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A Tale of Two Portals: Testing Light, Hidden New Physics at Future e^+e^- Colliders

Sunday 25 June 2017 11:05 (5 minutes)

We investigate the prospects for producing new, light, hidden states at a future e^+e^- collider in a Higgsed dark $U(1)_D$ model, which we call the Double Dark Portal model. The simultaneous presence of both vector and scalar portal couplings immediately modifies the Standard Model Higgsstrahlung channel, $e^+e^- \to Zh$, at leading order in each coupling. In addition, each portal leads to complementary signals which can be probed at direct and indirect detection dark matter experiments. After accounting for current constraints from LEP and LHC, we demonstrate that a future e^+e^- Higgs factory will have unique and leading sensitivity to the two portal couplings by studying a host of new production, decay, and radiative return processes. Besides the possibility of exotic Higgs decays, we highlight the importance of direct dark vector and dark scalar production at e^+e^- machines, whose invisible decays can be tagged from the recoil mass method.

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