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Dark Matter Signals at the LHC from a

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Content :

We analyse new signals of Dark Matter (DM) at the LHC, in a 3-Higgs Doublet Model (3HDM) in which only one doublet acquires a Vacuum Expectation Value (VEV), preserving a Higgs parity Z_2 . The other two doublets are inert and do not develop a VEV, leading to a dark scalar sector controlled by the Higgs parity and a Dark Matter (DM) candidate provided by the lightest CP-even dark scalar H_1 . This leads to a loop induced decay of the next-to-lightest scalar, $H_2 \rightarrow H_1 \gamma^* \rightarrow H_1 l+l-$ mediated by loops involving both the dark CP-odd and charged scalars. This smoking gun decay, not permitted in the 2HDM with one inert doublet, is expected to be important when H_2 and H_1 are close in mass. We examine the significance of this channel in the light of the LHC Run 2.

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