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Identification of metastable isomeric states of Ac-228 with NaI(Tl) crystals

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We report the identification of metastable isomeric states of Ac-228 at 6.28 keV, 6.67 keV, and 20.19 keV, with lifetimes of an order of 100 ns. These states were identified with NaI(Tl) crystal detectors of the COSINE-100 dark matter search experiment. The isomeric states are produced through the beta decay of Ra-228, a component of the Th-232 decay chain, with beta Q -values of 39.52 keV and 25.61 keV, respectively. The presence of these states has significant implications for low-energy background modeling in dark matter search experiments due to the low Q -value and the relative abundance of Th-232 and its progeny in low background experiments. In this presentation, we will describe methods and results with the COSINE-100 detectors as well as future prospects for a dedicated measurement of the Ac-228 isomeric states.

Primary author: KIM, Kyungwon (Center for Underground Physics, IBS)

Presenter: KIM, Kyungwon (Center for Underground Physics, IBS)

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