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A novel experimental search channel for very light Higgses in the Type-I 2HDM

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We present a reinterpretation study of existing results from the CMS Collaboration, specifically, searches for light BSM Higgs pairs produced in the chain decay $pp \rightarrow H_{SM} \rightarrow hh(AA)$ into a variety of final states, in the context of the CP-conserving 2-Higgs Doublet Model (2HDM) Type-I. Through this, we test the LHC sensitivity to a possible new signature, $pp \rightarrow H_{SM} \rightarrow ZA \rightarrow ZZh$, with $ZZ \rightarrow jj\mu^+\mu^-$ and $h_{SM} \rightarrow b\bar{b}$. We perform a systematic scan over the 2HDM Type-I parameter space, by taking into account all available theoretical and experimental constraints, in order to find a region with a potentially visible signal. We investigate the significance of it through a full Monte Carlo simulation down to the detector level. We show that such a signal is an alternative promising channel to standard four-body searches for light BSM Higgses at the LHC with an integrated luminosity of $L = 300/\text{fb}$.

In-person participation

Yes

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