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Measurement of the Higgs Self-Coupling at the FCC-hh Collider

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An important test of the Standard Model (SM) electroweak symmetry breaking sector is the measurement of the Higgs self-interactions. Sensitivity to the Higgs self-coupling for $m_H = 125$ GeV is evaluated through the measurement of the non-resonant di-Higgs production final states. The considered decay channels are $HH \rightarrow b\bar{b}\gamma\gamma$, $4b+\text{jet}$, $b\bar{b}\tau\tau$, and $b\bar{b}VV$, where $V=W$ and Z . For the non-resonant SM signal in an ideal detector parametrization, a precision of $O(3\%)$ on the SM cross-section can be estimated, roughly corresponding to a precision of $O(5\%)$ on the Higgs trilinear coupling for the $b\bar{b}\gamma\gamma$ channel. For the other channels precisions ranging from $O(10-40\%)$ can be achieved. The parton-level generation of the signal and the backgrounds is performed by using MadGraph5_aMC@NLO and the Delphes fast parametrisation of the FCC-hh detector is used.

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