



Contribution ID: 26

Type: Oral presentation

## Measurement of New Ac-228 Isomers Using a Ra-228 Doped CeBr3 Scintillation Crystal

*Friday, June 27, 2025 9:45 AM (30 minutes)*

Despite significant research efforts, the precise measurements of certain radioactive decays remain elusive. In this study, we have measured the energy and decay time of Ac-228 isomers produced by the beta decay of Ra-228. This was achieved using a novel method where a Ra-228 radioactive source is deposited in a scintillator. Given the low energy (45.8 keV) Q value of Ra-228 beta decay and the corresponding low energy emission of the resulting Ac-228 isomers, these measurements are challenging. To overcome this, we coated a Ra-228 radioactive source inside a quartz ampoule and grew CeBr<sub>3</sub> using the Bridgman method, thereby embedding the Ra-228 source within the CeBr<sub>3</sub> scintillator. The CeBr<sub>3</sub> scintillator, chosen for its high light yield, good resolution, and fast decay time, was critical in measuring the low energy and fast decay time of the Ac-228 isomers. Since Ac-228 is produced via the beta decay of Ra-228, the isomer's gamma emission coincides with the beta particle. We utilized the delayed coincidence method to measure the energy and decay time of the isomers. In this presentation, we will discuss the development of the detector using this novel method and the measured energy and decay time of Ac-228 isomers.

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**Session Classification:** Experiment

**Track Classification:** Experiment