Contribution ID: **353** Type: **Oral**

The event discrimination in the bulk region of the point-contact germanium detector

Wednesday 27 August 2025 18:00 (20 minutes)

The p-type point-contact high-purity germanium detector is a critical tool for rare-event searches, including direct dark matter detection, coherent elastic neutrino-nucleus scattering, and neutrinoless double-beta decay, owing to its ultralow detection threshold, ultralow intrinsic background, and excellent energy resolution.
In the CDEX-1B detector, we observed anomalous bulk events with an extremely fast rise time, which could be closely related to the background. Here, we developed a pulse shape discrimination method combining pulse shape simulation and reconstructed source experiment signatures, to extract fast bulk events from normal bulk events. Calibration data and the distribution of X-rays generated by intrinsic radioactivity verified that the fast bulk events experienced a single hit near the passivation layer.
This study demonstrates the detector's capability of single-hit bulk spatial resolution, and thus provides a background removal technique in future rare-event experiments.

Collaboration you are representing

CDEX

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Session Classification: Dark Matter and Its Detection

Track Classification: Dark Matter and Its Detection