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Relic Density Aspects of a Boosted Light Dark Matter Scenario

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Light dark matter (DM) is getting increasingly more important in our quest to probe the dark sector physics. Direct detection of a sub-GeV scale dark matter is difficult as it lacks sufficient kinematic heft to have significant nuclear or electron recoil. In this regard, a boosted dark matter plays an interesting role. Before attempting to detect a boosted dark matter, we explore a possible BSM scenario where a boosted DM arises very naturally as an artefact of the model construction. We also show how one can have a boosted DM in a two component dark sector, where a TeV scale heavier fermion DM can annihilate to a lighter scalar DM: gives it a boost. Both the heavier and lighter DM relic densities receive potential modification in the boosted scenario. We investigate the allowed parameter space in the context of relic density, once taking the two dark matter candidates individually and then taking them together in a coupled scenario, where boost effects can be important.

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