

Invariant mass distribution of di-Higgs production at HL-LHC in the 2HDM (10'+8')

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The dominant Higgs pair production process in the HL-LHC is gluon fusion, which we study in the framework of the Two Higgs Doublet Model. As a key observable we evaluate the invariant mass distribution of two Higgses at 125 GeV in the final state. We analyze in particular the contribution of the resonant diagram involving a heavy CP-even Higgs boson exchange. We analyze the potential sensitivity to the triple Higgs couplings involved. We show that for the benchmark points where the resonant production is dominant, the contribution of different parameters of the extra scalar can be traced. These parameters are its mass, total decay width and relative sign of BSM Higgs trilinear and top Yukawa couplings. Finally, we discuss the effects of experimental uncertainties by applying smearing and binning to the invariant mass.

Presenter: RADCHENKO SERDULA, Kateryna (DESY)

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