

first results DAREDEVIL with GaAs mK calorimeter

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The DAREDEVIL (DARk-mattEr-DEVIces-for-Low-energy-detection) is a new project aiming to develop a novel class of detectors to study Dark Matter candidates with mass below $1 \text{ GeV}/c^2$. The detection channel is DM-electron scattering, where the excitation energies of the electrons should be matched to the transferred momenta. The only materials with energy gaps of eV or below are special semiconductors, Dirac Semimetals, Weyl Semimetals, Scintillators. Such materials, already explored from a theoretical point of view, will be implemented in a detector, as planned by the DAREDEVIL project. The first phase of the project aims at designing a novel class of gram-scale detectors with meV threshold suitable for light DM-electron scattering detection. In order to achieve the high performances needed for detecting such small energy depositions we will use these crystals as absorbers in low temperature calorimeters with dual phonon and IR-photon readout.

In this contribution we present the very first results of a low temperature calorimeter based on GaAs as the target crystal, operated at 15 mK coupled to a Neutron Transmutation Doped thermistor for the phonon readout and facing a CdTeHg-based photon detector tuned to detect its IR scintillation light.

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