

Probing the electroweak symmetry breaking with Higgs production at the LHC

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The electroweak symmetry breaking (EWSB) mechanism is still an undecided question in particle physics. We propose to utilize the single top quark and Higgs associated production (th), Zh production via gluon fusion at the LHC to probe the couplings between the Higgs and the gauge bosons and further to test the EWSB. We demonstrate that the th and $gg \rightarrow Zh$ productions are sensitive to the relative sign of couplings ($ht\bar{t}$, hWW) and ($ht\bar{t}$, hZZ), respectively. We find that the relative sign between hWW and hZZ couplings could be fully determined after combining the present measurements from $gg \rightarrow h$, $t\bar{t}h$ and the th , Zh channels at the 13 TeV LHC, and this conclusion is not sensitive to the possible new physics contribution induced by $Zt\bar{t}$ couplings in the $gg \rightarrow Zh$ production.

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