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LBNE WCD calibration system design and energy calibration requirements for large water Cherenkov detectors

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The Long Baseline Neutrino Experiment in the US was developing two far detector concepts in parallel. While a liquid Argon time projection chamber was ultimately selected as the far detector technology, we have performed a conceptual design of the calibration requirements and systems needed for a large (200 kTon) water Cherenkov detector. In this talk I will discuss the requirements and design concepts for the calibration systems of the water Cherenkov detector design for LBNE.

[KUTTER, Thomas (LSU)]
A 200kt water Cherenkov detector was considered for the Long Baseline Neutrino Experiment (LBNE). Calibration requirements were defined based on past experience with water Cherenkov detectors and dedicated physics sensitivity studies. A calibration strategy and program were developed to characterize relevant properties of the detector. These include the optical calibration of the detector (water transparency, PMT properties), energy response, particle identification, vertex and angular resolution and environmental monitoring. The derived oscillation probability depends directly on the measured energy of
detected neutrino candidate events. Effects of energy resolution and energy scale and respective uncertainties on the sensitivity to measure the CP phase delta and the mass hierarchy were studied. These studies were performed within the GLoBES framework and with an independent analysis approach. Results of these studies will be presented.

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