

Data release for T2K 2015 ν_μ CC single positive pion production cross-section measurement on water

The T2K Collaboration

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This data release contains 1 ROOT file, 8 text files and this README document. The original files can be downloaded from <http://t2k-experiment.org/results/nd280data-numu-cc1pi-xs-on-h2o-2015>.

The true signal for this analysis is defined as true CC single positive pion (after final state interactions) with vertex in the true FV of the ND280 FGD2 water modules. The cross-section is evaluated in the restricted phase-space defined by $p_\mu > 200$ MeV, $p_\pi > 200$ MeV, $\cos\theta_\mu > 0.3$ and $\cos\theta_\pi > 0.3$ in both true and reconstructed variables.

`nd280data-numu-cc1pi-xs-on-h2o-2015.root` contains 6 directories with the differential cross-section results and the muon neutrino flux histogram for T2K Run I-IV.

The differential cross-section is given as a function of:

- pion kinematics (`PosPionMom`, `PosPionCos`);
- muon kinematics (`MuMom`, `MuCos`);
- muon-pion angle (`MuPiCos`);
- reconstructed neutrino energy (**model dependent result**, as it has been unfolded to the NEUT prediction) using two formulae:
 - `EnuRec.Delta` (energy reconstructed by looking at muon kinematics and assuming Delta resonance);
 - `EnuRec.MB` (energy reconstructed by looking at both muon and pion kinematics).

Each folder contains:

- `hResultStat`, `hResultTot`: histograms of extracted cross-section from T2K Data Run II-IV with statistical or total uncertainties;
- `hTruthNEUT`, `hTruthGENIE`: histograms of predicted cross-section calculated with the NEUT (version 5.1.4.2) and GENIE (version 2.6.2) generators, respectively.
- `TotalCovariance`: covariance matrix for all uncertainties;
- `covStatistics`, `covFlux`, `covTheoryCrossSection`, `covFSI`, `covDetector`: covariance matrices for statistical, flux, theory cross-section, final state interactions and detector systematic uncertainties, respectively.

The ROOT file also contains the muon neutrino flux histogram (`numu_flux`) for T2K Run I-IV.

Each text file corresponds to a single directory in the ROOT file, and contains the same information in CSV format.