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A four-year baseline characterization for the Pacific Ocean Neutrino Experiment (P-ONE) in the Cascadia Basin

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The STRings for Absorption length in Water (STRAW) and its successor STRAW-b are the pathfinders for the future Pacific Ocean Neutrino Experiment (P-ONE). Both experiments are mooring lines instrumented with several light emitter and receiver modules. The goals of the pathfinders are to measure the water's attenuation length of water, characterize the background light spectrum and perform long-term monitoring of the environmental and the optical properties of the 2.6km-deep site of the future P-ONE.

Here we present analyzed data collected over four years of STRAW and two years of STRAW-b operation, revealing periodical bioluminescence emission correlated with water current speed. We demonstrate the method to retrieve these results. We also report measurements of typical bioluminescence spectrum spectra and show camera pictures of emitting species. These observations are vital for P-ONE, providing empirical measurements of the bioluminescence background and input for our Monte-Carlo simulations of the ambient background.

Such monitoring data, as presented here from STRAW and STRAW-b, are vital for deep-sea neutrino experiments. However, they also are highly interdisciplinary, covering topics beyond physics, such as biology, oceanography, and climatology.

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