Discussion on "BSM Higgs Searches/Rare Higgs Decays"

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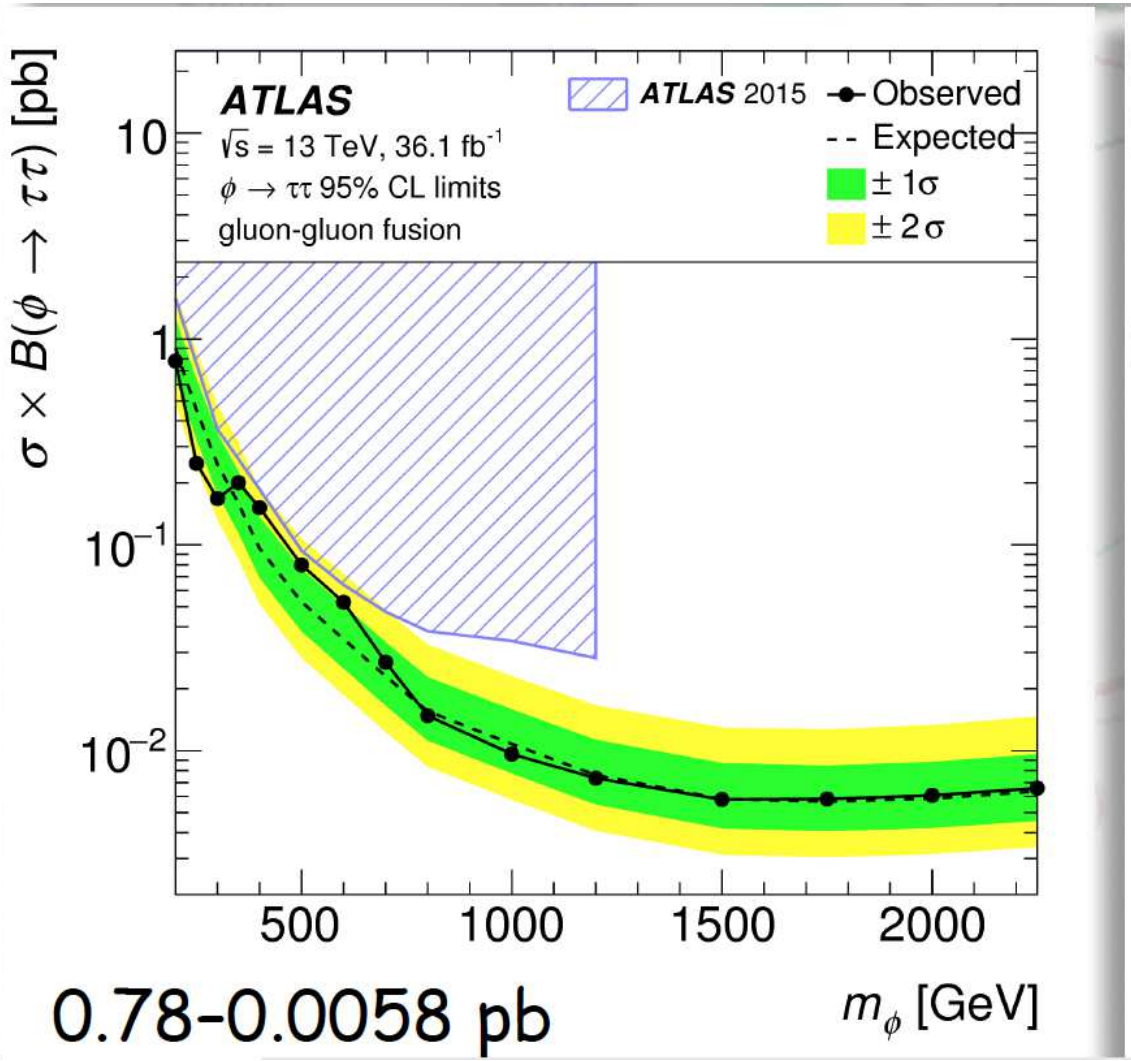
Talks:

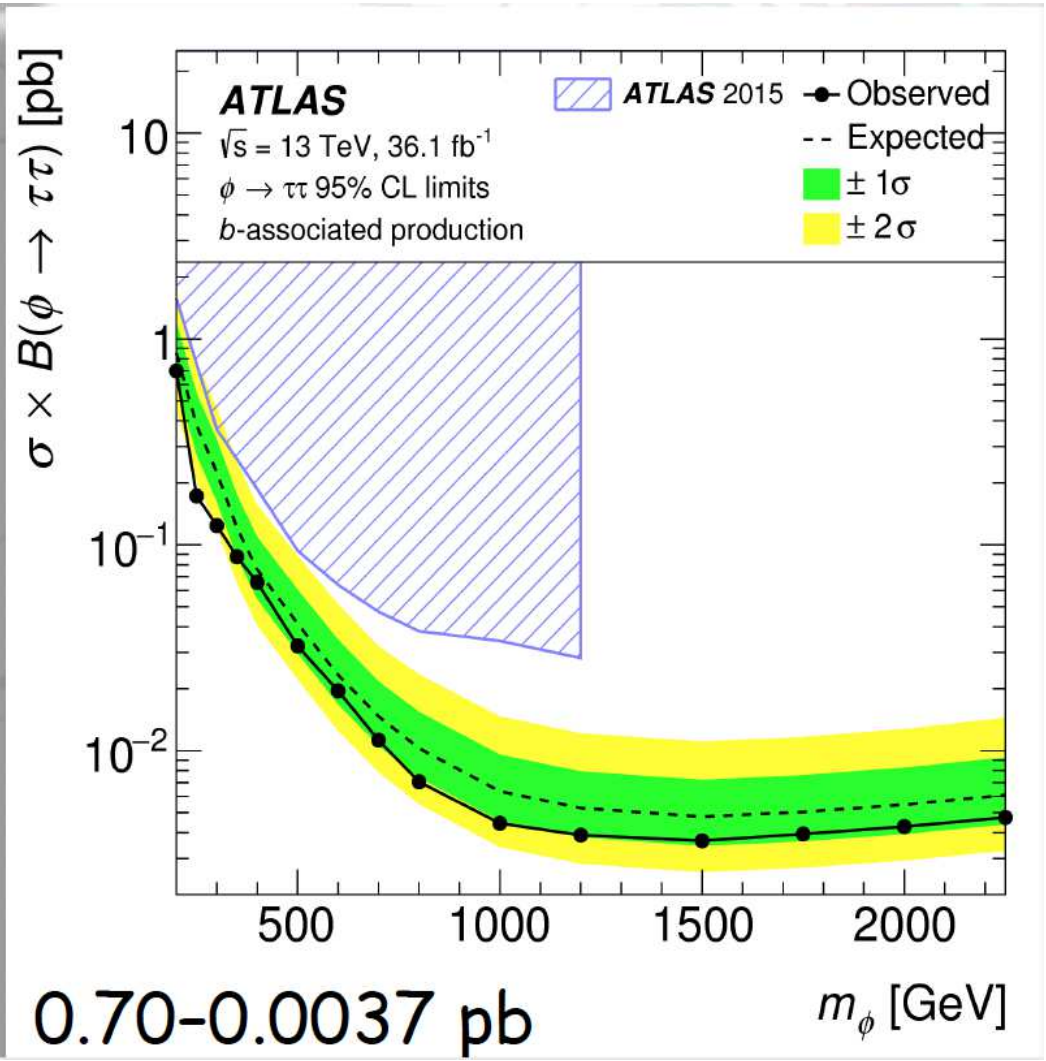
- A. Kaczmarska: ATLAS BSM Higgs searches
- S. Gascon-Shotkin: CMS BSM Higgs searches
- L. Truong: ATLAS rare and BSM decays
- Y. Gershtein: CMS rare and BSM decays

$\Rightarrow$ no full ATLAS – CMS comparison . . .
$\Rightarrow$ just a few (personally biased) examples . . .
($\Rightarrow$ who has the full overview?)

Perhaps slightly provocative . . . :-)

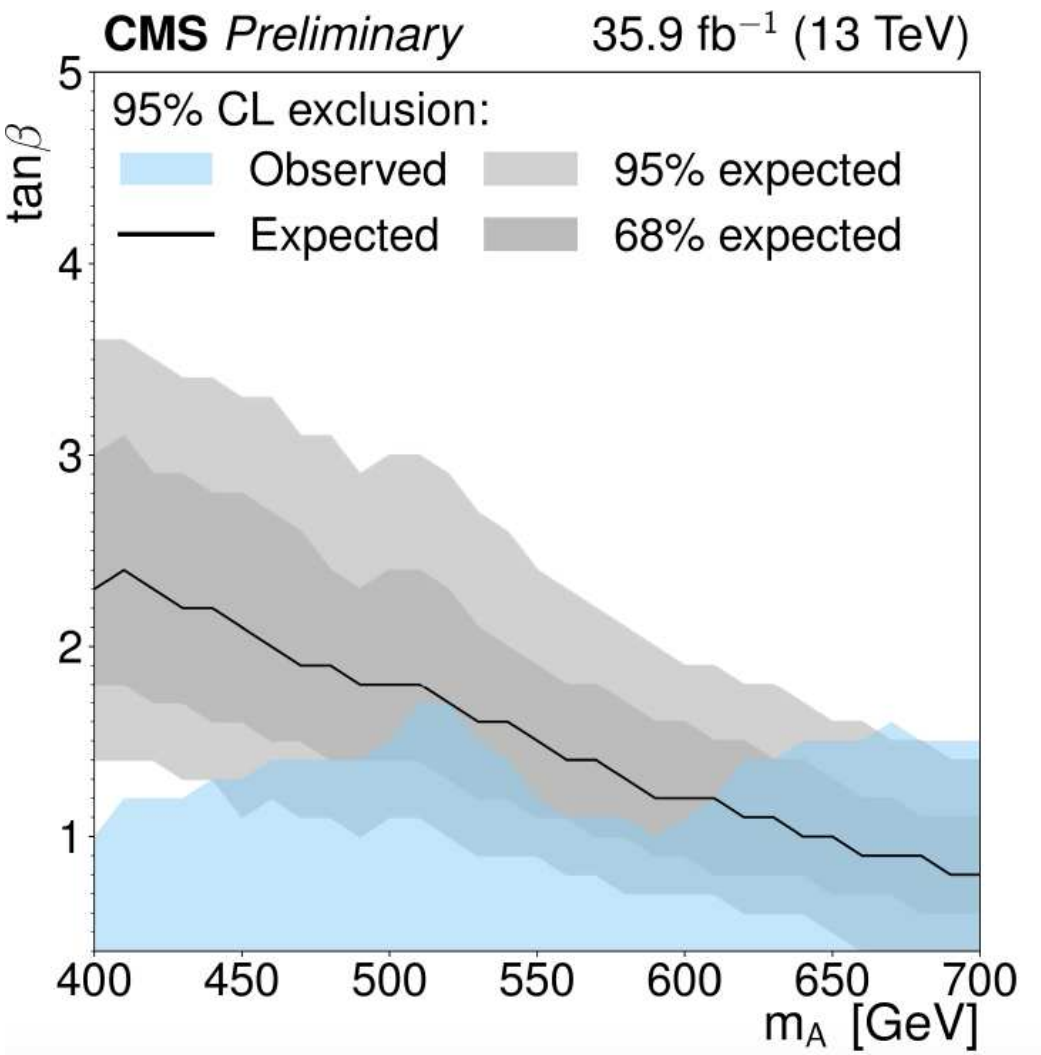
My personal favorite: $pp \to \phi \to \tau^+\tau^-$:





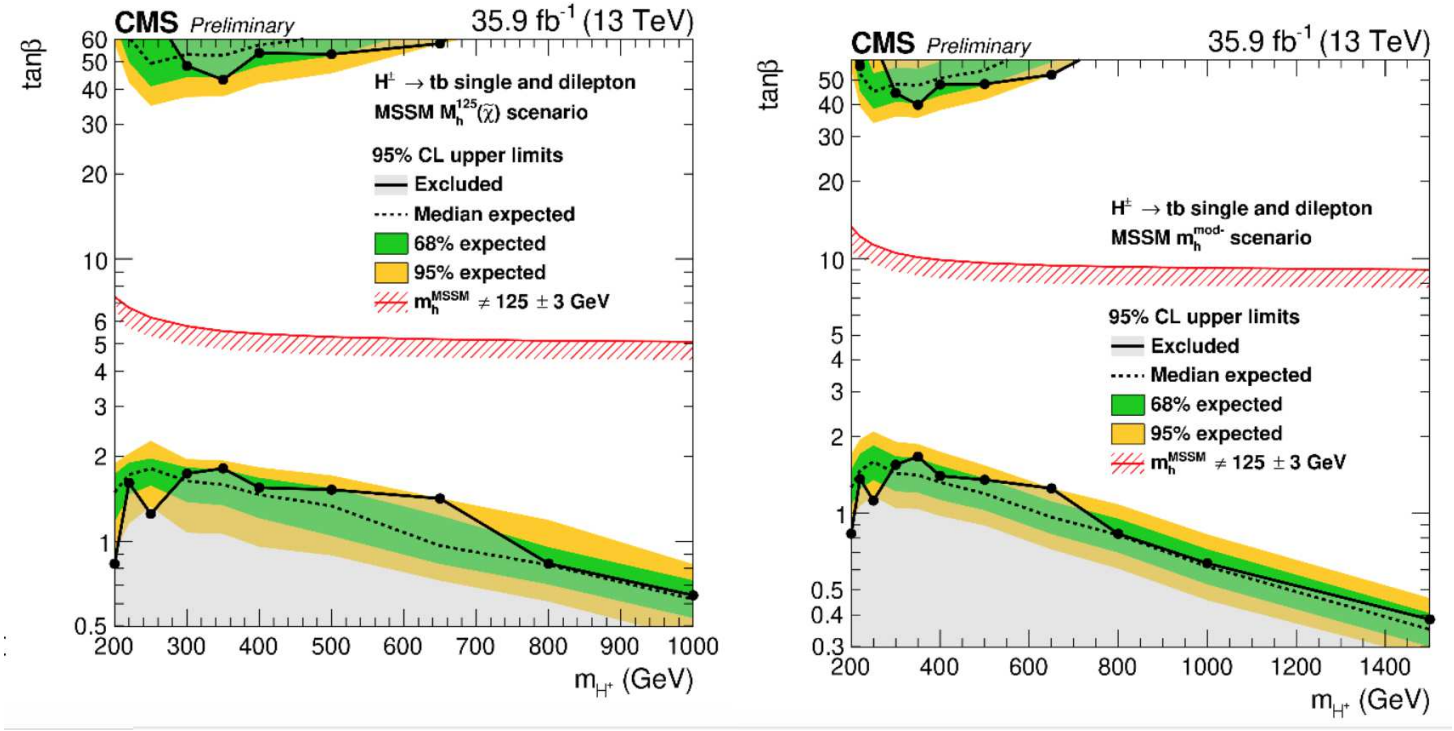
$\Rightarrow$ But how to cover low $\tan\beta$?

Progress to access low $\tan\beta$: $pp \to t\bar{t}$



Known complication: negative interference

Progress to access low tan β:

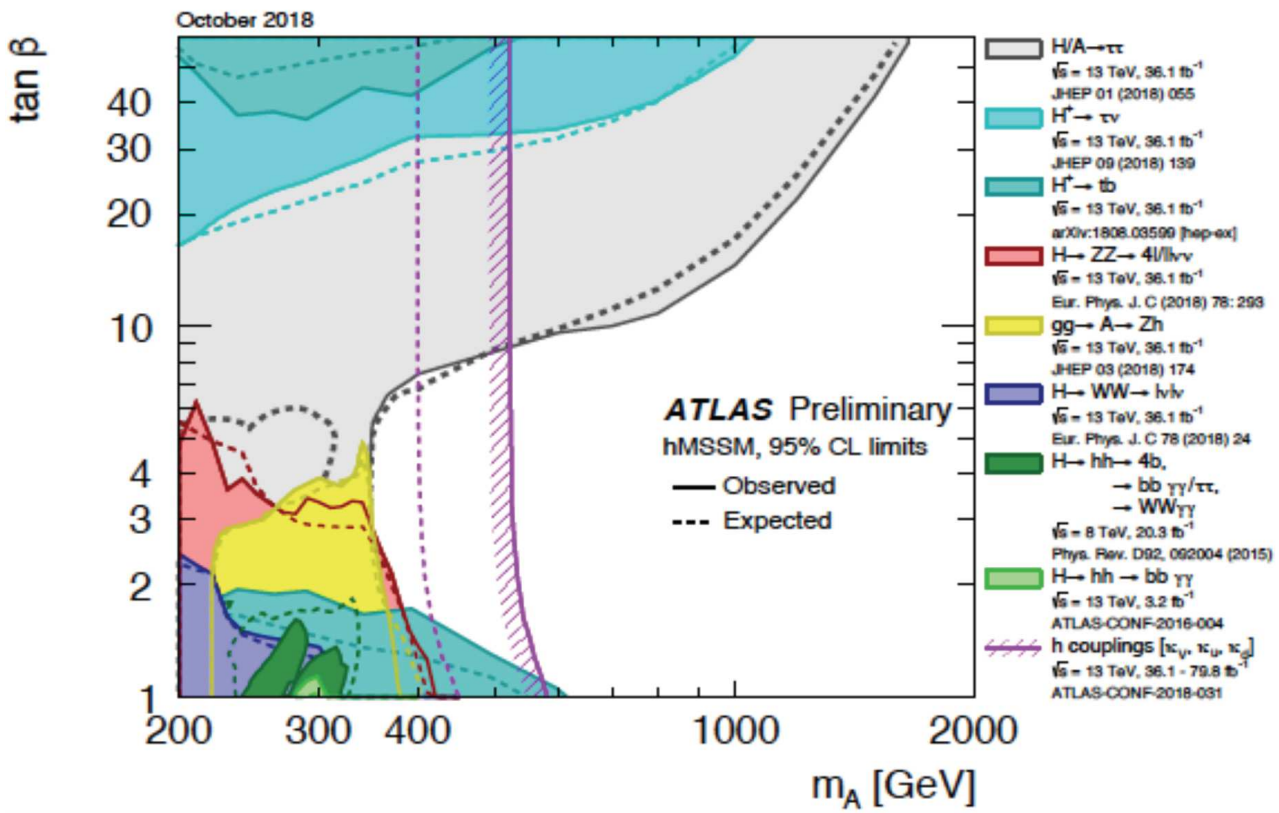


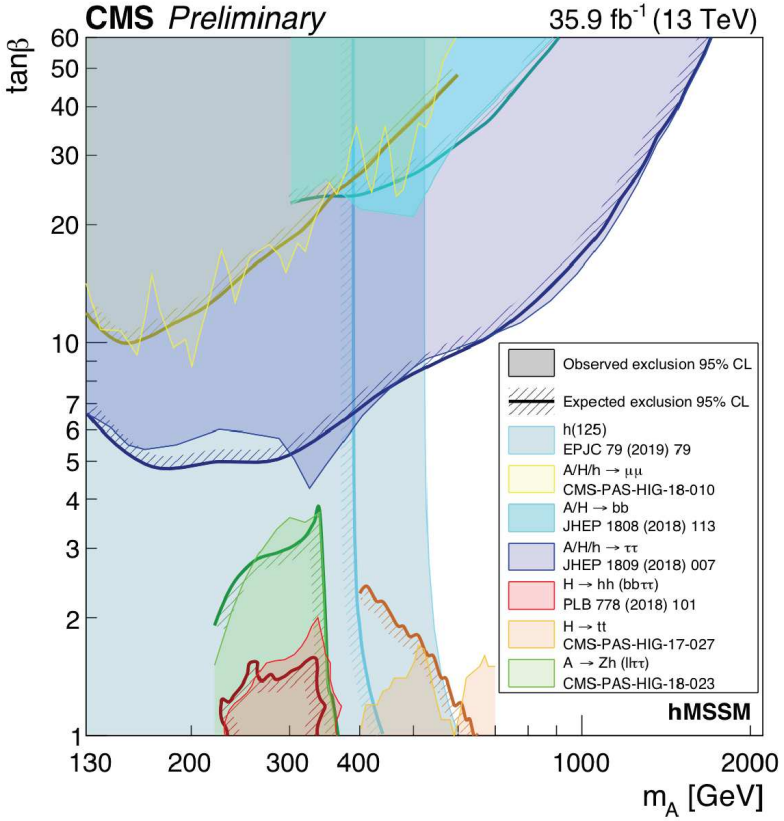
⇒ one big chance for the charged Higgs!

⇒ negative interference?!

⇒ one first example of new benchmarks! [*arXiv:1808.07542*]

But one thing seems to become "worse": WHY (so abundantly) **hMSSM?**





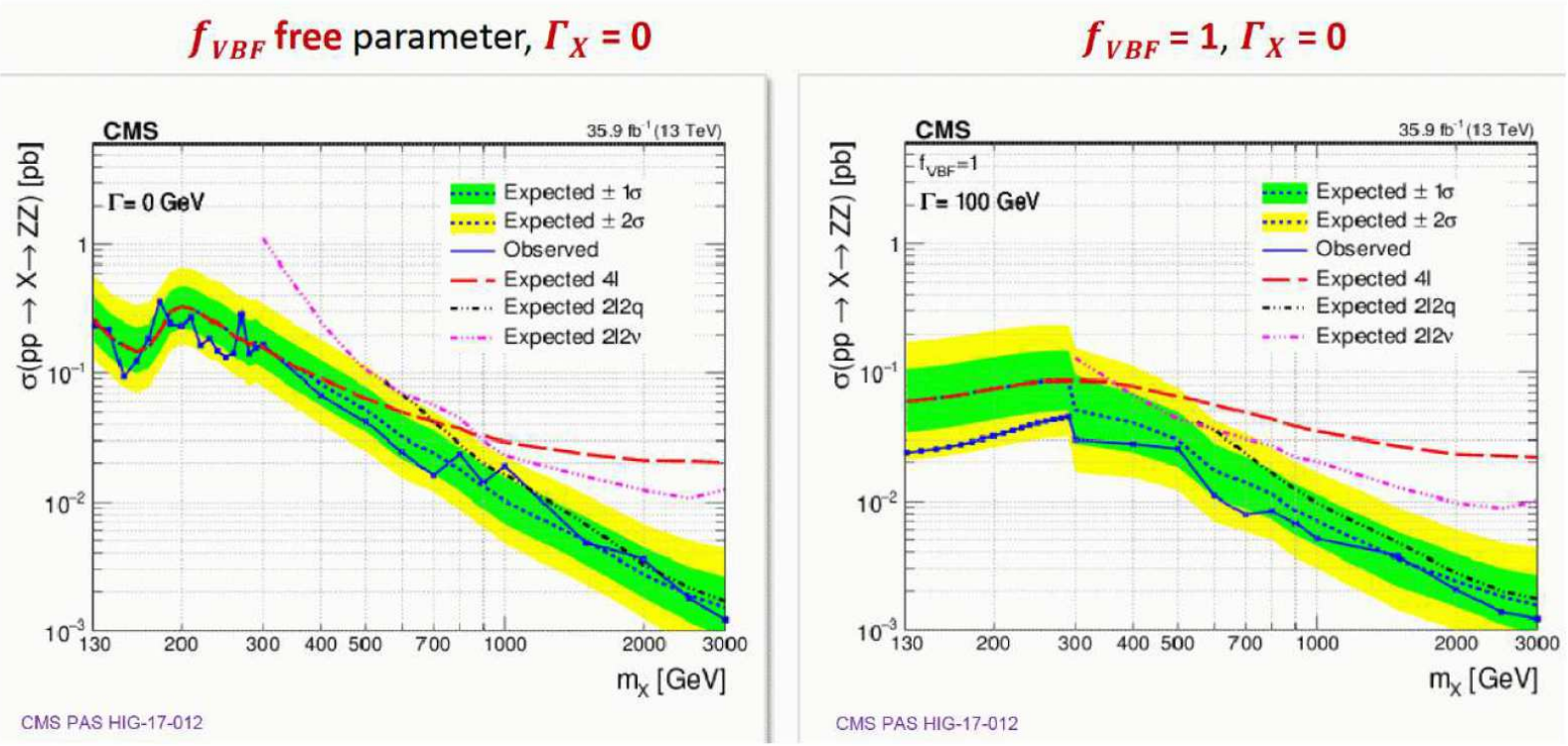
– Why to you "neglect" the results in the non-trivial scenarios?

– Are people still aware of the hMSSM restrictions?

$\Rightarrow$ the MSSM is much^2 richer than the hMSSM!

HiggsHunting 2018:

Please keep up with it: $pp \to \phi \to ZZ$



⇒ VERY important for re-interpretation for BSM models

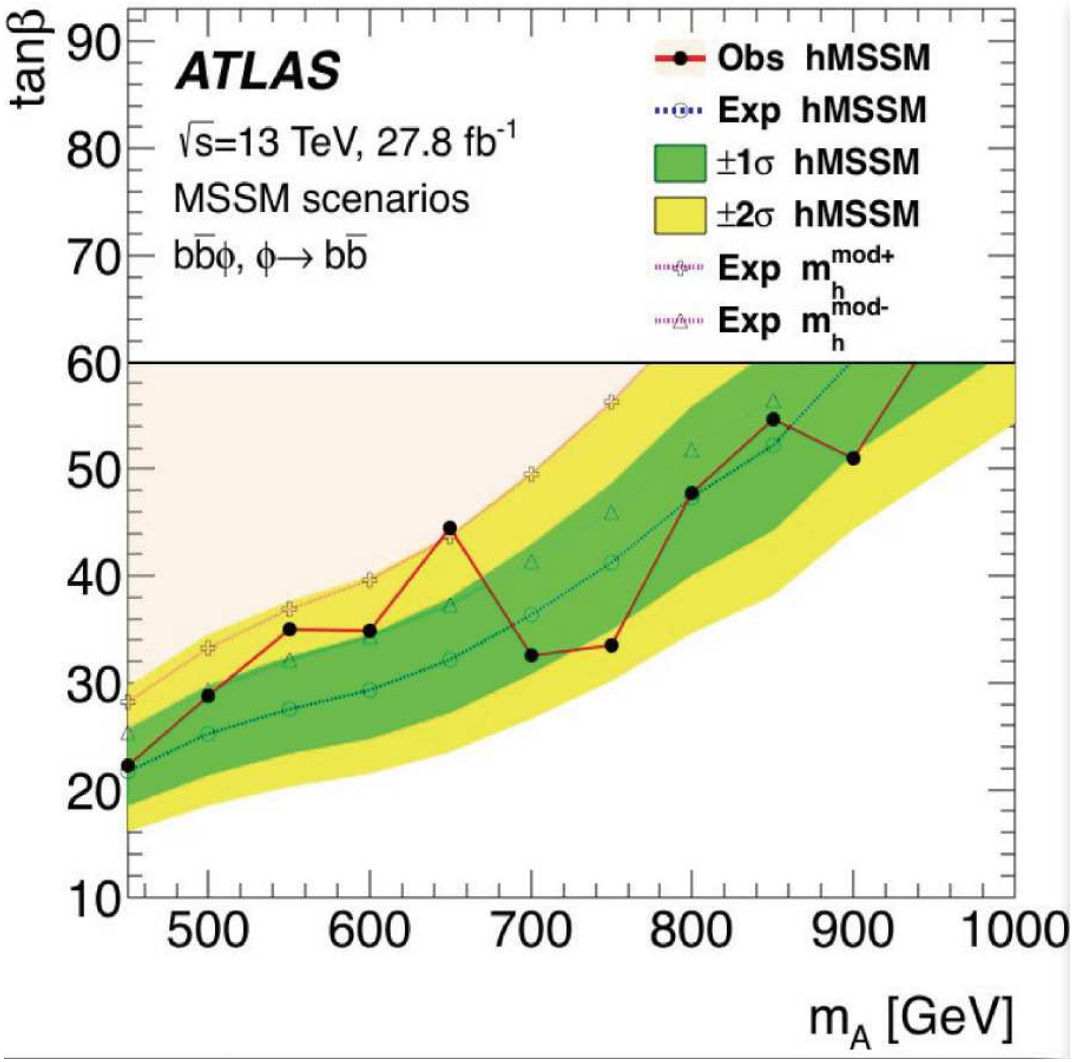
(somewhere the "remaining" SM doublet component c/should show up!)

⇒ best way to (re)present this??

Sven Heinemeyer, HiggsHunting 2018, Paris, 24.07.2018

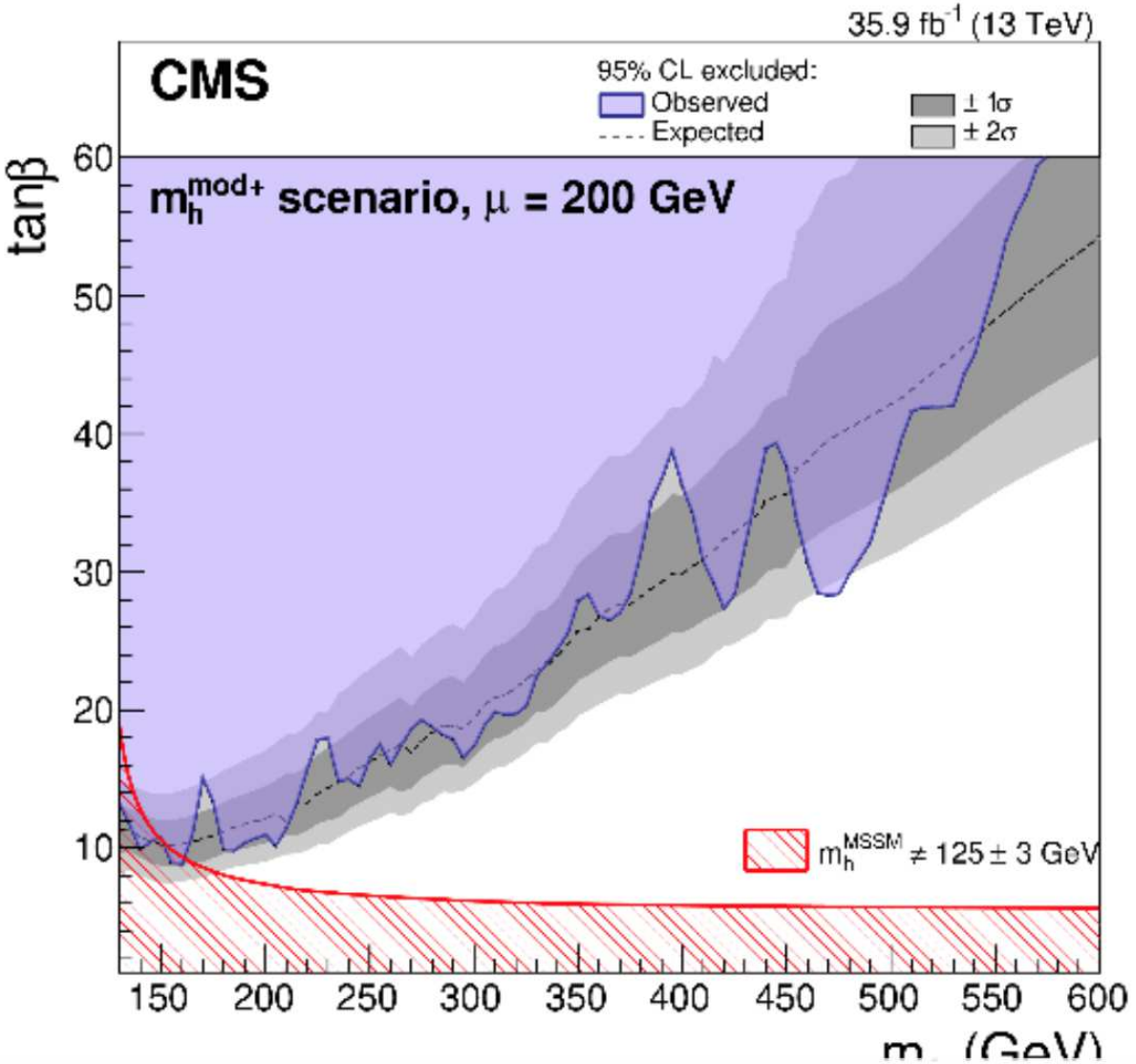
⇒ seems to have dropped off the agenda?

Happy to see (I): $pp \to H/A \to b\bar{b}$



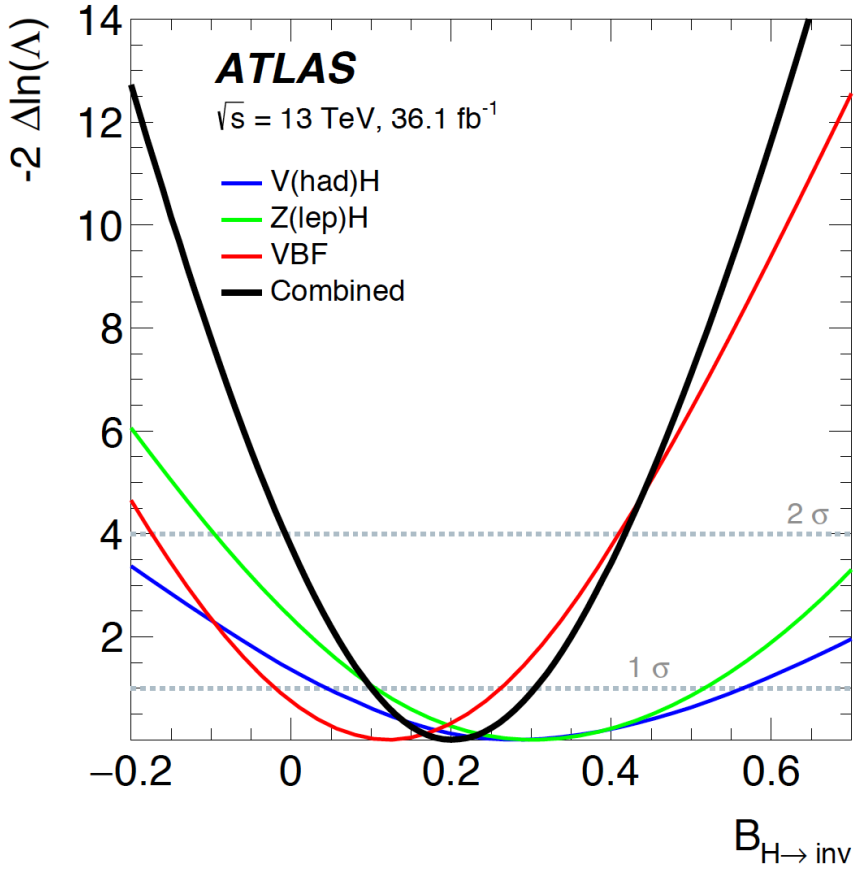
⇒ important to check other BSM models

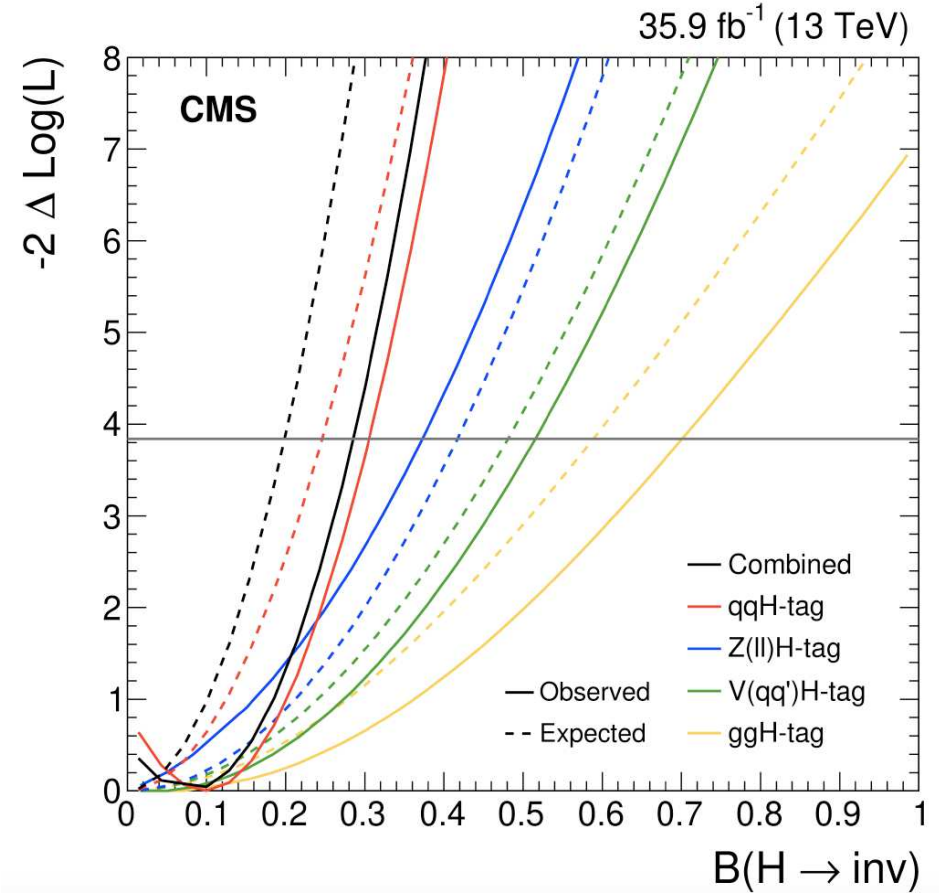
Happy to see (II): $pp \to H/A \to \mu^+\mu^-$



$\Rightarrow$ important to check other BSM models

Emergence of an anomaly?

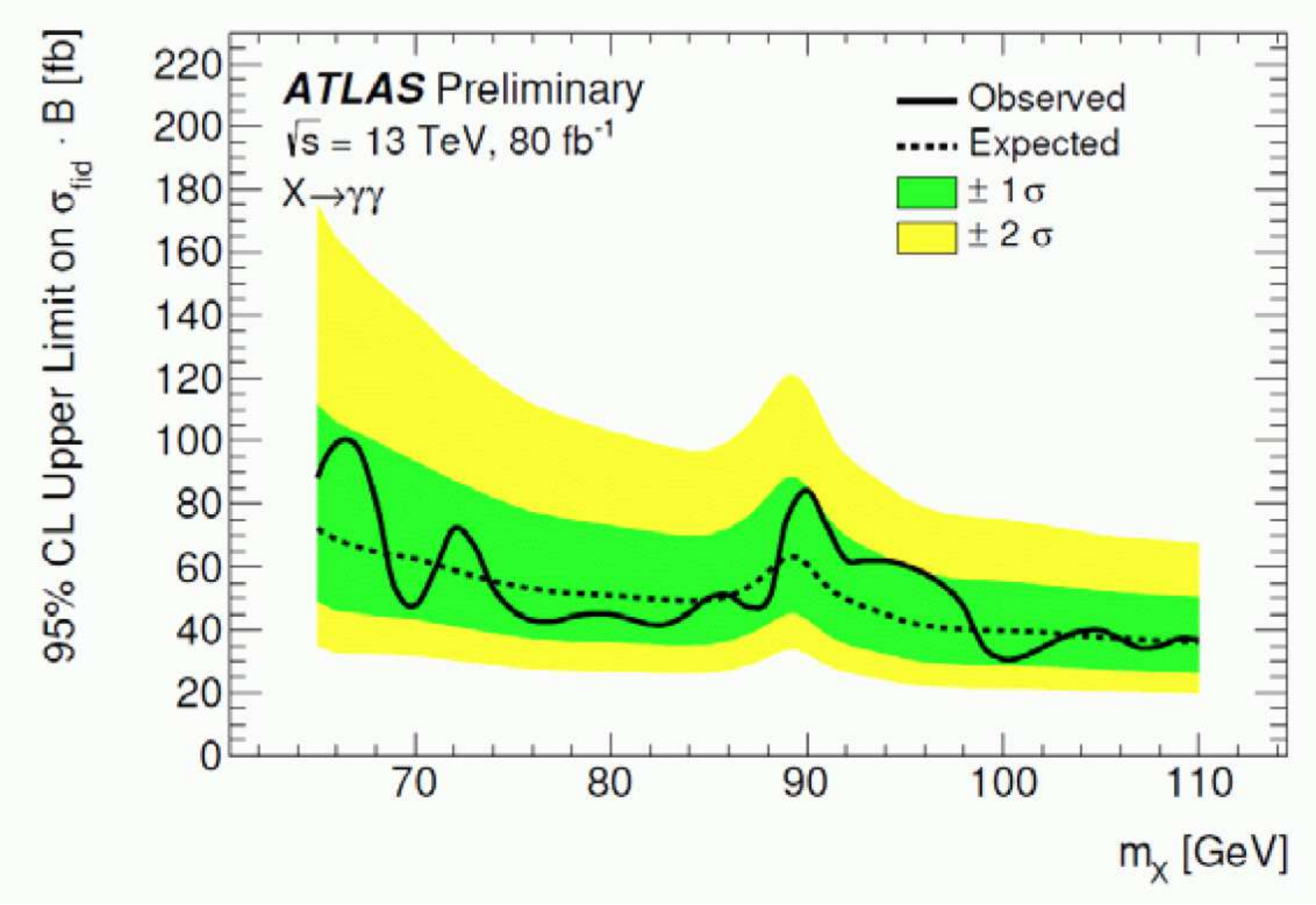




⇒ all sensitive measurements seem to prefer a value > 0!

⇒ nobody gets excited . . .

One important questions since exactly one year: $pp \to \phi_{96} \to \gamma\gamma$

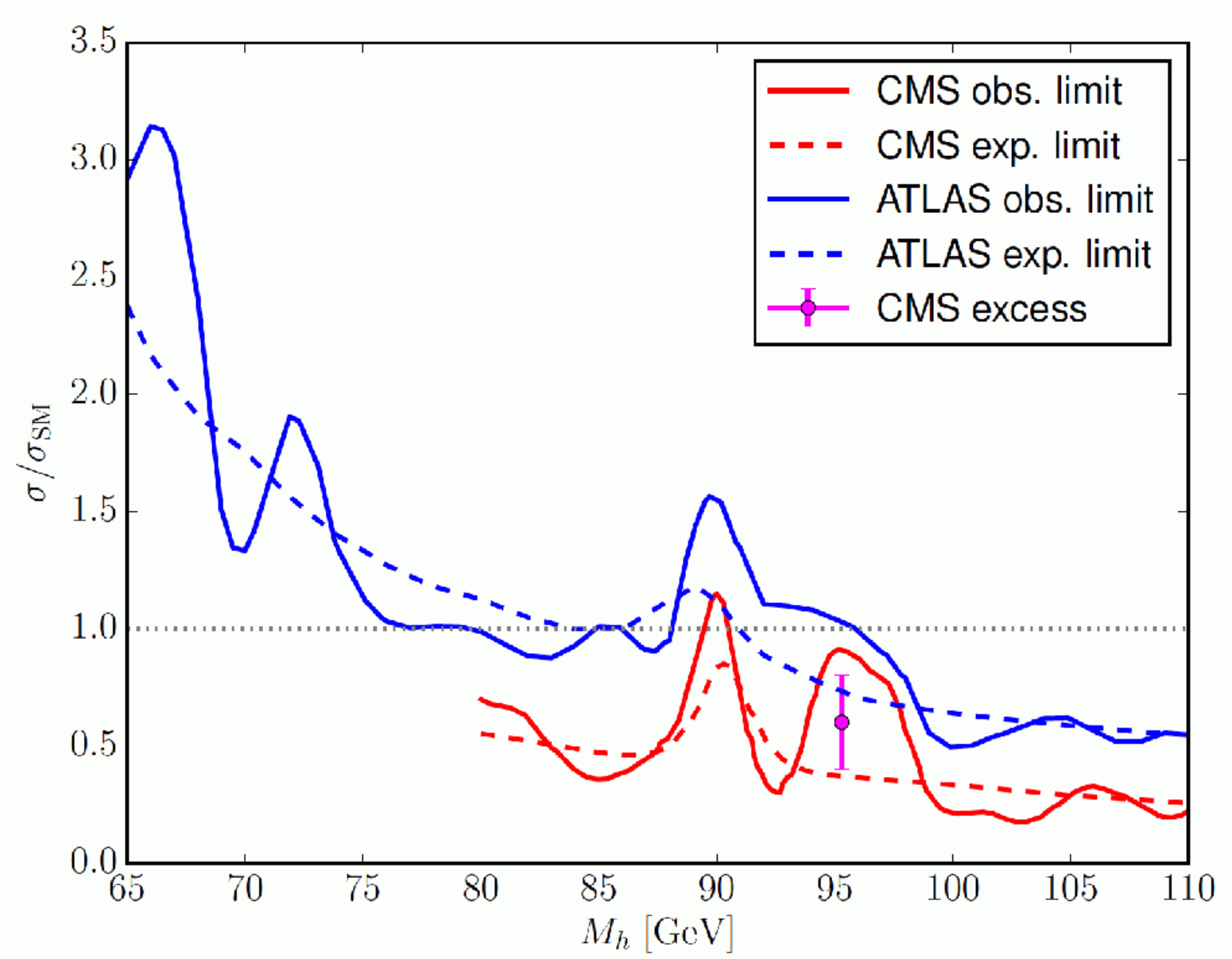


ATLAS sees only "the shoulder" at 96 GeV!

$\Rightarrow$ ATLAS sensitivity?

CMS and ATLAS in direct comparison:

[*S.H., T. Stefaniak '18*]



⇒ Can ATLAS and CMS (finally) clarify this?