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Impact of the near detector on the T2K oscillation analysis

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T2K is a long baseline neutrino experiment which exploits a neutrino and antineutrino beam at J-PARC to perform precision measurements of atmospheric parameters Δm^2_{32}, $\sin^2(\theta_{23})$ and to search for CP-violation. The main systematic uncertainties limiting the precision will be described, as well as, the role of the near detector to constrain such systematic uncertainties.

The most challenging of such systematic uncertainties is related with the modelling of few-GeV neutrino-nucleus interactions. In particular, in the latest oscillation analysis, new samples with proton and photon tagging at the near detector have been implemented to improve the control and tuning of such uncertainties. To attack this problem, the T2K experiment is also engaged in a continuous effort to implement up-to-date theoretical models in T2K's Monte-Carlo event generator (NEUT) and to define a suitable parametrisation of the model's uncertainties as an input for neutrino oscillation analyses.

The new uncertainty model, developed for the latest T2K oscillation measurement, will be presented, as well as a comparison of the model to available global lepton- and hadron-scattering data.

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