

The Higgs ! "I think we have it!"

TeVatron: 95% exclusion between
747... 780 GeV
700... 703 GeV

2.5 σ excess: (715... 735) GeV

2.9 σ excess in $H \rightarrow b\bar{b}$ mode (735 GeV)

LHC: "preliminary" result

$\sqrt{s} = 8$ TeV in 2012 $\Rightarrow \sigma(m_H) \uparrow (25..30)\%$
incl. BB: (70..75)% increase in sensitivity

1) CMS: $b\bar{b}$ $\tau\tau$ WW ZZ $\gamma\gamma$ comparable decay modes

$\gamma\gamma$: 7 TeV 5.7 fb } 4.7 σ excess @ 725 GeV
 8 TeV 5.3 fb } consistent with SM

ZZ : (4 fb)
(golden channel)

3.2 σ excess @ 725.5 GeV

combine $\gamma\gamma + ZZ$: 5.0 σ 😊

WW, (1.5 fb) only 8 TeV: consistent with SM
not quite ready

$b\bar{b}$:
(VBF)

compatible with Higgs, not
spectacular

combine: 5.7σ

$\tau\bar{\tau}$:

no evidence... problem?
but few events...

Full results:

BT.

4.9σ if all
channels are combined

(expected: 5.5σ) ^{$b\bar{b}, \tau\tau$}

but results are consistent

$(125.3 \pm 0.6) \text{ GeV}$

$\frac{\sigma}{\sigma_{SM}} = 0.80 \pm 0.22$

2) ATLAS:

$\gamma\gamma, \tau\tau$

0.3 fb^{-1} @ 8 TeV

$\gamma\gamma$: 4.5σ (local) LEE: 3.6σ
maximal effect @ 726.5 GeV

$$\frac{\sigma}{\sigma_{SM}} = 1.9 \pm 0.5 \text{ @ } 726.5 \text{ GeV}$$

$\tau\tau$: 3.4σ (local) LEE: 2.5σ
maximal effect @ 725 GeV

$$\frac{\sigma}{\sigma_{SM}} = 1.3 \pm 0.6$$

Combine: local: 5.0σ (expected 4.6σ)
maximum 726.5 GeV

$$\frac{\sigma}{\sigma_{SM}} = 1.2 \pm 0.3$$

consistent channels