



High Energy Physics - Theory

Semiclassical Description of Relativistic Spin without use of Grassmann variables and the Dirac equation

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We propose a relativistic particle model without Grassmann variables which, being canonically quantized, leads to the Dirac equation. Both Γ -matrices and the relativistic spin tensor are produced through the canonical quantization of the classical variables which parametrize the properly constructed relativistic spin surface. Although there is no mass-shell constraint in our model, our particle's speed cannot exceed the speed of light. The classical dynamics of the model is in correspondence with the dynamics of mean values of the corresponding operators in the Dirac theory. In particular, the position variable experiences *Zitterbewegung* in noninteracting theory. The classical equations for the spin tensor are the same as those of the Barut-Zanghi model of a spinning particle.

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