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Development of Real Time Calibration Systems for the Pacific Ocean Neutrino Experiment

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The Pacific Ocean Neutrino Experiment (P-ONE) is a cubic-kilometre scale neutrino telescope to be deployed deep in the northern Pacific Ocean off the coast of British Columbia, Canada. P-ONE aims to observe high-energy neutrinos to identify and gain insights into the physical mechanisms behind their sources across the universe. The detector will be composed of an array of kilometre tall mooring lines instrumented with P-ONE Optical Modules (P-OMs) which detect Cherenkov light from neutrino-induced secondary particles within the detector volume. To ensure accurate reconstruction of incident neutrinos, both the optical properties of seawater and position of each module within the detector must be known to high precision. The ocean is a dynamic environment where both of these parameters can vary over time and so to achieve this goal, P-ONE includes a variety of calibration systems for both localized and ranged real time detector calibration measurements. These include acoustic receivers and emitters for spatial trilateration and small fast light flashers integrated into each P-OM. Furthermore, some P-OM modules in the detector will be replaced with unique P-ONE CALibration (P-CAL) modules which contain a larger well calibrated nanosecond flasher along with some detection elements of the P-OM. This contribution highlights the development, simulations, and lab measurements of these P-ONE calibration systems.

Poster prize

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