

Search for lightly ionizing particles (LIPs) in the NOvA experiment

Tuesday 28 October 2025 16:15 (15 minutes)

This report focuses on the study of the search for lightly ionizing particles (LIPs) in the NOvA experiment. Quantization of electric charge is one of the unsolved problems of modern elementary particle physics. There are no direct observations of free particles with fractional charge (like free quarks), but there is a class of theoretical models beyond the Standard Model, including grand unification theories and superstring theory, which predict the possibility of the existence of such objects. LIPs are a natural candidate for such exotic particles.

NOvA has a large 14 kton detector on the surface, which ensures a high cosmic flux intensity and, accordingly, increases the probability of detecting rare events. In this work we have carried out simulations of lightly ionizing particles with fractional charge, constructed histograms of energy deposition for LIPs with different values of charge and energy. The criteria for separating the “signal-background” is some discrepancy of the dE/dx distribution on histograms for LIPs and muons.

Author: GEYTOTA, Olesya

Co-authors: ANTOSHKIN, Alexander (JINR); SAMOYLOV, Oleg (JINR)

Presenter: GEYTOTA, Olesya

Session Classification: Elementary Particle Physics and High-Energy Heavy Ion Physics