

Abstract Submitted
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Symmetries of the Dirac Operator BOJAN TUNGUZ, Wabash College — In relativistic wave mechanics and quantum field theory the most fundamental invariance group is the Poincaré group of transformations: the group spatial and temporal translations, rotations and relativistic boosts. The wave functions in that view belong to an infinite-dimensional representation of the Poincaré group, and the generators are represented with first-order differential and spin operators. The only major difference between different infinite-dimensional representations is in the number of spin degrees of freedom that are being represented in addition to spatiotemporal degrees of freedom. In this work we build upon our previous work on the invariance of the quantum-mechanical Hamiltonian and look at all the higher order differential operators that commute with the Dirac operator. We construct the most general group that leaves the Dirac operator invariant. This group will be generated by the operators that act on both the spin and spatiotemporal degrees of freedom. We show how the Poincaré group fits within this group, and how this group fits within the most general group of invariances of the Dirac field.

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