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Tachyons are Messengers for Entangled Particles

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Abstract

Index terms—

1 I. INTRODUCTION

For QED (Quantum Electro Dynamics) between two charged particles the messenger particle is the photon, and for QCD (Quantum Chromo Dynamics) between three quarks or between quark anti-quark pairs the messenger particle is the gluon. We will show that for QTD (Quantum Tachyonic Dynamics) between two entangled particles the messenger particle is the tachyon. The tachyon is a point particle with zero mass and zero charge like the photon and the gluon. However, we will show that it has zero spin and hence it is a Scalar Boson like the Higgs Boson. Like the photon and the gluon, it does not interact with the Higgs field because if it did, it would receive mass to slow it down. Therefore, the tachyon is very different from the W+-and the Bosons of the Weak interaction which get their mass ? 0 from the Higgs field. So far in Physics literature tachyons have been postulated to travel faster than the speed of light, and in science fiction the use of tachyon beams is made to be able to consider sending messages to the past (1).

We will show this to be true mathematically using the Lorentz transformation t = / which ? 0 1 -? 2 /? 2 becomes t = -i / for v > c. The axis of the imaginary number "i" in the equation is? 0 ? 2 /? 2 -1

perpendicular to the three real number axes x, y, z in our 3D space and therefore the tachyon lies in our fourth dimension (4D space), the negative sign indicating it can travel backwards in time from 4D to 3D since 3D space was created before 4D space. For v very close to c, v c, time does not exist because ? becomes zero, and t as time becomes ageless. The photon with speed v = c does not? 2 /? 2 -1 ? ?

age as it travels indefinitely through space. In the regime of v c, the tachyon behaves much like the ? photon. Because of it being massless, the problem of decaying into smaller mass particles does not exist. In that sense it is elementary like the photon, the gluon, and the electron which has the smallest mass of all the elementary particles. be positive, p > mc which must be the case since v > c. In the case of the massless tachyon E = pc and from the wave-particle duality of Quantum Mechanics p = h/? and E = hc/?. By comparison the highest energy Gamma ray photon in our 3D Universe would have energy of about Joules and this is 10 -8 because the speed of the photon cannot exceed 3x m/s. For the case of tachyons E = hc/? and as 10 8 the wavelength ? of the tachyon approaches zero the Energy of the tachyon approaches infinity. The tachyon borrows this tremendous amount of energy for a very short period from the vacuum energy density of 4D space based on Heisenberg's Uncertainty Principle Ex t h/2 . As E increases, t? ? ? ? ? ?

simultaneously decreases. This spontaneous burst of energy allows the tachyon to enter 3D space to interact with the two entangled electrons. Having changed their quantum states to a classical state as will be further discussed below, the tachyon gives up its borrowed energy to the vacuum energy density of 3D space. The equation wants to pull the tachyon in its now photonic-like normal state of eternal agelessness back into 4D space since its equation contains "i", the fourth dimension of space, and that is where tachyons must reside before being called upon once again to untangle two entangled particles in our 3D space. The portal between 3D and 4D space is the Black Hole. Once the tachyon enters the Black Hole in 3D it returns to its home in 4D space. This phenomenon is called the tachyonic loop of space-time. The existence of our 4D space has been confirmed both theoretically and experimentally because that is where Dark Matter of our 3D Universe resides (2). The reason we cannot observe the existence of tachyons in our 3D space is because they travel faster than the speed of light and therefore photons are unable to reach them to be able to observe them, and so they remain spooky (implying ghostly) particles as referred to by Einstein who called the interaction of tachyons with entangled particles "spooky action at a distance".

Matter entering 4D from our 3D space increases the energy of 4D space while decreasing the energy of 3D space. Tachyons borrow energy from 4D space energy density, returning the energy to 3D space energy density. Hence the reverse process takes place whereby the energy of 4D space is decreased while the energy of 3D space is increased. However, these two processes are not in equilibrium because in another 2.6 billion years our 3D Universe will become part of the 4D Universe (2), with all the energy existing in 4D space. This implies that the number of particles that are not entangled greatly exceeds the number of entangled particles in our 3D Universe. As an example, an electron and a positron can annihilate each other to produce two entangled photons but these entangled photons would be only a small fraction of the total number of photons that exist in our 3D Universe.

Using QTD we will explain the 2022 Nobel Prize in Physics which states that Quantum Mechanics is not a deterministic theory like Classical Mechanics with a speed limit that is the speed of light, since two entangled particles can exchange information instantaneously even when separated by huge distances in space. Consider two entangled electrons both with a superposition of spin up and spin down states. The tachyon travels back in time from 4D to 3D space to contact one of the entangled electrons to change its superposition state to a deterministic value of either spin up or spin down. Then it approaches the second entangled electron instantaneously to transmit the information to the second electron which changes its spin state to become the opposite spin state of the first electron. If the first electron has up spin, then the second electron will have down spin, and this happens instantaneously even if the two electrons are located at two opposite sides of our 3D Universe. Since the two electrons have equal and opposite spins (+1/2 and -1/2) the tachyon must carry a zero spin to be able to interact with both the electrons simultaneously, and hence it is classified as a Scalar Boson like the Higgs Boson. Only in Quantum Mechanics can the future change the past, and it is done to make Quantum Mechanics compatible with Classical Mechanics. Tachyons can change the indeterministic nature of Quantum Mechanics into the deterministic nature of Classical Mechanics.

Quantum theory is used to explain Schrodinger's cat in a box which can be in a superposition of being both alive and dead until one observes it at which time it will be found to be in a deterministic state of being either alive or dead. Along with the grandfather's paradox which implies going back in time to kill your own grandfather so that you cannot be born, Schrodinger's cat is a terribly wrong example widely London Journal of Research in Science: Natural and Formal used in Physics because Quantum Mechanics and the superposition principle apply only to microscopic particles, but for the size of a human being or a cat we are in the Classical regime for which the rules of Quantum Mechanics cannot apply. The law of causality for Classical Mechanics will not allow large objects to move backwards in time. This notion of humans being able to travel back and forth in time has been popularized by science fiction movies such as Back to the Future, Spiderman: Across the Spider-Verse, Flash, etc. and by science fiction books (3). Since tachyons and anti-particles can move backwards in time this means that the future can change the past implying quantum mechanics does not obey causality, while classical mechanics obeys causality since you cannot go to the past to kill your own grandfather and then find yourself to be still alive magically in an alternate Universe as has been depicted in the movies. Movies are for entertainment while Physics is for reality.

2 II. CONCLUSION

Tachyons and the Higgs Boson should be included together in the Standard Model of Particle Physics since they are both the only known Scalar Bosons.

The speed of light no longer exists as a universal cosmic speed limit as in classical mechanics because besides tachyons, space too that is quantized can expand faster than light speed (4).

Tachyons only interact with entangled particles such as two entangled electrons, two entangled photons, or an entangled electron-positron pair. Their job is to end the entanglement by separating them to demystify these quantum elementary particles to the classical level. The basic difference between Quantum Mechanics and Classical Mechanics is the size of the object and the time for which it is being observed. While space itself may seem to be very large it can be broken up into small quantum bits to obey the laws of Quantum Mechanics. Hence space and time can become a space-time continuum only for much larger classical values when they blend to become Classical, but their true nature is Quantum Mechanical at the tiniest levels (4). [1]

[1] ©

[Benford et al. ()] , G Benford , Simon Timescape , Usa Schuler . 1980. 1980. Nebula Award.

[Irani ()] 'Dark Energy, Dark Matter, and the Multiverse'. A Irani . 10.4236/jhepgc.2021.71009. https://doi.org/10.4236/jhepgc.2021.71009 *Journal of High Energy Physics, Gravitation and Cosmology* 2021. 7 p. .

[Irani (2022)] 'Faster than the speed of light is a Quantum Phenomenon'. A Irani . *Journal of High Energy Physics, Gravitation and Cosmology* 2022. Apr. 2023. 9 (2) .

[Benford ()] *REWRITE Loops in the timescape*, G Benford . 2018. 10020. NY: Saga Press, An imprint of Simon and Schuler, Inc. NY.