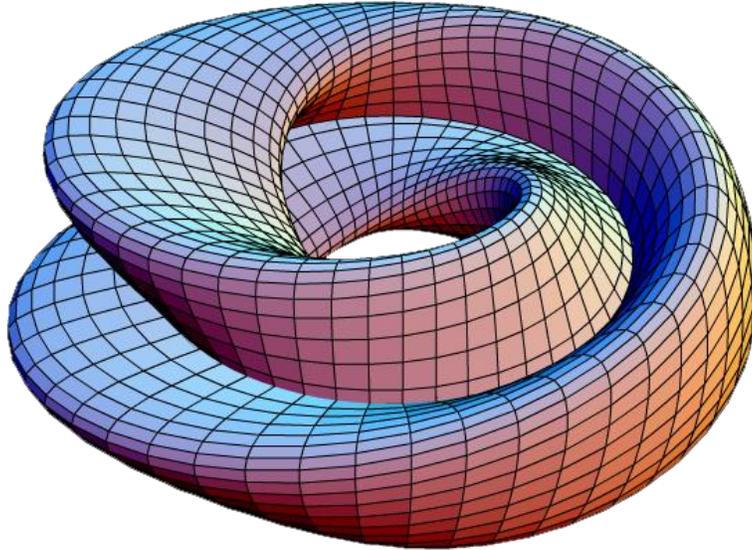
$$\begin{bmatrix} \underline{2} & \underline{3} & \underline{4} \\ 1 & 0 & 0 \end{bmatrix} \begin{bmatrix} 0 & \underline{1000} \\ 1 & \underline{100} \\ 0 & \underline{10} \end{bmatrix} = \begin{bmatrix} 3 & \underline{2340} \\ 0 & 1000 \end{bmatrix}.$$

From <[https://en.wikipedia.org/wiki/Matrix_\(mathematics\)](https://en.wikipedia.org/wiki/Matrix_(mathematics))>

Matrix mechanics is a version of quantum mechanics discovered by Werner Heisenberg in 1925, and matrix multiplication says X multiplied by Y does not always equal Y times X. The book "Quantum" by Manjit Kumar (Icon Books 2008, pp. 193-194) states, Max Born wrote to Albert Einstein that "Heisenberg's latest paper, soon to be published, appears rather mystifying, but is certainly true and profound." He was referring to "the strange multiplication rule" Heisenberg used in developing matrix mechanics. Born eventually realised that Heisenberg had stumbled on matrix multiplication - to which the originator of matrix mechanics replied, "I do not even know what a matrix is." (Cropper, William H. [2001] "Great Physicists: The Life and Times of Leading Physicists from Galileo to Hawking" - Oxford: Oxford University Press, p. 269)



Width a is perpendicular to the length (b or e) which is perpendicular to height c. How can a line be drawn perpendicular to c without retracing b's path? By positioning it at d, which is then parallel to (or, it could be said, at 180 degrees to) a. d is already at 90 degrees to length b and height c. **d has to be at right angles to length, width and height simultaneously if it's going to include the Complex Plane's vertical imaginary axis in space-time (the imaginary realm is at a right angle to the 4 known dimensions of space-time, which all reside on the horizontal real plane).** In other words, d has to also be perpendicular to (not parallel to) a. This is accomplished by a twist, like on the right side of the Mobius strip pictured above, existing in a. The twist needs to be more exaggerated than the illustrated one, with the upper right of the Mobius descending parallel to side "a" then turning perpendicular to it at approximately the level of the = sign. Thus, $90+90$ (the degrees between b & c added to the degrees between c & d) can equal 180, making a & d parallel. But $90+90$ can also equal 90, making a & d perpendicular. (Saying $90+90=90$ sounds ridiculous but it has similarities to the Matrix [of mathematics, not the action-science fiction movie]. The first 90 plus the second 90 does not always equal the second 90 plus the first 90 because $90+90$ can equal either 180 or 90.



The universe may be composed of figure-8 Klein bottles (diagram above - 2 Möbius strips are joined on their sides to form Bottle), with binary digits filling in the central hole and perfectly adjusting the outer edges to fit [this is similar to manipulation of an image on a computer screen].

SUMMARY

The answer to how matter and antimatter can differ if both are apparently composed of precisely cancelling advanced and retarded waves (the cancellation occurs according to physicist Richard Feynman's Quantum Electrodynamics) is that, consistent with matrix multiplication, the contributions of the retarded + advanced waves of matter \neq the contributions of the advanced + retarded waves of antimatter. Advanced waves can take over and send the original matter beyond its antimatter stage and completely into the past, where it becomes dark matter and continues to affect our present and future gravitationally as long as space-time exists because, as General Relativity says, gravity is the curvature of space-time ie space-time IS gravity.

Referring to the diagram where a Möbius strip = a, b, c, d + e:

This article proposes that the Mobius is a building block of every particle in the universe, whether it's a particle of matter (such as a proton or electron) or a particle of force or energy (like a photon or graviton). Inspired by matrix maths, the paragraph beneath that diagram says that $90 + 90 = 180$ or 90 . Since this weird maths takes place on the Mobius strip's quantum scale, it's in agreement with Heisenberg's matrix mechanics. And like quantum mechanics, it asserts that common sense has no possibility of arriving at a complete understanding of the world.

Referring to the diagram of Wick rotation -

A better picture of the universe can be visualised if we imagine both the horizontal, real axis and vertical, imaginary axis are 3-dimensional and not limited in their extension. Then a "block" universe exists – a four-dimensional (3 space + 1 time) block of space-time containing all the past, and the entire future. The real, known space and time (and unknown imaginary time described by Wick rotation and imaginary numbers) are united into one space-time. Known space and time cannot be separated, so it's likely that imaginary time is permanently joined with imaginary space. I don't like describing something that may exist with the word imaginary. The imaginary space above the origin or centre of the Wick-rotation diagram might be better referred to as hyperspace or superspace, and that below the origin as subspace. Since real and imaginary space-time are united into one space-time, the positions of hyperspace and subspace must be fluid and permeate the whole of space-time. They cannot be restricted to certain points above or below the origin. Another way of looking at this is to say the origin point itself moves. Early last century, the Dutch mathematician and philosopher Luitzen Egbertus Jan Brouwer (1881-1966) had one of the most useful theorems in mathematics named after him - the amazing topological result known as the Brouwer Fixed Point Theorem.

"Brouwer's theorem says that if you take a cup of coffee, and slosh it around, then after the sloshing there must be some point in the coffee which is in the exact spot that it was before you did the sloshing (though it might have moved around in between)." (Francis

E. Su, et al. 'Brouwer Fixed Point Theorem', *Math Fun Facts*,

<http://www.math.hmc.edu/funfacts>)

If the origin point moves around, it could be associated with the Fixed Point Theorem's sloshing. It could also be equated with our present knowledge of quantum mechanics because its exact position is indeterminate. Returning to the above paragraph's statement about real and imaginary axes not being limited in their extension - the origin is also known as the centre (of the Complex Plane used in Wick rotation). If the centre moves around, it can only retain its identity as the centre by remaining infinitely far from a hypothetical edge. A diagram of the Complex Plane used in Wick rotation is obviously finite but it's possible the universe is infinite. Then the origin or Fixed Point Theorem is infinitely far from a supposed edge to the universe before movement or sloshing - and wherever it moves to, it remains an infinite distance from that edge. That is, the universe would literally be infinite in size. And since time can't be separate from space, the cosmos is eternal too.

PARADOXICAL PS - Creation Of The Infinite, Eternal Cosmos Using Electronic BITS, Pi And Imaginary Time

Most scientists don't believe there can be a rational explanation for an infinite, eternal universe. They much prefer ideas like the Big Bang, the multiverse and random quantum fluctuations causing everything to pop into existence from nothing. Our concept of time as something that only goes from past to future makes the thought of an infinite, eternal cosmos unacceptable – a paradox which is seemingly absurd. But as 20th-century Danish physicist Niels Bohr said, “How wonderful that we have met with a paradox. Now we have some hope of making progress.” If he's correct, then absurd ideas about the universe may, when investigated, turn out to well founded or true.

Like the surface of the Earth, the universe's imaginary time has no boundaries (you can go around the world without falling over any edge). But, also like Earth, it is finite unless pi or another infinite number is incorporated into each and every part - numbers could be encoded into parts using the BITS (BInary digiT_S, 1's and 0's) of electronics. With

infinite numbers and Wick rotation encoded into the building blocks called Mobius strips, a universe perfused with both imaginary time and infinite numbers is comparable to a never-ending number of Cosmic DVD's on planes extending infinitely in every possible direction (not just the horizontal and vertical planes of Wick rotation's Complex Plane).

Professor Stephen Hawking says that boundaries and singularities exist in real time but don't exist in imaginary time. (Stephen Hawking, 1988, 'A Brief History of Time', p. 139. *Bantam Press*) There really are boundaries in real time and it must hypothetically be possible to step outside the universe if only real time exists. But when so-called imaginary time also exists, it is not possible to step outside the universe because the boundaries simply aren't there and the universe has no end or start (neither in space nor in time). Only one universe can then exist, and there is no multiverse.

What about the Cosmic Microwave Background that supposedly proves the Big Bang theory? (Penzias, A. A.; Wilson, R. W. [1965]. "A Measurement of Excess Antenna Temperature at 4080 Mc/s". *The Astrophysical Journal*. 142 [1]: 419–421) Or what about the astronomical redshift that supposedly means the universe is expanding? The answer to the microwave objection can be summed up in one sentence - "The quantum entanglement of microwaves with all of space-time means the Cosmic Microwave Background radiation fills the entire sky and is not produced by the Big Bang as most scientists believe (quantum entanglement has been repeatedly confirmed experimentally)." To answer the redshift problem almost as briefly - In astrophysics, gravitational redshift or Einstein shift is the process by which electromagnetic radiation originating from a source that is in a gravitational field is reduced in energy and in frequency / increased in wavelength, or redshifted to the red end of the spectrum. Since General Relativity says gravity is just another term for the curvature of space-time, the gravitational field out of which proceeds a particular measurement of electromagnetic redshift is not limited to a particular galaxy or galaxy cluster but spans (indeed, is) the

whole of space-time. The farther away a galaxy is, the greater is the amount of gravitation which any electromagnetic radiation has to traverse.