



Contribution ID: 108

Type: Poster

First test of a large-volume CdMoO₄-based low temperature detector for neutrinoless double beta decay search

Thursday, 25 July 2019 18:45 (15 minutes)

A large cylindrical cadmium molybdate crystal with natural isotopic abundance has been successfully used to fabricate a cryogenic microcalorimeter. The measurement was performed above ground at milli-Kelvin temperature, allowing simultaneous readout of the heat and the scintillation light using NTD-Ge sensors. We present its powerful discrimination capability of α versus γ/β events. The achieved energy resolution has FWHM from 5 keV (at 238 keV) to 13 keV (at 2615 keV). The low internal trace contamination of the CdMoO₄ crystal was evaluated as well. The excellent detector performance with preliminary positive indications proves that cadmium molybdate is an extremely promising detector crystal for neutrinoless double beta decay scintillating bolometric experiments with ¹¹⁶Cd and ¹⁰⁰Mo nuclides in the next-generation technique.

Less than 5 years of experience since completion of Ph.D

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Session Classification: Poster session

Track Classification: Low Temperature Detector Applications