

Ability of DUNE to establish Deviation from Maximal θ_{23}

Friday, 5 August 2022 16:32 (22 minutes)

The present global analyses of the available oscillation data still allow $\sin^2 \theta_{23} = 0.5$ at 3σ confidence level while, the current best-fit of θ_{23} strongly suggests $\sin^2 \theta_{23} \neq 0.5$. Thus, it is imperative to question at what significance maximal 2-3 mixing can be ruled out. We study in great detail the performance of DUNE to establish the deviation from maximality in the 2-3 sector. We also discuss the impact of $\sin^2 \theta_{23} - \Delta m_{31}^2$ degeneracy in establishing non-maximal θ_{23} and show how this degeneracy can be broken by exploiting the spectral shape information in ν and $\bar{\nu}$ disappearance events. We find that a 3σ (5σ) determination of non-maximal θ_{23} is possible in DUNE with an exposure of 336 kt-MW-years if the true value of $\sin^2 \theta_{23} \leq 0.465$ (0.450) or $\sin^2 \theta_{23} \geq 0.554$ (0.572) for any value of true δ_{CP} and true NMO. We also study the individual contributions from appearance and disappearance channels, the impact of systematic uncertainties and marginalization over oscillation parameters, the importance of spectral analysis, and the data from both ν and $\bar{\nu}$ runs, while analyzing DUNE's sensitivity to discover non-maximal θ_{23} .

Attendance type

Virtual presentation

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Session Classification: WG1: Neutrino Oscillations

Track Classification: WG1: Neutrino Oscillation Physics