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The Water Cherenkov Test Experiment at CERN

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Water Cherenkov neutrino experiments have played a crucial role in neutrino discoveries over the years, and provide a well established and affordable way to instrument large target masses. The largest uncertainty in the most recent T2K oscillation results are from the Super-Kamiokande detector systematic errors in the oscillated event samples. As neutrino experiments move from discovery to precision measurements a comprehensive understanding of water Cherenkov detectors becomes increasingly important. The physics and technological development studies that WCTE will be capable of will aid future neutrino experiments such as Hyper-Kamiokande, ESSnuSB and THEIA.

The Water Cherenkov Test Experiment (WCTE) is a small scale water Cherenkov detector which will be located in the T9 experimental area at CERN. WCTE will be used to study the water Cherenkov detector response to hadron, electron and muon beams, and will use new photosensor technologies. The detector will be instrumented with multi-PMT modules consisting of 19, 3-inch PMTs each, and will test a newly developed calibration deployment system. Calibration techniques with known particle fluxes will be used to demonstrate a 1% level calibration for GeV scale neutrino interactions. Other measurements will include those of Cherenkov light production, pion scattering and secondary neutrino production, to provide direct inputs to the T2K and Super-Kamiokande experiments. This talk will describe the WCTE detector design, the newly developed mPMT and calibration hardware and the all important physics program.

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