

# INVESTIGATIONS OF ELECTROWEAK SYMMETRY BREAKING MECHANISM FOR HIGGS BOSON DECAYS INTO FOUR FERMIONS

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Models with extended Higgs boson sectors are of prime importance for investigating the mechanism of electroweak symmetry breaking for Higgs decays into four fermions and for Higgs-production in association with a vector bosons [1]. In the framework of the Two-Higgs-Doublet Model [2] using two scenarios obtained from the experimental measurements we presented next-to-leading-order results on the four-fermion decays of light CP-even Higgs boson,  $h \rightarrow 4f$  [3]. With the help of Monte Carlo program Prophecy 4f3.0 [4], we calculated the values  $\Gamma = \Gamma_{EW} / (\Gamma_{EW} + \Gamma_{SM})$  and  $\Gamma = \Gamma_{EW+QCD} / (\Gamma_{EW+QCD} + \Gamma_{SM})$  for Higgs boson decay channels  $H \rightarrow \nu_\mu \bar{\mu} e \bar{\nu}_e, \mu \bar{\mu} e \bar{e}, e \bar{e} e \bar{e}$ . We didn't find significant difference when accounting QCD corrections to EW processes in the decay modes of Higgs boson.

Using computer programs Pythia 8.2 [5] and FeynHiggs [6] we calculated the following values:  $\sigma(VBH)BR(H \rightarrow ZZ)$  and  $\sigma(VBF)BR(H \rightarrow WW)$  for VBF production processes,  $\sigma(ggH)BR(H \rightarrow WW)$  and  $\sigma(ggH)BR(H \rightarrow ZZ)$  for gluon fusion production process at 13 and 14 TeV and found good agreement with experimental data [7].

## References:

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