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The Effects of a Late Decaying Scalar on Dark Matter Density
KATHERINE GARRETT, STEPHANIE SCHUK, GINTARAS DUDA, Creighton University — The neutralino as dark matter has yet to be discovered, either through direct detection of its interaction with detectors here on Earth, or through indirect detection of the products of neutralino self-annihilation processes. Dark matter searches have pushed limits of the neutralino's cross section so far down that only a handful of theoretical models with carefully constrained parameters can fit the experimental data. This seems unnatural; a correct model of neutralino dark matter should not have to be finely tuned to serve as a solution. The addition of a late decaying scalar particle, which essentially decays into the Lightest Supersymmetric Partner, has been shown to give neutralino densities in a more natural range needed for dark matter for a wide range of parameter space. We have implemented the addition of the scalar field in the code of DarkSUSY, run models, probed the parameter space, and compared the results of this modification with results from standard cosmological models. We also compared results from the simulations with the bounds set on dark matter from detection experiments; this let us place limits on properties of the scalar field and on non-standard cosmology scenarios.

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