

Snowmass Joint Workshop on New Physics Opportunities with Neutrino Experiments: Theoretical & Experimental Perspectives

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Improving CP Sensitivity with Muon Decay at Rest

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At long-baseline experiments, the genuine CP effect from the PMNS mixing matrix can be faked by the ubiquitous matter effect. The reduction of the experimental sensitivity to δ_D drops by 20% due to matter density uncertainties. In this work we present an experimental configuration that combines the DUNE experiment with a muon decay-at-rest (μ DAR) source. The μ DAR source provides a complementary $\bar{\nu}_\mu \rightarrow \bar{\nu}_e$ channel at a low energy, O(30) MeV. The synergy between DUNE and μ DAR improves the sensitivity of δ_D by up to 50%, even in the presence of matter density uncertainties.

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