

## Special Report

# ICHEP Preparations, July 4<sup>th</sup> Higgs Update at CERN & Several Higgs Webcasts

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### Abstract

In just three weeks time ICHEP 2012 will be underway with the biggest expected news to come from Higgs Searches presented on 9th July in Melbourne. CERN have issued a press release to announce that an update on the search for the Higgs boson will now be given at CERN on 4th July. There are also several Higgs webcasts coming up.

**Key Words:** ICHEP 2012, Higgs update, July 4<sup>th</sup>, CERN, Higgs Webcast.

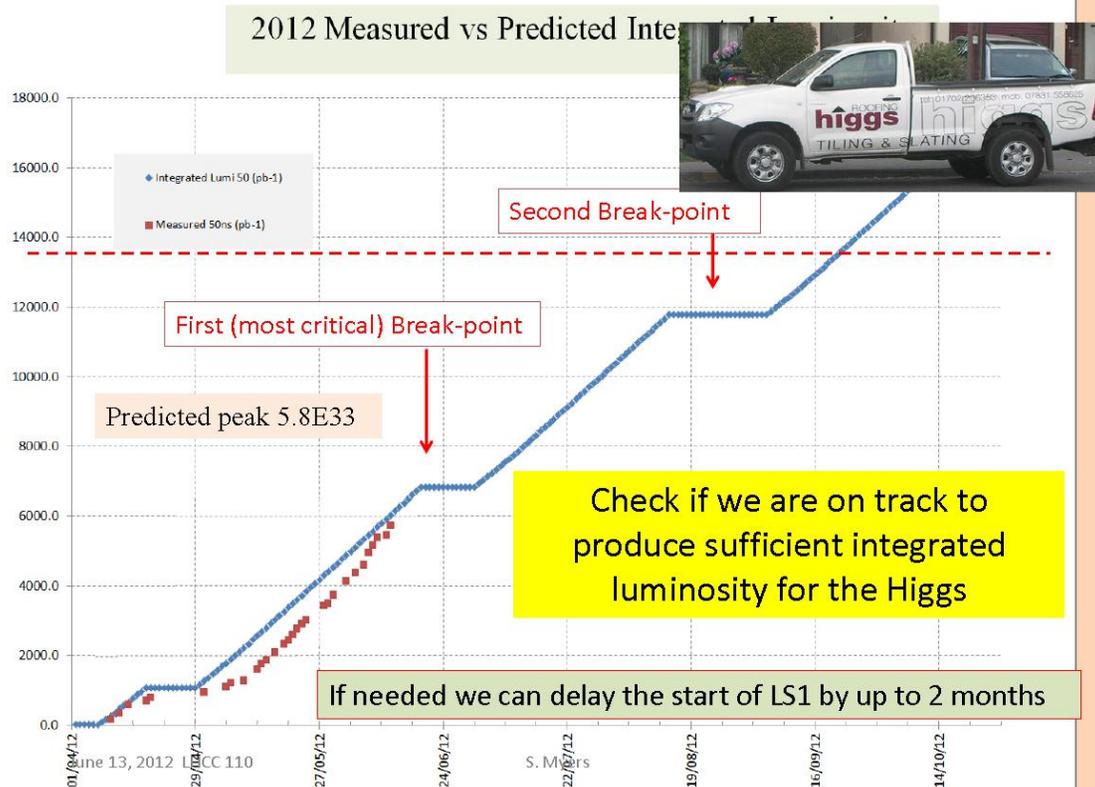
### ICHEP Preparations

In just three weeks time ICHEP 2012 will be underway with the biggest expected news to come from Higgs Searches presented on 9th July in Melbourne. Meanwhile closer to home a much more low-key meeting at CERN has given us [an update](#) on the running of the LHC. As far as I can tell from the images of the auditorium the only people who attend these meetings in person are the speakers, but there are high quality webcasts so nobody else has to.

The usual LHC Machine Status Report by Steve Myers is worth watching if you are interested in where they stand with beam operations. Tonight they will have a celebration for collecting 5/fb although they have already passed the 6/fb mark. This merged slide shows progress as we approach the next technical stop compared to his prediction from Chamonix. It is good news that they are almost on target and will decide not to use the two months of extra running that had been set aside just in case. They will need the extra time to do the growing pile of tasks scheduled for the long shutdown which could easily extend to nearly two years long if they are not careful. If you are observant you will also notice that the main goal is illustrated with a picture I took for this blog last year but Myres will have to nick a lot more of my stuff if he is to get even for all the ones I took from him.

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Myers also reported a scary story about a situation that nearly led to LHC armageddon last week when they discovered in testing that the beam dump system relied on a power supply that formed a single point of failure. A simple fault could have led to a situation where the beams could not be dumped even when a failure signal would normally abort the run. The beams would have kept circulating like an unstoppable train with the only possible outcome being the loss of 120 MJ of beam energy around the accelerator ring with the potential to destroy almost anything and everything in the collider.

The progress talk from ATLAS is also interesting in that they revealed three new versions of Higgs plots using 2011 data with improved analysis methods. From this I deduce that at ICHEP they will update only the critical digamma and Z to 4l channels with 2012 data and will use these new versions of the 2011 data for some of the other channels. These will be combined to form the new ATLAS plot. Although the cut-off for collecting data for ICHEP has passed I think there is a good chance they will continue collecting up to the technical stop because the collection rate is now very high. This may give them close to 6/fb of data in the two high-resolution channels.

In the ICHEP abstracts CMS indicate that they will update all their channels with 2012 data. This difference between the two experiments is similar to what was presented at the December council meeting. As far as I know there is no technical reason why the two experiments should not combine all the 2011 data and 2012 data in the high-resolution channels in time for ICHEP, but this would risk arriving at the unfair situation where one of the two experiments gets the

discovery level significance first. I think there is a good chance that they will compare preliminary results in the next few days and if it is clear that they can both reach the critical 5 sigma level they may go for full combinations and announce the joint discovery. Whether they can do this depends on how much data they use, how well they deal with pile-up, how well they control the background, how lucky they are with the fluctuations and even how big the cross-section is if the Higgs is seeing BSM enhancements. My prediction is that they won't quite get there this time round, however an unofficial discovery using ATLAS+CMS is much more likely.

Apart from these Higgs results there will be a lot of other new results presented at ICHEP including a few exotic searches (such as heavy gauge bosons) using 2012 data from both ATLAS and CMS. I expect ATLAS to hold their 2012 supersymmetry searches back for SUSY 2012 in August but the abstracts from CMS indicate that a few new SUSY at 8 TeV will be shown at ICHEP. LHCb, Tevatron and many others from the accelerator labs, neutrino experiments and astronomical observatories have the potential to produce new discoveries in particle physics and ICHEP 2012 is the place to grab the headlines so we should expect the unexpected.

If you have not yet [voted in the 3 Quarks Daily science blog awards](#) viXra log would appreciate your support. **Update:** voting is complete and we appear to have made it through to the next round in about 9th place with 68 votes. Thanks.

## **CERN to present update on the Higgs boson on 4th July at CERN**

CERN have issued a press release to announce that an update on the search for the Higgs boson will now be given at CERN on 4th July. This will come before the talks at the ICHEP conference in Melbourne begin. Presentations detailing the individual decay channel searches are scheduled for 7th July at the conference with the combinations detailed in plenary sessions on the 9th, but now it looks like any important news will be delivered before then.

The update is likely to be similar in format to the talks given in December when the spokespersons for ATLAS and CMS delivered their results in detail. On that occasion the CERN director warned that no big discovery was in the offing as press and blog speculation ran rife. This time round no such statements have been made which can only lead to even more intense speculation. Rumours have already been indicating that this year's results that will be added to the data from 2011 have been confirming the apparent Higgs signal seen at 125 GeV in the diphoton decay channel. This could increase the level of certainty to the five sigma significance from each experiment as required for an official discovery. Further rumours have even been suggesting that the strength of the signal is more than predicted by the standard model. An announcement of the discovery of a new particle consistent with the standard model Higgs would be the biggest in particle physics for some time, but if it is significantly different from predictions it will have enormous implications for the future direction of the whole field.

A possible reason for conducting the update at CERN is that the director general Rolf Heuer has said that he wants the news of a discovery to take place at the centre in front of the dedicated staff who have worked so hard for this result. The need is made stronger because Australia is not a member state of CERN so to announce the discovery there would be inconvenient politics. Originally an announcement was scheduled a few days ago for the 6th July (You may have seen it added on our blogs calendar) but this has now been brought forward. Presumably this is to avoid the conflict with talks that would be going on in Australia at that time.

The update will be webcast but from previous experience of these events the video stream is likely to be overloaded and very difficult to watch.

## Several Higgs webcasts coming up

We are used to looking at the slides from conferences and seminars around the world but we miss what the speaker actually says and the all important questions. So it is good to know that many of the talks to be given in the next few days about the Higgs boson will be webcast live from three continents. For your convenience (and mine) here is a short list with the appropriate links:

- 2nd July : Not to be outdone by CERN, Fermilab will present its Higgs results 2 days earlier, but *probably* there is nothing new because they already gave us the full details at Moriond. If you are still interested the webcast is [here](#)
- 4th July : CERN give their important update and possible discovery announcement followed by a press conference. This may just cover the most critical channels (e.g. diphoton and 4-lepton) Webcast from [here](#).
- 7th July: The Higgs results for each decay channel in fine detail will be presented at the ICHEP conference in the parallel sessions. Most of these will be updates with 2012 data. I am informed that one stream of talks will be webcast live from ICHEP for 5th-7th July and this will include the Higgs searches. Link to come later.
- 9th July: The combined Higgs results from CERN for ATLAS and CMS (separately) will be presented in the plenary sessions at ICHEP. This will again be webcast.

While we wait there is an interesting audio interview with [Peter Higgs at PhysicsWorld](#).

## References

1. <http://blog.vixra.org/2012/06/15/ichep-preparations/>
2. <http://blog.vixra.org/2012/06/22/cern-to-present-update-on-the-higgs-boson-on-4th-july-at-cern/>
3. <http://blog.vixra.org/2012/06/28/lots-of-higgs-webcasts-coming-up/>