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Electron and Hole Transport in 40 MilliKelvin Germanium $<$ 100 $>$[1] KYLE SUNDQVIST, University of California, Berkeley, CRYOGENIC DARK MATTER SEARCH COLLABORATION — Ultrapure germanium at milliKelvin temperatures presents a charge transport regime which is rarely encountered. In this case, thermal phonons play a negligible role and the scattering of electrons and holes is dominated by spontaneous phonon emission. As these carriers are always hot, typical assumptions of thermal equilibrium are no longer valid. Furthermore, for fields of only a few V/cm, the emission of optical and intervalley phonons is highly inelastic such that carrier distributions may differ substantially from the form of a displaced Maxwellian. We present simulation results of transport processes of carriers in germanium $<$ 100 $>$ at a temperature of 40 mK. These studies were performed in order to provide a deeper understanding of processes occurring in detectors of the Cryogenic Dark Matter Search (CDMS), which seeks to detect weakly-interacting massive particles (WIMPs) in the halo of our galaxy. As CDMS measures both the ionized charge and the energy in non-thermalized phonons created by particle interactions, we will describe the applicability of these transport simulation results to a wide variety of measured phenomena.

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Kyle Sundqvist
University of California, Berkeley

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