multi-PMT electronics system for Hyper-Kamiokande

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Hyper-K will benefit from the addition of the multi-PMT in the detector, introducing an intrinsic directional sensitivity, improving the timing resolution and improving the reconstruction performance, particularly for events with vertices near the photosensor plane.

- The mPMT electronics is a complete acquisition system for 19 3'' PMTs in an underwater vessel with really good performance.
- HV board:
  - 3.2 mW power consumption at 1500V
  - Less than 1 % noise
  - 300 years of expected MTTF
- FE board:
  - 12 bit 2 MHz ADC, a fast amplifier for high resolution event timestamping
  - An ultra low power microprocessor running FreeRTOS
  - 40 mW of power consumption
- Main Board:
  - Redundant POE+ power supply with 87% efficiency at 4W
  - Redundant CPU to increase reliability
  - 19 individual 270 ps LSB TDC
  - 100 ns absolute timestamping
- 3.5 W of power consumption for the complete system running at 1 MHz and with the HV on on all channels

About 7,000 PMTs for Outer Veto Detector

40% photo-coverage

60 m

74m Ø

for 1 tank

Fiducial volume: 188 kt