



Contribution ID: 1029

Type: Parallel Talk

## Impact of radiative corrections on decays of the charged and CP-odd Higgs bosons

*Thursday, 7 July 2022 17:00 (15 minutes)*

While the Higgs boson with 125 GeV was found in 2012, the Higgs sector remains unknown. In various new physics models, the Higgs sector is often extended from its minimal form in the standard model (SM), and there are additional Higgs bosons. Therefore, the discovery of additional Higgs bosons is clear evidence of the extended Higgs models, and the direct search of these particles is the key program at the LHC and HL-LHC. In addition, we can indirectly study the extended Higgs models by measuring the deviations in the SM-like Higgs boson couplings. Recently, it has turned out that the properties of the discovered Higgs boson are consistent with the prediction in the SM under theoretical and experimental uncertainty. This leads us to investigate the approximate alignment scenario, where the couplings of the 125 GeV Higgs boson are close to the predictions in the SM. It is known that the decays of additional Higgs bosons into the 125 GeV Higgs boson are useful channels to study the two-Higgs doublet model (2HDM), and we can comprehensively explore the parameter space of 2HDM by utilizing the synergy between the direct search of additional Higgs bosons and precision study of the 125 GeV Higgs boson. However, the size of radiative corrections is compatible with the tree-level contribution, especially in the approximate alignment scenario, and tree-level calculations are not reliable. In this talk, we discuss the impact of radiative corrections in decays of the charged and CP-odd Higgs bosons in the 2HDM. We show that radiative corrections sizably change the theoretical predictions for the decay branching ratios of the charged and CP-odd Higgs bosons in the approximate alignment scenario. In addition, we discuss the discrimination of the four types of Yukawa interaction in 2HDM by studying the decay patterns of additional Higgs bosons. This talk is based on NPB966 (2021) 115375 [arXiv: 2010.15057], NPB973 (2021) 115581 [arXiv: 2108.11868] and work in progress.

### In-person participation

Yes

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