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Exploring new physics by loop-corrected decays of additional Higgs bosons

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In order to test and discriminate the extended Higgs models, it is quite important to include radiative corrections to the analyses for the synergy between the precise measurements of the discovered Higgs boson (h_{125}) and the direct searches for additional Higgs bosons. Deviations of couplings of h_{125} from the standard model (SM) predictions give the upper limit on masses of additional Higgs bosons, and change predictions of decay rates of additional Higgs bosons. Precise calculations including loop corrections are clearly important for comparison with precise measurements of the h_{125} couplings in future collider experiments. We calculate the loop-corrected correlation between the branching ratio of additional Higgs bosons and the deviation in the $h_{125} \rightarrow ZZ^*$ decay from the SM prediction in the two Higgs doublet model, and show that loop corrections can significantly change the correlation predicted at LO. We perform the calculations of loop corrections based on Fortran code "H-COUP version 3" (<http://www-het.phys.sci.osaka-u.ac.jp/~hcoup/>) with some modifications for the renormalization conditions.

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