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Sensitivities to neutrino oscillation parameters of the Hyper-K experiment

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Hyper-Kamiokande is a next generation underground water Cherenkov detector which will serve as far detector of a long-baseline neutrino experiment in Japan (the natural extension of the already successful T2K experiment).

The upgraded facilities at J-PARC will deliver an off-axis narrow band (~ 0.6 GeV) (anti-)neutrino beam (750kW \sim 1MW) and direct it to Hyper-K that will measure the appearance and disappearance parameters with unprecedented precision as well as potentially discover CP violation in the lepton sector.

Hyper-K consists of two cylindrical tanks lying side-by-side, whose total (fiducial) mass is 0.99 (0.56) million metric tons (about 20 (25) times larger than that of Super-K).

The inner detector region of the Hyper-K detector is covered by 99,000 20-inch PMTs (20% photo-cathode coverage of PMT density).

The near detector complex will include: INGRID and ND280 (on-axis and off-axis detector at 280 m from the target, already used by the T2K experiment) and a new near detector to be possibly built at 2 km from the target.

The near detectors will help constraining the neutrino flux and systematic errors.

If the mass hierarchy is known, Hyper-K is expected to determine the CP phase to better than 19 degrees for all possible values of δ and CP violation can be determined at 3 sigmas for 76% of the δ parameter space (considering 5 years exposure to neutrino beam produced by the 1.66 MW J-PARC proton synchrotron).

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