

Search for a Light Pseudoscalar Higgs Boson in the Two Higgs Doublet Model using Data from the Large Hadron Collider (LHC)

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A search is presented for a light pseudoscalar Higgs boson (a) using data collected by the CMS experiment at LHC, at the center-of-mass of energy of 13 TeV. The study looks into the decay Higgs boson (H) via the $H \rightarrow aa \rightarrow \mu\mu\tau\tau$ channel. The Higgs boson can be both standard-model-like (125 GeV) or heavier. The pseudoscalar mass falls within the range $m_a \in [2m_\tau, mH/2]$. The large mass difference between the Higgs and the pseudoscalar means that the final tau lepton decay products are highly boosted in the decay direction and collimated. A modified version of tau reconstruction is used to account for the highly overlapping decay products. The modified reconstruction technique gives higher reconstruction efficiency over the standard tau reconstruction and hence better signal significance and background rejection. This technique also becomes useful when looking into various final states, especially the ones where one of the taus decays hadronically while the other decays leptonically (μ/e). The performance of the altered reconstruction technique, as opposed to the standard tau reconstruction, is also presented. The results from the 2016 and 2017 CMS datasets will be shown.

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Authors: ZHANG, Fengwangdong (University of California Davis (US)); HABIBULLAH, Redwan Md (Florida State University (US)); HAZA, Grace (University of California Davis (US)); ZHANG, Jingyu (Florida State University (US)); CHERTOK, Maxwell (University of California Davis (US)); YOHAY, Rachel (Florida State University (US))

Presenter: HABIBULLAH, Redwan Md (Florida State University (US))

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