

Cylindrical curves and classical paths of irreducible massive spinning particles in 4D Minkowsky space

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We study the dynamics of classical spinning particles such that quantization of classical model leads to an irreducible massive representation of the Poincare group from the viewpoint of recently proposed world sheet concept [1]. The class of gauge equivalent classical particle paths is shown to form a cylindrical surface in Minkowski space, irrespectively to any specifics of the classical model. The radius of cylinder is fixed by representation. Proceeding from the fact that the world lines of irreducible classical spinning particles are cylindrical curves, while all the lines are gauge equivalent on the same world sheet, we deduce the classical equations of motion for particles. It is shown that the spinning particle's path is defined by two fourth-order differential equations. These equations define the particle path in Minkowski space, and they do not involve auxiliary variables. The main results of the talk are published in [2].

[1] Kaparulin D.S. and Lyakhovich S.L. // Phys. Rev. D. -2017. -V. 96. -P. 105014

[2] Капарулин Д.С., Ляхович С. Л., Ретунцев И.А. // Известия высших учебных заведений. Физика -2018. -Т. 61. -№12. -с. 3-10

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