

Observational Constraints on Decoupled Hidden Sectors

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Summary

I will discuss observational constraints that can be placed on a decoupled hidden sector of dark matter, using as an example a Higgs-portal model, where the portal coupling is weak enough so that the hidden sector never thermalizes with the Standard Model. Even though the dark matter - SM scattering in this case is suppressed by the tiny coupling, the properties of the hidden sector can be constrained by astrophysical and cosmological observations.

The absence of inflationary isocurvature fluctuations provides lower bounds on the magnitude of the dark sector self-interactions, which in turn may lead to thermalization within the hidden sector, resulting in relic abundance of DM determined through a freeze-out process operating in the hidden sector. The parameter space of the decoupled sector is further constrained by considering observations of cluster mergers and by the Lyman-alpha forest bounds on warm dark matter.

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