A New Approach to Duality of Electron

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Abstract:

I decipher quantum duality of electron in Young's Double-Slit experiment. Hypothesis intends to decode

nteraction of knocked-electrons with observer, and perturbative disappearance of interference pattern. Hypothesis is basedon Bohr's Atomic Model, and the theoretical concepts of Quantization of electron. The hypothesis proposes a universal field,similar to Higg's field, that conserves the potential energy of electron through interaction with knocked-electrons, utilizingphenomena of pair-production. The hypothesis provides comprehensive theoretical and mathematical solutions to possiblyelaborate, in a broader context, why electrons exhibit duality and the role of observer in Young's Double-Slit experimentthrough introduction of universal field (SM Field). The interactions between photon and knocked-electrons have beendiscussed. Through using Schrodinger wave equation (SWE), a mathematical model has been derived, that is used to explainrole of the observer, and duality of electron by using SM field as a supplement.

Introduction:

The double slit experiment is the heart of Quantummechanics (Feynman) [1] following the experiment:If the beam of electrons passes through two slits, we resultwith diffraction pattern, instead of envisioned single line. [5][6]. The dual nature of electron is observed

. But an intriguingevent occurs when a detector is positioned in order toobserve the electron going through slit 'A' or 'B'. The wave pattern disappears [7] [8]. What ramificates the electron?What role does the detector play? How to elucidate thisphenomena?

Problem

As it is discussed that the electron is dual in nature, and it is also verified in the context of double slit experiment; The question arises, what is the explanation? Why does the electron, being matter, behave as a wave? Where does this dual nature stem from? Perhaps, it is just like De Broglie suggested in his hypothesis, that the motion is the agent to the wave nature of electron. But then, this would raise a serious objection.

Methods and Equations:

To solve the stated problems, we use Schrodinger waveequation, The developed mathematics is similar to the prevalent problem of physics "Particle in box 1D".

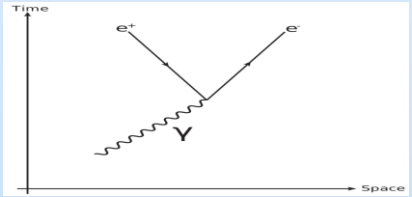
$$\frac{-h^2}{8\pi^2 m}\psi.\nabla^2 + U\psi = E\psi$$

$$F_c = \frac{(Ze_{ff})^2 e^4 m_e}{4\varepsilon_o^2 n^2 h^2 A}$$

$$E = \frac{n^2 eV}{4} + \frac{(Z_{eff})^2 e^4 m_e}{4\varepsilon_\circ^2 n^2 h^2}$$

Interaction of Detector's Photon with Pair-Production

When ever knocked- electron approaches Amplitude of the wave in the SM field, Pair-production occurs due to the potential energy of the knocked electron.The interaction is demonstrated through Feynman diagram: (Figure: 4)



But when the photons from the detector interact with knocked-electron, a second pair production is initiated, which interferes and annihilates the initial pair produced by potential energy of the electron. The annihilation gives rise to two photons. The SM field no longer interacts with the knocked-electron, as the potential function is collapsed. Theknocked electron can no longer cause pair production in SMf-ield, thus, only straight line motion is observed in the form of disappearance of nterferen-ce pattern.

Conclusions

The hypothesis successfully explains the role of observeri n double-slit experiment and accurately predicts interactionof the detector's photons with the Knocked-electron. It becomes clear that knocked-electron fired from electron gun has total energy, that is the sum of two different energy functions, such as kinetic-function and potential-function due to presence of the SM field (Theoretical), instead of only kinetic, as previously thought which explains the duality of electron.

The hypothesis is strongly supported by the double-slit experiments, and, successfully predicts the behaviour of the knocked-electron when detector is on/off. The SM field is yet to be proved experimentally, but theoretically, it is the hidden parameter to solve the problem of duality of electron (17).

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