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Appearance of Majorana phase in two flavour neutrino oscillations with neutrino decay

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The fundamental nature of neutrinos, whether they are Dirac or Majorana fermions, is still unknown and has been an open question for long time. If we consider neutrinos to be Majorana type, then the two flavour neutrino mixing matrix contains a Majorana phase. However, this phase doesn't appear in neutrino oscillation probabilities for vacuum as well as for matter modified oscillations. This leads us to the questions, "what are the conditions under which the Majorana phase appears in the oscillation probabilities ?". We find that the Majorana phase remains in the oscillation probabilities if the neutrino decay eigenstates **are not the same** as the mass eigenstates. In such a condition we find the possibilities of two kinds of CP-violation in our work: one due to the Majorana phase and the other due to the off-diagonal parameter of the neutrino decay matrix. We point out an another interesting result that the CP-violating terms in the oscillation probabilities are sensitive to **neutrino mass ordering**.

Session

Neutrino Physics

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