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Exploring Beyond the Standard Model Physics at Spallation Neutron Source Experiments

Content

Spallation neutron source facilities offer a powerful, low-background environment to search for new physics in the neutrino sector. In this work, we investigate the phenomenology of coherent elastic neutrino-nucleus scattering (CEvNS) using neutrinos produced from pion and muon decay-at-rest. By analyzing current data from the COHERENT experiment, we place stringent constraints on non-standard neutrino interactions, and we project the expected sensitivities from the future European Spallation Source (ESS), demonstrating its enhanced capacity to probe electroweak physics. In addition, we explore the sensitivity of the ESS to probe light scalar dark matter, testing its feasibility to dark matter-induced nuclear recoils at low energies. Our results highlight the role of next-generation spallation sources in constraining dark sector frameworks and physics beyond the Standard Model.

Summary

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