Discussion on "BSM Higgs Searches/Rare Higgs Decays"

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virtual, 09/2021

Talks:

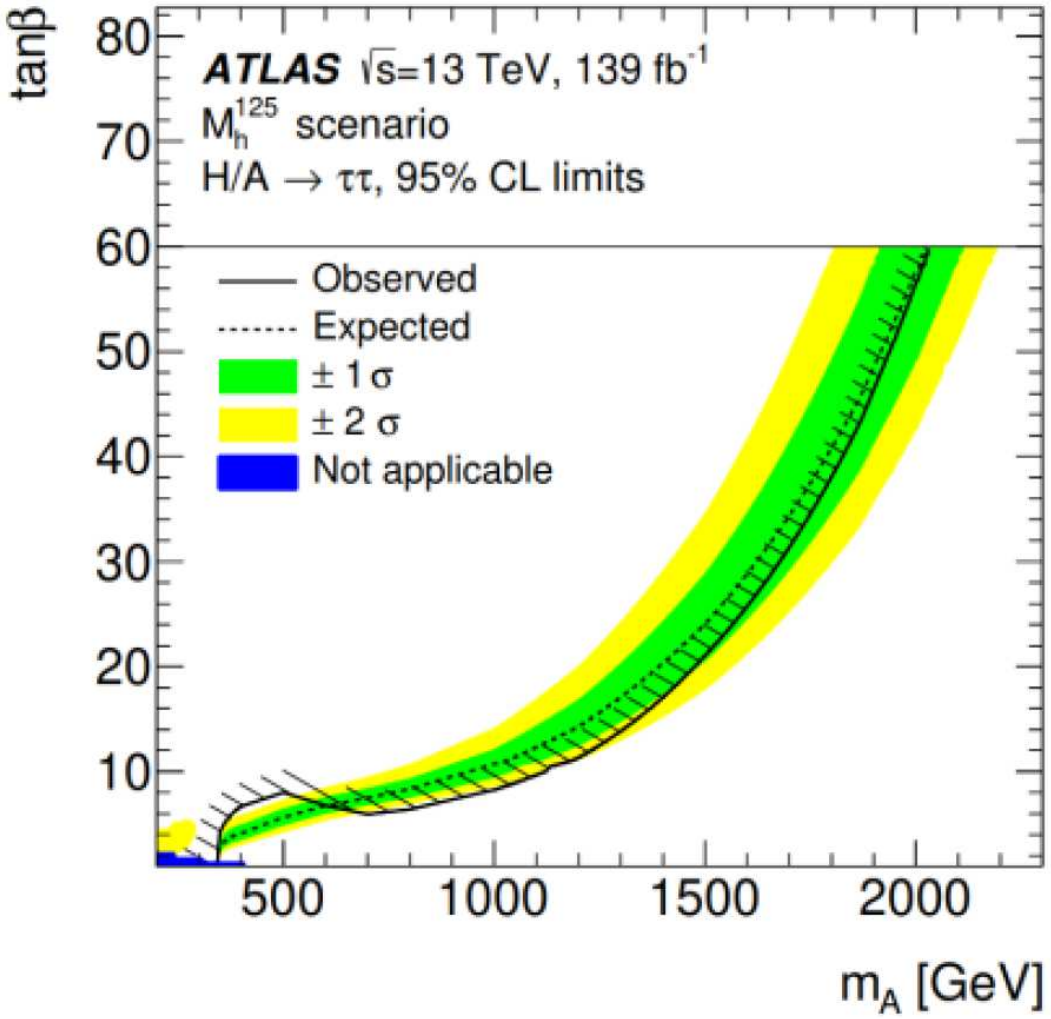
- K. Li: ATLAS BSM Higgs searches
- A. Attikis: CMS BSM Higgs searches
- A. Milic: ATLAS rare and BSM decays
- B. Marzocchi: CMS rare and BSM decays

$\Rightarrow$ no full ATLAS – CMS comparison . . .

$\Rightarrow$ just a few (personally biased) examples . . .

Perhaps slightly provocative . . . :-)

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

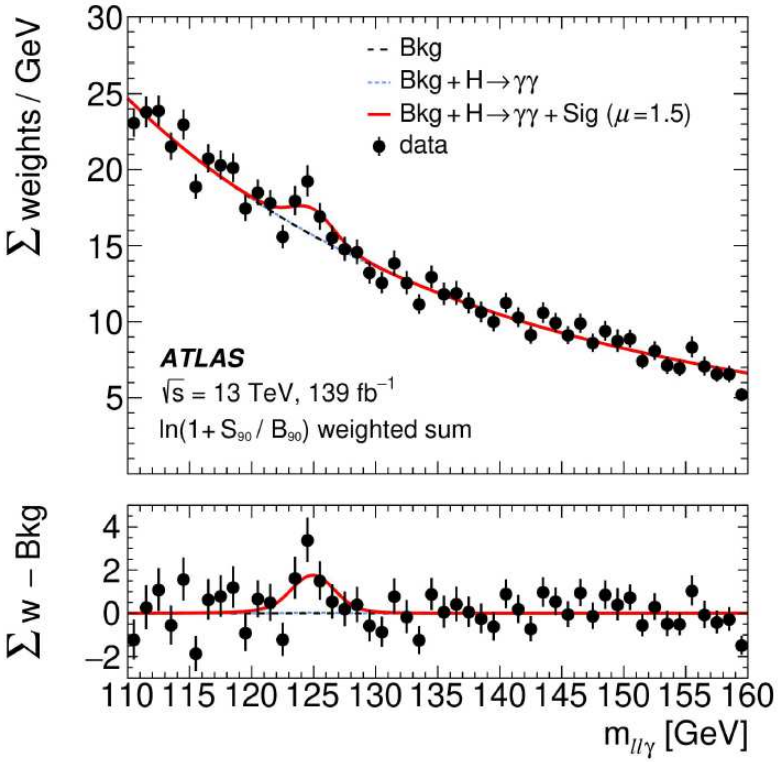


$\Rightarrow$ excess in ggH/A and $b\bar{b}H/A$! $(2.2, 2.7\,\sigma)$ $\Rightarrow$ what about CMS??

Finally: $h_{125} \to l^+ l^- \gamma$

- First evidence for $H \to ll\gamma$!
  - 3.2 σ observed, 2.1 σ expected
  - xsec $\times$ BR = $8.7\ ^{2.8}_{-2.7}$ fb

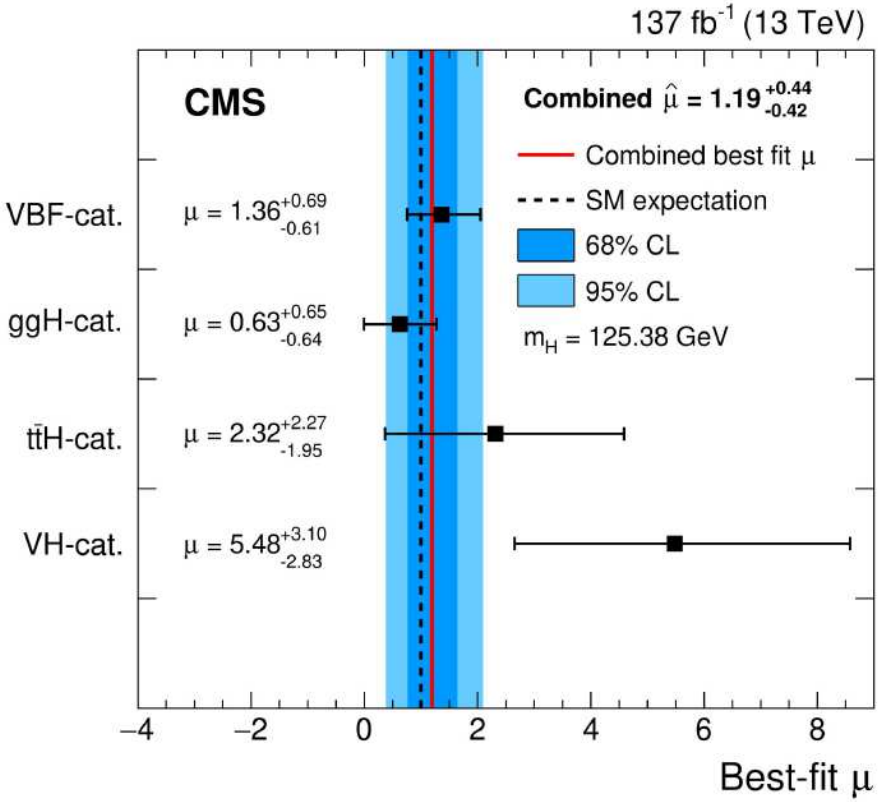
- Search statistically limited (syst. uncertainty 35% of stat. uncertainty)

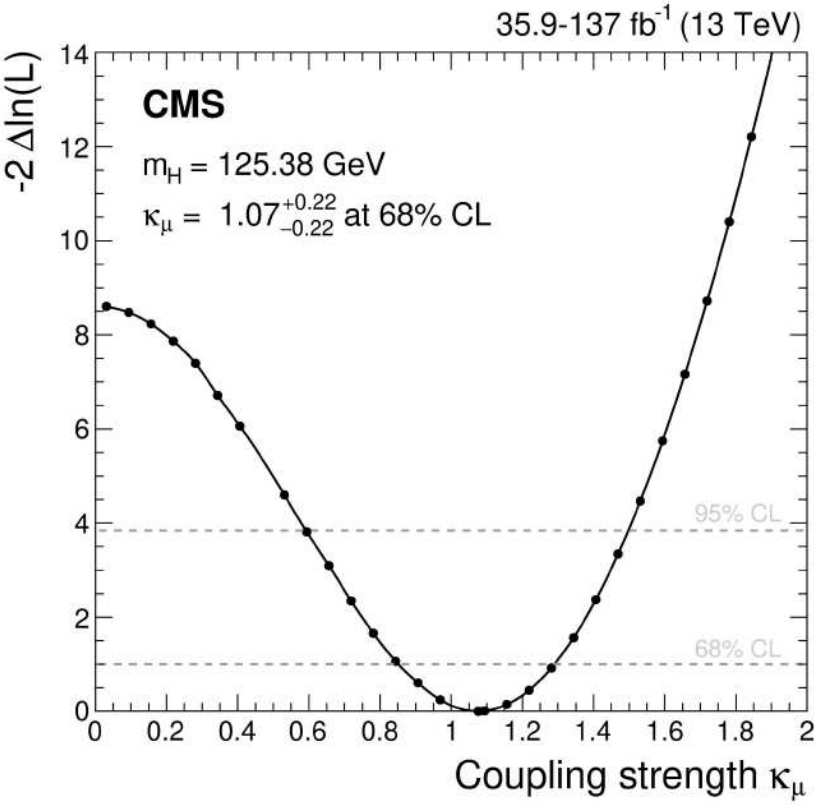


$\Rightarrow$ agreed upon cuts?? $\Rightarrow$ in the LHCHWG we tried for years . . .

Impressed to see:

- **Results: evidence of H → μμ**
  - **p-value: *3.0σ (2.5σ exp.)***
  - ***μ = 1.19 ± 0.40 (stat) ± 0.15 (syst)*** → statistically limited
  - **No deviation from SM observed**

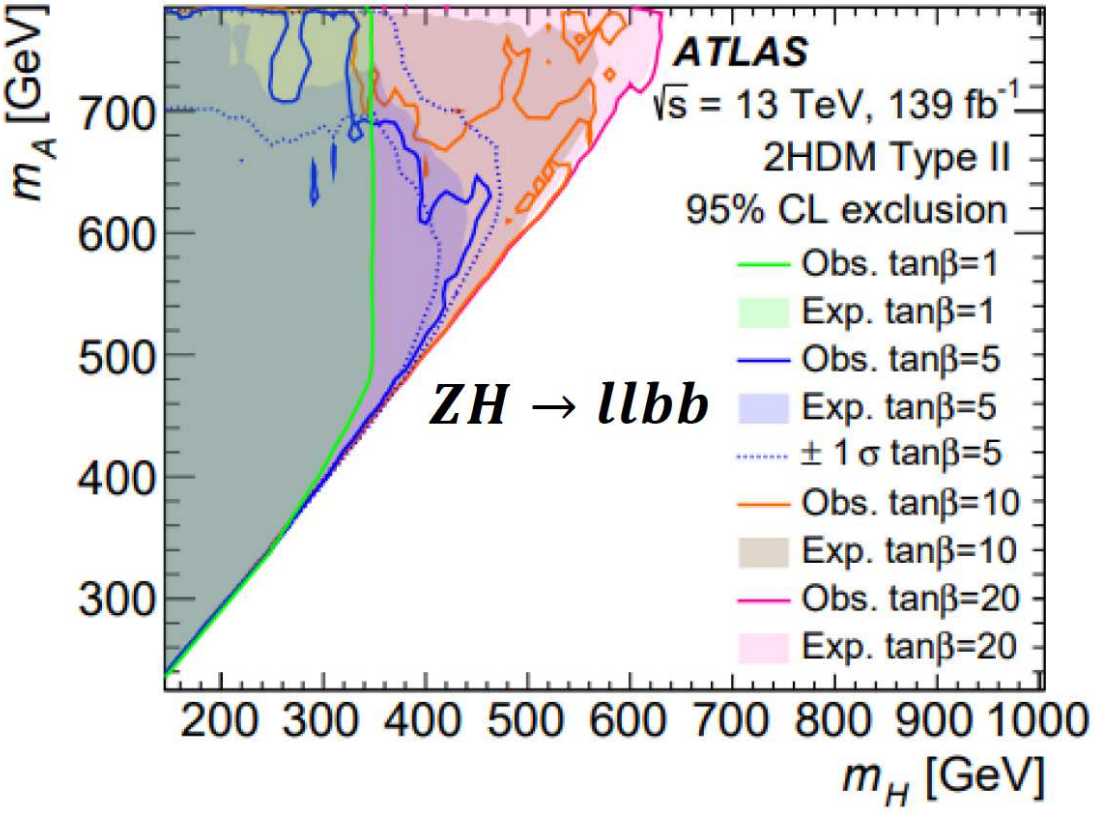




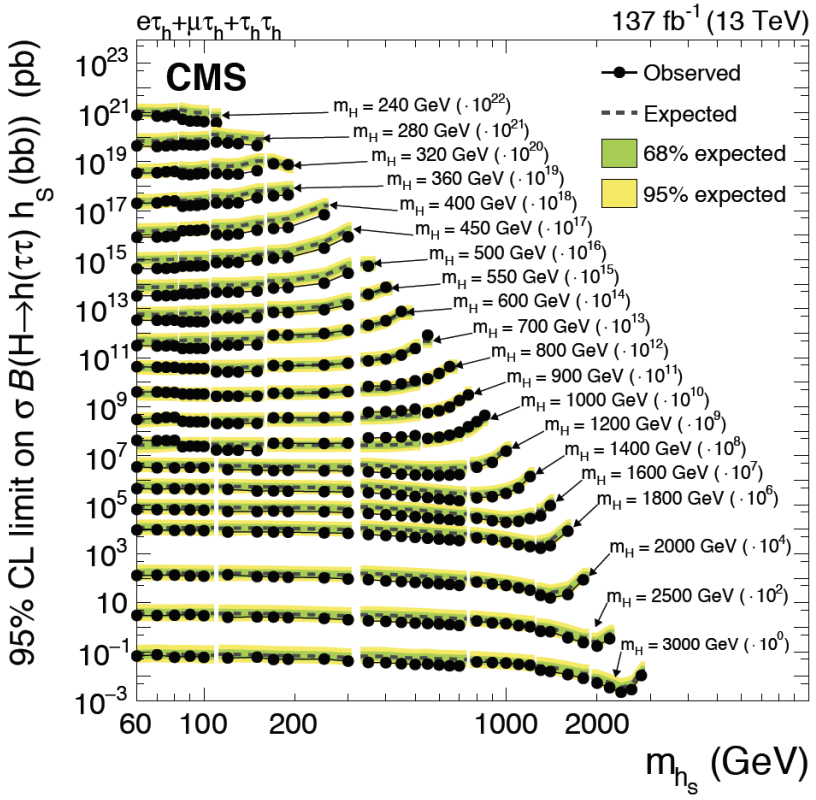
⇒ ATLAS is somewhat behind . . .

How to present results in the most confusing way?

ATLAS: $A \to ZH$

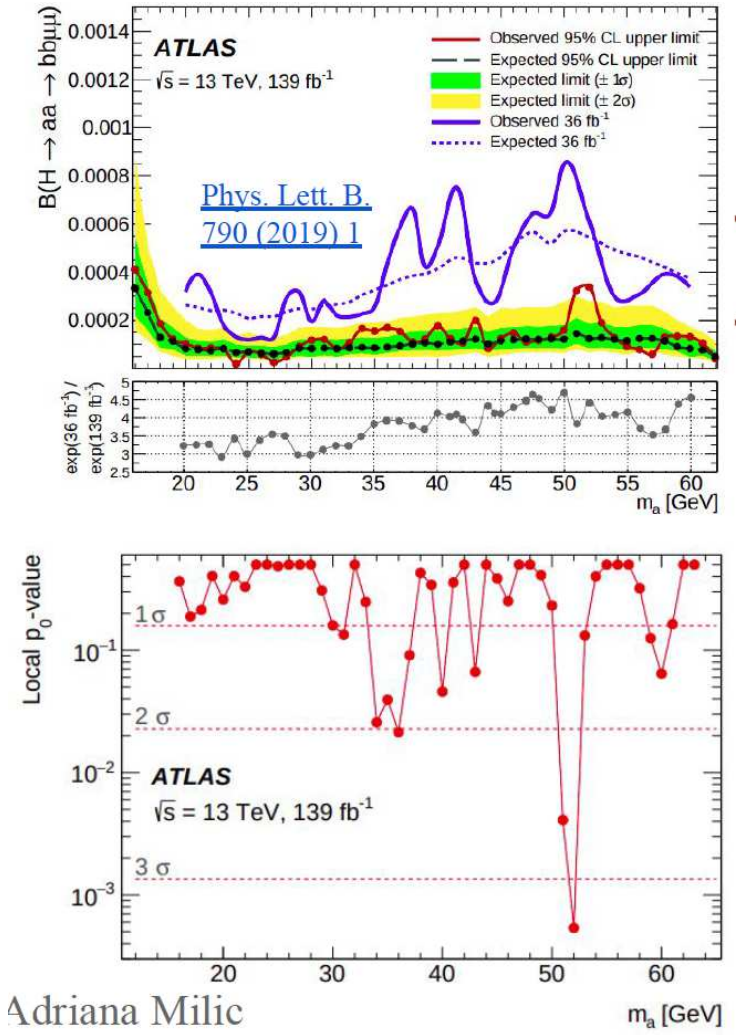


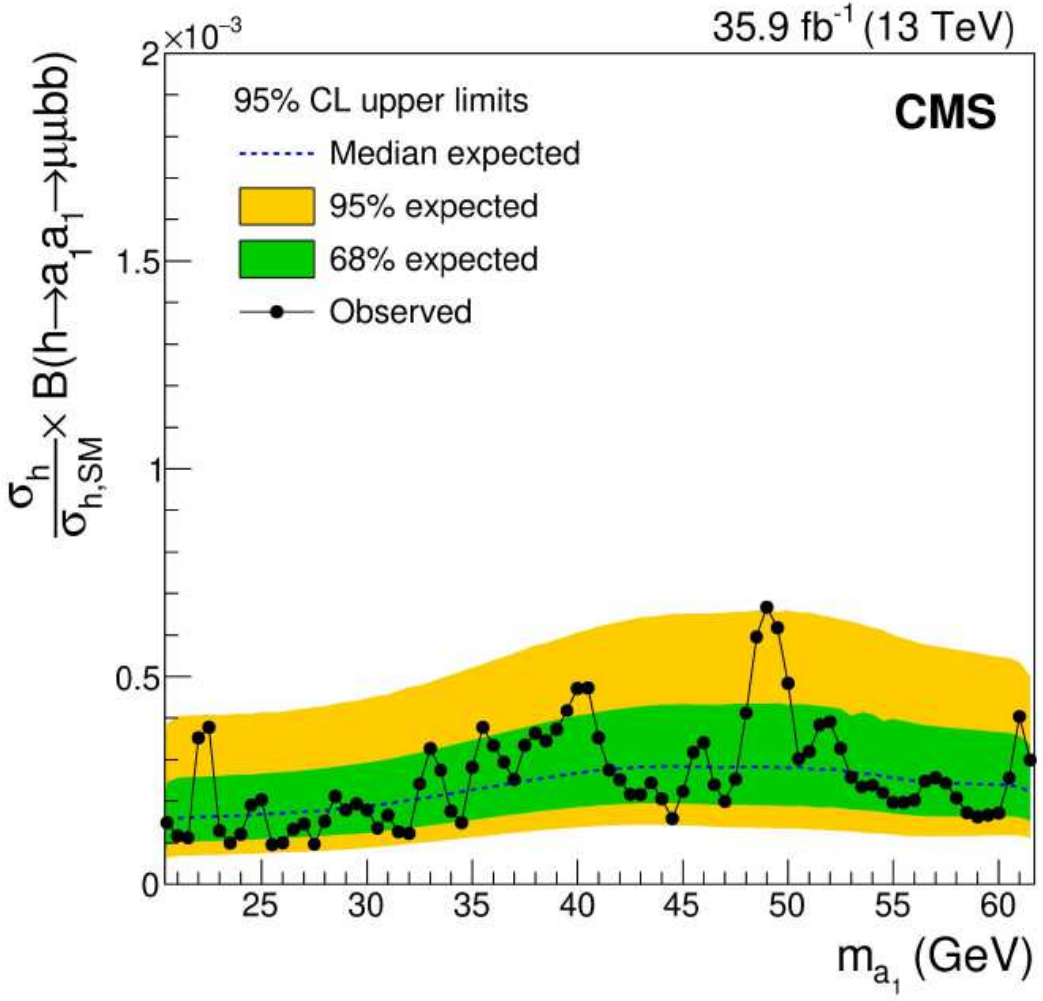
CMS: $H \to h_{125} h_s$



⇒ not sure who wins, ATLAS or CMS . . .

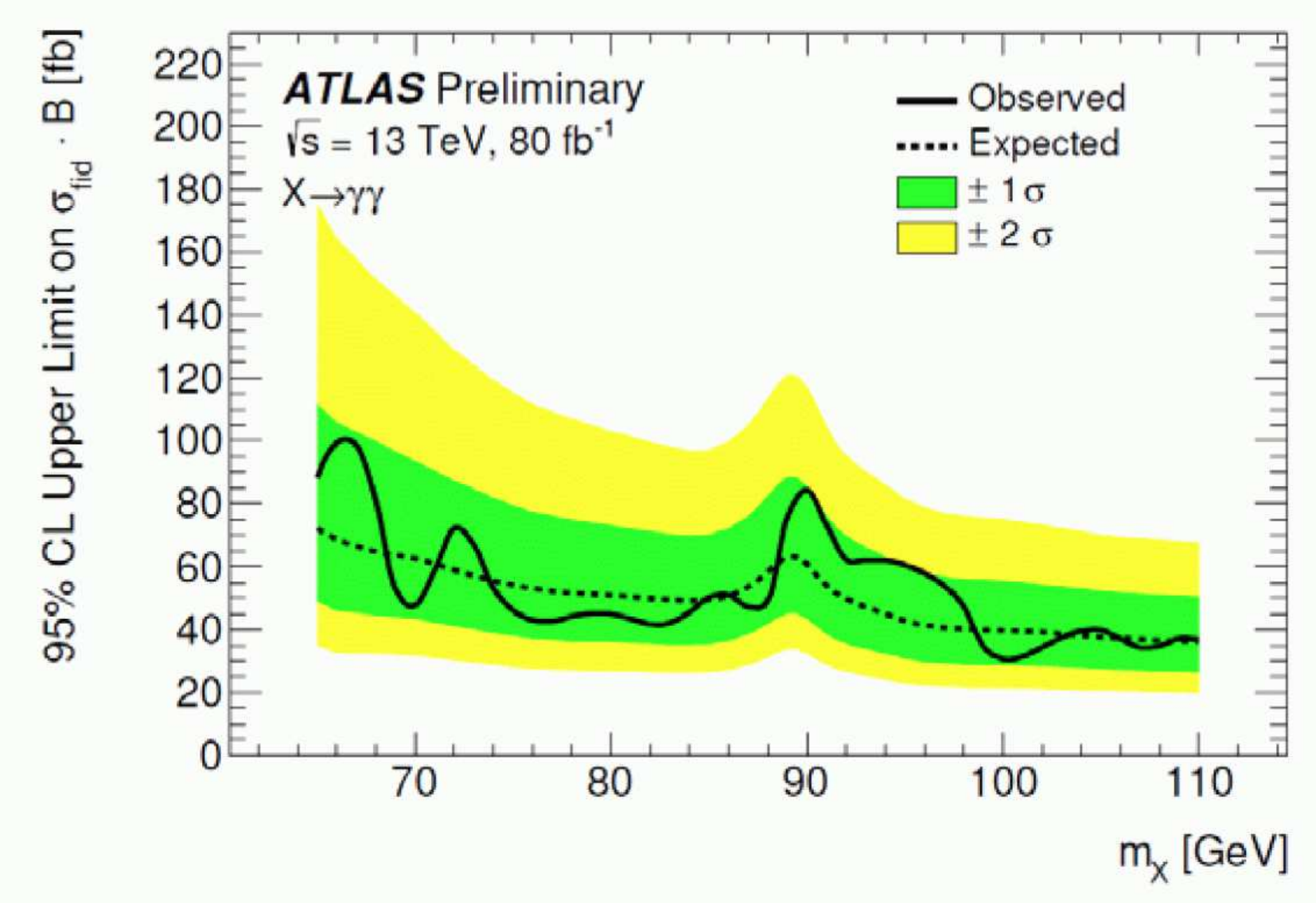
Discovery?





⇒ consistent? If so . . .

One important questions since more than three: $pp \to \phi_{96} \to \gamma\gamma$

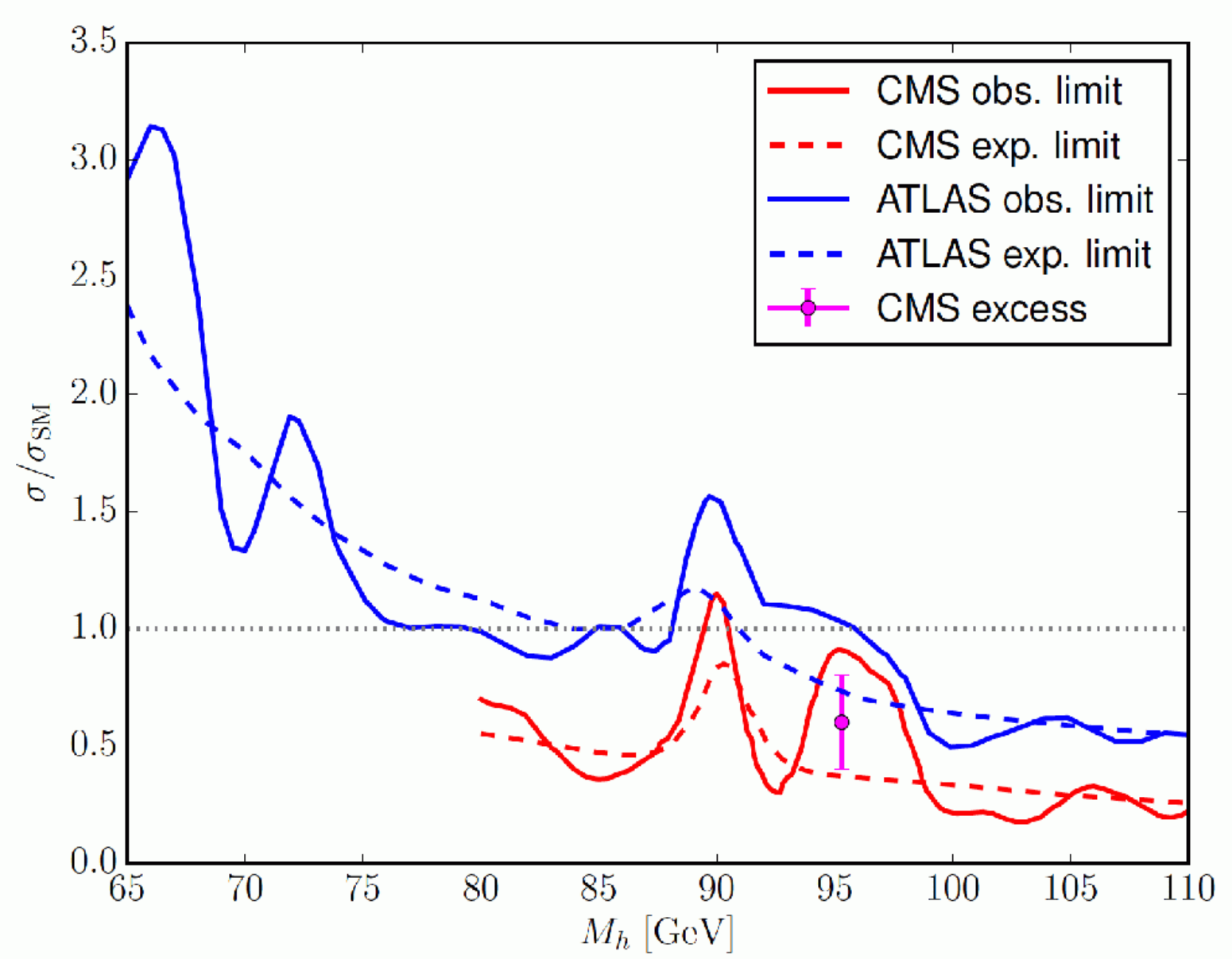


⇒ no update, neither from ATLAS, nor CMS, . . .

⇒ nothing about direct light Higgs production at HH21!

CMS and ATLAS in direct comparison:

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



⇒ Can ATLAS and CMS (finally) clarify this?