



Contribution ID: 71

Type: **Poster**

## Impact Ionization in SuperCDMS HVeV Detectors

*Thursday, July 25, 2019 6:45 PM (15 minutes)*

The existence of Dark Matter (DM) is supported by astronomical data and observations; however, to date there is no confirmed direct detection of DM. The SuperCDMS collaboration has expanded its capabilities with the development of the prototype HVeV detector. The HVeV detector uses a high voltage applied across the Si (or Ge) crystal to accelerate charges, which scatter off the crystal lattice generating additional phonons via the Neganov-Trofimov-Luke (NTL) effect. The total energy of the generated phonons is equal to the number of  $e^-h^+$  pairs times the applied voltage, thus the detector response is quantized from the discrete  $e^-h^+$  pair production. Unfortunately, the accelerated charges can (with some probability) free other loosely bound charges throughout the crystal, referred to as impact ionization. The observed energy from events that undergo impact ionization will not be quantized due to an incomplete NTL effect on the freed charges. These types of events will lie between the quantized peaks and appear as a flat high energy background. Here we discuss a technique for studying the effect of impact ionization on the SuperCDMS HVeV detector using a pulsed laser at ultra-low intensity.

### Less than 5 years of experience since completion of Ph.D

Y

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**Session Classification:** Poster session

**Track Classification:** Low Temperature Detector Development and Physics