

Signal ($m_H = 125$ GeV)	MC generator	$\sigma \times \text{BR}$ [pb] $\sqrt{s} = 8$ TeV
ggF, $H \rightarrow \tau\tau$	POWHEG [36–39] + PYTHIA8 [40]	1.22 NNLO+NNLL [42–47, 78]
VBF, $H \rightarrow \tau\tau$	POWHEG + PYTHIA8	0.100 (N)NLO [51–53, 78]
WH , $H \rightarrow \tau\tau$	PYTHIA8	0.0445 NNLO [56, 78]
ZH , $H \rightarrow \tau\tau$	PYTHIA8	0.0262 NNLO [56, 78]
Background	MC generator	$\sigma \times \text{BR}$ [pb] $\sqrt{s} = 8$ TeV
$W(\rightarrow \ell\nu)$, ($\ell = e, \mu, \tau$)	ALPGEN [71]+PYTHIA8	36800 NNLO [79, 80]
$Z/\gamma^*(\rightarrow \ell\ell)$, $60 \text{ GeV} < m_{\ell\ell} < 2 \text{ TeV}$	ALPGEN+PYTHIA8	3910 NNLO [79, 80]
$Z/\gamma^*(\rightarrow \ell\ell)$, $10 \text{ GeV} < m_{\ell\ell} < 60 \text{ GeV}$	ALPGEN+HERWIG [81]	13000 NNLO [79, 80]
VBF $Z/\gamma^*(\rightarrow \ell\ell)$	SHERPA [82]	1.1 LO [82]
$t\bar{t}$	POWHEG + PYTHIA8	253^\dagger NNLO+NNLL [83–88]
Single top : Wt	POWHEG + PYTHIA8	22^\dagger NNLO [89]
Single top : s -channel	POWHEG + PYTHIA8	5.6^\dagger NNLO [90]
Single top : t -channel	AcerMC [74]+PYTHIA6 [67]	87.8^\dagger NNLO [91]
$q\bar{q} \rightarrow WW$	ALPGEN+HERWIG	54^\dagger NLO [92]
$gg \rightarrow WW$	GG2WW [73]+HERWIG	1.4^\dagger NLO [73]
WZ, ZZ	HERWIG	30^\dagger NLO [92]
$H \rightarrow WW$	same as for $H \rightarrow \tau\tau$ signal	4.7^\dagger