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Systematics due to Energy Reconstruction and Multi-nucleon Effect and their impact on Oscillation Parameters Measurement.

Nuclear effects in neutrino interactions are one of the major sources of systematic uncertainties in neutrino beam oscillation experiments. Our present understanding of these effects is still insufficient. Another source of uncertainty is the energy dependence of oscillation probability which is a nontrivial function of true incoming neutrino energy. This energy is reconstructed using different methods, which in turn is used in the analysis leading to the extraction of various neutrino oscillation parameters. The extraction of still unknown parameters like the leptonic CP violation phase demands the precision level in these measurements to be very high. Here we study the calorimetric and kinematic reconstruction of the incoming neutrino energy, both at the ND and FD, and also investigate the role of multinucleon effects on the sensitivity measurement of various neutrino oscillation parameters. In particular, we consider the low energy experiment, T2K and NOvA that also have different target materials.

Mini-abstract

Systematics due to Energy reconstruction and multinucleon effects for T2K and NOvA target materials.

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