



Contribution ID: 42

Type: **Non-Invited Talk**

Disentangling genuine from matter-induced CP violation in neutrino oscillations

Tuesday 27 November 2018 13:30 (25 minutes)

We prove that, in any flavor transition, neutrino oscillation CP violating asymmetries in matter have two disentangled components: (a) a CPT-odd T-invariant term, non-vanishing iff there are interactions with matter; (b) a T-odd CPT-invariant term, non-vanishing iff there is genuine CP violation. As function of the baseline, these two terms are distinct L-even and L-odd observables, respectively. In the experimental region of terrestrial accelerator neutrinos, we calculate their approximate expressions from which we prove that, at medium baselines, the CPT-odd component is small and nearly δ -independent, so it can be subtracted from the experimental CP asymmetry as a theoretical background, provided the hierarchy is known. At long baselines, on the other hand, we find that (i) a Hierarchy-odd term in the CPT-odd component dominates the CP asymmetry for energies above the first oscillation node, and (ii) the CPT-odd term vanishes, independent of the CP phase δ , at $E = 0.92 \text{ GeV}$ ($L/1300 \text{ km}$) near the second oscillation maximum, where the T-odd term is almost maximal and proportional to $\sin \delta$. A measurement of the CP asymmetry in these energy regions would thus provide separate information on (i) the neutrino mass ordering, and (ii) direct evidence of genuine CP violation in the lepton sector.

Content of the contribution

Both

Authors: Prof. BERNABEU, Jose (IFIC (CSIC, Univ. Valencia)); Mr SEGARRA, Alejandro (IFIC (CSIC, Univ. Valencia))

Presenter: Mr SEGARRA, Alejandro (IFIC (CSIC, Univ. Valencia))

Session Classification: Neutrino masses, mixing and discrete symmetries

Track Classification: [4] Neutrino masses, mixing and discrete symmetries