Abstract Submitted
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Measurements of Charge Transport Properties for the Cryogenic Dark Matter Search[1] KYLE SUNDQVIST, University of California, Berkeley, THE CRYOGENIC DARK MATTER SEARCH COLLABORATION — The Cryogenic Dark Matter Search (CDMS) utilizes high-purity germanium detectors to seek for weakly interacting massive particles (WIMPs) via their interactions with nuclei. Operating at a temperature of 40 mK, the ionization and phonons generated by particle interactions enable CDMS to discriminate putative WIMPs from electromagnetic background. The discrimination potential of these signals has fundamental dependencies on the transport properties of drifting electrons and holes. We have performed simulations of charge dynamics for these conditions, where the dominant drift-limiting mechanism is the spontaneous emission of phonons. To corroborate our theoretical understanding of charge scattering processes, we have recently performed high-bandwidth ionization measurements on CDMS detectors. Electrons and holes are always "hot" under our typical operating conditions. Structure in their drift velocity response to applied field we identify as evidence of the inelastic and anisotropic emission of phonons that is unique to this non-equilibrium regime. We will present how this understanding is beneficial to future detector development.

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