

A multi-PMT photodetector for the Hyper-Kamiokande experiment

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Hyper-Kamiokande, a 260 kton water Cherenkov detector to be built in Japan, is the next generation of the Super-Kamiokande experiment. Its broad physics program includes nucleon decay, neutrinos from astronomical and human-made beam, with the main focus to determine the leptonic CP violation. To detect the weak Cherenkov light generated by neutrino interactions or proton decay, the primary photo-detector candidate are 20" "Box & Line" PMTs (Hamamatsu R12860). In order to enlarge Hyper-Kamiokande physics program, the use of multi-PMT modules is considered as a complement of the primary candidates. A multi-PMT Optical Module based on a pressure vessel instrumented with multiple small diameter photosensors, readout electronics and power, offers several advantages as higher sensitive surface, weaker sensitivity to Earth's magnetic field, increased granularity, reduced dark rate, improved timing resolution and directional information with an almost isotropic field of view.

We will present the multi-PMT module developed for Hyper-Kamiokande, as well as the measurement of the performances of its individual 3" PMTs. We will finally show the impact of these modules in Hyper-Kamiokande physics in both the high and low energy sectors.

Primary author: QUILAIN, Benjamin (Kavli IPMU, The University of Tokyo)

Presenter: QUILAIN, Benjamin (Kavli IPMU, The University of Tokyo)

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