

Contribution ID: 392

Type: Parallel

## Measurement of the CP violation in neutrino flavour oscillations with Hyper-Kamiokande

Tuesday 8 July 2025 17:25 (15 minutes)

Long baseline neutrino oscillation experiments have a high sensitivity to the CP violation phase of the neutrino mixing matrix through the  $\nu\mu \rightarrow \nu e$  and  $\bar{\nu}\mu \rightarrow \bar{\nu}e$  appearance channels. For instance, the measurements of the T2K experiment in Japan, using Super-Kamiokande as a far detector, favour a close to maximal CP violation and excluded the CP conserving values at a 90% CL. However, these results are largely limited by statistics. With a fiducial volume approximately 8 times larger than the existing Super-Kamiokande, the future water Cherenkov detector Hyper-Kamiokande (HK) being built in Japan is one example of a next generation of long-baseline neutrino experiment. It will use the same neutrino beam from the J-PARC accelerator facility, but three times more intense, and the same baseline as the current T2K experiment to improve on the measurements of neutrino oscillation parameters thanks to a larger far detector and an upgraded beam facility. With this increased statistics, the CP violation phase measurement will require a much better understanding of systematic effects among which the neutrino interaction modelling is a major source of uncertainties. This talk will address the plans of the Hyper-Kamiokande experiment to perform the measurement of the CP violation phase. The plan is based on studying in depth the systematics impacting the measurements and on potentially upgrading the near detectors used to constrain the neutrino flux and cross-section before oscillations. In particular, this talk will emphasize how HK plans to constrain the ve and ve cross-sections, that are expected to be a major source of uncertainty for the measurement of the CP violation phase, with a new intermediate water Cherenkov detector at about 1 km from the neutrino beam production and an upgraded near detector from the T2K experiment (ND280 at 280 m from the neutrino production target). Depending on the true value of the CP violation phase, the measurement could also be impacted by degeneracy with the neutrino Mass Ordering. The talk will also explain how this obstacle could be overcome using the combined analysis of accelerator and atmospheric neutrinos in HK.

## Secondary track

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Track Classification: T03 - Neutrino Physics