H^0

$J = 0$

In the following H^0 refers to the signal that has been discovered in the Higgs searches. Whereas the observed signal is labeled as a spin 0 particle and is called a Higgs Boson, the detailed properties of H^0 and its role in the context of electroweak symmetry breaking need to be further clarified. These issues are addressed by the measurements listed below.

Concerning mass limits and cross section limits that have been obtained in the searches for neutral and charged Higgs bosons, see the sections "Searches for Neutral Higgs Bosons" and "Searches for Charged Higgs Bosons ($H^{\pm}$ and $H^{\pm\pm}$)", respectively.

H^0 MASS

VALUE (GeV)	*DOCUMENT ID*		*TECN*	*COMMENT*
125.10±0.14 OUR AVERAGE				
124.86±0.27	[1] AABOUD	18BM	ATLS	pp, 13 TeV, 36.1 fb^{-1}, $\gamma\gamma$, $ZZ^* \to 4\ell$
125.26±0.20±0.08	[2] SIRUNYAN	17AV	CMS	pp, 13 TeV, $ZZ^* \to 4\ell$
125.09±0.21±0.11	[1,3] AAD	15B	LHC	pp, 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
124.79±0.37	[4] AABOUD	18BM	ATLS	pp, 13 TeV, 36.1 fb^{-1}, $ZZ^* \to 4\ell$
124.93±0.40	[5] AABOUD	18BM	ATLS	pp, 13 TeV, 36.1 fb^{-1}, $\gamma\gamma$
124.97±0.24	[1,6] AABOUD	18BM	ATLS	pp, 7, 8, 13 TeV, $\gamma\gamma$, $ZZ^* \to 4\ell$
125.07±0.25±0.14	[3] AAD	15B	LHC	pp, 7, 8 TeV, $\gamma\gamma$
125.15±0.37±0.15	[3] AAD	15B	LHC	pp, 7, 8 TeV, $ZZ^* \to 4\ell$
126.02±0.43±0.27	AAD	15B	ATLS	pp, 7, 8 TeV, $\gamma\gamma$
124.51±0.52±0.04	AAD	15B	ATLS	pp, 7, 8 TeV, $ZZ^* \to 4\ell$
125.59±0.42±0.17	AAD	15B	CMS	pp, 7, 8 TeV, $ZZ^* \to 4\ell$
$125.02^{+0.26}_{-0.27}{}^{+0.14}_{-0.15}$	[7] KHACHATRY...	15AM	CMS	pp, 7, 8 TeV
125.36±0.37±0.18	[1,8] AAD	14W	ATLS	pp, 7, 8 TeV
125.98±0.42±0.28	[8] AAD	14W	ATLS	pp, 7, 8 TeV, $\gamma\gamma$
124.51±0.52±0.06	[8] AAD	14W	ATLS	pp, 7, 8 TeV, $ZZ^* \to 4\ell$
125.6 ±0.4 ±0.2	[9] CHATRCHYAN	14AA	CMS	pp, 7, 8 TeV, $ZZ^* \to 4\ell$
122 ±7	[10] CHATRCHYAN	14K	CMS	pp, 7, 8 TeV, $\tau\tau$
124.70±0.31±0.15	[11] KHACHATRY...	14P	CMS	pp, 7, 8 TeV, $\gamma\gamma$
$125.5 \pm 0.2 {}^{+0.5}_{-0.6}$	[1,12] AAD	13AK	ATLS	pp, 7, 8 TeV
126.8 ±0.2 ±0.7	[12] AAD	13AK	ATLS	pp, 7, 8 TeV, $\gamma\gamma$
$124.3 {}^{+0.6}_{-0.5}{}^{+0.5}_{-0.3}$	[12] AAD	13AK	ATLS	pp, 7, 8 TeV, $ZZ^* \to 4\ell$
125.8 ±0.4 ±0.4	[1,13] CHATRCHYAN	13J	CMS	pp, 7, 8 TeV
126.2 ±0.6 ±0.2	[13] CHATRCHYAN	13J	CMS	pp, 7, 8 TeV, $ZZ^* \to 4\ell$
126.0 ±0.4 ±0.4	[1,14] AAD	12AI	ATLS	pp, 7, 8 TeV
125.3 ±0.4 ±0.5	[1,15] CHATRCHYAN	12N	CMS	pp, 7, 8 TeV

[1] Combined value from $\gamma\gamma$ and $ZZ^* \to 4\ell$ final states.

[2] SIRUNYAN 17AV use 35.9 fb^{-1} of pp collisions at E_{cm} = 13 TeV with $H^0 \to ZZ^* \to 4\ell$ where $\ell = e, \mu$.

[3] ATLAS and CMS data are fitted simultaneously.

[4] AABOUD 18BM use 36.1 fb^{-1} of pp collisions at E_{cm} = 13 TeV with $H^0 \to ZZ^* \to 4\ell$ where $\ell = e, \mu$.

[5] AABOUD 18BM use 36.1 fb^{-1} of pp collisions at E_{cm} = 13 TeV with $H^0 \to \gamma\gamma$.

[6] AABOUD 18BM combine 13 TeV results with 7 and 8 TeV results. Other combined results are summarized in their Fig. 4.

[7] KHACHATRYAN 15AM use up to 5.1 fb^{-1} of pp collisions at E_{cm} = 7 TeV and up to 19.7 fb^{-1} at E_{cm} = 8 TeV.

[8] AAD 14W use 4.5 fb^{-1} of pp collisions at E_{cm} = 7 TeV and 20.3 fb^{-1} at 8 TeV.

[9] CHATRCHYAN 14AA use 5.1 fb^{-1} of pp collisions at E_{cm} = 7 TeV and 19.7 fb^{-1} at E_{cm} = 8 TeV.

[10] CHATRCHYAN 14K use 4.9 fb^{-1} of pp collisions at E_{cm} = 7 TeV and 19.7 fb^{-1} at E_{cm} = 8 TeV.

[11] KHACHATRYAN 14P use 5.1 fb^{-1} of pp collisions at E_{cm} = 7 TeV and 19.7 fb^{-1} at E_{cm} = 8 TeV.

[12] AAD 13AK use 4.7 fb^{-1} of pp collisions at E_{cm}=7 TeV and 20.7 fb^{-1} at E_{cm}=8 TeV. Superseded by AAD 14W.

[13] CHATRCHYAN 13J use 5.1 fb^{-1} of pp collisions at E_{cm} = 7 TeV and 12.2 fb^{-1} at E_{cm} = 8 TeV.

[14] AAD 12AI obtain results based on 4.6–4.8 fb^{-1} of pp collisions at E_{cm} = 7 TeV and 5.8–5.9 fb^{-1} at E_{cm} = 8 TeV. An excess of events over background with a local significance of 5.9 σ is observed at m_{H^0} = 126 GeV. See also AAD 12DA.

[15] CHATRCHYAN 12N obtain results based on 4.9–5.1 fb^{-1} of pp collisions at E_{cm} = 7 TeV and 5.1–5.3 fb^{-1} at E_{cm} = 8 TeV. An excess of events over background with a local significance of 5.0 σ is observed at about m_{H^0} = 125 GeV. See also CHATRCHYAN 12BY and CHATRCHYAN 13Y.

H^0 SPIN AND *CP* PROPERTIES

The observation of the signal in the $\gamma\gamma$ final state rules out the possibility that the discovered particle has spin 1, as a consequence of the Landau-Yang theorem. This argument relies on the assumptions that the decaying particle is an on-shell resonance and that the decay products are indeed two photons rather than two pairs of boosted photons, which each could in principle be misidentified as a single photon.

Concerning distinguishing the spin 0 hypothesis from a spin 2 hypothesis, some care has to be taken in modelling the latter in order to ensure that the discriminating power is actually based on the spin properties rather than on unphysical behavior that may affect the model of the spin 2 state.

Under the assumption that the observed signal consists of a single state rather than an overlap of more than one resonance, it is sufficient to discriminate between distinct hypotheses in the spin analyses. On the other hand, the determination of the *CP* properties is in general much more difficult since in principle the observed state could consist of any admixture of *CP*-even and *CP*-odd components. As a first step, the compatibility of the data with distinct hypotheses of pure *CP*-even and pure *CP*-odd states with different spin assignments has been investigated. In order to treat the case of a possible mixing of different *CP* states, certain cross section ratios are considered. Those cross section ratios need to be distinguished from the amount of mixing between a *CP*-even and a *CP*-odd state, as the cross section ratios depend in addition also on the coupling strengths of the *CP*-even and *CP*-odd components to the involved particles. A small relative coupling implies a small sensitivity of the corresponding cross section ratio to effects of *CP* mixing.

VALUE	*DOCUMENT ID*		*TECN*	*COMMENT*
• • • We do not use the following data for averages, fits, limits, etc. • • •				
	[1] SIRUNYAN	19BL	CMS	pp, 7, 8, 13 TeV, $ZZ^*/ZZ \rightarrow 4\ell$
	[2] SIRUNYAN	19BZ	CMS	$pp \rightarrow H^0$+2jets (VBF, ggF, VH), $H^0 \rightarrow \tau\tau$, 13 TeV
	[3] AABOUD	18AJ	ATLS	$H^0 \rightarrow ZZ^* \rightarrow 4\ell$ ($\ell = e, \mu$), 13TeV
	[4] SIRUNYAN	17AM	CMS	$pp \rightarrow H^0 + \geq 2j$, $H^0 \rightarrow 4\ell$ ($\ell = e, \mu$)
	[5] AAD	16	ATLS	$H^0 \rightarrow \gamma\gamma$
	[6] AAD	16BL	ATLS	$pp \rightarrow H^0 jjX$ (VBF), $H^0 \rightarrow \tau\tau$, 8 TeV
	[7] KHACHATRY...	16AB	CMS	$pp \rightarrow WH^0$, ZH^0, $H^0 \rightarrow b\overline{b}$, 8 TeV
	[8] AAD	15AX	ATLS	$H^0 \rightarrow WW^*$
	[9] AAD	15CI	ATLS	$H^0 \rightarrow ZZ^*$, WW^*, $\gamma\gamma$
	[10] AALTONEN	15	TEVA	$p\overline{p} \rightarrow WH^0$, ZH^0, $H^0 \rightarrow b\overline{b}$
	[11] AALTONEN	15B	CDF	$p\overline{p} \rightarrow WH^0$, ZH^0, $H^0 \rightarrow b\overline{b}$
	[12] KHACHATRY...	15Y	CMS	$H^0 \rightarrow 4\ell$, WW^*, $\gamma\gamma$
	[13] ABAZOV	14F	D0	$p\overline{p} \rightarrow WH^0$, ZH^0, $H^0 \rightarrow b\overline{b}$
	[14] CHATRCHYAN	14AA	CMS	$H^0 \rightarrow ZZ^*$
	[15] CHATRCHYAN	14G	CMS	$H^0 \rightarrow WW^*$
	[16] KHACHATRY...	14P	CMS	$H^0 \rightarrow \gamma\gamma$
	[17] AAD	13AJ	ATLS	$H^0 \rightarrow \gamma\gamma$, $ZZ^* \rightarrow 4\ell$, $WW^* \rightarrow \ell\nu\ell\nu$
	[18] CHATRCHYAN	13J	CMS	$H^0 \rightarrow ZZ^* \rightarrow 4\ell$

[1] SIRUNYAN 19BL measure the anomalous HVV couplings from on-shell and off-shell production in the 4ℓ final state. Data of 80.2 fb^{-1} at 13 TeV, 19.7 fb^{-1} at 8 TeV, and 5.1 fb^{-1} at 7 TeV are used. See their Tables VI and VII for anomalous HVV couplings of *CP*-violating and *CP*-conserving parameters with on- and off-shells.

[2] SIRUNYAN 19BZ constrain anomalous HVV couplings of the Higgs boson with data of 35.9 fb^{-1} at $E_{\rm cm}$ = 13 TeV using Higgs boson candidates with two jets produced in VBF, ggF, and VH that decay to $\tau\tau$. See their Table 2 and Fig. 10, which show 68% CL and 95% CL intervals. Combining those with the $H^0 \rightarrow 4\ell$ (SIRUNYAN 19BL, on-shell scenario), results shown in their Tables 3, 4, and Fig. 11 are obtained. A *CP*-violating parameter is set to be $f_{a3}\cos(\phi_{a3}) = (0.00 \pm 0.27) \times 10^{-3}$ and *CP*-conserving parameters are $f_{a2}\cos(\phi_{a2}) = (0.08^{+1.04}_{-0.21}) \times 10^{-3}$, $f_{\Lambda 1}\cos(\phi_{\Lambda 1}) = (0.00^{+0.53}_{-0.09}) \times 10^{-3}$, and $f^{Z\gamma}_{\Lambda 1}\cos(\phi^{Z\gamma}_{\Lambda 1}) = (0.0^{+1.1}_{-1.3}) \times 10^{-3}$.

[3] AABOUD 18AJ study the tensor structure of the Higgs boson couplings using an effective Lagrangian using 36.1 fb^{-1} of pp collision data at $E_{\rm cm}$ = 13 TeV. Constraints are set on the non-Standard-Model *CP*-even and *CP*-odd couplings to Z bosons and on the *CP*-odd coupling to gluons. See their Figs. 9 and 10, and Tables 10 and 11.

[4] SIRUNYAN 17AM constrain anomalous couplings of the Higgs boson with 5.1 fb^{-1} of pp collisions at $E_{\rm cm}$ = 7 TeV, 19.7 fb^{-1} at $E_{\rm cm}$ = 8 TeV, and 38.6 fb^{-1} at $E_{\rm cm}$ = 13 TeV. See their Table 3 and Fig. 3, which show 68% CL and 95% CL intervals. A *CP* violation parameter f_{a3} is set to be $f_{a3}\cos(\phi_{a3})$ = [−0.38, 0.46] at 95% CL ($\phi_{a3} = 0$ or π).

[5] AAD 16 study $H^0 \rightarrow \gamma\gamma$ with an effective Lagrangian including *CP* even and odd terms in 20.3 fb^{-1} of pp collisions at $E_{\rm cm}$ = 8 TeV. The data is consistent with the expectations for the Higgs boson of the Standard Model. Limits on anomalous couplings are also given.

[6] AAD 16BL study VBF $H^0 \rightarrow \tau\tau$ with an effective Lagrangian including a *CP* odd term in 20.3 fb^{-1} of pp collisions at E_{cm} = 8 TeV. The measurement is consistent with the expectation of the Standard Model. The *CP*-mixing parameter $\widetilde{d}$ (a dimensionless coupling $\widetilde{d}=-(m^2_W/\Lambda^2)f_{\widetilde{W}W}$) is constrained to the interval of (−0.11, 0.05) at 68% CL under the assumption of $\widetilde{d} = \widetilde{d}_B$.

[7] KHACHATRYAN 16AB search for anomalous pseudoscalar couplings of the Higgs boson to W and Z with 18.9 fb^{-1} of pp collisions at E_{cm} = 8 TeV. See their Table 5 and Figs 5 and 6 for limits on possible anomalous pseudoscalar coupling parameters.

[8] AAD 15AX compare the $J^{CP} = 0^+$ Standard Model assignment with other J^{CP} hypotheses in 20.3 fb^{-1} of pp collisions at E_{cm} = 8 TeV, using the process $H^0 \rightarrow WW^* \rightarrow e\nu\mu\nu$. 2^+ hypotheses are excluded at 84.5–99.4%CL, 0^- at 96.5%CL, 0^+ (field strength coupling) at 70.8%CL. See their Fig. 19 for limits on possible *CP* mixture parameters.

[9] AAD 15CI compare the $J^{CP} = 0^+$ Standard Model assignment with other J^{CP} hypotheses in 4.5 fb^{-1} of pp collisions at E_{cm} = 7 TeV and 20.3 fb^{-1} at E_{cm} = 8 TeV, using the processes $H^0 \rightarrow ZZ^* \rightarrow 4\ell$. $H^0 \rightarrow \gamma\gamma$ and combine with AAD 15AX data. 0^+ (field strength coupling), 0^- and several 2^+ hypotheses are excluded at more than 99.9% CL. See their Tables 7–9 for limits on possible *CP* mixture parameters.

[10] AALTONEN 15 combine AALTONEN 15B and ABAZOV 14F data. An upper limit of 0.36 of the Standard Model production rate at 95% CL is obtained both for a 0^- and a 2^+ state. Assuming the SM event rate, the $J^{CP} = 0^-$ (2^+) hypothesis is excluded at the 5.0σ (4.9σ) level.

[11] AALTONEN 15B compare the $J^{CP} = 0^+$ Standard Model assignment with other J^{CP} hypotheses in 9.45 fb^{-1} of $p\overline{p}$ collisions at E_{cm} = 1.96 TeV, using the processes $ZH^0 \rightarrow \ell\ell b\overline{b}$, $WH^0 \rightarrow \ell\nu b\overline{b}$, and $ZH^0 \rightarrow \nu\nu b\overline{b}$. Bounds on the production rates of 0^- and 2^+ (graviton-like) states are set, see their tables II and III.

[12] KHACHATRYAN 15Y compare the $J^{CP} = 0^+$ Standard Model assignment with other J^{CP} hypotheses in up to 5.1 fb^{-1} of pp collisions at E_{cm} = 7 TeV and up to 19.7 fb^{-1} at E_{cm} = 8 TeV, using the processes $H^0 \rightarrow 4\ell$, $H^0 \rightarrow WW^*$, and $H^0 \rightarrow \gamma\gamma$. 0^- is excluded at 99.98% CL, and several 2^+ hypotheses are excluded at more than 99% CL. Spin 1 models are excluded at more than 99.999% CL in ZZ^* and WW^* modes. Limits on anomalous couplings and several cross section fractions, treating the case of *CP*-mixed states, are also given.

[13] ABAZOV 14F compare the $J^{CP} = 0^+$ Standard Model assignment with $J^{CP} = 0^-$ and 2^+ (graviton-like coupling) hypotheses in up to 9.7 fb^{-1} of $p\overline{p}$ collisions at E_{cm} = 1.96 TeV. They use kinematic correlations between the decay products of the vector boson and the Higgs boson in the final states $ZH \rightarrow \ell\ell b\overline{b}$, $WH \rightarrow \ell\nu b\overline{b}$, and $ZH \rightarrow \nu\nu b\overline{b}$. The 0^- (2^+) hypothesis is excluded at 97.6% CL (99.0% CL). In order to treat the case of a possible mixture of a 0^+ state with another J^{CP} state, the cross section fractions $f_X = \sigma_X/(\sigma_{0^+} + \sigma_X)$ are considered, where $X = 0^-$, 2^+. Values for f_{0^-} (f_{2^+}) above 0.80 (0.67) are excluded at 95% CL under the assumption that the total cross section is that of the SM Higgs boson.

[14] CHATRCHYAN 14AA compare the $J^{CP} = 0^+$ Standard Model assignment with various J^{CP} hypotheses in 5.1 fb^{-1} of pp collisions at E_{cm} = 7 TeV and 19.7 fb^{-1} at E_{cm} = 8 TeV. $J^{CP} = 0^-$ and $1^\pm$ hypotheses are excluded at 99% CL, and several $J = 2$ hypotheses are excluded at 95% CL. In order to treat the case of a possible mixture of a 0^+ state with another J^{CP} state, the cross section fraction $f_{a3} = |a_3|^2\,\sigma_3$ / $(|a_1|^2\,\sigma_1 + |a_2|^2\,\sigma_2 + |a_3|^2\,\sigma_3)$ is considered, where the case $a_3 = 1$, $a_1 = a_2 = 0$ corresponds to a pure *CP*-odd state. Assuming $a_2 = 0$, a value for f_{a3} above 0.51 is excluded at 95% CL.

[15] CHATRCHYAN 14G compare the $J^{CP} = 0^+$ Standard Model assignment with $J^{CP} = 0^-$ and 2^+ (graviton-like coupling) hypotheses in 4.9 fb^{-1} of pp collisions at E_{cm} = 7 TeV and 19.4 fb^{-1} at E_{cm} = 8 TeV. Varying the fraction of the production of the 2^+ state via gg and $q\overline{q}$, 2^+ hypotheses are disfavored at CL between 83.7 and 99.8%. The 0^- hypothesis is disfavored against 0^+ at the 65.3% CL.

[16] KHACHATRYAN 14P compare the $J^{CP} = 0^+$ Standard Model assignment with a 2^+ (graviton-like coupling) hypothesis in 5.1 fb^{-1} of pp collisions at E_{cm} = 7 TeV and 19.7 fb^{-1} at E_{cm} = 8 TeV. Varying the fraction of the production of the 2^+ state via gg and $q\overline{q}$, 2^+ hypotheses are disfavored at CL between 71 and 94%.

[17] AAD 13AJ compare the spin 0, CP-even hypothesis with specific alternative hypotheses of spin 0, CP-odd, spin 1, CP-even and CP-odd, and spin 2, CP-even models using the Higgs boson decays $H \to \gamma\gamma$, $H \to ZZ^* \to 4\ell$ and $H \to WW^* \to \ell\nu\ell\nu$ and combinations thereof. The data are compatible with the spin 0, CP-even hypothesis, while all other tested hypotheses are excluded at confidence levels above 97.8%.

[18] CHATRCHYAN 13J study angular distributions of the lepton pairs in the ZZ^* channel where both Z bosons decay to e or μ pairs. Under the assumption that the observed particle has spin 0, the data are found to be consistent with the pure CP-even hypothesis, while the pure CP-odd hypothesis is disfavored.

H^0 DECAY WIDTH

The total decay width for a light Higgs boson with a mass in the observed range is not expected to be directly observable at the LHC. For the case of the Standard Model the prediction for the total width is about 4 MeV, which is three orders of magnitude smaller than the experimental mass resolution. There is no indication from the results observed so far that the natural width is broadened by new physics effects to such an extent that it could be directly observable. Furthermore, as all LHC Higgs channels rely on the identification of Higgs decay products, the total Higgs width cannot be measured indirectly without additional assumptions. The different dependence of on-peak and off-peak contributions on the total width in Higgs decays to ZZ^* and interference effects between signal and background in Higgs decays to $\gamma\gamma$ can provide additional information in this context. Constraints on the total width from the combination of on-peak and off-peak contributions in Higgs decays to ZZ^* rely on the assumption of equal on- and off-shell effective couplings. Without an experimental determination of the total width or further theoretical assumptions, only ratios of couplings can be determined at the LHC rather than absolute values of couplings.

VALUE (GeV)	CL%	DOCUMENT ID		TECN	COMMENT
$\mathbf{0.0032^{+0.0028}_{-0.0022}}$		[1] SIRUNYAN	19BL	CMS	pp, 7, 8, 13 TeV, $ZZ^*/ZZ \to 4\ell$
<0.0144	95	[2] AABOUD	18BP	ATLS	pp, 13 TeV, $ZZ \to 4\ell$, $2\ell 2\nu$
<1.10	95	[3] SIRUNYAN	17AV	CMS	pp, 13 TeV, $ZZ^* \to 4\ell$
<0.013	95	[4] KHACHATRY...	16BA	CMS	pp, 7, 8 TeV, $ZZ^{(*)}$, $WW^{(*)}$
<1.7	95	[5] KHACHATRY...	15AM	CMS	pp, 7, 8 TeV
$> 3.5 \times 10^{-12}$	95	[6] KHACHATRY...	15BA	CMS	pp, 7, 8 TeV, flight distance
<5.0	95	[7] AAD	14W	ATLS	pp, 7, 8 TeV, $\gamma\gamma$
<2.6	95	[7] AAD	14W	ATLS	pp, 7, 8 TeV, $ZZ^* \to 4\ell$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<0.026	95	[8] KHACHATRY...16BA		CMS	pp, 7, 8 TeV, $WW^{(*)}$
<0.0227	95	[9] AAD	15BE	ATLS	pp, 8 TeV, $ZZ^{(*)}$, $WW^{(*)}$
<0.046	95	[10] KHACHATRY...15BA		CMS	pp, 7, 8 TeV, $ZZ^{(*)} \rightarrow 4\ell$
<3.4	95	[11] CHATRCHYAN	14AA	CMS	pp, 7, 8 TeV, $ZZ^{*} \rightarrow 4\ell$
<0.022	95	[12] KHACHATRY...14D		CMS	pp, 7, 8 TeV, $ZZ^{(*)}$
<2.4	95	[13] KHACHATRY...14P		CMS	pp, 7, 8 TeV, $\gamma\gamma$

[1] SIRUNYAN 19BL measure the width and anomalous HVV couplings from on-shell and off-shell production in the 4ℓ final state. Data of 80.2 fb^{-1} at 13 TeV, 19.7 fb^{-1} at 8 TeV, and 5.1 fb^{-1} at 7 TeV are used. The total width for the SM-like couplings is measured to be also [0.08, 9.16] MeV with 95% CL, assuming SM-like couplings for on- and off-shells (see their Table VIII). Constraints on the total width for anomalous HVV interaction cases are found in their Table IX. See their Table X for the Higgs boson signal strength in the off-shell region.

[2] AABOUD 18BP use 36.1 fb^{-1} at $E_{\text{cm}} = 13$ TeV. An observed upper limit on the off-shell Higgs signal strength of 3.8 is obtained at 95% CL using off-shell Higgs boson production in the $ZZ \rightarrow 4\ell$ and $ZZ \rightarrow 2\ell 2\nu$ decay channels ($\ell = e, \mu$). Combining with the on-shell signal strength measurements, the quoted upper limit on the Higgs boson total width is obtained, assuming the ratios of the relevant Higgs-boson couplings to the SM predictions are constant with energy from on-shell production to the high-mass range.

[3] SIRUNYAN 17AV obtain an upper limit on the width from the $m_{4\ell}$ distribution in $ZZ^{*} \rightarrow 4\ell$ ($\ell = e, \mu$) decays. Data of 35.9 fb^{-1} pp collisions at $E_{\text{cm}} = 13$ TeV is used. The expected limit is 1.60 GeV.

[4] KHACHATRYAN 16BA combine the $WW^{(*)}$ result with $ZZ^{(*)}$ results of KHACHATRYAN 15BA and KHACHATRYAN 14D.

[5] KHACHATRYAN 15AM combine $\gamma\gamma$ and $ZZ^{*} \rightarrow 4\ell$ results. The expected limit is 2.3 GeV.

[6] KHACHATRYAN 15BA derive a lower limit on the total width from an upper limit on the decay flight distance $\tau < 1.9 \times 10^{-13}$ s. 5.1 fb^{-1} of pp collisions at $E_{\text{cm}} = 7$ TeV and 19.7 fb^{-1} at 8 TeV are used.

[7] AAD 14W use 4.5 fb^{-1} of pp collisions at $E_{\text{cm}} = 7$ TeV and 20.3 fb^{-1} at 8 TeV. The expected limit is 6.2 GeV.

[8] KHACHATRYAN 16BA derive constraints on the total width from comparing $WW^{(*)}$ production via on-shell and off-shell H^0 using 4.9 fb^{-1} of pp collisions at $E_{\text{cm}} = 7$ TeV and 19.4 fb^{-1} at 8 TeV.

[9] AAD 15BE derive constraints on the total width from comparing $ZZ^{(*)}$ and $WW^{(*)}$ production via on-shell and off-shell H^0 using 20.3 fb^{-1} of pp collisions at $E_{\text{cm}} = 8$ TeV. The K factor for the background processes is assumed to be equal to that for the signal.

[10] KHACHATRYAN 15BA derive constraints on the total width from comparing $ZZ^{(*)}$ production via on-shell and off-shell H^0 with an unconstrained anomalous coupling. 4ℓ final states in 5.1 fb^{-1} of pp collisions at $E_{\text{cm}} = 7$ TeV and 19.7 fb^{-1} at $E_{\text{cm}} = 8$ TeV are used.

[11] CHATRCHYAN 14AA use 5.1 fb^{-1} of pp collisions at $E_{\text{cm}} = 7$ TeV and 19.7 fb^{-1} at $E_{\text{cm}} = 8$ TeV. The expected limit is 2.8 GeV.

[12] KHACHATRYAN 14D derive constraints on the total width from comparing $ZZ^{(*)}$ production via on-shell and off-shell H^0. 4ℓ and $\ell\ell\nu\nu$ final states in 5.1 fb^{-1} of pp collisions at $E_{\text{cm}} = 7$ TeV and 19.7 fb^{-1} at $E_{\text{cm}} = 8$ TeV are used.

[13] KHACHATRYAN 14P use 5.1 fb^{-1} of pp collisions at $E_{\text{cm}} = 7$ TeV and 19.7 fb^{-1} at $E_{\text{cm}} = 8$ TeV. The expected limit is 3.1 GeV.

H^0 DECAY MODES

	Mode		Fraction (Γ_i/Γ)	Confidence level
Γ_1	$W W^*$			
Γ_2	$Z Z^*$			
Γ_3	$\gamma\gamma$			
Γ_4	$b\overline{b}$			
Γ_5	$e^+ e^-$		$<3.6 \times 10^{-4}$	95%
Γ_6	$\mu^+ \mu^-$			
Γ_7	$\tau^+ \tau^-$			
Γ_8	$Z\gamma$			
Γ_9	$\gamma^*\gamma$			
Γ_{10}	$J/\psi\gamma$		$<3.5 \times 10^{-4}$	95%
Γ_{11}	$J/\psi J/\psi$		$<1.8 \times 10^{-3}$	95%
Γ_{12}	$\psi(2S)\gamma$		$<2.0 \times 10^{-3}$	95%
Γ_{13}	$\Upsilon(1S)\gamma$		$<4.9 \times 10^{-4}$	95%
Γ_{14}	$\Upsilon(2S)\gamma$		$<5.9 \times 10^{-4}$	95%
Γ_{15}	$\Upsilon(3S)\gamma$		$<5.7 \times 10^{-4}$	95%
Γ_{16}	$\Upsilon(\mathrm{nS})\Upsilon(\mathrm{mS})$		$<1.4 \times 10^{-3}$	95%
Γ_{17}	$\rho(770)\gamma$		$<8.8 \times 10^{-4}$	95%
Γ_{18}	$\phi(1020)\gamma$		$<4.8 \times 10^{-4}$	95%
Γ_{19}	$e\mu$	LF	$<6.1 \times 10^{-5}$	95%
Γ_{20}	$e\tau$	LF	$<4.7 \times 10^{-3}$	95%
Γ_{21}	$\mu\tau$	LF	$<2.5 \times 10^{-3}$	95%
Γ_{22}	invisible			
Γ_{23}	γ invisible		<4.6 %	95%

H^0 BRANCHING RATIOS

$\Gamma(e^+ e^-)/\Gamma_{\text{total}}$ — Γ_5/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<3.6 \times 10^{-4}$	95	[1] AAD	20F	ATLS	pp, 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<1.9 \times 10^{-3}$	95	[2] KHACHATRY...	15H	CMS	pp, 7, 8 TeV

[1] AAD 20F use 139 fb^{-1} of pp collisions at E_{cm} = 13 TeV. The best-fit value of the $H^0 \to ee$ branching fraction is $(0.0 \pm 1.7 \pm 0.6) \times 10^{-4}$ for m_{H^0} = 125 GeV.

[2] KHACHATRYAN 15H use 5.0 fb^{-1} of pp collisions at E_{cm} = 7 TeV and 19.7 fb^{-1} at 8 TeV.

$\Gamma(J/\psi\gamma)/\Gamma_{\text{total}}$ — Γ_{10}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<7.6 \times 10^{-4}$	95	[1] SIRUNYAN	19AJ	CMS	13 TeV, 35.9 fb^{-1}
$<3.5 \times 10^{-4}$	95	[2] AABOUD	18BL	ATLS	13 TeV, 36.1 fb^{-1}
• • • We do not use the following data for averages, fits, limits, etc. • • •					

$<1.5 \times 10^{-3}$	95	[3] KHACHATRY...16B		CMS	8 TeV
$<1.5 \times 10^{-3}$	95	[4] AAD	15I	ATLS	8 TeV

[1] SIRUNYAN 19AJ search for $H^0 \to J/\psi\gamma$, $J/\psi \to \mu^+\mu^-$ with 35.9 fb^{-1} of pp collision data at E_{cm} = 13 TeV. The upper limit corresponds to 260 times the SM prediction and by combining the KHACHATRYAN 16B, it is 220 times the SM prediction.

[2] AABOUD 18BL search for $H^0 \to J/\psi\gamma$, $J/\psi \to \mu^+\mu^-$ with 36.1 fb^{-1} of pp collision data at E_{cm} = 13 TeV.

[3] KHACHATRYAN 16B use 19.7 fb^{-1} of pp collision data at 8 TeV.

[4] AAD 15I use 19.7 fb^{-1} of pp collision data at 8 TeV.

$\Gamma(J/\psi J/\psi)/\Gamma_{total}$ — Γ_{11}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.8 \times 10^{-3}$	95	[1] SIRUNYAN	19BR	CMS	pp at 13 TeV

[1] SIRUNYAN 19BR search for $H^0 \to J/\psi J/\psi$, $J/\psi \to \mu^+\mu^-$ with 37.5 fb^{-1} of pp collision data at E_{cm} = 13 TeV. J/ψs from the Higgs decay are assumed to be unpolarized. For fully longitudinal (transverse) polarized J/ψs, limits change by -22% ($+10\%$).

$\Gamma(\psi(2S)\gamma)/\Gamma_{total}$ — Γ_{12}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<2.0 \times 10^{-3}$	95	[1] AABOUD	18BL	ATLS	13 TeV, 36.1 fb^{-1}

[1] AABOUD 18BL search for $H^0 \to \psi(2S)\gamma$, $\psi(2S) \to \mu^+\mu^-$ with 36.1 fb^{-1} of pp collision data at E_{cm} = 13 TeV.

$\Gamma(\Upsilon(1S)\gamma)/\Gamma_{total}$ — Γ_{13}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<4.9 \times 10^{-4}$	95	[1] AABOUD	18BL	ATLS	13 TeV, 36.1 fb^{-1}
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<1.3 \times 10^{-3}$	95	[2] AAD	15I	ATLS	8 TeV

[1] AABOUD 18BL search for $H^0 \to \Upsilon(1S)\gamma$, $\Upsilon(1S) \to \mu^+\mu^-$ with 36.1 fb^{-1} of pp collision data at E_{cm} = 13 TeV.

[2] AAD 15I use 19.7 fb^{-1} of pp collision data at 8 TeV.

$\Gamma(\Upsilon(2S)\gamma)/\Gamma_{total}$ — Γ_{14}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<5.9 \times 10^{-4}$	95	[1] AABOUD	18BL	ATLS	13 TeV, 36.1 fb^{-1}
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<1.9 \times 10^{-3}$	95	[2] AAD	15I	ATLS	8 TeV

[1] AABOUD 18BL search for $H^0 \to \Upsilon(2S)\gamma$, $\Upsilon(2S) \to \mu^+\mu^-$ with 36.1 fb^{-1} of pp collision data at E_{cm} = 13 TeV.

[2] AAD 15I use 19.7 fb^{-1} of pp collision data at 8 TeV.

$\Gamma(\Upsilon(3S)\gamma)/\Gamma_{total}$ — Γ_{15}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<5.7 \times 10^{-4}$	95	[1] AABOUD	18BL	ATLS	13 TeV, 36.1 fb^{-1}
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<1.3 \times 10^{-3}$	95	[2] AAD	15I	ATLS	8 TeV

[1] AABOUD 18BL search for $H^0 \to \Upsilon(3S)\gamma$, $\Upsilon(3S) \to \mu^+\mu^-$ with 36.1 fb^{-1} of pp collision data at E_{cm} = 13 TeV.

[2] AAD 15I use 19.7 fb^{-1} of pp collision data at 8 TeV.

$\Gamma(\Upsilon(\mathrm{nS})\,\Upsilon(\mathrm{mS}))/\Gamma_{\mathrm{total}}$ — Γ_{16}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<1.4 \times 10^{-3}$	95	[1] SIRUNYAN	19BR	CMS	pp at 13 TeV

[1] SIRUNYAN 19BR search for $H^0 \to \Upsilon(\mathrm{nS})\,\Upsilon(\mathrm{mS})$ with $\Upsilon(\mathrm{nS}), \Upsilon(\mathrm{mS}) \to \mu^+\mu^-$ (n, m = 1, 2, 3) for 37.5 fb^{-1} of pp collision data at $E_{\mathrm{cm}} = 13$ TeV. Υs from the Higgs decay are assumed to be unpolarized. For fully longitudinal (transverse) polarized Υs, limits change by -22% ($+10\%$). The three Υ states selected in a mass range of 8.5–11 GeV are not distinguished.

$\Gamma(\rho(770)\gamma)/\Gamma_{\mathrm{total}}$ — Γ_{17}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<8.8 \times 10^{-4}$	95	[1] AABOUD	18AU	ATLS	pp, 13 TeV

[1] AABOUD 18AU use 35.6 fb^{-1} of pp collision data at 13 TeV.

$\Gamma(\phi(1020)\gamma)/\Gamma_{\mathrm{total}}$ — Γ_{18}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<4.8 \times 10^{-4}$	95	[1] AABOUD	18AU	ATLS	pp, 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<1.4 \times 10^{-3}$	95	[2] AABOUD	16K	ATLS	pp, 13 TeV

[1] AABOUD 18AU use 35.6 fb^{-1} of pp collision data at 13 TeV.
[2] AABOUD 16K use 2.7 fb^{-1} of pp collision data at 13 TeV.

$\Gamma(e\mu)/\Gamma_{\mathrm{total}}$ — Γ_{19}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<6.1 \times 10^{-5}$	95	[1] AAD	20F	ATLS	pp, 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<3.5 \times 10^{-4}$	95	[2] KHACHATRY...	16CD	CMS	pp, 8 TeV

[1] AAD 20F use 139 fb^{-1} of pp collisions at $E_{\mathrm{cm}} = 13$ TeV. The best-fit value of the $H^0 \to e\mu$ branching fraction is $(0.4 \pm 2.9 \pm 0.3) \times 10^{-5}$ for $m_{H^0} = 125$ GeV.
[2] KHACHATRYAN 16CD search for $H^0 \to e\mu$ in 19.7 fb^{-1} of pp collisions at $E_{\mathrm{cm}} = 8$ TeV. The limit constrains the $Y_{e\mu}$ Yukawa coupling to $\sqrt{|Y_{e\mu}|^2 + |Y_{\mu e}|^2} < 5.4 \times 10^{-4}$ at 95% CL (see their Fig. 6).

$\Gamma(e\tau)/\Gamma_{\mathrm{total}}$ — Γ_{20}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
$<4.7 \times 10^{-3}$	95	[1] AAD	20A	ATLS	pp, 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$<6.1 \times 10^{-3}$	95	[2] SIRUNYAN	18BH	CMS	pp, 13 TeV
$<1.04 \times 10^{-2}$	95	[3] AAD	17	ATLS	pp, 8 TeV
$<6.9 \times 10^{-3}$	95	[4] KHACHATRY...	16CD	CMS	pp, 8 TeV

[1] AAD 20A search for $H^0 \to e\tau$ in 36.1 fb^{-1} of pp collisions at $E_{\mathrm{cm}} = 13$ TeV. The limit constrains the $Y_{e\tau}$ Yukawa coupling to $\sqrt{|Y_{e\tau}|^2 + |Y_{\tau e}|^2} < 2.0 \times 10^{-3}$ at 95% CL (see their Fig. 5).
[2] SIRUNYAN 18BH search for $H^0 \to e\tau$ in 35.9 fb^{-1} of pp collisions at $E_{\mathrm{cm}} = 13$ TeV. The limit constrains the $Y_{e\tau}$ Yukawa coupling to $\sqrt{|Y_{e\tau}|^2 + |Y_{\tau e}|^2} < 2.26 \times 10^{-3}$ at 95% CL (see their Fig. 10).

[3] AAD 17 search for $H^0 \to e\tau$ in 20.3 fb^{-1} of pp collisions at E_{cm} = 8 TeV.

[4] KHACHATRYAN 16CD search for $H^0 \to e\tau$ in 19.7 fb^{-1} of pp collisions at E_{cm} = 8 TeV. The limit constrains the $Y_{e\tau}$ Yukawa coupling to $\sqrt{|Y_{e\tau}|^2+|Y_{\tau e}|^2} < 2.4 \times 10^{-3}$ at 95% CL (see their Fig. 6).

$\Gamma(\mu\tau)/\Gamma_{total}$ Γ_{21}/Γ

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<2.5 × 10^{-3}	95	[1] SIRUNYAN	18BH	CMS	pp, 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<2.8 × 10^{-3}	95	[2] AAD	20A	ATLS	pp, 13 TeV
<0.26	95	[3] AAIJ	18AM	LHCB	pp, 8 TeV
<1.43 × 10^{-2}	95	[4] AAD	17	ATLS	pp, 8 TeV
<1.51 × 10^{-2}	95	[5] KHACHATRY...	15Q	CMS	pp, 8 TeV

[1] SIRUNYAN 18BH search for $H^0 \to \mu\tau$ in 35.9 fb^{-1} of pp collisions at E_{cm} = 13 TeV. The limit constrains the $Y_{\mu\tau}$ Yukawa coupling to $\sqrt{|Y_{\mu\tau}|^2+|Y_{\tau\mu}|^2} < 1.43 \times 10^{-3}$ at 95% CL (see their Fig. 10).

[2] AAD 20A search for $H^0 \to \mu\tau$ in 36.1 fb^{-1} of pp collisions at E_{cm} = 13 TeV. The limit constrains the $Y_{\mu\tau}$ Yukawa coupling to $\sqrt{|Y_{\mu\tau}|^2+|Y_{\tau\mu}|^2} < 1.5 \times 10^{-3}$ at 95% CL (see their Fig. 5).

[3] AAIJ 18AM search for $H^0 \to \mu\tau$ in 2.0 fb^{-1} of pp collisions at E_{cm} = 8 TeV. The limit constrains the $Y_{\mu\tau}$ Yukawa coupling to $\sqrt{|Y_{\mu\tau}|^2+|Y_{\tau\mu}|^2} < 1.7 \times 10^{-2}$ at 95% CL assuming SM production cross sections.

[4] AAD 17 search for $H^0 \to \mu\tau$ in 20.3 fb^{-1} of pp collisions at E_{cm} = 8 TeV.

[5] KHACHATRYAN 15Q search for $H^0 \to \mu\tau$ with τ decaying electronically or hadronically in 19.7 fb^{-1} of pp collisions at E_{cm} = 8 TeV. The fit gives B($H^0 \to \mu\tau$) = $(0.84^{+0.39}_{-0.37})$% with a significance of 2.4 σ.

$\Gamma(\text{invisible})/\Gamma_{total}$ Γ_{22}/Γ

Invisible final states.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.26	95	[1] AABOUD	19AL	ATLS	pp, 7, 8, 13 TeV, $H \to$ inv
<0.19	95	[2] SIRUNYAN	19BO	CMS	pp, 7, 8, 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.37	95	[3] AABOUD	19AI	ATLS	$pp \to qqH^0X$, $H^0 \to$ inv, 13 TeV
<0.38	95	[4] AABOUD	19AL	ATLS	pp, 13 TeV, $H \to$ inv
<0.22	95	[5] SIRUNYAN	19AT	CMS	pp, 13 TeV, $H \to$ inv
<0.33	95	[6] SIRUNYAN	19BO	CMS	$pp \to qqH^0X$, $H^0 \to$ inv, 13 TeV
<0.26	95	[7] SIRUNYAN	19BO	CMS	pp, 13 TeV
<0.67	95	[8] AABOUD	18	ATLS	$pp \to H^0ZX$, $H^0 \to$ inv., 13 TeV
<0.83	95	[9] AABOUD	18CA	ATLS	$pp \to H^0 W/Z$, $W/Z \to jj$, 13 TeV
<0.40	95	[10] SIRUNYAN	18BV	CMS	$pp \to Z(\ell\ell)H^0$, $H^0 \to$ inv, 13 TeV

<0.53	95	[11] SIRUNYAN	18S	CMS	pp, 13 TeV, jet or $V(\rightarrow q\overline{q})$, $H^0 \rightarrow$ inv
<0.46	95	[12] AABOUD	17BD	ATLS	$pp \rightarrow gH^0X$, qqH^0X, $H^0 \rightarrow$ inv, 13 TeV
<0.24	95	[13] KHACHATRY...	17F	CMS	pp, 7, 8, 13 TeV
<0.28	95	[14] AAD	16AF	ATLS	$pp \rightarrow qqH^0X$, 8 TeV
<0.34	95	[15] AAD	16AN	LHC	pp, 7, 8 TeV
<0.78	95	[16] AAD	15BD	ATLS	$pp \rightarrow H^0W/ZX$, 8 TeV
<0.25	95	[17] AAD	15CX	ATLS	pp, 7, 8 TeV, $H \rightarrow$ inv
<0.75	95	[18] AAD	14O	ATLS	$pp \rightarrow H^0ZX$, 7, 8 TeV
<0.58	95	[19] CHATRCHYAN	14B	CMS	$pp \rightarrow H^0ZX$, qqH^0X
<0.81	95	[20] CHATRCHYAN	14B	CMS	$pp \rightarrow H^0ZX$, 7, 8 TeV
<0.65	95	[21] CHATRCHYAN	14B	CMS	$pp \rightarrow qqH^0X$, 8 TeV

[1] AABOUD 19AL combine results of 7, 8 (AAD 15CX), and 13 TeV for H^0 decaying to invisible final states.

[2] SIRUNYAN 19BO combine 13 TeV 35.9 fb^{-1} results with 7, 8, 13 TeV (KHACHATRYAN 17F) for H^0 decaying to invisible final states. The quoted limit on the branching ratio is given for m_{H^0} = 125.09 GeV and assumes the Standard Model production rates. The branching ratio is obtained to be 0.05 $\pm$ 0.03 (stat) $\pm$0.07(syst).

[3] AABOUD 19AI search for $pp \rightarrow qqH^0X$ (VBF) with H^0 decaying to invisible final states using 36.1 fb^{-1} of data. The quoted limit on the branching ratio is given for m_{H^0} = 125 GeV and assumes the Standard Model rates for VBF and gluon-fusion production.

[4] AABOUD 19AL combine results of H^0 decaying to invisible final states with VBF(AABOUD 19AI), ZH, and WH productions (AABOUD 18, AABOUD 18CA), which use 36.1 fb^{-1} of data at 13 TeV. The quoted limit is given for m_{H^0} = 125 GeV and assumes the Standard Model rates for gluon fusion, VBF, ZH, and WH productions.

[5] SIRUNYAN 19AT perform a combined fit with visible decay using 35.9 fb^{-1} of data at 13 TeV.

[6] SIRUNYAN 19BO search for $pp \rightarrow qqH^0X$ (VBF) with H^0 decaying to invisible final states using 35.9 fb^{-1} of data. The quoted limit on the branching ratio is given for m_{H^0} = 125.09 GeV and assumes the Standard Model production rates.

[7] SIRUNYAN 19BO combine the VBF channel with results of other 13 TeV analyses: SIRUNYAN 18BV and SIRUNYAN 18S. The quoted limit on the branching ratio is given for m_{H^0} = 125.09 GeV and assumes the Standard Model production rates.

[8] AABOUD 18 search for $pp \rightarrow H^0ZX$, $Z \rightarrow ee$, $\mu\mu$ with H^0 decaying to invisible final states in 36.1 fb^{-1} at E_{cm} = 13 TeV. The quoted limit on the branching ratio is given for m_{H^0} = 125 GeV and assumes the Standard Model rate for H^0Z production.

[9] AABOUD 18CA search for H^0 decaying to invisible final states using WH, and ZH productions, where W and Z hadronically decay. The data of 36.1 fb^{-1} at E_{cm} = 13 TeV is used. The quoted limit assumes SM production cross sections with combining the contributions from WH, ZH, ggF and VBF production modes.

[10] SIRUNYAN 18BV search for H^0 decaying to invisible final states associated with a Z, $Z \rightarrow \ell\ell$ using 35.9 fb^{-1} at 13 TeV.The limit is obtained for m_{H^0} = 125 GeV and assuming the SM ZH^0 production cross section.

[11] SIRUNYAN 18S search for H^0 decaying to invisible final states associated with an energetic jet or a V, $V \rightarrow q\overline{q}$ using 35.9 fb^{-1} at 13 TeV.

[12] AABOUD 17BD search for H^0 decaying to invisible final states with $\geq$ 1 jet and VBF events using 3.2 fb^{-1} of pp collisions at E_{cm} = 13 TeV. A cross-section ratio R^{miss} is used in the measurement. The quoted limit is given for m_{H^0} = 125 GeV.

[13] KHACHATRYAN 17F search for H^0 decaying to invisible final states with gluon fusion, VBF, ZH, and WH productions using 2.3 fb^{-1} of pp collisions at E_{cm} = 13 TeV, 19.7 fb^{-1} at 8 TeV, and 5.1 fb^{-1} at 7 TeV. The quoted limit is given for m_{H^0} = 125 GeV and assumes the Standard Model rates for gluon fusion, VBF, ZH, and WH productions.

[14] AAD 16AF search for $pp \to qqH^0X$ (VBF) with H^0 decaying to invisible final states in 20.3 fb^{-1} at E_{cm} = 8 TeV. The quoted limit on the branching ratio is given for m_{H^0} = 125 GeV and assumes the Standard Model rates for VBF and gluon-fusion production.

[15] AAD 16AN perform fits to the ATLAS and CMS data at E_{cm} = 7 and 8 TeV. The branching fraction of decays into BSM particles that are invisible or into undetected decay modes is measured for m_{H^0} = 125.09 GeV.

[16] AAD 15BD search for $pp \to H^0WX$ and $pp \to H^0ZX$ with W or Z decaying hadronically and H^0 decaying to invisible final states using data at E_{cm} = 8 TeV. The quoted limit is given for m_{H^0} = 125 GeV, assumes the Standard Model rates for the production processes and is based on a combination of the contributions from H^0W, H^0Z and the gluon-fusion process.

[17] AAD 15CX search for H^0 decaying to invisible final states with VBF, ZH, and WH productions using 20.3 fb^{-1} at 8 TeV, and 4.7 fb^{-1} at 7 TeV. The quoted limit is given for m_{H^0} = 125.36 GeV and assumes the Standard Model rates for gluon fusion, VBF, ZH, and WH productions. The upper limit is improved to 0.23 by adding the measured visible decay rates.

[18] AAD 14O search for $pp \to H^0ZX$, $Z \to \ell\ell$, with H^0 decaying to invisible final states in 4.5 fb^{-1} at E_{cm} = 7 TeV and 20.3 fb^{-1} at E_{cm} = 8 TeV. The quoted limit on the branching ratio is given for m_{H^0} = 125.5 GeV and assumes the Standard Model rate for H^0Z production.

[19] CHATRCHYAN 14B search for $pp \to H^0ZX$, $Z \to \ell\ell$ and $Z \to b\overline{b}$, and also $pp \to qqH^0X$ with H^0 decaying to invisible final states using data at E_{cm} = 7 and 8 TeV. The quoted limit on the branching ratio is obtained from a combination of the limits from H^0Z and qqH^0. It is given for m_{H^0} = 125 GeV and assumes the Standard Model rates for the two production processes.

[20] CHATRCHYAN 14B search for $pp \to H^0ZX$ with H^0 decaying to invisible final states and $Z \to \ell\ell$ in 4.9 fb^{-1} at E_{cm} = 7 TeV and 19.7 fb^{-1} at E_{cm} = 8 TeV, and also with $Z \to b\overline{b}$ in 18.9 fb^{-1} at E_{cm} = 8 TeV. The quoted limit on the branching ratio is given for m_{H^0} = 125 GeV and assumes the Standard Model rate for H^0Z production.

[21] CHATRCHYAN 14B search for $pp \to qqH^0X$ (vector boson fusion) with H^0 decaying to invisible final states in 19.5 fb^{-1} at E_{cm} = 8 TeV. The quoted limit on the branching ratio is given for m_{H^0} = 125 GeV and assumes the Standard Model rate for qqH^0 production.

$\Gamma(\gamma\,\text{invisible})/\Gamma_{\text{total}}$ $\qquad\Gamma_{23}/\Gamma$

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<0.046	95	[1] SIRUNYAN	19CG	CMS	$pp \to H^0Z$, $H^0 \to \gamma$invisible, $Z \to \ell\ell$, 13 TeV

[1] SIRUNYAN 19CG search for $pp \to H^0Z$, $Z \to ee$, $\mu\mu$ with H^0 decaying to invisible final states plus a γ in 137 fb^{-1} at E_{cm} = 13 TeV. The quoted limit on the branching ratio is given for m_{H^0} = 125 GeV assuming the Standard Model rate for H^0Z production and is obtained in the context of a theoretical model, where the undetected (invisible) is massless.

H^0 SIGNAL STRENGTHS IN DIFFERENT CHANNELS

The H^0 signal strength in a particular final state xx is given by the cross section times branching ratio in this channel normalized to the Standard Model (SM) value, $\sigma \cdot$ B($H^0 \to xx$) / ($\sigma \cdot$ B($H^0 \to xx$))$_{SM}$, for the specified mass value of H^0. For the SM predictions, see DITTMAIER 11, DITTMAIER 12, and HEINEMEYER 13A. Results for fiducial and differential cross sections are also listed below.

Combined Final States

VALUE	DOCUMENT ID		TECN	COMMENT
1.13±0.06 OUR AVERAGE				
$1.11^{+0.09}_{-0.08}$	[1] AAD	20	ATLS	pp, 13 TeV
1.17 ± 0.10	[2] SIRUNYAN	19AT	CMS	pp, 13 TeV
$1.09\pm0.07\pm0.04\pm0.03^{+0.07}_{-0.06}$	[3,4] AAD	16AN	LHC	pp, 7, 8 TeV
$1.44^{+0.59}_{-0.56}$	[5] AALTONEN	13M	TEVA	$p\overline{p} \to H^0 X$, 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
	[6] SIRUNYAN	19BA	CMS	pp, 13 TeV, diiferential cross sections
$1.20\pm0.10\pm0.06\pm0.04^{+0.08}_{-0.07}$	[4] AAD	16AN	ATLS	pp, 7, 8 TeV
$0.97\pm0.09\pm0.05^{+0.04}_{-0.03}{}^{+0.07}_{-0.06}$	[4] AAD	16AN	CMS	pp, 7, 8 TeV
$1.18\pm0.10\pm0.07^{+0.08}_{-0.07}$	[7] AAD	16K	ATLS	pp, 7, 8 TeV
$0.75^{+0.28}_{-0.26}{}^{+0.13}_{-0.11}{}^{+0.08}_{-0.05}$	[7] AAD	16K	ATLS	pp, 7 TeV
$1.28\pm0.11^{+0.08}_{-0.07}{}^{+0.10}_{-0.08}$	[7] AAD	16K	ATLS	pp, 8 TeV
	[8] AAD	15P	ATLS	pp, 8 TeV, cross section
$1.00\pm0.09\pm0.07^{+0.08}_{-0.07}$	[9] KHACHATRY...	15AM	CMS	pp, 7, 8 TeV
$1.33^{+0.14}_{-0.10}\pm0.15$	[10] AAD	13AK	ATLS	pp, 7 and 8 TeV
$1.54^{+0.77}_{-0.73}$	[11] AALTONEN	13L	CDF	$p\overline{p} \to H^0 X$, 1.96 TeV
$1.40^{+0.92}_{-0.88}$	[12] ABAZOV	13L	D0	$p\overline{p} \to H^0 X$, 1.96 TeV
$1.4\ \pm0.3$	[13] AAD	12AI	ATLS	$pp \to H^0 X$, 7, 8 TeV
$1.2\ \pm0.4$	[13] AAD	12AI	ATLS	$pp \to H^0 X$, 7 TeV
$1.5\ \pm0.4$	[13] AAD	12AI	ATLS	$pp \to H^0 X$, 8 TeV
0.87 ± 0.23	[14] CHATRCHYAN	12N	CMS	$pp \to H^0 X$, 7, 8 TeV

[1] AAD 20 combine results of up to 79.8 fb^{-1} of data at E_{cm} = 13 TeV, assuming m_{H^0} = 125.09 GeV: $\gamma\gamma$, ZZ^*, WW^*, $\tau\tau$, $b\overline{b}$, $\mu\mu$, invisible, and off-shell analyses (see their Table I). The signal strengths for individual production processes are 1.04 ± 0.09 for gluon fusion, $1.21^{+0.24}_{-0.22}$ for vector boson fusion, $1.30^{+0.40}_{-0.38}$ for WH^0 production, $1.05^{+0.31}_{-0.29}$ for ZH^0 production, and $1.21^{+0.26}_{-0.24}$ for $t\overline{t}H^0$+tH^0 production (see their Fig. 2 and Table IV). Several results with the simplified template cross section and κ-frameworks are presented: see their Figs. 9–11, Figs 20, 21 and Table VIII for stage-1 simplified template cross sections, their Figs. 12–17 and Tables X–XII for the κ-framework.

[2] SIRUNYAN 19AT combine results of 35.9 fb^{-1} of data at E_{cm} = 13 TeV, assuming m_{H^0} = 125.09 GeV. The signal strengths for individual production processes are $1.22^{+0.14}_{-0.12}$ for gluon fusion, $0.73^{+0.30}_{-0.27}$ for vector boson fusion, $2.18^{+0.58}_{-0.55}$ for WH^0 production, $0.87^{+0.44}_{-0.42}$ for ZH^0 production, and $1.18^{+0.30}_{-0.27}$ for $t\overline{t}H^0$ production. Several results with the simplified template cross section and κ-frameworks are presented: see their Fig. 8 and Table 5 for stage-0 simplified template cross sections, their Figs. 9–18 and Tables 7–11 for the κ-framework.

[3] AAD 16AN perform fits to the ATLAS and CMS data at E_{cm} = 7 and 8 TeV. The signal strengths for individual production processes are $1.03^{+0.16}_{-0.14}$ for gluon fusion, $1.18^{+0.25}_{-0.23}$ for vector boson fusion, $0.89^{+0.40}_{-0.38}$ for WH^0 production, $0.79^{+0.38}_{-0.36}$ for ZH^0 production, and $2.3^{+0.7}_{-0.6}$ for $t\overline{t}H^0$ production.

[4] AAD 16AN: The uncertainties represent statistics, experimental systematics, theory systematics on the background, and theory systematics on the signal. The quoted signal strengths are given for m_{H^0} = 125.09 GeV. In the fit, relative branching ratios and relative production cross sections are fixed to those in the Standard Model.

[5] AALTONEN 13M combine all Tevatron data from the CDF and D0 Collaborations with up to 10.0 fb^{-1} and 9.7 fb^{-1}, respectively, of $p\overline{p}$ collisions at E_{cm} = 1.96 TeV. The quoted signal strength is given for m_{H^0} = 125 GeV.

[6] SIRUNYAN 19BA measure differential cross sections for the Higgs boson transverse momentum, the number of jets, the rapidity of the Higgs boson and the transverse momentum of the leading jet using 35.9 fb^{-1} of data at E_{cm} = 13 TeV with $H^0 \to \gamma\gamma$, $H^0 \to ZZ^*$, and $H^0 \to b\overline{b}$. The total cross section for Higgs boson production is measured to be $61.1 \pm 6.0 \pm 3.7$ pb using $H^0 \to \gamma\gamma$ and $H^0 \to ZZ^*$ channels. Several coupling measurements in the κ-framework are performed.

[7] AAD 16K use up to 4.7 fb^{-1} of pp collisions at E_{cm} = 7 TeV and up to 20.3 fb^{-1} at E_{cm} = 8 TeV. The third uncertainty in the measurement is theory systematics. The signal strengths for individual production modes are $1.23 \pm 0.14^{+0.09}_{-0.08}{}^{+0.16}_{-0.12}$ for gluon fusion, $1.23^{+0.28}_{-0.27}{}^{+0.13}_{-0.12}{}^{+0.11}_{-0.09}$ for vector boson fusion, $0.80^{+0.31}_{-0.30} \pm 0.17^{+0.10}_{-0.05}$ for W/ZH^0 production, and $1.81^{+0.52}_{-0.50}{}^{+0.58}_{-0.55}{}^{+0.31}_{-0.12}$ for $t\overline{t}H^0$ production. The quoted signal strengths are given for m_{H^0} = 125.36 GeV.

[8] AAD 15P measure total and differential cross sections of the process $pp \to H^0 X$ at E_{cm} = 8 TeV with 20.3 fb^{-1}. $\gamma\gamma$ and 4ℓ final states are used. $\sigma(pp \to H^0 X) = 33.0 \pm 5.3 \pm 1.6$ pb is given. See their Figs. 2 and 3 for data on differential cross sections.

[9] KHACHATRYAN 15AM use up to 5.1 fb^{-1} of pp collisions at E_{cm} = 7 TeV and up to 19.7 fb^{-1} at E_{cm} = 8 TeV. The third uncertainty in the measurement is theory systematics. Fits to each production mode give the value of $0.85^{+0.19}_{-0.16}$ for gluon fusion, $1.16^{+0.37}_{-0.34}$ for vector boson fusion, $0.92^{+0.38}_{-0.36}$ for WH^0, ZH^0 production, and $2.90^{+1.08}_{-0.94}$ for $t\overline{t}H^0$ production.

[10] AAD 13AK use 4.7 fb^{-1} of pp collisions at E_{cm} = 7 TeV and 20.7 fb^{-1} at E_{cm} = 8 TeV. The combined signal strength is based on the $\gamma\gamma$, $ZZ^* \to 4\ell$, and $WW^* \to \ell\nu\ell\nu$ channels. The quoted signal strength is given for m_{H^0} = 125.5 GeV. Reported statistical error value modified following private communication with the experiment.

[11] AALTONEN 13L combine all CDF results with 9.45–10.0 fb^{-1} of $p\overline{p}$ collisions at E_{cm} = 1.96 TeV. The quoted signal strength is given for m_{H^0} = 125 GeV.

[12] ABAZOV 13L combine all D0 results with up to 9.7 fb^{-1} of $p\overline{p}$ collisions at E_{cm} = 1.96 TeV. The quoted signal strength is given for m_{H^0} = 125 GeV.

[13] AAD 12AI obtain results based on 4.6–4.8 fb^{-1} of pp collisions at E_{cm} = 7 TeV and 5.8–5.9 fb^{-1} at E_{cm} = 8 TeV. An excess of events over background with a local significance of 5.9 σ is observed at m_{H^0} = 126 GeV. The quoted signal strengths are given for m_{H^0} = 126 GeV. See also AAD 12DA.

[14] CHATRCHYAN 12N obtain results based on 4.9–5.1 fb^{-1} of pp collisions at E_{cm} = 7 TeV and 5.1–5.3 fb^{-1} at E_{cm} = 8 TeV. An excess of events over background with a local significance of 5.0 σ is observed at about m_{H^0} = 125 GeV. The combined signal strength is based on the $\gamma\gamma$, ZZ^*, WW^*, $\tau^+\tau^-$, and $b\overline{b}$ channels. The quoted signal strength is given for m_{H^0} = 125.5 GeV. See also CHATRCHYAN 13Y.

WW^* Final State

VALUE	DOCUMENT ID		TECN	COMMENT
1.19±0.12 OUR AVERAGE				
$1.28^{+0.17}_{-0.16}$	[1] SIRUNYAN	19AT	CMS	pp, 13 TeV
$1.09^{+0.18}_{-0.16}$	[2,3] AAD	16AN	LHC	pp, 7, 8 TeV
$0.94^{+0.85}_{-0.83}$	[4] AALTONEN	13M	TEVA	$p\overline{p} \to H^0 X$, 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
	[5] AABOUD	19F	ATLS	pp, 13 TeV, cross sections
$2.5\ ^{+0.9}_{-0.8}$	[6] AAD	19A	ATLS	$pp \to H^0 W / H^0 Z$, $H^0 \to WW^*$, 13 TeV
$1.28^{+0.18}_{-0.17}$	[7] SIRUNYAN	19AX	CMS	pp, 13 TeV
$1.22^{+0.23}_{-0.21}$	[3] AAD	16AN	ATLS	pp, 7, 8 TeV
$0.90^{+0.23}_{-0.21}$	[3] AAD	16AN	CMS	pp, 7, 8 TeV
	[8] AAD	16AO	ATLS	pp, 8 TeV, cross sections
$1.18 \pm 0.16^{+0.17}_{-0.14}$	[9] AAD	16K	ATLS	pp, 7, 8 TeV
$1.09^{+0.16}_{-0.15}{}^{+0.17}_{-0.14}$	[10] AAD	15AA	ATLS	pp, 7, 8 TeV
$3.0\ ^{+1.3}_{-1.1}{}^{+1.0}_{-0.7}$	[11] AAD	15AQ	ATLS	$pp \to H^0 W / Z X$, 7, 8 TeV
$1.16^{+0.16}_{-0.15}{}^{+0.18}_{-0.15}$	[12] AAD	15AQ	ATLS	pp, 7, 8 TeV
$0.72 \pm 0.12 \pm 0.10^{+0.12}_{-0.10}$	[13] CHATRCHYAN	14G	CMS	pp, 7, 8 TeV
$0.99^{+0.31}_{-0.28}$	[14] AAD	13AK	ATLS	pp, 7 and 8 TeV
$0.00^{+1.78}_{-0.00}$	[15] AALTONEN	13L	CDF	$p\overline{p} \to H^0 X$, 1.96 TeV
$1.90^{+1.63}_{-1.52}$	[16] ABAZOV	13L	D0	$p\overline{p} \to H^0 X$, 1.96 TeV
1.3 ±0.5	[17] AAD	12AI	ATLS	$pp \to H^0 X$, 7, 8 TeV
0.5 ±0.6	[17] AAD	12AI	ATLS	$pp \to H^0 X$, 7 TeV
1.9 ±0.7	[17] AAD	12AI	ATLS	$pp \to H^0 X$, 8 TeV
$0.60^{+0.42}_{-0.37}$	[18] CHATRCHYAN	12N	CMS	$pp \to H^0 X$, 7, 8 TeV

[1] SIRUNYAN 19AT perform a combine fit to 35.9 fb^{-1} of data at E_{cm} = 13 TeV.

[2] AAD 16AN perform fits to the ATLAS and CMS data at E_{cm} = 7 and 8 TeV. The signal strengths for individual production processes are 0.84 ± 0.17 for gluon fusion, 1.2 ± 0.4

for vector boson fusion, $1.6^{+1.2}_{-1.0}$ for $W H^0$ production, $5.9^{+2.6}_{-2.2}$ for $Z H^0$ production, and $5.0^{+1.8}_{-1.7}$ for $t\overline{t}H^0$ production.

[3] AAD 16AN: In the fit, relative production cross sections are fixed to those in the Standard Model. The quoted signal strength is given for m_{H^0} = 125.09 GeV.

[4] AALTONEN 13M combine all Tevatron data from the CDF and D0 Collaborations with up to 10.0 fb^{-1} and 9.7 fb^{-1}, respectively, of $p\overline{p}$ collisions at E_{cm} = 1.96 TeV. The quoted signal strength is given for m_{H^0} = 125 GeV.

[5] AABOUD 19F measure cross-sections times the $H^0 \rightarrow W W^*$ branching fraction in the $H^0 \rightarrow W W^* \rightarrow e\nu\mu\nu$ channel using 36.1 fb^{-1} of pp collisions at E_{cm} = 13 TeV: $\sigma_{ggF}\times$B($H^0 \rightarrow W W^*$) = $11.4^{+1.2}_{-1.1}{}^{+1.8}_{-1.7}$ pb and $\sigma_{VBF}\times$B($H^0 \rightarrow W W^*$) = $0.50^{+0.24}_{-0.22} \pm 0.17$ pb.

[6] AAD 19A use 36.1 fb^{-1} data at 13 TeV. The cross section times branching fraction values are measured to be $0.67^{+0.31}_{-0.27}{}^{+0.18}_{-0.14}$ pb for $W H^0$, $H^0 \rightarrow W W^*$ and $0.54^{+0.31}_{-0.24}{}^{+0.15}_{-0.07}$ pb for $Z H^0$, $H^0 \rightarrow W W^*$.

[7] SIRUNYAN 19AX measure the signal strengths, cross sections and so on using gluon fusion, VBF and $V H^0$ production processes with 35.9 fb^{-1} of data. The quoted signal strength is given for m_{H^0} = 125.09 GeV. Signal strengths for each production process is found in their Fig. 9. Measured cross sections and ratios to the SM predictions in the stage-0 simplified template cross section framework are shown in their Fig. 10. κ_F = $1.52^{+0.48}_{-0.41}$ and $\kappa_V = 1.10 \pm 0.08$ are obtained (see their Fig. 11 (right)).

[8] AAD 16AO measure fiducial total and differential cross sections of gluon fusion process at E_{cm} = 8 TeV with 20.3 fb^{-1} using $H^0 \rightarrow W W^* \rightarrow e\nu\mu\nu$. The measured fiducial total cross section is 36.0 $\pm$ 9.7 fb in their fiducial region (Table 7). See their Fig. 6 for fiducial differential cross sections. The results are given for m_{H^0} = 125 GeV.

[9] AAD 16K use up to 4.7 fb^{-1} of pp collisions at E_{cm} = 7 TeV and up to 20.3 fb^{-1} at E_{cm} = 8 TeV. The quoted signal strength is given for m_{H^0} = 125.36 GeV.

[10] AAD 15AA use 4.5 fb^{-1} of pp collisions at E_{cm} = 7 TeV and 20.3 fb^{-1} at E_{cm} = 8 TeV. The signal strength for the gluon fusion and vector boson fusion mode is $1.02 \pm 0.19^{+0.22}_{-0.18}$ and $1.27^{+0.44}_{-0.40}{}^{+0.30}_{-0.21}$, respectively. The quoted signal strengths are given for m_{H^0} = 125.36 GeV.

[11] AAD 15AQ use 4.5 fb^{-1} of pp collisions at E_{cm} = 7 TeV and 20.3 fb^{-1} at E_{cm} = 8 TeV. The quoted signal strength is given for m_{H^0} = 125.36 GeV.

[12] AAD 15AQ combine their result on $W/Z H^0$ production with the results of AAD 15AA (gluon fusion and vector boson fusion, slightly updated). The quoted signal strength is given for m_{H^0} = 125.36 GeV.

[13] CHATRCHYAN 14G use 4.9 fb^{-1} of pp collisions at E_{cm} = 7 TeV and 19.4 fb^{-1} at E_{cm} = 8 TeV. The last uncertainty in the measurement is theory systematics. The quoted signal strength is given for m_{H^0} = 125.6 GeV.

[14] AAD 13AK use 4.7 fb^{-1} of pp collisions at E_{cm} = 7 TeV and 20.7 fb^{-1} at E_{cm} = 8 TeV. The quoted signal strength is given for m_{H^0} = 125.5 GeV. Superseded by AAD 15AA.

[15] AALTONEN 13L combine all CDF results with 9.45–10.0 fb^{-1} of $p\overline{p}$ collisions at E_{cm} = 1.96 TeV. The quoted signal strength is given for m_{H^0} = 125 GeV.

[16] ABAZOV 13L combine all D0 results with up to 9.7 fb^{-1} of $p\overline{p}$ collisions at E_{cm} = 1.96 TeV. The quoted signal strength is given for m_{H^0} = 125 GeV.

[17] AAD 12AI obtain results based on 4.7 fb^{-1} of pp collisions at E_{cm} = 7 TeV and 5.8 fb^{-1} at E_{cm} = 8 TeV. The quoted signal strengths are given for m_{H^0} = 126 GeV. See also AAD 12DA.

[18] CHATRCHYAN 12N obtain results based on 4.9 fb^{-1} of pp collisions at E_{cm} = 7 TeV and 5.1 fb^{-1} at E_{cm} = 8 TeV. The quoted signal strength is given for m_{H^0} = 125.5 GeV. See also CHATRCHYAN 13Y.

ZZ^* Final State

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$1.20^{+0.12}_{-0.11}$ OUR AVERAGE				
$1.06^{+0.19}_{-0.17}$		[1] SIRUNYAN 19AT	CMS	pp, 13 TeV
$1.28^{+0.21}_{-0.19}$		[2] AABOUD 18AJ	ATLS	pp, 13 TeV
$1.29^{+0.26}_{-0.23}$		[3,4] AAD 16AN	LHC	pp, 7, 8 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<6.5	95	[5] AABOUD 19N	ATLS	pp, 13 TeV, off-shell
<3.8	95	[6] AABOUD 18BP	ATLS	pp, 13 TeV, off-shell
$1.05^{+0.15}_{-0.14}{}^{+0.11}_{-0.09}$		[7] SIRUNYAN 17AV	CMS	pp, 13 TeV
$1.52^{+0.40}_{-0.34}$		[4] AAD 16AN	ATLS	pp, 7, 8 TeV
$1.04^{+0.32}_{-0.26}$		[4] AAD 16AN	CMS	pp, 7, 8 TeV
$1.46^{+0.35}_{-0.31}{}^{+0.19}_{-0.13}$		[8] AAD 16K	ATLS	pp, 7, 8 TeV
		[9] KHACHATRY... 16AR	CMS	pp, 7, 8 TeV cross sections
$1.44^{+0.34}_{-0.31}{}^{+0.21}_{-0.11}$		[10] AAD 15F	ATLS	$pp \to H^0 X$, 7, 8 TeV
		[11] AAD 14AR	ATLS	pp, 8 TeV, differential cross section
$0.93^{+0.26}_{-0.23}{}^{+0.13}_{-0.09}$		[12] CHATRCHYAN 14AA	CMS	pp, 7, 8 TeV
$1.43^{+0.40}_{-0.35}$		[13] AAD 13AK	ATLS	pp, 7 and 8 TeV
$0.80^{+0.35}_{-0.28}$		[14] CHATRCHYAN 13J	CMS	$pp \to H^0 X$, 7, 8 TeV
1.2 ± 0.6		[15] AAD 12AI	ATLS	$pp \to H^0 X$, 7, 8 TeV
1.4 ± 1.1		[15] AAD 12AI	ATLS	$pp \to H^0 X$, 7 TeV
1.1 ± 0.8		[15] AAD 12AI	ATLS	$pp \to H^0 X$, 8 TeV
$0.73^{+0.45}_{-0.33}$		[16] CHATRCHYAN 12N	CMS	$pp \to H^0 X$, 7, 8 TeV

[1] SIRUNYAN 19AT perform a combine fit to 35.9 fb^{-1} of data at E_{cm} = 13 TeV.

[2] AABOUD 18AJ perform analyses using $H^0 \to ZZ^* \to 4\ell$ ($\ell = e, \mu$) with data of 36.1 fb^{-1} at E_{cm} = 13 TeV. Results are given for m_{H^0} = 125.09 GeV. The inclusive cross section times branching ratio for $H^0 \to ZZ^*$ decay ($|\eta(H^0)| < 2.5$) is measured to be $1.73^{+0.26}_{-0.24}$ pb (with $1.34^{+0.09}_{-0.09}$ pb expected in the SM).

[3] AAD 16AN perform fits to the ATLAS and CMS data at E_{cm} = 7 and 8 TeV. The signal strengths for individual production processes are $1.13^{+0.34}_{-0.31}$ for gluon fusion and $0.1^{+1.1}_{-0.6}$ for vector boson fusion.

[4] AAD 16AN: In the fit, relative production cross sections are fixed to those in the Standard Model. The quoted signal strength is given for m_{H^0} = 125.09 GeV.

[5] AABOUD 19N measure the spectrum of the four-lepton invariant mass $m_{4\ell}$ ($\ell = e$ or μ) using 36.1 fb^{-1} of data at E_{cm} = 13 TeV. The quoted signal strength upper limit is obtained from 180 GeV $< m_{4\ell} <$ 1200 GeV.

[6] AABOUD 18BP measure an off-shell Higgs boson production using $ZZ \rightarrow 4\ell$ and $ZZ \rightarrow 2\ell 2\nu$ ($\ell = e,\ \mu$) decay channels with 36.1 fb^{-1} of data at E_{cm} = 13 TeV. The quoted signal strength upper limit is obtained from a combination of these two channels, where 220 GeV $< m_{4\ell} <$ 2000 GeV for $ZZ \rightarrow 4\ell$ and 250 GeV $< m_T^{ZZ} <$ 2000 GeV for $ZZ \rightarrow 2\ell 2\nu$ (m_T^{ZZ} is defined in their Section 5). See their Table 2 for each measurement.

[7] SIRUNYAN 17AV use 35.9 fb^{-1} of pp collisions at E_{cm} = 13 TeV. The quoted signal strength, obtained from the analysis of $H^0 \rightarrow ZZ^* \rightarrow 4\ell$ ($\ell = e,\ \mu$) decays, is given for m_{H^0} = 125.09 GeV. The signal strengths for different production modes are given in their Table 3. The fiducial and differential cross sections are shown in their Fig. 10.

[8] AAD 16K use up to 4.7 fb^{-1} of pp collisions at E_{cm} = 7 TeV and up to 20.3 fb^{-1} at E_{cm} = 8 TeV. The quoted signal strength is given for m_{H^0} = 125.36 GeV.

[9] KHACHATRYAN 16AR use data of 5.1 fb^{-1} at E_{cm} = 7 TeV and 19.7 fb^{-1} at 8 TeV. The fiducial cross sections for the production of 4 leptons via $H^0 \rightarrow 4\ell$ decays are measured to be $0.56^{+0.67}_{-0.44}{}^{+0.21}_{-0.06}$ fb at 7 TeV and $1.11^{+0.41}_{-0.35}{}^{+0.14}_{-0.10}$ fb at 8 TeV in their fiducial region (Table 2). The differential cross sections at E_{cm} = 8 TeV are also shown in Figs. 4 and 5. The results are given for m_{H^0} = 125 GeV.

[10] AAD 15F use 4.5 fb^{-1} of pp collisions at E_{cm} = 7 TeV and 20.3 fb^{-1} at E_{cm} = 8 TeV. The quoted signal strength is given for m_{H^0} = 125.36 GeV. The signal strength for the gluon fusion production mode is $1.66^{+0.45}_{-0.41}{}^{+0.25}_{-0.15}$, while the signal strength for the vector boson fusion production mode is $0.26^{+1.60}_{-0.91}{}^{+0.36}_{-0.23}$.

[11] AAD 14AR measure the cross section for $pp \rightarrow H^0 X$, $H^0 \rightarrow ZZ^*$ using 20.3 fb^{-1} at E_{cm} = 8 TeV. They give $\sigma \cdot B = 2.11^{+0.53}_{-0.47} \pm 0.08$ fb in their fiducial region, where 1.30 ± 0.13 fb is expected in the Standard Model for m_{H^0} = 125.4 GeV. Various differential cross sections are also given, which are in agreement with the Standard Model expectations.

[12] CHATRCHYAN 14AA use 5.1 fb^{-1} of pp collisions at E_{cm} = 7 TeV and 19.7 fb^{-1} at E_{cm} = 8 TeV. The quoted signal strength is given for m_{H^0} = 125.6 GeV. The signal strength for the gluon fusion and $t\overline{t}H$ production mode is $0.80^{+0.46}_{-0.36}$, while the signal strength for the vector boson fusion and WH^0, ZH^0 production mode is $1.7^{+2.2}_{-2.1}$.

[13] AAD 13AK use 4.7 fb^{-1} of pp collisions at E_{cm} = 7 TeV and 20.7 fb^{-1} at E_{cm} = 8 TeV. The quoted signal strength is given for m_{H^0} = 125.5 GeV.

[14] CHATRCHYAN 13J obtain results based on $ZZ \rightarrow 4\ell$ final states in 5.1 fb^{-1} of pp collisions at E_{cm} = 7 TeV and 12.2 fb^{-1} at E_{cm} = 8 TeV. The quoted signal strength is given for m_{H^0} = 125.8 GeV. Superseded by CHATRCHYAN 14AA.

[15] AAD 12AI obtain results based on 4.7–4.8 fb^{-1} of pp collisions at E_{cm} = 7 TeV and 5.8 fb^{-1} at E_{cm} = 8 TeV. The quoted signal strengths are given for m_{H^0} = 126 GeV. See also AAD 12DA.

[16] CHATRCHYAN 12N obtain results based on 4.9–5.1 fb^{-1} of pp collisions at E_{cm} = 7 TeV and 5.1–5.3 fb^{-1} at E_{cm} = 8 TeV. An excess of events over background with a local significance of 5.0 σ is observed at about m_{H^0} = 125 GeV. The quoted signal strengths are given for m_{H^0} = 125.5 GeV. See also CHATRCHYAN 12BY and CHATRCHYAN 13Y.

$\gamma\gamma$ Final State

VALUE	DOCUMENT ID	TECN	COMMENT
$\mathbf{1.11^{+0.10}_{-0.09}}$ **OUR AVERAGE**			
$1.20^{+0.18}_{-0.14}$	[1] SIRUNYAN 19AT	CMS	pp, 13 TeV
$0.99^{+0.15}_{-0.14}$	[2] AABOUD 18BO	ATLS	pp, 13 TeV, 36.1 fb^{-1}
$1.14^{+0.19}_{-0.18}$	[3,4] AAD 16AN	LHC	pp, 7, 8 TeV
$5.97^{+3.39}_{-3.12}$	[5] AALTONEN 13M	TEVA	$p\overline{p} \rightarrow H^0 X$, 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •			
	[6] SIRUNYAN 19L	CMS	pp, 13 TeV, diff. x-section
$1.18^{+0.17}_{-0.14}$	[7] SIRUNYAN 18DS	CMS	pp, $H^0 \rightarrow \gamma\gamma$, 13 TeV, floated m_{H^0}
$1.14^{+0.27}_{-0.25}$	[4] AAD 16AN	ATLS	pp, 7, 8 TeV
$1.11^{+0.25}_{-0.23}$	[4] AAD 16AN	CMS	pp, 7, 8 TeV
	[8] KHACHATRY... 16G	CMS	pp, 8 TeV, diff. x-section
$1.17 \pm 0.23 ^{+0.10}_{-0.08} {}^{+0.12}_{-0.08}$	[9] AAD 14BC	ATLS	$pp \rightarrow H^0 X$, 7, 8 TeV
	[10] AAD 14BJ	ATLS	pp, 8 TeV, diff. x-section
$1.14 \pm 0.21 ^{+0.09}_{-0.05} {}^{+0.13}_{-0.09}$	[11] KHACHATRY... 14P	CMS	pp, 7, 8 TeV
$1.55^{+0.33}_{-0.28}$	[12] AAD 13AK	ATLS	pp, 7 and 8 TeV
$7.81^{+4.61}_{-4.42}$	[13] AALTONEN 13L	CDF	$p\overline{p} \rightarrow H^0 X$, 1.96 TeV
$4.20^{+4.60}_{-4.20}$	[14] ABAZOV 13L	D0	$p\overline{p} \rightarrow H^0 X$, 1.96 TeV
1.8 ± 0.5	[15] AAD 12AI	ATLS	$pp \rightarrow H^0 X$, 7, 8 TeV
2.2 ± 0.7	[15] AAD 12AI	ATLS	$pp \rightarrow H^0 X$, 7 TeV
1.5 ± 0.6	[15] AAD 12AI	ATLS	$pp \rightarrow H^0 X$, 8 TeV
$1.54^{+0.46}_{-0.42}$	[16] CHATRCHYAN 12N	CMS	$pp \rightarrow H^0 X$, 7, 8 TeV

[1] SIRUNYAN 19AT perform a combine fit to 35.9 fb^{-1} of data at E_{cm} = 13 TeV.

[2] AABOUD 18BO use 36.1 fb^{-1} of pp collisions at E_{cm} = 13 TeV. The signal strengths for the individual production modes are: $0.81^{+0.19}_{-0.18}$ for gluon fusion, $2.0^{+0.6}_{-0.5}$ for vector boson fusion, $0.7^{+0.9}_{-0.8}$ for VH^0 production ($V = W$, Z), and 0.5 ± 0.6 for $t\overline{t}H^0$ and tH^0 production. Other measurements of cross sections and couplings are summarized in their Section 10. The quoted values are given for m_{H^0} = 125.09 GeV.

[3] AAD 16AN perform fits to the ATLAS and CMS data at E_{cm} = 7 and 8 TeV. The signal strengths for individual production processes are $1.10^{+0.23}_{-0.22}$ for gluon fusion, 1.3 ± 0.5 for vector boson fusion, $0.5^{+1.3}_{-1.2}$ for WH^0 production, $0.5^{+3.0}_{-2.5}$ for ZH^0 production, and $2.2^{+1.6}_{-1.3}$ for $t\overline{t}H^0$ production.

[4] AAD 16AN: In the fit, relative production cross sections are fixed to those in the Standard Model. The quoted signal strength is given for m_{H^0} = 125.09 GeV.

[5] AALTONEN 13M combine all Tevatron data from the CDF and D0 Collaborations with up to 10.0 fb^{-1} and 9.7 fb^{-1}, respectively, of $p\overline{p}$ collisions at E_{cm} = 1.96 TeV. The quoted signal strength is given for m_{H^0} = 125 GeV.

[6] SIRUNYAN 19L measure fiducial and differential cross sections of the process $p p \to H^0 \to \gamma\gamma$ at E_{cm} = 13 TeV with 35.9 fb^{-1}. See their Figs. 4–11.

[7] SIRUNYAN 18DS use 35.9 fb^{-1} of $p p \to H^0$ collisions with $H^0 \to \gamma\gamma$ at E_{cm} = 13 TeV. The Higgs mass is floated in the measurement of a signal strength. The result is $1.18^{+0.12}_{-0.11}$(stat.)$^{+0.09}_{-0.07}$(syst.)$^{+0.07}_{-0.06}$(theory), which is largely insensitive to the Higgs mass around 125 GeV.

[8] KHACHATRYAN 16G measure fiducial and differential cross sections of the process $p p \to H^0 X$, $H^0 \to \gamma\gamma$ at E_{cm} = 8 TeV with 19.7 fb^{-1}. See their Figs. 4–6 and Table 1 for data.

[9] AAD 14BC use 4.5 fb^{-1} of $p p$ collisions at E_{cm} = 7 TeV and 20.3 fb^{-1} at E_{cm} = 8 TeV. The last uncertainty in the measurement is theory systematics. The quoted signal strength is given for m_{H^0} = 125.4 GeV. The signal strengths for the individual production modes are: 1.32 $\pm$ 0.38 for gluon fusion, 0.8 $\pm$ 0.7 for vector boson fusion, 1.0 $\pm$ 1.6 for $W H^0$ production, $0.1^{+3.7}_{-0.1}$ for $Z H^0$ production, and $1.6^{+2.7}_{-1.8}$ for $t\bar{t}H^0$ production.

[10] AAD 14BJ measure fiducial and differential cross sections of the process $p p \to H^0 X$, $H^0 \to \gamma\gamma$ at E_{cm} = 8 TeV with 20.3 fb^{-1}. See their Table 3 and Figs. 3–12 for data.

[11] KHACHATRYAN 14P use 5.1 fb^{-1} of $p p$ collisions at E_{cm} = 7 TeV and 19.7 fb^{-1} at E_{cm} = 8 TeV. The last uncertainty in the measurement is theory systematics. The quoted signal strength is given for m_{H^0} = 124.7 GeV. The signal strength for the gluon fusion and $t\bar{t}H$ production mode is $1.13^{+0.37}_{-0.31}$, while the signal strength for the vector boson fusion and $W H^0$, $Z H^0$ production mode is $1.16^{+0.63}_{-0.58}$.

[12] AAD 13AK use 4.7 fb^{-1} of $p p$ collisions at E_{cm} = 7 TeV and 20.7 fb^{-1} at E_{cm} = 8 TeV. The quoted signal strength is given for m_{H^0} = 125.5 GeV.

[13] AALTONEN 13L combine all CDF results with 9.45–10.0 fb^{-1} of $p\bar{p}$ collisions at E_{cm} = 1.96 TeV. The quoted signal strength is given for m_{H^0} = 125 GeV.

[14] ABAZOV 13L combine all D0 results with up to 9.7 fb^{-1} of $p\bar{p}$ collisions at E_{cm} = 1.96 TeV. The quoted signal strength is given for m_{H^0} = 125 GeV.

[15] AAD 12AI obtain results based on 4.8 fb^{-1} of $p p$ collisions at E_{cm} = 7 TeV and 5.9 fb^{-1} at E_{cm} = 8 TeV. The quoted signal strengths are given for m_{H^0} = 126 GeV. See also AAD 12DA.

[16] CHATRCHYAN 12N obtain results based on 5.1 fb^{-1} of $p p$ collisions at E_{cm}=7 TeV and 5.3 fb^{-1} at E_{cm}=8 TeV. The quoted signal strength is given for m_{H^0}=125.5 GeV. See also CHATRCHYAN 13Y.

$c\bar{c}$ Final State

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<110	95	[1] AABOUD	18M	ATLS	$p p$, 13 TeV

[1] AABOUD 18M use 36.1 fb^{-1} at of $p p$ collisions at E_{cm} = 13 TeV. The upper limit on $\sigma(p p \to Z H^0)\cdot$B$(H^0 \to c\bar{c})$ is 2.7 pb at 95% CL. The quoted values are given for m_{H^0} = 125 GeV.

$b\bar{b}$ Final State

VALUE	DOCUMENT ID		TECN	COMMENT
1.04±0.13 OUR AVERAGE				
1.12±0.29	[1] SIRUNYAN	19AT	CMS	$p p$, 13 TeV
$1.16^{+0.27}_{-0.25}$	[2] AABOUD	18BN	ATLS	$p p \to H^0 W / H^0 Z$, $H^0 \to b\bar{b}$, 13 TeV, 79.8 fb^{-1}

1.06 ± 0.26	[3] SIRUNYAN	18DB	CMS	$pp \to H^0 W / H^0 Z$, $H^0 \to b\overline{b}$, 13 TeV, 77.2 fb^{-1}
$0.70^{+0.29}_{-0.27}$	[4,5] AAD	16AN	LHC	pp, 7, 8 TeV
$1.59^{+0.69}_{-0.72}$	[6] AALTONEN	13M	TEVA	$p\overline{p} \to H^0 X$, 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
	[7] AABOUD	19U	ATLS	$pp \to VH^0$, $H^0 \to b\overline{b}$, 13 TeV, cross sections
$0.98^{+0.22}_{-0.21}$	[8] AABOUD	18BN	ATLS	$pp \to H^0 W / H^0 Z$, $H^0 \to b\overline{b}$, 7, 8, 13 TeV
1.01 ± 0.20	[9] AABOUD	18BN	ATLS	$pp \to H^0 X$, ggF, VBF, VH^0, $t\overline{t}H^0$ 7, 8, 13 TeV
$2.5\ ^{+1.4}_{-1.3}$	[10,11] AABOUD	18BQ	ATLS	$pp \to H^0 X$, VBF, ggF, VH^0, $t\overline{t}H^0$, 13 TeV
$3.0\ ^{+1.7}_{-1.6}$	[10,12] AABOUD	18BQ	ATLS	$pp \to H^0 X$, VBF, 13 TeV
	[13] AALTONEN	18C	CDF	$p\overline{p} \to H^0 X$, 1.96 TeV
$1.19^{+0.40}_{-0.38}$	[14] SIRUNYAN	18AE	CMS	$pp \to H^0 W / H^0 Z$, $H^0 \to b\overline{b}$, 13 TeV
$1.06^{+0.31}_{-0.29}$	[15] SIRUNYAN	18AE	CMS	$pp \to H^0 W / H^0 Z$, $H^0 \to b\overline{b}$, 7, 8, 13 TeV
1.01 ± 0.22	[16] SIRUNYAN	18DB	CMS	$pp \to H^0 W / H^0 Z$, $H^0 \to b\overline{b}$, 7, 8, 13 TeV
1.04 ± 0.20	[17] SIRUNYAN	18DB	CMS	$pp \to H^0 X$, ggF, VBF, VH^0, $t\overline{t}H^0$ 7, 8, 13 TeV
$2.3\ ^{+1.8}_{-1.6}$	[18] SIRUNYAN	18E	CMS	$pp \to H^0 X$, boosted, 13 TeV
$1.20^{+0.24}_{-0.23}{}^{+0.34}_{-0.28}$	[19] AABOUD	17BA	ATLS	$pp \to H^0 W / Z X$, $H^0 \to b\overline{b}$, 13 TeV, 36.1 fb^{-1}
$0.90\pm0.18^{+0.21}_{-0.19}$	[20] AABOUD	17BA	ATLS	$pp \to H^0 W / Z X$, $H^0 \to b\overline{b}$, 7, 8, 13 TeV
$-0.8\ \pm1.3\ ^{+1.8}_{-1.9}$	[21] AABOUD	16X	ATLS	$pp \to H^0 X$, VBF, 8 TeV
0.62 ± 0.37	[5] AAD	16AN	ATLS	pp, 7, 8 TeV
$0.81^{+0.45}_{-0.43}$	[5] AAD	16AN	CMS	pp, 7, 8 TeV
$0.63^{+0.31}_{-0.30}{}^{+0.24}_{-0.23}$	[22] AAD	16K	ATLS	pp, 7, 8 TeV
$0.52\pm0.32\pm0.24$	[23] AAD	15G	ATLS	$pp \to H^0 W / Z X$, 7, 8 TeV
$2.8\ ^{+1.6}_{-1.4}$	[24] KHACHATRY...	15Z	CMS	$pp \to H^0 X$, VBF, 8 TeV
$1.03^{+0.44}_{-0.42}$	[25] KHACHATRY...	15Z	CMS	pp, 8 TeV, combined
$1.0\ \pm0.5$	[26] CHATRCHYAN	14AI	CMS	$pp \to H^0 W / Z X$, 7, 8 TeV
$1.72^{+0.92}_{-0.87}$	[27] AALTONEN	13L	CDF	$p\overline{p} \to H^0 X$, 1.96 TeV
$1.23^{+1.24}_{-1.17}$	[28] ABAZOV	13L	D0	$p\overline{p} \to H^0 X$, 1.96 TeV
$0.5\ \pm2.2$	[29] AAD	12AI	ATLS	$pp \to H^0 W / Z X$, 7 TeV
	[30] AALTONEN	12T	TEVA	$p\overline{p} \to H^0 W / Z X$, 1.96 TeV

$0.48^{+0.81}_{-0.70}$	[31] CHATRCHYAN 12N	CMS	$pp \to H^0 W/Z X$, 7, 8 TeV

[1] SIRUNYAN 19AT perform a combine fit to 35.9 fb^{-1} of data at E_{cm} = 13 TeV.

[2] AABOUD 18BN search for $V H^0$, $H^0 \to b\overline{b}$ ($V = W$, Z) using 79.8 fb^{-1} of pp collision data at E_{cm} = 13 TeV. The quoted signal strength corresponds to a significance of 4.9 standard deviations and is given for m_{H^0} = 125 GeV.

[3] SIRUNYAN 18DB search for $V H^0$, $H^0 \to b\overline{b}$ ($V = W$, Z) using 77.2 fb^{-1} of pp collision data at E_{cm} = 13 TeV. The quoted signal strength corresponds to a significance of 4.4 standard deviations and is given for m_{H^0} = 125.09 GeV.

[4] AAD 16AN perform fits to the ATLAS and CMS data at E_{cm} = 7 and 8 TeV. The signal strengths for individual production processes are 1.0 ± 0.5 for $W H^0$ production, 0.4 ± 0.4 for $Z H^0$ production, and 1.1 ± 1.0 for $t\overline{t} H^0$ production.

[5] AAD 16AN: In the fit, relative production cross sections are fixed to those in the Standard Model. The quoted signal strength is given for m_{H^0} = 125.09 GeV.

[6] AALTONEN 13M combine all Tevatron data from the CDF and D0 Collaborations with up to 10.0 fb^{-1} and 9.7 fb^{-1}, respectively, of $p\overline{p}$ collisions at E_{cm} = 1.96 TeV. The quoted signal strength is given for m_{H^0} = 125 GeV.

[7] AABOUD 19U measure cross sections of $pp \to V H^0$, $H^0 \to b\overline{b}$ production as a function of the gauge boson transverse momentum using data of 79.8 fb^{-1}. The kinematic fiducial volumes used is based on the simplified template cross section framework (reduced stage-1). See their Table 3 and Fig. 3.

[8] AABOUD 18BN combine results of 79.8 fb^{-1} at E_{cm} = 13 TeV with results of $V H^0$ at E_{cm} = 7 and 8 TeV.

[9] AABOUD 18BN combine results of $V H^0$ at E_{cm} = 7, 8 and 13 TeV with results of VBF (+gluon fusion) and $t\overline{t} H^0$ at E_{cm} = 7, 8, and 13 TeV to perform a search for the $H^0 \to b\overline{b}$ decay. The quoted signal strength assumes a SM production strength and corresponds to a significance of 5.4 standard deviations.

[10] AABOUD 18BQ search for $H^0 \to b\overline{b}$ produced through vector-boson fusion (VBF) and VBF+γ with 30.6 fb^{-1} pp collision data at E_{cm} = 13 TeV. The quoted signal strength is given for m_{H^0} = 125 GeV.

[11] The signal strength is measured including all production modes (VBF, ggF, $V H^0$, $t\overline{t} H^0$).

[12] The signal strength is measured for VBF-only and others (ggF, $V H^0$, $t\overline{t} H^0$) are constrained to Standard Model expectations with uncertainties described in their Section VIII B.

[13] AALTONEN 18C use 5.4 fb^{-1} of $p\overline{p}$ collisions at E_{cm} = 1.96 TeV. The upper limit at 95% CL on $p\overline{p} \to H^0 \to b\overline{b}$ is 33 times the SM predicion, which corresponds to a cross section of 40.6 pb.

[14] SIRUNYAN 18AE use 35.9 fb^{-1} of pp collision data at E_{cm} = 13 TeV. The quoted signal strength corresponds to 3.3 standard deviations and is given for m_{H^0} = 125.09 GeV.

[15] SIRUNYAN 18AE combine the result of 35.9 fb^{-1} at E_{cm} = 13 TeV with the results obtained from data of up to 5.1 fb^{-1} at E_{cm} = 7 TeV and up to 18.9 fb^{-1} at E_{cm} = 8 TeV (CHATRCHYAN 14AI and KHACHATRYAN 15Z). The quoted signal strength corresponds to 3.8 standard deviations and is given for m_{H^0} = 125.09 GeV.

[16] SIRUNYAN 18DB combine the result of 77.2 fb^{-1} at E_{cm} = 13 TeV with the results obtained from data of up to 5.1 fb^{-1} at E_{cm} = 7 TeV and up to 18.9 fb^{-1} at E_{cm} = 8 TeV. The quoted signal strength corresponds to a significance of 4.8 standard deviations and is given for m_{H^0} = 125.09 GeV.

[17] SIRUNYAN 18DB combine results of 77.2 fb^{-1} at E_{cm} = 13 TeV with results of gluon fusion (ggF), VBF and $t\overline{t}H^0$ at E_{cm} = 7 TeV, 8 TeV and 13 TeV to perform a search for the $H^0 \rightarrow b\overline{b}$ decay. The quoted signal strength assumes a SM production strength and corresponds to a significance of 5.6 standard deviations and is given for m_{H^0} = 125.09 GeV.

[18] SIRUNYAN 18E use 35.9 fb^{-1} at E_{cm} = 13 TeV. The quoted signal strength is given for m_{H^0} = 125 GeV. They measure $\sigma \cdot B$ for gluon fusion production of $H^0 \rightarrow b\overline{b}$ with p_T >450 GeV, $|\eta|$ <2.5 to be 74 $\pm$ 48$^{+17}_{-10}$ fb.

[19] AABOUD 17BA use 36.1 fb^{-1} at E_{cm} = 13 TeV. The quoted signal strength is given for m_{H^0} = 125 GeV. They give σ(W H)$\cdot B(H^0 \rightarrow b\overline{b}) = 1.08^{+0.54}_{-0.47}$ pb and σ(Z H)$\cdot B(H^0 \rightarrow b\overline{b}) = 0.57^{+0.26}_{-0.23}$ pb.

[20] AABOUD 17BA combine 7, 8 and 13 TeV analyses. The quoted signal strength is given for m_{H^0} = 125 GeV.

[21] AABOUD 16X search for vector-boson fusion production of H^0 decaying to $b\overline{b}$ in 20.2 fb^{-1} of pp collisions at E_{cm} = 8 TeV. The quoted signal strength is given for m_{H^0} = 125 GeV.

[22] AAD 16K use up to 4.7 fb^{-1} of pp collisions at E_{cm} = 7 TeV and up to 20.3 fb^{-1} at E_{cm} = 8 TeV. The quoted signal strength is given for m_{H^0} = 125.36 GeV.

[23] AAD 15G use 4.7 fb^{-1} of pp collisions at E_{cm} = 7 TeV and 20.3 fb^{-1} at E_{cm} = 8 TeV. The quoted signal strength is given for m_{H^0} = 125.36 GeV.

[24] KHACHATRYAN 15Z search for vector-boson fusion production of H^0 decaying to $b\overline{b}$ in up to 19.8 fb^{-1} of pp collisions at E_{cm} = 8 TeV. The quoted signal strength is given for m_{H^0} = 125 GeV.

[25] KHACHATRYAN 15Z combined vector boson fusion, WH^0, ZH^0 production, and $t\overline{t}H^0$ production results. The quoted signal strength is given for m_{H^0} = 125 GeV.

[26] CHATRCHYAN 14AI use up to 5.1 fb^{-1} of pp collisions at E_{cm} = 7 TeV and up to 18.9 fb^{-1} at E_{cm} = 8 TeV. The quoted signal strength is given for m_{H^0} = 125 GeV. See also CHATRCHYAN 14AJ.

[27] AALTONEN 13L combine all CDF results with 9.45–10.0 fb^{-1} of $p\overline{p}$ collisions at E_{cm} = 1.96 TeV. The quoted signal strength is given for m_{H^0} = 125 GeV.

[28] ABAZOV 13L combine all D0 results with up to 9.7 fb^{-1} of $p\overline{p}$ collisions at E_{cm} = 1.96 TeV. The quoted signal strength is given for m_{H^0} = 125 GeV.

[29] AAD 12AI obtain results based on 4.6–4.8 fb^{-1} of pp collisions at E_{cm} = 7 TeV. The quoted signal strengths are given in their Fig. 10 for m_{H^0} = 126 GeV. See also Fig. 13 of AAD 12DA.

[30] AALTONEN 12T combine AALTONEN 12Q, AALTONEN 12R, AALTONEN 12S, ABAZOV 12O, ABAZOV 12P, and ABAZOV 12K. An excess of events over background is observed which is most significant in the region m_{H^0} = 120–135 GeV, with a local significance of up to 3.3 σ. The local significance at m_{H^0} = 125 GeV is 2.8 σ, which corresponds to $(\sigma(H^0 W) + \sigma(H^0 Z)) \cdot$ B$(H^0 \rightarrow b\overline{b}) = (0.23^{+0.09}_{-0.08})$ pb, compared to the Standard Model expectation at m_{H^0} = 125 GeV of 0.12 $\pm$ 0.01 pb. Superseded by AALTONEN 13M.

[31] CHATRCHYAN 12N obtain results based on 5.0 fb^{-1} of pp collisions at E_{cm}=7 TeV and 5.1 fb^{-1} at E_{cm}=8 TeV. The quoted signal strength is given for m_{H^0}=125.5 GeV. See also CHATRCHYAN 13Y.

$\mu^+\mu^-$ Final State

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
0.6 ±0.8 OUR AVERAGE					
1.0 ±1.0 ±0.1		[1] SIRUNYAN	19E	CMS	pp, 7, 8, 13 TeV
−0.1 ±1.4		[2] AABOUD	17Y	ATLS	pp, 7, 8, 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
$0.68^{+1.25}_{-1.24}$		[3] SIRUNYAN	19AT	CMS	pp, 13 TeV
$0.7 \pm 1.0 ^{+0.2}_{-0.1}$		[1] SIRUNYAN	19E	CMS	pp, 13 TeV, 35.9 fb^{-1}
−0.1 ±1.5		[2] AABOUD	17Y	ATLS	pp, 13 TeV
0.1 ±2.5		[4] AAD	16AN	LHC	pp, 7, 8 TeV
−0.6 ±3.6		[4] AAD	16AN	ATLS	pp, 7, 8 TeV
$0.9 ^{+3.6}_{-3.5}$		[4] AAD	16AN	CMS	pp, 7, 8 TeV
< 7.4	95	[5] KHACHATRY...	15H	CMS	$pp \to H^0 X$, 7, 8 TeV
< 7.0	95	[6] AAD	14AS	ATLS	$pp \to H^0 X$, 7, 8 TeV

[1] SIRUNYAN 19E search for $H^0 \to \mu^+\mu^-$ using 35.9 fb^{-1} of pp collisions at E_{cm} = 13 TeV and combine with results of 7 TeV (5.0 fb^{-1}) and 8 TeV (19.7 fb^{-1}). The upper limit at 95% CL on the signal strength is 2.9, which corresponds to the SM Higgs boson branching fraction to a muon pair of 6.4×10^{-4}.

[2] AABOUD 17Y use 36.1 fb^{-1} of pp collisions at E_{cm} = 13 TeV, 20.3 fb^{-1} at 8 TeV and 4.5 fb^{-1} at 7 TeV. The quoted signal strength is given for m_{H^0} = 125 GeV.

[3] SIRUNYAN 19AT perform a combine fit to 35.9 fb^{-1} of data at E_{cm} = 13 TeV.

[4] AAD 16AN: In the fit, relative production cross sections are fixed to those in the Standard Model. The quoted signal strength is given for m_{H^0} = 125.09 GeV.

[5] KHACHATRYAN 15H use 5.0 fb^{-1} of pp collisions at E_{cm} = 7 TeV and 19.7 fb^{-1} at 8 TeV. The quoted signal strength is given for m_{H^0} = 125 GeV.

[6] AAD 14AS search for $H^0 \to \mu^+\mu^-$ in 4.5 fb^{-1} of pp collisions at E_{cm} = 7 TeV and 20.3 fb^{-1} at E_{cm} = 8 TeV. The quoted signal strength is given for m_{H^0} = 125.5 GeV.

$\tau^+\tau^-$ Final State

VALUE	DOCUMENT ID		TECN	COMMENT
$1.15^{+0.16}_{-0.15}$ OUR AVERAGE				
$1.09^{+0.18+0.26+0.16}_{-0.17-0.22-0.11}$	[1] AABOUD	19AQ	ATLS	pp, 13 TeV, $H \to \tau\tau$
$1.24^{+0.29}_{-0.27}$	[2] SIRUNYAN	19AF	CMS	pp, 13 TeV
$1.11^{+0.24}_{-0.22}$	[3,4] AAD	16AN	LHC	pp, 7, 8 TeV
$1.68^{+2.28}_{-1.68}$	[5] AALTONEN	13M	TEVA	$p\overline{p} \to H^0 X$, 1.96 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
$2.5 ^{+1.4}_{-1.3}$	[6] SIRUNYAN	19AF	CMS	$pp \to H^0 W/H^0 Z$, $H^0 \to \tau\tau$, 13 TeV
$1.02^{+0.26}_{-0.24}$	[7] SIRUNYAN	19AT	CMS	pp, 13 TeV
$1.09^{+0.27}_{-0.26}$	[8] SIRUNYAN	18Y	CMS	pp, 13 TeV

0.98 ± 0.18	[9] SIRUNYAN	18Y	CMS	pp, 7, 8, 13 TeV
2.3 ± 1.6	[10] AAD	16AC	ATLS	$pp \rightarrow H^0 W/Z X$, 8 TeV
$1.41^{+0.40}_{-0.36}$	[4] AAD	16AN	ATLS	pp, 7, 8 TeV
$0.88^{+0.30}_{-0.28}$	[4] AAD	16AN	CMS	pp, 7, 8 TeV
$1.44^{+0.30}_{-0.29}{}^{+0.29}_{-0.23}$	[11] AAD	16K	ATLS	pp, 7, 8 TeV
$1.43^{+0.27}_{-0.26}{}^{+0.32}_{-0.25} \pm 0.09$	[12] AAD	15AH	ATLS	$pp \rightarrow H^0 X$, 7, 8 TeV
0.78 ± 0.27	[13] CHATRCHYAN	14K	CMS	$pp \rightarrow H^0 X$, 7, 8 TeV
$0.00^{+8.44}_{-0.00}$	[14] AALTONEN	13L	CDF	$p\overline{p} \rightarrow H^0 X$, 1.96 TeV
$3.96^{+4.11}_{-3.38}$	[15] ABAZOV	13L	D0	$p\overline{p} \rightarrow H^0 X$, 1.96 TeV
$0.4\ ^{+1.6}_{-2.0}$	[16] AAD	12AI	ATLS	$pp \rightarrow H^0 X$, 7 TeV
$0.09^{+0.76}_{-0.74}$	[17] CHATRCHYAN	12N	CMS	$pp \rightarrow H^0 X$, 7, 8 TeV

[1] AABOUD 19AQ use 36.1 fb^{-1} of data. The first, second and third quoted errors are statistical, experimental systematic and theory systematic uncertainties, respectively. The quoted signal strength is given for m_{H^0} = 125 GeV and corresponds to 4.4 standard deviations. Combining with 7 TeV and 8 TeV results (AAD 15AH), the observed significance is 6.4 standard deviations. The cross sections in the $H^0 \rightarrow \tau\tau$ decay channel (m_{H^0} = 125 GeV) are measured to $3.77^{+0.60}_{-0.59}$ (stat) $^{+0.87}_{-0.74}$ (syst) pb for the inclusive, $0.28 \pm 0.09^{+0.11}_{-0.09}$ pb for VBF, and $3.1 \pm 1.0^{+1.6}_{-1.3}$ pb for gluon-fusion production. See their Table XI for the cross sections in the framework of simplified template cross sections.

[2] SIRUNYAN 19AF use 35.9 fb^{-1} of data. $H^0 W/Z$ channels are added with a few updates on gluon fusion and vector boson fusion with respect to SIRUNYAN 18Y. The quoted signal strength is given for m_{H^0} = 125 GeV and corresponds to 5.5 standard deviations. The signal strengths for the individual production modes are: $1.12^{+0.53}_{-0.50}$ for gluon fusion, $1.13^{+0.45}_{-0.42}$ for vector boson fusion, $3.39^{+1.68}_{-1.54}$ for WH^0 and $1.23^{+1.62}_{-1.35}$ for ZH^0. See their Fig. 7 for other couplings (κ_V, κ_f).

[3] AAD 16AN perform fits to the ATLAS and CMS data at $E_{\rm cm}$ = 7 and 8 TeV. The signal strengths for individual production processes are 1.0 ± 0.6 for gluon fusion, 1.3 ± 0.4 for vector boson fusion, -1.4 ± 1.4 for WH^0 production, $2.2^{+2.2}_{-1.8}$ for ZH^0 production, and $-1.9^{+3.7}_{-3.3}$ for $t\overline{t}H^0$ production.

[4] AAD 16AN: In the fit, relative production cross sections are fixed to those in the Standard Model. The quoted signal strength is given for m_{H^0} = 125.09 GeV.

[5] AALTONEN 13M combine all Tevatron data from the CDF and D0 Collaborations with up to 10.0 fb^{-1} and 9.7 fb^{-1}, respectively, of $p\overline{p}$ collisions at $E_{\rm cm}$ = 1.96 TeV. The quoted signal strength is given for m_{H^0} = 125 GeV.

[6] SIRUNYAN 19AF use 35.9 fb^{-1} of data. The quoted signal strength is given for m_{H^0} = 125 GeV and corresponds to 2.3 standard deviations.

[7] SIRUNYAN 19AT perform a combine fit to 35.9 fb^{-1} of data at $E_{\rm cm}$ = 13 TeV. This combination is based on SIRUNYAN 18Y.

[8] SIRUNYAN 18Y use 35.9 fb^{-1} of pp collisions at $E_{\rm cm}$ = 13 TeV. The quoted signal strength is given for m_{H^0} = 125.09 GeV and corresponds to 4.9 standard deviations.

[9] SIRUNYAN 18Y combine the result of 35.9 fb^{-1} at $E_{\rm cm}$ = 13 TeV with the results obtained from data of 4.9 fb^{-1} at $E_{\rm cm}$ = 7 TeV and 19.7 fb^{-1} at $E_{\rm cm}$ = 8 TeV (KHACHATRYAN 15AM). The quoted signal strength is given for m_{H^0} = 125.09 GeV and corresponds to 5.9 standard deviations.

[10] AAD 16AC measure the signal strength with $pp \to H^0 W/Z X$ processes using 20.3 fb^{-1} of $E_{\rm cm}$ = 8 TeV. The quoted signal strength is given for m_{H^0} = 125 GeV.

[11] AAD 16K use up to 4.7 fb^{-1} of pp collisions at $E_{\rm cm}$ = 7 TeV and up to 20.3 fb^{-1} at $E_{\rm cm}$ = 8 TeV. The quoted signal strength is given for m_{H^0} = 125.36 GeV.

[12] AAD 15AH use 4.5 fb^{-1} of pp collisions at $E_{\rm cm}$ = 7 TeV and 20.3 fb^{-1} at $E_{\rm cm}$ = 8 TeV. The third uncertainty in the measurement is theory systematics. The signal strength for the gluon fusion mode is $2.0 \pm 0.8^{+1.2}_{-0.8} \pm 0.3$ and that for vector boson fusion and $W/Z H^0$ production modes is $1.24^{+0.49}_{-0.45}{}^{+0.31}_{-0.29} \pm 0.08$. The quoted signal strength is given for m_{H^0} = 125.36 GeV.

[13] CHATRCHYAN 14K use 4.9 fb^{-1} of pp collisions at $E_{\rm cm}$ = 7 TeV and 19.7 fb^{-1} at $E_{\rm cm}$ = 8 TeV. The quoted signal strength is given for m_{H^0} = 125 GeV. See also CHATRCHYAN 14AJ.

[14] AALTONEN 13L combine all CDF results with 9.45–10.0 fb^{-1} of $p\overline{p}$ collisions at $E_{\rm cm}$ = 1.96 TeV. The quoted signal strength is given for m_{H^0} = 125 GeV.

[15] ABAZOV 13L combine all D0 results with up to 9.7 fb^{-1} of $p\overline{p}$ collisions at $E_{\rm cm}$ = 1.96 TeV. The quoted signal strength is given for m_{H^0} = 125 GeV.

[16] AAD 12AI obtain results based on 4.7 fb^{-1} of pp collisions at $E_{\rm cm}$ = 7 TeV. The quoted signal strengths are given in their Fig. 10 for m_{H^0} = 126 GeV. See also Fig. 13 of AAD 12DA.

[17] CHATRCHYAN 12N obtain results based on 4.9 fb^{-1} of pp collisions at $E_{\rm cm}$=7 TeV and 5.1 fb^{-1} at $E_{\rm cm}$=8 TeV. The quoted signal strength is given for m_{H^0}=125.5 GeV. See also CHATRCHYAN 13Y .

$Z\gamma$ Final State

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
< 6.6	95	[1] AABOUD 17AW	ATLS	$pp \to H^0 X$, 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •				
< 7.4	95	[2] SIRUNYAN 18DQ	CMS	$pp \to H^0 X$, 13 TeV, $H^0 \to Z\gamma$
<11	95	[3] AAD 14J	ATLS	$pp \to H^0 X$, 7, 8 TeV
< 9.5	95	[4] CHATRCHYAN 13BK	CMS	$pp \to H^0 X$, 7, 8 TeV

[1] AABOUD 17AW search for $H^0 \to Z\gamma$, $Z \to ee$, $\mu\mu$ in 36.1 fb^{-1} of pp collisions at $E_{\rm cm}$ = 13 TeV. The quoted signal strength is given for m_{H^0} = 125.09 GeV. The upper limit on the branching ratio of $H^0 \to Z\gamma$ is 1.0% at 95% CL assuming the SM Higgs boson production.

[2] SIRUNYAN 18DQ search for $H^0 \to Z\gamma$, $Z \to ee$, $\mu\mu$ in 35.9 fb^{-1} of pp collisions at $E_{\rm cm}$ = 13 TeV. The quoted signal strength (see their Figs. 6 and 7) is given for m_{H^0} = 125 GeV.

[3] AAD 14J search for $H^0 \to Z\gamma \to \ell\ell\gamma$ in 4.5 fb^{-1} of pp collisions at $E_{\rm cm}$ = 7 TeV and 20.3 fb^{-1} at $E_{\rm cm}$ = 8 TeV. The quoted signal strength is given for m_{H^0} = 125.5 GeV.

[4] CHATRCHYAN 13BK search for $H^0 \to Z\gamma \to \ell\ell\gamma$ in 5.0 fb^{-1} of pp collisions at $E_{\rm cm}$ = 7 TeV and 19.6 fb^{-1} at $E_{\rm cm}$ = 8 TeV. A limit on cross section times branching ratio which corresponds to (4–25) times the expected Standard Model cross section is given in the range m_{H^0} = 120–160 GeV at 95% CL. The quoted limit is given for m_{H^0} = 125 GeV, where 10 is expected for no signal.

$\gamma^*\gamma$ Final State

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<4.0	95	[1] SIRUNYAN	18DQ	CMS	$pp \to H^0 X$, 13 TeV, $H^0 \to \gamma^*\gamma$
<6.7	95	[2] KHACHATRY...	16B	CMS	pp, 8 TeV, $ee\gamma$, $\mu\mu\gamma$

[1] SIRUNYAN 18DQ search for $H^0 \to \gamma^*\gamma$, $\gamma^* \to \mu\mu$ in 35.9 fb^{-1} of pp collisions at E_{cm} = 13 TeV. The mass of γ^* is smaller than 50 GeV except in J/ψ and Υ mass regions. The quoted signal strength (see their Figs. 6 and 7) is given for m_{H^0} = 125 GeV.

[2] KHACHATRYAN 16B search for $H^0 \to \gamma^*\gamma \to e^+e^-\gamma$ and $\mu^+\mu^-\gamma$ (with m(e^+e^-) < 3.5 GeV and m($\mu^+\mu^-$) < 20 GeV) in 19.7 fb^{-1} of pp collisions at E_{cm} = 8 TeV. See their Fig. 6 for limits on individual channels.

Higgs Yukawa couplings

top Yukawa coupling

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
<1.7	95	[1] SIRUNYAN	20C	CMS	pp, 13 TeV
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.67	95	[2] SIRUNYAN	19BY	CMS	pp, 13 TeV
<2.1	95	[3] SIRUNYAN	18BU	CMS	pp, 13 TeV

[1] SIRUNYAN 20C search for the production of four top quarks with same-sign and multilepton final states with 137 fb^{-1} pp collision data at E_{cm} = 13 TeV. The results constraint the ratio of the top quark Yukawa coupling y_t to its the Standard Model by comparing to the central value of a theoretical prediction (see their Refs. [1-2]), yielding $|y_t/y_t^{SM}| < 1.7$ at 95% CL. See their Fig. 5.

[2] SIRUNYAN 19BY measure the top quark Yukawa coupling from $t\overline{t}$ kinematic distributions, the invariant mass of the top quark pair and the rapidity difference between t and $\overline{t}$, in the ℓ+jets final state with 35.8 fb^{-1} pp collision data at E_{cm} = 13 TeV. The results constraint the ratio of the top quark Yukawa coupling to its the Standard Model to be $1.07^{+0.34}_{-0.43}$ with an upper limit of 1.67 at 95% CL (see their Table III).

[3] SIRUNYAN 18BU search for the production of four top quarks with same-sign and multilepton final states with 35.9 fb^{-1} pp collision data at E_{cm} = 13 TeV. The results constraint the ratio of the top quark Yukawa coupling y_t to its the Standard Model by comparing to the central value of a theoretical prediction (see their Ref. [16]), yielding $|y_t/y_t^{SM}| < 2.1$ at 95% CL.

OTHER H^0 PRODUCTION PROPERTIES

$t\overline{t}H^0$ Production

Signal strengh relative to the Standard Model cross section.

VALUE	CL%	DOCUMENT ID		TECN	COMMENT
1.28±0.20 OUR AVERAGE					
1.2 ±0.3		[1] AABOUD	18AC	ATLS	pp, 13 TeV, $H^0 \to b\overline{b}\,\tau\tau$, $\gamma\gamma$, WW^*, ZZ^*
$1.26^{+0.31}_{-0.26}$		[2] SIRUNYAN	18L	CMS	pp, 7, 8, 13 TeV, $H^0 \to b\overline{b}$, $\tau\tau$, $\gamma\gamma$, WW^*, ZZ^*
$1.9\ ^{+0.8}_{-0.7}$		[3] AAD	16AN	ATLS	pp, 7, 8 TeV

• • • We do not use the following data for averages, fits, limits, etc. • • •

$0.72 \pm 0.24 \pm 0.38$		[4] SIRUNYAN	19R	CMS	pp, 13 TeV, $H^0 \rightarrow b\overline{b}$
$1.6\ ^{+0.5}_{-0.4}$		[5] AABOUD	18AC	ATLS	pp, 13 TeV, $H^0 \rightarrow \tau\tau$, WW^*, ZZ^*
		[6] AABOUD	18BK	ATLS	pp, 13 TeV, $H^0 \rightarrow b\overline{b}\ \tau\tau$, $\gamma\gamma$, WW^*, ZZ^*
$0.84\ ^{+0.64}_{-0.61}$		[7] AABOUD	18T	ATLS	pp, 13 TeV, $H^0 \rightarrow b\overline{b}$
0.9 ± 1.5		[8] SIRUNYAN	18BD	CMS	pp, 13 TeV, $H^0 \rightarrow b\overline{b}$
$1.23\ ^{+0.45}_{-0.43}$		[9] SIRUNYAN	18BQ	CMS	pp, 13 TeV, $H^0 \rightarrow \tau\tau$, WW^*, ZZ^*
1.7 ± 0.8		[10] AAD	16AL	ATLS	pp, 7, 8 TeV, $H^0 \rightarrow b\overline{b}$, $\tau\tau$, $\gamma\gamma$, WW^*, and ZZ^*
$2.3\ ^{+0.7}_{-0.6}$		[3,11] AAD	16AN	LHC	pp, 7, 8 TeV
$2.9\ ^{+1.0}_{-0.9}$		[3] AAD	16AN	CMS	pp, 7, 8 TeV
$1.81\ ^{+0.52}_{-0.50}\ ^{+0.58}_{-0.55}\ ^{+0.31}_{-0.12}$		[12] AAD	16K	ATLS	pp, 7, 8 TeV
$1.4\ ^{+2.1}_{-1.4}\ ^{+0.6}_{-0.3}$		[13] AAD	15	ATLS	pp, 7, 8 TeV
1.5 ± 1.1		[14] AAD	15BC	ATLS	pp, 8 TeV
$2.1\ ^{+1.4}_{-1.2}$		[15] AAD	15T	ATLS	pp, 8 TeV
$1.2\ ^{+1.6}_{-1.5}$		[16] KHACHATRY...	15AN	CMS	pp, 8 TeV
$2.8\ ^{+1.0}_{-0.9}$		[17] KHACHATRY...	14H	CMS	pp, 7, 8 TeV
$9.49\ ^{+6.60}_{-6.28}$		[18] AALTONEN	13L	CDF	$p\overline{p}$, 1.96 TeV
<5.8	95	[19] CHATRCHYAN	13X	CMS	pp, 7, 8 TeV, $H^0 \rightarrow b\overline{b}$

[1] AABOUD 18AC combine results of $t\overline{t}H^0$, $H^0 \rightarrow \tau\tau$, $WW^*(\rightarrow \ell\nu\ell\nu$, $\ell\nu q\overline{q})$, $ZZ^*(\rightarrow \ell\ell\nu\nu$, $\ell\ell q\overline{q})$ with results of $t\overline{t}H^0$, $H^0 \rightarrow b\overline{b}$ (AABOUD 18T), $\gamma\gamma$ (AABOUD 18BO), $ZZ^*(\rightarrow 4\ell)$ (AABOUD 18AJ) in 36.1 fb^{-1} of pp collisions at $E_{\rm cm}$ = 13 TeV. The quoted signal strength is given for m_{H^0} = 125 GeV. See their Table 14.

[2] SIRUNYAN 18L use up to 5.1, 19.7 and 35.9 fb^{-1} of pp collisions at $E_{\rm cm}$ = 7, 8, and 13 TeV, respectively. The quoted signal strength corresponds to a significance of 5.2 standard deviations and is given for m_{H^0} = 125.09 GeV. H^0 decay channels of WW^*, ZZ^*, $\gamma\gamma$, $\tau\tau$, and $b\overline{b}$ are used. See their Table 1 and Fig. 2 for results on individual channels.

[3] AAD 16AN: In the fit, relative branching ratios are fixed to those in the Standard Model. The quoted signal strength is given for m_{H^0} = 125.09 GeV.

[4] SIRUNYAN 19R search for $t\overline{t}H^0$ production with H^0 decaying to $b\overline{b}$ in 35.9 fb^{-1} of data at $E_{\rm cm}$ = 13 TeV. The quoted signal strength is given for m_{H^0} = 125 GeV.

[5] AABOUD 18AC search for $t\overline{t}H^0$ production with H^0 decaying to $\tau\tau$, $WW^*(\rightarrow \ell\nu\ell\nu$, $\ell\nu q\overline{q})$, $ZZ^*(\rightarrow \ell\ell\nu\nu$, $\ell\ell q\overline{q})$ in 36.1 fb^{-1} of pp collisions at $E_{\rm cm}$ = 13 TeV. The quoted signal strength is given for m_{H^0} = 125 GeV. See their Table 13 and Fig. 13.

[6] AABOUD 18BK use 79.8 fb^{-1} data for $t\overline{t}H^0$ production with $H^0 \rightarrow \gamma\gamma$ and $ZZ^* \rightarrow 4\ell$ ($\ell = e, \mu$) and 36.1 fb^{-1} for other decay channels at E_{cm} = 13 TeV. A significance of 5.8 standard deviations is observed for m_{H^0} = 125.09 GeV and its signal strength without the uncertainty of the $t\overline{t}H^0$ cross section is $1.32^{+0.28}_{-0.26}$. Combining with results of 7 and 8 TeV (AAD 16K), the significance is 6.3 standard deviations. Assuming Standard Model branching fractions, the total $t\overline{t}H^0$ production cross section at 13 TeV is measured to be $670 \pm 90^{+110}_{-100}$ fb.

[7] AABOUD 18T search for $t\overline{t}H^0$ production with H^0 decaying to $b\overline{b}$ in 36.1 fb^{-1} of pp collisions at E_{cm} = 13 TeV. The quoted signal strength is given for m_{H^0} = 125 GeV.

[8] SIRUNYAN 18BD search for $t\overline{t}H^0$, $H^0 \rightarrow b\overline{b}$ in the all-jet final state with 35.9 fb^{-1} pp collision data at E_{cm} = 13 TeV. The quoted signal strength is given for m_{H^0} = 125 GeV.

[9] SIRUNYAN 18BQ search for $t\overline{t}H^0$ in final states with electrons, muons and hadronically decaying τ leptons ($H^0 \rightarrow WW^*$, ZZ^*, $\tau\tau$) with 35.9 fb^{-1} of pp collision data at E_{cm} = 13 TeV. The quoted signal strength corresponds to a significance of 3.2 standard deviations and is given for m_{H^0} = 125 GeV.

[10] AAD 16AL search for $t\overline{t}H^0$ production with H^0 decaying to $\gamma\gamma$ in 4.5 fb^{-1} of pp collisions at E_{cm} = 7 TeV and $b\overline{b}$, $\tau\tau$, $\gamma\gamma$, WW^*, and ZZ^* in 20.3 fb^{-1} at E_{cm} = 8 TeV. The quoted signal strength is given for m_{H^0} = 125 GeV. This paper combines the results of previous papers, and the new result of this paper only is: $\mu = 1.6 \pm 2.6$.

[11] AAD 16AN perform fits to the ATLAS and CMS data at E_{cm} = 7 and 8 TeV.

[12] AAD 16K use up to 4.7 fb^{-1} of pp collisions at E_{cm} = 7 TeV and up to 20.3 fb^{-1} at E_{cm} = 8 TeV. The third uncertainty in the measurement is theory systematics. The quoted signal strength is given for m_{H^0} = 125.36 GeV.

[13] AAD 15 search for $t\overline{t}H^0$ production with H^0 decaying to $\gamma\gamma$ in 4.5 fb^{-1} of pp collisions at E_{cm} = 7 TeV and 20.3 fb^{-1} at E_{cm} = 8 TeV. The quoted result on the signal strength is equivalent to an upper limit of 6.7 at 95% CL and is given for m_{H^0} = 125.4 GeV.

[14] AAD 15BC search for $t\overline{t}H^0$ production with H^0 decaying to $b\overline{b}$ in 20.3 fb^{-1} of pp collisions at E_{cm} = 8 TeV. The corresponding upper limit is 3.4 at 95% CL. The quoted signal strength is given for m_{H^0} = 125 GeV.

[15] AAD 15T search for $t\overline{t}H^0$ production with H^0 resulting in multilepton final states (mainly from WW^*, $\tau\tau$, ZZ^*) in 20.3 fb^{-1} of pp collisions at E_{cm} = 8 TeV. The quoted result on the signal strength is given for m_{H^0} = 125 GeV and corresponds to an upper limit of 4.7 at 95% CL. The data sample is independent from AAD 15 and AAD 15BC.

[16] KHACHATRYAN 15AN search for $t\overline{t}H^0$ production with H^0 decaying to $b\overline{b}$ in 19.5 fb^{-1} of pp collisions at E_{cm} = 8 TeV. The quoted result on the signal strength is equivalent to an upper limit of 4.2 at 95% CL and is given for m_{H^0} = 125 GeV.

[17] KHACHATRYAN 14H search for $t\overline{t}H^0$ production with H^0 decaying to $b\overline{b}$, $\tau\tau$, $\gamma\gamma$, WW^*, and ZZ^*, in 5.1 fb^{-1} of pp collisions at E_{cm} = 7 TeV and 19.7 fb^{-1} at E_{cm} = 8 TeV. The quoted signal strength is given for m_{H^0} = 125.6 GeV.

[18] AALTONEN 13L combine all CDF results with 9.45–10.0 fb^{-1} of $p\overline{p}$ collisions at E_{cm} = 1.96 TeV. The quoted signal strength is given for m_{H^0} = 125 GeV.

[19] CHATRCHYAN 13X search for $t\overline{t}H^0$ production followed by $H^0 \rightarrow b\overline{b}$, one top decaying to $\ell\nu$ and the other to either $\ell\nu$ or $q\overline{q}$ in 5.0 fb^{-1} and 5.1 fb^{-1} of pp collisions at E_{cm} = 7 and 8 TeV. A limit on cross section times branching ratio which corresponds to (4.0–8.6) times the expected Standard Model cross section is given for m_{H^0} = 110–140 GeV at 95% CL. The quoted limit is given for m_{H^0} = 125 GeV, where 5.2 is expected for no signal.

$H^0 H^0$ Production

The 95% CL limits are for the cross section (CS) and Higgs self coupling (κ_λ) scaling factors both relative to the SM predictions.

CS	κ_λ	CL%	DOCUMENT ID		TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •						
$<$ 6.9	-5.0 to 12.0	95	[1] AAD	20C	ATLS	13 TeV, $b\overline{b}\gamma\gamma$, $b\overline{b}\tau\tau$, $b\overline{b}b\overline{b}$, $b\overline{b}WW^*$, $WW^*\gamma\gamma$, WW^*WW^*
$<$ 40		95	[2] AAD	20E	ATLS	13 TeV, $H^0 H^0 \rightarrow b\overline{b}\ell\nu\ell\nu$
$<$ 12.9		95	[3] AABOUD	19A	ATLS	13 TeV, $b\overline{b}b\overline{b}$
$<$300		95	[4] AABOUD	19O	ATLS	13 TeV, $b\overline{b}WW^*$
$<$160		95	[5] AABOUD	19T	ATLS	13 TeV, WW^*WW^*
$<$ 24	-11 to 17	95	[6] SIRUNYAN	19	CMS	13 TeV, $\gamma\gamma b\overline{b}$
$<$ 75		95	[7] SIRUNYAN	19AB	CMS	13 TeV, $b\overline{b}b\overline{b}$
$<$ 22.2	-11.8 to 18.8	95	[8] SIRUNYAN	19BE	CMS	13 TeV, $b\overline{b}\gamma\gamma$ $b\overline{b}\tau\tau$, $b\overline{b}b\overline{b}$, $b\overline{b}WW^*$, $b\overline{b}ZZ^*$
$<$179		95	[9] SIRUNYAN	19H	CMS	13 TeV, $b\overline{b}b\overline{b}$
$<$230		95	[10] AABOUD	18BU	ATLS	13 TeV, $\gamma\gamma WW^*$
$<$ 12.7		95	[11] AABOUD	18CQ	ATLS	13 TeV, $b\overline{b}\tau\tau$
$<$ 22	-8.2 to 13.2	95	[12] AABOUD	18CW	ATLS	13 TeV, $\gamma\gamma b\overline{b}$
$<$ 30		95	[13] SIRUNYAN	18A	CMS	13 TeV, $b\overline{b}\tau\tau$
$<$ 79		95	[14] SIRUNYAN	18F	CMS	13 TeV, $b\overline{b}\ell\nu\ell\nu$
$<$ 43		95	[15] SIRUNYAN	17CN	CMS	8 TeV, $b\overline{b}\tau\tau$, $\gamma\gamma b\overline{b}$, $b\overline{b}b\overline{b}$
$<$108		95	[16] AABOUD	16I	ATLS	13 TeV, $b\overline{b}b\overline{b}$
$<$ 74		95	[17] KHACHATRY...	16BQ	CMS	8 TeV, $\gamma\gamma b\overline{b}$
$<$ 70		95	[18] AAD	15CE	ATLS	8 TeV, $b\overline{b}b\overline{b}$, $b\overline{b}\tau\tau$, $\gamma\gamma b\overline{b}$, $\gamma\gamma WW$

[1] AAD 20C combine results of up to 36.1 fb^{-1} data at $E_{\rm cm}$ = 13 TeV for $pp \rightarrow H^0 H^0 \rightarrow b\overline{b}\gamma\gamma$, $b\overline{b}\tau\tau$, $b\overline{b}b\overline{b}$, $b\overline{b}WW^*$, $WW^*\gamma\gamma$, WW^*WW^* (AABOUD 18CW, AABOUD 18CQ, AABOUD 19A, AABOUD 19O, AABOUD 18BU, and AABOUD 19T).

[2] AAD 20E search non-resonant for $H^0 H^0$ production using $H^0 H^0 \rightarrow b\overline{b}\ell\nu\ell\nu$, where one of the Higgs bosons decays to $b\overline{b}$ and the other decays to either WW^*, ZZ^*, or $\tau\tau$, with data of 139 fb^{-1} at $E_{\rm cm}$ = 13 TeV. The upper limit on the $pp \rightarrow H^0 H^0$ production cross section at 95% CL is measured to be 1.2 pb, which corresponds to about 40 times the SM prediction.

[3] AABOUD 19A search for $H^0 H^0$ production using $H^0 H^0 \rightarrow b\overline{b}b\overline{b}$ with data of 36.1 fb^{-1} at $E_{\rm cm}$ = 13 TeV. The upper limit on the $pp \rightarrow H^0 H^0 \rightarrow b\overline{b}b\overline{b}$ production cross section at 95% is measured to be 147 fb, which corresponds to about 12.9 times the SM prediction.

[4] AABOUD 19O search for $H^0 H^0$ production using $H^0 H^0 \rightarrow b\overline{b}WW^*$ with data of 36.1 fb^{-1} at $E_{\rm cm}$ = 13 TeV. The upper limit on the $pp \rightarrow H^0 H^0$ production cross section at 95% CL is calculated to be 10 pb from the observed upper limit on the $pp \rightarrow H^0 H^0 \rightarrow b\overline{b}WW^*$ production cross section of 2.5 pb assuming the SM branching fractions. The former corresponds to about 300 times the SM prediction.

[5] AABOUD 19T search for $H^0 H^0$ production using $H^0 H^0 \rightarrow WW^* WW^*$ with data of 36.1 fb^{-1} at $E_{cm} = 13$ TeV. The upper limit on the $pp \rightarrow H^0 H^0$ production cross section at 95% is measured to be 5.3 pb, which corresponds to about 160 times the SM prediction.

[6] SIRUNYAN 19 search for $H^0 H^0$ production using $H^0 H^0 \rightarrow \gamma\gamma b\overline{b}$ with data of 35.9 fb^{-1} at $E_{cm} = 13$ TeV. The upper limit on the $pp \rightarrow H^0 H^0 \rightarrow \gamma\gamma b\overline{b}$ production cross section at 95% CL is measured to be 2.0 fb, which corresponds to about 24 times the SM prediction. The effective Higgs boson self-coupling κ_λ ($= \lambda_{HHH} / \lambda^{SM}_{HHH}$) is constrainted to be $-11 < \kappa_\lambda < 17$ at 95% CL assuming all other Higgs boson couplings are at their SM value.

[7] SIRUNYAN 19AB search for $H^0 H^0$ production using $H^0 H^0 \rightarrow b\overline{b}b\overline{b}$, where 4 heavy flavor jets from two Higgs bosons are resolved, with data of 35.9 fb^{-1} at $E_{cm} = 13$ TeV. The upper limit on the $pp \rightarrow H^0 H^0 \rightarrow b\overline{b}b\overline{b}$ production cross section at 95% is measured to be 847 fb, which corresponds to about 75 times the SM prediction.

[8] SIRUNYAN 19BE combine results of 13 TeV 35.9 fb^{-1} data: SIRUNYAN 19, SIRUNYAN 18A, SIRUNYAN 19AB, SIRUNYAN 19H, and SIRUNYAN 18F.

[9] SIRUNYAN 19H search for $H^0 H^0$ production using $H^0 H^0 \rightarrow b\overline{b}b\overline{b}$, where one of $b\overline{b}$ pairs is highly boosted and the other one is resolved, with data of 35.9 fb^{-1} at $E_{cm} =$ 13 TeV. The upper limit on the $pp \rightarrow H^0 H^0 \rightarrow b\overline{b}b\overline{b}$ production cross section at 95% is measured to be 1980 fb, which corresponds to about 179 times the SM prediction.

[10] AABOUD 18BU search for $H^0 H^0$ production using $\gamma\gamma WW^*$ with the final state of $\gamma\gamma\ell\nu jj$ using data of 36.1 fb^{-1} at $E_{cm} = 13$ TeV. The upper limit on the $pp \rightarrow H^0 H^0$ production cross section at 95% CL is measured to be 7.7 pb, which corresponds to about 230 times the SM prediction. The upper limit on the $pp \rightarrow H^0 H^0 \rightarrow \gamma\gamma WW^*$ at 95% CL is measured to be 7.5 fb (see thier Table 6).

[11] AABOUD 18CQ search for $H^0 H^0$ production using $H^0 H^0 \rightarrow b\overline{b}\tau\tau$ with data of 36.1 fb^{-1} at $E_{cm} = 13$ TeV. The upper limit on the $pp \rightarrow H^0 H^0 \rightarrow b\overline{b}\tau\tau$ production cross section at 95% is measured to be 30.9 fb, which corresponds to about 12.7 times the SM prediction.

[12] AABOUD 18CW search for $H^0 H^0$ production using $H^0 H^0 \rightarrow \gamma\gamma b\overline{b}$ with data of 36.1 fb^{-1} at $E_{cm} = 13$ TeV. The upper limit on the $pp \rightarrow H^0 H^0$ production cross section at 95% is measured to be 0.73 pb, which corresponds to about 22 times the SM prediction. The effective Higgs boson self-coupling κ_λ is constrained to be $-8.2 < \kappa_\lambda < 13.2$ at 95% CL assuming all other Higgs boson couplings are at their SM value.

[13] SIRUNYAN 18A search for $H^0 H^0$ production using $H^0 H^0 \rightarrow b\overline{b}\tau\tau$ with data of 35.9 fb^{-1} at $E_{cm} = 13$ TeV. The upper limit on the $gg \rightarrow H^0 H^0 \rightarrow b\overline{b}\tau\tau$ production cross section is measured to be 75.4 fb, which corresponds to about 30 times the SM prediction. Limits on Higgs-boson trilinear coupling λ_{HHH} and top Yukawa coupling y_t are also given (see their Fig. 6).

[14] SIRUNYAN 18F search non-resonant for $H^0 H^0$ production using $H^0 H^0 \rightarrow b\overline{b}\ell\nu\ell\nu$, where $\ell\nu\ell\nu$ is either $WW \rightarrow \ell\nu\ell\nu$ or $ZZ \rightarrow \ell\ell\nu\nu$ (ℓ is e, μ or a leptonically decaying τ), with data of 35.9 fb^{-1} at $E_{cm} = 13$ TeV. The upper limit on the $H^0 H^0 \rightarrow b\overline{b}\ell\nu\ell\nu$ production cross section at 95% CL is measured to be 72 fb, which corresponds to about 79 times the SM prediction.

[15] SIRUNYAN 17CN search for $H^0 H^0$ production using $H^0 H^0 \rightarrow b\overline{b}\tau\tau$ with data of 18.3 fb^{-1} at $E_{cm} = 8$ TeV. Results are then combined with the published results of the $H^0 H^0 \rightarrow \gamma\gamma b\overline{b}$ and $H^0 H^0 \rightarrow b\overline{b}b\overline{b}$, which use data of up to 19.7 fb^{-1} at $E_{cm} =$ 8 TeV. The upper limit on the $gg \rightarrow H^0 H^0$ production cross section is measured to be 0.59 pb from $b\overline{b}\tau\tau$, which corresponds to about 59 times the SM prediction (gluon fusion). The combined upper limit is 0.43 pb, which is about 43 times the SM prediction. The quoted values are given for $m_{H^0} = 125$ GeV.

[16] AABOUD 16I search for $H^0 H^0$ production using $H^0 H^0 \rightarrow b\overline{b}b\overline{b}$ with data of 3.2 fb^{-1} at E_{cm} = 13 TeV. The upper limit on the $pp \rightarrow H^0 H^0 \rightarrow b\overline{b}b\overline{b}$ production cross section is measured to be 1.22 pb. This result corresponds to about 108 times the SM prediction (gluon fusion), which is $11.3^{+0.9}_{-1.0}$ fb (NNLO+NNLL) including top quark mass effects. The quoted values are given for m_{H^0} = 125 GeV .

[17] KHACHATRYAN 16BQ search for $H^0 H^0$ production using $H^0 H^0 \rightarrow \gamma\gamma b\overline{b}$ with data of 19.7 fb^{-1} at E_{cm} = 8 TeV. The upper limit on the $gg \rightarrow H^0 H^0 \rightarrow \gamma\gamma b\overline{b}$ production is measured to be 1.85 fb, which corresponds to about 74 times the SM prediction and is translated into 0.71 pb for $gg \rightarrow H^0 H^0$ production cross section. Limits on Higgs-boson trilinear coupling λ are also given.

[18] AAD 15CE search for $H^0 H^0$ production using $H^0 H^0 \rightarrow b\overline{b}\tau\tau$ and $H^0 H^0 \rightarrow \gamma\gamma W W$ with data of 20.3 fb^{-1} at E_{cm} = 8 TeV. These results are then combined with the published results of the $H^0 H^0 \rightarrow \gamma\gamma b\overline{b}$ and $H^0 H^0 \rightarrow b\overline{b}b\overline{b}$, which use data of up to 20.3 fb^{-1} at E_{cm} = 8 TeV. The upper limits on the $gg \rightarrow H^0 H^0$ production cross section are measured to be 1.6 pb, 11.4 pb, 2.2 pb and 0.62 pb from $b\overline{b}\tau\tau$, $\gamma\gamma W W$, $\gamma\gamma b\overline{b}$ and $b\overline{b}b\overline{b}$, respectively. The combined upper limit is 0.69 pb, which corresponds to about 70 times the SM prediction. The quoted results are given for m_{H^0} = 125.4 GeV. See their Table 4.

tH^0 associated production cross section

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
	[1] SIRUNYAN 19BK	CMS	pp, 13 TeV
	[2] KHACHATRY...16AU	CMS	pp, 8 TeV

[1] SIRUNYAN 19BK search for the tH^0 associated production using multilepton signatures ($H^0 \rightarrow W W^*$, $H^0 \rightarrow \tau\tau$, $H^0 \rightarrow Z Z^*$) and signatures with a single lepton and a $b\overline{b}$ pair ($H^0 \rightarrow b\overline{b}$) using 35.9 fb^{-1} at E_{cm} = 13 TeV. Results are combined with $H^0 \rightarrow \gamma\gamma$ (SIRUNYAN 18DS). The observed 95% CL upper limit on the tH^0 production cross section times $H^0 \rightarrow W W^* + \tau\tau + Z Z^* + b\overline{b} + \gamma\gamma$ branching fraction is 1.94 pb (assuming SM $t\overline{t}H^0$ production cross section). See their Table X and Fig. 14. The values outside the ranges of [−0.9, −0.5] and [1.0, 2.1] times the standard model top quark Yukawa coupling are excluded at 95% CL.

[2] KHACHATRYAN 16AU search for the tH^0 associated production in 19.7 fb^{-1} at E_{cm} = 8 TeV. The 95% CL upper limits on the tH^0 associated production cross section is measured to be 600–1000 fb depending on the assumed $\gamma\gamma$ branching ratios of the Higgs boson. The $\gamma\gamma$ branching ratio is varied to be by a factor of 0.5–3.0 of the Standard Model Higgs boson (m_{H^0} = 125 GeV). The results of the signal strengths for a negative Higgs-boson trilinear coupling are given. The results are given for m_{H^0} = 125 GeV.

H^0 Production Cross Section in pp Collisions at $\sqrt{s}$ = 13 TeV

Assumes m_{H^0} = 125 GeV

VALUE (pb)	DOCUMENT ID	TECN	COMMENT
59 ± 5 OUR AVERAGE			
$61.1 \pm 6.0 \pm 3.7$	[1] SIRUNYAN 19BA	CMS	pp, 13 TeV, $\gamma\gamma$, $Z Z^* \rightarrow 4\ell$ ($\ell = e$, μ)
$57.0^{+6.0+4.0}_{-5.9-3.3}$	[2] AABOUD 18CG	ATLS	pp, 13 TeV, $\gamma\gamma$, $Z Z^* \rightarrow 4\ell$ ($\ell = e$, μ)

• • • We do not use the following data for averages, fits, limits, etc. • • •

$47.9^{+\ 9.1}_{-\ 8.6}$	[2] AABOUD	18CG	ATLS	pp, 13 TeV, $\gamma\gamma$
$68\ ^{+11}_{-10}$	[2] AABOUD	18CG	ATLS	pp, 13 TeV, $ZZ^* \rightarrow 4\ell$ ($\ell = e,\ \mu$)
$69\ ^{+10}_{-\ 9}\ \pm 5$	[3] AABOUD	17CO	ATLS	pp, 13 TeV, $ZZ^* \rightarrow 4\ell$

[1] SIRUNYAN 19BA use 35.9 fb^{-1} of pp collisions at E_{cm} = 13 TeV.

[2] AABOUD 18CG use 36.1 fb^{-1} of pp collisions at E_{cm} = 13 TeV.

[3] AABOUD 17CO use 36.1 fb^{-1} of pp collisions at E_{cm} = 13 TeV with $H^0 \rightarrow ZZ^* \rightarrow 4\ell$ where $\ell = e,\ \mu$ for m_{H^0} = 125 GeV. Differential cross sections for the Higgs boson transverse momentum, Higgs boson rapidity, and other related quantities are measured as shown in their Figs. 8 and 9.

H^0 REFERENCES

AAD	20	PR D101 012002	G. Aad et al.	(ATLAS Collab.)
AAD	20A	PL B800 135069	G. Aad et al.	(ATLAS Collab.)
AAD	20C	PL B800 135103	G. Aad et al.	(ATLAS Collab.)
AAD	20E	PL B801 135145	G. Aad et al.	(ATLAS Collab.)
AAD	20F	PL B801 135148	G. Aad et al.	(ATLAS Collab.)
SIRUNYAN	20C	EPJ C80 75	A.M. Sirunyan et al.	(CMS Collab.)
AABOUD	19A	JHEP 1901 030	M. Aaboud et al.	(ATLAS Collab.)
AABOUD	19AI	PL B793 499	M. Aaboud et al.	(ATLAS Collab.)
AABOUD	19AL	PRL 122 231801	M. Aaboud et al.	(ATLAS Collab.)
AABOUD	19AQ	PR D99 072001	M. Aaboud et al.	(ATLAS Collab.)
AABOUD	19F	PL B789 508	M. Aaboud et al.	(ATLAS Collab.)
AABOUD	19N	JHEP 1904 048	M. Aaboud et al.	(ATLAS Collab.)
AABOUD	19O	JHEP 1904 092	M. Aaboud et al.	(ATLAS Collab.)
AABOUD	19T	JHEP 1905 124	M. Aaboud et al.	(ATLAS Collab.)
AABOUD	19U	JHEP 1905 141	M. Aaboud et al.	(ATLAS Collab.)
AAD	19A	PL B798 134949	G. Aad et al.	(ATLAS Collab.)
SIRUNYAN	19	PL B788 7	A.M. Sirunyan et al.	(CMS Collab.)
SIRUNYAN	19AB	JHEP 1904 112	A.M. Sirunyan et al.	(CMS Collab.)
SIRUNYAN	19AF	JHEP 1906 093	A.M. Sirunyan et al.	(CMS Collab.)
SIRUNYAN	19AJ	EPJ C79 94	A.M. Sirunyan et al.	(CMS Collab.)
SIRUNYAN	19AT	EPJ C79 421	A.M. Sirunyan et al.	(CMS Collab.)
SIRUNYAN	19AX	PL B791 96	A.M. Sirunyan et al.	(CMS Collab.)
SIRUNYAN	19BA	PL B792 369	A.M. Sirunyan et al.	(CMS Collab.)
SIRUNYAN	19BE	PRL 122 121803	A.M. Sirunyan et al.	(CMS Collab.)
SIRUNYAN	19BK	PR D99 092005	A.M. Sirunyan et al.	(CMS Collab.)
SIRUNYAN	19BL	PR D99 112003	A.M. Sirunyan et al.	(CMS Collab.)
SIRUNYAN	19BO	PL B793 520	A.M. Sirunyan et al.	(CMS Collab.)
SIRUNYAN	19BR	PL B797 134811	A.M. Sirunyan et al.	(CMS Collab.)
SIRUNYAN	19BY	PR D100 072007	A.M. Sirunyan et al.	(CMS Collab.)
SIRUNYAN	19BZ	PR D100 112002	A.M. Sirunyan et al.	(CMS Collab.)
SIRUNYAN	19CG	JHEP 1910 139	A.M. Sirunyan et al.	(CMS Collab.)
SIRUNYAN	19E	PRL 122 021801	A.M. Sirunyan et al.	(CMS Collab.)
SIRUNYAN	19H	JHEP 1901 040	A.M. Sirunyan et al.	(CMS Collab.)
SIRUNYAN	19L	JHEP 1901 183	A.M. Sirunyan et al.	(CMS Collab.)
SIRUNYAN	19R	JHEP 1903 026	A.M. Sirunyan et al.	(CMS Collab.)
AABOUD	18	PL B776 318	M. Aaboud et al.	(ATLAS Collab.)
AABOUD	18AC	PR D97 072003	M. Aaboud et al.	(ATLAS Collab.)
AABOUD	18AJ	JHEP 1803 095	M. Aaboud et al.	(ATLAS Collab.)
AABOUD	18AU	JHEP 1807 127	M. Aaboud et al.	(ATLAS Collab.)
AABOUD	18BK	PL B784 173	M. Aaboud et al.	(ATLAS Collab.)
AABOUD	18BL	PL B786 134	M. Aaboud et al.	(ATLAS Collab.)
AABOUD	18BM	PL B784 345	M. Aaboud et al.	(ATLAS Collab.)
AABOUD	18BN	PL B786 59	M. Aaboud et al.	(ATLAS Collab.)
AABOUD	18BO	PR D98 052005	M. Aaboud et al.	(ATLAS Collab.)
AABOUD	18BP	PL B786 223	M. Aaboud et al.	(ATLAS Collab.)
AABOUD	18BQ	PR D98 052003	M. Aaboud et al.	(ATLAS Collab.)
AABOUD	18BU	EPJ C78 1007	M. Aaboud et al.	(ATLAS Collab.)
AABOUD	18CA	JHEP 1810 180	M. Aaboud et al.	(ATLAS Collab.)
AABOUD	18CG	PL B786 114	M. Aaboud et al.	(ATLAS Collab.)

AABOUD	18CQ	PRL 121 191801	M. Aaboud *et al.*	(ATLAS Collab.)
AABOUD	18CW	JHEP 1811 040	M. Aaboud *et al.*	(ATLAS Collab.)
AABOUD	18M	PRL 120 211802	M. Aaboud *et al.*	(ATLAS Collab.)
AABOUD	18T	PR D97 072016	M. Aaboud *et al.*	(ATLAS Collab.)
AAIJ	18AM	EPJ C78 1008	R. Aaij *et al.*	(LHCb Collab.)
AALTONEN	18C	PR D98 072002	T. Aaltonen *et al.*	(CDF Collab.)
SIRUNYAN	18A	PL B778 101	A.M. Sirunyan *et al.*	(CMS Collab.)
SIRUNYAN	18AE	PL B780 501	A.M. Sirunyan *et al.*	(CMS Collab.)
SIRUNYAN	18BD	JHEP 1806 101	A.M. Sirunyan *et al.*	(CMS Collab.)
SIRUNYAN	18BH	JHEP 1806 001	A.M. Sirunyan *et al.*	(CMS Collab.)
SIRUNYAN	18BQ	JHEP 1808 066	A.M. Sirunyan *et al.*	(CMS Collab.)
SIRUNYAN	18BU	EPJ C78 140	A.M. Sirunyan *et al.*	(CMS Collab.)
SIRUNYAN	18BV	EPJ C78 291	A.M. Sirunyan *et al.*	(CMS Collab.)
SIRUNYAN	18DB	PRL 121 121801	A.M. Sirunyan *et al.*	(CMS Collab.)
SIRUNYAN	18DQ	JHEP 1811 152	A.M. Sirunyan *et al.*	(CMS Collab.)
SIRUNYAN	18DS	JHEP 1811 185	A.M. Sirunyan *et al.*	(CMS Collab.)
SIRUNYAN	18E	PRL 120 071802	A.M. Sirunyan *et al.*	(CMS Collab.)
SIRUNYAN	18F	JHEP 1801 054	A.M. Sirunyan *et al.*	(CMS Collab.)
SIRUNYAN	18L	PRL 120 231801	A.M. Sirunyan *et al.*	(CMS Collab.)
SIRUNYAN	18S	PR D97 092005	A.M. Sirunyan *et al.*	(CMS Collab.)
SIRUNYAN	18Y	PL B779 283	A.M. Sirunyan *et al.*	(CMS Collab.)
AABOUD	17AW	JHEP 1710 112	M. Aaboud *et al.*	(ATLAS Collab.)
AABOUD	17BA	JHEP 1712 024	M. Aaboud *et al.*	(ATLAS Collab.)
AABOUD	17BD	EPJ C77 765	M. Aaboud *et al.*	(ATLAS Collab.)
AABOUD	17CO	JHEP 1710 132	M. Aaboud *et al.*	(ATLAS Collab.)
AABOUD	17Y	PRL 119 051802	M. Aaboud *et al.*	(ATLAS Collab.)
AAD	17	EPJ C77 70	G. Aad *et al.*	(ATLAS Collab.)
KHACHATRY...	17F	JHEP 1702 135	V. Khachatryan *et al.*	(CMS Collab.)
SIRUNYAN	17AM	PL B775 1	A.M. Sirunyan *et al.*	(CMS Collab.)
SIRUNYAN	17AV	JHEP 1711 047	A.M. Sirunyan *et al.*	(CMS Collab.)
SIRUNYAN	17CN	PR D96 072004	A.M. Sirunyan *et al.*	(CMS Collab.)
AABOUD	16I	PR D94 052002	M. Aaboud *et al.*	(ATLAS Collab.)
AABOUD	16K	PRL 117 111802	M. Aaboud *et al.*	(ATLAS Collab.)
AABOUD	16X	JHEP 1611 112	M. Aaboud *et al.*	(ATLAS Collab.)
AAD	16	PL B753 69	G. Aad *et al.*	(ATLAS Collab.)
AAD	16AC	PR D93 092005	G. Aad *et al.*	(ATLAS Collab.)
AAD	16AF	JHEP 1601 172	G. Aad *et al.*	(ATLAS Collab.)
AAD	16AL	JHEP 1605 160	G. Aad *et al.*	(ATLAS Collab.)
AAD	16AN	JHEP 1608 045	G. Aad *et al.*	(ATLAS and CMS Collabs.)
AAD	16AO	JHEP 1608 104	G. Aad *et al.*	(ATLAS Collab.)
AAD	16BL	EPJ C76 658	G. Aad *et al.*	(ATLAS Collab.)
AAD	16K	EPJ C76 6	G. Aad *et al.*	(ATLAS Collab.)
KHACHATRY...	16AB	PL B759 672	V. Khachatryan *et al.*	(CMS Collab.)
KHACHATRY...	16AR	JHEP 1604 005	V. Khachatryan *et al.*	(CMS Collab.)
KHACHATRY...	16AU	JHEP 1606 177	V. Khachatryan *et al.*	(CMS Collab.)
KHACHATRY...	16B	PL B753 341	V. Khachatryan *et al.*	(CMS Collab.)
KHACHATRY...	16BA	JHEP 1609 051	V. Khachatryan *et al.*	(CMS Collab.)
KHACHATRY...	16BQ	PR D94 052012	V. Khachatryan *et al.*	(CMS Collab.)
KHACHATRY...	16CD	PL B763 472	V. Khachatryan *et al.*	(CMS Collab.)
KHACHATRY...	16G	EPJ C76 13	V. Khachatryan *et al.*	(CMS Collab.)
AAD	15	PL B740 222	G. Aad *et al.*	(ATLAS Collab.)
AAD	15AA	PR D92 012006	G. Aad *et al.*	(ATLAS Collab.)
AAD	15AH	JHEP 1504 117	G. Aad *et al.*	(ATLAS Collab.)
AAD	15AQ	JHEP 1508 137	G. Aad *et al.*	(ATLAS Collab.)
AAD	15AX	EPJ C75 231	G. Aad *et al.*	(ATLAS Collab.)
AAD	15B	PRL 114 191803	G. Aad *et al.*	(ATLAS and CMS Collabs.)
AAD	15BC	EPJ C75 349	G. Aad *et al.*	(ATLAS Collab.)
AAD	15BD	EPJ C75 337	G. Aad *et al.*	(ATLAS Collab.)
AAD	15BE	EPJ C75 335	G. Aad *et al.*	(ATLAS Collab.)
AAD	15CE	PR D92 092004	G. Aad *et al.*	(ATLAS Collab.)
AAD	15CI	EPJ C75 476	G. Aad *et al.*	(ATLAS Collab.)
Also		EPJ C76 152 (errat.)	G. Aad *et al.*	(ATLAS Collab.)
AAD	15CX	JHEP 1511 206	G. Aad *et al.*	(ATLAS Collab.)
AAD	15F	PR D91 012006	G. Aad *et al.*	(ATLAS Collab.)
AAD	15G	JHEP 1501 069	G. Aad *et al.*	(ATLAS Collab.)
AAD	15I	PRL 114 121801	G. Aad *et al.*	(ATLAS Collab.)
AAD	15P	PRL 115 091801	G. Aad *et al.*	(ATLAS Collab.)
AAD	15T	PL B749 519	G. Aad *et al.*	(ATLAS Collab.)
AALTONEN	15	PRL 114 151802	T. Aaltonen *et al.*	(CDF and D0 Collabs.)
AALTONEN	15B	PRL 114 141802	T. Aaltonen *et al.*	(CDF Collab.)
KHACHATRY...	15AM	EPJ C75 212	V. Khachatryan *et al.*	(CMS Collab.)

KHACHATRY... 15AN	EPJ C75 251	V. Khachatryan *et al.*	(CMS Collab.)
KHACHATRY... 15BA	PR D92 072010	V. Khachatryan *et al.*	(CMS Collab.)
KHACHATRY... 15H	PL B744 184	V. Khachatryan *et al.*	(CMS Collab.)
KHACHATRY... 15Q	PL B749 337	V. Khachatryan *et al.*	(CMS Collab.)
KHACHATRY... 15Y	PR D92 012004	V. Khachatryan *et al.*	(CMS Collab.)
KHACHATRY... 15Z	PR D92 032008	V. Khachatryan *et al.*	(CMS Collab.)
AAD 14AR	PL B738 234	G. Aad *et al.*	(ATLAS Collab.)
AAD 14AS	PL B738 68	G. Aad *et al.*	(ATLAS Collab.)
AAD 14BC	PR D90 112015	G. Aad *et al.*	(ATLAS Collab.)
AAD 14BJ	JHEP 1409 112	G. Aad *et al.*	(ATLAS Collab.)
AAD 14J	PL B732 8	G. Aad *et al.*	(ATLAS Collab.)
AAD 14O	PRL 112 201802	G. Aad *et al.*	(ATLAS Collab.)
AAD 14W	PR D90 052004	G. Aad *et al.*	(ATLAS Collab.)
ABAZOV 14F	PRL 113 161802	V.M. Abazov *et al.*	(D0 Collab.)
CHATRCHYAN 14AA	PR D89 092007	S. Chatrchyan *et al.*	(CMS Collab.)
CHATRCHYAN 14AI	PR D89 012003	S. Chatrchyan *et al.*	(CMS Collab.)
CHATRCHYAN 14AJ	NATP 10 557	S. Chatrchyan *et al.*	(CMS Collab.)
CHATRCHYAN 14B	EPJ C74 2980	S. Chatrchyan *et al.*	(CMS Collab.)
CHATRCHYAN 14G	JHEP 1401 096	S. Chatrchyan *et al.*	(CMS Collab.)
CHATRCHYAN 14K	JHEP 1405 104	S. Chatrchyan *et al.*	(CMS Collab.)
KHACHATRY... 14D	PL B736 64	V. Khachatryan *et al.*	(CMS Collab.)
KHACHATRY... 14H	JHEP 1409 087	V. Khachartryan *et al.*	(CMS Collab.)
KHACHATRY... 14P	EPJ C74 3076	V. Khachatryan *et al.*	(CMS Collab.)
AAD 13AJ	PL B726 120	G. Aad *et al.*	(ATLAS Collab.)
AAD 13AK	PL B726 88	G. Aad *et al.*	(ATLAS Collab.)
Also	PL B734 406 (errat.)	G. Aad *et al.*	(ATLAS Collab.)
AALTONEN 13L	PR D88 052013	T. Aaltonen *et al.*	(CDF Collab.)
AALTONEN 13M	PR D88 052014	T. Aaltonen *et al.*	(CDF and D0 Collabs.)
ABAZOV 13L	PR D88 052011	V.M. Abazov *et al.*	(D0 Collab.)
CHATRCHYAN 13BK	PL B726 587	S. Chatrchyan *et al.*	(CMS Collab.)
CHATRCHYAN 13J	PRL 110 081803	S. Chatrchyan *et al.*	(CMS Collab.)
CHATRCHYAN 13X	JHEP 1305 145	S. Chatrchyan *et al.*	(CMS Collab.)
CHATRCHYAN 13Y	JHEP 1306 081	S. Chatrchyan *et al.*	(CMS Collab.)
HEINEMEYER 13A	arXiv:1307.1347	S. Heinemeyer *et al.*	(LHC Higgs CS Working Group)
AAD 12AI	PL B716 1	G. Aad *et al.*	(ATLAS Collab.)
AAD 12DA	SCI 338 1576	G. Aad *et al.*	(ATLAS Collab.)
AALTONEN 12Q	PRL 109 111803	T. Aaltonen *et al.*	(CDF Collab.)
AALTONEN 12R	PRL 109 111804	T. Aaltonen *et al.*	(CDF Collab.)
AALTONEN 12S	PRL 109 111805	T. Aaltonen *et al.*	(CDF Collab.)
AALTONEN 12T	PRL 109 071804	T. Aaltonen *et al.*	(CDF and D0 Collabs.)
ABAZOV 12K	PL B716 285	V.M. Abazov *et al.*	(D0 Collab.)
ABAZOV 12O	PRL 109 121803	V.M. Abazov *et al.*	(D0 Collab.)
ABAZOV 12P	PRL 109 121804	V.M. Abazov *et al.*	(D0 Collab.)
CHATRCHYAN 12BY	SCI 338 1569	S. Chatrchyan *et al.*	(CMS Collab.)
CHATRCHYAN 12N	PL B716 30	S. Chatrchyan *et al.*	(CMS Collab.)
DITTMAIER 12	arXiv:1201.3084	S. Dittmaier *et al.*	(LHC Higgs CS Working Group)
DITTMAIER 11	arXiv:1101.0593	S. Dittmaier *et al.*	(LHC Higgs CS Working Group)