



ATLAS Note

ANA-HIGG-2020-01-INT1

14th July 2020



Draft version 0.4

Supporting documentation for the combined measurements of Higgs boson production at 13 TeV using up to 139 fb⁻¹ of ATLAS data

Syed Haider Abidi^a, Rahul Balasubramanian^b, Nicolas Berger^c, Carsten Daniel Burgard^b, Thomas Philippe Calvet^d, Bianca Monica Ciungu^a, Joshua Clercx^e, Ana Rosario Cueto Gomez^c, Saskia Falke^f, Sarah Heim^e, Alexander Held^g, Yanping Huang^h, Jelena Jovicevic^f, Gangcheng Lu^h, Nicolas Morangeⁱ, Brian Moser^b, Davide Pietro Mungo^j, Tae Hyoun Park^a, Kunlin Ran^h, Douglas Schaefer^k, RD Schafferⁱ, Kerstin Tackmann^e, Wouter Verkerke^b, Alex Wang^l, Rongkun Wang^m, Yuhao Wangⁿ, Zirui Wang^o, Hongtao Yang^p, Xinmeng Ye^m, Lei Zhangⁿ, Zhengguo Zhao^m, Bing Zhou^o

^aUniversity of Toronto, ^bNikhef, ^cLAPP Annecy, ^dCPPM Marseille, ^eDESY, ^fCERN, ^gNew York University, ^hIHEP, ⁱIJCLab Orsay, ^jINFN Milano, ^kUniversity of Chicago, ^lUniversity of Wisconsin, ^mUSTC, ⁿNanjing University, ^oUniversity of Michigan, ^pLBNL Berkeley

This note presents combined measurements of Higgs boson production and decay based on up to 139 fb⁻¹ of proton-proton collision data collected by the ATLAS experiment at the LHC at $\sqrt{s} = 13$ TeV. The combination uses results from the $H \rightarrow \gamma\gamma$, $H \rightarrow ZZ^{(*)}$, $H \rightarrow WW^{(*)}$, $H \rightarrow \tau\tau$, VH , $H \rightarrow b\bar{b}$, VBF, $H \rightarrow b\bar{b}, t\bar{t}H \rightarrow lep, t\bar{t}H$, $H \rightarrow b\bar{b}, H \rightarrow \mu\mu$ and VBF $H \rightarrow$ inv. channels. The global signal strength is determined to be $\mu = 1.06 \pm 0.07$. Measurements of inclusive production cross-sections and simplified template cross-sections are provided. The results are also interpreted using the κ modifiers to the SM Lagrangian, as well as using BSM models. No significant deviation from the Standard Model predictions is observed.