CMS/LHC Status Report

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- ☑ LHC sets world record for highest beam intensity at a hadron collider
- ☑ CMS has recorded 0.3 fb^{-1} of integrated luminosity so far

LHC sets world record beam intensity

A week of milestones

- Breaking news: LHC sets new world record luminosity: **884** $\mu b^{-1}s^{-1}$
  - an important milestone in LHC commissioning
  - setting new world record every day on instantaneous luminosity

- On April 22nd LHC set a new world record for beam intensity at a hadron collider when it collided beams with a luminosity of 467 $\mu b^{-1}s^{-1}$
  - this exceeded the previous world record of 402 $\mu b^{-1}s^{-1}$, which was set by the Tevatron in 2010
  - Tevatron surpassed its own record on Friday: now **417** $\mu b^{-1}s^{-1}$

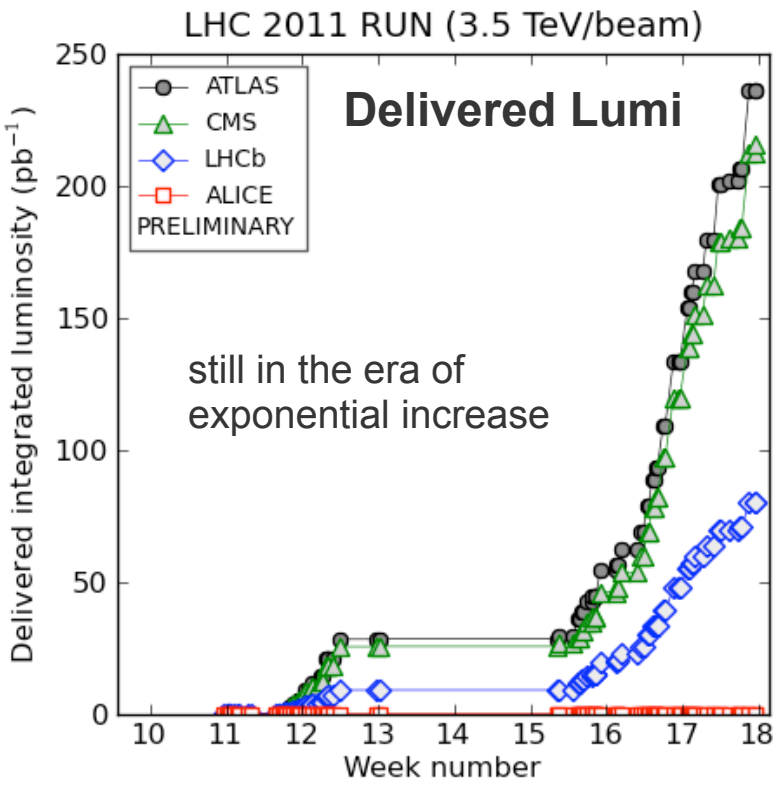
- Overall machine emphasis is shifting toward continuous physics running
  - scheduled to last until the end of this year
  - short technical stop in December, then physics run until end of 2012
  - already delivered 0.3 fb^{-1} per experiment

"Official" target:

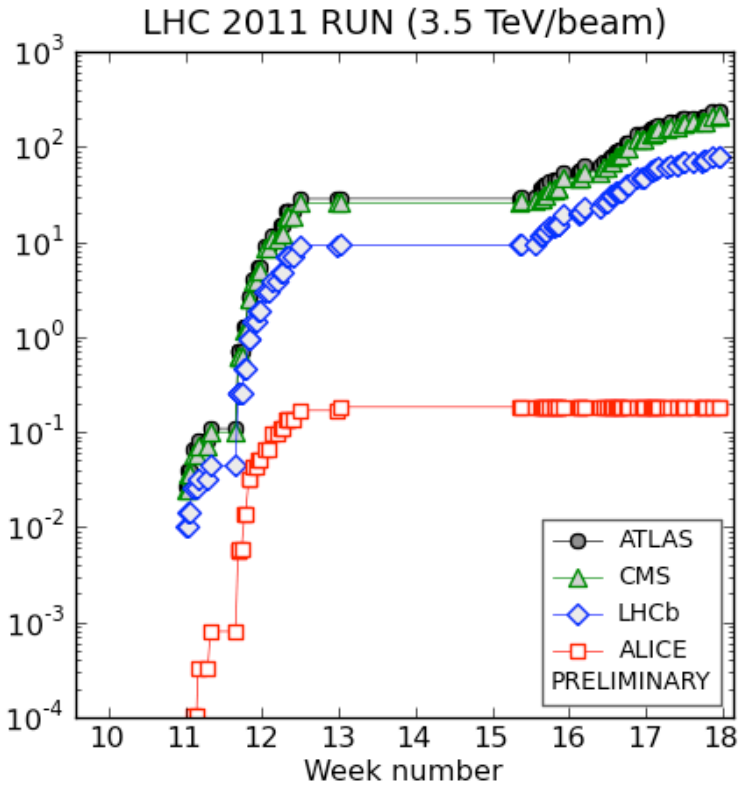
Deliver at least 1 fb^{-1} per experiment at $\sqrt{s}$ = 7 TeV by the end of this year

LHC performance so far this year: spectacular

- 72 bunch trains have been validated
  - 768 bunches per beam
- Soon will go to 108 bunch trains, ~ 900 bunches
  - will take us to 1 $nb^{-1}s^{-1}$ instantaneous luminosity era
  - LHC design luminosity is **5 $nb^{-1}s^{-1}$**, so we are getting there fast



Log scale



CMS Status: efficiently collecting data

Some highlights:

- ~320 pb^{-1} delivered by LHC and ~290 pb^{-1} collected by CMS
  - We now regularly record ~**20** pb^{-1} per day
  - Maximum luminosity recorded in a single day was **29** pb^{-1}

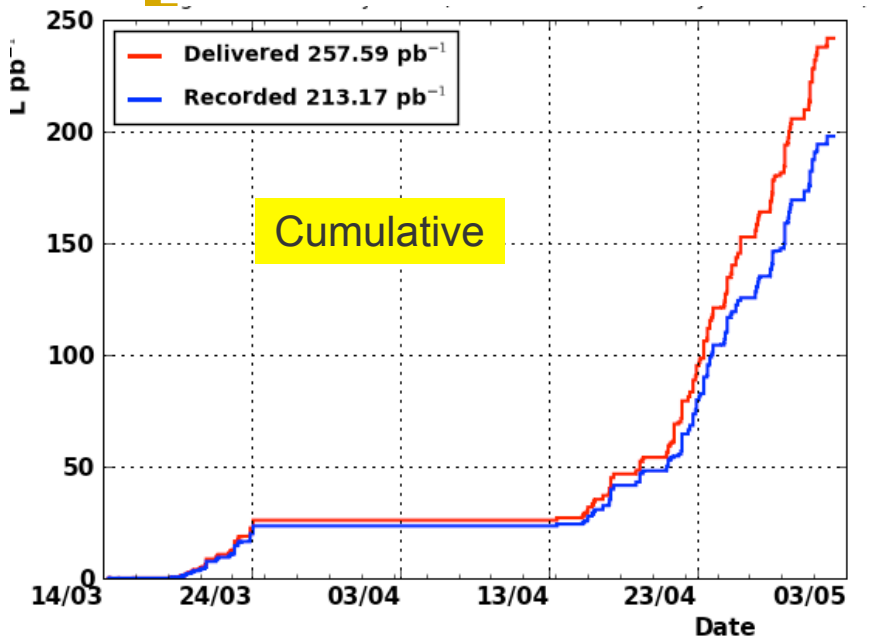
- More than 130^{-1} pb data were delivered within a week last week
  - CMS has been **96%** efficient during the week end fills; sometimes even up to **98%**
  -routinely log more than 90% uptime

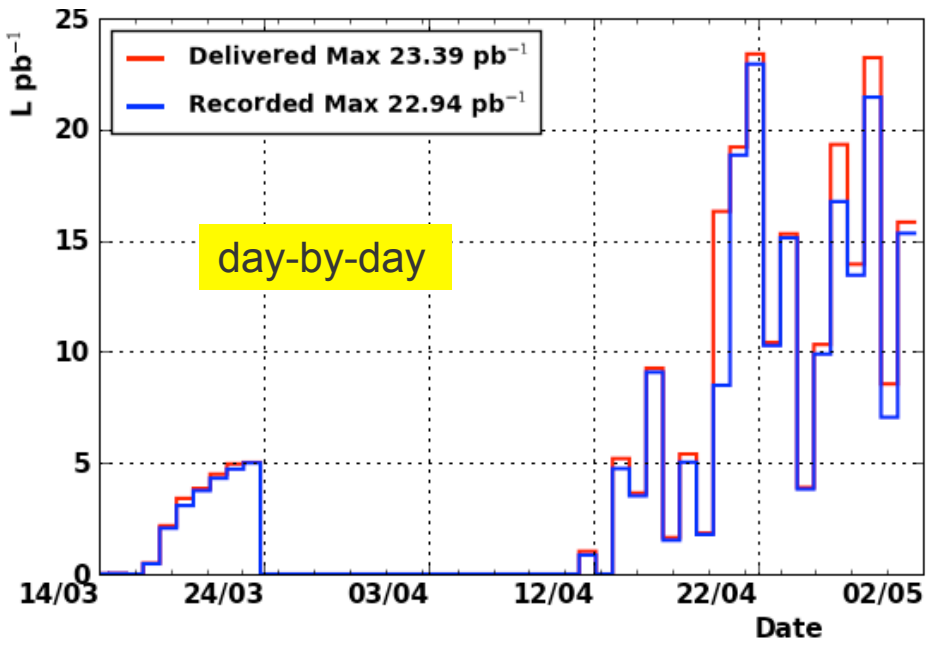
- No significant down time over the last two weeks.
- LHC is now running at 50 ns bunch crossing
  - CMS sees higher in-time and out-of-time pileups

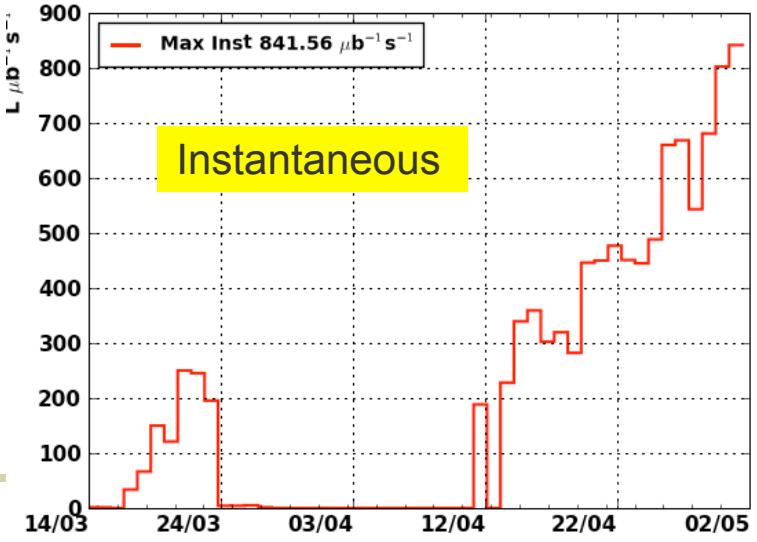
Outlook is bright

- **The goal** of collecting 1fb^{-1} of data before the end of June is within reach

CMS luminosity profile

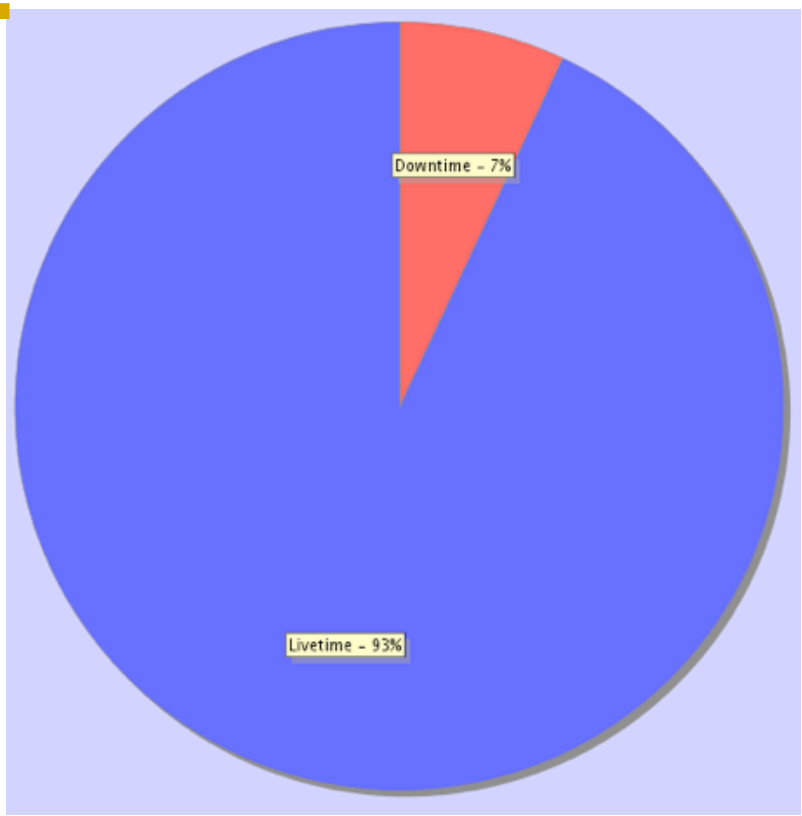


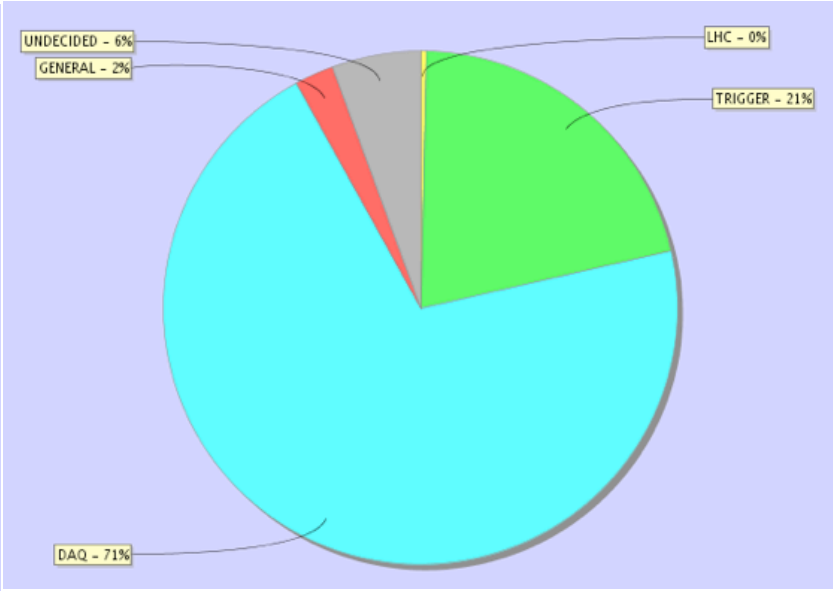


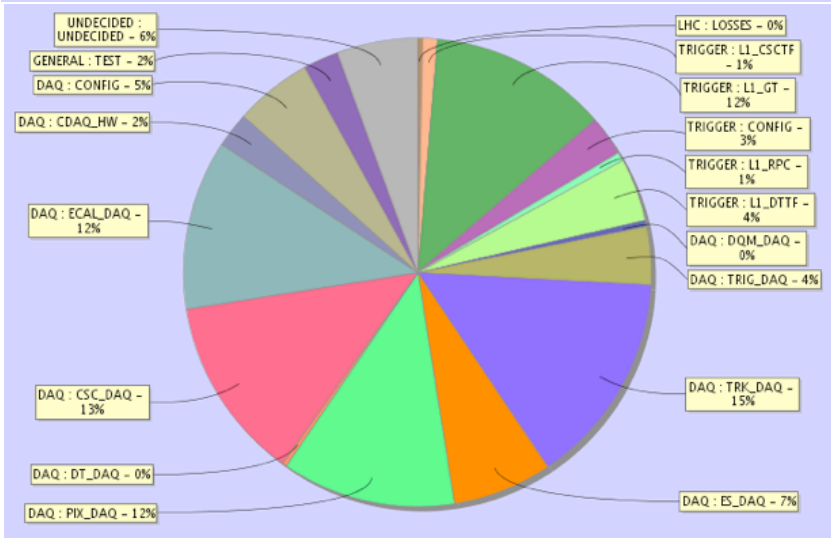


The maximum instantaneous luminosity achieved as of May 2 is 884 $\mu b^{-1}s^{-1}$

Down-time analysis: no major down-time







The chart shows the down time in the month of April 2011. Clearly we are collecting the fast incoming data from LHC with good efficiency.

Upcoming technical stop in May

Needed to prepare for higher instantaneous luminosity

- The dates are
  - Machine Development: 4−8 May
  - Technical Stop: 9−12 May

- LHC
  - prepare for more bunches (900 and more)
    - and longer bunch trains (108 and more)
  - machine development
  - access, magnet training, aperture scan, Van der Meer scan, ...

- CMS
  - CMS plans being collected now
  - magnet likely not to ramp down
  - prepare to deploy new trigger menu for 1−2 $nb^{-1}s^{-1}$
  - general idea: if it ain't broke, don't fix it

Backup slides

Various

- On Friday, two site wide power glitches within 30 minutes interval at CERN
  - ATLAS magnet, ALICE magnet, and LHCb RF modules tripped
  - CMS was relatively untouched

- Default architecture of CMS software was switched from 32bit to 64bit
- FNAL experienced problems accessing T1 SW area from LPC farms

- Four-day Easter holiday was a huge success for both LHC and CMS
  - LHC bunch spacing decreased from 75 ns ➜ 50 ns to increase lumi
  - Most of the data came over this period
    - L1 rate increase: 35kHz ➜ 85kHz, Struggled to keep HLT rate 300 Hz
  - No major problems observed for any CMS sub-detector ...
    - good news for upcoming increases of luminosity
    - perhaps more people need break 

- USCMS collaboration meeting is this week (May 4−7) at Notre Dame

- Exchange rate is now $1 = 0.87 CHF