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Exploring Neutrino Decay and Decoherence in Neutrino Oscillation

Experimental observation on neutrino oscillation confirms the fact that neutrinos have non-zero mass. Thus, there is a possibility of decaying heavy neutrinos to lighter one. Additionally, due to some external factors (like environmental interactions, quantum mechanical uncertainty, quantum fluctuations etc.), the quantum phases between the neutrino mass eigenstates lose their correlation, resulting "quantum decoherence". In our work, we explore the effect of both neutrino decay and quantum decoherence in neutrino oscillation considering open quantum system framework. The inclusion of neutrino decay in Hamiltonian of neutrino oscillation changes the nature of Hamiltonian from hermitian to non-hermitian. On the other hand, the addition of decoherence makes the final Hamiltonian in a more complicated form. We formulate the appearance and disappearance probabilities in three flavour neutrino framework by considering both these effects.

Field of contribution

Phenomenology

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