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I. The Isotopic Foldy-Wouthuysen Representation and Chiral Symmetry

V. P. Neznamov

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The paper introduces the isotopic Foldy-Wouthuysen representation. This representation was used to derive equations for massive interacting fermion fields. When the interaction Hamiltonian commutes with the matrix, these equations possess chiral invariance irrespective of whether fermions have mass or are massless. The isotopic Foldy-Wouthuysen representation preserves the vector and axial currents irrespective of the fermion mass value. In the Dirac representation, the axial current is preserved only for massless fermions. In the isotopic Foldy-Wouthuysen representation, the ground state of fermions (vacuum) turns out to be degenerate, and therefore there is the possibility of spontaneously breaking parity (P - symmetry). This study considers the example of constructing a chirally symmetric quantum electrodynamics framework in the isotopic Foldy-Wouthuysen representation. A number of physical processes are calculated in the lowest orders of the perturbation theory. Final results of the calculations agree with the results of the standard quantum electrodynamics.

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