

## Summary of Proposal

This proposal, in collaboration with Fermilab scientist Pedro Machado and Fermilab Distinguished Scholar Kaladi Babu, seeks to undertake a comprehensive study of neutrino non-standard interactions (NSI) with matter. Our approach is two-fold: (i) to explore phenomenological aspects of NSI directly relevant to the Fermilab long-baseline neutrino program in a model-independent way, with implications for other low- and high-energy experiments as well; and (ii) to build self-consistent, ultraviolet (UV)-complete neutrino mass models for observable NSI, taking into account all relevant theoretical and experimental constraints. This project is of high relevance to the U.S. Neutrino program, as it would help understand how neutrinos interact with matter in beyond the Standard Model scenarios, which could significantly affect the interpretation of the experimental data within the context of 3-neutrino oscillation paradigm. It also opens up the possibility of using neutrino oscillation experiments to probe the origin of neutrino mass. As the NSI framework is an effective theory, having UV-complete models is crucial to understand which sort of physics the neutrino experimental program is actually probing when constraints on NSI are presented.