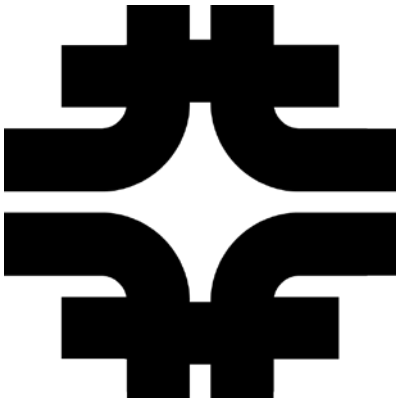
CMS and LHC Report

All Experimenters' Meeting

Kevin Pedro

(FNAL)

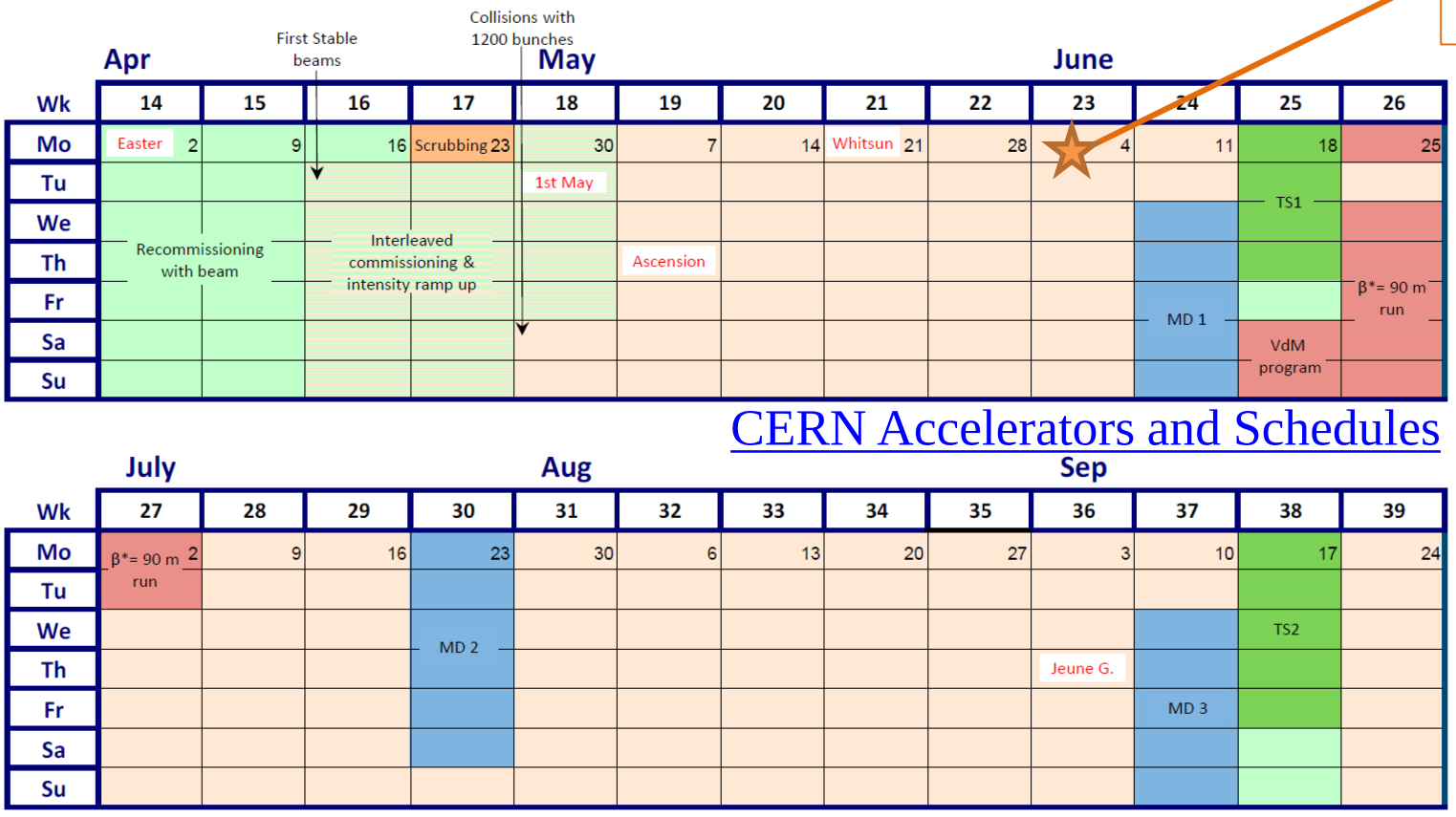
June 4, 2018



LHC & CMS Schedule

- Over a month into the 2018 proton-proton run!
- First machine development/technical stop next week
- Then special runs: Van der Meer scan, β* = 90 m (for CMS-TOTEM)

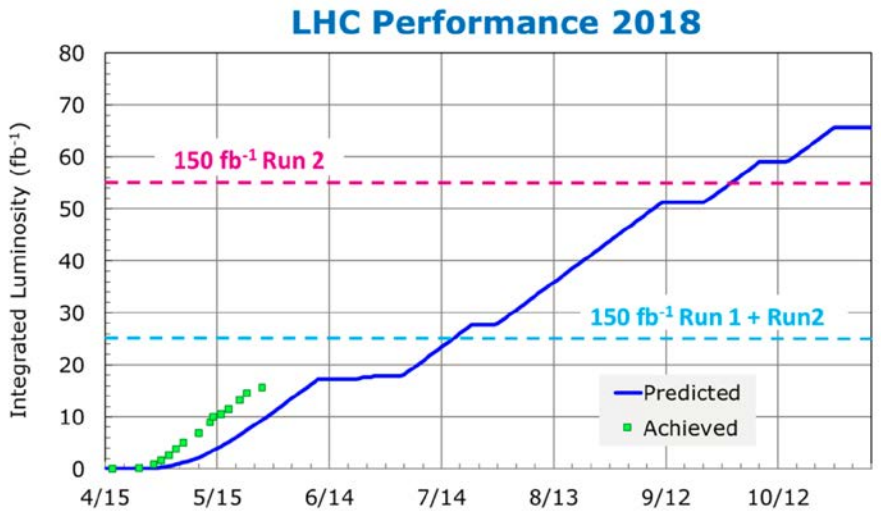
We are here

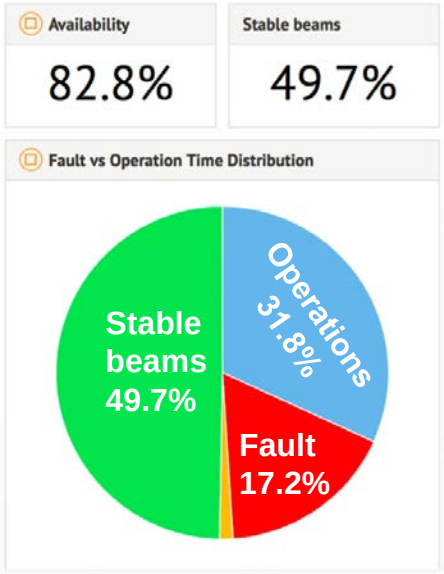


CERN Accelerators and Schedules

LHC Status

- First month of running: ahead of schedule!
- Goal: 60 fb^{-1} by end of the run
- Aim to reach and maintain 50% stable beams for remainder of proton-proton run

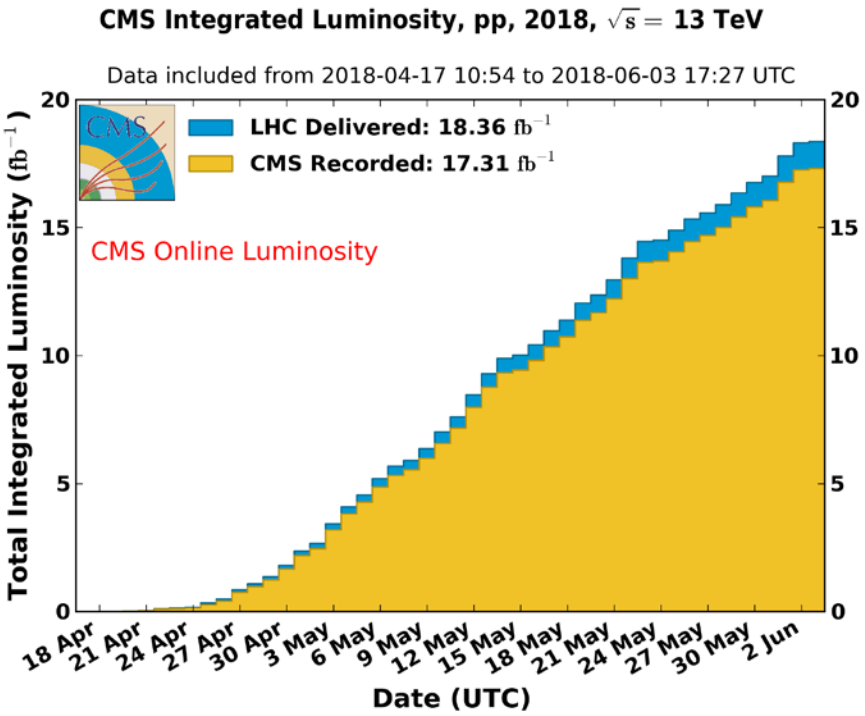


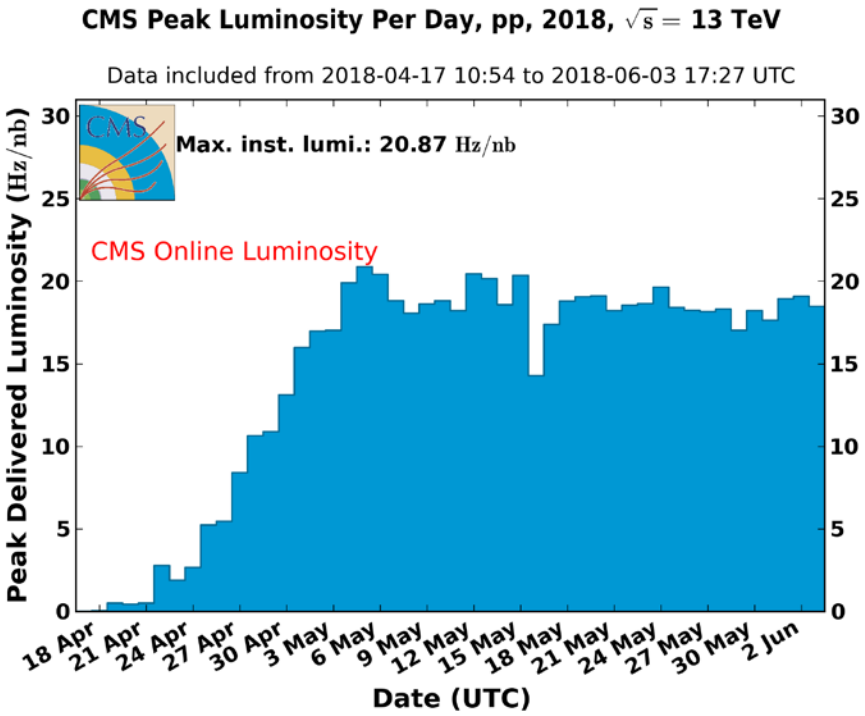


- "Gruffalo" (beam losses from contamination in 16L2 sector) not completely fixed
- Losses currently acceptable; if it gets worse, try single fill w/ 900 bunches

➢ CMS is prepared to take data with a custom trigger menu for a 900b fill

CMS Status

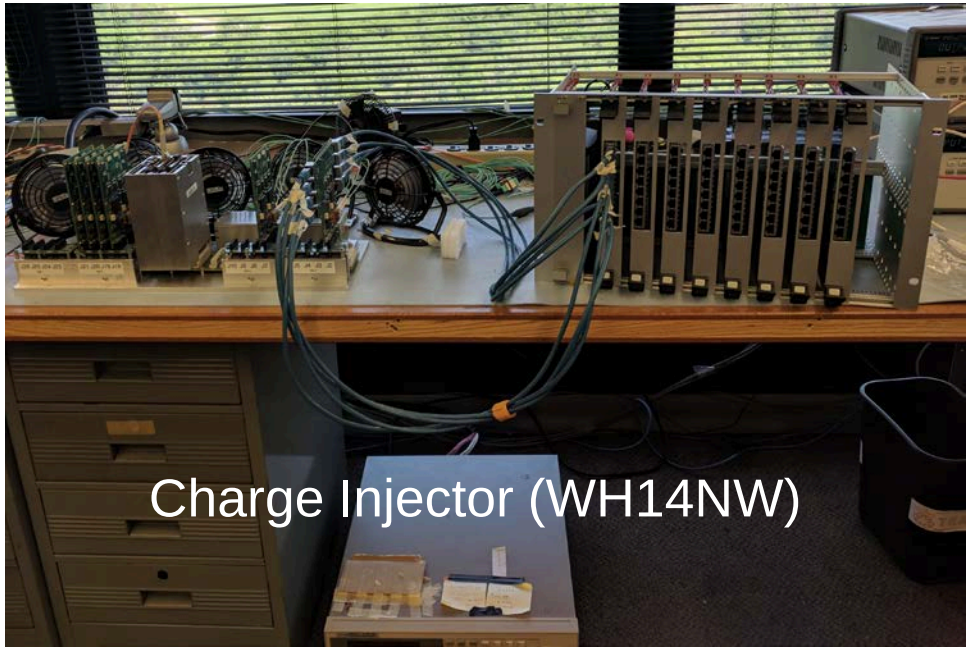




- 94% data recording efficiency (~10 fb^{-1} certified for physics so far)
- New records:
  - Max instantaneous luminosity = $2.087\times10^{34}/cm^2/s$ (design = $1.0\times10^{34}/cm^2/s$)
  - Max integrated luminosity = 851 pb^{-1} delivered in a single day

CMS Detector Status

- All subdetectors have >95% uptime
- DC/DC converter tests ongoing
  - Can induce failures by irradiating FEAST ASICs (1 Mrad of x-rays) and toggling enable/disable (now comparing to power on/off to optimize operation)



- HCAL Barrel upgrade procurement ongoing
- PCB assembly begins this week
- QIE card testing in July

FNAL

- 15 students at FNAL for the summer to conduct the tests

Phase 2 Upgrade

- 6 TDRs released, LHCC / UCSG reviews completed by CMS
- US CMS significantly contributing to the Phase2 Upgrade under the coordination of V. O'Dell (L1 Manager)
- US CMS is preparing for CD1 on June 5-7th

Maral Alyari building the HGCAL proto-cassette

Lorenzo Uplegger testing sensors for timing at FTBF

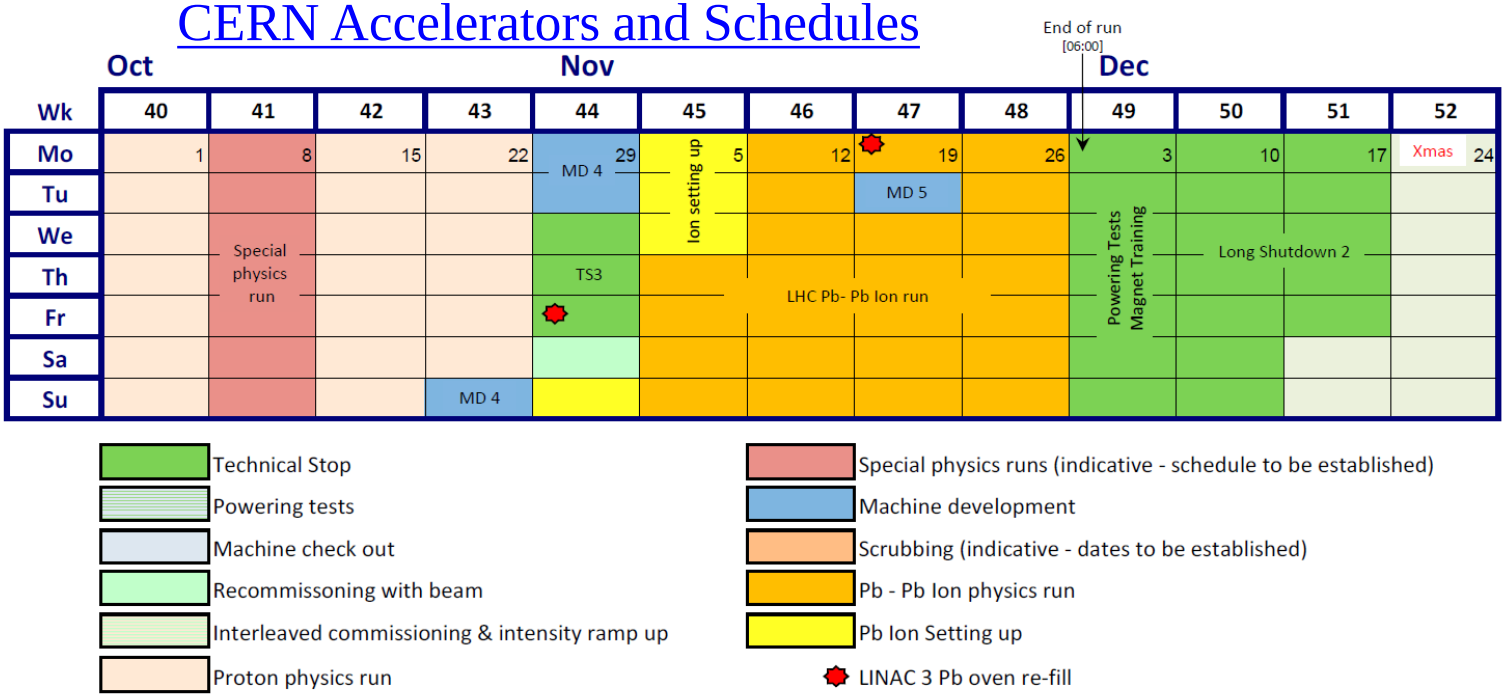
Bert Gonzalez building the 1st tracker module

- New silicon- (& scintillator-) based high granularity endcap calorimeter: 6M channels
  - Design and assembly of 375 cassettes, each with ~40 8" silicon modules; design of concentrator chip
- Innovative tracker: Local tracking at 40MHz as input to L1 trigger
  - Fabrication of ~3000 modules; assembly of 1000-modules barrel system
- New timing detector (barrel and endcap): unprecedented 20ps time resolution
  - Design of front end chip; fabrication of 1/4 of modules
- L1 Trigger (off-detector): Correlation of calorimeter and tracking info at L1
- Software and computing R&D: vectorized reconstruction code on HPC machines, new storage architectures like data lakes, and much more.

Backup

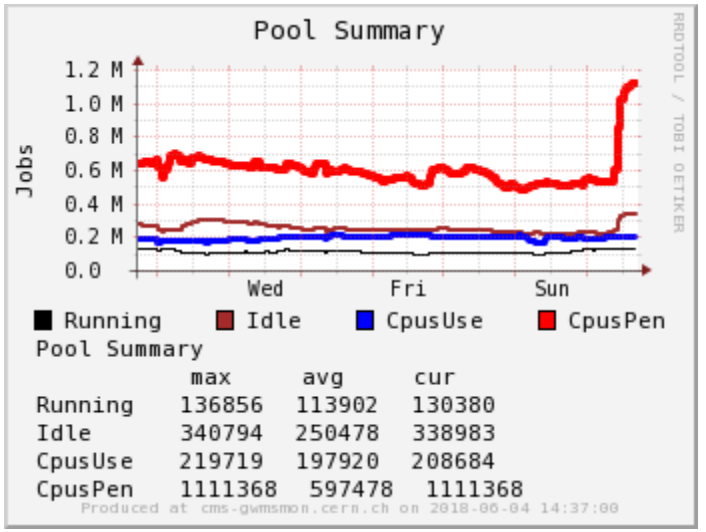
LHC Schedule Cont.

CERN Accelerators and Schedules

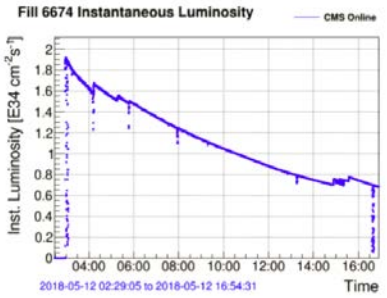


Physics, Computing, etc.

- Computing in high demand:
  - MC for 2018 detector
  - Reprocessing of 2016, 2017 data and MC
  - Analysis for summer conferences
  - Soon: MIP Timing Detector TDR
- B physics data parking:
  - Collect unbiased sample of B decays
  - Store data until LS2 when it can be reconstructed
  - Parking triggers turn on when lumi drops to $1.4\times10^{34}/cm^2/s$ during fill



Lumi



HLT rate