

# Constraining the neutrino interaction model using near detector data in the T2K experiment

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T2K is a world-leading long baseline neutrino oscillation experiment in Japan, studying the appearance of electron neutrinos and the disappearance of muon neutrinos in a muon neutrino beam, using both neutrinos and anti-neutrinos. With these four channels, T2K provides measurements of one neutrino mass splitting, two neutrino mixing angles, and the CP violating phase in the PMNS paradigm. T2K utilises the near detector ND280 to characterise the neutrinos before long baseline oscillations, leading to a substantial reduction in uncertainty in the oscillation analysis.

The analysis of ND280 data uses selections separated by proton and photon tagging, pion multiplicity, and the sign of the muon, to better separate the dominant CCQE interactions from 2p2h and single pion production, and the neutrino background in anti-neutrino mode. This analysis introduces new inputs from the NA61/SHINE hadron scattering experiment, which are used to constrain the neutrino flux, and a variety of neutrino and pion scattering models and data to constrain the neutrino and pion interaction model.

The results from fitting to data are presented in this talk, with an emphasis on the neutrino interaction model. Furthermore, the capabilities of T2K's upgraded ND280 are also discussed, and its goal to better understand neutrino interactions in the sub-GeV region.

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