

## An Overview of Neutrino-Nucleus Interactions Physics: Status and Path Forward

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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 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. This talk will focus on neutrinos from tens of MeV to a few GeV energies. At these energies, neutrino interactions are 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. In this talk, I will present an overview of the field, discuss these challenges, highlight recent progress, and attempt to outline a path forward.

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