

# Phenomenology of dark matter in complex scalar singlet extensions of Two Higgs doublet models

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Extensions of the two Higgs doublet models with a singlet scalar can easily accommodate all current experimental constraints and are highly motivated candidates for Beyond Standard Model Physics. It can successfully provide a dark matter candidate, explain baryogenesis and provide gravitational wave signals. In this work, we focus on the dark matter phenomenology of the two Higgs doublet model extended with a complex scalar singlet which serves as the dark matter candidate. We study the variations of the dark matter observables, i.e, relic density and direct detection cross-section, with respect to the model parameters. We obtain a few benchmark points in the light and heavy dark matter mass region. We also study possible signatures of this model at future  $e^+e^-$  colliders.

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