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Higher-order effects in the trilinear Higgs coupling for future collider experiments

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Although the Higgs boson has been discovered, the couplings with the Higgs boson have room for deviation from the Standard Model (SM) prediction. Each extended Higgs model is characterized by its Higgs potential. Nearly aligned models where the shape of the Higgs potential is described by one classical field include the classical scale invariance model (CSI), the pseudo-Nambu-Goldstone model, the tadpole-induced model, and so on. This classification enables us to scrutinize numerous numbers of models efficiently by measuring the trilinear Higgs coupling with high precision. In this study, we calculate the trilinear Higgs couplings including loop contributions from the top quark and new particles for various Higgs potentials, and investigate the feasibility of future collider experiments. For several benchmark parameters, we show that the High-luminosity LHC and the ILC are capable of discriminating several extended Higgs models. We present the result of work in progress.

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