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Performances of multi-PMT photodetectors for the Hyper-Kamiokande experiment

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Hyper-Kamiokande, a 187 kton fiducial volume 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 photodetector candidate are 20-inch PMTs. In order to enhance the Hyper-Kamiokande physics sensitivity, 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 increased granularity, reduced dark rate, weaker sensitivity to Earth's magnetic field, improved timing resolution and directional information with an almost isotropic field of view. In this talk, we will present the recent development of the mechanical design and electronics of these modules in order to both maximize the physics sensitivity of Hyper-Kamiokande and comply with the detector requirements. We will then show the exhaustive tests of the individual 3-inch PMTs that constitute these modules before to present the incoming perspectives of testing the assembled modules in a test beam.

Presenters: NASCIMENTO MACHADO, Lucas (INFN - National Institute for Nuclear Physics); NASCIMENTO MACHADO, Lucas (Purdue University Calumet (US))

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