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Li₂MoO₄ phonon-scintillation detection system with MMC readout

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We developed a measurement system for simultaneous detection of phonon and scintillation signals from Li₂MoO₄ crystals based on a metallic magnetic calorimeter (MMC) readout technology. The work was motivated to check the properness of Li₂MoO₄ crystals as the main target molybdate crystals for the advance Mo-based rare process experiment (AMoRE). MMCs are one kind of the most sensitive detector technologies used in low temperature detectors. We have studied to surveying a proper scintillating crystal for the final stage experiment that is planning to use 100 kg of 100Mo isotope. Li₂MoO₄ is one of the promising crystal candidates among molybdate crystals for heat and light detection at mili-Kelvin temperatures. The choice of Li₂MoO₄ crystal as a target is advantageous in terms of crystal growth and internal background controls. However, its hygroscopic property requires handing care to keep transparent surface conditions. We carried out several sets of measurement using a Li₂MoO₄ in 5 cm diameter and 5 cm height in dilution refrigerator system. In the presentation we will summarize the difference of the detector performance depending on the surface condition of the crystals. The detector performance including particle identification and energy resolution is to be presented together with feasibility discussion to use Li₂MoO₄ for 200-kg scale experiment, AMoRE-II.

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

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Student (Ph.D., M.Sc. or B.Sc.)

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