

SPECIAL RELATIVITY (21st-century-style), PARTICLE PHYSICS, AND THE DARK UNIVERSE

By Rodney Bartlett (corresponding author), rodney.bartlett22@yahoo.com,

vUniversity3A (Science and Technology), Stanthorpe, Qld. 4380, Australia

ORCID - <https://orcid.org/0000-0003-2240-3743>

Abstract

This article begins with “vector-tensor-scalar geometry” interacting photons and gravitons to produce the quantum spins of matter particles, the Higgs boson, plus the particles of the weak and strong nuclear forces. It then proposes the universe uses base-2 mathematics (a.k.a. electronics’ binary digits), the topology of Mobius strips and figure-8 Klein bottles, plus the geometry mentioned before, to produce photons and still hypothetical gravitons and non-hypothetical mass. It’s then proposed that the three-dimensional figure-8 Klein bottles composing the universe possess space-time's four dimensions (3 of space + 1 of time) when Wick rotation is programmed into them. This programming is adaptive, depending on the strength of gravity and electromagnetism (in Special Relativity, time slows in intense gravity and on approaching c , the speed of light). Because of the rotating between the x- and y-axes in Wick rotation, there’s a

space-time we call imaginary or higher dimensional that is just as real as ordinary space-time. Gravity also leads to mass here - “**dark**” **matter** – and that matter’s associated “**dark**” **energy**. Back in this dimension, the Big Bang is regarded as dispensable due to the quantum-mechanical entanglement of microwave photons. And the speed of light becomes a duality – simultaneously having the two velocities of approx. 300 000, and approx. zero, km/s.

Article

Introduction -

The abstract of a review article in the journal “Science” (1) states, “Both dark matter and dark energy require extensions to our current understanding of particle physics or point toward a breakdown of general relativity on cosmological scales.” Could it be that understanding dark matter and dark energy doesn’t require modification of general relativity, but needs Einstein’s 1905 masterpiece of special relativity? Nevertheless, modification of general relativity – and its unification with quantum mechanics – might be accomplished with the hidden variables of base 2 mathematics, Mobius strips, figure-8 Klein bottles, and Wick rotation. The greatest obstacle to understanding the dark universe, and beginning the journey to quantum gravity, will be the human reluctance to accept a paradigm shift to determinism.

Section 1: Vector-Tensor-Scalar Geometry and Particle Physics

- section previously published in similar versions at numerous sites during recent years:
most recently in (12)

Two adjoining sides of a parallelogram (see Fig. 1) represent the vectors of the photon's spin 1 and the graviton's spin 2. The resultant diagonal represents the interaction of the sides/vectors ($1 \div 2 =$ the spin $\frac{1}{2}$ of every matter particle). Tensor calculus changes the coordinates of the sides and diagonal into the coordinates of a position on a line (a single point on the diagonal). This scalar point is associated with particles of spin 0. If the mass produced previously happens to be $125 \text{ GeV}/c^2$, its union with spin 0 produces the Higgs boson. $125 \text{ GeV}/c^2$ united with spin 0 means the central scalar point of the Higgs boson is related to the vector of the graviton's spin 2, and the Higgs field is therefore united with the supposedly unrelated gravitational field (together with the latter's constant interaction with the electromagnetic field).

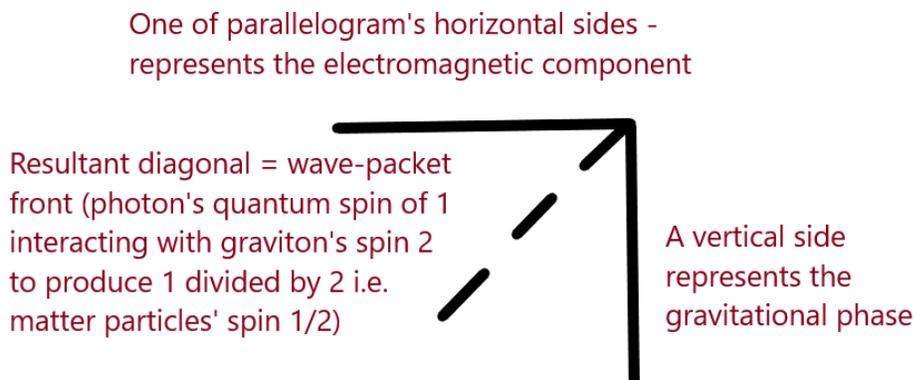


FIGURE 1: VECTOR-TENSOR-SCALAR GEOMETRY

It must be remembered that referring to space alone is incomplete. Living in space-time, it's necessary to add some sentences about the time factor. The photon must interact with the graviton to produce the mass of the weak nuclear force's W and Z bosons. To produce their quantum spin, the photon's spin 1 needs to react with the graviton's spin 2. That is, the photon's turning through one complete revolution needs to be combined with the graviton's being turned through two half-revolutions.^ Incorporating the time factor as a reversal of time in the middle of the interaction: a gravitonic half revolution is subtracted from the photonic full revolution then the graviton's time-reversal adds a half revolution ($1 - \frac{1}{2} + \frac{1}{2} =$ the spin 1 of W and Z bosons). The strong nuclear force's gluon's quantum spin of 1 could arise in the same way as the spin 1 of weak-force bosons.

^ Professor Hawking writes,

"What the spin of a particle really tells us is what the particle looks like from different directions." (2)

Spin 1 is like an arrow-tip pointing, say, up. A photon has to be turned round a full revolution of 360 degrees to look the same.

Spin 2 is like an arrow with 2 tips - 1 pointing up, 1 down. A graviton has to be turned half a revolution (180 degrees) to look the same.

Spin 0 is like a ball of arrows having no spaces. A Higgs boson looks like a dot: the same from every direction.

Spin $\frac{1}{2}$ is like a Mobius strip. A particle of matter has to be turned through two complete revolutions to look the same, and you must travel around a Mobius strip twice to reach the starting point.

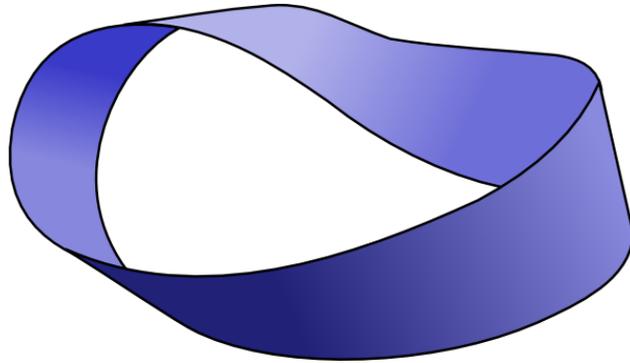


Figure 2 - MOBIUS STRIP (source:

http://www.clker.com/cliparts/3/7/a/9/1220546534781713951lummie_Mobius_Strip.svg
[hi.png](#))

Section 2 – Wick Rotation and Special Relativity

- section previously published in similar versions at numerous sites during recent years:
most recently in (12)

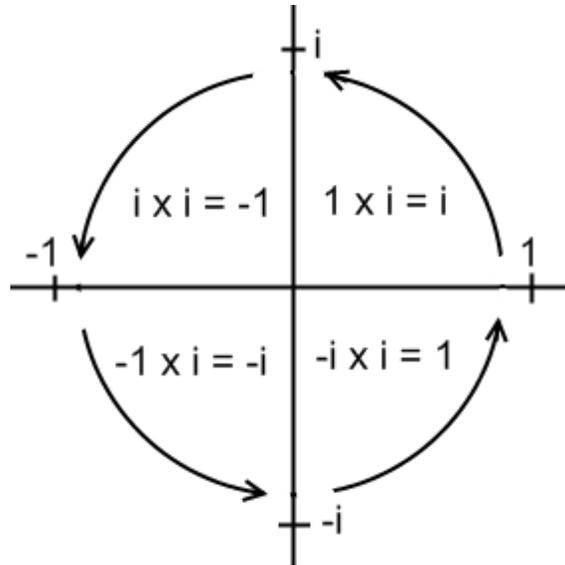


Figure 3 – WICK ROTATION: “The complex plane reveals i ’s special relationship with cycles via the circle of i , also known as Wick rotation. Whenever a point on the complex plane is multiplied by i , it moves a quarter rotation around the origin or center of the plane.” (3)

The proposal here is that the time in space-time is programming of Wick rotation into the 2D (two-dimensional) Mobius strips whose shape is formed with the binary digits (1’s and 0’s) of electronics. In a holographic universe, all of the information in the universe is contained in 2D packages trillions of times smaller than an atom. (4)

(“Holographic” would have the accepted cosmological meaning of the entire universe being seen as two-dimensional information – from Mobius strips, according to this article - projected into the three dimensions we’re familiar with.) Two strips can combine into the three-dimensional figure-8 Klein bottles (5) composing the universe, which has

space-time's four dimensions when Wick rotation is added. Trillions of Mobius strips are assembled into electromagnetism's photon while trillions of figure-8 Klein bottles become gravity's graviton. Photons' quantum spin of 1 interacts with the gravitons' spin of 2 to produce the emergent property of mass (referring to matter particles, their spin of $\frac{1}{2}$). Regarding bosons of the weak and strong nuclear forces – see the second paragraph's $1 - \frac{1}{2} + \frac{1}{2} =$ the spin 1 of W and Z bosons as well as the gluons.

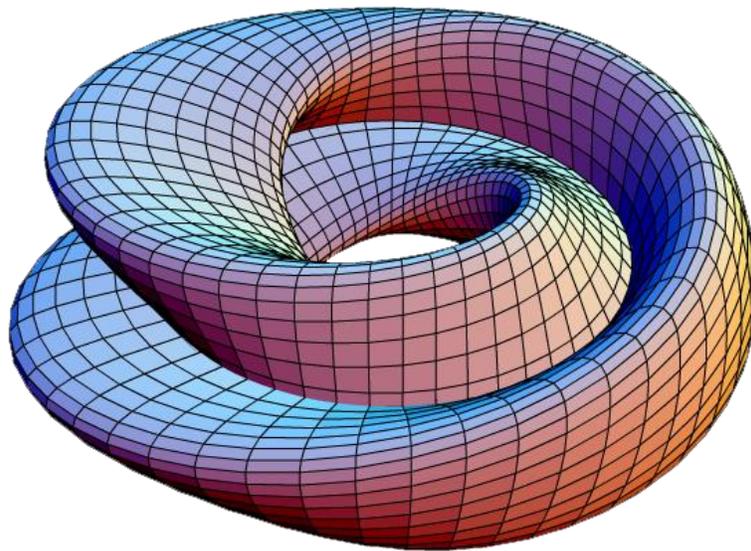


Figure 4 - MOBIUS DOUBLET (FIGURE-8 KLEIN BOTTLE)

(source: <https://upload.wikimedia.org/wikipedia/commons/7/73/KleinBottle-Figure8-01.png>) Note that, when considering many bottles, the reddish positive curvature fits together with the bluish negative curvature to produce the flatness implying space-time's infinity and, since space and time are always unified, its eternity. (In flat space-

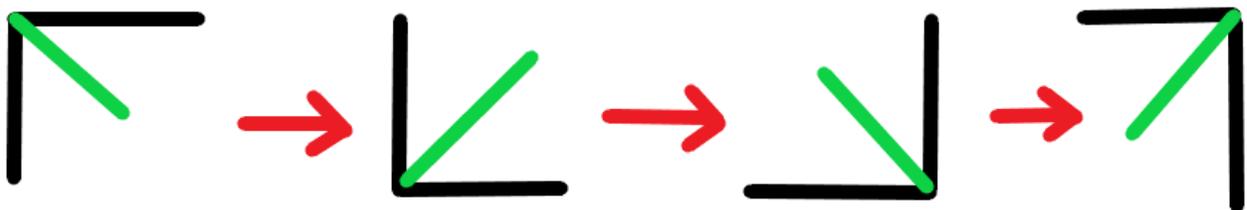
time, light beams travel in straight lines and can go infinite distance without ever meeting.)

People think time cannot be the programming of Wick rotation into the Mobius strip because they assume programming would mean time always passes at a fixed rate everywhere, in violation of Special Relativity. Actually, programs are adaptive (like the adaptive optics used in modern astronomy). In familiar life, time rotates between the horizontal x-axis (called real time) and the vertical y-axis (called imaginary time) at one second per second since that rotation can be viewed as rotation of vector-tensor-scalar geometry's gravitational and electromagnetic waves (specifically, of their resultant green diagonal).

Figure 5 -

Uniting "FIGURE 1: VECTOR-TENSOR-SCALAR GEOMETRY" With "Figure 3 – WICK ROTATION"

Rotation starts in Fig. 3's Lower Right Quadrant, then Upper Right, Upper Left, Lower Left . . . and Repeats



Section 3 – The Dark Universe, the Big Bang, and the Speed of Light

- section previously published in similar versions at numerous sites during recent years:
most recently in (12)

Because of the rotating between the x- and y-axes, there's a space-time we call real in which gravity leads to mass. There's also a space-time we call imaginary or higher dimensional that is just as real as ordinary space-time. Gravity also leads to mass here - **“dark” matter** – and that matter's associated **“dark” energy**. This means “... ‘dark matter’ might be just ordinary matter”, which was suggested by Nima Arkani-Hamed in an interview about his paper. (6) The only difference between them would be that dark matter is, to use Wick rotation, rotated 90 degrees from ordinary matter's horizontal x-axis to the vertical, “imaginary” y-axis. It's unified with this dimension by BITS (Binary digITS) and reversal of the direction of Wick rotation, which allows “advanced” waves that travel back in time.[^] However, the dark dimension may be visualized as existing “above” and “below” ordinary space-time: in “hyperspace” and “subspace”. Following Einstein's $E=mc^2$, (7) the relation between Dark Matter (DM) and its associated Dark Energy (DE) would be $DE=DMc^2$.

[^] 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 (negative distance must exist if the universe is mathematical – just as hyperspace and subspace are the regions above and below the x-axis in Fig. 3's Wick rotation, negative distance is the positive distance to the left of that figure's centre [the centre is where the axes intersect] – the shortcuts formed by warping space-time into wormholes might also be referred to as negative distance). The forwards and backwards movement cancels 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. The quantum-mechanical entanglement of microwave photons 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. For more about entanglement, see (8) and (9).

As stated previously – programming is adaptive, with time's rate of passing depending on the strength of gravity and electromagnetism. In Special Relativity, time slows in intense gravity and on approaching c , the speed of light[^]. Near c or a black hole, time passes normally for a spaceship and its occupants but many more years pass back on Earth where speeds are extremely slow compared to c and black holes are very distant. For example - At 99.9% of light speed, 3.7 years pass in a spaceship while 21.6 years

go by on Earth. At 99.999999% of light speed, 9 years pass in the ship while Earth experiences 6,847 years. (10)

^ Squaring the speed of light results in a very large number since that velocity is 300,000 kilometres per second, but this speed refers to the disturbance in space-time (the shock wave) which excites photons. As Paul Camp, Ph.D. in theoretical physics, writes,

"A photon is a quantum of excitation of the electromagnetic field. That field fills all space and so do its quantum modes." (11)

Gluons are restricted in their travel through space-time (particle physics uses the word "confined") and are relatively fixed. The same relative fixation applies to the short-range weak-force bosons of spin 1 as well as the supposedly long-range electromagnetic photons of spin 1 (whose speed is assigned the value zero). Whereas 125 giga electron volts divided by the speed of light squared gives a practically nonexistent result if the shock wave's speed is squared, any mathematical operation involving zero can be regarded as an operation not performed and dividing 125 by 0 - the speed of the photons - squared does not change the Higgs boson's mass from the experimentally verified 125 giga electron volts.

REFERENCES

(1) “The dark side of cosmology: Dark matter and dark energy” by David N. Spergel – Science, 06 Mar 2015: Vol. 347, Issue 6226, pp. 1100-1102
DOI: [10.1126/science.aaa0980](https://doi.org/10.1126/science.aaa0980)

(2) Stephen Hawking, 1988, 'A Brief History of Time', pp.66-67 - Bantam Press

(3) Figure and quote from “The Meaning of Imaginary Time: Creativity’s Dialog with Timelessness” - Posted on July 15, 2015 by Kerri Welch (public domain figure supplied by WordPress) - <https://textureoftime.wordpress.com/2015/07/15/the-meaning-of-imaginary-time/>

(4) “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>)

(5) Polthier, Konrad, “Imaging maths - Inside the Klein bottle”- [http://plus.Maths.org/content/os/issue26/features/mathart/index](http://plus.maths.org/content/os/issue26/features/mathart/index)

(6) "The hierarchy problem and new dimensions at a millimetre" by N. Arkani-Hamed, S. Dimopoulos, G. Dvali - Physics Letters B - Volume 429, Issues 3–4, 18 June 1998, Pages 263–272

(7) "Ist die Trägheit eines Körpers von seinem Energieinhalt abhängig?" ("Does the Inertia of a Body Depend upon its Energy Content?") by Albert Einstein - Annalen der Physik (ser. 4), 18, 639–641: http://myweb.rz.uni-augsburg.de/~eckern/adp/history/einstein-papers/1905_18_639-641.pdf

(8) "The Weirdest Link" (New Scientist, vol. 181, issue 2440 - 27 March 2004, 32, <http://www.biophysica.com/QUANTUM.HTM>)

(9) "Quantum Entanglement in Time" by Caslav Brukner, Samuel Taylor, Sancho Cheung, Vlatko Vedral, <http://www.arxiv.org/abs/quant-ph/0402127>

(10) English physicist Eric Sheldon's computer model named STELLA, in the 1991 book "Starbound" in the "Voyage Through the Universe" series, pp. 131-133

(11) Paul Camp, Ph.D. in theoretical physics, a reply in "How big is a photon?" -

<https://www.quora.com/How-big-is-a-photon>

(12) "SPECIAL RELATIVITY (21st-century-style), PARTICLE PHYSICS, AND THE DARK UNIVERSE" by Rodney Bartlett – preprint on Figshare - Feb. 14, 2019 -

<https://doi.org/10.6084/m9.figshare.7717883.v1>