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Probing Quantum Decoherence in ν_μ at NO ν A

Non-unitary evolution described by the Lindblad formalism offers a powerful pathway to search for physics beyond the Standard Model in neutrino propagation. This contribution explores energy-dependent quantum decoherence in the $\nu_\mu \rightarrow \nu_\mu$ disappearance channel, using public reconstructed spectra from the NO ν A experiment at an 810 km baseline. We investigate how cumulative damping effects alter the survival probability around the primary oscillation minimum under distinct energy-scaling scenarios ($n = -1$ and $n = 2$). Rather than assuming standard propagation a priori, we evaluate the compatibility of the NO ν A spectral data with non-standard decoherence phenomena and discuss the constraints imposed on the damping parameter γ_0 . Furthermore, we outline the implications of these constraints for future long-baseline facilities like DUNE and broader searches for new physics at SHiP. This presentation is based on our recently published work in an IOP journal.

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