

Multidimensional spinors and Dirac equation in the theory of superalgebraic spinors

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The theory of superalgebraic spinors [1] - [6] is an extension of the theory of algebraic spinors [7]. It is a modern version of algebraic quantum field theory. The main difference of this theory from other versions of quantum field theory is that the field operators in it are the superposition of Grassmann densities in momentum space and their derivatives. In this case, gamma operators (algebraic analogs of Dirac gamma matrices) are constructed from the Grassmann densities and their derivatives. In this approach, we have proved that in the case of a four-dimensional spacetime, in addition to the five gamma operators corresponding to the Dirac gamma matrices, there are two more gamma operators (Clifford vectors). The generator of rotation in the plane of these vectors is the operator of the electric charge, and the electromagnetic field is the connection in the spinor bundle [4]. We have constructed explicitly the spinor vacuum state vector and inversion operators P, T and C [6] - [7]. We have proved that the vacuum is symmetrical with respect to the P, CT and CPT inversions. But the operators T and C transform the vacuum into an alternative one and therefore cannot be operators of the exact symmetry of the spinors [6] - [7].

This paper discusses the extension of the theory to more than four dimensions. Such a generalization is nontrivial, since in this case the classification of representations of the Lorentz group is fundamentally different from the four-dimensional case, and the spinor cannot be considered the representation $(1/2, 0)$, and the antispinor, the representation $(0, 1/2)$. Moreover, for an odd number of dimensions, the automorphisms of Clifford algebras are not internal. Therefore, the theory of spinor bundles is considered only for even-dimensional spaces. The use of the superalgebraic spinor formalism allows us to solve these problems.

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