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Electromagnetic field, spin and gravitation, as characteristics of a charged quantum particle wave function

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Our starting point is a wave packet of a quantum particle, which, for the agreement of the group velocities in the coordinate and momentum spaces with the Hamilton equations, instead of the Hamiltonian in the time dependent phase, includes the Lagrangian. We consider the interaction of such a particle with an external field, with potentials conjugated to time (the scalar potential), and to the spatial coordinates (the vector potential), and a quantum relativistic principle, asserting that the time-dependent phase of a quantum particle is an invariant for an arbitrary change of coordinates. For this field, we obtain the Lorentz equation of the particle-field interaction, the Faraday-Maxwell equation and the Gauss-Maxwell equations for the field components of the two potentials, and the Ampère-Maxwell equation for an electromagnetic field. For a nonrelativistic case, we obtain a Schrödinger equation with a Hamiltonian including the rest mass. With this equation, we obtain the spin as a characteristic of the particle wave function. From the group velocity of a particle wave packet, we obtain an acceleration, proportional to the Christoffel symbols, which take non-zero values only in the curved space of a gravitational field.

Biography

Eliade Stefanescu graduated from the Polytechnic University of Bucharest in 1970, with a specialization in Physics of Semiconductor Devices in 1976, and a PhD in Theoretical Physics in 1990. He became a Scientist in 1976, Senior Scientist 3 in 1978, Senior Scientist 2 in 1991, and Senior Scientist 1 in 1997. Since 2004 he is Senior Scientist 1 at Advanced Studies in Physics Centre of the Romanian Academy. He is known for a microscopic theory of open quantum systems, the invention and the microscopic theory of a semiconductor device for the convertion of environmental heat into usable energy, and a unitary quantum relativistic theory.

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