

DAREDEVIL

Wednesday 27 August 2025 15:00 (20 minutes)

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, and 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. Furthermore, we have conducted the first tests of the double readout technique with a germanium light detector utilizing the Luke effect, and in the future, we aim to test CdTeHg-based photon detector tuned to detect its IR scintillation light.

Collaboration you are representing

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