News

LHC Update for August 2012

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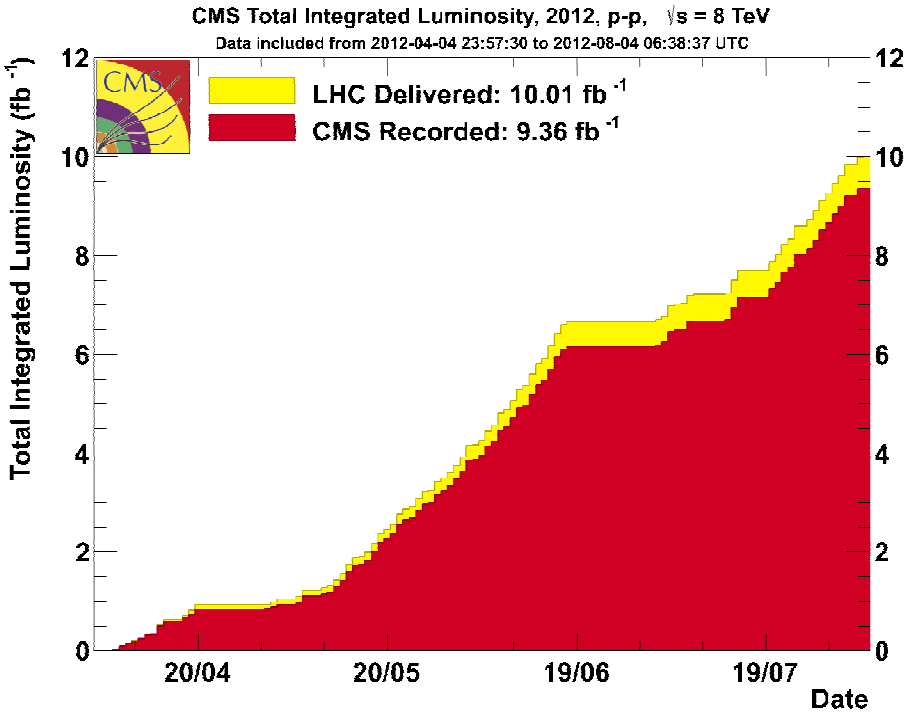
Abstract

This news is adapted from viXra log (http://blog.vixra.org) and contains LHC updates through August 30, 2012.

Key Words: LHC update, August 2012.

August 4, 2012: 10/fb LHC Update

The Large Hadron Collider has now delivered over 10/fb at 8 TeV during 2012 in the middle of a long 11 week summer run between technical stops. The 10/fb is for ATLAS and CMS but LHCb has also passed 1/fb in 2012 to add to their 1/fb from last year.



About 3.5/fb have been added in the first 5 weeks after a slow start with time taken out from pp luminosity production for floating MDs, 90m physics (TOTEM and ALFA) and VDM scans. The collider has now settled into a straight stretch with about 1/fb added each week. Peak

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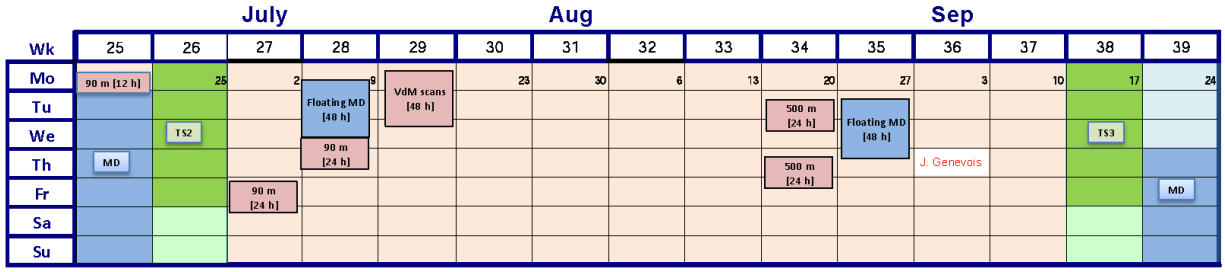
luminosities are a little down compared to before the last technical stop due to problems with beam instabilities but if they keep it steady the results will be good. There are six more weeks before the next stop with time scheduled for more floating MD and 500m physics. We can expect them to end on 16th September with about 15/fb recorded this year in addition to the 5/fb from last year.



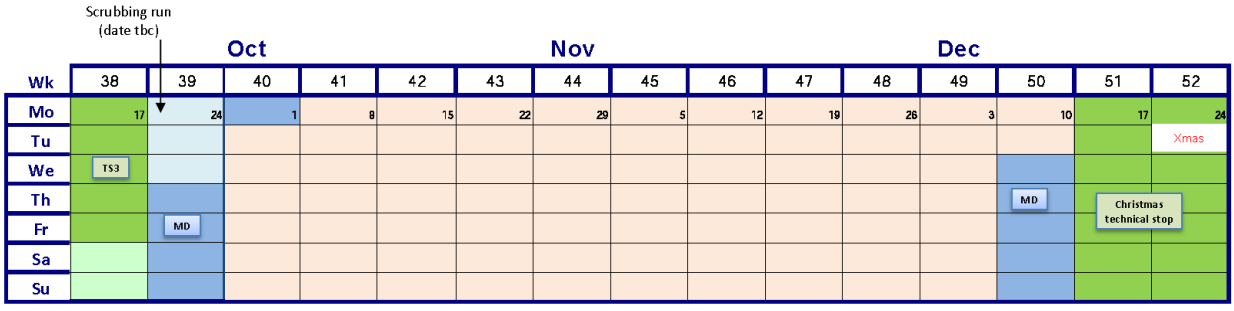
Enlarge the image for summer schedule

While this run is in progress we can expect to see results from before the last technical stops at a series of specialised conferences SUSY 2012, TOP 2012 etc., see the viXra calendar for details. It seems most likely that the next Higgs update will come around early october with 20/fb of data available. This will be in keeping with past updates where the amount of data has doubled each time. With the Higgs discovery behind them the next update may be a little more low-key but I think there is a good prospect for reporting a significant excess beyond standard model in the diphoton channel. It may even pass three sigma in one of the experiments.

This list of LHC Higgs updates looks roughly like this

- Moriond, March 2011 – 0.04/fb
- EPS, July 2011 – 1.2/fb
- Lepton-Photon, August 2011 - 2.3/fb
- CERN council, December 2011 - 4.9/fb
- ICHEP, July 2012 – 10.4/fb
- October 2012 – about 20/fb ?
- Dec/Jan 2013 – ??

Assuming they update at around 20/fb in October, can they double the dataset one last time by the end of the year? The final 10 week proton run schedule looks like this,



Enlarge the image for autumn schedule

If they run with the same parameters they will add another 10/fb to the total luminosity, but with the target for the year already achieved I think they will want to do something different for this run. The scheduled scrubbing run after the technical stop only makes sense if they are considering the option of running at 25ns spacing. Earlier MD tests at 25ns have worked but with reduced beam lifetimes. The scrubbing run will help clean the pipes to make the runs more successful. To run at 25ns they will have to reduce the bunch intensity. The PS will need to split the bunches in half one extra time before injection and also because the present high intensities at 25ns would result in too much heating. This means that luminosity will not increase at 25ns unless they can also improve the squeeze.

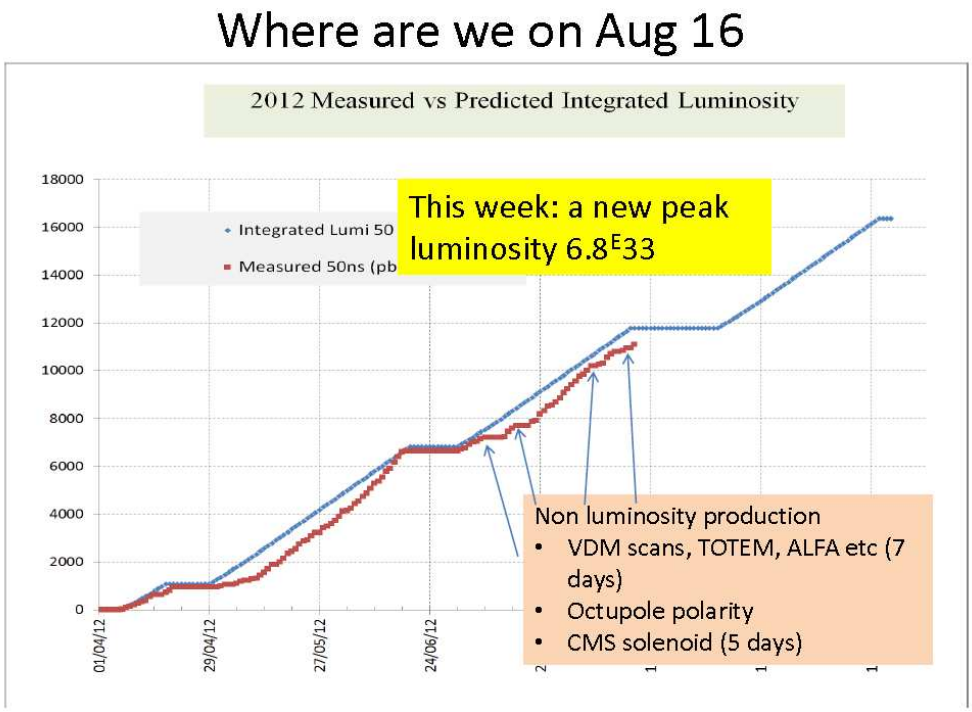
In fact the MD tests for tighter squeeze down to 0.2m went very well (as far as I know). Current beta* is 0.6m so they have plenty of scope to at least double the luminosity with the tighter squeeze. The 25ns spacing means less pileup making an increase in luminosity more manageable. I don't know what the actual plans are but I think a 25ns final run with 0.3m would make complete sense if they can get it to work. As well as giving them a chance at doubling the integrated luminosity yet again it will be a valuable trial for runs after the technical stop which will certainly have to be at 25ns spacing. Running at 25ns this year is a risk but definitely one worth taking.

August 18, 2012: LHC Update

The Large Hadron Collider is running better than ever this week with record peak luminosities of 7.2/nb/s and a record-shattering 0.3/fb delivered in the last 24 hours.

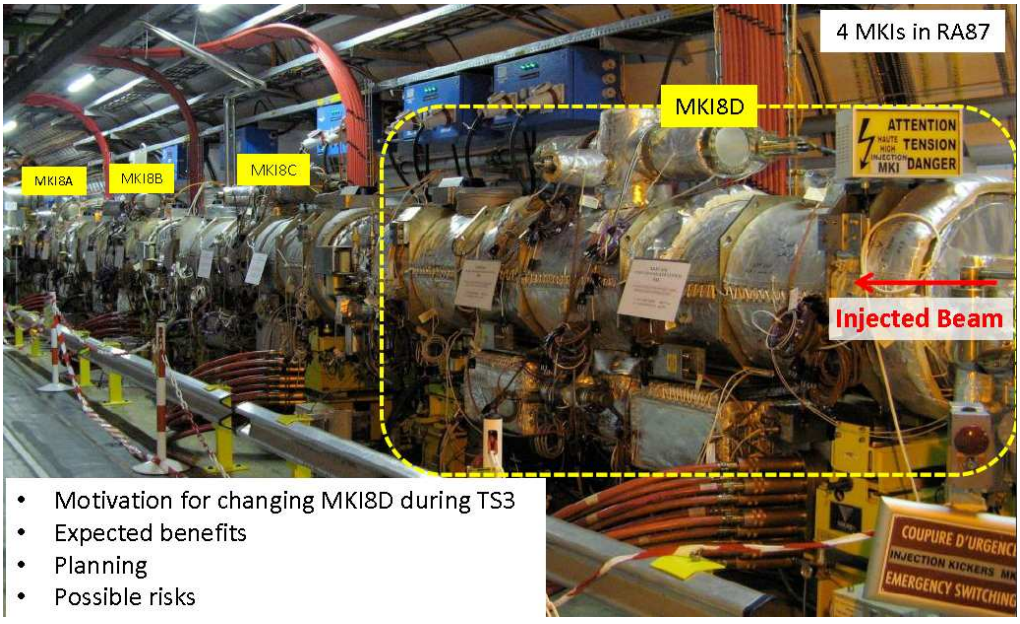
After they reached the 10/fb total luminosity milestone for 2012 a couple of weeks ago they undertook some messing about that included a polarity switch for ALICE. One outcome of all that was that CMS accidentally lost its solenoid for a few days which gave them an opportunity to do some more tests in the shadow. I am not sure of all the details but there seem to have been some collimator changes and the end result is that everything is now running much better so they should be able to make up the lost time. If anyone has a better description of what went on please do let us know.

A couple of days ago there was also a Machine Advisory Committee Meeting to report on where they go next. There is a new schedule with a few changes. It looks like they want studies for running after the long shutdown as a priority, and are making the case that enough luminosity has been delivered already. I think they still need to get as much as they can to help resolve the Higgs cross-section anomalies. A good compromise would be to attempt 25ns run after the next technical stop with a smaller beta*. Without a webcast of the MAC talks it is hard to tell where they are really heading but they seem to be planning for at least some more 25ns development runs.



From Steve Myers introduction at MAC meeting

Another thing they are thinking about is replacing the injection kicker (MKI8) that has been suffering from overheating since luminosities peaked earlier this year. This has been forcing them to delay some fills while it cools down. The change would be risky and could result in lost time, but if they can test out the replacement before the long shutdown it would put them in a better position when they restart at higher energy in 2015. It looks like a big job though.



References

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2. http://blog.vixra.org/2012/08/18/lhc-update-2/