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Resolving the LMA-dark NSI degeneracy with coherent neutrino–nucleus scattering

In the presence of non-standard neutrino interactions (NSI), a degeneracy exists in neutrino oscillation data, which involves the flipping of the octant of the mixing angle θ_{13} and the type of the neutrino mass ordering. In this article, we revisit the status of this degeneracy in the light of recent data on coherent elastic neutrino–nucleus scattering (CE ν NS) from the COHERENT experiment. For general relative couplings to up and down quarks, the degeneracy is disfavoured at the 2σ level by the latest data but remains at a higher confidence level. We investigate the requirements of future CE ν NS measurements to resolve the degeneracy with high significance. We find that a measurement involving both, electron and muon neutrino flavours and a target with a neutron-to-proton ratio close to 1 is required. For example, an experiment with a silicon target at the European Spallation Source can resolve the degeneracy at more than 4σ for arbitrary relative couplings to up and down quarks.

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