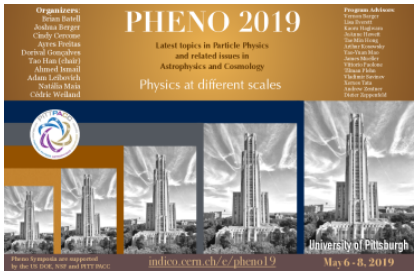

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Long live the Higgs portal!

Tuesday 7 May 2019 17:15 (15 minutes)

In Higgs portal models of fermion dark matter, scalar couplings are unavoidably suppressed by strong bounds from direct detection experiments. As a consequence, thermal dark matter relics must coexist with mediators in a compressed spectrum of dark particles. Small couplings and small mass splittings lead to slow mediator decays, leaving signatures with displaced vertices or disappearing tracks at colliders. We perform a comprehensive analysis of long-lived mediators at the LHC in the context of a minimal dark matter model with a naturally small Higgs portal, also known as the wino-bino scenario in supersymmetry. Existing searches for disappearing charged tracks and displaced hard leptons already exclude tiny portal couplings that cannot be probed by current direct and indirect detection experiments. For larger portal couplings, we predict new signatures with displaced soft leptons, which are accessible with run-II data. Searches for displaced particles are sensitive to weakly coupling mediators with masses up to the TeV scale, well beyond the reach of prompt signals.

Summary

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