

Symmetry-Inspired Basis to Disentangle Genuine and Fake Asymmetries in Neutrino Oscillations

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Abstract: Discrete Asymmetries for Neutrino Oscillations are contaminated by Matter Effects. Their Physics is discussed in terms of a basis of 3 independent components in correspondence with invariance under CPT (genuine), Time Reversal T (matter) and Charge-Parity CP (interference). They have definite and different parities under the baseline L -theory independent-, the imaginary part of the flavor mixing, the matter potential and the hierarchy of the neutrino spectrum. In terms of the Standard Model of neutrino oscillations, these definite model-independent parities manifest in terms of definite parities in the standard parameters, which can be studied analytically thanks to the smallness of some of these quantities. The two fake components vanish at the same MAGIC ENERGY E, with the connection $L/E = 1420 \text{ Km/GeV}$ near the second oscillation maximum, where the genuine component is also maximal. The experimental CPV Asymmetry for the appearance $\nu_\mu \rightarrow \nu_e$ can separate the genuine (CPT-invariant) and the fake matter-induced (T-invariant) components by either L-dependence (HKK) or E-dependence (DUNE).

Keywords: discrete symmetries; neutrino

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