

A Test of New Large Aperture Photodetectors in a Water Čerenkov Detector

Tuesday, 7 July 2015 10:30 (0:20)

Content

A large-aperture photodetector is essential for a large-volume detector aiming at a neutrino physics and a nuclear decay search. Several new photodetectors with high resolution and efficiency have been developed for a one megaton water Čerenkov detector, Hyper-Kamiokande, planned in Japan. A proof test started in 2013 using a 200-ton water Čerenkov detector to evaluate feasibility of high quantum efficiency (HQE), a hybrid photodetector (HPD) and a photomultiplier tube (PMT) with a box-and-line (BL) dynode. Eight HPDs with a 20 cm diameter were installed to the 200-ton water tank in advance of a 50 cm HPD. A 50 cm Venetian-blind PMT used in Super-Kamiokande was improved with the HQE of 30% from 22%, and there were five PMTs attached as well in 2013. In addition, three 50 cm HQE BL PMTs joined in 2014, which showed high detection performance at a single photoelectron. In total in the 200-ton tank, 240 photodetectors including the 50 cm conventional Super-Kamiokande PMT have been tested over a year. Based on results in the proof test, the best candidate photodetector for Hyper-Kamiokande will be decided in 2016. A primary result on a calibration, long-term stability for a year and performance will be reported.

Author's Institution

ICRR, The University of Tokyo

Co-author's Institution

Primary author(s) : NISHIMURA, Yasuhiro (ICRR, The University of Tokyo)

Co-author(s) : Mr. OKAJIMA, Yuji (Tokyo Institute of Technology); Mr. MIAO, Jiang (Kyoto University); Mr. FUKUDA, Daisuke (Okayama University); Mr. AKUTSU, Ryosuke (ICRR, The University of Tokyo); Mr. SUDA, Yusuke (The University of Tokyo); Mrs. HIROTA, Seiko (Kyoto University); Dr. NAKAYAMA, Shoei (Kamioka Observatory, ICRR, University of Tokyo); Prof. SHIOZAWA, Masato (Kamioka Observatory, ICRR, University of Tokyo); Prof. YOKOYAMA, Masashi (The University of Tokyo); Prof. HAYATO, Yoshinari (Kamioka Observatory, ICRR, University of Tokyo); Dr. TANAKA, Hidekazu (Kamioka Observatory, ICRR, University of Tokyo); Prof. NAKAHATA, Masayuki (Kamioka Observatory, ICRR, University of Tokyo); Prof. NAKAYA, Tsuyoshi (Kyoto University); Prof. KUZE, Masahiro (Tokyo Institute of Technology); Prof. KOSHIO, Yusuke (Okayama University); Dr. TAKETA, Akimichi (ERI, University of Tokyo)

Presenter(s) : NISHIMURA, Yasuhiro (ICRR, The University of Tokyo)

Session Classification : Morning Session 7 July/A