

Long-range interactions at current and future neutrino oscillation experiments

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The presence of flavoured symmetries like $U(1)_{L_e-L_\mu}$, etc. can affect the propagation of neutrinos by introducing new interactions. If the mediating gauge bosons corresponding to these symmetries are ultra light, then the nucleons and electrons in the sun can generate a long-range potential that can modify the neutrino oscillation probabilities for earth-based experiments. We study the effect of these long-range interactions on long-baseline and atmospheric neutrino experiments. We constrain the parameter space of these new physics scenarios using current oscillation data. We discuss the effect that these interactions can have on future data, and calculate the projected bounds from future experiments. We also discuss the smoking-gun signatures that can distinguish these scenarios from other non-standard interactions.

Authors: Dr RAUT, Sushant (IBS CTPU, Daejeon, South Korea); LEE, Hye-Sung (Institute for Basic Science); DAVOUDIASH, Hooman (BNL); MARCIANO, William

Presenter: Dr RAUT, Sushant (IBS CTPU, Daejeon, South Korea)

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