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Calibrating energy scale of SuperCDMS Si HVeV detectors in keV range and study the Compton steps

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Low mass dark matter (sub-GeV/ c^2) search has been a primary objective for direct detection experiments over the last few years. The SuperCDMS HVeV Si detector is sensitive to low-mass dark matter candidates due to the $\mathcal{O}(\text{eV})$ energy resolution ability. Based on the Neganov-Trofimov-Luke (NTL) principle, the phonon-sensitive HVeV device can distinguish the single charge excitations inside the crystal. This study aims to calibrate the energy of three 1 gram cryogenic Si HVeV detectors in the $\mathcal{O}(\text{keV})$ scale and study the Compton steps (K shell and L shell steps at 1.8 keV and 0.15 keV, respectively) using the detector response in both 0V and 100V bias voltages across the crystal. In this symposium, we will be presenting the updates on the Compton step analysis for Si HVeV detectors. The understanding of Compton steps for these detectors will be used to calibrate the big SuperCDMS HV detectors for the 2nd generation SuperCDMS experiment at SNOLAB.

Session

Astroparticle Physics and Cosmology

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