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## **Modelling dark matter-electron interactions in materials**

*Thursday 31 August 2023 14:00 (15 minutes)*

The search for electronic transitions induced by the scattering of Milky Way dark matter (DM) particles in detector materials has attracted a great deal of attention in recent years as it can probe DM masses that are not accessible in conventional nuclear recoil experiments. In this talk, I introduce a formalism that can describe the scattering of DM particles by electrons bound in detector materials for a general form of the underlying DM-electron interaction. The formalism predicts a factorisation of the DM and material physics input to the DM-induced electronic transition rate, and combines a non-relativistic effective theory for DM-electron interactions with material response functions defined in terms of electron wave function overlap integrals. To illustrate the generality of this approach, I apply our formalism to interpret the null result reported by operating DM direct detection experiments, and to assess the potential of graphene and nanotubes as next-generation directional DM detectors.

### **Submitted on behalf of a Collaboration?**

No

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