Quantum-Relativistic Effects at the Nanolevel: Analysis of the Mean Square Deviation of Position with a new Analytical Model

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Abstract

In this paper I present new results about the quantum-relativistic form of the mean square deviation of position related to a recently appeared Drude-Lorentz-like model already performed in classical and quantum way, named DS model. The model gives precise informations about the distance traveled by a carrier (electrons, ions, etc.) inside a nanostructure in the hypothesis of quantum effects and relativistic velocity. It has a wide scale range of applicability; I consider the nanoscale in this paper, but the model holds from sub-pico-level to macro-level because of the presence of a gauge factor, making it applicable to all oscillating processes in Nature. Examples of application and suggestions complete the paper.

Keywords: DS model; Drude-Lorentz-like Models; Mean Square Deviation of Position; Nanoscience; Quantum-Relativistic Effects; Surface Dynamics; Solid-State Physics; Analytical modelling.

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