CMS and LHC Report

All Experimenters' Meeting

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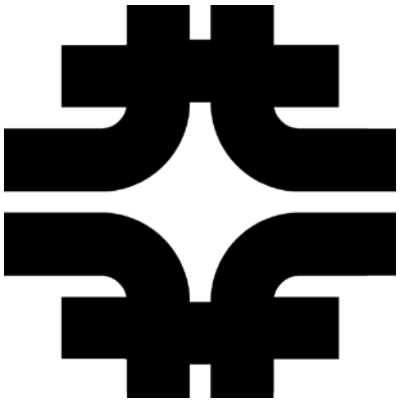
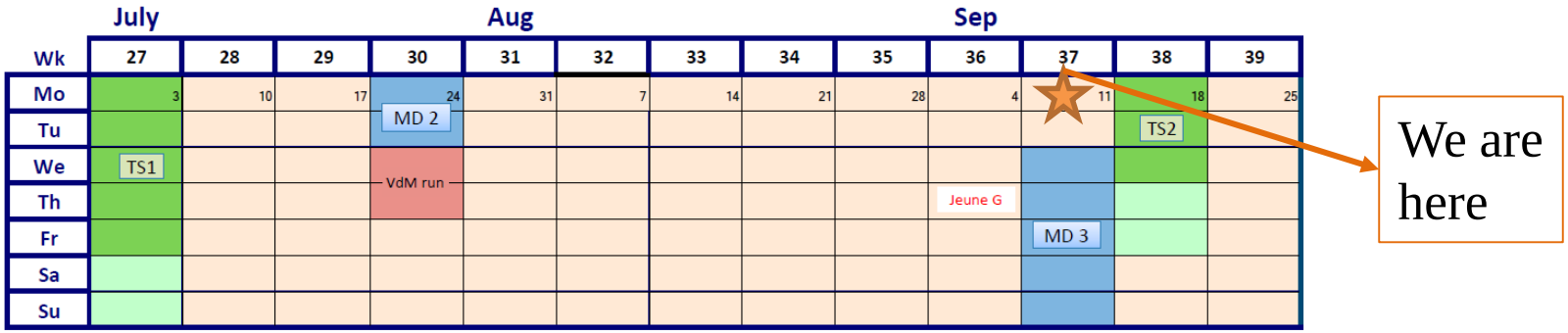
(FNAL)

September 11, 2017

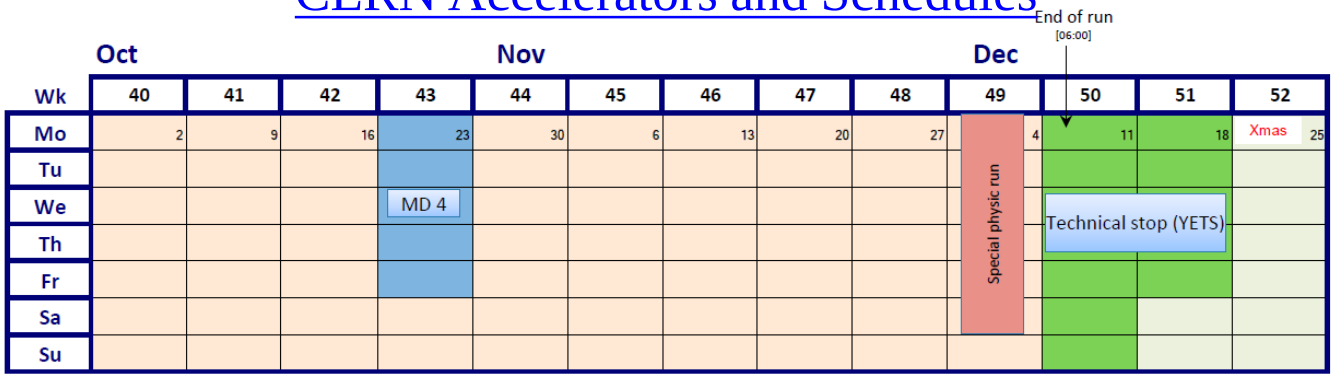


LHC Schedule

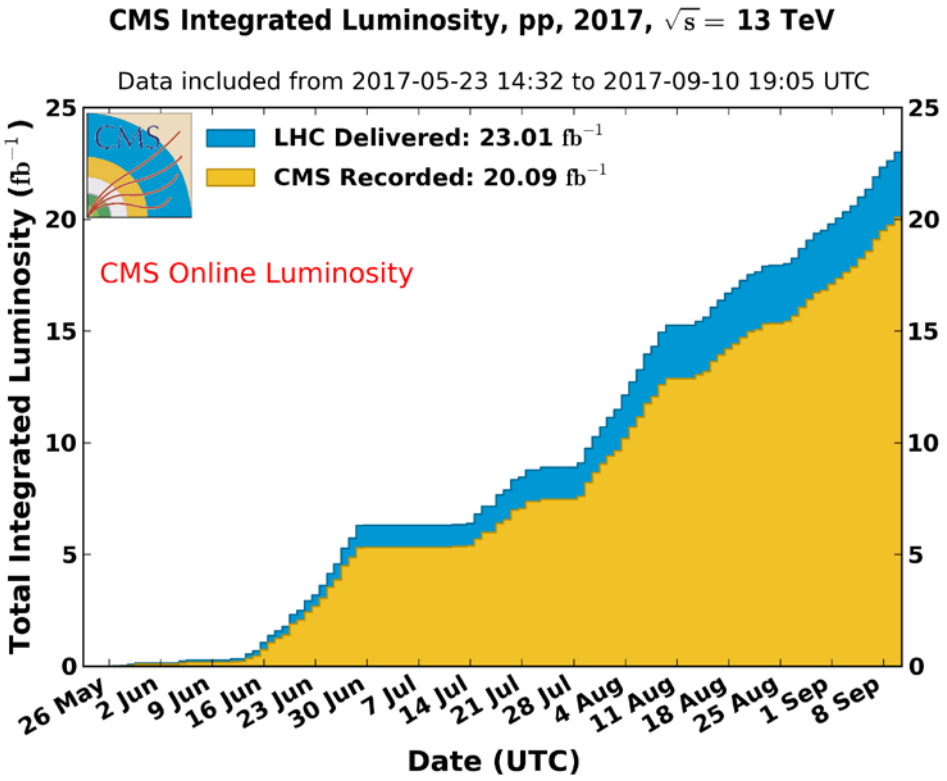
- Approaching: third machine development, then second technical stop
- LHC delivering ~2 fb^{-1} per week
- This week: high-PU runs (individual μ=240, 8b4e μ=125, 25ns trains μ=73)
- Post-MD3/TS2: β* = 30cm? (currently 40cm) → push peak lumi to 19 Hz/nb



[CERN Accelerators and Schedules]

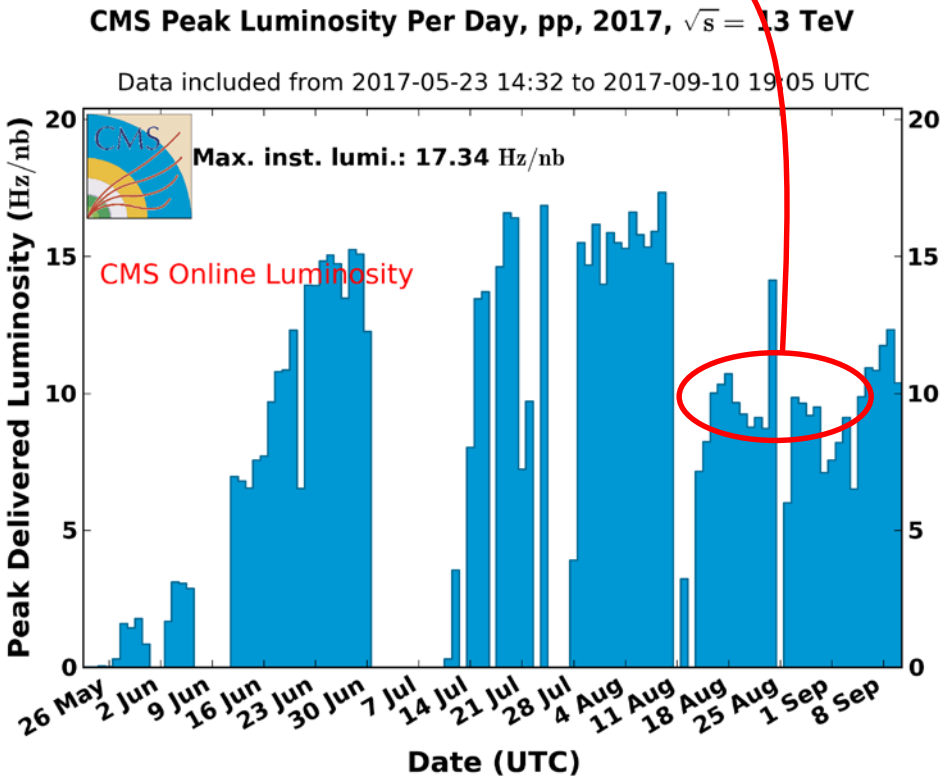


LHC Performance



[CMS LumiPublicResults]

"The Gruffalo" – beam losses in 16L2 section of LHC (between ALICE and ATLAS)



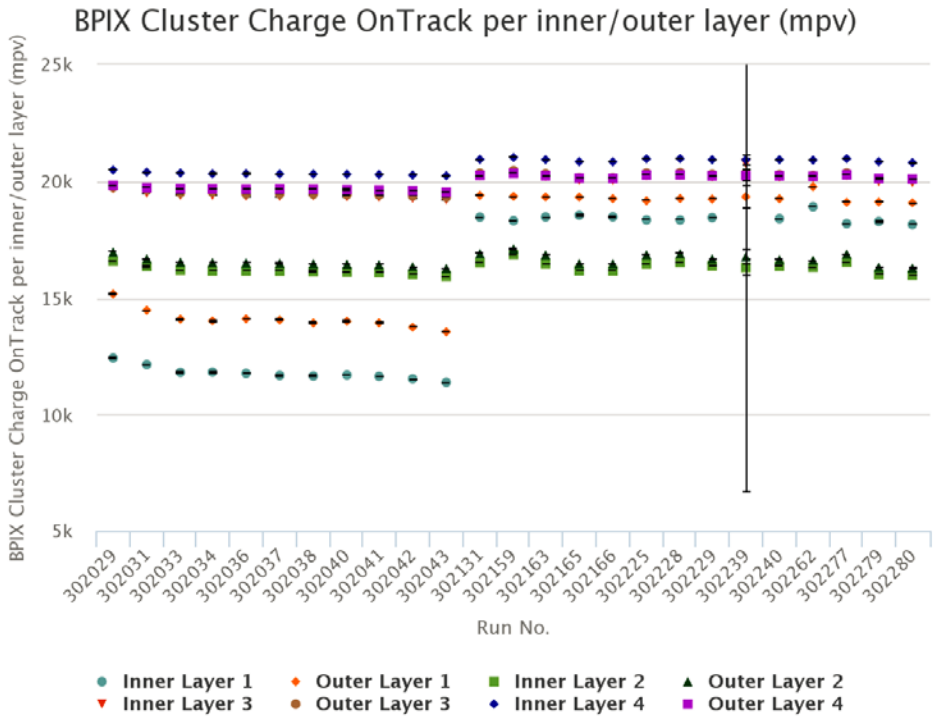
- Beam losses seem intensity-related
- Now using "8b4e" scheme
- Seems to enable 1900 bunches (previously limited to 1500)
- Can still get ~35 fb^{-1} this year

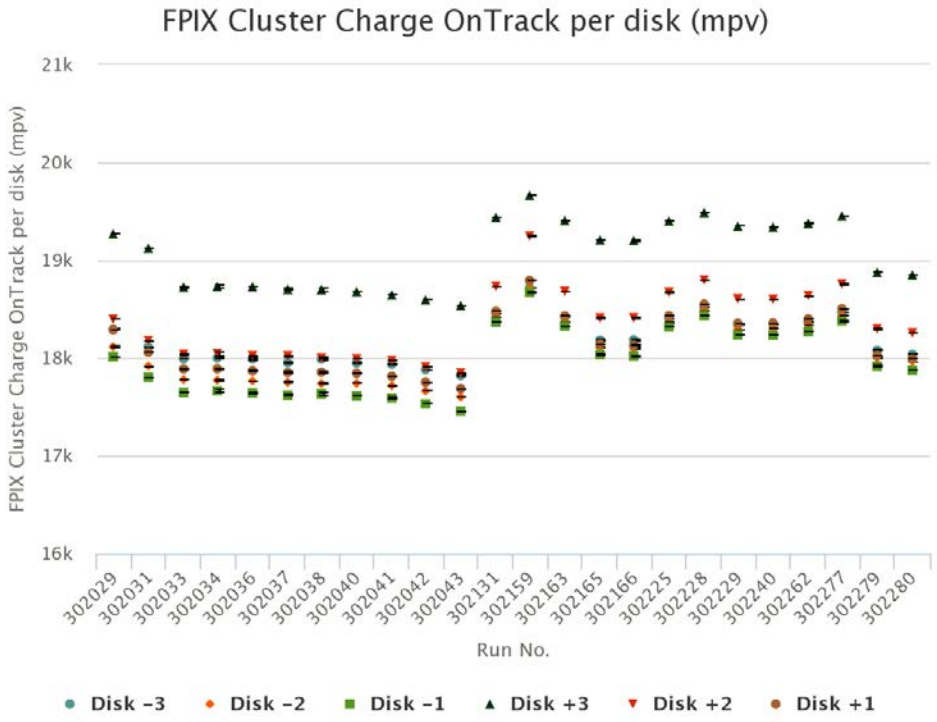
CMS Status

- 95% data-taking efficiency in past couple weeks
- Certified for physics: 13.88 fb^{-1} / 16.73 fb^{-1} recorded (through Aug 29) (more will certainly be recovered)

- Updated BPIX and FPIX voltage settings to recover cluster charge

FNAL



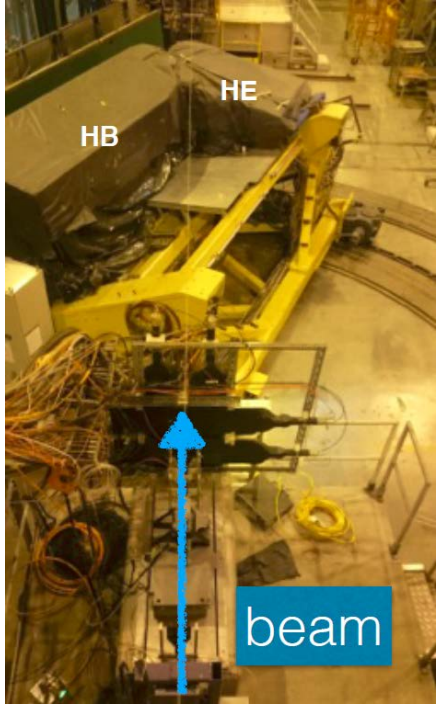


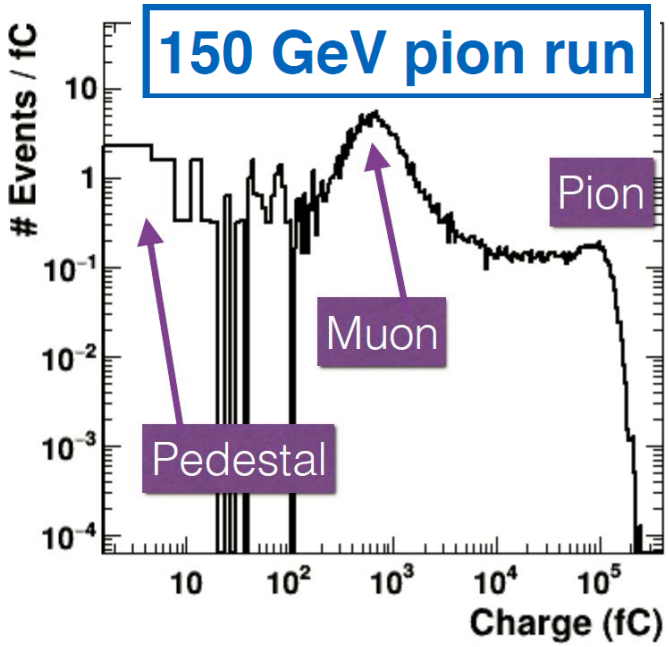
CMS Test Beam

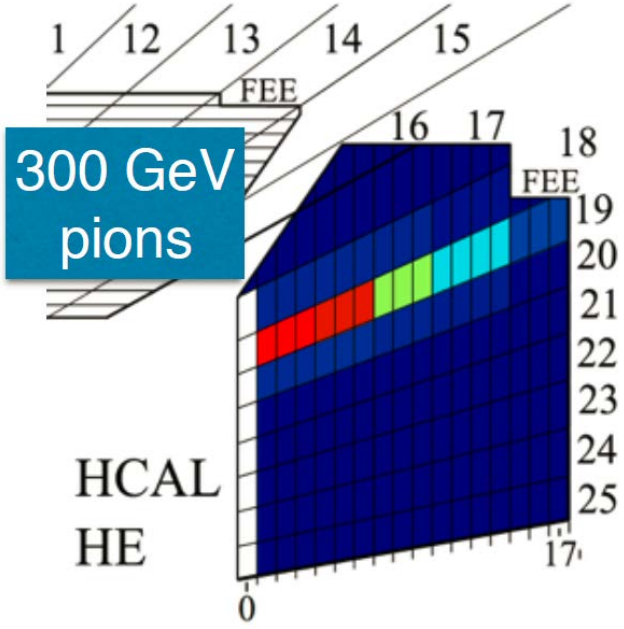
- Conducted at CERN, July 19 – Aug 2
- Investigate production system for HE upgrade
- Test prototype for HB upgrade
- Obtained SiPM data with pions, muons, electrons; analysis ongoing

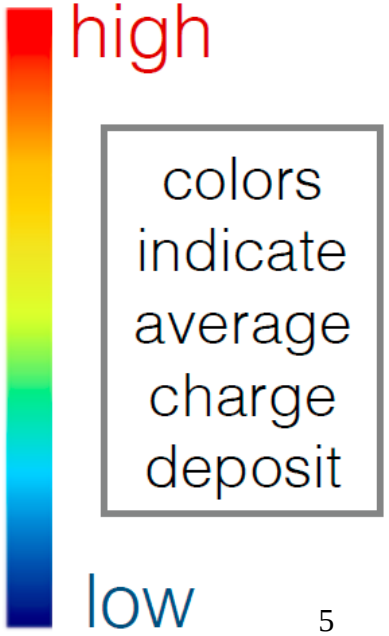
FNAL

- Up next: pixel test beam at FNAL!
- Aimed at Phase 2, using Phase 1 hardware
- Preparatory workshop held Aug 23–25 at LPC



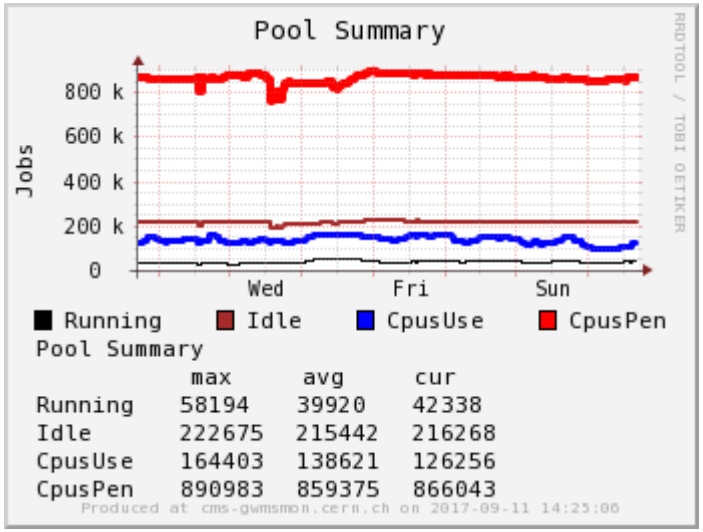


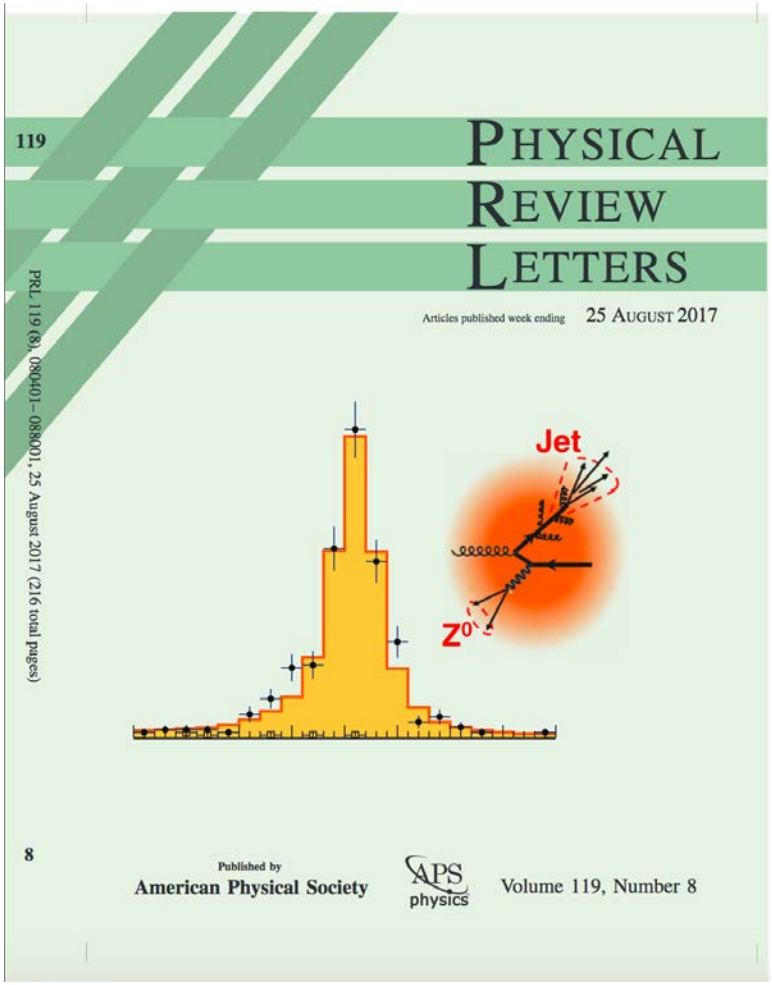




Physics & Computing

- Data and MC processing: plenty of pressure
  - Legacy re-reco of 2016 data (36 fb^{-1}) restarting
  - 2017 MC campaign ongoing
  - 2017 early data re-reco beginning
- Cover of PRL!
  - Study of jet quenching with Z+jet correlations in Pb-Pb and pp collisions at $\sqrt{s_{NN}}$ = 5.02 TeV
  - Synopsis: https://physics.aps.org/synopsis-for/10.1103/PhysRevLett.119.082301





Backup

16L2 Problem
Current understanding

With the very large release of gas during the beam screen warm-up it became clear that a large amount of gas in the system is an important part of the problem.
During the pumping of sector 12 after the EYETS (in March 2017) both beam pipes were connected to a common pump at the location 16L2 (8 points were used to pump the sector and 16L2 was one of them). A mechanical or procedural problem at this time could have let air into the system (both beams at 16L2). Seems very likely the fundamental cause.

The current best hypothesis is that there is frozen N_2, and O_2 on the beam screen. Flakes of these can be moved into the beam due to their magnetic properties especially when the magnetic fields are changing during the ramp. A solid flake in the beam leads to losses and instabilities.
At the moment it is thought that e-cloud or synchrotron radiation do not play an important role in the mechanism.