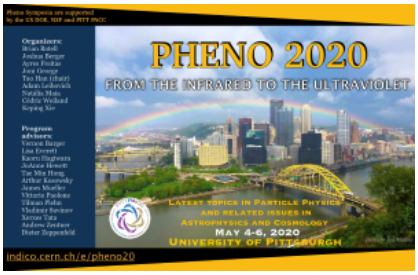

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Mirror Twin Higgs Portal Dark Matter

Monday 4 May 2020 15:15 (15 minutes)

Direct and indirect detection experiments have excluded large regions of parameter space for many of the simplest models of sub-TeV WIMP dark matter. However, the predictions of these models can be altered through the introduction of non-equilibrium events in their cosmological history. In this study we explore the implications of an energy-dominating, asymmetric, out-of-equilibrium decay on Twin Higgs Portal Dark Matter (THPDM), a Mirror Twin Higgs (MTH) model extended by a singlet scalar acting as dark matter. Asymmetric decays are highly motivated within the MTH framework since Planck bounds on $\Delta N_{\rm eff}$ severely restrict the amount of extra radiation that can be present during big bang nucleosynthesis (BBN). In THPDM, the asymmetric decay has the secondary effect of diluting the frozen-out dark matter population, which implies that the observed relic abundance today may be only a fraction of its original value. This leads to smaller direct detection cross section predictions compared to conventional models of Higgs Portal dark matter. We examine two models of asymmetric reheating in conjunction with THPDM to determine whether either scenario yields predictions accessible by the next generation of direct detection experiments.

Summary

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