

Time-Dependent Impact Ionization in a Large-Size Ge Detector Made from a Crystal Grown at USD

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To understand the charge transport in a SuperCDMS-style Ge detector made from a crystal grown at USD was performed at the University of Minnesota. The detector is patterned with four concentric charge channels on one side, and a bias electrode on the opposite side. An Am-241 movable source was used to characterize the 59.54 keV peak in the energy spectra from each channel. This study can be utilized to understand the charge generation processes inside the detector at a cryogenic temperature. We investigated the time-dependent impact ionization induced by holes at mK temperature. We observed time-dependent impact ionization, which is due to the formation of cluster dipole states. We determined charge collection efficiency and impact ionization scattering cross-section using the data taken at mK temperatures.

Collaboration: PIRE-GEMADARC

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