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Experiment for Spatial Wave Function Out of 3D

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Abstract: ***An experiment is proposed to determine Mazzini's (2021) hypothesis that tangible existence is the combination of stuff in a media, where stuff is the compact particles of the Standard Model and the media is a wavy quantum space; concluding that the elementary particles will be in 3D meanwhile its coexisting space is present. Where the oscillation frequency is given by its energetic content and, on each fluctuation, particles will assume one of their valid states; they will randomly change to another eigen state on every new cycle. To define this hypothesis, an experiment is proposed with a low-frequency individual photon and, by means of a crystal, be divided into two photons, one for detecting the timing of the measurement event and the other photon will be observed to confirm its presence in 3Dat a given traveling distance. With the detector thickness much less than the photon wavelength, the detector position is changed to determine its presence at different distances. This experiment will reveal the goodness of this hypothesis as anew quantum mechanics interpretation.***

Keywords: wave function experiment, quantum space, wavy space, theory of space

1. Introduction

From intuitive thoughts, the universe can be simplified as "stuff in a media", from Mazzini paper in 2021 [1], "stuff" is proposed as all the particles resumed by the Standard Model and the "media" is proposed as the 3D quantum space. The first entity is circumscribed inside the quantum system as compact, i.e., "particle" or "compact field", and the second entity is the quantum system space that is in oscillation between 3D and its 4th longitudinal dimension. So, the universe will be the coexistence of elementary particles with its wavyspace; this particle will exist aleatorily in 3D meanwhile its space is in 3D. These two entities solve the wave-particle duality, not one entity that assumes two rolls in a weird-convenient way, but a wavy space that can be splitted or joined or interfered with itself, providing a wave behavior characteristic to the compact entity.

On each new cycle, the compact entity will assume aleatorily a new eigen value in such a way that only one eigenvalue exists in a given ephemeral moment; completely in accordance to the observations known as the measurement problem or the collapse of the wave function. The oscillation frequency is so fast that it gives the opportunity to the entity, to develop all its eigen states in an apparent superposition form; accomplishing by this way with all the math of Quantum Theory without the weirdness of multiple-superposition versus unique-collapse existence. This aleatory poli deterministic characteristic of nature enables compact "particles" to behave in a probabilistic manner; a fundamental behavior of nature. For example, the existence of electron surrounding its nucleus is done with multi-orbits, these multi-orbits make a perfect electro field shield; it also provides a stable bonding of atoms and the consequent existence of molecules and cellular formations, i.e., our own existence due to the quantum probabilistic poli-deterministic behavior of nature.

Now, the issue that the quantum system space is temporarily out of the 3D longitudinal dimensions explains how particle can change from one eigen state to another eigen state without the conflict of "forbidden travels" in 3D between valid solutions. Besides, this passage to its 4th longitudinal dimension [2] provides the explanation how separated entangled particles interchange information without the relativistic speed limit at 3D; a "local" interaction in this new dimension. It also provides the view of how tunneling of a 3D barrier is overcome meanwhile it's outside the 3D space. This oscillating passage to the 4th dimension can be the zone where particles interaction (creation and destruction) occurs, accomplishing in this way the conservation laws of momentum, energy, charge, etc.

The issue that some physical parameters are defined at 3D (x, y, z) and others are known at the 4th dimension (total energy, total momentum, total charge, etc.) explains Heisenberg's Uncertainty Principle [3], not as inaccessible full knowledge but a knowledge that has a border horizon limit at the quantum space. A simple deduction from Poincare's invariance (at the quantum space environment) can show this relation:

$(i\,C\,\Delta t)^2 + (\Delta x)^2 + (\Delta y)^2 + (\Delta z)^2 = 0$
where C is the energetic wavy speed (1)

$(\Delta r)^2 = (C\,\Delta t)^2$ where $(\Delta r)^2 = (\Delta x)^2 + (\Delta y)^2 + (\Delta z)^2$ (2)
$\Delta r/h = C\,\Delta t/h$ where h is Planck's action (3)
$\Delta r/h = \lambda/h$ where λ is the energetic wavelength (4)
$\Delta r/h = 1/\Delta p$ where p is the momentum (5)
$\Delta p * \Delta r = h$ Heisenberg's limit equation (6)

From equation 3:
$(\Delta r/C)/h = 1/(v*h)$ where $\Delta t = 1/v$ (7)
$\Delta t/h = 1/\Delta E$ from equation 2; $\Delta r/C = \Delta t$ (8)
$\Delta E * \Delta t = h$ Heisenberg's another equation (9)

Going further inside this quantum system, there will be a limit in the simultaneous knowledge of some physical parameters due to parameters at different phases i.e., one being at 3D and the others at the 4th dimension; in these cases, no simultaneous measurement can be achieved since action h is involved during the phase difference. Note that all math relational ways contain an exact limit knowledge involving action h, not an unknown nor an arbitrary value. It also explains why the complex numbers are so useful; parameters can be express in a single equation combining

real numbers with imaginary ones, perfect to manage an oscillatory existence.

It's important to realize that the speed C in inherent to this space oscillation, so the relativistic speed limit C in 3D is just a consequence of this quantum characteristic of all the particles and, not only for electromagnetic EM waves as, for example, our observable light.

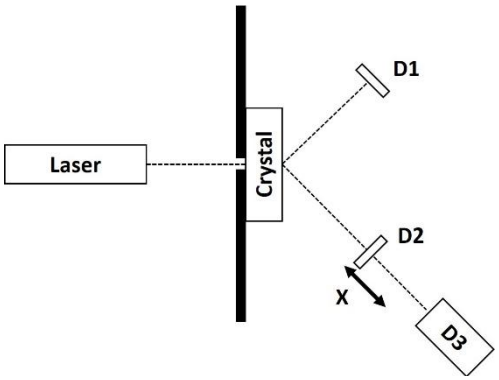
2. Experiment

When the displacement speed of the quantum system is less than C, particle's position will still randomly change on each fluctuation; but for photons traveling at C speed, they will have a consistent position and it will be the best elementary particle for this experiment. From Mazzini hypothesis [1], the photons are compact EM pulse coexisting in its wavy quantum space, same as the other compact particles like electrons; no mayor conceptual difference neither the classic distinction of one being a diffuse EM wave and the other a compact particle. This can be seen in the classical Young's double slit experiment [4], but with individual photons, they are detected at the end as small particles (less than the slit opening) but its wavy component sufficiently big (in the order of the slits separation) to produce the interference pattern. This is also in accordance with Einstein's [5] quanta-compact-corpuscular concept given in 1905 and confirmed in 1923bythe Compton's scattering effect [6].

An experiment is proposed (see figure 1) consisting in an individual low frequency photon that will be divided by a BBO crystal into two photons. One of them is detected by D1 to obtain the timing of the measurement event and, the other photon will be observed to confirm its presence in 3D at a given traveling distance. These observations are done by means of thin detectors D1 andD2, with a thickness much less than the photon wavelength; D2determinesthe photon's presence at different traveling distance X. Note that the frequency of the photons is sufficiently low to obtain a practical thickness of detectors D1 and D2. For the non-detected photons, an additional detector D3 is used to confirm photon's existence discarding that the lack of detection at D2 is not due to an experimental error. Take into account that the position of detector D1 must be fixed, so for the correct event timing at D2, the time is adjusted in correspondence to their trajectory length difference.

Data will be analyzed between the adjusted D1 timing and D2 detection at X position, statistical variations will indicate the consistency of photons presence at this given position. The distance X must be change in fractions of the photon's wavelength up to a few wavelengths distance for finally obtaining a distribution of photon presence in 3D versus X position. The detection in D3 will validate the photons existence out of 3D if they pass through D2 without detection.

Figure 1



3. Conclusions

The basic misunderstanding or weirdness of quantum theory can be overcome considering that the space has a more challenging roll in nature. The wave-particle duality as two entities coexisting together solves the ambiguity of one entity dual role. Now, the Schrodinger's wave function equation [7] can be physically explained as the random behavior of elementary particles within its oscillating quantum space between 3D and a new dimension. This will reinforce the unique existence of one eigenstate meanwhile in a short moment all the eigenstates are present, by this way solving the measurement problem i.e., the conflict between multiple-superposition existence versus individual-collapse existence. The aleatory assumption of individual eigenstates per cycle, provides to the quantum system the greatness of a random multiple existence in 3D; nature fundamental poli characteristic existence. This ephemeral random existence makes understandable the non-reversibility of time in nature at quantum detail; no aleatory behavior can be reproduced backwards in time.

Declarations

The author declares no conflicts of interest regarding the publication of this paper.

References

[1] J. O. Mazzini, "Space, main actor of Quantum and Relativistic Theories" Int'l Journal of Science and Research 10/4, (April 2021) DOI: 10.21275/SR21406195404
[2] J.O. Mazzini, "Space, Time and Mass Complementary Dimensions" Int'l Journal of Science and Research 11/6, (June 2022) DOI: 10.21275/SR22621013409
[3] W.Heisenberg, Uber den anschaulichen Inhalt der quantentheoretischen ¨ Kinematik und Mechanik Zeitschrift f¨ur Physik 43 (3–4) 172–198 (1927)
[4] T. Young, "The Bakerian lecture. Experiments and calculation relative to physical optics". Philosophical Transactions of the Royal Society of London. **94**: 1–16. (1804) DOI: 10.1098/rstl.1804.0001. S2CID 110408369.
[5] A. Einstein, "Über einen die Erzeugung und Verwandlung des Lichtes betreffenden heuristischen Gesichtspunkt" [On a Heuristic Point of View about the

Creation and Conversion of Light] (PDF). Annalen der Physik (in German). **17** (6): 132–148. (1905) DOI: 10.1002/ andp. 19053220607.

[6] A. H. Compton, "A Quantum Theory of the Scattering of X-Rays by Light Elements". Physical Review. **21** (5): 483–502. (May 1923) DOI: 10.1103/PhysRev.21.483

[7] E. Schrodinger, Quantisierung als Eigenwertproblem, Annalen der Physik 384 (4) 273–376 (1926)