Contribution ID: **280**   Type: **Poster**

multi-PMT electronics system for Hyper-Kamiokande

Thursday, 26 May 2022 15:58 (1 minute)

Hyper-Kamiokande (Hyper-K) is a next generation underground water Cherenkov detector designed to study neutrinos from J-PARC accelerator and astronomical sources, nucleon decay, with the main focus on the determination of leptonic CP violation.

To detect the weak Cherenkov light generated by neutrino interactions or proton decay, the newly developed 20-inch PMTs by Hamamatsu will be used. The addition of a system of small photomultipliers as implemented in the KM3NeT experiment, the so called multi-PMT module (mPMT) is considered to improve the Hyper-K physics capability. The mPMT system is composed of 19 3-inch PMTs and all the electronics required for the system, with a power budget of only 4 W.

Each PMT is equipped with an active HV board capable of providing up to 1500V with only 3.2 mW of power consumption. Also, each PMT is equipped with a Front End Board based on a fast discriminator for trigger generation and a slow shaper, followed by a 12 bit@2Msps ADC.

A Main Board collects the 19 channels information and provides a timestamp for the event using a TDC for each channel at 200 ps RMS. The data are then transferred to the DAQ system using the Ethernet protocol. The only connection to the experiment is the Ethernet cable, that provides also the power and the clock to the system. For the power we designed a custom PoE+ Power supply, with an efficiency of 87% at 4W, while for the clock distribution we developed a distribution system based on a 25 MHz clock transmission in which a PPS is embedded thanks to a duty cycle clock modulation.

The developed system has been fully validated.

The HV and read-out electronics will be described and the results of the measurements will be discussed.

Collaboration

Hyper-Kamiokande

Primary author: LAVITOLA, Luigi (Università di Napoli Federico II e Istituto Nazionale di Fisica Nucleare)

Presenter: LAVITOLA, Luigi (Università di Napoli Federico II e Istituto Nazionale di Fisica Nucleare)

Session Classification: Detectors Techniques for Cosmology and Astroparticle Physics - Poster session