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Electron Neutrino Cross Section Measurements at the T2K Off-Axis Near Detector

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T2K is a long baseline neutrino oscillation experiment in Japan, that targets the measurement of the mixing angle between the first and the third neutrino mass eigenstates (θ_{13}) by looking for the appearance of electron neutrinos (ν_e) in a beam of muon neutrinos (ν_μ), as well as a precision measurement for the mass difference between the the second and the third neutrino mass eigenstates (Δm_{32}^2) and their mixing angle (θ_{23}). T2K can also probe anti-neutrino oscillation by looking for the appearance of anti-electron neutrinos ($\bar{\nu}_e$) in a beam of anti-muon neutrinos ($\bar{\nu}_\mu$).

The experiment uses two detectors: a near detector at 280 m from the neutrino production target (in Tokai), and the far detector at 295 km, Super-Kamiokande (SK). The ND280 is a complex detector that includes a Pi0 Detector (P0D), two Fine Grained Detectors (FGDs), three Time Projection Chambers (TPCs), a Segmented Muon Range Detector (SMRD) and Electromagnetic Calorimeters (ECALs).

The electron neutrino sample at ND280 is used for cross-section measurements, the search of sterile neutrinos and for the measurement of the ν_e component of the total neutrino flux. Obtaining a clean electron neutrino sample is complicated by the large muon neutrino background, and backgrounds due to external gamma rays.

This talk will present the results of current electron neutrino cross section measurements at the T2K near detector. Status of work on anti-electron neutrino selection, and research on improving the selection of electrons, positrons, proton background, and background gamma samples using multivariate analysis techniques will be presented.

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