

# First ECFA WORKSHOP.

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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  $3\text{ ab}^{-1}$  and  $30\text{ ab}^{-1}$  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  $2.8\sigma$ .

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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