

Electronics for Hyper-Kamiokande

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The Hyper-Kamiokande experiment, aiming to search for nucleon decay and study various properties of neutrinos, is expected to start in 2026. The detector is the ring imaging water Cherenkov type similar to Super-Kamiokande. The newly developed 20inch PMT will be used as photo sensors. They realize better timing resolution but the pulse shape of output signal is slightly different from the PMT currently used in Super-Kamiokande. Because the size of the detector is huge and it is not feasible to run the cable from each PMT to the electronics module located outside of the tank, we are considering to place the front-end electronics module with high voltage system inside the tank. Each front-end module will handle ~24 PMTs and transfer the data to the outside of the detector via an optical data transfer system. One candidate of digitizer is charge-to-time converter (QTC) with FPGA based TDC. In this presentation, we will review the conceptual design of the front-end electronics module together with the detail of the R&D status of components, including the basic performance of newly implemented FPGA based TDC.

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