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Measuring Ionization Efficiency of Germanium Detector Using E0 Transition of 72Ge¹ D'ANN BARKER, DONGMING MEI, WENZHAO WEI, University of South Dakota — Ionization efficiency plays a crucial role in the interpretation of experimental results for the WIMP-induced dark matter signature. We previously proposed an analytic model that calculates the ionization efficiency for germanium detectors. To test the accuracy of this model, we have measured ionization efficiency of nuclear recoils in germanium by utilizing the characteristic E0 transition of germanium-72 with an AmBe neutron source. Due to the superposition of the internal conversion electrons and nuclear recoils, the signature is a triangular shape, which is well identified from background events. The nuclear recoils are measured down to keV range. We extracted the 692 keV Gaussian distributions of electrons using well-established model from energy calibration. A Monte Carlo simulation is used to determine the energy of nuclear recoils. In this paper, we show the measured ionization efficiency in contrast to the proposed theoretic model for ionization efficiency. All available models and measurements are compared and a reliable model is identified.

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