Contribution ID: **1073** Type: **Oral**

Worldsheet of a continuous helicity particle

Tuesday, 25 October 2022 15:45 (15 minutes)

We consider the class of spinning particle theories, whose quantization corresponds to the continuous helicity representation of the Poincare group. The classical trajectories of the particle are shown to lie on the parabolic cylinder with a lightlike axis irrespectively to any specifics of the model. The space-time position of the cylinder is determined by the values of momentum and total angular momentum. The value of helicity determines the focal distance of parabolic cylinder. Assuming that all the world lines lying on one and the same cylinder are connected by gauge transformations, we derive the geometrical equations of motion for the particle. The timelike world paths are shown to be solutions to a single relation involving the invariants of trajectory up to fourth order in derivatives. Geometrical equation of motion is non-Lagrangian, but it admits equivalent variational principle in the extended set of dynamical variables. The lightlike paths are also admissible on the cylinder, but they do not represent the classical trajectories of this spinning particle. The classical trajectories of massless particle (with zero helicity) are shown to lie on hyperplanes, whose space-time position depends on momentum and total angular momentum.

Primary authors: Mr KAPARULIN, Dmitry (Tomsk State University); Prof. LYAKHOVICH, Simon; RETUNTSEV, Ivan (Tomsk State University)

Presenter: RETUNTSEV, Ivan (Tomsk State University)

Session Classification: Theoretical Physics

Track Classification: Theoretical Physics