

T2K flux prediction and tuning

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T2K is a long baseline neutrino experiment which exploits a neutrino and antineutrino beam at J-PARC, which is produced by a proton beam impinging on a graphite target, a flux of pions and kaons are produced and neutrinos are produced by their disintegration.

A very detailed simulation of the beamline allows to predict the rate and energy of produced neutrinos, but still large uncertainties related with the nuclear models to describe the hadron interactions in the target affect such predictions. To improve the precision, the flux simulation is tuned using the results of a dedicated hadron production experiment at CERN: NA61/SHINE. Notably, T2K has obtained a major improvement in the flux uncertainties of the latest oscillation analysis by implementing the constraints coming from a new NA61/SHINE analysis of data taken with a replica of the T2K target. In parallel, the simulation of the material in the beamline has been further refined.

The impact of replica-target data, the improved simulation and the impact on the oscillation analysis will be described, together with prospects for further future improvements.

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