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# Dark Matter Phenomenology in $Z^2$ broken Two Higgs Doublet Model with Complex Singlet Extension

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Although the Standard Model is very successful, there are still open problems which it cannot explain, one of it being dark matter (DM). This has led to various Beyond Standard Model theories, of which Two Higgs Doublet models are very popular, as they are one of the simplest extensions and lead to a rich phenomenology. Further extensions with a complex singlet lead to a natural DM candidate.

The aim of this work is to explore the dark sector in a Two Higgs Doublet Model extended by a complex scalar singlet, where the imaginary component of the singlet gives rise to a pseudo-scalar DM candidate. Both, the doublets, and the singlet, obtain a vacuum expectation value (vev), where the singlet vev leads to additional mixing of the doublet and the singlet scalar sector. We examine the influence of the Higgs sector parameters on DM relic density as well as direct and indirect detection cross sections. The results are then compared with constraints from experiments.

## Collaboration / Activity

none

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