

Exploring environmentally induced decoherence effect on neutrino oscillation probabilities

We discuss the effect of environmental decoherence on matter-effective neutrino oscillation probabilities. Decoherence is a phenomenon observed in systems interacting with the environment. We treat the neutrinos as an open quantum system and by using the Lindblad Master equation we study the evolution of neutrino states. The matter effect is incorporated for neutrinos passing through matter with the help of the Cayley-Hamilton formalism.

In this work, we have developed a general algorithm that attempts to solve the Lindblad Master Equation to compute the neutrino oscillation probabilities in presence of environmental decoherence. We extensively validate the algorithm and explore how environmentally induced decoherence can potentially affect the oscillation probabilities, particularly in the long-baseline sector.

Working group

WG5

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