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Ocean Bottom Detector : new under-development anti-neutrino detector for direct observation of mantle geo-neutrino

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Observation of geo-neutrinos originating from radioactive isotopes in the Earth (238U,232Th, etc.) can be converted to the amount of radioactive isotopes and the heat generated by their decays which governs the Earth dynamics.

To date, two experiments (KamLAND and Borexino) have measured geo-neutrinos and constrained the range of acceptable models for the Earth's chemical composition, but distinguishing the mantle flux by land-based detectors is challenging as the crust signal is about 70% of the total anti-neutrino flux.

Given the oceanic crust is thinner and has lower concentration of radioactive elements than continental crust, geo-neutrino detector in the ocean, Ocean Bottom Detector (OBD), makes it sensitive to geo-neutrinos originating from the Earth's mantle.
Our working group was jointly constructed from interdisciplinary communities in Japan which include particle physics, geoscience, and ocean engineering. We have started to work on technological developments of OBD.
We are now developing a 20 kg prototype liquid scintillator detector. This detector will undergo operation deployment tests at 1 km depth seafloor in 2022. Our first big goal is 1.5 kt size detector, and we aim world first direct observation of mantle geo-neutrinos.

In my presentation, I will give our detector concept, current development status and performance evaluation result.