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Multi-PMT modules for the Hyper-Kamiokande experiment.

The Hyper-Kamiokande (HK) is the next-generation long baseline neutrino experiment currently being constructed in Japan. It will have two underground water-Cherenkov detectors - the 260 kt far detector and approx. 1 kt intermediate detector (IWCD). The Water Cherenkov Test Experiment (WCTE) at CERN will evaluate different technologies and methodologies used in water Cherenkov detectors. It will have approx. 100 multi-PMT modules inside a water tank measuring about 3.8 meters in diameter and 3.6 meters in height, containing around 41 tonnes of water.

The poster will present the ongoing development of multi-PMT modules intended for deployment in both HK and WCTE. The multi-PMT unit comprises nineteen Hamamatsu Photonics R14374 3-inch PMTs and associated front-end electronics, all enclosed within a watertight pressure vessel. Two configurations of multi-PMTs will be used in Hyper-Kamiokande - power-optimized far-detector version and IWCD version, optimized for a high rate of incoming events. The poster will provide insights into the production process of the multi-PMT system, encompassing assembly procedures and quality assurance protocols. A dedicated section will cover the multi-PMT electronic system, including the high-voltage supply, the front-end cards, and the digitizer board. Moreover, we will explain the techniques for assessing the electronic performance and optical characteristics of the 3-inch PMT and whole multi-PMT module. Lastly, we will present data from quality assurance assessments conducted on a representative module.

Primary author: Mr RYCHTER, Andrzej (Warsaw University of Technology)

Presenter: Mr RYCHTER, Andrzej (Warsaw University of Technology)

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