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Development of Scintillating Bolometer with Large Undoped and Eu-doped CaF₂ Crystals for Neutrinoless Double Beta Decay of ⁴⁸Ca

We are developing CaF₂ scintillating bolometers to search for neutrinoless double beta decay of ⁴⁸Ca.

We realized large scintillating bolometers using 312g(50mm ϕ \times 50mm cylinder) of undoped and Europium-doped CaF₂ crystals with a readout technology of metallic magnetic calorimeters.

We used CaF₂ crystals with a large amount of internal ²³⁸U-series impurities to evaluate detector performance such as energy resolution and particle identification.

We found that the thermal signal amplitudes are strongly position-dependent in both CaF₂ crystals.

By analyzing the sequential alpha-decays (222Rn-218Po-214Pb), the energy resolution without position dependence was evaluated, and obtained to be 0.2% at 5MeV, in the case of undoped CaF₂ crystal.

In the poster presentation, we will present the results obtained with this R&D measurements.

Mini-abstract

Scintillating Bolometer with Large CaF₂ Crystals for Neutrinoless Double Beta Decay of ⁴⁸Ca

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