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The influence of cross section uncertainties on oscillation physics

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Current and future accelerator-based neutrino facilities utilizing intense neutrino beams and advanced neutrino detectors are focused on precisely determining neutrino oscillation properties and signals of weakly interacting Beyond the Standard Model (BSM) physics. These are all subtle effects, such as extracting the CP violation phase and disentangling parameter degeneracies between oscillation effects and BSM physics, and require an unprecedented level of precision in measurements. The potential of achieving discovery-level precision and fully exploring the physics capabilities of these experiments relies greatly on the precision with which the fundamental underlying neutrino-nucleus interaction processes are known. A non-trivial multi-scale, multi-process problem that lies in an uncharted territory that spans from low-energy nuclear physics to perturbative QCD with no known underlying unified physics. Therefore, multiple cross-community efforts are required to tackle such a problem and establish global constraints on neutrino-nucleus interaction physics that can enable desired precision in neutrino experiments. In this talk, I will discuss these challenges and highlight some of the recent cross-community experimental and theoretical efforts of tackling them.

Working group

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Author: Dr PANDEY, Vishvas (University of Florida)

Presenter: Dr PANDEY, Vishvas (University of Florida)

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