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Study on LaBr3(Ce) gamma-ray detectors by using Geant4 simulation

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The gamma-ray detector array composed of 24 LaBr3(Ce) scintillators is now in preparation for the decay spectroscopy with the fast-timing gamma-ray measurements by the Center for Extreme Nuclear Matters (CENuM) in Korea. Accordingly, the simulation based on the Geant4 framework has been performed for various purposes.

The encapsulated LaBr3(Ce) crystal with a size of 1.5-inch diameter was applied to the simulation to reproduce the energy spectra from the experiments with several radiation sources. Moreover, the self-radioactivity of La-138 contained in the crystal was considered to reproduce the background energy spectrum.

From our work on the simulation, the primary goals are as followings: reproducing the expected energy spectra from the specific beta-decay experiments, designing the detector configuration, and the efficiency calculations. In this presentation, we introduce our recent results from the Geant4 simulation of the LaBr3(Ce) gamma-ray detectors.

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