

Understanding neutrino-nucleus interaction in Long-Baseline Neutrino oscillation experiments

Scientific Achievement

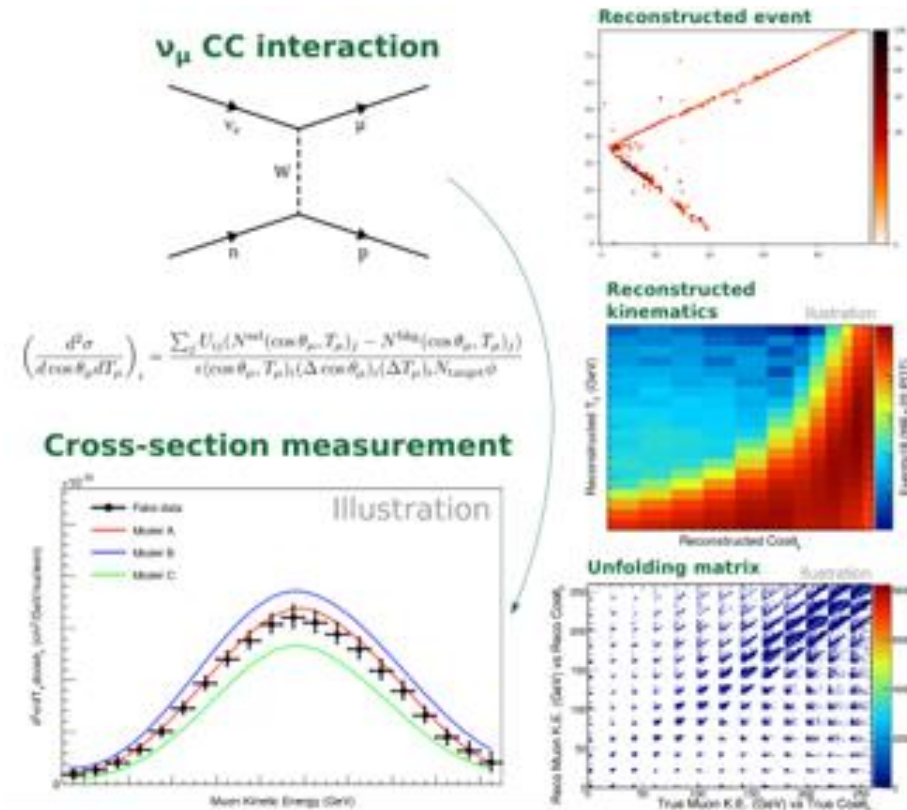
First neutrino cross-section analysis taking advantage of HPC resources (NERSC) : unprecedented accuracy in the study of systematic effects in neutrino-nucleus cross-section measurements.

Significance and Impact

Improve the understanding of neutrino-nucleus interactions for Short and Long-Baseline Neutrino Oscillation experiments (SBN, NOvA, DUNE). NOvA will report an accurate measurement of the main signal cross-section in long-baseline experiments.

Research Details

- Thousands of unfolding matrices were constructed from hundreds of thousands of Monte-Carlo simulation files and for many variations of hundreds of systematic parameters, called universes.
- 10 time more universes were studied and results were obtained 200 times faster.



Measurement of the ν_μ CC cross-section in NOvA's Near Detector:

The ability to study in detail the effect of the systematic uncertainties on NOvA's measurement allows us to decrease the reported cross-section uncertainties, to discriminate between different interactions models and therefore to improve our understanding of neutrino-nucleus interaction models.