

News

LHC Update: New Record, New Higgs Results & End of Run

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Abstract

This news article contains LHC updates from October 1, 2011 to November 12, 2011 which appeared in viXra Log at <http://blog.vixra.org>.

Key Words: LHC update, new record, Higgs results, end of run.

October 9, 2011: [LHC Update and new records](#)

ATLAS and CMS are now reporting about 4.2/fb recorded while LHCb recently celebrated their first 1/fb. There are 20 days of proton physics left this year, enough time to bring the total to about 5/fb each for the big two. Some time is being reserved for extra machine development studies looking forward to next years runs.

Last week they collided bunches with 25ns spacing for the first time. Next week they will do this again with more bunches and will also run some pile-up tests. I think this means they will collide some high intensity bunches so the experiments can test their algorithms to see how well they can deal with even higher event pile-ups.

Meanwhile the physics runs continue to collect data and today they established a new peak luminosity record of 3.42/nb/s , beating the record of 3.3/nb/s from a few weeks ago. This suggests that they are returning to some adiabatic intensity increases as the end of the run approaches.

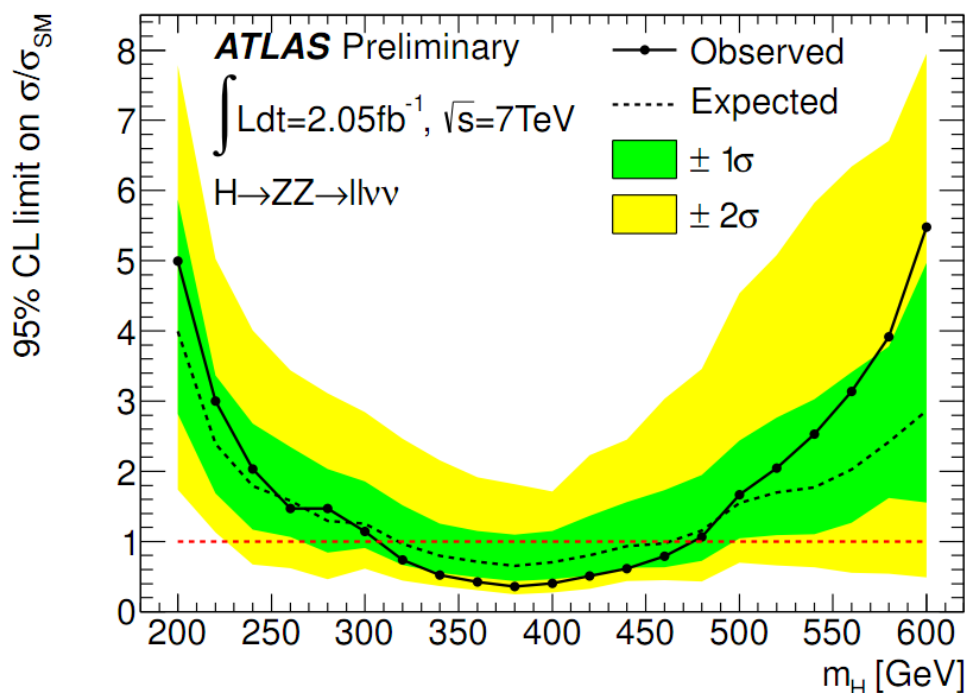
If you are following the physics results don't miss "[Heavy flavor physics with the CMS experiment](#)" this Tuesday and "[Searches for Exotic Physics with the ATLAS Detector](#)" next Tuesday. Both talks will probably be webcast live from CERN.

Update 14-Oct-2011: The all-time delivered luminosity for the LHC has now passed 5/fb per experiment. The more important figure for recorded luminosity in ATLAS and CMS is over 4.5/fb with two weeks of proton physics remaining for 2011.

October 22, 2011: [New Higgs Results](#)

ATLAS have released a [conference note](#) with new results for Higgs decays to ZZ and then two leptons and two neutrinos in the final states. The update uses 2.05/fb compared to 1.04/fb as first shown at the Europhysics conference in July. This is not the most exciting channel for discovery potential because it does not cover the light mass region, but it is good to see new data appearing now. No significant excesses are seen. Here is the main plot.

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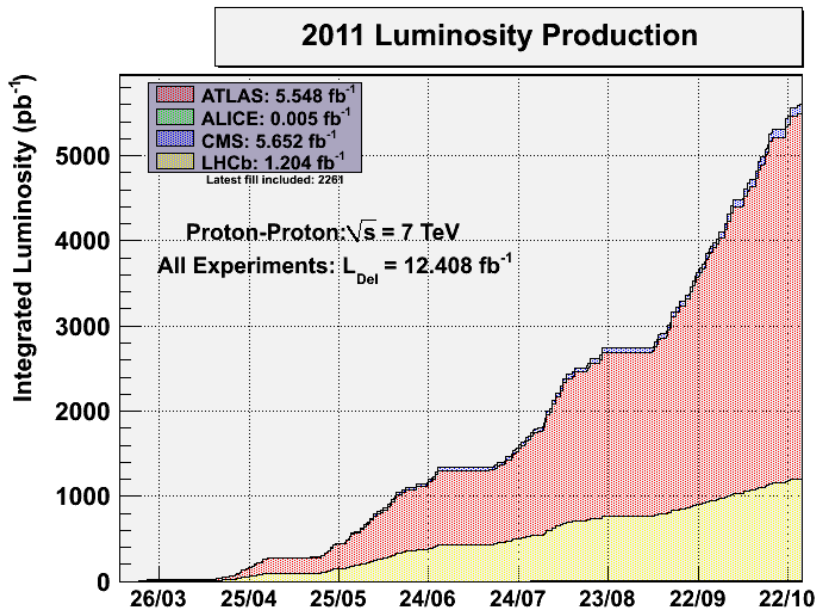
The note is aimed at the [Hadron Collider Physics conference](#) starting 16th November in Paris when we are already expecting to see a full LHC combination of Higgs searches in all channels based on data from the Lepton-Photon meeting.

As the 2011 proton physics run enters its last week, nearly 5/fb have been collected per experiment. That is enough data to give good observation potential at all possible Higgs masses except the crucial 115 GeV – 125 GeV light mass region. We may yet have to wait a few weeks before plots at that amount of data emerge.

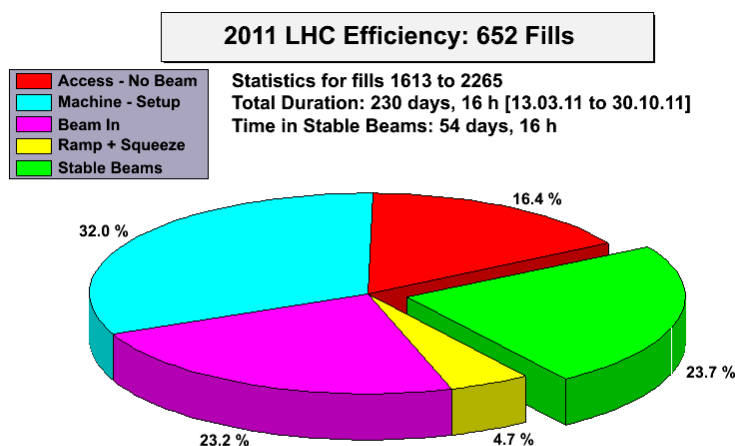
Update 23-Oct-2011: Both ATLAS and CMS now have over 5/fb recorded.

October 30, 2011: [LHC end of run update](#)

Today is scheduled as the end of proton physics at the Large Hadron Collider and the last few fills are circulating this morning. The integrated luminosity recorded this year will end at about 5.2/fb each for CMS and ATLAS, 1.1/fb for LHCb and 5/pb for ALICE. For the remainder of this year they will return to heavy ion physics until the winter shutdown.



The good news this year has been the high luminosity achieved with peaks at 3.65/nb/s. This compares with the expectations of 0.288/nb/s estimated before the 2011 run began. The higher luminosity has been made possible by pushing beam parameters (number of bunches, bunch intensity, emittance, beta*) to give better than expected performance. The not so good news is that out of 230 days that were available for physics runs only 55 (24%) were spent in stable beams. This was due to a barrage of technical difficulties including problems with RF, Vacuum, cryogenics, power stability, UFOs, SEUs and more. There were times when everything ran much more smoothly and the time in stable beams was then twice the average. The reality is that the Large Hadron Collider pushes a number of technologies far beyond anything attempted before and nothing on such scales can be expected to run smoothly first time out. The remarkable amount of data collected this year is testament to the competence and dedication of the teams of engineers and physicists in the operation groups.



After the heavy ion runs they will start looking towards next year. There will be a [workshop at Evian](#) in mid December to review the year and prepare for 2012. Mike Lamont, the LHC Machine Coordinator will be providing a less technical overview for the [John Adams Lecture](#) on 18th November.