



Contribution ID: 36

Type: Poster

Investigating the Impact of the Intermediate Water Cherenkov Detector on the Hyper-Kamiokande Neutrino Oscillation Measurements

Monday, 3 July 2023 15:30 (1 hour)

Hyper-Kamiokande (HK) is a next-generation long-baseline neutrino experiment that aims to take data in 2027. The experiment will use the J-PARC neutrino beam, upgraded to 1.3 MW, followed by a suite of near detectors. The HK far detector is a 260 kt underground water Cherenkov detector, placed 2.5-degree off the central axis of the neutrino beam and 295 km from the target. The experiment is designed to search for charge-parity (CP) violation and measure the neutrino oscillation parameters precisely. Observing CP violation at 5 sigma significance for a large fraction of dCP will require the systematic uncertainties on the neutrino interaction model to be significantly reduced compared to available constraints from the available data of neutrino-nucleus interactions.

The Intermediate Water Cherenkov Detector (IWCD) is a proposed near detector for HK located approximately 1 km from the beam production target. The IWCD will move vertically between 1-4 degrees off the neutrino beam axis. The large detector volume with excellent electron identification power will provide high statistics electron neutrino and antineutrino samples. The off-axis fluxes will provide muon neutrino samples with energy spectra peaked at different energies, resulting in different dominated types of neutrino interaction to allow better constraints on the cross-section uncertainties. The poster will present how the predicted results from IWCD are implemented into the HK neutrino oscillation analysis and the corresponding sensitivity studies carried out on the oscillation parameters.

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Session Classification: Poster session & Coffee break