NEW YORK CITY COLLEGE OF TECHNOLOGY
Physics Department
Center for Theoretical Physics

Schrödinger Theory from a Newtonian' Perspective

Presented by:

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Abstract

This talk is a description of the Schrödinger theory of a system of N electrons in the presence of an arbitrary time-dependent external field Fext(rt) = − nabla v(rt) in terms of a 'Newtonian' perspective. The perspective is based on the 'Quantal Newtonian' second law of motion for each electron which is a description in terms of 'classical' fields that pervade all space, and whose sources are quantal in that they are expectations of Hermitian operators. In analogy to classical physics, there is then in addition to the external field, an internal field, and a field representative of the response of each electron. The internal field is a sum of fields representative of electron correlations due to the Pauli Exclusion Principle and Coulomb repulsion, the density, and kinetic effects. The perspective leads to an understanding of the self-consistent nature of the Schrödinger equation. On summing the law over all electrons, each component of the internal field vanishes, thereby leading to Ehrenfest's theorem. The 'Quantal Newtonian' first law, a special case, is in turn descriptive of stationary state Schrödinger theory. The perspective will be explicated for both a ground and excited state via an exactly solvable model system. Time permitting, a brief description of Quantal Density Functional Theory, which is founded in these laws, will be given.

Light refreshments will be served.