

General Dark Matter Electron Interactions in Detector Materials

Wednesday 15 June 2022 16:15 (15 minutes)

We develop a novel formalism to describe the scattering of dark matter (DM) particles by electrons bound in detector materials such as silicon, germanium and graphene for a general form of the underlying DM-electron interaction. By applying non-relativistic effective field theory methods, we find that the DM and material physics factorise into a handful of DM and material “response functions”. The former are obtained by taking the non-relativistic limit of the free amplitude for DM-electron scattering, whereas the latter are expressed in terms electron wave-function overlap integrals and obtained using Density Functional Theory. To illustrate the potential of our formalism, we predict scattering rates for DM-electron interactions that were not accurately tractable before, such as the magnetic dipole interaction.

Author: URDSHALS, Einar

Presenter: URDSHALS, Einar

Session Classification: Sektionen för elementarpartikel och astropartikelfysik

Track Classification: Parallel session: partikelsektionen