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Phenomenological Advantages of the Normal Neutrino Mass Ordering

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The preference of the normal neutrino mass ordering from the recent cosmological constraint and the global fit of neutrino oscillation experiments does not seem like a wise choice at first glance since it obscures the neutrinoless double beta decay and hence the Majorana nature of neutrinos. Contrary to this naive expectation, we point out that the actual situation is the opposite. The normal neutrino mass ordering opens the possibility of excluding the higher solar octant and simultaneously measuring the two Majorana CP phases in future $0\nu2\beta$ experiments. Especially, the funnel region will completely disappear if the solar mixing angle takes the higher octant. The combined precision measurement by the JUNO and Daya Bay experiments can significantly reduce the uncertainty in excluding the higher octant. With a typical O(meV) sensitivity on the effective mass |mee|, the neutrinoless double beta decay experiment can tell if the funnel region really exists and hence exclude the higher solar octant. With the sensitivity further improved to sub-meV, the two Majorana CP phases can be simultaneously determined. Thus, the normal neutrino mass ordering clearly shows phenomenological advantages over the inverted one.

Collaboration name

Primary author: Prof. GE, Shao-Feng (Tsung-Dao Lee Institute (TDLI), Shanghai Jiao Tong University)

Presenter: Prof. GE, Shao-Feng (Tsung-Dao Lee Institute (TDLI), Shanghai Jiao Tong University)

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