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Multi-PMTs for NuPRISM/E61

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Abstract: We are using multi-PMTs (mPMTs) as the photosensors for NuPRISM/E61, the proposed intermediate water Cherenkov detector for the Hyper-Kamiokande experiment. The Canadian mPMT design has nineteen 3" PMTs enclosed in a water-tight pressure vessel, along with the associated electronics. The 3" PMTs provide excellent spatial imaging of the neutrino-induced Cherenkov light ring. This talk will describe the mechanical design of the mPMT, as well as the design of the digitizing electronics. Some of the key features of the mPMT design include:

- i) new Hamamatsu 3" PMTs with improved timing resolution.
- ii) acrylic dome with gel coupling between the PMTs and the acrylic.
- iii) FADC digitization in order to handle the expected high rate of neutrino interactions during the J-PARC beam spill.

We will describe the results from several different prototype mPMTs we have constructed, as well as the path towards mass production. Finally we will present the simulated performance of the mPMTs, showing the improvements compared to a detector with larger PMTs.

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