



Charge Trapping and Impact Ionization in CDMS Detectors

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The Cryogenic Dark Matter Search (CDMS) operates an array of high purity, cryogenic ($T=50\text{mK}$) germanium detectors in an effort to measure nuclear recoils induced by scattering dark matter particles. Discrimination between electron and nuclear recoils is performed by the simultaneous measurement of ionization and phonons. The total amount of charge collected will depend on charge trapping and impact ionization processes which occur as the charge carriers drift through the bulk of the germanium. We present measurements of these properties for electrons and holes in a typical CDMS detector. The data indicates charge trapping is dominated by the production of overcharged (D^- and A^+) donor and acceptor impurity states, leading to the observed build up of space charge over time in these detectors. At higher electric fields, we see that an excess of charge can be produced by impact ionization. We discuss the implications of these results.