

# Probing Co-Scattering of scalar dark matter in an EFT framework with monophoton searches

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We investigate the co-scattering mechanism for dark matter production in an EFT framework which contains new  $Z_2$ -odd singlets, namely two fermions  $N_{1,2}$  and a real scalar  $\chi$ . The singlet scalar  $\chi$  is the dark matter candidate. The dimension-5 operators play a vital role to set the observed DM relic density. We focus on a nearly degenerate mass spectrum for the  $Z_2$  odd particles to allow for a significant contribution from the co-scattering or co-annihilation mechanisms. We present two benchmark points where either of the two mechanisms primarily set the DM relic abundance. The main constraint on the model at the LHC arise from the ATLAS mono- $\gamma$  search. We obtain the parameter space allowed by the observed relic density and the mono- $\gamma$  search after performing a scan over the key parameters. We find the region of parameter space where the relic abundance is set primarily by the co-scattering mechanism while being allowed by the LHC search. We also determine how the model can be further probed at the HL-LHC via the mono- $\gamma$  signature.

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