

Two Higgs Doublet Model (2HDM) search projections for high-luminosity LHC

Monday, 9 June 2014 15:50 (20 minutes)

Compact Muon Solenoid (CMS) experiment at CERN is presently undergoing necessary upgrades for the high energy run of Large Hadron Collider (LHC) machine foreseen in Year 2015. The higher center-of-mass energy and high luminosity will offer precision measurements of the recently discovered Higgs boson as well as an enhanced sensitivity for the New Physics beyond the Standard Model (SM). There are many natural extensions of SM which predict the existence of additional heavy Higgs-like scalars. Two Higgs Doublet Model is a generic way of describing such extensions with extended Higgs sector. We explore the potential of future analyses to exclude or discover heavy, neutral Higgs bosons in the context of models with two Higgs doublets. The production of a heavy scalar H boson and pseudo-scalar A boson through gluon fusion, with subsequent decay $H \rightarrow ZZ \rightarrow 4l$ and $A \rightarrow Zh \rightarrow llbb$ ($l=e, \mu$), is considered. The sensitivity of these analyses is assessed for a dataset consisting of an integrated luminosity of 3000 fb^{-1} of proton-proton collisions at $\sqrt{s} = 14 \text{ TeV}$ center-of-mass energy, collected with an average of 140 pileup interactions per bunch crossing.

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Session Classification: Session 3