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TALK: Unleashing the Power of EFT in Neutrino–Nucleus Scattering

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Neutrino physics is advancing into a precision era with the construction of new experiments, particularly in the few GeV energy range. Within this energy range, neutrinos exhibit diverse interactions with nucleons and nuclei. This talk delves in particular into neutrino–nucleus quasi-elastic cross sections, taking into account both standard and, for the first time, non-standard interactions, all within the framework of effective field theory (EFT). The main uncertainties in these cross sections stem from uncertainties in the nucleon-level form factors, and from the approximations necessary to solve the nuclear many-body problem. In this talk I explore how these uncertainties influence the potential of neutrino experiments to probe new physics introduced by left-handed, right-handed, scalar, pseudoscalar, and tensor interactions. For some of these interactions the cross section is enhanced, making long-baseline experiments an excellent place to search for them. The results, including tabulated cross sections for all interaction types and all neutrino flavors, can serve as the foundation for such searches.

Presenter: TABRIZI, Zahra (Northwestern University)