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Overcoming Neutrino Interaction Mis-modeling with DUNE-PRISM

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The expected precision of current long-baseline neutrino oscillation experiments (T2K, NOνA) will be limited by uncertainties in neutrino interaction models in addition to sample statistics. The interaction uncertainties will also play a significant role in next-generation experiments (DUNE, Hyper-K), which aim to collect much larger samples of oscillated neutrinos. Without significant advancements in neutrino-nucleus interaction modeling, traditional analyses will be susceptible to biased oscillation measurements.

The DUNE-PRISM (Precision Reaction Independent Spectrum Measurement) technique offers a complementary approach to the oscillation analysis methods used by T2K, NOνA, and MINOS. DUNE-PRISM uses direct extrapolation of near detector data to infer oscillation probabilities with significantly less dependence on the validity of neutrino interaction models. This is achieved by combining multiple near detector measurements, each taken with the detector at a different off beam axis position, in order to sample a variety of neutrino energy spectra.

This talk will introduce DUNE-PRISM and show how the oscillation parameters extracted using this technique are robust to unknown interaction modeling errors.

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