

Direct Detection of Low Mass Fast Moving Dark Matter

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Low mass fast moving/energetic dark matter (DM) is very well motivated and has been a subject of attention in the literature. These fast-moving particles can gain enough kinetic energy to pass the thresholds of some Large volume terrestrial detectors. For instance, fast-moving or “boosted” DM can account for the recent excess in electron recoil events observed by the XENON1T detector, due to its velocity being large enough to give rise to \sim keV recoil electrons. An explanation from ambient DM seems challenging otherwise. In this talk, I will focus on “boosted” DM which is a byproduct of the annihilation of heavier, ambient, dark sector partners. I will present on-going work in which the atomic effects are considered and show that, in the case of fast-moving DM, the limits can change depending on the electron ionization form factor used.

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