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Can we observe new neutrino oscillation phenomenon with Standard Model physics?

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Standard calculations of neutrino oscillation are predicated on the assumption that neutrinos' wave packets maintain coherence throughout their propagation. Effects associated with neutrino wave packet decoherence —specifically, damping of the oscillation probabilities—were previously considered unobservable in terrestrial experiments. However, recent claims suggest that if sterile neutrinos exist, we could observe decoherence effects in terrestrial experiments. To test these claims, one must compute the neutrino wave packet size for a given source. In this talk, I will discuss our efforts to determine the wave packet size for neutrinos produced in accelerator-based experiments. We demonstrate that it is feasible to compute this value through a well-defined framework accompanied by precise input parameters.

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