Fermion with three mass parameters: general theory, interactions with external fields

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Abstract. In the paper, starting from Gel'fand-Yaglom approach a new 20-component wave equation for a spin ½ fermion, which is characterized by three mass parameters, is derived. On the base of 20-component wave function, three auxiliary bispinors are introduced, they in absence of external field for three bispinors obey to three separate Dirac-lice equations with different masses. It is shown that in presence of external fields, electromagnetic field and gravitational non-Euclidean background with nob-vanishing Ricci scalar curvature, the main equation is not split into separated equations, instead a quite definite mixing of three Dirac-lice equations arises. It is shown that a generalized equation for Majorana particle with three mass parameters exists as well, such a generalized Majorana equation is not split into three separated equations in curved background if Ricci scalar of space-time model does not vanish.

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