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Comprehensive studies of loop-corrected decays of various Higgs bosons

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Content :

In extended Higgs models, the nearly-alignment scenario is phenomenologically interesting and consistent with the current LHC data. In the nearly-alignment case, it is known that a wide parameter region is expected to be surveyed by "Higgs to Higgs decays" in direct searches of the additional Higgs bosons. We comprehensively investigate the impact of NLO electroweak and NNLO QCD corrections to branching ratios (BRs) of various decay processes of additional Higgs bosons in several extended Higgs models by using the numerical tool H-COUP, which we are developing. We show the correlation between BRs of the Higgs to Higgs decays and those of the 125 GeV Higgs boson. As the results, we find that the one-loop corrections can change BRs of the Higgs to Higgs decays from the LO results by several tens of percent, so that radiative corrections are quite important for the direct searches for the additional Higgs bosons at the high-luminosity LHC and future lepton colliders. This talk is based on Nuclear Physics B 983(2022)115906.

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