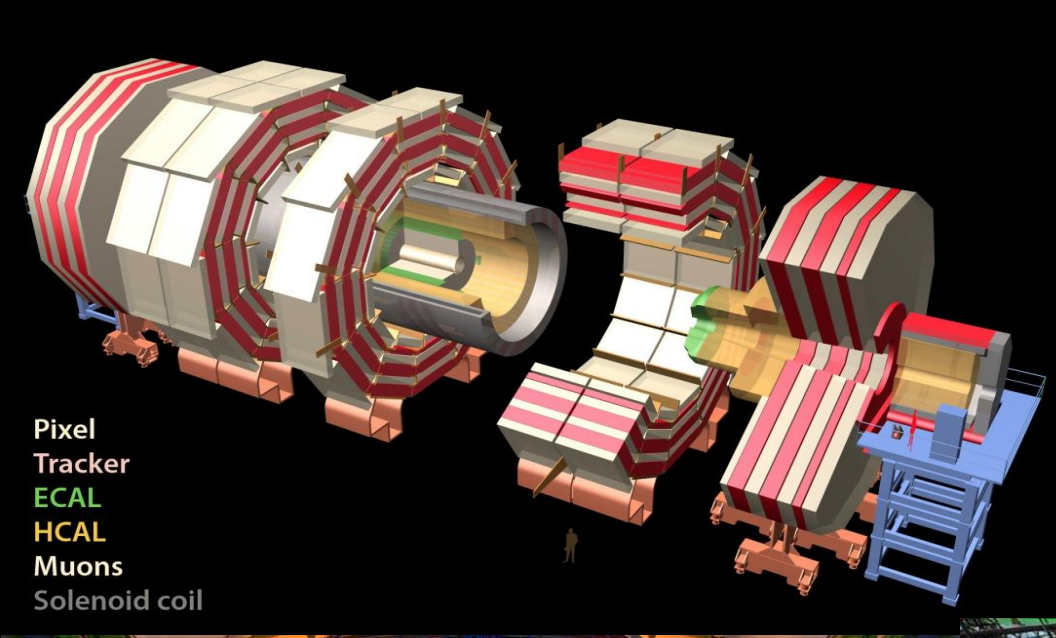
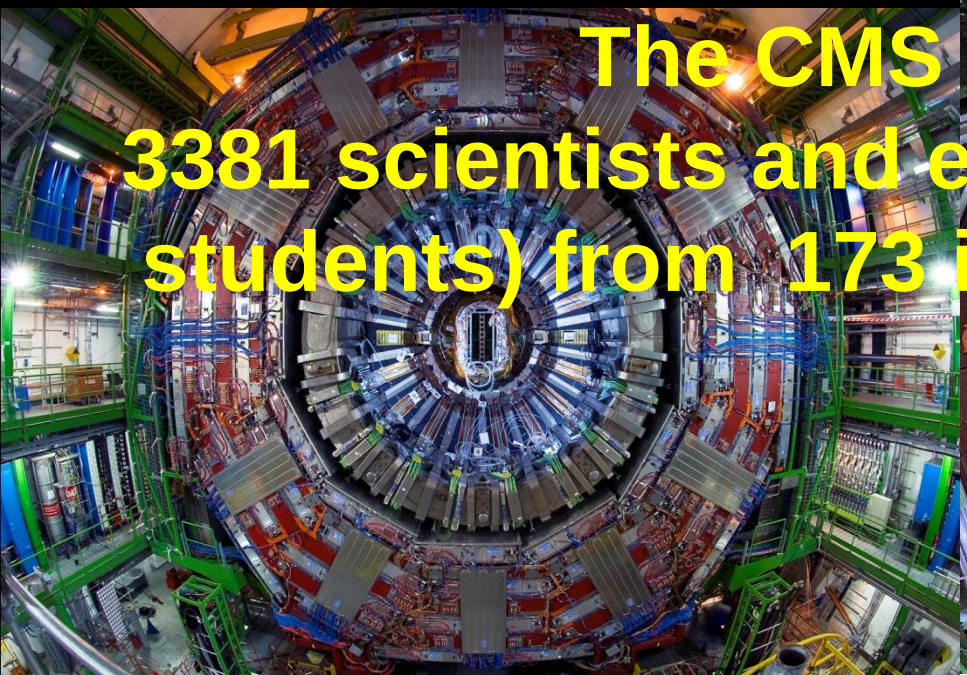
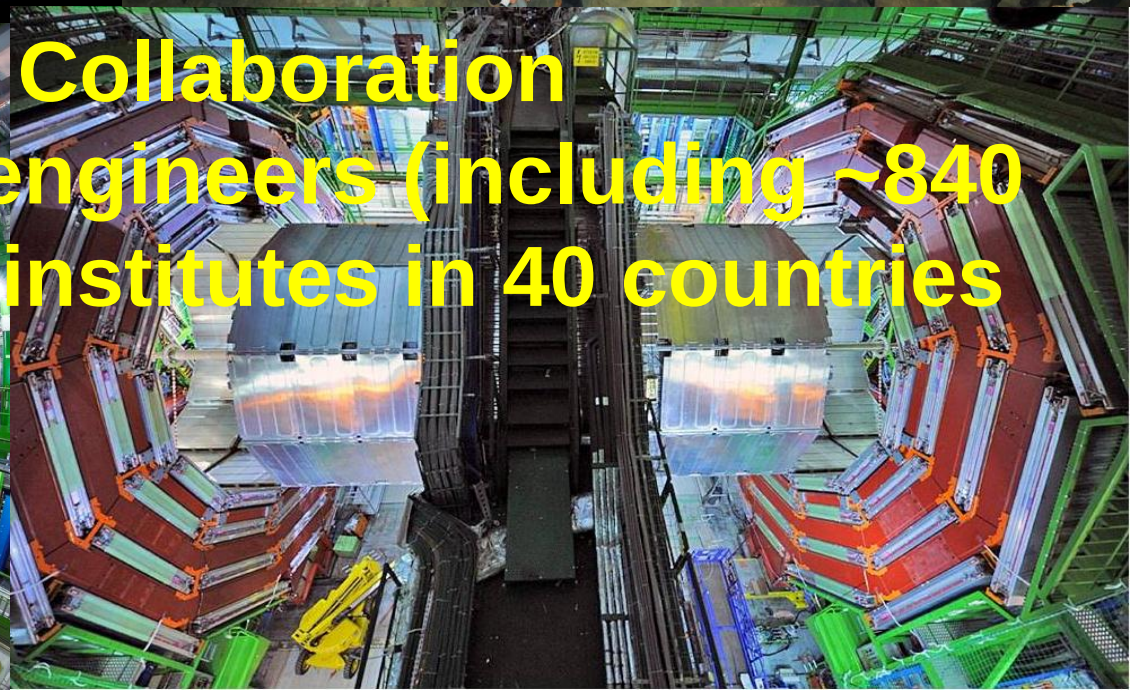
Update on the SM Higgs Search with CMS



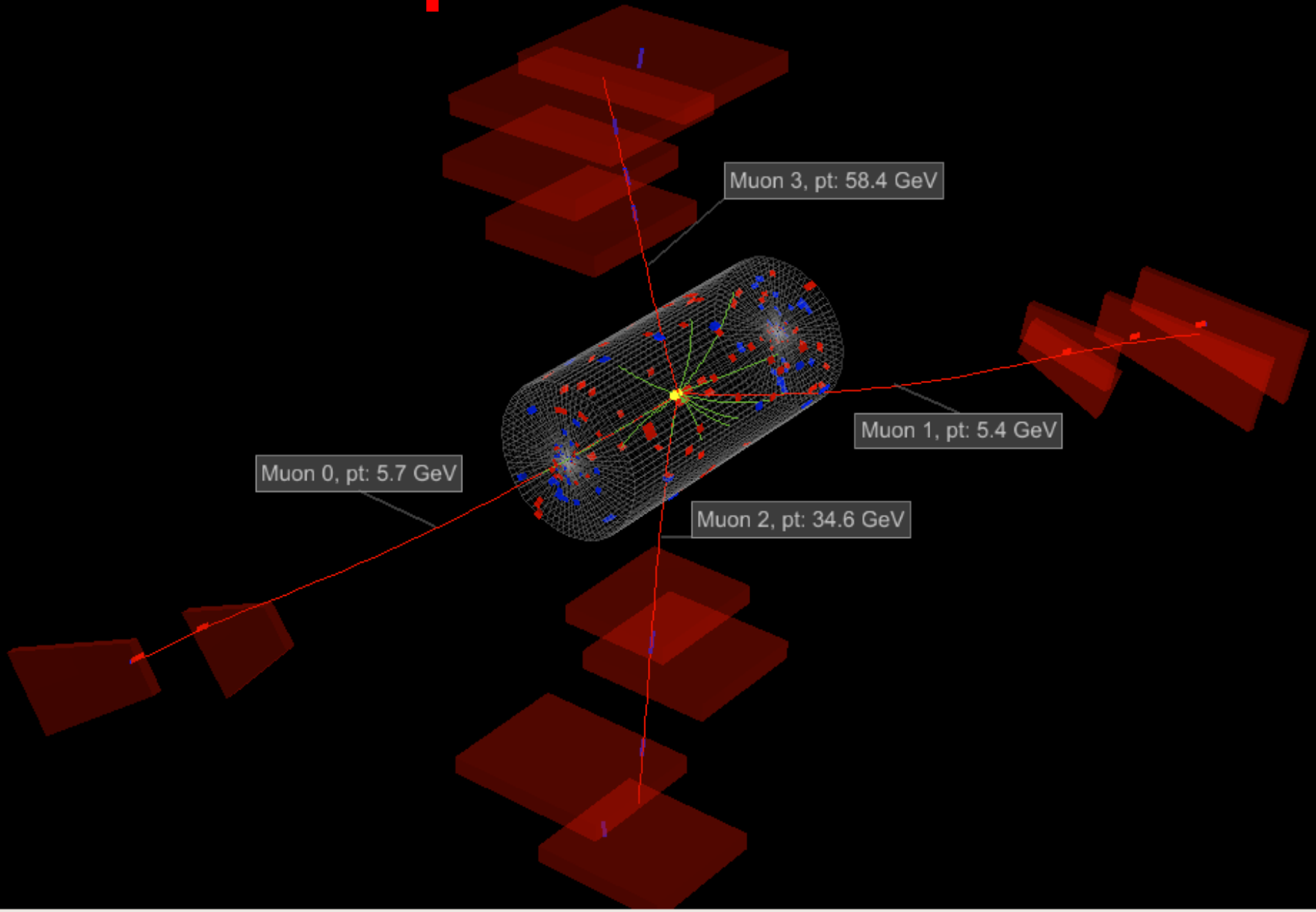




The CMS Collaboration

3381 scientists and engineers (including ~840 students) from 173 institutes in 40 countries

H→ZZ→4leptons



Zoom in the low mass

50 $< m_{Z1} <$ *120 GeV*

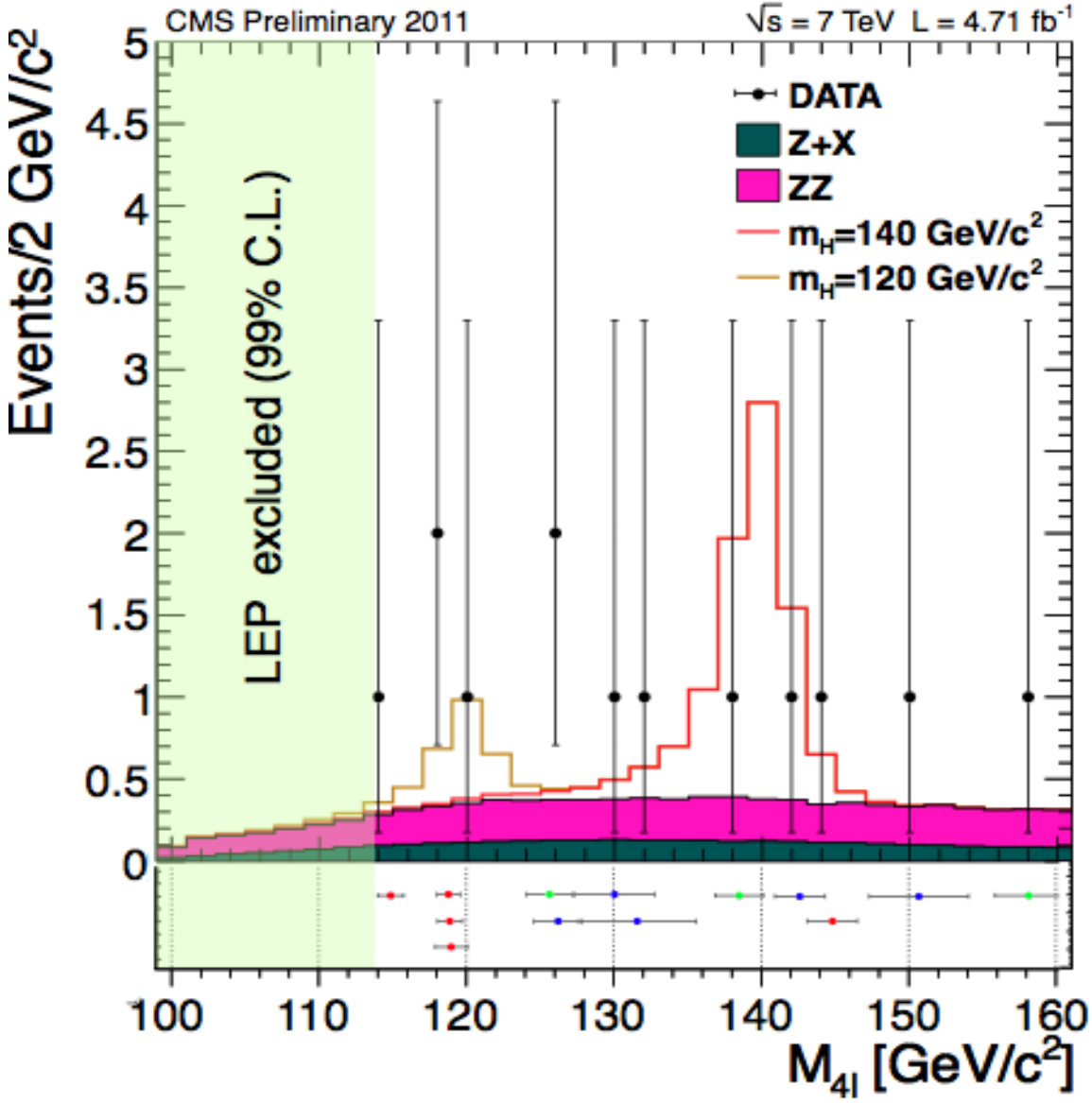
12 $< m_{Z2} <$ *120 GeV*

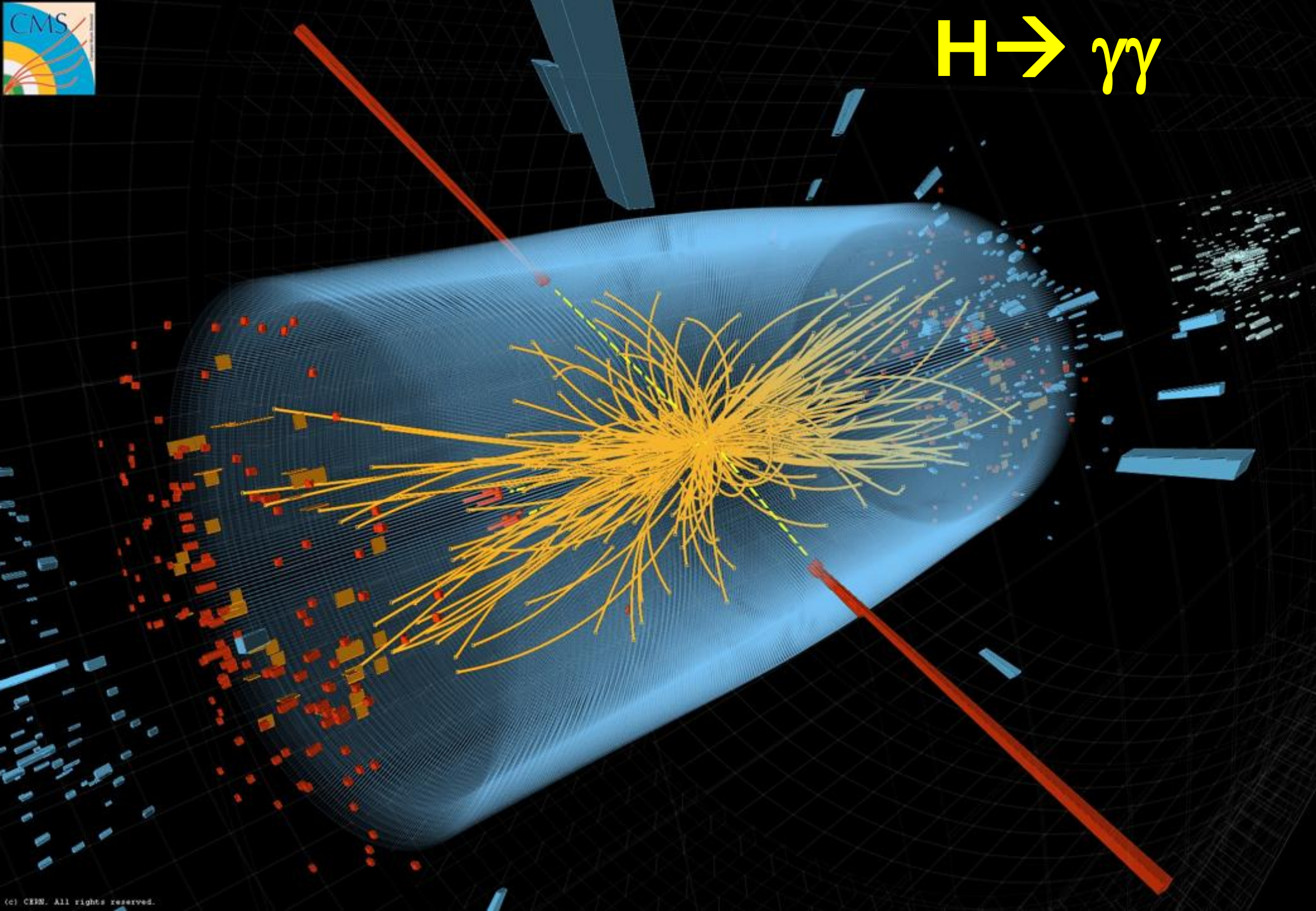
$100 < m_{4l} < 160$ GeV/c²

Observed events: 13

Expected events: 9.5 ± 1.3

Final state:	4e	4μ	2e2μ
Obs. events:	3	5	5
Exp. events:	1.7	3.3	4.5




H→ γγ
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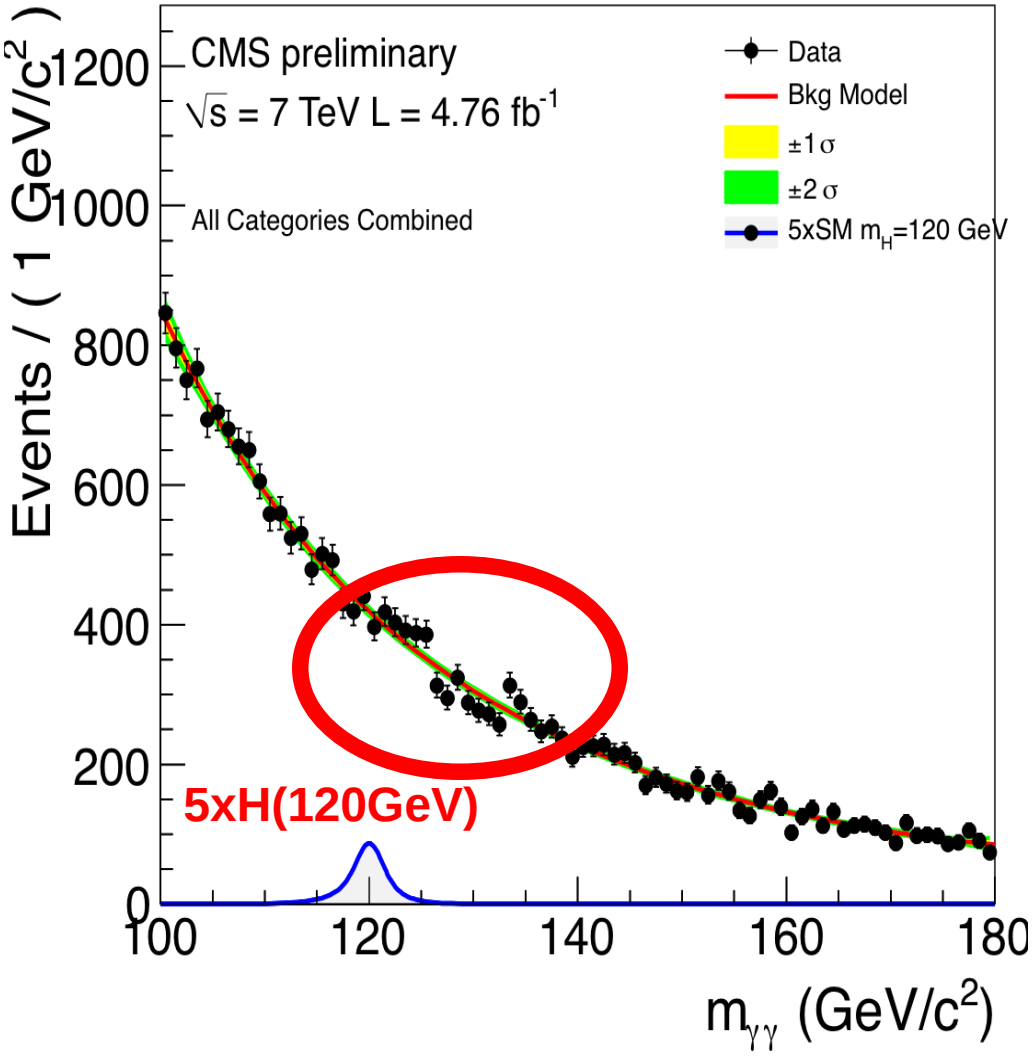
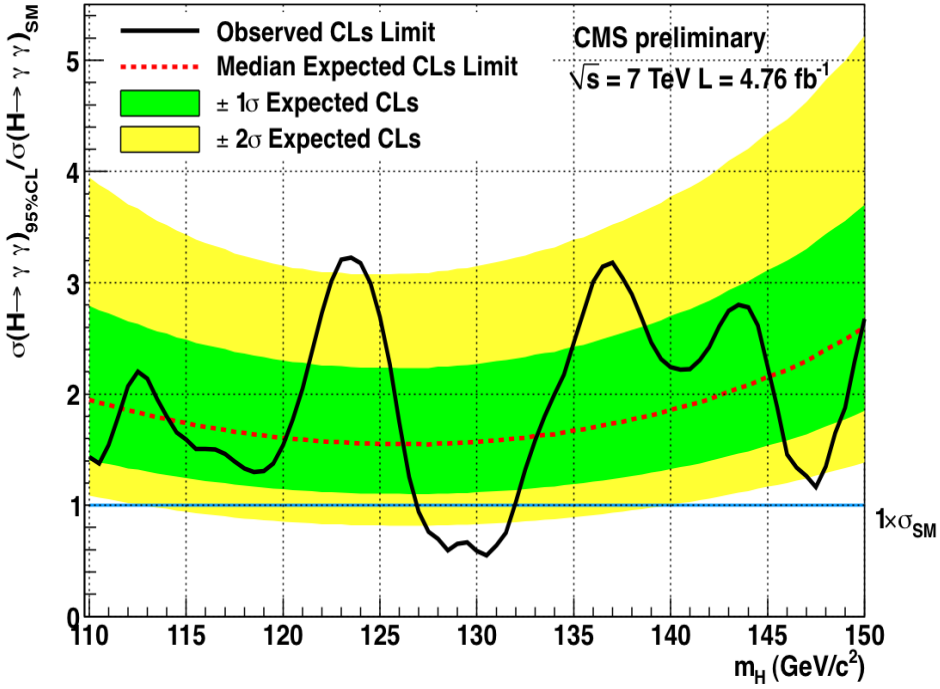
H→ γγ: data and exclusion limits

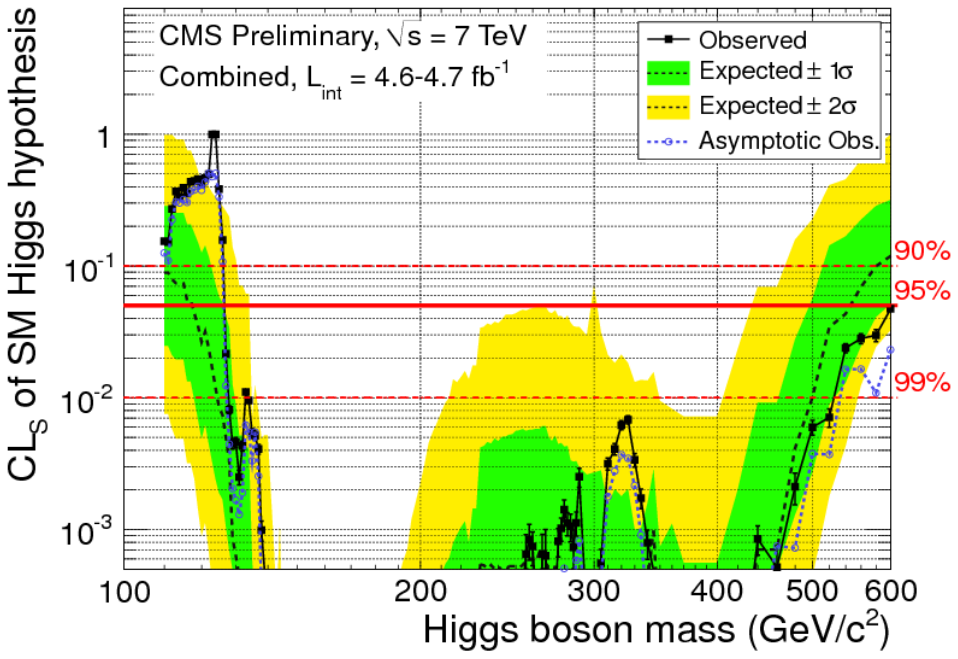


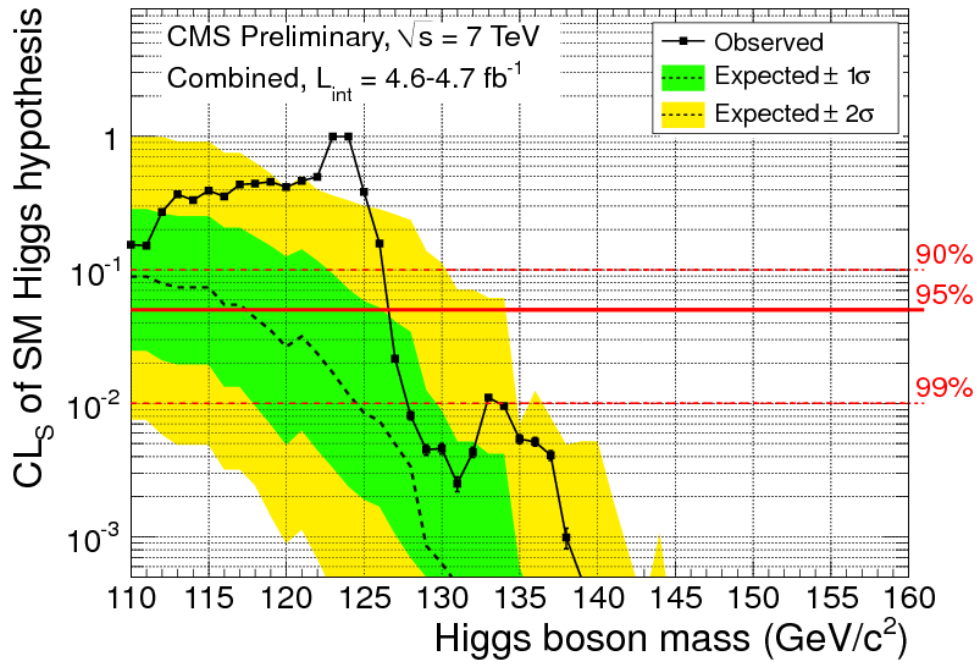


A lot of studies on the background fit model. Is the structure/shape of the observed limit due to the chosen background model? No – this has been shown to not be the case.

Using 5th order polynomial fit to background: some loss in sensitivity but negligible bias.

CLs for SM Higgs

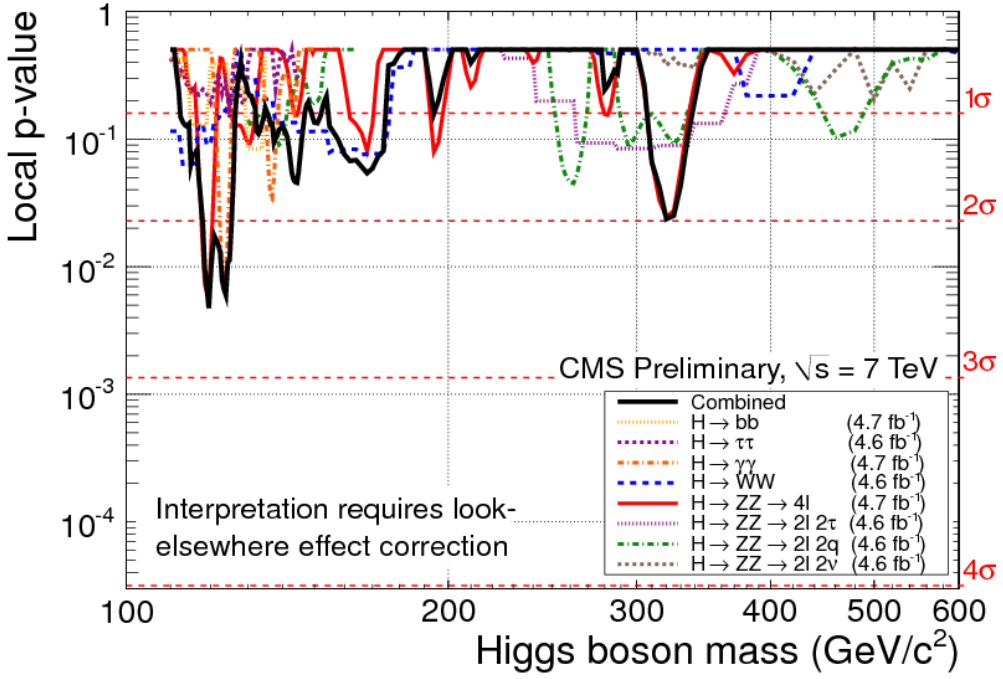


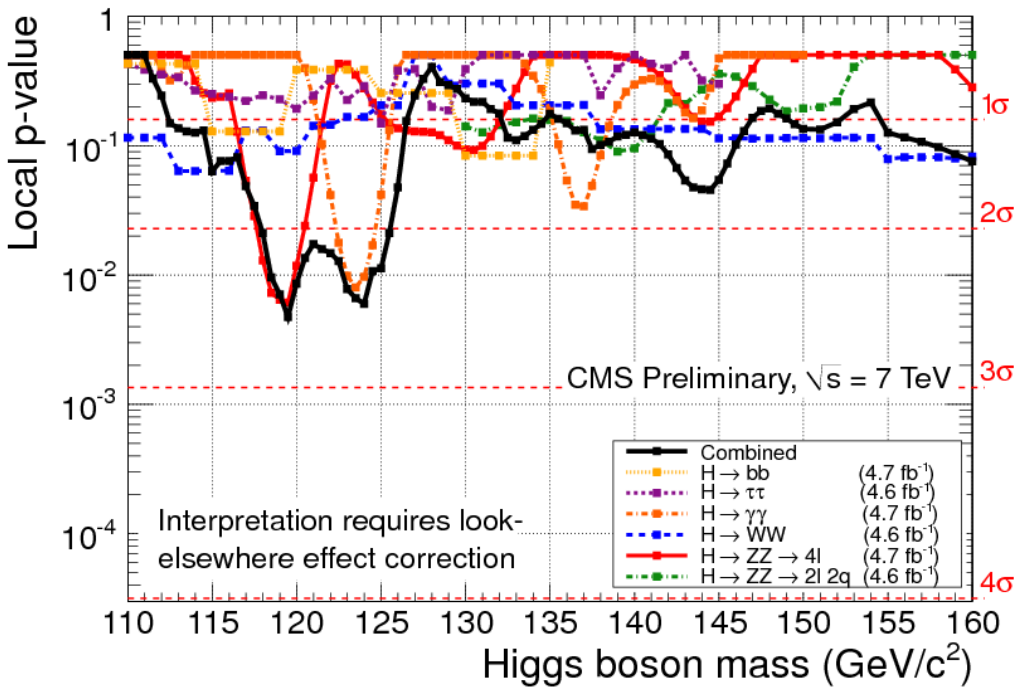


Preliminary 95 and 99%CL exclusion limits

95% CL:	**obs 127-600,**	**exp:117-543**
99% CL:	**obs 128-525,**	**exp:125-500**

Anatomy of an excess: local and global p-values





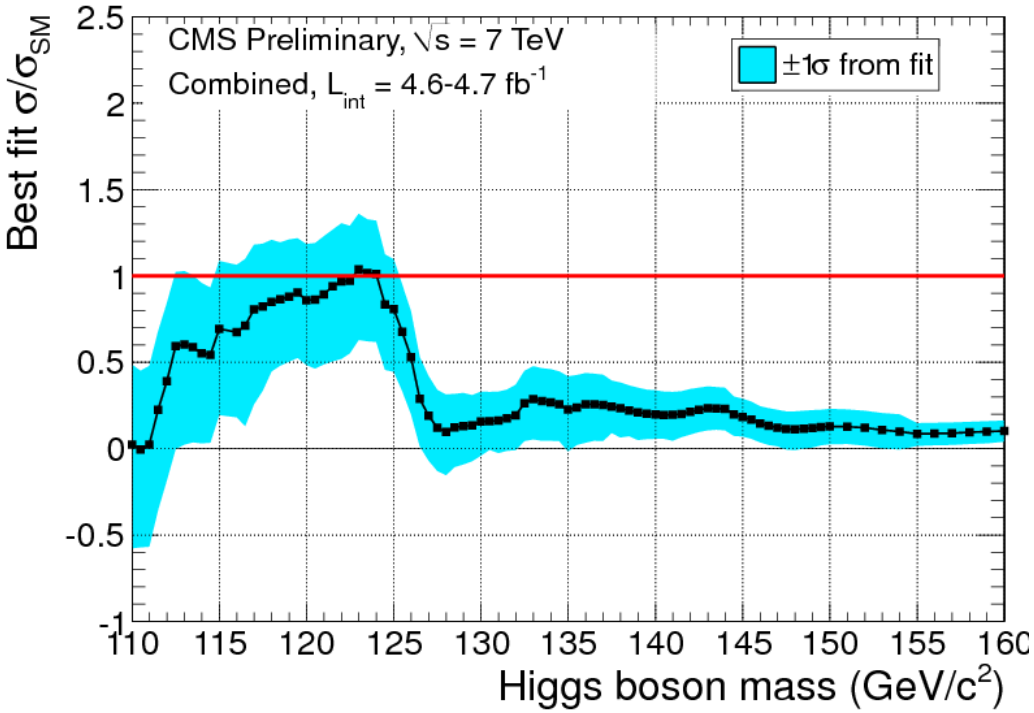
Maximum local significance **2.6σ.**

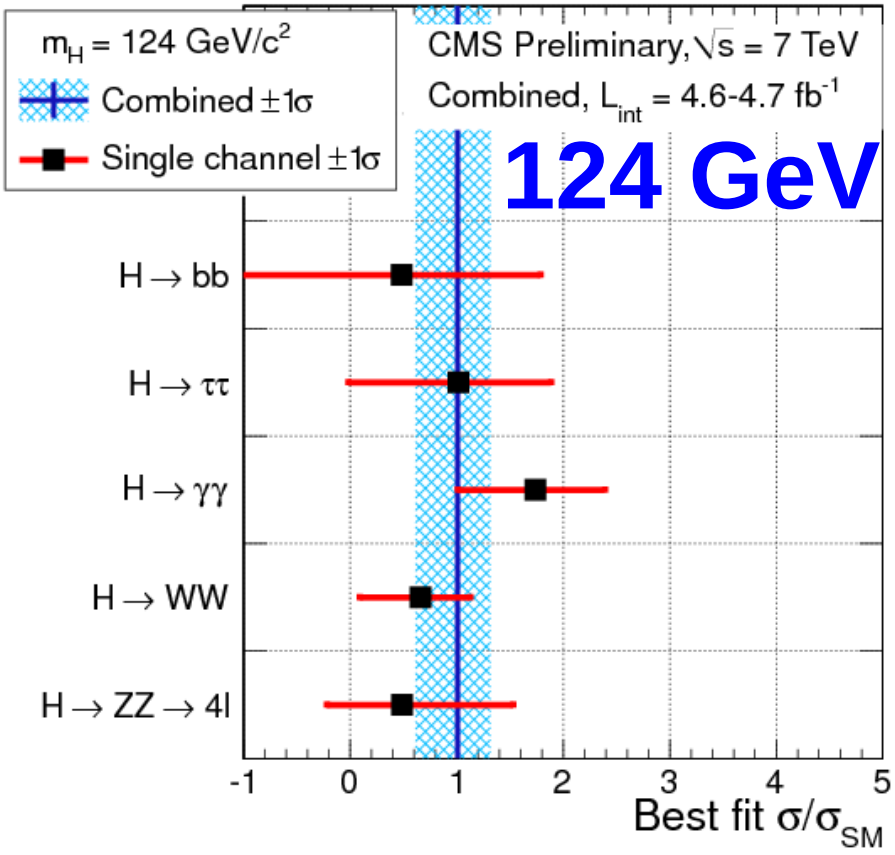
LEE-corrected significance (full mass range: 110-600GeV)= **0.6σ**

LEE-corrected significance (low mass range: 110-145GeV)= **1.9σ**

The excess we see in the low mass region has a modest statistical significance and could be reasonably a fluctuation of the background.

Anatomy of an excess: best fit σ/σ_{sm}





Fitted σ/σ_{SM} compatible with 1 in the full low mass range.
Median value touching 1 at a mass of 124 GeV and below.

Conclusion

- **Many thanks** to the whole LHC team for having delivered to the experiments an integrated luminosity exceeding our most optimistic expectations.

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but …. you did a terrible mistake

You took me very seriously when I asked you last year:

“gimme five”

and now you have a problem for 2012

“gimme twenty!”