International Journal of Astronomy, Space Sciences and Cosmology
Short Communication

How the Higgs Boson and Two Nuclear Forces Relate to the Quantum Pressure and Hawking Radiation of Black Holes as Well as Dark Matter and Dark Energy

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ABSTRACT

The following article proposes that black holes are formed by the quantum pressure of interacting gravitons and photons. This pressure would not magically stop at the event horizon but would naturally affect the environment of the black holes.

Added to the quantum nature of photons and gravitons is the simplified diagram below of this article's vector-tensor-scalar (VTS) geometry describing the two particles' interaction. Since the geometry was inspired by a paper Albert Einstein published in 1919, it would - if correct - be a step towards quantum gravity, the ongoing quest to link Einstein's general relativity with quantum mechanics. Similarly with Einstein's 1919 attempt to explain the atom in terms of electromagnetism and gravitation, this article outlines how the Higgs boson and the two nuclear forces arise through interaction of electromagnetism and gravitation. In the case of the weak and strong nuclear forces, it's thus suggesting a different approach to the electroweak interaction (one approach won the Nobel Prize for Physics in 1979).[1]

Interaction of the gravitons and photons within a black hole produces a pressure we identify as mass. Since this pressure extends into the black hole's environment, the black hole is losing mass, as Stephen Hawking's idea of "Hawking radiation" tells us (radiation of a thermal nature - heat - implies that electromagnetism's photons are present).

As will be seen, the term "diagonal" in VTS Geometry can be replaced with the term "quaternion". And the counter clock wise rotation of the (horizontal) x-and (vertical) y-axes in Wick Rotation can be viewed as either rotation into diagonal form or as a quaternion function. This permits another view of dark matter and dark energy to be explored in the text.

Keywords: Black Holes; Dark Matter; Dark energy; General Relativity; Vector-Tensor-Scalar Geometry

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Citation: *Rodney Bartlett. How the Higgs boson and Two Nuclear Forces Relate to the Quantum Pressure and Hawking Radiation of Black Holes As Well As Dark Matter and Dark energy. Int Ast Spa Cos Jour. 2021;1(1):1-6*

Received Date: 23 September, 2021; **Accepted Date:** 28 September, 2021; **Published Date:** 30 September, 2021

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INTRODUCTION

Quaternions, Spinors and Wick Rotation Related to Two-Dimensional Vector-Tensor-Scalar (VTS) Geometry

"Dust grains assemble by chemical bonding. Once they are sand or gravel sized, how they continue to stick is a mystery. Metre-sized rocks should spiral into the star rapidly due to disc drag (the gas orbits a little slower than the rocks as a pressure gradient partially supports it). Once rocks somehow get past these barriers, they collide with each other in a chaotic and random way assembling the planets.[2]

The following method of building planets is preferred to collisions between rocks and dust in the disc because most planetary systems seem to outweigh the proto planetary discs in which they formed, leaving astronomers to re-evaluate planet-formation theories.[3]

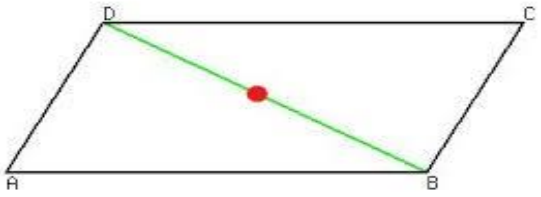

Figure 1: VTS (Vector-Tensor-Scalar) Geometry-Interaction of Gravitation and Electromagnetism Produces a Momentum in Gravitons and Photons (and a Pressure which is known as Mass). (My VTS Geometry was inspired by[4]

A vector is a quantity which possesses both magnitude and direction. Two such quantities acting on a point may be represented by two adjoining sides of a parallelogram, so that their resultant is represented in magnitude and direction by the diagonal of the parallelogram (AD and CD, for example, can symbolize the electromagnetic and gravitational vectors. While the resultant green diagonal of DB substitutes for the interaction of those two forces).

A scalar variable is representable by a position on a line, having only magnitude e.g. the red dot on the diagonal, symbolic of the Higgs boson. A tensor is a set of functions which, when changing from one set of coordinates to another, are transformed in a precisely defined manner (e.g. changing from the coordinates of AD and CD to those of the green diagonal, or of the red dot, is a transformation performed in a particular way).[5]

Two sides thus illustrate the graviton's spin2 and the photon's spin1. The resultant diagonal represents the interaction of the sides/vectors (1÷2= the spin ½ of every matter particle). Tensor calculus changes the coordinates of the sides and diagonal into the coordinates of a single (scalar) point on the diagonal. This scalar point is associated with particles of spin 0.[6] If the mass produced during the photon-graviton interaction (the energy and momentum of photons and presently hypothetical gravitons produces a pressure we call mass*) happens to be 125 GeV/c^2, its union with spin 0 produces the Higgs boson.

GeV/c^2 originates with E=mc^2 solved for mass (m=E/c^2, or mass equals the Energy of 125 Giga-billion-electron Volts divided by the speed of light squared). The short version is that the mass of the Higgs particle is 125GeV.

125 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).

* Material from a star could fall onto a neutron star, heating it up and causing it to emit radiation. Then the energy and momentum of the photons and presently hypothetical gravitons would be the interaction of electromagnetism (the charged particles and strong magnetism) with the neutron star's powerful gravity. The heating could produce gravitational and electromagnetic radiation which would produce the mass and quantum spin of subatomic particles-instead of only radiation being emitted, jets of matter would be emitted too (normally, the matter would be emitted as beams or jets from the neutron star's magnetic poles).

Black Hole Formation plus Bosons of the Weak and Strong Nuclear Forces

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 spin1 needs to react with the graviton's spin2. 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 (Richard Feynman, 20th-century winner of the Nobel Prize in Physics, used reversal-of-time to explain anti matter) in the middle of the interaction: a graviton half revolution is subtracted from the photonic full revolution then the graviton's time-reversal adds a half revolution(1-½+½=the spin1of W and Z bosons). The strong nuclear force's gluon's quantum spin 1 of could arise in the same way as the spin 1of weak-force bosons. The masslessness of gluons might be produced by retarded and advanced waves*** cancelling. They neutralize each other, producing a mass of zero and relating gluons to the Higgs boson whose zero quantity is its quantum spin.

**Professor Stephen Hawking writes[7]

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

Spin1 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.

Spin2 is like an arrow with 2 tips-1 pointing up, 1down. A graviton has to be turned half a revolution (180 degrees) to look the same.

Spin0 is like a ball of arrows having no spaces. A Higgs boson looks like a dot: the same from every direction.

Spin ½ is logically like a Mobius strip, though Hawking doesn't specifically say so. This is because 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.

***"When we solve (19th-century Scottish physicist James Clerk) Maxwell's equations for light, we find not one but two solutions: a 'retarded' wave, which represents the standard motion of light from one point to another; but also an 'advanced' wave, 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.[8]

The interacting gravity and electromagnetism produce mass e.g. they can form a Higgs boson or the strong/weak nuclear forces' bosons as well as matter. On a cosmic level-if gravitational and electromagnetic waves focus on a proto planetary disc surrounding a new born star, the quantum spin of the particles of matter in the disc(1/2) could imprint itself on the waves' interaction and build up a planet layer by layer from vector-tensor-scalar geometry's 1÷2 interaction. If the waves focus on a region of space where there's no matter, the opposite interaction occurs and the graviton's spin2 is divided by the photon's spin1 to produce 2÷1. The mass produced has the spin inherent in each of the gravitons composing space time-and could be an alternative, or complementary, method to supernovas for producing the gravitational waves making up black holes.

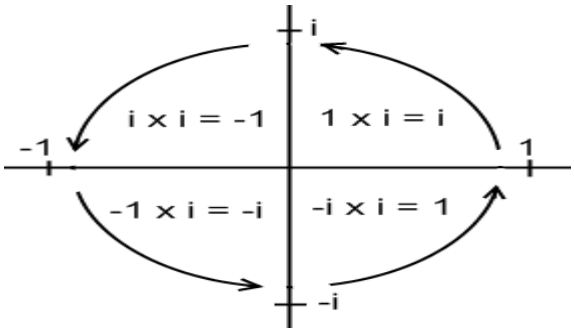

Figure 2: Wick Rotation: "The complex plane reveals it's special relationship with cycles via the circle of i, also known as Wick rotation. Whenever a point on the complex plane is multiplied by i, it moves a quarter rotation around the origin or center of the plane.[9]

Quaternions were first described by Irish mathematician William Rowan Hamilton in1843. Hamilton defined a quaternion as the quotient of two vectors.[10] In this case: the quotient of two vectors is 1/2, the division of the electromagnetic vector (photonic quantum spin of 1) by the gravitational vector (gravitonic quantum spin of 2). In other words, the term "diagonal"(like 1/2, the result of these 2 vectors interacting) in VTS Geometry can be replaced with the term "quaternion". And the counter clock wise rotation of the (horizontal) x- and (vertical) y-axes in Wick Rotation can be viewed as either rotation into diagonal form or as a quaternion function.

Spinors-elements of a complex vector space that were introduced in geometry by Élie Cartan in 1913[11] can be viewed as the "square roots" of vectors. This indicates that spinors are a guide to the mathematical interactions

between gravitation and electromagnetism outlined by the gravitational and electromagnetic vectors of Vector-tensor-scalar geometry.

Dark Matter and Dark Energy

The electromagnetic and gravitational waves composing space-time rotate in a cycle. The waves rotate through the vertical y-axis* that is home to so-called Dark Matter and the Dark Energy composing it, and back to the horizontal x-axis' space-time. (As NASA's measurements reveal in the next paragraph, the composition of dark matter by dark energy isn't as simple as energy=mass in all cases i.e. it isn't always similar to ordinary energy composing ordinary matter via E=mc^2.) Since quantum mechanics says particles can be in two or more places at once, the photons and gravitons which make up the waves in space-time can be on the x- and y-axes simultaneously (everywhere and every when at once) and thus interfere with themselves, causing time to slow down significantly near the speed of light in a vacuum or under intense gravity.

*The dark matter/dark energy (DM/DE) residing at or near the Complex Number Plane's y axis remains in space-time's curves (in gravity) so it gravitationally affects space-time on the x axis. But this exotic mass-energy lies perpendicular (or almost perpendicular) to each dimension of our instruments, and thus electromagnetically undetectable (at least at present). 5.5 rotations, each of ~ 65.45 degrees, means there would be 5 1/2 times as much dark matter as ordinary matter (or, to use NASA's number in,[12] about 27% of the universe would be DM). Constant rotation keeps the x- and y-axes interactive but doesn't make more ordinary matter since the x-axis is restricted to E=mc^2 (the amount of available energy limits the production of matter). Mass-energy equivalence may not be DE=DMc^2 in every "dark" dimension. In some, there might be more "dark" energy available. It'd be possible for the universe to contain more than 5.5 times as much energy as our dimension. DE could be roughly 68% of the content of the cosmos.

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