

CMS Report

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All Experimenters' Meeting
May 2, 2016



Reminder

- Last report by Caterina Vernieri 04/04/2016
 - First beams on March 25, then splashes March 29

	Jan				Feb				Mar				
Wk	1	2	3	4	5	6	7	8	9	10	11	12	13
Mo	4	11	18	25	1	8	15	22	29	7	14	21	Easter Mon 28
Tu													
We													
Th													
Fr													
Sa													
Su													

Year end technical stop
Powering tests
DSO test
Machine checkout
G. Friday
First beam
★

– Plan for 2016

- 2016 will be a production year with $\sqrt{s}=13$ TeV and 25ns bunch spacing
- 25 fb^{-1} at lumi which might exceed $\sim 1.2 \cdot 10^{34}/\text{cm}^2/\text{s}$ (pileup ~ 30)



Current Schedule

	Apr			May				June			
Wk	14	15	16	17	18	19	20	21	22	23	24
Mo	4	11	18	25	2	9	Whit 16	23	30	6	13
Tu							VdM				
We		Injector TS (8 hours)								TS1	
Th					Ascension				MD 1		
Fr					May Day comp						
Sa		Recommissioning with beam				Intensity ramp-up Scrubbing as required					
Su				1st May					beta* 2.5 km dev.		

04/09: start
magnet cooldown

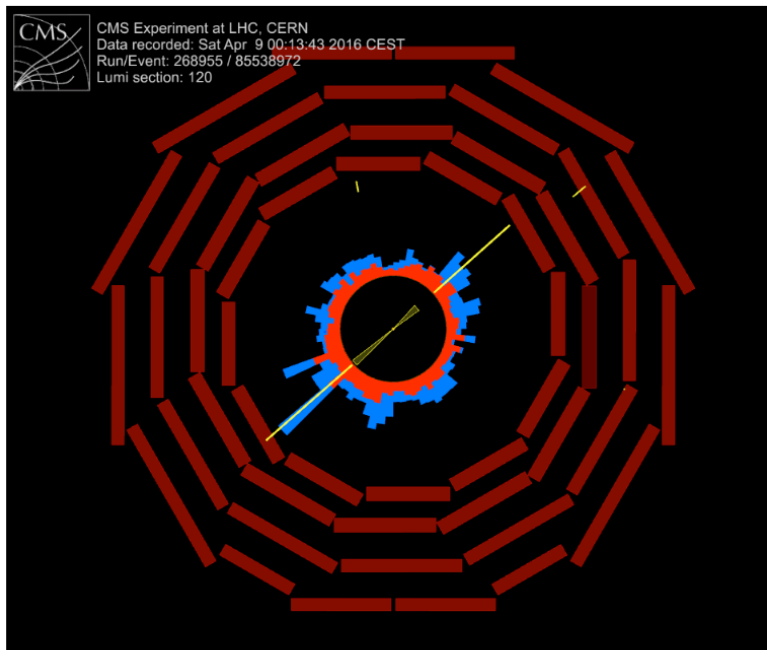
04/21: LHC 1st
Stable beam

04/28: CMS magnet
at full field 3.8T

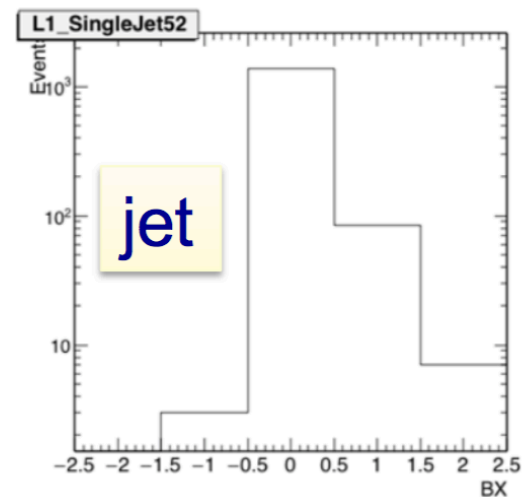
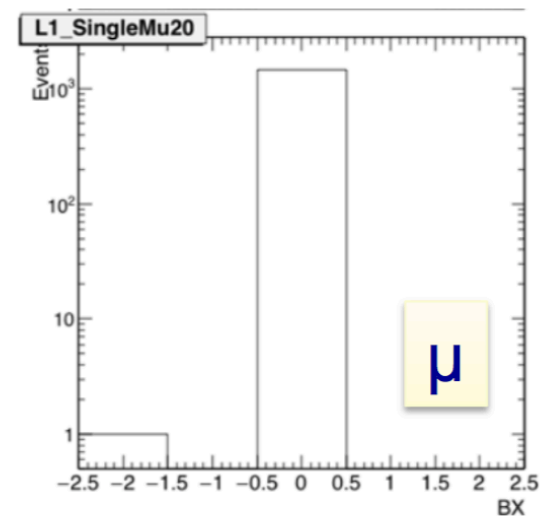
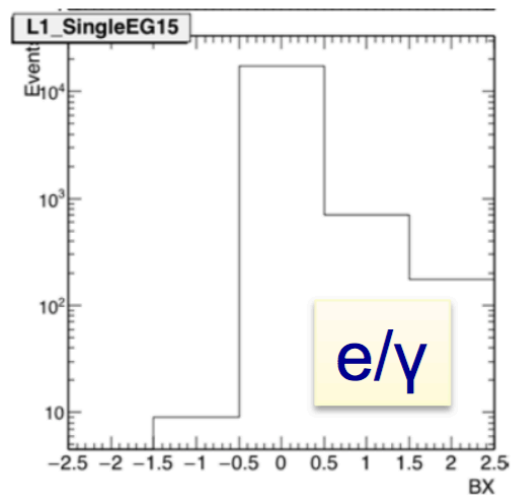
- During LHC commissioning, CMS continues with beam splash, test collisions, and cosmics
- Commission the LHC for first stable beams
- Pilot Physics with 3x3 and 12x12 bunches
- Scrubbing
- Single van der Meer scan of 2016 planned for week of May 16th



Commissioning: test collisions 04/08

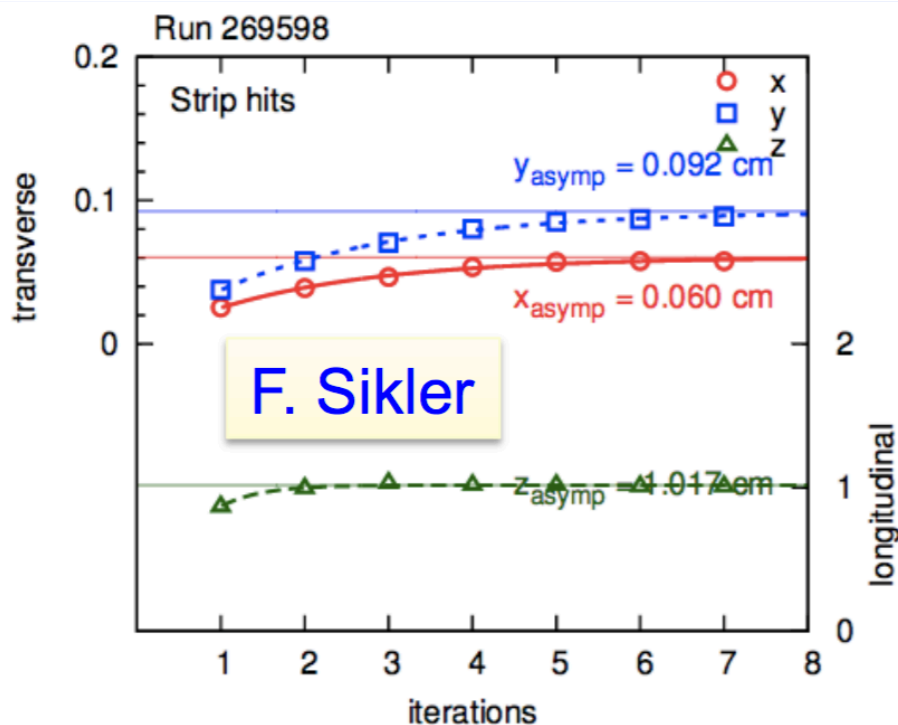


<https://twiki.cern.ch/twiki/bin/view/CMS/CMSNonStableCollisions2016>

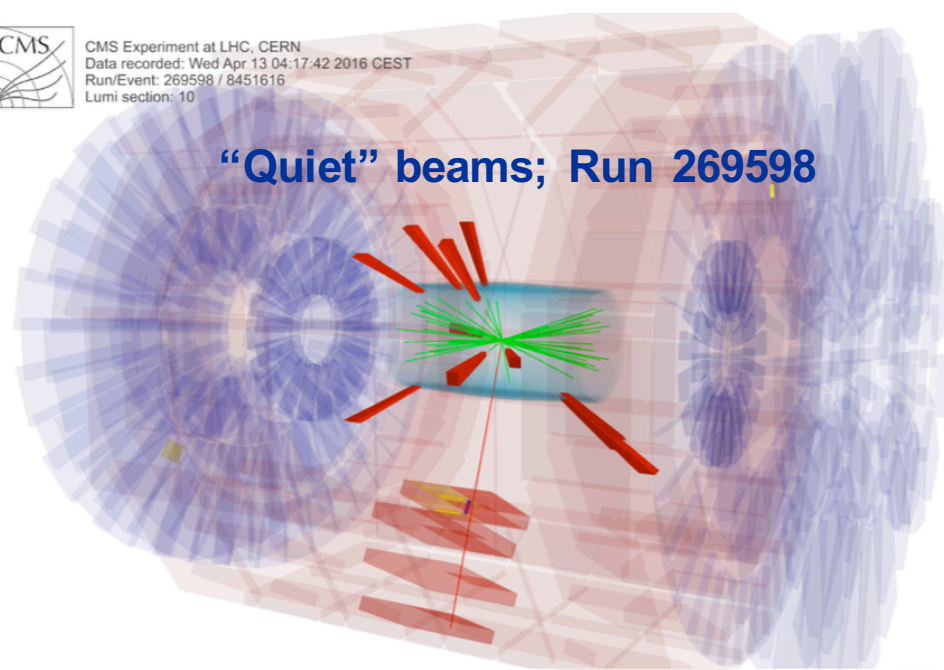


Commissioning: quiet beams

- “Quiet” beams on Apr 11th and 13th in order to measure beam spot with outer Tracker (not Pixels)
 - Workflow defined to deliver beamspot with $\sim 200\mu\text{m}$ accuracy (pileup $\lesssim 5$, $B=0\text{T}$, strips-only) within \sim hours



CMS Experiment at LHC, CERN
Data recorded: Wed Apr 13 04:17:42 2016 CEST
Run/Event: 269598 / 8451616
Lumi section: 10



Stable beams

- LHC has delivered stable beams since April 22
 - 04/22 night filled 3 individual bunches (2 colliding in CMS)
 - 04/23 and 04/24 night, filled with 12 individual bunches (8 colliding in CMS)
 - 04/28 night, filled with 49 bunches (12 bunch trains, 49 colliding in CMS)



Single 3b 2 2 2.csv

3 individual bunches for the first Stable Beams.

ATLAS	CMS	ALICE	LHCb
2	2	2	2
		Beam 1	Beam 2
		Bunches	3
		Non colliding	0
		Injections	3

Single 12b 8 8 8.csv

12 bunches with 12 injections
Bunches spaced by at least 5 μ s

ATLAS	CMS	ALICE	LHCb
8	8	8	8
		Beam 1	Beam 2
		Bunches	12
		Non colliding	0
		Injections	12

25ns 49b 49 36 36 12bpi 5inj.csv

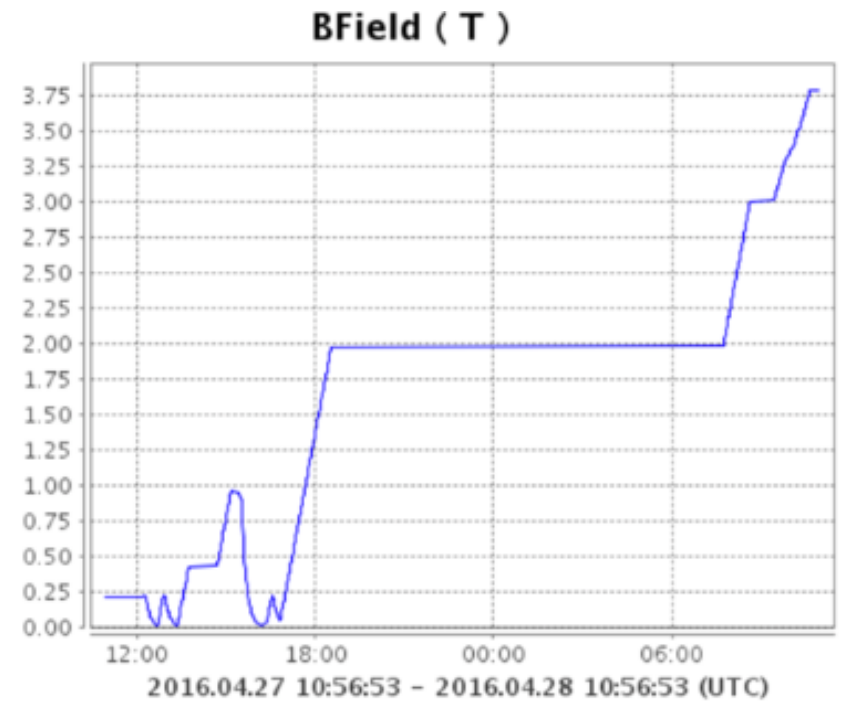
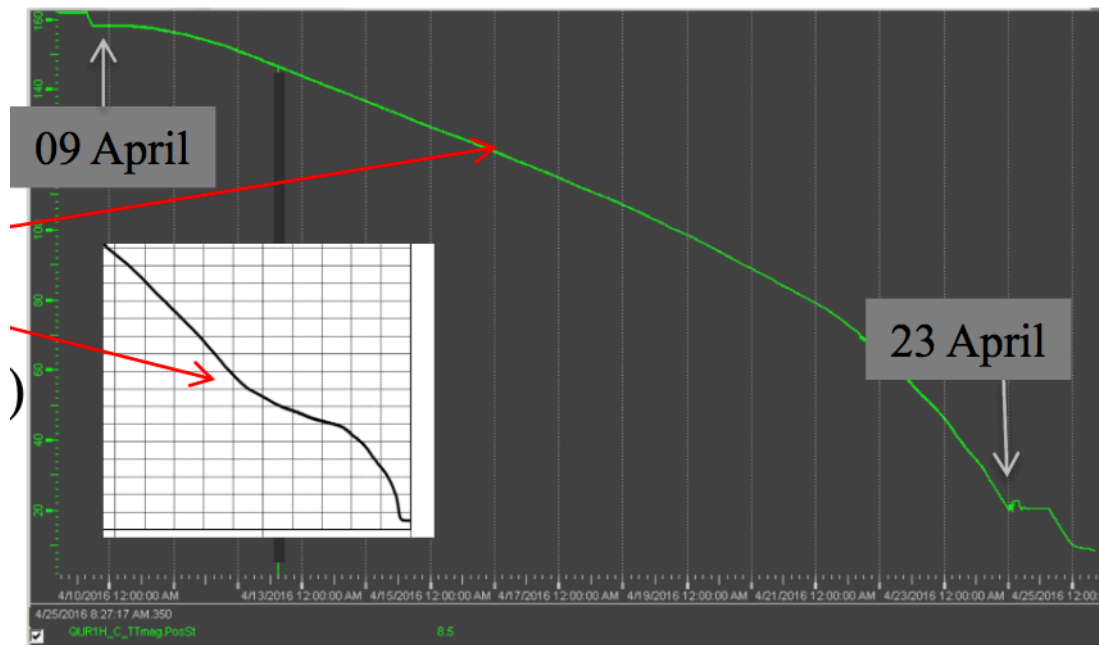
1 isolated bunch colliding in IP1/5
4 trains of 12b

ATLAS	CMS	ALICE	LHCb
49	49	36	36
		Beam 1	Beam 2
		Bunches	49
		Non colliding	0
		Injections	5



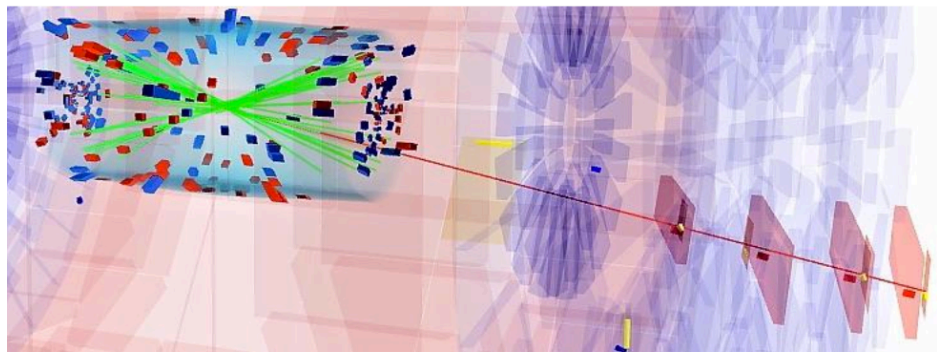
CMS Magnet

- Magnet at full field as of April 28
 - 04/09 cooldown started
 - 04/27 magnet ramped to 2T, cryo ready
 - 04/28 magnet field at 3.8T
- Looks stable for now



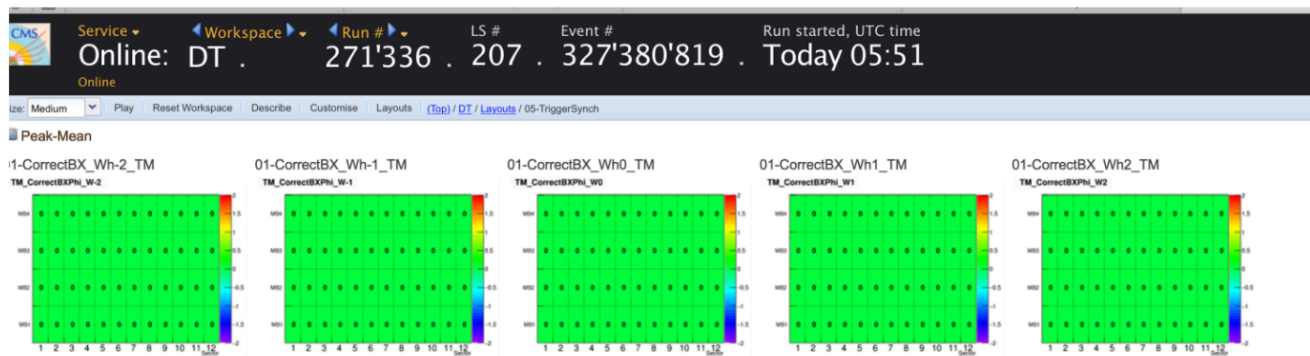
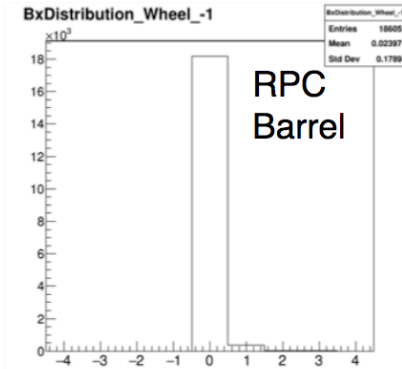
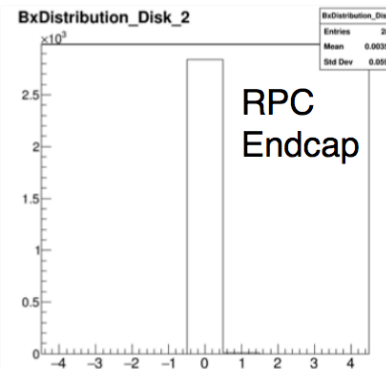
CMS data taking

- First stable beam fills used to carry out Tracker and Pixel calibrations
- Muons OK



CSC: OK

RPC timing Ok



DT timing OK,
trigger rates Ok,
waiting for B-
filled for final
timing tuning



Vacuum leak in SPS

- 04/26: vacuum leak found in SPS beam dump
 - SPS limited to single bunch
 - Detailed leak detection ongoing
- Near term plan:
 - Continue operation in degraded mode with reduced intensity = maximum 72 bunch trains
 - At first guess, this would limit the total number of bunches per fill to about 2000 bunches (c.f. 2800), and would increase the length of time to inject (to 2000 bunches) by a factor of 3
 - In the meantime, team is studying how to proceed



Last Friday: weasel causes shutdown

- Short to ground of 66kV transformer at P8
- The result
 - Beam dumped; no beam expected until May 5 (~1 week)
 - CMS Magnet ramped down to 2T
 - Cooling disabled throughout LHC / experiments
 - Overall impact on other CMS systems relatively minor (UPS worked well)
- Plan
 - Some electrical perturbations expected
 - After this, magnet ramps to 3.8 T
 - CMS will go to cosmics (much needed for calibration / alignment!)



Summary and outlook

- CMS has finished the commissioning with beam stage and we are ready to take physics data from here on
- LHC Physics Run with 50 bunches (next step in ramp-up sequence)
 - 25 fb⁻¹ expected
- We are engaged on multiple fronts:
 - Phase I upgrades (pixel and HCAL) are reaching critical stages
 - Phase II: the process leading to the TDRs is engaged and engaging resources

