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Favourable Conditions for Majorana Phase Appearance in Neutrino Oscillation Probabilities

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The nature of neutrinos, whether they are Dirac or Majorana particles, has been an open question for long time. In the case of two flavour mixing, the transition matrix is real in the case of Dirac neutrinos but it contains a phase ϕ in the case of Majorana neutrinos. This phase does not appear in neutrino oscillation probabilities for vacuum oscillations as well as for matter modified oscillations. However, it was shown by Benatti et al. 2001, that for some special forms of quantum decoherence effects in neutrino evolution, this ϕ-phase appears in oscillation probabilities. In this work, we ask the question: For what other forms of neutrino evolution equation does the Majorana phase appear in the oscillation probabilities? We show that, in the case of neutrino decay, the Majorana phase appears in the oscillation probabilities if the decay eigenstates are not the same as the mass eigenstates. The forms of appearance of Majorana phase in our work and that in [Benatti et al. 2001] can be distinguished from each other by their CPT properties.

Attendance type

Virtual presentation

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