

The Interaction Lagrangian For Two Spin 1/2 Elementary Dirac Particles

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Abstract

It has been recently shown¹ that the spacetime symmetry group of a Dirac particle is larger than the Poincaré group. It also contains spacetime dilations and local rotations. In the quantum representation it becomes $\mathcal{W} \otimes SU(2)$, where \mathcal{W} is the Weyl group (Poincaré group including spacetime dilations) and $SU(2)$ is the unitary representation of the local rotation group. In this work we obtain the interaction Lagrangian for two Dirac particles, which is invariant under this enlarged spacetime group. We analyze the interaction between two Dirac particles, and show that it is possible the existence of metastable bound states for particles of the same charge, provided some initial conditions are fulfilled.

¹The space-time symmetry group of a spin 1/2 elementary particle *J. Phys. A: Math. and Gen.* **39**, 4291 (2006)