

# Low temperature light detectors using metallic magnetic calorimeter

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We developed light detectors to measure scintillation signals from simultaneous phonon-scintillation detection system for rare-event search experiments. The light detector is composed of a two-inch Ge or Si wafer and a low-temperature sensor called Metallic Magnetic Calorimeter (MMC) operated at milli-Kelvin range. The light detector showed promising performance for neutrinoless double beta decay searches. The rise time of the light detectors are as fast as 0.2 ms independent of operating temperatures. An energy resolution of 545 eV of FWHM are found at 40mK with Fe-55 source. Its corresponding rms noise of the light detector is about 30 eV at 10 mK. The performance can be improved even more through optimization of MMC sensors, wafer material selection, and phonon amplifying technique using Neganov-Luke effect. In this poster, we introduce the current status and future studies of light detector development.

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