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Hadronic uncertainties and isospin violation in supersymmetric dark matter models

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Current limits from dark matter direct-detection experiments place a powerful constraint on the parameter space of the Minimal Supersymmetric Standard Model (MSSM). The interpretation of these limits, however, depends sensitively on the hadronic uncertainties associated with the scattering of supersymmetric dark matter particles off nucleons. For spin-independent scattering, we review the role of chiral perturbation theory in the determination of these hadronic uncertainties, and quantify the amount of isospin violation within several simplified versions of the MSSM. In each case, we identify parameter-space configurations that produce (almost) vanishing cross sections and examine the complementarity of constraints due to direct-detection, flavour, and collider experiments. In the vicinity of these so-called blind spots, we find that isospin violation is much larger than typically expected in the MSSM.

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