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Direct Detection of Strongly Interacting Sub-GeV Dark Matter via Electron Recoils

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Scatterings both on electrons and nuclei of the Earth crust, atmosphere, and shielding attenuate the expected local dark matter flux at a terrestrial detector. Such experiments lose sensitivity to dark matter above some critical cross section, and do not probe potentially stronger interactions. In this talk, I consider a simple model of the dark sector with a dark photon in the two limits of heavy and ultralight mediators. In this model, the dark matter-electron scattering cross-section is directly linked to the dark matter-nucleus cross section, and nuclear interactions typically dominate the attenuation process. I will present the exclusion bands for various experiments computed using Monte Carlo simulations, and also the constraint's behaviour for various scenarios. Apart from the dark photon model, I also consider the case where the dark matter couples exclusively to electrons, and show the corresponding constraints computed via analytic methods. Finally, I will discuss the prospects and modulation signature of small scale, balloon and satellite borne direct detection experiments.

Summary

Author: SHOLAPURKAR, Mukul (Stony Brook University)

Co-authors: ESSIG, Rouven; KOUVARIS, Chris; EMKEN, Timon

Presenter: SHOLAPURKAR, Mukul (Stony Brook University)

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