Contribution ID: **130** Type: **Talk: remote**

High precision measurements of oscillation parameters exploiting the complementarity between DUNE and T2HK

Friday, 20 September 2024 14:45 (20 minutes)

A high-precision measurement of Δm^2_{31} and θ_{23} is inevitable to estimate the Earth's matter effect in long-baseline experiments which in turn plays an important role in addressing the issue of neutrino mass ordering and to measure the value of CP phase in 3ν framework. After reviewing the results from the current experiments and discussing the near-future sensitivities from IceCube Upgrade and KM3NeT/ORCA, we study the improvements in the precision of 2-3 oscillation parameters that the next-generation experiments, DUNE and T2HK, can bring either in isolation or combination. We highlight the relevance of the possible complementarity between DUNE and T2HK in determining the sensitivity towards the deviation from maximal mixing of θ_{23}, excluding the wrong octant solution of θ_{23}, and obtaining high precision on 2-3 oscillation parameters, as compared to their individual performances. We observe that for the current best-fit values of the oscillation parameters and assuming normal mass ordering (NMO), DUNE + T2HK can establish the non-maximal θ_{23} and exclude the wrong octant solution of θ_{23} at around 7σ C.L. with their nominal exposures. We find that DUNE + T2HK can improve the current relative 1σ precision on $\sin^2\theta_{23}$ (Δm^2_{31}) by a factor of 7 (5) assuming NMO. Also, we notice that with less than half of their nominal exposures, DUNE + T2HK can achieve the sensitivities that are expected from these individual experiments using their full exposures. We also portray how the synergy between DUNE and T2HK can provide better constraints on ($\sin^2\theta_{23}$ - $\delta_{\rm CP}$) plane as compared to their individual reach.

Working Group

WG 1: Neutrino Oscillation Physics

Primary authors: SINGH, Masoom (Utkal University and Institute of Physics, Bhubaneswar); Mr KUNDU, Ritam (Institute of Physics, Bhubaneswar); AGARWALLA, Sanjib Kumar (Institute of Physics, Bhubaneswar)

Presenter: Mr KUNDU, Ritam (Institute of Physics, Bhubaneswar)

Session Classification: Parallel: WG1

Track Classification: WG1: Neutrino Oscillation Physics