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Title:	Probing the scalar potential via double Higgs boson production at hadron colliders
Authors:	Borowka, S. (/jspui/browse?type=author&value=Borowka%2C+S.) Shivaji, A. (/jspui/browse?type=author&value=Shivaji%2C+A.)
Keywords:	Sensitivity Production Model Simplicity
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Abstract:	We present a sensitivity study on the cubic and quartic self couplings in double Higgs production via gluon fusion at hadron colliders. Considering the relevant operators in the Standard Model Effective Field Theory up to dimension eight, we calculate the dominant contributions up to two-loop level, where the first dependence on the quartic interaction appears. Our approach allows to study the independent variations of the two self couplings and to clearly identify the terms necessary to satisfy gauge invariance and to obtain UV-finite results order by order in perturbation theory. We focus on the $bb\rightarrow\gamma\gamma$ signature for simplicity and provide the expected bounds for the cubic and quartic self couplings at the 14 TeV LHC with 3000 fb ⁻¹ (HL-LHC) and for a future 100 TeV collider (FCC-100) with 30 ab ⁻¹ . We find that while the HL-LHC will provide very limited sensitivity on the quartic self coupling, precision measurements of double Higgs production at a FCC-100 will offer the opportunity to set competitive bounds. We show that combining information from double and triple Higgs production leads to significantly improved prospects for the determination of the quartic self coupling.
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