

Time generation and clock distribution for Hyper-Kamiokande

Tuesday, August 2, 2022 3:40 PM (20 minutes)

The construction of the next-generation far detector Hyper-Kamiokande (HK) has started. It will have ten times larger fiducial volume and increased detection performances. The data taking is planned for 2027. Time stability is crucial, as detecting physics events relies on reconstructing Cherenkov rings based on the coincidence between the photomultipliers. The above requires a timebase jitter smaller than 100 ps. In addition, since this detector will be used to detect neutrinos produced by the J-PARC accelerator in Tokai, each event needs to be timed with a precision of less than 100 ns with respect to UTC in order to be associated with a proton spill from J-PARC.

The HK collaboration is in an R&D phase and several groups are working in parallel, exploring various solutions for the electronics system. This talk will present the studies related to a novel design for the time synchronization system. We will discuss the clock generation, including the connection scheme between the GNSS receiver (Septentrio) and the atomic clock (free-running Rubidium), the precise calibration of atomic clock and algorithms to correct errors on satellites orbits, the redundancy of the system ; and a two-stage distribution system that sends the clock encoded in the data stream, using a custom protocol.

Attendance type

In-person presentation

Primary author: MELLET, Lucile (LPNHE, Paris, FRANCE)

Presenter: MELLET, Lucile (LPNHE, Paris, FRANCE)

Session Classification: WG6: Detectors

Track Classification: WG6: Detectors