

Development of Germanium Detectors with n/g Discrimination at 77 K for Dark Matter Experiments

Utilizing unique germanium crystal growth capability at USD, detectors of new type can be developed - germanium detectors with internal amplification with n/g discrimination at 77 K. Such detector can have effective threshold below 100 eV, which opens up fresh opportunity for directly detecting low mass WIMPs. The discrimination capability of nuclear recoils from electronic recoils (n/g) can be realized by measuring the plasma time difference created by the respective ionization density. The achievable time resolution of this new detector is less than 3 ns. In this paper, we demonstrate how the detector-grade crystals can be grown to meet the requirements for such a new detector and the development of such a detector at USD.

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