

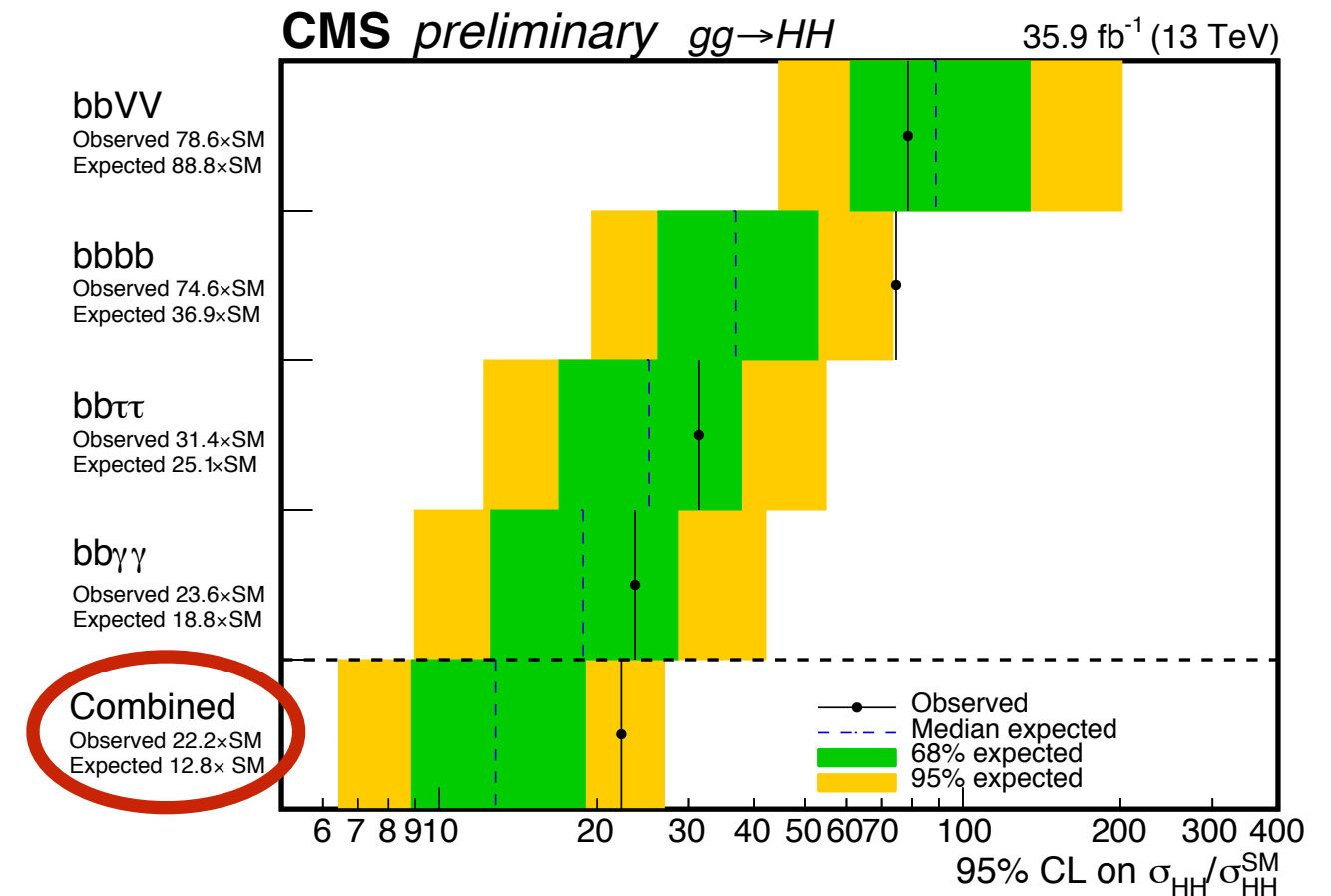
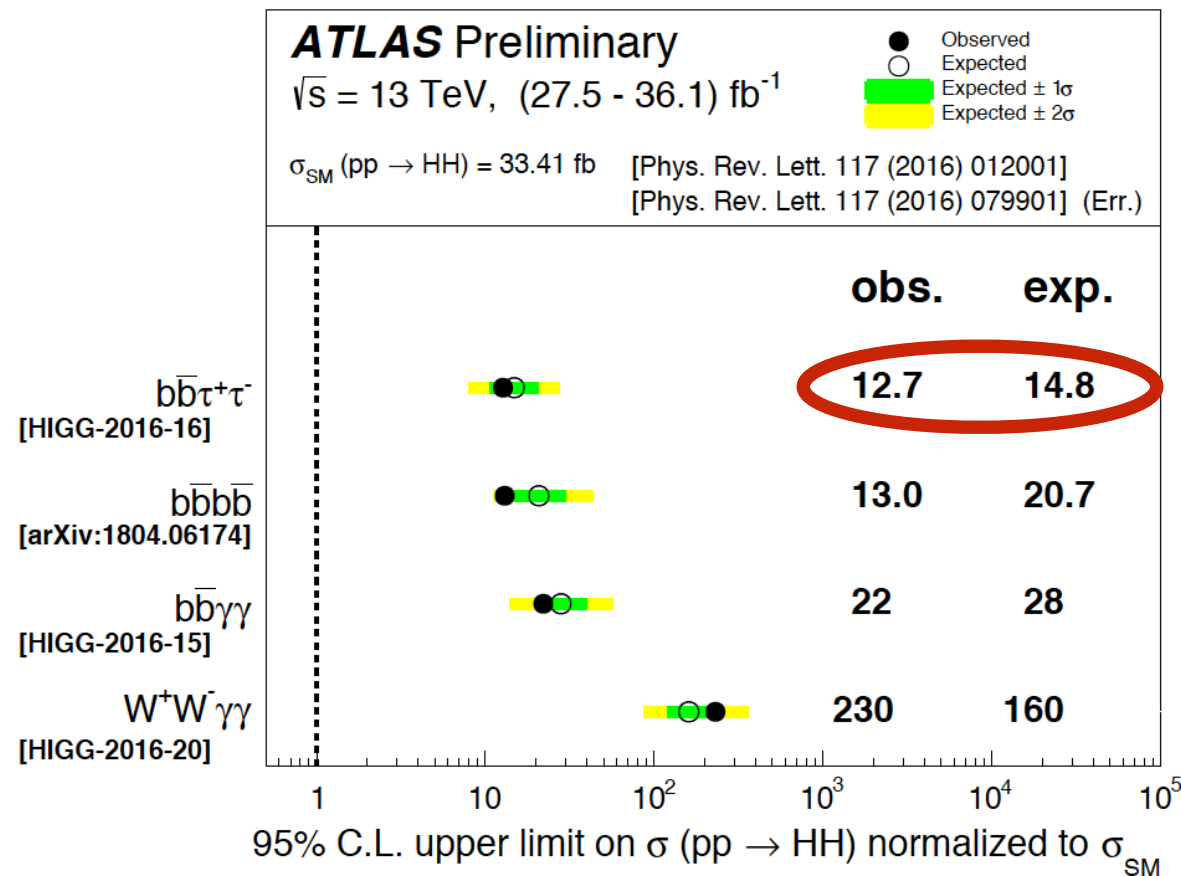
~~3~~ 4 transparencies of comparison



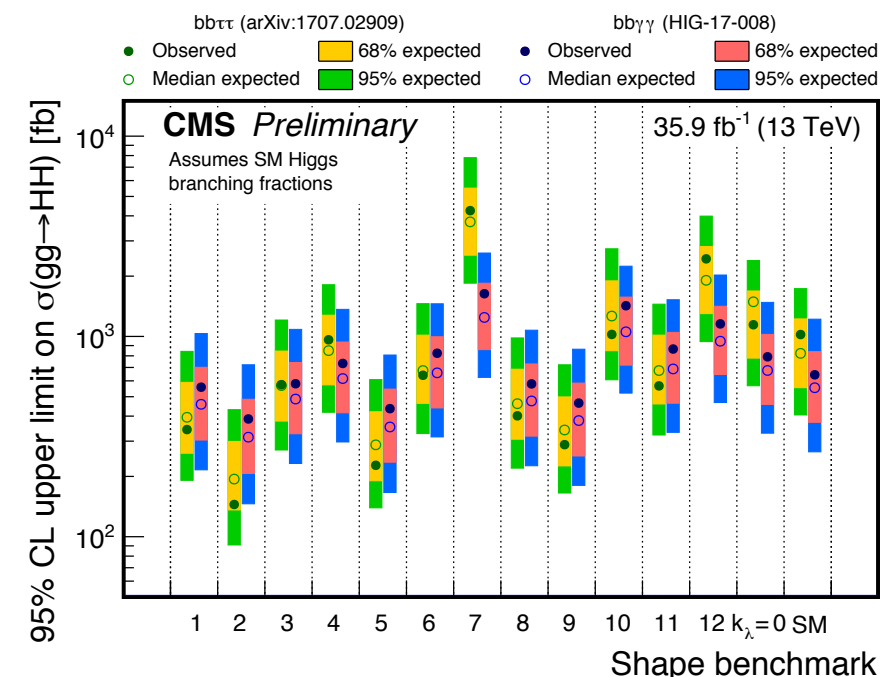
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HH non resonant analyses

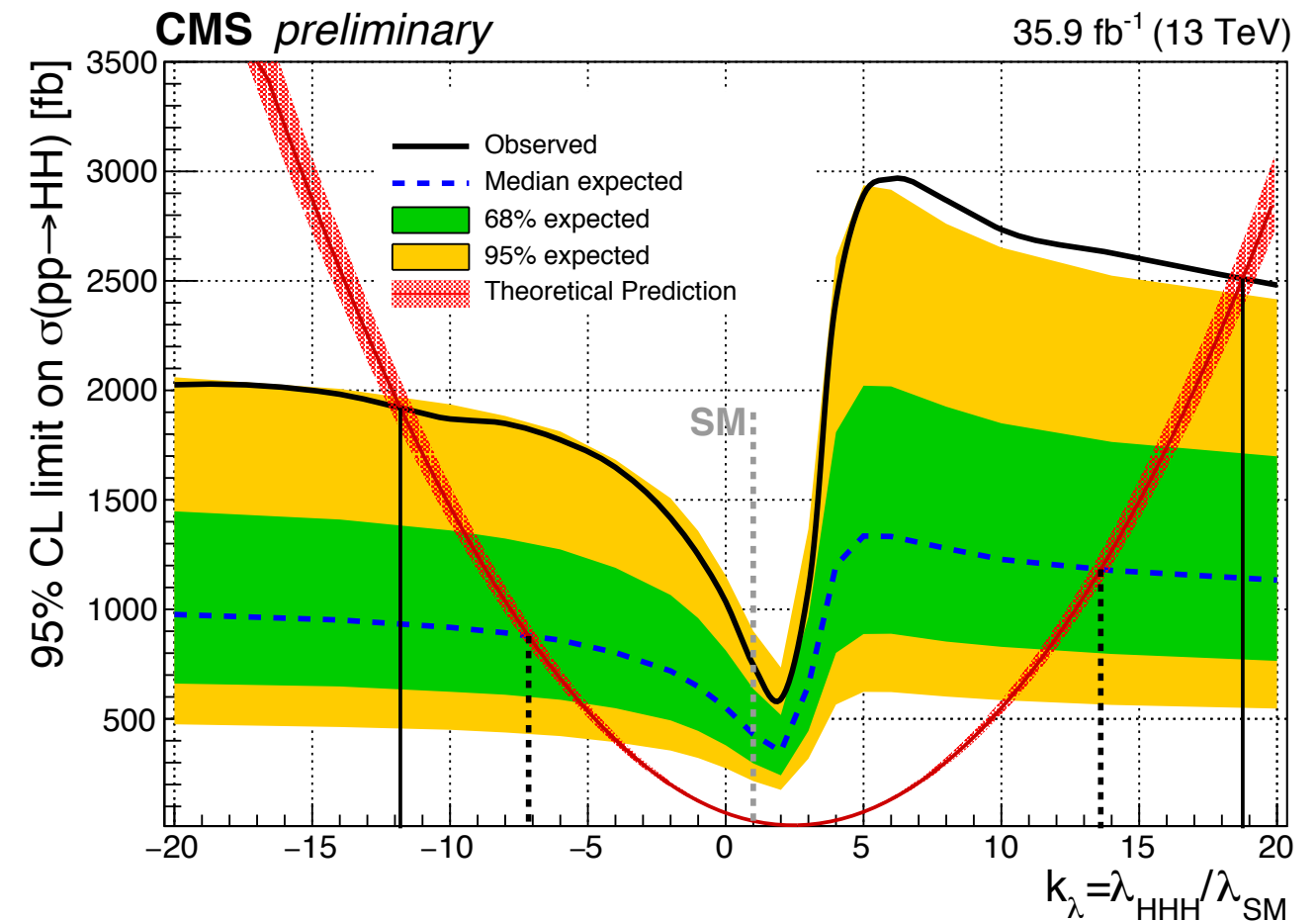
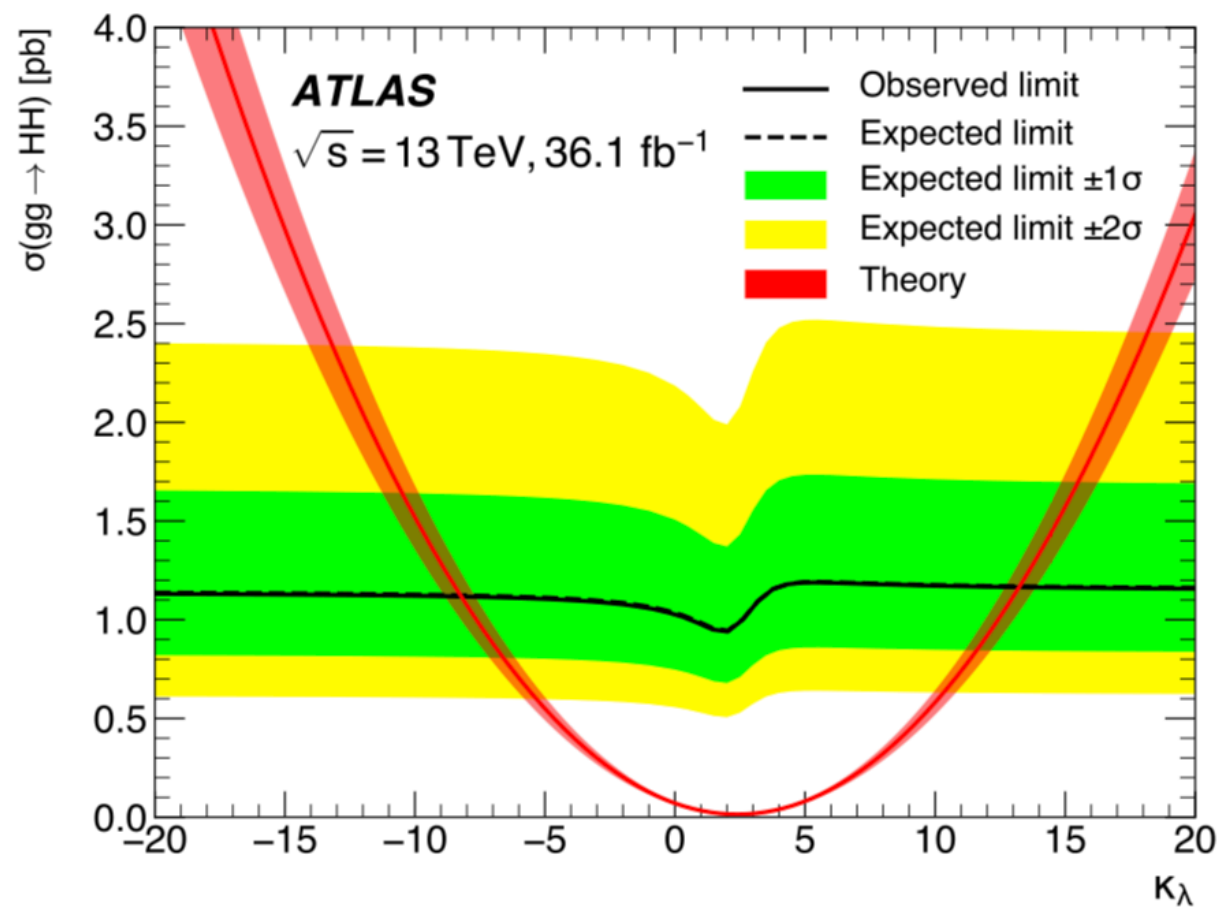
Phenomenologically rich set of decay channel



Complementary sensitivity
to different regions of the phase space
CMS is testing the 12 shape benchmarks



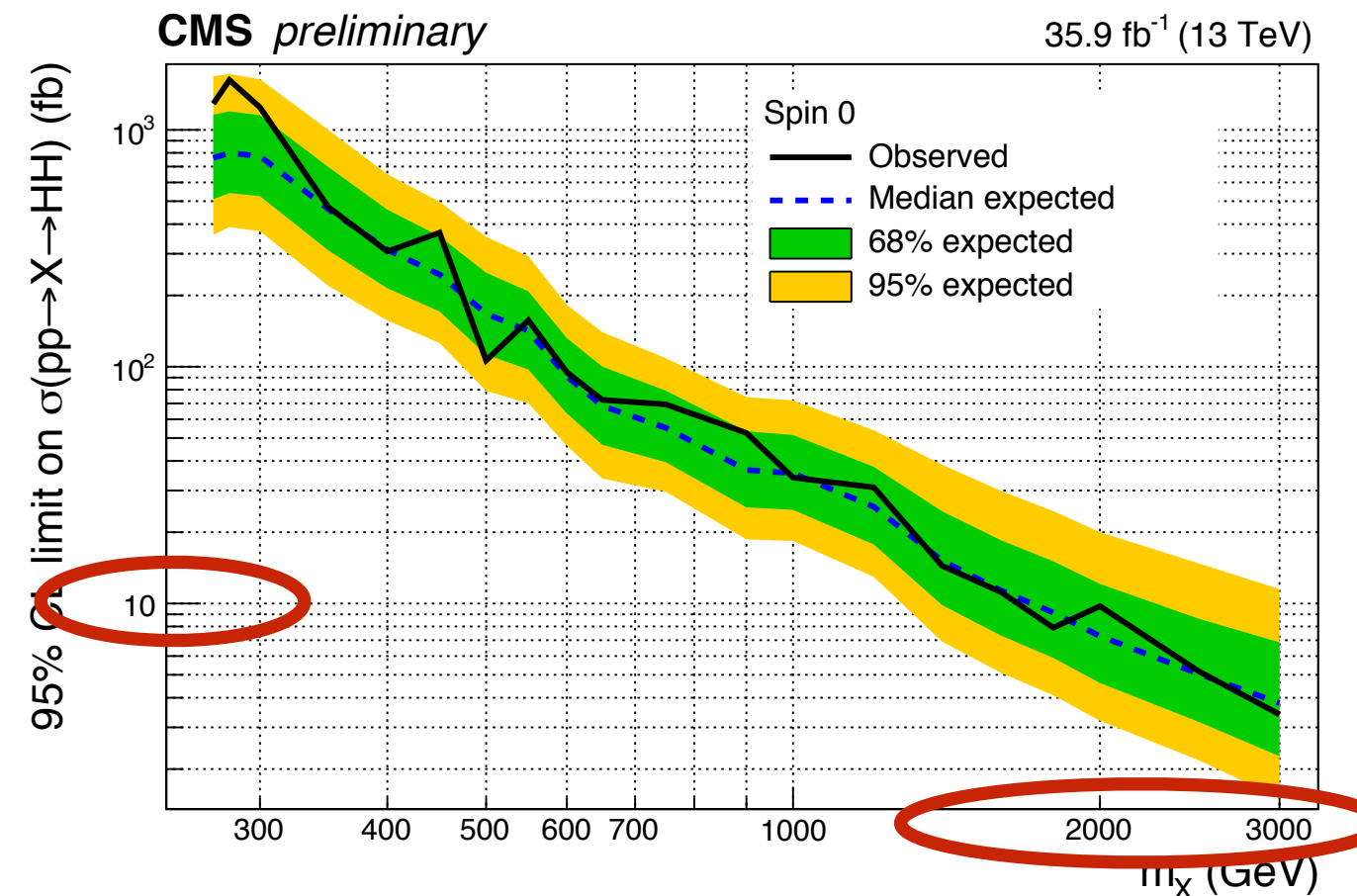
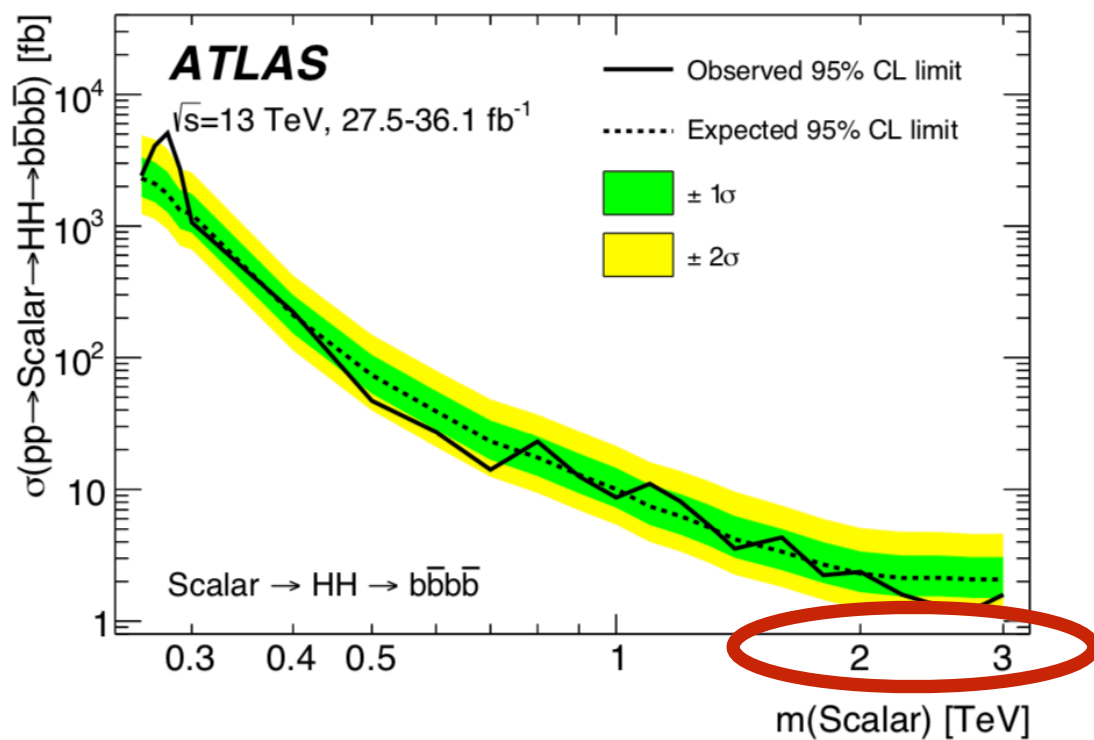
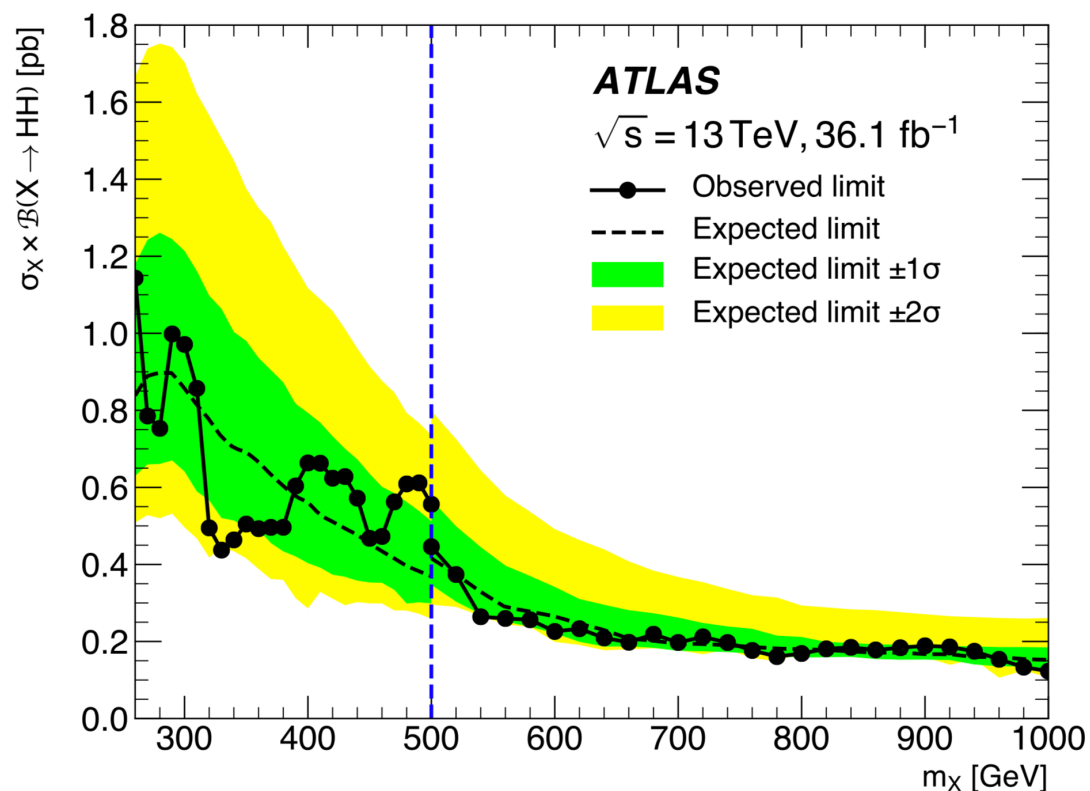
HH UL in function of k_λ



Important to have k factor as function of k_λ

Properly scaled the main ttH background once we moved to UL (k_λ, k_t) plane

HH resonant analyses



UL based on narrow resonances
 to be added finite width (interference)
 to be added more production mechanisms

HH HL-LHC extrapolations

Decay channel combination is essential for an evidence of HH production

	CMS	ATLAS
bbbb	0.39σ	$\mu < 5.2(1.5)^{(3)}$ $-4.1 < \lambda/\lambda_{SM} < 8.7$ ($0.2 < \lambda/\lambda_{SM} < 7.0$)
$bb\tau\tau$	$0.39\sigma^{(1)} / \mu < 1.6^{(2)}$	$\mu < 4.3^{(4)}$ $-4.0 < \lambda/\lambda_{SM} < 12$
$bb\gamma\gamma$	1.43σ	$1.5\sigma^{(3)}$ $0.2 < \lambda/\lambda_{SM} < 6.9$ (stat only)
$bbVV$	0.45σ	
ttHH(bbbb)		0.35σ

(1) CMS PAS FTR-16-002 (extrapolation of early $\sim 3/\text{fb}$ Run-II)

(2) CERN-LHCC-2017-023 (updated projections)

(3) ATLAS ITK-2018-001 (improved wrt ATL-PHYS-PUB-2016-024)

(4) ATL-PHYS-PUB-2015-046

Analyses improve faster than the integrated luminosity scaling $\rightarrow$ some projections are conservative wrt latest Run 2 analyses

Updating the projections with state-of-the-art analyses/upgrade detector $\rightarrow$ motivates the preparation of updated projection (YR)