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The Central Logic Board for the KM3NeT detector: design and production

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The KM3NeT deep sea neutrino observatory will include a very large number of multi-Photomultiplier (PMT) optical modules (DOM) to detect the Cherenkov light generated by secondary particles produced in neutrino interactions.

The Central Logic Board (CLB) has been developed to acquire timing and amplitude information from the PMT signals, implementing time-to-digital conversion (TDC) with time over threshold (TOT) technique.

All the collected data are transmitted to shore using a wide-bandwidth optical network.

All the DOMs are kept synchronized in time within 1 ns precision using the White Rabbit (WR) Precision Time Protocol (PTP).

A large Field Programmable Gate Array (FPGA) has been adopted to implement all the specifications witht the requested performances.

The CLB will be also used in the base container of the detection unit (DU) to set-up and monitor all the requested functionalities: in this scenario a dedicated firmware and software will be deployed on board.

The design has been started in early 2013 and several prototypes have been developed.

After deep test carried on in different EU laboratories, the final mass production batch of 600 boards has been ordered and built: all the CLB are now ready for integration in the DOMs and base containers.

The first two KM3NeT DU will be deployed in spring-summer 2015 and all other units are in advanced stage of integration.

Collaboration

Presented on behalf of the KM3NeT collaboration

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