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Properties of the Schrödinger Theory for Electrons in External Fields VIRAHT SAHNI, CUNY-Brooklyn Coll, XIAO-YIN PAN, Ningbo University, China — We consider electrons in external electrostatic $\mathcal{E}(\mathbf{r}) = -\nabla v(\mathbf{r})$ and magnetostatic $\mathbf{B}(\mathbf{r}) = \nabla \times \mathbf{A}(\mathbf{r})$ fields. (The case of solely an electrostatic field constitutes a special case.) Via the 'Quantal Newtonian' first law for the individual electron we prove the following: (i) In addition to the external electric and Lorentz fields, each electron experiences an internal field representative of electron correlations due to the Pauli exclusion principle and Coulomb repulsion, the kinetic energy, the density, and the magnetic field; (ii) the scalar potential $v(\mathbf{r})$ arises from a curl-free field and is thus path-independent; (iii) the magnetic field $\mathbf{B}(\mathbf{r})$ appears explicitly in the Schrödinger equation in addition to the vector potential $\mathbf{A}(\mathbf{r})$; (iv) The Schrödinger equation can be written to exhibit its intrinsic self-consistent form. (The generalization of the conclusions to time-dependent external fields via the 'Quantal Newtonian' second law follows.)

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