

Higgs phenomenology at the LHC using di-Higgs searches

The discovery of a light Higgs particle h_0 (125 GeV) opens up new prospect for searching heavier Higgs boson(s) at the LHC Run-2, which will unambiguously point to new physics beyond the standard model (SM). We study the detection of a heavier neutral Higgs boson H_0 via di-Higgs production channel at the LHC (14 TeV) with $H_0 \rightarrow h_0 h_0 \rightarrow b\bar{b}\gamma\gamma, W W\gamma\gamma, WWWW$. *This directly probes the Hhh cubic Higgs interaction, which exists in most extensions of the SM Higgs sector. For the decay products of final states $WW\gamma\gamma$, both pure leptonic mode $WW \rightarrow l\nu l\nu$ and semi-leptonic mode $WW \rightarrow q\bar{q}l\nu$ are included. For $WWWW$ analysis, only same signed di-lepton final state is considered. We analyze signals and backgrounds by performing fast detector simulation for the full process $pp \rightarrow H \rightarrow hh$ over the mass range of M_H from 250 to 600 GeV. For generic two-Higgs-doublet models (2HDM), we present the discovery reach of the heavier Higgs boson at the LHC Run-2, and compare it with the current Higgs global fit of the 2HDM parameter space. In addition, the impact of the h_0 replaced by a scalar particle instead of 125 GeV will be briefly discussed.*

I intend to submit my contribution for the proceedings

Yes

Primary author: Prof. FANG, Yaquan (Institute of High Energy Physics)

Presenter: Prof. FANG, Yaquan (Institute of High Energy Physics)