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BSM Higgs production cross sections at $\sqrt{s} = 14$ TeV (update in CERN Report4 2016)

- Cross sections reported in CERN Report 4. See [here](#) and [here](#) here for previous numbers in CERN Report 3.
- Higgs cross sections and BRs in Spread sheet are available in xlsx format [NEW](#)
- You can find figures at our gallery [here](#).

• BSM Higgs-boson production cross section calculation

- Please check Proposal on how to provide reference "Higgs" cross sections for BSM applications
- Full mass scan should be provided for major Higgs production processes:
 1. Major process: ggF, VBF, WH (also separate W^+H and W^-H), ZH (also gg ZH)
 2. Associated Higgs with heavy quark: ttH, bbH
 3. Associated Higgs with single top-quark: tH (bq tHq', bg WtH, qq btH)
- Higgs width should be set to zero (NWA).
- Separate electroweak correction should be provided.
- For relevant processes, and if possible, the contributions proportional to different Higgs couplings should be given separately, together with the corresponding uncertainties.
- All other external parameters should be chosen as in the corresponding best SM predictions as well as the evaluation of the uncertainties.
- SM width: At each mass point, the corresponding Higgs widths calculated in the SM with the same characteristics above should be provided.
- Examples on how to use these predictions in specific cases are provided.

Mass range and step for BSM Higgs boson:

Higgs Mass range	step size	# of points	addendum
[10,150] GeV	5 GeV	29 points	
[150,500] GeV	10 GeV	35 points	+ $M_H=125.09$ GeV
[500,3000] GeV	50 GeV	50 points	

- Total 115 points for $M_H=[10,3000]$ GeV.
 - Lower mass limit might depend on stability of the code at low Bjorken-x. To be assessed.
-

gluon-gluon Fusion Process

- Cross sections are calculated with dFG program at NNLO+NNLL QCD (only) accuracy. Separate NLO EW correction factors $1+_{EW}$ are also given for $M_H=[100,2500]$ GeV.
 - ◆ This is an interim recommendation, will be updated when new N3LO QCD numbers became available.
- Calculations are the same as CERN Report 3 (i.e. top, bottom and charm quark effects are taken into account), except it is in NWA (CPS in CERN Report 3).
- Program: dFG
- QCD scales: $\mu=\mu_F=\mu_R=M_H$, uncertainty estimated in the range $1/2 < \mu/M_H < 2$ with $1/2 < \mu_F/\mu_R < 2$ constraint.
 - ◆ No additional THU nor PU uncertainties assigned.
- PDF set: PDF4LHC15_nlo_30

m_H (GeV)				±(PDF+ _s) %	±PDF %	$1+_{EW}$
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	Cross Section (pb)	+QCD Scale %	-QCD Scale %			± s %	
10.00	7.441E+03	+49.3	-39.1	±8.0	±7.5	±2.8	0.0000
15.00	4.576E+03	+37.1	-30.7	±6.0	±5.3	±2.8	0.0000
20.00	2.245E+03	+28.7	-24.5	±4.9	±3.9	±2.9	0.0000
25.00	1.242E+03	+23.2	-20.0	±4.4	±3.2	±2.9	0.0000
30.00	7.726E+02	+19.9	-16.9	±4.2	±2.9	±3.0	0.0000
35.00	5.292E+02	+17.5	-14.7	±4.0	±2.6	±3.0	0.0000
40.00	3.894E+02	+15.8	-13.3	±3.9	±2.5	±3.0	0.0000
45.00	3.022E+02	+14.4	-12.5	±3.8	±2.4	±3.0	0.0000
50.00	2.438E+02	+13.2	-11.9	±3.7	±2.3	±3.0	0.0000
55.00	2.025E+02	+12.3	-11.4	±3.7	±2.2	±2.9	0.0000
60.00	1.720E+02	+11.6	-10.9	±3.6	±2.1	±2.9	0.0000
65.00	1.486E+02	+10.9	-10.5	±3.5	±2.1	±2.9	0.0000
70.00	1.301E+02	+10.4	-10.2	±3.5	±2.0	±2.8	0.0000
75.00	1.151E+02	+10.0	-9.9	±3.4	±2.0	±2.8	0.0000
80.00	1.028E+02	+9.6	-9.6	±3.4	±2.0	±2.8	0.0000
85.00	9.252E+01	+9.3	-9.4	±3.3	±1.9	±2.7	0.0000
90.00	8.378E+01	+9.0	-9.2	±3.3	±1.9	±2.7	0.0000
95.00	7.627E+01	+8.7	-9.0	±3.3	±1.9	±2.7	0.0000
100.00	6.977E+01	+8.5	-8.8	±3.2	±1.9	±2.6	1.0418
105.00	6.410E+01	+8.3	-8.6	±3.2	±1.9	±2.6	1.0436
110.00	5.910E+01	+8.1	-8.5	±3.2	±1.9	±2.6	1.0455
115.00	5.468E+01	+7.9	-8.4	±3.1	±1.8	±2.6	1.0474
120.00	5.076E+01	+7.8	-8.2	±3.1	±1.8	±2.5	1.0494
125.00	4.725E+01	+7.6	-8.1	±3.1	±1.8	±2.5	1.0514
130.00	4.411E+01	+7.5	-8.0	±3.1	±1.8	±2.5	1.0534
135.00	4.127E+01	+7.4	-7.9	±3.1	±1.8	±2.5	1.0553
140.00	3.871E+01	+7.3	-7.8	±3.0	±1.8	±2.5	1.0571
145.00	3.639E+01	+7.2	-7.7	±3.0	±1.8	±2.5	1.0587
150.00	3.428E+01	+7.1	-7.6	±3.0	±1.8	±2.4	1.0598
160.00	3.059E+01	+6.9	-7.5	±3.0	±1.8	±2.4	1.0486
170.00	2.748E+01	+6.7	-7.3	±3.0	±1.8	±2.4	1.0206
180.00	2.485E+01	+6.5	-7.2	±2.9	±1.7	±2.4	1.0053
190.00	2.261E+01	+6.4	-7.1	±2.9	±1.7	±2.3	0.9872
200.00	2.070E+01	+6.3	-7.0	±2.9	±1.7	±2.3	0.9793
210.00	1.905E+01	+6.2	-6.9	±2.9	±1.7	±2.3	0.9761
220.00	1.762E+01	+6.1	-6.8	±2.9	±1.7	±2.3	0.9749
230.00	1.637E+01	+6.0	-6.7	±2.9	±1.7	±2.3	0.9749
240.00	1.530E+01	+5.9	-6.6	±2.8	±1.7	±2.3	0.9755
250.00	1.437E+01	+5.8	-6.5	±2.8	±1.7	±2.2	0.9762
260.00	1.356E+01	+5.8	-6.5	±2.8	±1.7	±2.2	0.9772
270.00	1.287E+01	+5.7	-6.4	±2.8	±1.7	±2.2	0.9783
280.00	1.228E+01	+5.7	-6.3	±2.8	±1.7	±2.2	0.9795
290.00	1.179E+01	+5.7	-6.3	±2.8	±1.7	±2.2	0.9805
300.00	1.139E+01	+5.7	-6.2	±2.8	±1.7	±2.2	0.9813
310.00	1.110E+01	+5.7	-6.1	±2.8	±1.8	±2.2	0.9819
320.00	1.092E+01	+5.7	-6.0	±2.8	±1.8	±2.2	0.9820
330.00	1.089E+01	+5.7	-6.0	±2.8	±1.8	±2.2	0.9813
340.00	1.111E+01	+5.7	-5.9	±2.8	±1.8	±2.2	0.9779

350.00	1.197E+01	+5.7	-5.8	±2.8	±1.8	±2.2	0.9595
360.00	1.243E+01	+5.7	-5.8	±2.8	±1.8	±2.2	0.9608
370.00	1.245E+01	+5.7	-5.7	±2.9	±1.8	±2.2	0.9642
380.00	1.219E+01	+5.7	-5.6	±2.9	±1.8	±2.2	0.9677
390.00	1.174E+01	+5.7	-5.6	±2.9	±1.9	±2.2	0.9713
400.00	1.118E+01	+5.7	-5.5	±2.9	±1.9	±2.2	0.9741
410.00	1.056E+01	+5.7	-5.5	±2.9	±1.9	±2.2	0.9771
420.00	9.917E+00	+5.7	-5.4	±2.9	±1.9	±2.2	0.9802
430.00	9.265E+00	+5.7	-5.4	±2.9	±1.9	±2.2	0.9830
440.00	8.624E+00	+5.7	-5.3	±2.9	±2.0	±2.2	0.9853
450.00	8.007E+00	+5.6	-5.3	±3.0	±2.0	±2.2	0.9878
460.00	7.417E+00	+5.6	-5.2	±3.0	±2.0	±2.2	0.9900
470.00	6.861E+00	+5.6	-5.2	±3.0	±2.0	±2.2	0.9921
480.00	6.340E+00	+5.6	-5.2	±3.0	±2.0	±2.2	0.9940
490.00	5.854E+00	+5.6	-5.1	±3.0	±2.1	±2.2	0.9961
500.00	5.401E+00	+5.6	-5.1	±3.0	±2.1	±2.2	0.9981
550.00	3.601E+00	+5.5	-5.0	±3.1	±2.2	±2.2	1.0069
600.00	2.413E+00	+5.4	-4.9	±3.2	±2.3	±2.3	1.0152
650.00	1.636E+00	+5.4	-4.8	±3.4	±2.5	±2.3	1.0226
700.00	1.124E+00	+5.4	-4.8	±3.5	±2.6	±2.3	1.0301
750.00	7.826E-01	+5.4	-4.7	±3.6	±2.8	±2.3	1.0377
800.00	5.527E-01	+5.4	-4.7	±3.8	±3.0	±2.4	1.0454
850.00	3.951E-01	+5.4	-4.7	±4.0	±3.2	±2.4	1.0532
900.00	2.858E-01	+5.4	-4.7	±4.1	±3.3	±2.4	1.0610
950.00	2.093E-01	+5.4	-4.7	±4.3	±3.5	±2.5	1.0695
1000.00	1.547E-01	+5.5	-4.7	±4.5	±3.7	±2.5	1.0783
1050.00	1.156E-01	+5.5	-4.7	±4.7	±3.9	±2.6	1.0890
1100.00	8.707E-02	+5.6	-4.8	±4.9	±4.1	±2.6	1.1004
1150.00	6.617E-02	+5.6	-4.8	±5.1	±4.3	±2.7	1.1122
1200.00	5.068E-02	+5.6	-4.8	±5.3	±4.5	±2.7	1.1242
1250.00	3.909E-02	+5.7	-4.8	±5.5	±4.7	±2.7	1.1364
1300.00	3.037E-02	+5.7	-4.8	±5.7	±4.9	±2.8	1.1475
1350.00	2.374E-02	+5.7	-4.9	±5.9	±5.1	±2.8	1.1586
1400.00	1.867E-02	+5.7	-4.9	±6.1	±5.3	±2.9	1.1700
1450.00	1.477E-02	+5.8	-4.9	±6.3	±5.6	±2.9	1.1816
1500.00	1.174E-02	+5.9	-5.0	±6.5	±5.8	±3.0	1.1937
1550.00	9.382E-03	+6.1	-5.0	±6.7	±6.0	±3.1	1.2069
1600.00	7.529E-03	+6.3	-5.0	±6.9	±6.2	±3.1	1.2206
1650.00	6.074E-03	+6.5	-5.1	±7.1	±6.4	±3.2	1.2347
1700.00	4.920E-03	+6.8	-5.1	±7.4	±6.6	±3.2	1.2493
1750.00	3.998E-03	+9.4	-1.7	±9.1	±7.5	±5.0	1.2644
1800.00	3.261E-03	+9.1	-2.3	±9.0	±7.6	±4.7	1.2798
1850.00	2.672E-03	+8.8	-2.9	±9.0	±7.7	±4.5	1.2955
1900.00	2.196E-03	+8.6	-3.4	±9.0	±7.9	±4.3	1.3117
1950.00	1.810E-03	+8.4	-3.8	±9.0	±8.0	±4.2	1.3283
2000.00	1.497E-03	+8.3	-4.2	±9.1	±8.2	±4.0	1.3453
2050.00	1.241E-03	+8.2	-4.6	±9.2	±8.3	±4.0	1.3627
2100.00	1.032E-03	+8.1	-4.9	±9.4	±8.5	±3.9	1.3806
2150.00	8.606E-04	+8.1	-5.1	±9.6	±8.7	±3.9	1.3989
2200.00	7.200E-04	+8.1	-5.3	±9.8	±8.9	±3.9	1.4176

2250.00	6.032E-04	+8.1	-5.5	±10.0	±9.2	±3.9	1.4367
2300.00	5.064E-04	+8.1	-5.7	±10.2	±9.4	±4.0	1.4563
2350.00	4.264E-04	+8.2	-5.8	±10.5	±9.7	±4.1	1.4763
2400.00	3.601E-04	+8.3	-5.9	±10.7	±9.9	±4.1	1.4968
2450.00	3.045E-04	+8.3	-6.0	±11.0	±10.2	±4.2	1.5177
2500.00	2.577E-04	+8.4	-6.1	±11.3	±10.5	±4.3	1.5390
2550.00	2.184E-04	+8.5	-6.2	±11.6	±10.8	±4.4	0.0000
2600.00	1.860E-04	+8.6	-6.2	±12.0	±11.1	±4.5	0.0000
2650.00	1.583E-04	+8.7	-6.3	±12.3	±11.4	±4.6	0.0000
2700.00	1.350E-04	+8.7	-6.3	±12.6	±11.7	±4.7	0.0000
2750.00	1.151E-04	+8.8	-6.4	±12.9	±12.0	±4.8	0.0000
2800.00	9.881E-05	+8.9	-6.5	±13.3	±12.3	±4.9	0.0000
2850.00	8.442E-05	+8.9	-6.6	±13.6	±12.7	±4.9	0.0000
2900.00	7.282E-05	+8.9	-6.7	±13.9	±13.0	±5.0	0.0000
2950.00	6.233E-05	+8.9	-6.8	±14.3	±13.4	±5.0	0.0000
3000.00	5.374E-05	+8.9	-6.9	±14.6	±13.7	±5.0	0.0000

VBF Process

- Cross sections are calculated at (approx.) NNLO QCD accuracy.
- Calculations are the same as CERN Report 3, except it is in NWA (CPS in CERN Report 3).
- Program: NNLO QCD (VBF@NNLO)
- QCD scales: $\mu = \mu_F = \mu_R = M_W$, uncertainty estimated in the range $1/2 < \mu/M_W < 2$ (scales have been varied independently by factor 2).
 - ◆ No additional THU nor PU uncertainties assigned.
- PDF set: PDF4LHC15_nnlo_30_pdfas

m_H (GeV)	Cross Section (pb)	+QCD Scale %	-QCD Scale %	±(PDF+ _s) %	±PDF %	± _s %	1+ _{EW}
10.00	1.246E+01	+1.0	-0.7	±2.0	±1.8	±0.9	
15.00	1.194E+01	+1.0	-0.6	±2.0	±1.8	±0.9	
20.00	1.140E+01	+0.9	-0.6	±2.0	±1.8	±0.8	
25.00	1.088E+01	+0.9	-0.6	±2.0	±1.8	±0.8	
30.00	1.037E+01	+0.9	-0.5	±2.0	±1.8	±0.8	
35.00	9.872E+00	+0.8	-0.5	±2.0	±1.8	±0.8	
40.00	9.401E+00	+0.8	-0.5	±1.9	±1.8	±0.8	
45.00	8.955E+00	+0.8	-0.5	±1.9	±1.8	±0.8	
50.00	8.533E+00	+0.8	-0.5	±1.9	±1.8	±0.7	
55.00	8.136E+00	+0.7	-0.4	±1.9	±1.8	±0.7	
60.00	7.761E+00	+0.7	-0.4	±1.9	±1.8	±0.7	
65.00	7.408E+00	+0.7	-0.4	±1.9	±1.8	±0.7	
70.00	7.075E+00	+0.7	-0.4	±1.9	±1.8	±0.7	
75.00	6.761E+00	+0.7	-0.4	±1.9	±1.8	±0.7	
80.00	6.465E+00	+0.6	-0.3	±1.9	±1.8	±0.7	
85.00	6.186E+00	+0.6	-0.3	±1.9	±1.8	±0.7	
90.00	5.922E+00	+0.6	-0.3	±1.9	±1.8	±0.6	
95.00	5.674E+00	+0.6	-0.3	±1.9	±1.8	±0.6	
100.00	5.440E+00	+0.6	-0.3	±1.9	±1.8	±0.6	
105.00	5.219E+00	+0.6	-0.3	±1.9	±1.8	±0.6	
110.00	5.009E+00	+0.5	-0.3	±1.9	±1.8	±0.6	
115.00	4.811E+00	+0.5	-0.3	±1.9	±1.8	±0.6	
120.00	4.623E+00	+0.5	-0.2	±1.9	±1.8	±0.6	

125.00	4.445E+00	+0.5	-0.2	±1.9	±1.8	±0.6	
130.00	4.276E+00	+0.5	-0.2	±1.9	±1.8	±0.6	
135.00	4.115E+00	+0.5	-0.2	±1.9	±1.8	±0.6	
140.00	3.963E+00	+0.5	-0.2	±1.9	±1.8	±0.6	
145.00	3.818E+00	+0.4	-0.2	±1.9	±1.8	±0.6	
150.00	3.681E+00	+0.4	-0.2	±1.9	±1.8	±0.6	
160.00	3.425E+00	+0.4	-0.2	±1.9	±1.8	±0.5	
170.00	3.193E+00	+0.4	-0.2	±1.9	±1.8	±0.5	
180.00	2.981E+00	+0.4	-0.2	±1.9	±1.8	±0.5	
190.00	2.788E+00	+0.3	-0.2	±1.9	±1.8	±0.5	
200.00	2.611E+00	+0.3	-0.2	±1.9	±1.8	±0.5	
210.00	2.449E+00	+0.3	-0.2	±1.9	±1.8	±0.5	
220.00	2.301E+00	+0.3	-0.2	±1.9	±1.8	±0.5	
230.00	2.164E+00	+0.3	-0.2	±1.9	±1.8	±0.5	
240.00	2.038E+00	+0.3	-0.2	±1.9	±1.8	±0.5	
250.00	1.921E+00	+0.3	-0.1	±1.9	±1.8	±0.4	
260.00	1.813E+00	+0.3	-0.1	±1.9	±1.8	±0.4	
270.00	1.714E+00	+0.3	-0.1	±1.9	±1.8	±0.4	
280.00	1.621E+00	+0.3	-0.1	±1.9	±1.9	±0.4	
290.00	1.535E+00	+0.3	-0.1	±1.9	±1.9	±0.4	
300.00	1.454E+00	+0.3	-0.1	±1.9	±1.9	±0.4	
310.00	1.380E+00	+0.3	-0.1	±1.9	±1.9	±0.4	
320.00	1.310E+00	+0.3	-0.1	±1.9	±1.9	±0.4	
330.00	1.245E+00	+0.3	-0.1	±1.9	±1.9	±0.4	
340.00	1.184E+00	+0.3	-0.1	±1.9	±1.9	±0.4	
350.00	1.126E+00	+0.3	-0.1	±1.9	±1.9	±0.4	
360.00	1.073E+00	+0.3	-0.1	±1.9	±1.9	±0.4	
370.00	1.022E+00	+0.3	-0.1	±1.9	±1.9	±0.4	
380.00	9.749E-01	+0.3	-0.1	±1.9	±1.9	±0.3	
390.00	9.303E-01	+0.3	-0.1	±1.9	±1.9	±0.3	
400.00	8.884E-01	+0.3	-0.1	±2.0	±1.9	±0.3	
410.00	8.488E-01	+0.3	-0.1	±2.0	±1.9	±0.3	
420.00	8.115E-01	+0.3	-0.1	±2.0	±1.9	±0.3	
430.00	7.763E-01	+0.3	-0.0	±2.0	±1.9	±0.3	
440.00	7.430E-01	+0.3	-0.0	±2.0	±1.9	±0.3	
450.00	7.115E-01	+0.3	-0.0	±2.0	±2.0	±0.3	
460.00	6.817E-01	+0.3	-0.1	±2.0	±2.0	±0.3	
470.00	6.535E-01	+0.3	-0.1	±2.0	±2.0	±0.3	
480.00	6.268E-01	+0.3	-0.1	±2.0	±2.0	±0.3	
490.00	6.014E-01	+0.3	-0.1	±2.0	±2.0	±0.3	
500.00	5.773E-01	+0.3	-0.1	±2.0	±2.0	±0.3	
550.00	4.736E-01	+0.3	-0.2	±2.0	±2.0	±0.2	
600.00	3.921E-01	+0.3	-0.2	±2.1	±2.1	±0.2	
650.00	3.274E-01	+0.3	-0.3	±2.1	±2.1	±0.2	
700.00	2.753E-01	+0.3	-0.3	±2.1	±2.1	±0.2	
750.00	2.330E-01	+0.3	-0.4	±2.2	±2.2	±0.1	
800.00	1.984E-01	+0.3	-0.4	±2.2	±2.2	±0.1	
850.00	1.697E-01	+0.3	-0.5	±2.3	±2.3	±0.1	
900.00	1.459E-01	+0.3	-0.5	±2.3	±2.3	±0.1	
950.00	1.259E-01	+0.3	-0.5	±2.3	±2.3	±0.1	

1000.00	1.091E-01	+0.3	-0.6	±2.4	±2.4	±0.0	
1050.00	9.479E-02	+0.3	-0.6	±2.4	±2.4	±0.0	
1100.00	8.265E-02	+0.3	-0.7	±2.5	±2.5	±0.0	
1150.00	7.227E-02	+0.3	-0.7	±2.5	±2.5	±0.0	
1200.00	6.336E-02	+0.3	-0.8	±2.6	±2.6	±0.0	
1250.00	5.569E-02	+0.3	-0.8	±2.6	±2.6	±0.0	
1300.00	4.906E-02	+0.3	-0.8	±2.7	±2.7	±0.0	
1350.00	4.330E-02	+0.3	-0.9	±2.7	±2.7	±0.1	
1400.00	3.830E-02	+0.4	-0.9	±2.8	±2.8	±0.1	
1450.00	3.393E-02	+0.4	-1.0	±2.8	±2.8	±0.1	
1500.00	3.011E-02	+0.4	-1.0	±2.9	±2.9	±0.1	
1550.00	2.677E-02	+0.4	-1.1	±2.9	±2.9	±0.1	
1600.00	2.383E-02	+0.4	-1.1	±3.0	±3.0	±0.1	
1650.00	2.124E-02	+0.5	-1.2	±3.0	±3.0	±0.1	
1700.00	1.896E-02	+0.5	-1.2	±3.1	±3.1	±0.1	
1750.00	1.694E-02	+0.5	-1.2	±3.1	±3.1	±0.1	
1800.00	1.515E-02	+0.5	-1.3	±3.2	±3.2	±0.2	
1850.00	1.357E-02	+0.5	-1.3	±3.2	±3.2	±0.2	
1900.00	1.217E-02	+0.6	-1.4	±3.3	±3.3	±0.2	
1950.00	1.092E-02	+0.6	-1.4	±3.4	±3.4	±0.2	
2000.00	9.804E-03	+0.6	-1.5	±3.4	±3.4	±0.2	
2050.00	8.812E-03	+0.6	-1.5	±3.5	±3.5	±0.2	
2100.00	7.926E-03	+0.7	-1.6	±3.6	±3.6	±0.2	
2150.00	7.135E-03	+0.7	-1.6	±3.6	±3.6	±0.2	
2200.00	6.428E-03	+0.7	-1.7	±3.7	±3.7	±0.2	
2250.00	5.794E-03	+0.7	-1.7	±3.8	±3.8	±0.2	
2300.00	5.227E-03	+0.7	-1.8	±3.8	±3.8	±0.2	
2350.00	4.717E-03	+0.8	-1.8	±3.9	±3.9	±0.2	
2400.00	4.259E-03	+0.8	-1.8	±4.0	±4.0	±0.2	
2450.00	3.848E-03	+0.8	-1.9	±4.1	±4.1	±0.2	
2500.00	3.478E-03	+0.8	-1.9	±4.2	±4.1	±0.2	
2550.00	3.145E-03	+0.9	-2.0	±4.2	±4.2	±0.2	
2600.00	2.846E-03	+0.9	-2.0	±4.3	±4.3	±0.2	
2650.00	2.575E-03	+0.9	-2.1	±4.4	±4.4	±0.2	
2700.00	2.331E-03	+1.0	-2.1	±4.5	±4.5	±0.2	
2750.00	2.112E-03	+1.0	-2.2	±4.6	±4.6	±0.2	
2800.00	1.914E-03	+1.0	-2.2	±4.7	±4.7	±0.2	
2850.00	1.734E-03	+1.0	-2.3	±4.8	±4.8	±0.2	
2900.00	1.572E-03	+1.0	-2.3	±4.9	±4.9	±0.2	
2950.00	1.426E-03	+1.1	-2.4	±5.0	±5.0	±0.2	
3000.00	1.293E-03	+1.1	-2.4	±5.1	±5.1	±0.2	

WH Process

- Cross sections are calculated at NNLO QCD accuracy.
 - ◆ Calculations are the same as CERN Report 3.
- Program: NNLO QCD (VH@NNLO)
- QCD scales: $\mu = \mu_F = \mu_R = M_{VH} = (p_V + p_H)^2$ for QCD part. Uncertainty is estimated in the range $1/3 < \mu/M_{VH} < 3$ (μ_F and μ_R are varied independently).
 - ◆ No additional THU nor PU uncertainties assigned.

- PDF set: PDF4LHC15_nnlo_mc (QCD part)
- Photon-induced contribution of O(5%)

◆ NOT included for total cross section (agrees with CERN Report 3 numbers within 1%).

m_H (GeV)	Cross Section (pb)	+QCD Scale %	-QCD Scale %	\pm ;(PDF+ %)	\pm ;PDF %	\pm ; %	1+ EW	W+H (pb)	W-H (pb)
10.00	2.592E+02	+1.2	-2.1	± 2.1				1.503E+02	1.089E+02
15.00	1.609E+02	+1.1	-1.8	± 2.0				9.357E+01	6.731E+01
20.00	1.079E+02	+0.7	-1.6	± 2.0				6.281E+01	4.509E+01
25.00	7.606E+01	+1.0	-1.6	± 2.0				4.438E+01	3.168E+01
30.00	5.555E+01	+0.8	-1.7	± 2.0				3.255E+01	2.300E+01
35.00	4.165E+01	+0.7	-1.7	± 2.0				2.445E+01	1.720E+01
40.00	3.186E+01	+0.7	-1.4	± 2.0				1.876E+01	1.310E+01
45.00	2.484E+01	+0.7	-1.3	± 2.0				1.464E+01	1.020E+01
50.00	1.965E+01	+0.7	-1.3	± 1.9				1.162E+01	8.033E+00
55.00	1.574E+01	+0.9	-1.1	± 1.8				9.323E+00	6.413E+00
60.00	1.279E+01	+0.5	-1.2	± 1.8				7.597E+00	5.194E+00
65.00	1.048E+01	+0.5	-1.1	± 1.8				6.234E+00	4.241E+00
70.00	8.654E+00	+0.5	-1.0	± 1.8				5.162E+00	3.492E+00
75.00	7.222E+00	+0.3	-1.0	± 1.8				4.320E+00	2.902E+00
80.00	6.066E+00	+0.4	-1.0	± 1.8				3.636E+00	2.430E+00
85.00	5.125E+00	+0.6	-0.9	± 1.8				3.075E+00	2.050E+00
90.00	4.360E+00	+0.5	-0.8	± 1.8				2.619E+00	1.741E+00
95.00	3.735E+00	+0.4	-0.7	± 1.8				2.250E+00	1.485E+00
100.00	3.214E+00	+0.4	-0.7	± 1.8				1.940E+00	1.274E+00
105.00	2.781E+00	+0.5	-0.7	± 1.8				1.682E+00	1.099E+00
110.00	2.418E+00	+0.4	-0.7	± 1.9				1.465E+00	9.526E-01
115.00	2.110E+00	+0.4	-0.7	± 1.8				1.281E+00	8.289E-01
120.00	1.848E+00	+0.5	-0.6	± 1.8				1.124E+00	7.243E-01
125.00	1.627E+00	+0.4	-0.7	± 1.8				9.919E-01	6.349E-01
130.00	1.437E+00	+0.5	-0.7	± 1.8				8.772E-01	5.598E-01
135.00	1.272E+00	+0.5	-0.7	± 1.8				7.781E-01	4.941E-01
140.00	1.131E+00	+0.5	-0.7	± 1.8				6.931E-01	4.379E-01
145.00	1.009E+00	+0.5	-0.8	± 1.8				6.189E-01	3.899E-01
150.00	9.016E-01	+0.6	-0.7	± 1.8				5.542E-01	3.474E-01
160.00	7.268E-01	+0.5	-0.8	± 1.8				4.484E-01	2.784E-01
170.00	5.915E-01	+0.6	-0.9	± 1.8				3.661E-01	2.254E-01
180.00	4.862E-01	+0.6	-0.8	± 1.9				3.019E-01	1.843E-01
190.00	4.025E-01	+0.7	-0.8	± 1.9				2.508E-01	1.517E-01
200.00	3.361E-01	+0.7	-0.9	± 1.9				2.100E-01	1.261E-01
210.00	2.826E-01	+0.8	-0.9	± 1.9				1.771E-01	1.055E-01
220.00	2.392E-01	+0.8	-0.9	± 1.9				1.503E-01	8.885E-02
230.00	2.037E-01	+0.8	-1.0	± 2.0				1.284E-01	7.527E-02
240.00	1.743E-01	+0.9	-1.0	± 2.0				1.102E-01	6.408E-02
250.00	1.500E-01	+0.9	-0.9	± 2.0				9.508E-02	5.490E-02
260.00	1.297E-01	+0.9	-1.0	± 2.0				8.248E-02	4.723E-02
270.00	1.127E-01	+0.9	-1.0	± 2.0				7.186E-02	4.085E-02
280.00	9.828E-02	+1.0	-1.0	± 2.0				6.281E-02	3.547E-02
290.00	8.609E-02	+1.0	-1.0	± 2.0				5.517E-02	3.092E-02
300.00	7.567E-02	+1.1	-1.0	± 2.1				4.861E-02	2.706E-02
310.00	6.677E-02	+1.1	-1.0	± 2.1				4.301E-02	2.376E-02

320.00	5.910E-02	+1.1	-1.0	±2.1				3.817E-02	2.093E-02
330.00	5.247E-02	+1.1	-1.0	±2.2				3.397E-02	1.850E-02
340.00	4.675E-02	+1.1	-1.0	±2.2				3.033E-02	1.642E-02
350.00	4.175E-02	+1.2	-1.0	±2.2				2.716E-02	1.459E-02
360.00	3.738E-02	+1.2	-1.1	±2.3				2.437E-02	1.301E-02
370.00	3.357E-02	+1.2	-1.1	±2.3				2.194E-02	1.163E-02
380.00	3.022E-02	+1.2	-1.1	±2.3				1.979E-02	1.043E-02
390.00	2.726E-02	+1.2	-1.1	±2.4				1.789E-02	9.370E-03
400.00	2.464E-02	+1.2	-1.1	±2.4				1.621E-02	8.433E-03
410.00	2.233E-02	+1.2	-1.1	±2.4				1.472E-02	7.610E-03
420.00	2.026E-02	+1.2	-1.2	±2.4				1.338E-02	6.879E-03
430.00	1.842E-02	+1.3	-1.1	±2.4				1.219E-02	6.229E-03
440.00	1.679E-02	+1.3	-1.3	±2.5				1.114E-02	5.652E-03
450.00	1.532E-02	+1.3	-1.2	±2.5				1.018E-02	5.139E-03
460.00	1.401E-02	+1.3	-1.2	±2.5				9.331E-03	4.680E-03
470.00	1.283E-02	+1.3	-1.3	±2.5				8.562E-03	4.270E-03
480.00	1.176E-02	+1.4	-1.3	±2.5				7.863E-03	3.898E-03
490.00	1.081E-02	+1.3	-1.3	±2.5				7.239E-03	3.568E-03
500.00	9.937E-03	+1.4	-1.4	±2.5				6.667E-03	3.270E-03
550.00	6.667E-03	+1.5	-1.5	±2.8				4.513E-03	2.154E-03
600.00	4.601E-03	+1.5	-1.5	±3.0				3.140E-03	1.461E-03
650.00	3.249E-03	+1.6	-1.6	±3.2				2.235E-03	1.014E-03
700.00	2.342E-03	+1.6	-1.7	±3.3				1.622E-03	7.196E-04
750.00	1.718E-03	+1.7	-1.8	±3.6				1.198E-03	5.197E-04
800.00	1.278E-03	+1.7	-1.8	±3.8				8.969E-04	3.813E-04
850.00	9.639E-04	+1.7	-1.9	±4.0				6.802E-04	2.837E-04
900.00	7.353E-04	+1.8	-2.0	±4.2				5.217E-04	2.136E-04
950.00	5.665E-04	+1.8	-2.0	±4.4				4.040E-04	1.625E-04
1000.00	4.405E-04	+1.9	-2.1	±4.6				3.156E-04	1.249E-04
1050.00	3.454E-04	+1.9	-2.2	±5.0				2.485E-04	9.687E-05
1100.00	2.728E-04	+1.9	-2.2	±5.3				1.971E-04	7.570E-05
1150.00	2.169E-04	+2.0	-2.3	±5.6				1.573E-04	5.960E-05
1200.00	1.734E-04	+2.0	-2.3	±6.0				1.262E-04	4.721E-05
1250.00	1.395E-04	+2.0	-2.4	±6.3				1.018E-04	3.765E-05
1300.00	1.127E-04	+2.0	-2.4	±6.6				8.255E-05	3.018E-05
1350.00	9.152E-05	+2.1	-2.5	±6.9				6.720E-05	2.432E-05
1400.00	7.462E-05	+2.1	-2.5	±7.3				5.494E-05	1.968E-05
1450.00	6.108E-05	+2.1	-2.6	±7.6				4.507E-05	1.601E-05
1500.00	5.017E-05	+2.2	-2.6	±7.9				3.710E-05	1.307E-05
1550.00	4.135E-05	+2.2	-2.7	±8.2				3.063E-05	1.072E-05
1600.00	3.418E-05	+2.2	-2.7	±8.5				2.536E-05	8.816E-06
1650.00	2.834E-05	+2.2	-2.8	±8.9				2.106E-05	7.277E-06
1700.00	2.356E-05	+2.3	-2.8	±9.2				1.753E-05	6.027E-06
1750.00	1.963E-05	+2.3	-2.9	±9.5				1.462E-05	5.006E-06
1800.00	1.640E-05	+2.3	-2.9	±9.9				1.223E-05	4.170E-06
1850.00	1.372E-05	+2.3	-3.0	±10.2				1.024E-05	3.482E-06
1900.00	1.151E-05	+2.4	-3.1	±10.5				8.595E-06	2.914E-06
1950.00	9.669E-06	+2.4	-3.1	±10.9				7.224E-06	2.445E-06
2000.00	8.137E-06	+2.4	-3.1	±11.3				6.080E-06	2.057E-06

ZH Process

- Cross sections are calculated at NNLO QCD accuracy.
 - ◆ Calculations are the same as CERN Report 3.
 - ◆ gg ZH (box-diagram) occurs as a part of NNLO QCD correction and included in the total cross section.
- Program: NNLO QCD (VH@NNLO)
- QCD scales: $\mu = \mu_F = \mu_R = M_{VH} = (p_V + p_H)^2$ for QCD part. Uncertainty is estimated in the range $1/3 < \mu/M_{VH} < 3$ (μ_F and μ_R are varied independently).
 - ◆ No additional THU nor PU uncertainties assigned.
- PDF set: PDF4LHC15_nlo_mc (QCD part)
- Photon-induced contribution of O(1%) or below
 - ◆ NOT included for total cross section (agrees with CERN Report 3 numbers).

m_H (GeV)	Cross Section (pb)	+QCD Scale %	-QCD Scale %	\pm (PDF+ s) %	\pm PDF % \pm s	1+ EW	(gg ZH) (pb)
10.00	1.154E+02	+0..9	-1..5	± 2.2			
15.00	7.371E+01	+1..3	-1..8	± 2.2			
20.00	5.058E+01	+0..6	-1..8	± 2.2			
25.00	3.630E+01	+0..7	-1..6	± 2.1			
30.00	2.698E+01	+0..5	-1..5	± 2.1			
35.00	2.055E+01	+0..3	-1..3	± 2.1			
40.00	1.597E+01	+0..5	-1..1	± 2.0			
45.00	1.264E+01	+0..6	-1..2	± 2.0			
50.00	1.014E+01	+0..7	-1..1	± 1.9			
55.00	8.241E+00	+0..9	-1..0	± 1.9			
60.00	6.775E+00	+1..1	-1..0	± 1.8			
65.00	5.628E+00	+1..1	-1..2	± 1.8			
70.00	4.709E+00	+1..3	-1..2	± 1.8			
75.00	3.990E+00	+1..2	-1..7	± 1.8			
80.00	3.386E+00	+1..7	-1..5	± 1.8			
85.00	2.899E+00	+2..0	-1..8	± 1.7			
90.00	2.503E+00	+1..8	-1..9	± 1.7			
95.00	2.168E+00	+2..3	-2..0	± 1.7			
100.00	1.890E+00	+2..4	-2..3	± 1.6			
105.00	1.654E+00	+2..6	-2..3	± 1.6			
110.00	1.454E+00	+2..9	-2..5	± 1.6			
115.00	1.284E+00	+3..2	-2..6	± 1.6			
120.00	1.138E+00	+3..4	-2..8	± 1.7			
125.00	1.014E+00	+3..5	-3..0	± 1.6			
130.00	9.044E-01	+3..8	-3..1	± 1.6			
135.00	8.099E-01	+4..0	-3..1	± 1.6			
140.00	7.278E-01	+4..2	-3..3	± 1.6			
145.00	6.554E-01	+4..3	-3..5	± 1.6			
150.00	5.911E-01	+4..5	-3..5	± 1.6			
160.00	4.844E-01	+4..8	-3..8	± 1.6			
170.00	3.996E-01	+4..9	-3..9	± 1.6			
180.00	3.319E-01	+5..1	-4..1	± 1.6			
190.00	2.770E-01	+5..1	-4..2	± 1.5			
200.00	2.317E-01	+5..4	-4..2	± 1.5			
210.00	1.945E-01	+5..2	-4..1	± 1.5			
220.00	1.636E-01	+5..2	-4..0	± 1.5			

230.00	1.382E-01	+4..9	-4..0	±1.6				
240.00	1.171E-01	+4..7	-3..8	±1.6				
250.00	9.940E-02	+4..5	-3..7	±1.6				
260.00	8.475E-02	+4..3	-3..5	±1.6				
270.00	7.261E-02	+4..0	-3..3	±1.6				
280.00	6.247E-02	+3..8	-3..0	±1.6				
290.00	5.404E-02	+3..5	-3..0	±1.6				
300.00	4.691E-02	+3..3	-2..7	±1.6				
310.00	4.093E-02	+3..1	-2..6	±1.6				
320.00	3.586E-02	+2..9	-2..5	±1.6				
330.00	3.154E-02	+2..7	-2..3	±1.6				
340.00	2.788E-02	+2..6	-2..2	±1.7				
350.00	2.478E-02	+2..6	-2..2	±1.7				
360.00	2.214E-02	+2..6	-2..2	±1.7				
370.00	1.987E-02	+2..6	-2..2	±1.8				
380.00	1.788E-02	+2..6	-2..3	±1.8				
390.00	1.614E-02	+2..7	-2..3	±1.8				
400.00	1.461E-02	+2..8	-2..4	±1.8				
410.00	1.327E-02	+2..9	-2..5	±1.8				
420.00	1.207E-02	+3..0	-2..5	±1.8				
430.00	1.101E-02	+3..2	-2..6	±1.9				
440.00	1.006E-02	+3..2	-2..8	±1.9				
450.00	9.219E-03	+3..4	-2..9	±1.9				
460.00	8.466E-03	+3..4	-3..0	±1.9				
470.00	7.786E-03	+3..6	-3..2	±1.9				
480.00	7.176E-03	+3..7	-3..3	±1.9				
490.00	6.621E-03	+3..9	-3..4	±1.9				
500.00	6.122E-03	+4..1	-3..6	±1.9				
550.00	4.229E-03	+4..9	-4..3	±2.0				
600.00	3.012E-03	+5..8	-5..1	±2.1				
650.00	2.200E-03	+6..8	-5..8	±2.2				
700.00	1.643E-03	+7..6	-6..6	±2.2				
750.00	1.247E-03	+8..5	-7..4	±2.3				
800.00	9.603E-04	+9..3	-8..0	±2.4				
850.00	7.490E-04	+10..0	-8..7	±2.5				
900.00	5.900E-04	+10..8	-9..2	±2.6				
950.00	4.690E-04	+11..6	-9..8	±2.6				
1000.00	3.761E-04	+12..1	-10..3	±2.8				
1050.00	3.037E-04	+12..6	-10..9	±3.0				
1100.00	2.470E-04	+13..1	-11..4	±3.1				
1150.00	2.016E-04	+13..8	-11..8	±3.3				
1200.00	1.656E-04	+14..3	-12..2	±3.5				
1250.00	1.368E-04	+14..9	-12..7	±3.7				
1300.00	1.134E-04	+15..2	-13..2	±3.9				
1350.00	9.429E-05	+15..6	-13..5	±4.0				
1400.00	7.874E-05	+16..4	-13..8	±4.2				
1450.00	6.595E-05	+16..6	-14..1	±4.4				
1500.00	5.546E-05	+17..1	-14..5	±4.6				
1550.00	4.667E-05	+17..5	-14..8	±4.8				
1600.00	3.953E-05	+17..6	-15..2	±4.9				

1650.00	3.343E-05	+18..2	-15..3	±5.1				
1700.00	2.836E-05	+18..8	-15..5	±5.3				
1750.00	2.415E-05	+19..1	-15..9	±5.5				
1800.00	2.060E-05	+19..3	-16..1	±5.7				
1850.00	1.762E-05	+19..4	-16..5	±5.9				
1900.00	1.507E-05	+20..0	-16..7	±6.1				
1950.00	1.293E-05	+20..3	-16..9	±6.3				
2000.00	1.111E-05	+20..5	-17..3	±6.7				

ttH Process

- Cross sections are calculated at NLO QCD accuracy.
 - ◆ Calculations are the same as CERN Report 3.
- Program: MadGraph5_aMC@NLO (Sherpa+OpenLoops as cross ceck)
- QCD scales: $\mu=\mu_F=\mu_R=M_{top}+M_H/2$, uncertainty estimated in the range $1/2 < \mu/(M_{top}+M_H/2) < 2$ (with $1/2 < \mu_F/\mu_R < 2$ constraint).
 - ◆ No additional THU nor PU uncertainties assigned.
- PDF set: PDF4LHC15_nlo_30_pdfas

m_H (GeV)	Cross Section (pb)	+QCD Scale %	-QCD Scale %	±(PDF+ s) %	±PDF %	± s %	1+ EW
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bbH Process

- The cross sections are the Santander matched numbers with 5FS (NNLO) and 4FS (NLO).
- Program: SusHi for 5FS and dedicated version of MadGraph5_aMC@NLO for 4FS.
- QCD scales:
 - ◆ 5FS: $\mu_F=M_H/4$, $\mu_R=M_H$,
 - ◆ 4FS: $\mu_F=\mu_R=(M_H+2M_b)/4$,
 - ◆ scale with 7-point variation by a factor of 2 in both cases.
- Uncertainties
 - ◆ 5FS: Linearly added scale + (PDF s) + M_b + μ_b (PDF and s uncertainties are added in quadrature).
 - ◆ 4FS: Only scale uncertainties (as they are the dominant ones) and no PDF uncertainties are included.
- PDF set
 - ◆ 5FS: Dedicated sets produced with APFEL are used which are generated from the PDF4LHC15_nlo_100 sets taken below the M_b -threshold and evolved upwards, while generating a b-PDF set at high scale.
 - ◆ 4FS: PDF4LHC15_nlo_nf4_100

m_H (GeV)	Cross Section (pb)	+(QCD Scale+PDF+ s) %	-(QCD Scale+PDF+ s) %	1+ EW
10.00	1.229E+02	+92.4	-61.0	
15.00	6.908E+01	+67.3	-53.3	
20.00	4.444E+01	+54.1	-48.0	
25.00	2.994E+01	+45.2	-43.9	
30.00	2.124E+01	+40.5	-40.8	
35.00	1.532E+01	+35.8	-38.1	
40.00	1.136E+01	+34.6	-40.2	
45.00	8.619E+00	+32.8	-41.3	
50.00	6.769E+00	+31.2	-40.6	
55.00	5.425E+00	+30.0	-39.3	
60.00	4.364E+00	+28.1	-37.9	
65.00	3.559E+00	+27.1	-36.3	

70.00	2.936E+00	+26.2	-34.9	
75.00	2.453E+00	+25.4	-33.4	
80.00	2.056E+00	+24.6	-32.0	
85.00	1.735E+00	+24.0	-30.8	
90.00	1.481E+00	+23.4	-29.7	
95.00	1.264E+00	+22.6	-28.6	
100.00	1.090E+00	+22.3	-27.7	
105.00	9.433E-01	+21.8	-26.9	
110.00	8.216E-01	+21.3	-26.1	
115.00	7.171E-01	+20.7	-25.3	
120.00	6.288E-01	+20.4	-24.7	
125.00	5.529E-01	+20.0	-24.0	
130.00	4.878E-01	+21.4	-23.5	
135.00	4.329E-01	+19.4	-23.0	
140.00	3.853E-01	+19.3	-22.5	
145.00	3.439E-01	+19.1	-22.1	
150.00	3.080E-01	+18.8	-21.6	
160.00	2.488E-01	+18.4	-20.8	
170.00	2.025E-01	+17.9	-19.9	
180.00	1.667E-01	+17.5	-19.2	
190.00	1.381E-01	+17.1	-18.7	
200.00	1.156E-01	+16.7	-18.1	
210.00	9.698E-02	+16.6	-17.6	
220.00	8.201E-02	+16.3	-17.3	
230.00	6.983E-02	+16.1	-17.1	
240.00	5.973E-02	+15.9	-16.9	
250.00	5.135E-02	+15.6	-16.7	
260.00	4.430E-02	+15.4	-16.4	
270.00	3.843E-02	+15.2	-16.2	
280.00	3.342E-02	+15.0	-16.0	
290.00	2.926E-02	+15.0	-15.9	
300.00	2.563E-02	+14.9	-15.8	
310.00	2.252E-02	+14.8	-15.7	
320.00	1.990E-02	+15.0	-15.6	
330.00	1.759E-02	+14.6	-15.5	
340.00	1.564E-02	+14.6	-15.4	
350.00	1.390E-02	+14.6	-15.3	
360.00	1.239E-02	+14.3	-15.2	
370.00	1.109E-02	+14.0	-15.2	
380.00	9.944E-03	+14.2	-15.1	
390.00	8.934E-03	+14.3	-15.1	
400.00	8.021E-03	+14.1	-14.9	
410.00	7.241E-03	+14.2	-14.9	
420.00	6.548E-03	+14.3	-14.8	
430.00	5.927E-03	+14.3	-14.7	
440.00	5.373E-03	+14.3	-14.7	
450.00	4.883E-03	+14.2	-14.7	
460.00	4.449E-03	+14.2	-14.6	
470.00	4.045E-03	+14.1	-14.6	
480.00	3.694E-03	+14.4	-14.6	

490.00	3.369E-03	+14.2	-14.5	
500.00	3.088E-03	+14.4	-14.5	
550.00	2.016E-03	+14.1	-14.4	
600.00	1.355E-03	+14.5	-14.5	
650.00	9.318E-04	+14.8	-14.6	
700.00	6.540E-04	+15.2	-14.7	
750.00	4.674E-04	+15.6	-14.9	
800.00	3.391E-04	+16.0	-14.8	
850.00	2.495E-04	+16.4	-15.0	
900.00	1.858E-04	+16.8	-15.3	
950.00	1.402E-04	+17.3	-15.7	
1000.00	1.067E-04	+17.8	-15.9	
1050.00	8.200E-05	+18.1	-16.3	
1100.00	6.359E-05	+18.3	-16.7	
1150.00	4.958E-05	+18.5	-17.2	
1200.00	3.901E-05	+18.6	-17.6	
1250.00	3.088E-05	+18.8	-18.2	
1300.00	2.458E-05	+18.9	-18.6	
1350.00	1.969E-05	+19.1	-19.2	
1400.00	1.586E-05	+19.5	-19.9	
1450.00	1.283E-05	+19.8	-20.7	
1500.00	1.043E-05	+20.2	-21.5	
1550.00	8.512E-06	+20.6	-22.2	
1600.00	6.968E-06	+21.1	-23.0	
1650.00	5.736E-06	+21.7	-23.7	
1700.00	4.733E-06	+22.5	-24.2	
1750.00	3.920E-06	+23.3	-24.8	
1800.00	3.235E-06	+24.1	-25.3	
1850.00	2.714E-06	+25.0	-25.9	
1900.00	2.270E-06	+25.9	-26.4	
1950.00	1.901E-06	+26.5	-27.0	
2000.00	1.598E-06	+27.2	-27.6	
2050.00	1.347E-06	+27.9	-28.2	
2100.00	1.137E-06	+28.5	-28.8	
2150.00	9.613E-07	+29.1	-29.5	
2200.00	8.154E-07	+29.8	-30.1	
2250.00	6.927E-07	+30.4	-30.8	
2300.00	5.899E-07	+31.1	-31.6	
2350.00	5.028E-07	+31.7	-32.6	
2400.00	4.373E-07	+32.4	-33.4	
2450.00	3.676E-07	+33.4	-34.6	
2500.00	3.108E-07	+34.4	-35.8	
2550.00	2.705E-07	+35.3	-36.7	
2600.00	2.325E-07	+36.4	-37.7	
2650.00	1.966E-07	+38.0	-39.3	
2700.00	1.636E-07	+39.1	-40.8	
2750.00	1.493E-07	+39.1	-40.9	
2800.00	1.229E-07	+41.0	-43.0	
2850.00	1.113E-07	+41.2	-43.1	
2900.00	9.641E-08	+42.4	-44.1	

2950.00	8.285E-08	+43.7	-45.2	
3000.00	7.259E-08	+44.9	-45.9	

tH Process (t-ch)

- Cross sections are calculated at NLO QCD accuracy in 5FS.
- Program: MadGraph5_aMC@NLO
- QCD scales: $\mu=\mu_F=\mu_R=(M_{top}+M_H)/4$, uncertainty estimated in the range $1/2 < \mu/\{(M_{top}+M_H)/4\} < 2$ (with $1/2 < \mu_F/\mu_R < 2$ constraint).
 - ◆ Flavour scheme (FS) dependence (4FS - 5FS envelope) included in the scale uncertainty. No PU uncertainty assigned.
- PDF set:
 - ◆ PDF4LHC15_nlo_30_pdfas (5FS)
 - ◆ PDF4LHC15_nlo_nf4_100 (4FS central set), used to compute the combined scale+FS uncertainty in tH t-channel.

m_H (GeV)	Cross Section (pb)	+(QCD Scale + FS) %	-(QCD Scale + FS) %	\pm ;(PDF+ s) %	\pm ;PDF %	\pm ; s %	1+ EW	tH (pb)	tbarH (pb)
10.00	2.128E+00	+8.0	-11.8	± 2.5	± 2.3	± 0.9		1.347E+00	7.890E-01
15.00	1.474E+00	+8.2	-12.6	± 2.5	± 2.4	± 0.9		9.350E-01	5.380E-01
20.00	1.084E+00	+8.5	-12.8	± 2.6	± 2.4	± 0.9		6.900E-01	3.930E-01
30.00	6.543E-01	+8.7	-12.5	± 2.7	± 2.5	± 0.9		4.198E-01	2.347E-01
45.00	3.632E-01	+8.8	-11.9	± 2.8	± 2.6	± 1.0		2.352E-01	1.281E-01
70.00	1.837E-01	+8.4	-10.9	± 3.1	± 2.9	± 1.0		1.120E-01	6.370E-02
100.00	1.135E-01	+7.3	-12.9	± 3.4	± 3.3	± 1.1		7.430E-02	3.910E-02
150.00	7.781E-02	+5.7	-16.3	± 3.8	± 3.6	± 1.2		5.074E-02	2.689E-02
200.00	6.363E-02	+4.8	-18.0	± 3.9	± 3.7	± 1.3		4.156E-02	2.205E-02
300.00	4.622E-02	+3.8	-19.9	± 4.1	± 3.9	± 1.3		3.036E-02	1.594E-02
450.00	2.889E-02	+3.0	-21.9	± 4.5	± 4.3	± 1.3		1.921E-02	9.690E-03
700.00	1.349E-02	+2.3	-24.8	± 5.1	± 4.9	± 1.4		9.150E-03	4.340E-03
1000.00	5.750E-03	+2.0	-27.9	± 6.0	± 5.7	± 1.6		3.980E-03	1.780E-03
1500.00	1.570E-03	+2.0	-31.9	± 7.7	± 7.4	± 1.9		1.120E-03	4.600E-04
2000.00	4.760E-04	+2.3	-35.3	± 9.9	± 9.6	± 2.4		3.450E-04	1.300E-04
3000.00	4.990E-05	+3.3	-41.0	± 15.4	± 14.9	± 3.9		3.750E-05	1.240E-05

tH Process (s-ch)

- Cross sections are calculated at NLO QCD accuracy in 5FS.
- Program: MadGraph5_aMC@NLO
- QCD scales: $\mu=\mu_F=\mu_R=(M_{top}+M_H)/2$, uncertainty estimated in the range $1/2 < \mu/\{(M_{top}+M_H)/2\} < 2$ (with $1/2 < \mu_F/\mu_R < 2$ constraint).
 - ◆ No additional THU nor PU uncertainties assigned.
- PDF set:
 - ◆ PDF4LHC15_nlo_30_pdfas (5FS)

m_H (GeV)	Cross Section (pb)	+QCD Scale %	-QCD Scale %	\pm ;(PDF+ s) %	\pm ;PDF %	\pm ; s %	1+ EW	tH (pb)	tbarH (pb)
10.00	1.153E-01	+2.4	-2.0	± 1.9	± 1.8	± 0.6		7.140E-02	4.380E-02
15.00	8.183E-02	+2.4	-1.9	± 1.9	± 1.8	± 0.5		5.082E-02	3.105E-02
20.00	6.175E-02	+2.4	-1.9	± 1.9	± 1.8	± 0.5		3.847E-02	2.324E-02
30.00	3.870E-02	+2.3	-1.9	± 1.9	± 1.8	± 0.5		2.426E-02	1.446E-02
45.00	2.205E-02	+2.2	-1.8	± 1.9	± 1.9	± 0.4		1.390E-02	8.130E-03

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70.00	1.054E-02	+2.2	-1.7	± 2.0	± 2.0	± 0.4		6.716E-03	3.820E-03
100.00	5.248E-03	+2.3	-1.6	± 2.1	± 2.0	± 0.3		3.389E-03	1.865E-03
150.00	2.139E-03	+2.3	-1.8	± 2.2	± 2.2	± 0.2		1.403E-03	7.370E-04
200.00	1.062E-03	+2.3	-1.9	± 2.4	± 2.4	± 0.1		7.050E-04	3.550E-04
300.00	3.630E-04	+2.3	-2.0	± 2.7	± 2.7	± 0.0		2.470E-04	1.160E-04
450.00	1.110E-04	+2.0	-2.0	± 3.2	± 3.2	± 0.2		7.800E-05	3.400E-05
700.00	2.610E-05	+2.0	-2.3	± 3.9	± 3.9	± 0.4		1.880E-05	7.300E-06
1000.00	6.590E-06	+2.0	-2.6	± 4.8	± 4.7	± 0.6		4.880E-06	1.720E-06
1500.00	9.860E-07	+2.3	-3.1	± 6.0	± 5.9	± 1.0		7.450E-07	2.390E-07
2000.00	1.850E-07	+2.6	-3.7	± 7.0	± 6.9	± 1.3		1.420E-07	4.400E-08
3000.00	8.700E-09	+3.6	-4.8	± 10.7	± 10.5	± 2.1		6.580E-09	2.120E-09

-- ReiTanaka - 2016-03-01

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