Triality and Dual Equivalence Between Dirac Field and Topologically Massive Gauge Field

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Abstract: It is proved that there exists a vector representation of Dirac's spinor field and in one sense it is equivalent to biquaternion (i.e. complexified quaternion) representation. This can be considered as a generalization of Cartan's idea of triality to Dirac's spinors. In the vector representation the first-order Dirac Lagrangian is dual-equivalent to the two-order Lagrangian of topologically massive gauge field. The potential field which corresponds to the Dirac field is obtained by using master (or parent) action approach. The novel gauge field is self-dual and contains both anti-symmetric Lee and symmetric Jordan structure.

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