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Constraining Fermilab long-baseline neutrino fluxes

The determination of the neutrino flux presents a challenge for the current and upcoming long-baseline neutrino experiments. The dominant uncertainty comes from the hadronic cascade model in the beamline. Fermilab experiments, such as DUNE and NOνA, use external hadron production data to constrain the models in their simulations and predict the neutrino flux at their detectors. Cross-section measurements from NA49 (CERN) are currently used for proton interactions, and their impact reduces the flux uncertainty significantly. However, the simulation of interacting pions is not currently constrained by external data, and a large uncertainty (40%) is assumed.

Recently, the NA61 experiment (CERN) released differential cross-section measurements of 60 GeV pions interacting in Carbon and Beryllium. In this talk, I will present the status of incorporating NA61 data to constrain these interactions and its impact on the neutrino flux for the DUNE and NOνA experiments.

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