

Dark matter detection via atomic interactions

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The mystery of dark matter (DM) is a long-standing issue in physics, with numerous dedicated experiments returning no confirmed detections. With the constantly increasing sensitivity of direct detection experiments, much of the parameter space for Weakly Interacting Massive Particles (WIMPs) has been ruled out. However, low mass (sub-GeV) WIMP-like particles are less researched and yet to be excluded as a possibility, despite their potential for direct detection via atomic interactions. Due to these particles having masses comparable to or lower than nucleons, detection of any nuclear recoil in scintillation experiments proves difficult. Instead, a DM-electron interaction could be detected in conventional scintillators due to an enhanced scattering rate [1, 2]. Considering this possibility is important for assessing recent experimental results and upcoming scintillator-based DM searches. In this work, I will present atomic excitation factors and calculated event rates for DM-electron scattering, and how they compare to the excess seen in the XENON1T experiment.

[1] B. M. Roberts, V. V. Flambaum and G. F. Gribakin, *Phys. Rev. Lett.* **116**, 023201 (2016).

[2] B. M. Roberts and V. V. Flambaum, *Phys. Rev. D* **100**, 063017 (2019).