

The Reach of Thermal Supersymmetric Dark Matter

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Although the relic density of supersymmetric dark matter is often much too high, it can be reduced through several processes. One of these processes, stop coannihilation, is very efficient at reducing the dark matter density. This process's efficiency comes because of an enhancement to the stop anti stop scattering rate the final state is the longitudinal mode of the W or Z boson. Since the coupling of the stops to the Goldstone bosons is proportional to the A-terms, this scattering can be drastically enhanced for large A-terms. If the A-terms are too large, however, the Higgs mass will be suppressed and the stop coannihilation strip is not viable. Due to uncertainties in the Higgs mass calculators, it is unclear whether this really is an important constraint on the stop coannihilation strip. Taking the most up to date Higgs mass calculator and CMSSM input parameters, it is seen that the Higgs mass constraint excluded much of the stop coannihilation strip with larger values of the LSP mass. If sub-GUT type models are considered, the reduced running softens the effect of the large A-terms allowing large LSP masses to be consistent with the Higgs mass calculation.

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