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Analysis Techniques to Measure Charged Current Inclusive Water Cross Section and to Constrain Neutrino Oscillation Parameters using the Near Detector (ND280) of the T2K Experiment RAJARSHI DAS, Colorado State University, T2K COLLABORATION — The Tokai to Kamioka (T2K) Experiment is a long-baseline neutrino oscillation experiment located in Japan with the primary goal to precisely measure multiple neutrino flavor oscillation parameters. An off-axis muon neutrino beam with an energy that peaks at 600 MeV is generated at the JPARC facility and directed towards the kiloton Super-Kamiokande (SK) water Cherenkov detector located 295 km away. The rates of electron neutrino and muon neutrino interactions are measured at SK and compared with expected model values. This yields a measurement of the neutrino oscillation parameters sinq and sinq. Measurements from a Near Detector that is 280 m downstream of the neutrino beam target are used to constrain uncertainties in the beam flux prediction and neutrino interaction rates. We present a measurement of inclusive charged current neutrino interactions on water. We used several sub-detectors in the ND280 complex, including a Pi-Zero detector (P0D) that has alternating planes of plastic scintillator and water bag layers, a time projection chamber (TPC) and fine-grained detector (FGD) to detect and reconstruct muons from neutrino charged current events. Finally, we describe a "forward-fitting" technique that is used to constrain the beam flux and cross section as an input for the neutrino oscillation analysis and also to extract a flux-averaged inclusive charged current cross section on water.

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