

## Special Report

# Higgs Combos

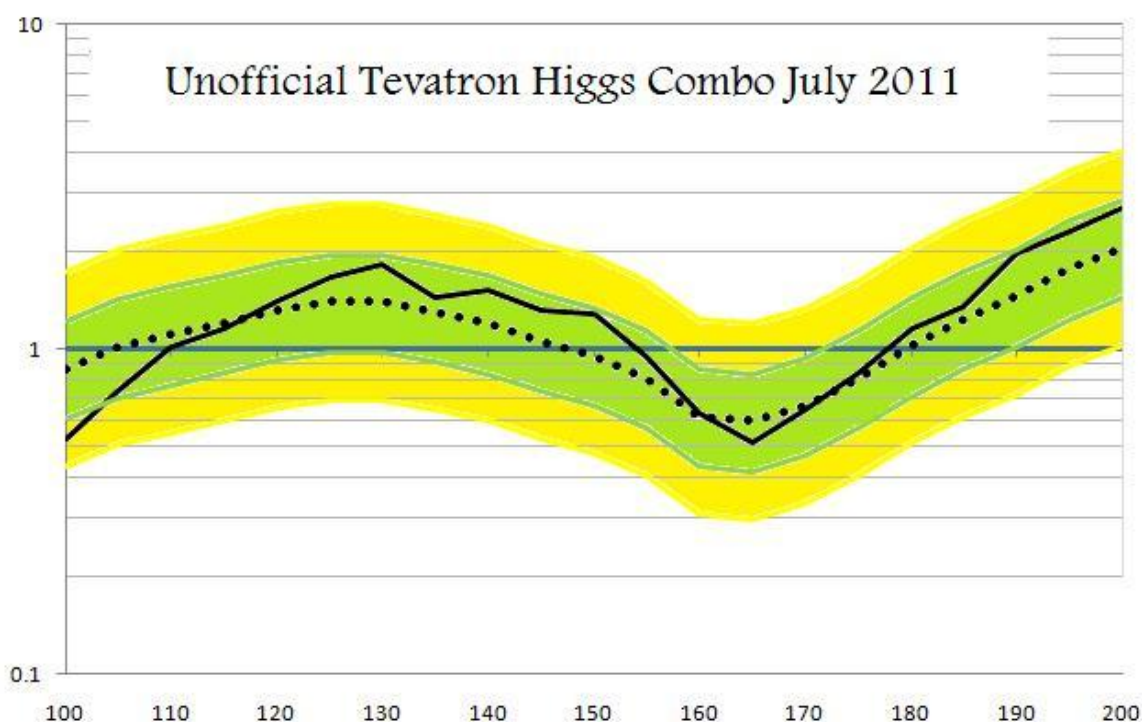
Philip E. Gibbs \*

### Abstract

Some people have been asking if confidence level plots can be combined now that we have the individual data from Dzero, CDF, ATLAS and CMS. The answer is of course not. You need to combine the underlying event data and all the backgrounds etc., and re-derive the levels from that.

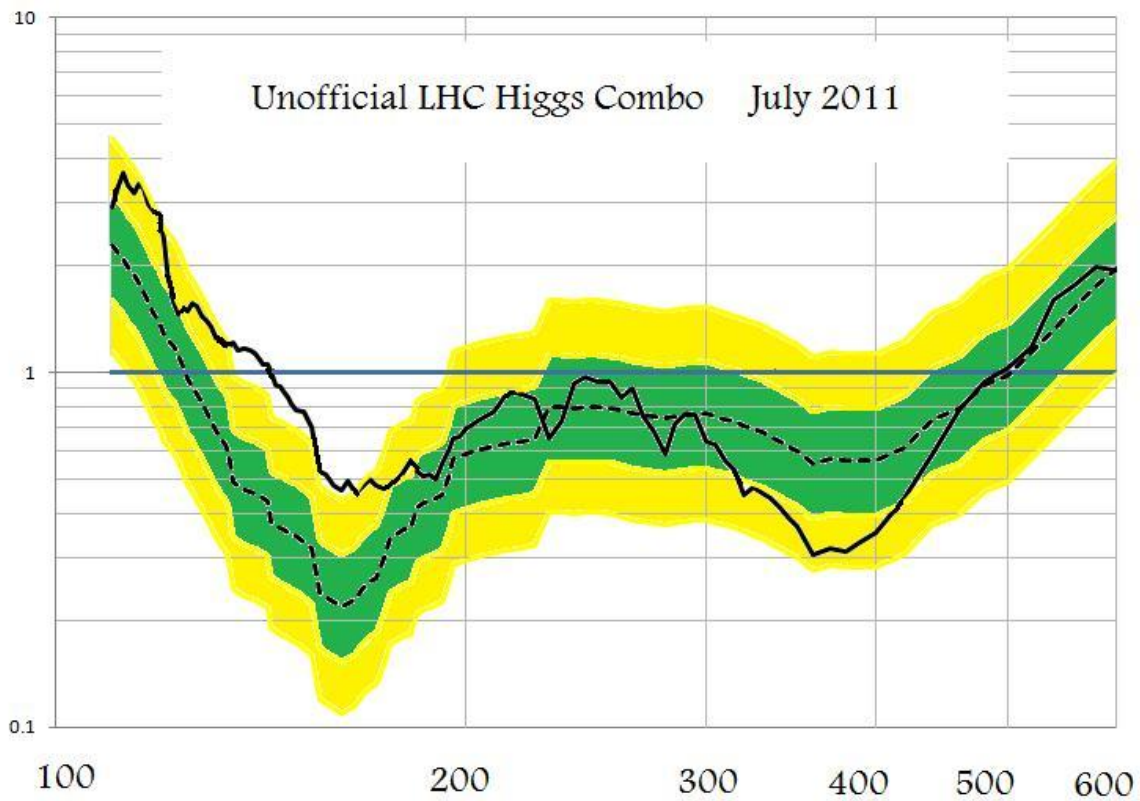
**Key Words:** Higgs Boson, LHC, ATLAS, CMS, D0, CDF, ESP-HEPS, 2011.

On the other hand, confidence levels can sort of be combined by adding in inverse square, and there is no harm in trying so long as everyone realizes that the result is just a crude unofficial bootleg indicative approximation, right? So in that spirit here is my combined Tevatron plot

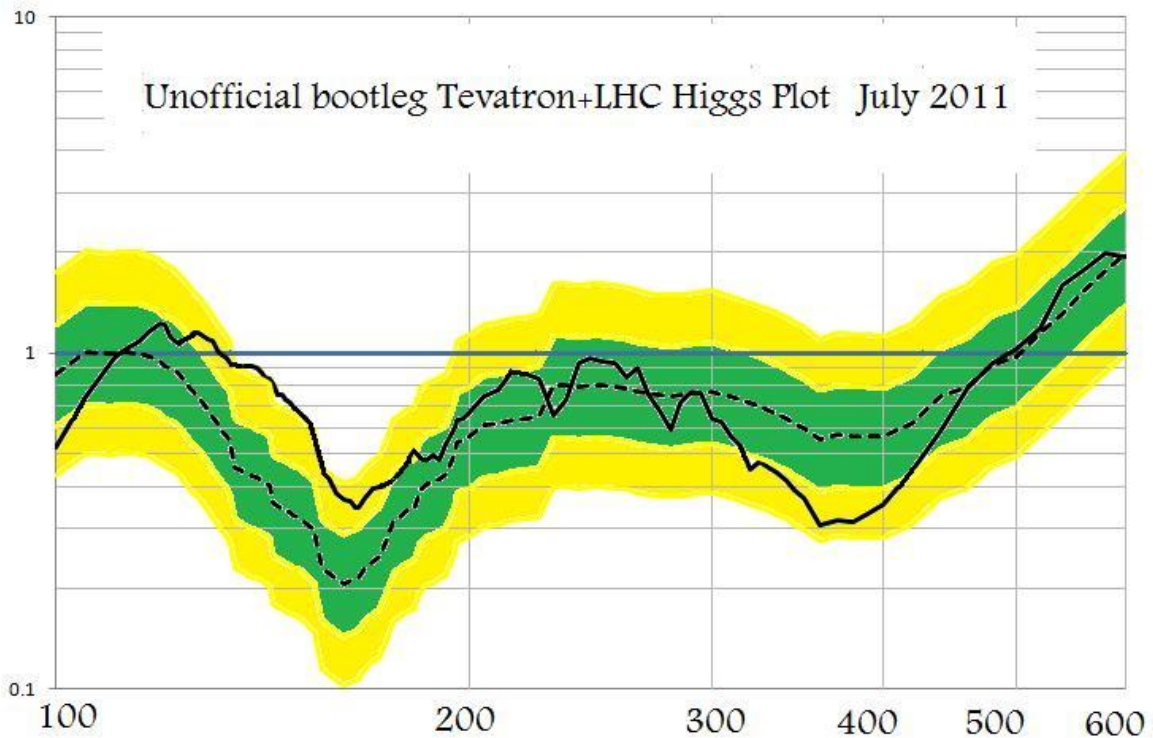


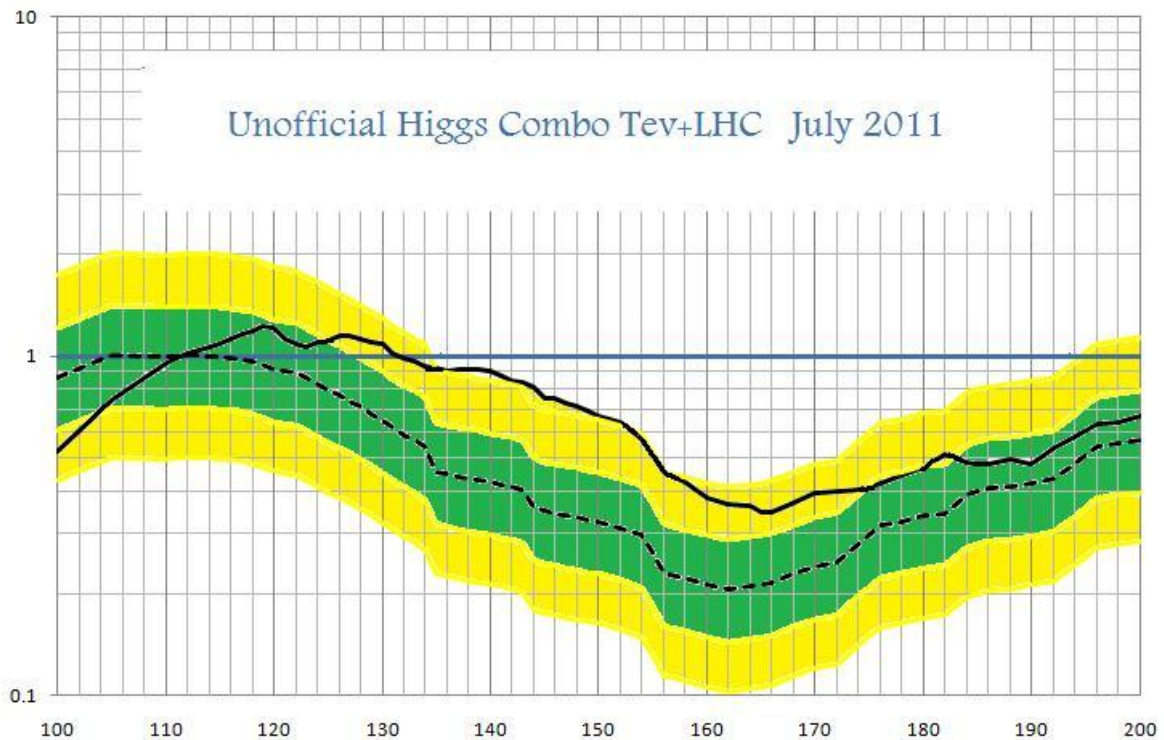
Using the same method, here is a combined LHC plot using the ATLAS and CMS plots published yesterday. It excludes all Higgs masses from 145 GeV to 480 GeV. This should be treated with skepticism, but if the Tevatron plot above matches the one that will be shown on Wednesday at EPS you will know that this one has some credibility too.

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Finally, combine everything and what you get is this





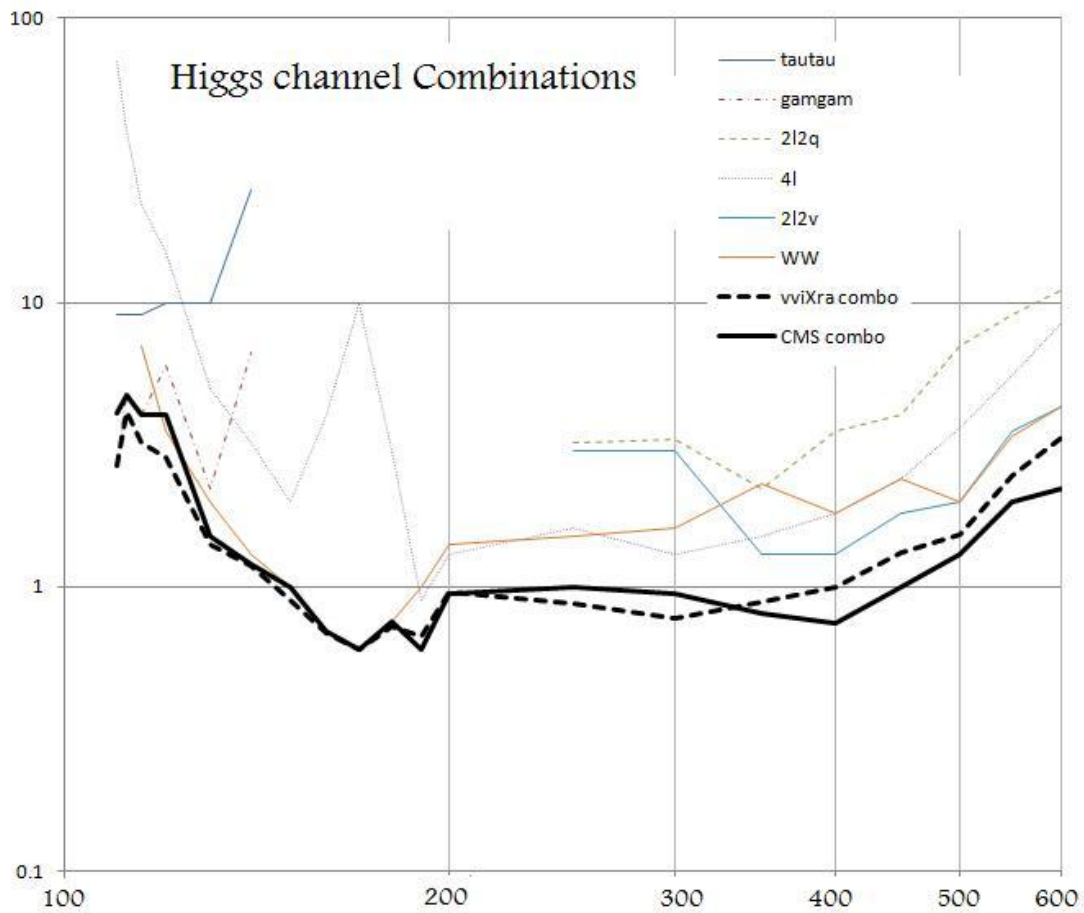
Yikes! Perhaps we shouldn't take this too seriously.

The formula used is

$$C_{combo} = (C_1^{-2} + C_2^{-2})^{-0.5}$$

This is used for the expected levels and the observed levels.

**Update 25-July-2011:** As an indication of how well this combination formula works here is a plot showing a combination test of the CMS decay channels using the same formula sampled at some mass points. The black dashed line is my estimated combination and the heavy black line is the official combination. It is not good enough to draw reliable conclusions about the size of any excesses but as a rough indication of what we can expect it seems very reasonable.



## References

1. <http://blog.vixra.org/2011/07/23/higgs-combos/>