

Neutrino-nucleus interactions and the quest for new and precision physics searches in neutrino experiments

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Current and future accelerator-based neutrino facilities, leveraging intense neutrino beams and advanced detectors, aim to precisely determine neutrino properties and probe signals of weakly interacting beyond the Standard Model physics. Achieving discovery-level precision and fully exploring the physics potential of these experiments critically depends on the accuracy of our understanding of fundamental underlying neutrino-nucleus interaction processes. This talk will focus on neutrino interactions spanning energies from tens of MeV to a few GeV—a complex, multi-scale and multi-process domain spanning from low-energy nuclear physics to perturbative QCD, with no unified underlying framework currently known. In this talk, I will provide an overview of the field, discuss recent advancements, and share examples of ongoing cross-community efforts addressing these challenges.

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