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# DUNE Systematic Flux Uncertainties

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The Deep Underground Neutrino Experiment (DUNE) is a long baseline oscillation experiment that, among its many physics goals, seeks to measure the charge-parity (CP) violating phase, $\delta_{\mathrm{CP}}$. To do so requires precise knowledge of both the neutrino and antineutrino fluxes. DUNE will achieve this via the use of both a near and far detection system. The leading source of systematic uncertainty associated with predicting the DUNE flux comes from the production of hadrons, closely followed by the uncertainties associated with beam focusing effects.

The DUNE flux was simulated within a custom geant4 framework in parallel with the Package to Predict the Flux (PPFX).The total systematic uncertainties associated with the hadron production and beam focusing effects within DUNE's region of interest [0.5, 8] GeV, was found to be on average 8-10% across all modes, detector locations and neutrino species. Construction of the correlation matrix indicated that the systematic uncertainties were highly correlated, while the Far to Near Flux Ratio allowed for the cancellation of many systematic effects, effectively reducing the total systematic uncertainties to the order of 1.5-5%.

## Mini Symposia (Invited Talks Only)

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