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Mukul Sholapurkar (Stony Brook): Neutrino Backgrounds for the Direct-Detection of Sub-GeV Dark Matter

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The direct detection of sub-GeV dark matter has received increased interest in the last few years. Recent proposals for experimental ideas using dark matter electron scattering have opened up previously unexplored, but theoretically well-motivated, regions of parameter space. As these experiments increase their cross section reach and exposures, they will start to become sensitive to astrophysical neutrinos. The coherent scattering of neutrinos can mimic a dark matter signal, and for experiments without directional sensitivity, is indistinguishable from dark matter. We consider the effects of the coherent neutrino background in which the neutrino scatters off of the nucleus for dark matter-electron scattering experiments. In particular, we calculate the dark matter-electron scattering cross section sensitivities for silicon, germanium and xenon targets at exposures ranging from 1-1000 kg-years assuming a solar neutrino-only background. We find that the neutrino background is negligible in semiconductors for exposures less than 1 kg-year, but become important at higher exposures. These findings show that the neutrino background is not a concern for experiments like SENSEI or DAMIC, but will have contributions to SuperCDMS

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