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Ionization efficiency in silicon from 50 eV to 3 MeV

Content

Ionization detectors based on detecting low-energy nuclear recoils have become an important recent tool to explore neutrino non-standard interactions, direct dark matter searches, etc. For these detectors, the electron ionization efficiency (quenching factor) is relevant to reconstruct the visible energy events. In this study, we present the recent updates to model the quenching factor in pure silicon by using Lindhard integral equation formalism. Where we introduce an adequate electronic stopping power for low energies, electron straggling effects, and other high energy effects, like Bohr stripping, etc. Showing a good match with low and high energy quenching factor measurements in silicon that lies from ˜0.7 keV to 3 MeV. Finally, we are also going to show recent studies to apply this model to other target materials, e.g. Ge, LXe, and LAr.

Summary

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