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Dark Matter Search with a low-threshold SuperCDMS HVeV detector

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For many years the SuperCDMS collaboration has been developing cryogenic low-threshold silicon and germanium detectors for dark matter searches. The recently developed gram-scale high-voltage eV-resolution (HVeV) detectors are designed to be operated with a high voltage bias (on the order of 100 V) to take advantage of the Neganov-Trofimov-Luke amplification to resolve individual electron-hole pairs. An improved version of the HVeV detector achieved a phonon energy resolution of 2.7 eV without the voltage assisted amplification. Background data with exposures on the order of 1 gram-day were acquired with this detector in an above-ground laboratory, without bias voltage (0 V) as well as at high voltages. We compare the 0 V data with high voltage data, in an attempt to understand the spectrum observed. The 0 V data were also used to set a nuclear recoil dark matter limit.

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