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Investigation of the low energy excess in SuperCDMS HVeV detectors and its potential subtraction for enhanced dark matter sensitivity

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A variety of detectors across many different rare event search experiments have reported a rising sub-keV low energy excess (LEE) in the spectra of both total substrate energy deposits eV_t and ionization-producing energy deposits eV_{ee} . It has been hypothesized that non-ionizing substrate events such as stress-induced events from crystal or film relaxation could be a possible source of the low energy excess in eV_t . The spectrum of these non-ionizing events has been termed 0QLEE. SuperCDMS High Voltage (HV) detectors are a type of phonon-mediated detector that is sensitive to eV_{ee} by way of Neganov-Trofimov-Luke phonon production from voltage-driven charge drift; as phonon-mediated detectors, they are also sensitive to the non-ionizing components of the eV_t spectrum. The most recent deployment of a prototype HV-style detector called HVeV saw greatly decreased rates of the ionizing low energy excess in comparison to previous runs. At these lower rates, measurement of the 0QLEE contribution to the HVeV phonon spectrum at high voltage may now be possible via *in situ* operation of the detector at zero voltage. I will present on this technique as well as the expected gain in sensitivity from subtracting the 0QLEE background in search of charge-producing dark matter.

Early Career

No

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