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An Updated Simulation of the Booster Neutrino Beam

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For accelerator neutrino experiments, an accurate prediction of the incoming neutrino flux is crucial for reducing uncertainties for all physics measurements. In this exciting period for the Short-Baseline Neutrino program at Fermilab, with far detector (ICARUS) already operating and the near detector (SBND) nearing operation, an updated flux model for the Booster Neutrino Beam (BNB) is presented. The BNB delivers 8 GeV protons to a beryllium target, subsequently producing neutrinos from the decay of the secondary beam of hadrons. A updated Monte-Carlo simulation of beam production in GEANT4 has been created, allowing predictions to be made for detectors with different baselines, offsets and sizes. This new simulation contains new features, such as a full neutrino ancestry to handle hadron production systematics with more precision, with a view to storing all resulting particles - including neutral mesons - from the proton-Beryllium scatter to allow the study of exotic BSM scenarios. Results are presented, with comparisons to the original flux simulated for the MiniBooNE experiment.

Working Group

WG 3: Accelerator Physics

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