Causal Interpretation of Quantum Mechanics: The Schrödinger Equation as a Condition of Stability

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Abstract. In the present work, the causal interpretation to quantum mechanics is developed. The critical analysis is given of (1) Schrödinger's article: "Quantization as an Eigenvalue Problem" (1926); and (2) D. Bohm's work "A suggested interpretation of the quantum theory in terms of 'Hidden Variables'" (1952). Using the causal approach, it is proven that Schrödinger equation is a necessary condition of stability of the motion of a particle. For the case of the hydrogen atom this approach gives a mathematical base with which to suggest that (1) the electron's spin in an atom is precessing; (2) the energy of the precessional motion on Bohr orbits satisfies Rydberg's formula. Using the Louis de Broglie' double solution theory (which was developed further by Jean-Pierre Vigier and other proponents of the theory) it is demonstrated, in the framework of the causal approach, that some spatial structures accompany any quantum object in a physical vacuum.