

# ***THE HIGGS BOSON AND THE SUPPOSEDLY UNRELATED GRAVITON***

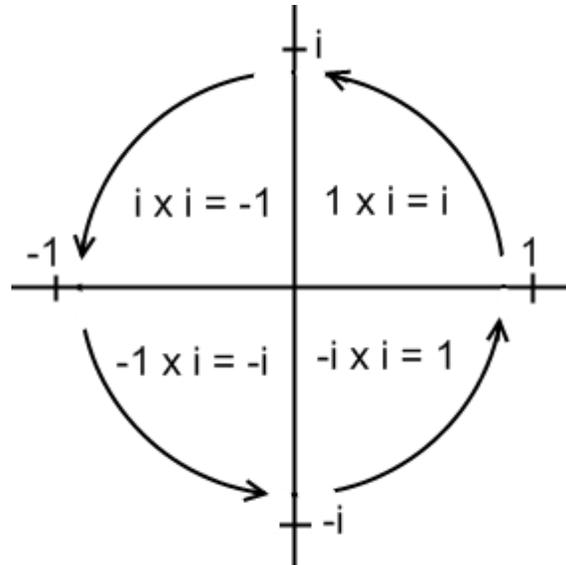
Abstract -

**ALBERT EINSTEIN'S DREAM OF UNITING ELECTROMAGNETISM AND GRAVITATION, PLUS EXISTENCE OF GRAVITON, CONFIRMED BY DISCOVERY OF HIGGS BOSON AND WOLFGANG PAULI'S APPROACH TO QUANTUM SPIN**

In relation to Quantum Spin, Wolfgang Pauli in 1924 was the first to propose a doubling of electron states due to a two-valued non-classical "hidden rotation". (Pais, Abraham [1991]. *Niels Bohr's Times*. Oxford: Clarendon Press. p. 201. ISBN 0-19-852049-2) Let's equate the two-valued system with virtual particles<sup>^</sup> that can take the two values of binary digits (1+0), and thus have the properties of hidden variables. ^^

<sup>^</sup> A virtual particle is a transient fluctuation that exhibits some of the characteristics of an ordinary particle but cannot be detected in experiments. However, they're known to exist because they have the measurable effect of giving rise to forces between particles of matter. This article equates them with the electronic binary digits that are transient and only exist as either a 1 or 0 for an extremely brief time eg as a computer image changes.

\*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)



**Figure 1 – WICK ROTATION**

Binary digits can form the 2-dimensional shape in mathematics called a Mobius strip and, following Pauli's doubling, two strips form the 4-dimensional Klein bottle (Polthier Konrad, "Imaging maths - Inside the Klein bottle" - <http://plus.maths.org/content/os/issue26/features/mathart/index>) which has length, width, depth and, when Wick rotation<sup>^</sup> is programmed into the strips as a subroutine, the 4th dimension of movement in time. 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. (WMAP science team - "Wilkinson Microwave Anisotropy Probe" - <https://map.gsfc.nasa.gov/>)

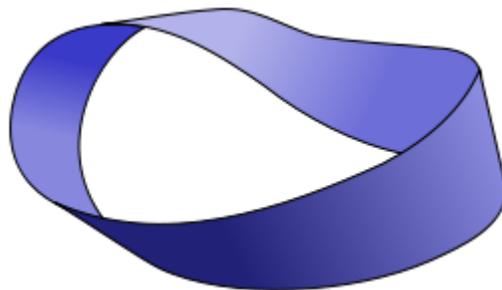
<sup>^</sup> Mathematics has three types of numbers - real, imaginary and complex. Real numbers are exemplified by 0, the positive numbers used in counting and negative numbers. On a two dimensional "Complex Plane", 'Real Numbers' are on the horizontal plane and 'Imaginary Numbers' such as  $i = \sqrt{-1}$  are on the vertical plane. 'Complex Numbers' can be easily identified as a combination of 'Real Numbers' and 'Imaginary Numbers'. ("Difference Between Complex Numbers and Real Numbers" - June 18, 2011 - Posted by Olivia - <https://www.differencebetween.com/difference-between-complex-numbers-and-vs-real-numbers/>) "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." ("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-of-imaginary-time/>)

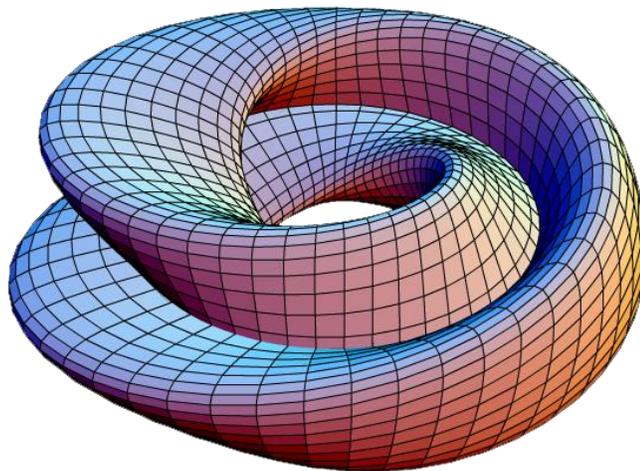
Returning to the subject of quantum spin, assign the Mobius the value of spin 1 and the figure-8 Klein bottle (Mobius doublet) a value of spin 2 (the remainder of this paragraph will show the necessity of this assignment). "From Planck Data to Planck Era: Observational Tests of Holographic Cosmology" 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. ("2D packages trillions of times smaller than an atom" could, here, refer to Mobius strips.)

Following this paper's example, trillions of Mobius strips are built-up into the spin-1 photon instead of the atom. And trillions of figure-8 Kleins are built-up into the undiscovered graviton, which is expected to have spin-2. ***Doubling the Mobius strip to make the figure-8 Klein bottle thus unites the photon with the graviton, and electromagnetism with gravitation.***

**Figure 2 - MOBIUS STRIP** (source: [http://www.clker.com/cliparts/3/7/a/9/1220546534781713951lummie\\_Mobius\\_Strip.svg\\_hi.png](http://www.clker.com/cliparts/3/7/a/9/1220546534781713951lummie_Mobius_Strip.svg_hi.png))



**Figure 3 - 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.)



Matter particles (spin  $1/2$ ) would be formed by photon-graviton interaction (spin 1 divided by spin 2). The interaction forming the Higgs particle's spin 0 is "destruction" of couplings eg of 1 trillion gravitons (value = quantity times spin = 2 trillion) and 2 trillion photons (2 trillion times 1). "Destruction" is actually a phenomenon described by Richard Feynman's work on antimatter. ^ 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). ("Physics of the Impossible" by Michio Kaku – Penguin Books 2008, pp. 277-278) Visualizing the Complex Plane and Wick rotation, the gravitons forming a gravitational wave cycle or oscillate between its advanced (towards the left and the past) or retarded (towards the right and the future) states. The waves also cycle into the vertical direction – contributing to the formation of the so-called "imaginary" time which is described by imaginary numbers, and may possibly be joined to an "imaginary" space filled with Dark Matter.

^ The word “destruction” is not accurate. Though the particles and antiparticles involved in annihilation vanish; gamma-ray photons, neutrinos, and sometimes less-massive particle–antiparticle pairs remain. The reaction of 1 kg of antimatter with 1 kg of matter would produce  $1.8 \times 10^{17}$  J (roughly 1,000 GeV) of energy (by the mass–energy equivalence formula,  $E = mc^2$ ). (M. G. Sowerby. "Nuclear fission and fusion, and neutron interactions". *Kaye & Laby: Table of Physical & Chemical Constants*. National Physical Laboratory) This is eight times the mass of the Higgs boson, whose production would require a wave-advancement (see next paragraph) equivalent to approximately 1/8 kg of antimatter reacting with approximately 1/8 kg of matter and leaving a remnant of 125 GeV /  $c^2$ .

Consider the Wheeler-Feynman absorber theory and Transactional Interpretation of Quantum mechanics. (Cramer, John G. (February 1988). "An Overview of the Transactional Interpretation". *International Journal of Theoretical Physics*. **27** (2): 227–236. [doi:10.1007/BF00670751](https://doi.org/10.1007/BF00670751)) These speak of "retarded" electromagnetic waves going forward in time and "advanced" waves going backwards in time. Einstein's gravitational equations contain enough information about electromagnetism to allow electromagnetism equations to be restated in terms of these gravitational fields, (George Yuri Rainich, *Transactions of the American Mathematical Society*, 27, 106 - Rainich, G. Y. [1925]) giving gravity retarded and advanced components too.

Mass – including the mentioned matter – is an emergent property resulting from (in simpler terms) photon-graviton interaction or, in more precise terms, virtual particles or binary digits ( $D_{\text{subscript } 1+0}$ ) interacting with the Mobius strip ( $S_{\text{sub } M}$ ) and figure-8 Klein bottle ( $K_{\text{sub } 8}$ ) which are assembled into photons and gravitons. In the maths notation adopted here,

$$m = (D_{1+0}) (S_M, K_8)$$

Like a biological catalyst or enzyme, the binary digits of 1 and 0 "bind to" and "hold in the proper position" the Mobius strip plus the figure-8 Klein bottle (these make up the substrate of reacting “chemicals”). The positioning is done by (a) uniting two Mobius strips to form each figure-8 Klein bottle, and (b) by changing the shape of the figure-8

Klein bottle. 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 (they're multiply connected). Referring to the conceivably infinite universe - 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](https://arxiv.org/abs/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 the changing of the Klein bottle's shape by gravitation and electromagnetism (these are composed of binary digits, also called virtual particles and hidden variables) mimics the process of gaps in, or irregularities between, figure-8 Klein bottles being "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 ensures the positive and negative shapes in different figure-8 Klein bottles are precisely united, and makes space-time relatively smooth and continuous as Einstein thought. Plus - it gets rid of holes, making figure-8 Klein subunits feasible. Since the  $S_M$  and  $K_8$  are both mathematical shapes,  $D_{(1+0)}$  must also be mathematical to interact with them. It uses the base-2 maths of binary digits, and interaction cannot be attributed to a lock-and-key mechanism of shapes fitting together.