

Special Report

ICHEP Higgs Rumours = Discovery?

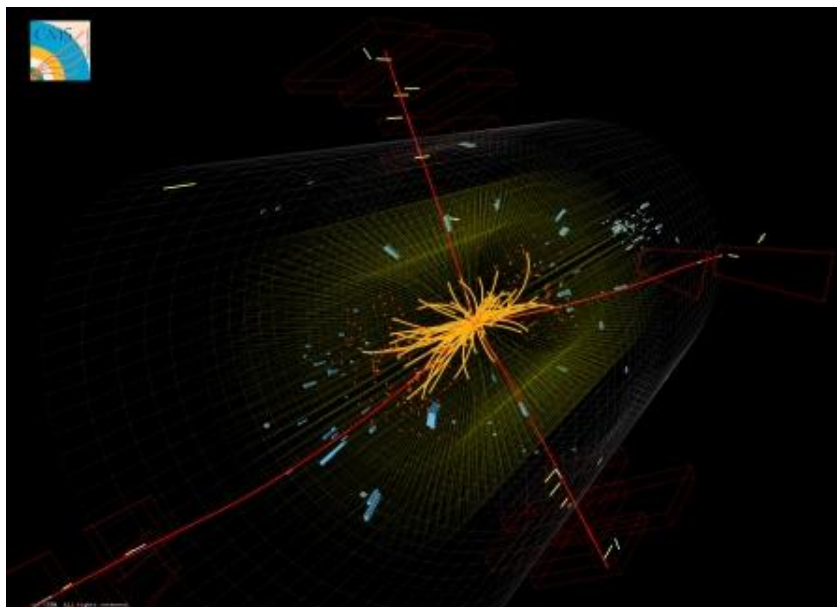
Philip E. Gibbs*

Abstract

Both ATLAS and CMS are seeing excesses in the diphoton channels at the same places where they saw them last year. The significance is said to be 4 sigma in each experiments for the combination of 2011 and 2012 data. Could this mean the Higgs Boson discovery has arrived? For what its worth, I agree that it would be better if no rumours emerged before the conference and I have resisted the temptation to reveal unapproved information from the experiments I have come across in the past whenever I knew it to be private, but once one blog has revealed something like this everyone will see it and follow-up postings like this one do not spread it any further.

Key Words: ICHEP, rumor, Higgs, discovery.

The first batch of 2012 data from the LHC has started to be analysed ready for the ICHEP conference in three weeks time so it is no surprise that the first rumours about the Higgs data has surfaced. At [NEW](#) Peter Woit revealed his latest information that both ATLAS and CMS are seeing excesses in the diphoton channels at the same places where they saw them last year. The significance is said to be 4 sigma in each experiments for the combination of 2011 and 2012 data. Could this mean the Higgs Boson discovery has arrived?



* Correspondence: Philip E. Gibbs, Ph.D., Independent Researcher, UK. E-Mail: phil@royalgenes.com Note: This Special Report is adopted from <http://blog.vixra.org/2012/06/17/ichep-higgs-rumours-discovery/>

Remember that from last year's data the local significance with diphotons was **3.1 sigma for CMS** and **2.9 sigma for ATLAS**. According to the new rumour the total significance has risen to about 4 sigmas in both cases. This is not yet sufficient to claim a discovery for each experiment independently but the two results together could easily take the combined significance over the 5 sigma line that is required for discovery. Note that this would be the discovery of something consistent with a standard model Higgs boson. More work would be required to show that it has all the characteristics of the particle they were searching for. The total combined local significance across all channels might be expected to be even better but don't forget that ATLAS had only 2.5-sigma for its combination, and CMS got 3.1 sigma, so even if the diphoton channel provides a discovery the combination may or may not reach 5 sigma depending on what happens in other channels.

Here are a few points just to underline how much uncertainty remains

1. The rumours are a little vague and may not be completely reliable.
2. If this year's peaks are not exactly in the same place as last year's then the combined significance could be considerably less.
3. They may insist on using a Look Elsewhere Effect to reduce the significance to a global value. HEP protocol says they can claim a discovery on local significance, but if they want to draw out the game even longer they could still do this.
4. We don't know how much data had been analysed. They should have about 4.5/fb but due to the processing lag I estimate that both CMS and ATLAS might be looking at something like 3/fb at this time. This might make the 4 sigma seem even better but it also means that it could go down as more data is added. The LHC has been running very well over the last few days and there are a couple more days left before the technical stop with over 6/fb recorded for each experiment and no reason why it should not all be used at ICHEP. If this is the case we will most likely get even better results and possibly even Independent discoveries from each experiment.
5. Credible information tells us that ATLAS and CMS don't plan to show the combination of the 2012 results at 8 TeV with the 2011 results at 7 TeV. However, I think that if both experiments each have a clear 5 sigma discovery with the combined results they will not be able to resist making the combos, if they have time.

Here is a bonus video about Peter Higgs http://www.youtube.com/watch?v=EdPcdEAzSXg&feature=player_embedded

See also Dorigo at [QDS](#) who is not giving away what he knows as a member of the CMS collaboration but he points out that these levels of significance are about what is expected from the amount of luminosity provided.

See also an article on the [collider blog](#) questioning the practice of spreading these rumours. For what its worth, I agree that it would be better if no rumours emerged before the conference and I have resisted the temptation to reveal unapproved information from the experiments I have come

across in the past whenever I knew it to be private, but once one blog has revealed something like this everyone will see it and follow-up postings like this one do not spread it any further.

References

1. <http://blog.vixra.org/2012/06/17/ichep-higgs-rumours-discovery/>