



Poster session 2 – Tuesday 5 July

P2.021 Neutrino oscillation measurements at Hyper-Kamiokande

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Hyper-Kamiokande (Hyper-K) is a proposed next generation underground water Cherenkov detector with a total (fiducial) mass of 516 (374) kilotons, approximately 10 (17) times as large as that of Super-Kamiokande. It will serve as a far detector of a long baseline neutrino oscillation experiment envisioned for the upgraded J-PARC and will also observe atmospheric neutrinos. The design of Hyper-K is based on the highly successful SuperKamiokande (Super-K), making full use of a well-proven technology. The inner detector region of the Hyper-K is viewed by 80,000 20-inch High Quantum Efficiency (QE) Box and Line PMTs, corresponding to 40% photocathode coverage, the same as Super-K. However, the High-QE Box and Line PMT has a detection efficiency two times higher than that of the PMTs used in Super-K, which means that a better energy resolution can be achieved for Hyper-K. In this work, we will discuss Hyper-K's sensitivity to the leptonic CP violation and the neutrino mass hierarchy by studying the oscillations of both beam and atmospheric neutrinos. The high photon detection efficiency of PMT can make Hyper-K have a high neutron tagging efficiency, therefore discriminate neutrinos from anti-neutrinos more easily. This discrimination can increase the sensitivity to the CP violation and neutrino mass hierarchy. Besides the improvement in the performance of photodetector, the improvement in the reconstruction tool and the reduction of systematic error are also ongoing to improve the sensitivity further. Their impact on the neutrino oscillation analysis will also be discussed.