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Indirect detection of (Late-decoupling) Semi-Annihilating Dark Matter

Tuesday 24 July 2018 17:00 (20 minutes)

Semi-annihilation describes non-decay processes with an odd number of external dark sector states. The canonical example is an initial state of two dark particles and a final state of one dark plus one or more standard model particles. It is a generic feature of dark matter whenever the symmetry group enforcing stability is not a discrete Z_2. Semi-annihilation changes the expected signals in current dark matter searches, weakening limits from direct and collider searches, but can still be probed using cosmic ray observations. We discuss generic features of semi-annihilating searches and derive model-independent bounds using effective operators. We additionally discuss the relation between semi-annihilation and kinetic decoupling of the dark and visible sectors. The scattering processes that maintain thermal contact are related by crossing symmetry to dark matter annihilation, which can have an important effect on thermal freeze out. However, interesting parameter space remains where the indirect signals today can be significantly enhanced. We illustrate this general feature using a specific example, a dark matter explanation of the AMS positron flux.

Parallel Session

Dark Matter, Astroparticle Physics

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