

# Phenomenology 2021 Symposium



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## Improved Calculation of Dark Matter-Electron Scattering in Semiconductors

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Semiconducting targets (such as Silicon and Germanium) are exceptionally sensitive detectors of sub-GeV Dark Matter (DM). An incident DM particle can scatter off the target electrons and excite them across the band gap. The scattering rate therefore crucially depends on the wave functions, and energies, of the target electrons. Usually the electronic states near the band gap are computed with density functional theory (DFT). We extend this calculation in two ways: including more electronic states above, and below, those computed with DFT with semi-analytic expressions, and incorporate all-electron reconstruction effects which have been previously overlooked. We will discuss for what targets and DM models these effects will be important for, and highlight the cases where the results significantly change the detection prospects in ongoing experiments such as SuperCDMS and DAMIC.

### Summary

**Primary author:** TRICKLE, Tanner (California Institute of Technology)

**Co-authors:** ZUREK, Kathryn (Caltech); Dr ZHANG, Zhengkang (Caltech)

**Presenter:** TRICKLE, Tanner (California Institute of Technology)

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