

An Attractive Scenario for Light Dark Matter Direct Detection

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Direct detection of light dark matter (DM), below the GeV scale, through electron recoil can be efficient if DM has a velocity well above the virial value of $v \sim 10^{-3}$. We point out that if there is a long range attractive force sourced by bulk ordinary matter, i.e. baryons or electrons, DM can be accelerated towards the Earth and reach velocities $v \sim 0.1$ near the Earth's surface. In this “attractive scenario” all DM will be boosted to high velocities by the time it reaches direct detection apparatuses in laboratories. Furthermore, the attractive force leads to an enhanced DM number density at the Earth facilitating DM detection even more. We elucidate the implications of this scenario for electron recoil direct detection experiments and find parameters that could lead to potential signals, while being consistent with stellar cooling and other bounds.

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