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Mechanical design of multi-PMT for the intermediate water Cherenkov detector of Hyper-K

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Hyper-Kamiokande (Hyper-K) is a next generation water Cherenkov neutrino detector for discovery of CP violation in neutrino oscillations, determination of the neutrino mass ordering as well as potentially discover proton decay. A new Intermediate Water Cherenkov Detector (IWCD) is proposed for Hyper-K to cancel the neutrino flux and cross section uncertainties located 1-2 km away from the neutrino source at J-PARC.

This work presents the mechanical development of the new multi-PMT (mPMT) prototype with 19-front facing 3-inch PMTs in a pressure vessel consisting of an acrylic dome, PVC cylinder and stainless steel backplate. The IWCD requires the assembly of about 500 mPMT. The prototype consists of PMT support matrix, scintillator-plate and read out electronics board. This work also presents the design and analysis of the 6m tall and 8m wide cylindrical support structure for the 500 mPMT modules.

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