**Arbitrary spin and statistics in the new relativistic wave equation, example spin s=3/2**

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Further approbation of the equation for the particles of arbitrary spin introduced recently in [1–3] is under consideration. The comparison with the known equations suggested by Bhabha, Bargmann–Wigner, Rarita–Schwinger (for spin s = 3/2) and other authors is discussed. The advantages of the new equations are considered briefly. The advantages follow from the fact that our equation does not contain the redundant components. The important partial example of spin s=3/2 case is considered in details. The 8-component Dirac-like wave equation for the spin s=(3/2,3/2) particle-antiparticle doublet is suggested.

The Poincaré invariance and the way of introduction of interaction with external field is demonstrated.

The three level consideration (relativistic canonical quantum mechanics, canonical Foldy–Wouthuysen type field theory and manifestly covariant field theory) is presented.

The operator link between the relativistic canonical quantum mechanics and locally covariant field theory of arbitrary spin is found. Such link is given by the extended Foldy–Wouthuysen transformation between the 2(2s+1)-component local field theory and the corresponding relativistic canonical quantum mechanics. On this basis the field equation is derived from the formalism of quantum mechanics. The hypothesis on the spin s=5/2 particle is discussed.

1. Simulik V. M. Derivation of the Dirac and Dirac-like equations of arbitrary spin from the corresponding relativistic canonical quantum mechanics. Ukr. J. Phys., 2015, 60, 985–1006.
2. Simulik V. M. Link between the relativistic canonical quantum mechanics of arbitrary spin and the corresponding field theory. Journ. Phys.: Conf. Ser., 2016, 670, 012047(1–16).
3. Simulik V. M. Relativistic wave equations of arbitrary spin in quantum mechanics and field theory, example spin s=2. Journ. Phys.: Conf. Ser., 2017, 804, 012040(1–10).