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A search for light pseudoscalar from the decay of Standard Model Higgs boson in CMS using 137 fb^{-1} Run-2 data

After the discovery of the 125 GeV Higgs boson (H) at CERN LHC, the next physics program is set on measuring its properties with precision as well as searching for new physics. In some of the Beyond Standard Models (BSM) such as next to minimal supersymmetric standard model (NMSSM), the Higgs sector is extended by adding an additional doublet, and also a singlet scalar. The extended Higgs sector in NMSSM predicts seven Higgs bosons, namely the two CP odd (A_1, A_2); 3 CP even (H_1, H_2, H_3) and two charged Higgs (H^\pm). Interestingly, for a certain region of parameter space, the masses of A_1, H_1 can be found to be less than 60 GeV. Looking for such lighter states of the mass range from a few GeV to $m_H/2$ at the LHC experiments is hence an interesting area in CMS and ATLAS collaboration. Recently, quite a few searches have been carried out to look for lighter states, in the SM-like Higgs boson decay $H \rightarrow AA$, where “A” is considered to decay to $b\bar{b}, \tau\tau, \mu\mu, \gamma\gamma$.

In this presentation, we will summarize our search for the exotic decays of the 125 GeV Higgs boson to a pair of light pseudoscalars “A” in the $H \rightarrow AA \rightarrow b\bar{b}\gamma\gamma$ decay channel, using 13 TeV proton-proton collision data recorded with the CMS detector in Run-2, corresponding to an integrated luminosity of 137 fb^{-1} . The search is performed with M_A from 20-60 GeV in the VH (V=W/Z boson) production mode of the Higgs boson. The expected limits at 95% confidence level (CL) are placed on the signal strength in this particular decay channel.

Field of contribution

Experiment

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