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# 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, as well as  $tZj$  and  $Zt\bar{t}$  production 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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