Contribution ID: **50** Type: **Presentation**

Latest cross-section measurements from T2K with the ND280 detector

Thursday 4 September 2025 13:45 (23 minutes)

The T2K experiment's primary off-axis near detector, ND280, has the essential role of constraining the main systematic uncertainties that affect neutrino oscillation measurements. Among the leading sources of these uncertainties are neutrino-nucleon interaction cross sections, which must be more precisely understood to fully exploit the potential of current and future long-baseline neutrino experiments. ND280 is a multi-layered magnetised tracking detector with a variety of different target nuclei; it is capable of making precise measurements of cross-section topologies which form the main signal and background channels in T2K's oscillation analysis and is well suited for studying rare interaction channels relevant to the electron neutrino appearance signal. The cross-section measurements obtained at ND280 directly inform the theoretical models of neutrino interactions, helping to refine our understanding of this field and enabling more accurate determinations of oscillation parameters. This first part of this talk will show several novel cross-section results from T2K, including new measurements in muon neutrino charged current interactions without pions and world-first measurements of neutral-current single pion production and electron neutrino charged-current pion production on carbon.

The second part of this talk will focus on the recent upgrade to ND280 to include a new suite of sub-detectors: a high granularity SuperFGD with 2 million optically-isolated scintillating cubes read out by wavelength shifting fibres and 55000 Multi-Pixel Photon Counters; two horizontal Time-Projection Chambers instrumented with resistive Micromegas, and additionally six panels of scintillating bars for precise time-of-flight measurements. These new detectors permit analyses with lower tracking thresholds, 4pi angular acceptance and the measurement of kinematics of neutrons produced in neutrino interactions. Developments of analyses using the upgraded ND280 detector configuration will be discussed, highlighting significant performance improvements.

Author: LACHNER, Katharina (ETH Zurich (CH))

Presenter: LACHNER, Katharina (ETH Zurich (CH))

Session Classification: WG2

Track Classification: NuFACT 2025: WG2 - Neutrino Scattering