World Academy of Science, Engineering and Technology
International Journal of Nuclear and Quantum Engineering
Vol:17, No:12, 2023

On the Internal Structure of the 'Enigmatic Electrons'

Authors : Natarajan Tirupattur Srinivasan

Abstract : Quantum mechanics(QM) and (special) relativity (SR) have indeed revolutionized the very thinking of physicists, and the spectacular successes achieved over a century due to these two theories are mind-boggling. However, there is still a strong disquiet among some physicists. While the mathematical structure of these two theories has been established beyond any doubt, their physical interpretations are still being contested by many. Even after a hundred years of their existence, we cannot answer a very simple question, "What is an electron"? Physicists are struggling even now to come to grips with the different interpretations of quantum mechanics with all their ramifications. However, it is indeed strange that the (special) relativity theory of Einstein enjoys many orders of magnitude of "acceptance", though both theories have their own stocks of weirdness in the results, like time dilation, mass increase with velocity, the collapse of the wave function, quantum jump, tunnelling, etc. Here, in this paper, it would be shown that by postulating an intrinsic internal motion to these enigmatic electrons, one can build a fairly consistent picture of reality, revealing a very simple picture of nature. This is also evidenced by Schrodinger's 'Zitterbewegung' motion, about which so much has been written. This leads to a helical trajectory of electrons when they move in a laboratory frame. It will be shown that the helix is a three-dimensional wave having all the characteristics of our familiar 2D wave. Again, the helix, being a geodesic on an imaginary cylinder, supports 'quantization', and its representation is just the complex exponentials matching with the wave function of quantum mechanics. By postulating the instantaneous velocity of the electrons to be always 'c', the velocity of light, the entire relativity comes alive, and we can interpret the 'time dilation', 'mass increase with velocity', etc., in a very simple way. Thus, this model unifies both QM and SR without the need for a counterintuitive postulate of Einstein about the constancy of the velocity of light for all inertial observers. After all, if the motion of an inertial frame cannot affect the velocity of light, the converse that this constant also cannot affect the events in the frame must be true. But entire relativity is about how 'c' affects time, length, mass, etc., in different frames.

Keywords : quantum reconstruction, special theory of relativity, quantum mechanics, zitterbewegung, complex wave function, helix, geodesic, Schrodinger's wave equations
Conference Title : ICQPR 2023 : International Conference on Quantum Physics and Relativity
Conference Location : Sydney, Australia
Conference Dates : December 04-05, 2023