

## Constraining the T2K Neutrino Flux Prediction with 2009 NA61/SHINE Replica-Target Data

Accurate modelling of the T2K neutrino flux is crucial for a better understanding of neutrino interactions at the near and far detectors. Most of T2K neutrinos are created through in-flight decays of unstable hadrons, produced by interactions of 31 GeV/c protons in a long graphite target (90 cm). The nominal unoscillated T2K neutrino flux prediction relies on NA61/SHINE measurements collected with protons incident on a thin graphite target (2 cm). The following analysis incorporates NA61 2009 data collected on the full length replica of the T2K target. Predicted rates of pions exiting from the T2K target are now estimated using NA61 replica-target measurements, instead of extrapolating the multiplicities of parent hadrons produced within the long target. The unoscillated neutrino flux uncertainty is reduced from  $\sim 10\%$  to  $\sim 5\%$ . Future hadron production measurements that could further improve the T2K neutrino flux prediction have also been highlighted.

### Authorship annotation

for the T2K collaboration

### Session and Location

Wednesday Session, Poster Wall #55 (Auditorium Gallery Right)

### Poster included in proceedings:

yes

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**Track Classification:** Poster (participating in poster prize competition)