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Application of Metallic Magnetic Calorimeters to Neutrinoless Double Beta Decay Search

Metallic Magnetic Calorimeters (MMCs) are a type of low temperature detectors operating at millikelvin temperatures that demonstrated high energy resolution. They read temperature increase due to an energy input by sensing magnetization change of paramagnetic sensor material with superconducting niobium sensing coils and a superconducting quantum interference devices (SQUID). Because of their high sensitivity and good linearity at a broad energy range, MMCs are one of competitive candidates for a rare event search experiment at MeV scale, such as neutrinoless double beta decay (0nbb) search. We develop a high resolution detection scheme composed of a large scintillating crystal and an MMC sensor. We present how the energy deposit in an absorber crystal is measured with an MMC sensor together with the current application of the detection scheme in Advanced Molybdenum-based Rare-process Experiment (AMoRE), an international collaboration which aims to search for the neutrinoless double beta decay (0nbb) of Mo-100 in scintillating molybdenum-based crystals using MMCs.

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