Isaev, A. P.; Podoinicin, M. A.
Unitary representations of the Wigner group ISL(2, C) and a two-spinor description of massive particles with an arbitrary spin. (English. Russian original) Zbl 1398.81086

Summary: Based on Wigner unitary representations for the covering group ISL(2, C) of the Poincaré group, we obtain spin-tensor wave functions of free massive particles with an arbitrary spin that satisfy the Dirac-Pauli-Fierz equations. In the framework of a two-spinor formalism, we construct spin-polarization vectors and obtain conditions that fix the corresponding density matrices (the Behrends-Fronsdal projection operators) determining the numerators in the propagators of the fields of such particles. Using these conditions, we find explicit expressions for the particle density matrices with integer (Behrends-Fronsdal projection operators) and half-integer spin. We obtain a generalization of the Behrends-Fronsdal projection operators to the case of an arbitrary number $D$ of space-time dimensions.

MSC:
81Q05 Closed and approximate solutions to the Schrödinger, Dirac, Klein-Gordon and other equations of quantum mechanics
22E43 Structure and representation of the Lorentz group
81R25 Spinor and twistor methods applied to problems in quantum theory
81V25 Other elementary particle theory in quantum theory
22E70 Applications of Lie groups to the sciences; explicit representations

Keywords:
Wigner unitary representation; Poincaré group; Behrends-Fronsdal projection operator; Dirac-Pauli-Fierz equation

Full Text: DOI

References:


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