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Development and Testing of the LED Calibration System for the Daya Bay Antineutrino Detectors BRIAN LESTER, California Institute of Technology, DAYA BAY NEUTRINO EXPERIMENT COLLABORATION — The Daya Bay Neutrino Experiment requires extremely precise measurements of the antielectron-neutrino rate and spectrum from the Daya Bay nuclear reactors to produce an accurate measure of the neutrino mixing angle θ_{13}. Such precise measurements require rigorous calibration of each antineutrino detector (which use liquid scintillator in the detecting regions) using both radioactive and LED calibration sources. This project aims to test the feasibility that, by comparing the detector response in a dry run to the liquid run, we can determine the attenuation length of the liquid interior of the detector. Using two photomultiplier tubes (PMTs) attached to the ends of 5 meters of 4" inner diameter PVC pipe, we mock up the interior of the detector with 2" calibration PMTs at the top and bottom of the detector. We then place an LED diffuser ball inside of the PVC pipe via various access holes to model the LED calibration units inside of the detector and pulse the LED as we would for calibration of the detector. We record the response of the PMTs for various positions along the PVC pipe, both with the pipe filled with liquid and with only air inside of the pipe. Comparing the PMT detection ratio for runs in liquid and runs in air we measure the attenuation length of the liquid.

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