Characterization of a Novel CdZnTe Spectrometer for Measuring Radioactivity in the Marine Environment

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Naturally occurring or with human origin radioactivity exists in the marine environment, but it is considered under-measured compared to studies in the land and atmosphere. A recently funded EU H2020 FET Program called RAMONES (Radioactivity Monitoring in Ocean Ecosystems) aims to provide *in situ* and in near real time underwater radioactivity monitoring by employing a set of novel instruments offering high detection efficiency and energy resolution. Part of these instruments is a group of mobile gamma spectrometers equipped with CdZnTe detectors aboard autonomous underwater gliders, called γ sniffers. Such spectrometers will be developed and used for the first time to measure radioactivity in the marine environment.

Due to the harsh environmental conditions in the ocean, measurements had to be conducted to fully characterize the response of the spectrometer under various geometries and deployment scenarios. Besides detailed measurements in the lab, field tests were performed to estimate the performance of the detector in underwater measurements using point and volume sources of low activity. Results were compared to Monte Carlo simulations using MCNP5 and Geant4. The results unveiled the features of the type of the detector including its energy resolution and efficiency, as well as the capabilities and limitations during underwater deployment.

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