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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 di-bottom-quark di-photons, di-bottom-quark di-tau, and four-bottom-quark for several future colliders: the HL-LHC at 14 TeV and the FCC-hh at 100 TeV, assuming respectively 3 inverse ab and 30 inverse ab 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.

In-person participation

Yes

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