

# Investigating Quantum Decoherence in Neutrino Oscillation at ESSnuSB Experiment

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Neutrino oscillation provides a unique window in exploring physics beyond the standard model (BSM). One such scenario is quantum decoherence in neutrino oscillation which tends to destroy the interference pattern of neutrinos reaching the far detector from the source. In this poster, I will present the study of the decoherence in neutrino oscillation in the context of the ESSnuSB experiment. We consider the energy-independent decoherence parameter and derive the analytical expressions for  $P_{\mu e}$  and  $P_{\mu\mu}$  probabilities in vacuum. We have computed the capability of ESSnuSB to put bounds on the decoherence parameters namely,  $\Gamma_{21}$  and  $\Gamma_{32}$  and found that the constraints on  $\Gamma_{21}$  are competitive compared to the DUNE bounds and even better than the T2K and MINOS ones. We have also investigated the impact of neutrino decoherence in the measurement of the Dirac CP phase  $\delta_{CP}$  and concluded that the  $\delta_{CP}$  measurement of ESSnuSB is robust even in the presence of decoherence.

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## Poster prize

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