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Hyper-Kamiokande project

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Hyper-Kamiokande (Hyper-K) will be a next generation underground water Cherenkov detector with the total (fiducial) mass of 0.99 (0.56) million metric tons, which is approximately 20 (25) times larger than that of Super-Kamiokande.

One of the main goals of Hyper-K is the study of CP asymmetry in the lepton sector using accelerator neutrino and anti-neutrino beams. With a total exposure of $7.5 \text{ MW} \times 10^7 \text{ sec}$ integrated proton beam power (corresponding to 1.56×10^{22} protons on target with a 30 GeV proton beam) to a 2.5-degree off-axis neutrino beam produced by the J-PARC proton synchrotron, it is expected

that the CP phase δ_{CP} can be determined to better than 19 degrees for all possible values of δ_{CP} , and CP violation can be established with a statistical significance of 3σ for 76% of the δ_{CP} parameter space.

Hyper-K's high statistics data sample of atmospheric neutrinos will allow us to extract the information on the mass hierarchy and the octant of θ_{23} .

With a full 10 year duration of data taking, the significance for the mass hierarchy determination is expected to reach 3σ or greater if $\sin^2 \theta_{23} > 0.4$.

The scope of studies at Hyper-K also covers high precision measurements of solar neutrinos, observation of supernova neutrinos, and dark matter searches.

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