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Higgs Self Couplings Measurements at Future proton-proton Colliders

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The Higgs boson trilinear and quartic self-couplings are directly related to the shape of the Higgs potential; measuring them with precision is extremely important, as they provide invaluable information on the electroweak symmetry breaking and the electroweak phase transition.
\\In this paper, we perform a detailed analysis of double Higgs boson production, through the gluon-gluon fusion process, in the most promising decay channels $b\bar{b}\gamma\gamma$, $b\bar{b}\tau\tau$, and $b\bar{b}b\bar{b}$ for several future colliders: the HL-LHC at 14 TeV and the FCC-hh at 100 TeV, assuming respectively 3 ab^{-1} and 30 ab^{-1} of integrated luminosity.\\
In the HL-LHC scenario, we expect an upper limit on the di-Higgs cross section production of 0.76 at 95\% confidence level, corresponding to a significance of 2.8 σ.
In the FCC-hh scenario, depending on the assumed detector performance and systematic uncertainties, we expect that the Higgs self-coupling will be measured with a precision in the range 4.8-8.5\% at 95\% confidence level.\\

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