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Latest Results from the SuperCDMS-HVeV Program

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The SuperCDMS-HVeV (High-Voltage with eV resolution) program is an R&D project focused on developing detectors with low energy resolution to search for low-mass dark matter (🛛 1 GeV/c2), study charge-transport in cryogenically cooled crystals, and probe unclassified backgrounds at low energy. The program utilizes gram-scale silicon detectors instrumented with TES (transition-edge sensor)-based phonon sensors. A voltage bias can be applied to the crystal to amplify phonon signals from ionizing interactions via the Neganov-Trofimov-Luke effect. HVeV detectors have recently achieved sub-eV baseline energy resolutions and demonstrated competitive sensitivities to electron-recoil dark matter at masses below 1 MeV.This talk will provide an overview of the latest developments in the HVeV program. This includes the results from a dark matter search conducted at the NEXUS underground facility which featured a redesigned detector housing aimed at reducing backgrounds from dielectric materials used in previous designs. I will present preliminary results from the most recent data-taking campaign at SNOLAB, with a new iteration of these detectors. Finally, I will preview the next generation of HVeV detectors which seek to improve upon the original design to achieve lower thresholds and mitigate backgrounds.

Keyword-1

Dark matter search

Keyword-2

Detector R&D

Keyword-3

Author: HONG, Ziqing (University of Toronto)

Co-author: SUPERCDMS COLLABORATION

Presenter: HONG, Ziqing (University of Toronto)

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