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Precision Measurement of Target Mass in the Antineutrino Detectors of the Daya Bay Reactor θ_{13} Experiment PATRICK MENDE, University of Wisconsin — Of the parameters within the neutrino mixing matrix, the reactor neutrino experiment at Daya Bay seeks to determine the yet unknown neutrino mixing angle θ_{13} to a sensitivity of 0.01 or better in $\sin^2 2\theta_{13}$. The experiment utilizes the inverse beta-decay reaction of electron antineutrinos on protons to measure the flux of reactor antineutrinos at different distances from the reactors and measure the disappearance of $\overline{\nu}_e$. In the experiment it is important to measure the target mass to a high degree of accuracy to determine the number of free protons in the detector target. My work focuses on evaluating sensors for a high-precision measurement of the target mass in the Daya Bay antineutrino detectors to $< 0.1\%$. The resolution and long-term stability of ultrasonic and capacitance sensors have been characterized and found to meet the precision requirements of the experiment.

Patrick Mende
University of Wisconsin

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