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First Analysis of Muon Neutrino Interactions in the SuperFGD

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The Tokai-to-Kamioka (T2K) experiment is a long-baseline neutrino oscillation experiment in Japan. T2K is designed to precisely measure neutrino oscillation parameters and search for CP violation in the lepton sector using an intense muon (anti)neutrino beam. Measurements with the near detector, ND280, are essential for constraining neutrino interaction models and the initial neutrino flux, thereby reducing systematic uncertainties in the oscillation analysis. In 2024, ND280 was upgraded with the novel 3D-segmented SuperFGD detector at its core. This work presents the first analysis of muon neutrino interactions in the SuperFGD detector. The results establish the foundation for incorporating the upgraded ND280 into the T2K oscillation analysis, improving its overall precision and laying the groundwork for the next-generation Hyper-Kamiokande experiment at the J-PARC beamline.

Primary author(s) : Ms. FEDOROVA, Daria (INR RAS, MIPT)

Presenter(s) : Ms. FEDOROVA, Daria (INR RAS, MIPT)

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