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General neutrino interactions from an effective field theory perspective

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We discuss the concept and detection prospects of general neutrino interactions (GNI) as a well-motivated generalisation of the widely-studied non-standard interactions (NSI), both encompassing effects of new physics at energies below the electroweak scale. If GNI (tensor, (pseudo)scalar, and (axial) vector interactions) arise from heavy new physics, they should be related to effective field theory (EFT) operators that respect the Standard Model (SM) gauge symmetry, much like NSI are frequently addressed in the context of SMEFT. The minimal extension of SMEFT towards admitting GNI is introducing right-handed SM-singlet neutrinos. In this case nearly all general interactions with quarks and charged leptons can originate from dimension-six four-fermion operators. This motivates searching for experimental signatures beyond NSI, for instance in neutrino-electron scattering, beta decay and coherent elastic neutrino nucleus scattering, that may inform us about UV extensions of the SM and the Dirac or Majorana nature of neutrinos.

Collaboration name

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