

Zero-Point Fluctuations of Electromagnetic Fields and Zitterbewegung Model

Naranbaatar Dashdorj

Department of Physics, National University of Mongolia, Ulaanbaatar, Mongolia 210136

ABSTRACT

The electromagnetic zero-point like a charged particle undergoes a random Zitterbewegung-type motion. Thus, strict localization of its position in space is implausible, which in turn gives rise to a concept of an extended spread-out particle. Within the framework of the gauge invariant theory that is developed, averaged structure of these particles is an oriented ring, in which non-local electromagnetic interaction of these string-like objects is constructed in a consistent way. Some primitive Feynman diagrams of the S-matrix elements of a ring theory are calculated. Based on the experimental data that tested quantum electrodynamics, it is inferred that the radius of the charged ring should be less than 10^{-18} m.