

EYETS 2016-17 STATUS

CMS RC/DPG WORKSHOP, TORINO, ITALY

25TH JANUARY 2017

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EYETS task-list in full

EYETS 2016-17: Minimum essential services maintenance (asap – driven by cooling towers).
Re-centring of beamline in pixel: -2mm (CMS request to LHC) (+ Q10 to -Q10)

Replace pixel tracker with phase 1 pixel tracker (CO₂ cooled – PH-DT)

Complete phase 1 upgrade of HF phototransducers and readout

Phase 1 upgrade of HE photo-transducers and readout

NO LONGER FULL HE – PLAN1

Upgrade magnet safety system + compressor power feed & maintain 20kA breakers

Upgrade BCM1F

Install “demonstrator” for additional muon station GE1/1 (GEMs)

Muon system essential maintenance (ME1/1 & DT/RPC on YB2’s)

ME1/1 on-chamber cooling distribution: braize joint consolidation test

Check options for barrel RPC major revision in LS2

Install demonstrator for new yoke opening system

Install YE4+ push-back-system

(RPC cooling distribution: swage-fitting consolidation tests)

ECAL Maraton power supply revision II

Install new vac insulated N₂ transfer line for cold box liq N₂ pre-cooler

Prototype cooled freewheel thyristor/diode for Magnet

- ▶ EYETS PROJECTS covered in this talk:
 - ▶ PIXEL, Barrel and Forward
 - ▶ HCAL - HE Plan1 and HF
- ▶ Current Status
- ▶ Looking forward

- ▶ March 30: CMS starts closing procedure
- ▶ April 26: CMS Closed
- ▶ May 1: First beams
- ▶ Physics expected mid-June 2017

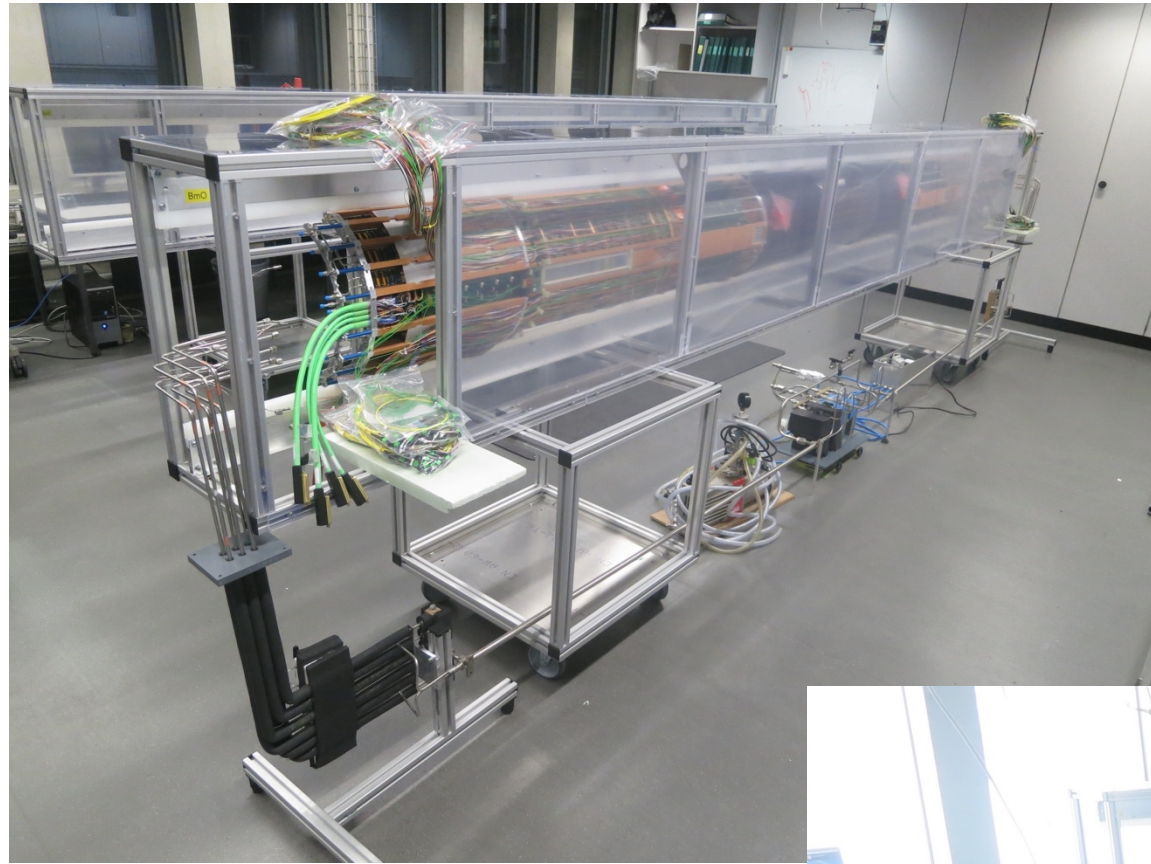
	Apr			May							June				
Wk	14	15	16	17	18	19	20	21	22	23	24	25	26		
Mo	3	10	Easter Mon 17	24	1st May 1	8	15	22	29	Whit 5	12	Special physics run	19	26	
Tu															
We				Machine checkout											
Th								Ascension							
Fr		G. Friday													
Sa							Recommissioning with beam								
Su															

Scrubbing

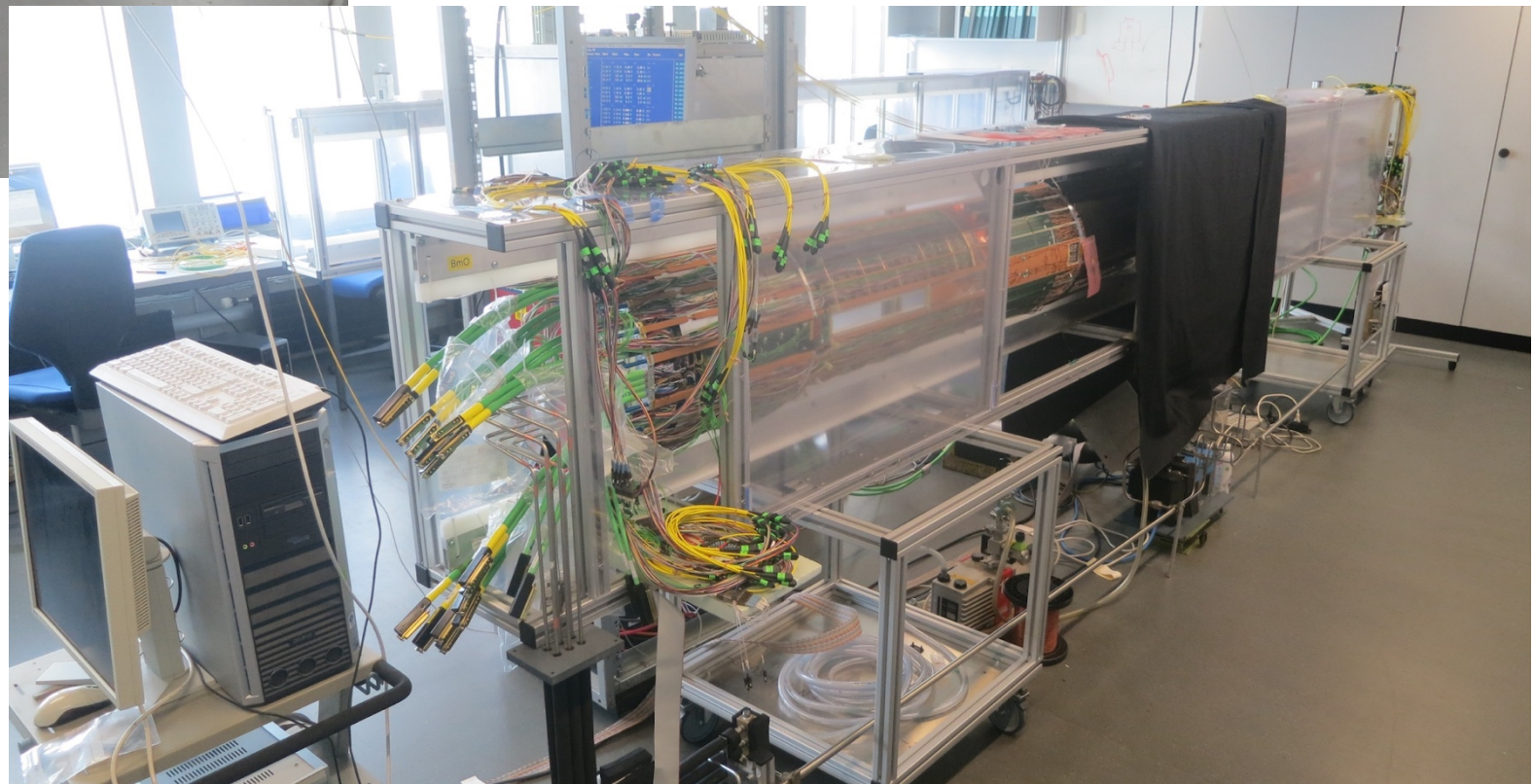
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- ▶ BPIX far side (-x half) fully assembled at PSI
 - ▶ Modules, mechanics, cooling, supply tubes
 - ▶ All 16 sectors tested & all correctly working
 - ▶ no system issue observed, CCU system fine, all sectors as should
 - ▶ test performed with CO₂ cooling at room temperature (15C)
- ▶ BPIX near side (+x half) assembled at PSI end of last week
 - ▶ Check out is being completed this week
- ▶ **The transportation of BPIX at P5 is scheduled on Jan 31st**



BPIX –X FULLY ASSEMBLED AND TESTED



- ▶ At PSI
 - ▶ -x side: essentially ready.
 - ▶ +x side: final modules being tested/debugged now.
 - ▶ Prepare for transport to CERN P5
- ▶ Still on schedule to transport BPIX at P5 by Jan 31st
 - ▶ Both halves at the same time

Half Cylinder	Location	Repairs complete	Tested after repairs	Ready for installation
Bml	P5	Wed 14 Dec	Yes (more tests @ P5 last week)	Needs few hours work (install covers), done before Jan 26
Bpl	P5 (since Dec 19)	Mon 12 Dec	Yes (complete testing @ P5 last week)	Needs few hours work (install covers), done before Jan 26
BmO	P5	Fri 13 Jan	last week @ TIF, this week @ P5	Ready for installation after checkout at P5 (Jan 27)
BpO	TIF	Mon 23 Jan	Jan 26 – Feb 21 @ TIF Feb 28 – Mar 5 @ P5	Ready for installation after checkout at P5 (Mar 5)

TRIAL INSERTION DONE LAST WEEK, USEFUL INPUT GAINED ON MODIFICATIONS FOR TOOLS ETC . TRY ANOTHER TRIAL BEFORE INSTALLATION (MID FEB)

- ▶ Pixel hardware in good shape, all boards available and tested. DAQ racks all installed at P5.
- ▶ Firmware:
 - ▶ Three flavours: px FEC, trk FEC, FED.
- ▶ px FEC in good shape, ready for commissioning/running.
- ▶ trk FEC has minor bugs to be fixed.
- ▶ FED FW used in end of 2016 run, was ok for 6 channels, but for 24 channels and higher PU, need higher draining speed - > **Firmware structure re-written, well advanced and first complete version expected end of Jan**

- ▶ BPIX
 - ▶ Debugging at PSI until the end of Jan
 - ▶ Cold test in pixel lab at P5
 - ▶ Installation on Feb 27th
- ▶ FPIX
 - ▶ First trial installation
 - ▶ BpO cable replacements and tests (at TIF until Feb 21 and then at P5)
 - ▶ Bpl and Bml final tests at P5 last week and BmO this week
- ▶ Survey of beam pipe before installation
- ▶ **Installation: BPIX Feb 27th, FPIX March 6th and 8th**



- ▶ Reminder of upgrade procedure:
 - ▶ Remove PMT boxes from HF and bring them to stations in SX5
 - ▶ Rework PMT boxes to implement dual anode readout, re-commission and test with LED runs
 - ▶ Re-install on HF, re-commission and test using upgraded front-end electronics (to be installed in parallel). Reminder front-end electronics for HF is upgrade to improved QIE10 cards.
- ▶ 39/72 PMT boxes reworked (from HFM and HFP)
- ▶ About ready to re-install 2 HF- quadrants of PMT boxes
- ▶ PMT removal:
 - ▶ Scaffolding built in HF+, removal of top PMT boxes can begin
 - ▶ Scaffolding in HF- to be done today

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HF UPGRADE PROGRESSING WELL AND ON SCHEDULE

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- ▶ PMT removal:
 - ▶ Scaffolding built in HF+, removal of top PMT boxes can begin
 - ▶ Scaffolding in HF- to be done today

- ▶ Readout modules (includes new QIE11): 4 for 1 RBX:
 - ▶ 144 burned in, min 5 weeks
- ▶ Calibration Units: 1 for 1 RBX:
 - ▶ 36 burned in, min 5 weeks
- ▶ No failures observed.
- ▶ ngCCM: Need 1 for 1 RBX
 - ▶ 18 (Prod2) ng CCMs were tested and burned in - ready for P5.
 - ▶ Second batch of 18 being burned in now.

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CAN BE CONFIDENT IN THE HARDWARE

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- ▶ Considerable progress
 - ▶ ngCCM firmware, solved a number of outstanding problems
 - ▶ Verified control link quality using PRBS protocol
 - ▶ Reduced trigger primitive latency to acceptable level for 2017 (2-3BX longer than existing, but work to reduce further continuing)
 - ▶ Control link redundancy for operations:
 - ▶ identified an alternative schema to resolve design oversight with original schema
 - ▶ requires installation of new FE - UXC patch panel - USC control link fibers (order finalized, installation plan being defined, to be done during this EYETS, independently from postponement of full installation)

STILL TO DO:

- ▶ **COMPLETE CCM FIRMWARE AND PROCEED TO COMPREHENSIVELY TEST ALL FUNCTIONS**
- ▶ **FINALISE DESIGN OF ELECTRICAL SWITCHES NEEDED TO SELECT SECONDARY CCM CONTROL CARD**
- ▶ **FINALISE INSTALLATION OF NEW FIBRES**
- ▶ **C060 SOURCING OF ENTIRE HE – PROVIDES REFERENCE FOR RECALIBRATION NEXT YEAR**

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 - ▶ ngCCM firmware, solved a number of outstanding problems

EVEN THOUGH DECIDED TO POSTPONE FULL HE INSTALLATION, STILL WORKING ON PLAN1. FEASIBILITY OF ONLINE/OFFLINE IMPLICATIONS BEING STUDIED

schema

- ▶ requires installation of new FE - UXC patch panel - USC control link fibers (order finalized, installation plan being defined, to be done during this EYETS)

- ▶ EYETS 2016-17 is tightly packed
- ▶ However it is going well so far, especially on the critical path activity (Pixel)
- ▶ HCAL has made enormous amounts of progress in its ambitious program - HF is going well, Full HE won't happen this year, but in anticipation of full installation next year, work is not slowing down but progressing on all fronts to enable Plan1 to be an option