AMoRE: cryogenic phonon-scintillation detector for neutrinoless double beta decay experiment

AMoRE, Advanced Mo-based Rare process Experiment, aims to measure neutrinoless double beta decays ($0\nu\beta\beta$) of $^{100}$Mo using cryogenic phonon-scintillation detection. The project uses $^{40}$Ca$^{100}$MoO$_4$ (CMO) scintillating crystals, composed of $^{100}$Mo-enriched and $^{48}$Ca-depleted elements, as the source. The phonon and scintillation signals from the crystals are simultaneously detected by metallic magnetic calorimeters (MMCs). The sensors provide an excellent energy and timing resolutions and background discrimination based on phonon pulse shapes and heat and light ratios.

A pilot stage of AMoRE has been started with about 1.5 kg of CMO crystals at the Yangyang underground laboratory (Y2L). In this talk, the status of the experiment will be presented with recent efforts to upgrade the system. We will also discuss the future plan of the project to build a large size detector with 200-kg crystals.