

No Need for Speed: Halo-Independent Analysis of Dark-Matter-Electron Scattering

Wednesday, September 20, 2023 11:30 AM (20 minutes)

DM direct detection experiments and the interpretation of their results are sensitive to the velocity structure of the galactic halo. However, the halo model is subject to large uncertainties. In this talk I will present a formalism to analyze DM-electron scattering events in semiconductor experiments without assuming a particular DM velocity distribution. Using simulated data, I will show that halo-independent information about DM properties can be extracted via numerical fits in which the DM velocity is treated as a collection of nuisance parameters. I will argue that the complementarity of semiconductor materials with different crystal form factors is essential to inferring the DM mass, interaction structure, and velocity distribution. Finally, I will discuss an application of the technique to real data from the SENSEI and EDELWEISS experiments.

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