



CMS open: 5 Nov 2008 AB

Shutdown 08-09

Completion of Commissioning

Set-up for shutdown

Compulsory activities

Elective activities

Overall strategy

Provisional sequence and work package examples

Conclusion



CMS open: 5 Nov 2008 AB

Completing commissioning

Achieve stable operation of CMS at 3.8T.done 06-10 Oct
(included removing CASTOR (-z) to avoid mechanical risk to beampipe above 2.5T)

Master remaining magnetic field effects in UXC /USC empirically
Shield or move devices whose operation is compromised.ongoing

CRAFT: Period of sustained operation with defined objectives (300M cosmics)..nearly done
Complete forward shielding, tune opening/closing and test closed at full field... after CRAFT

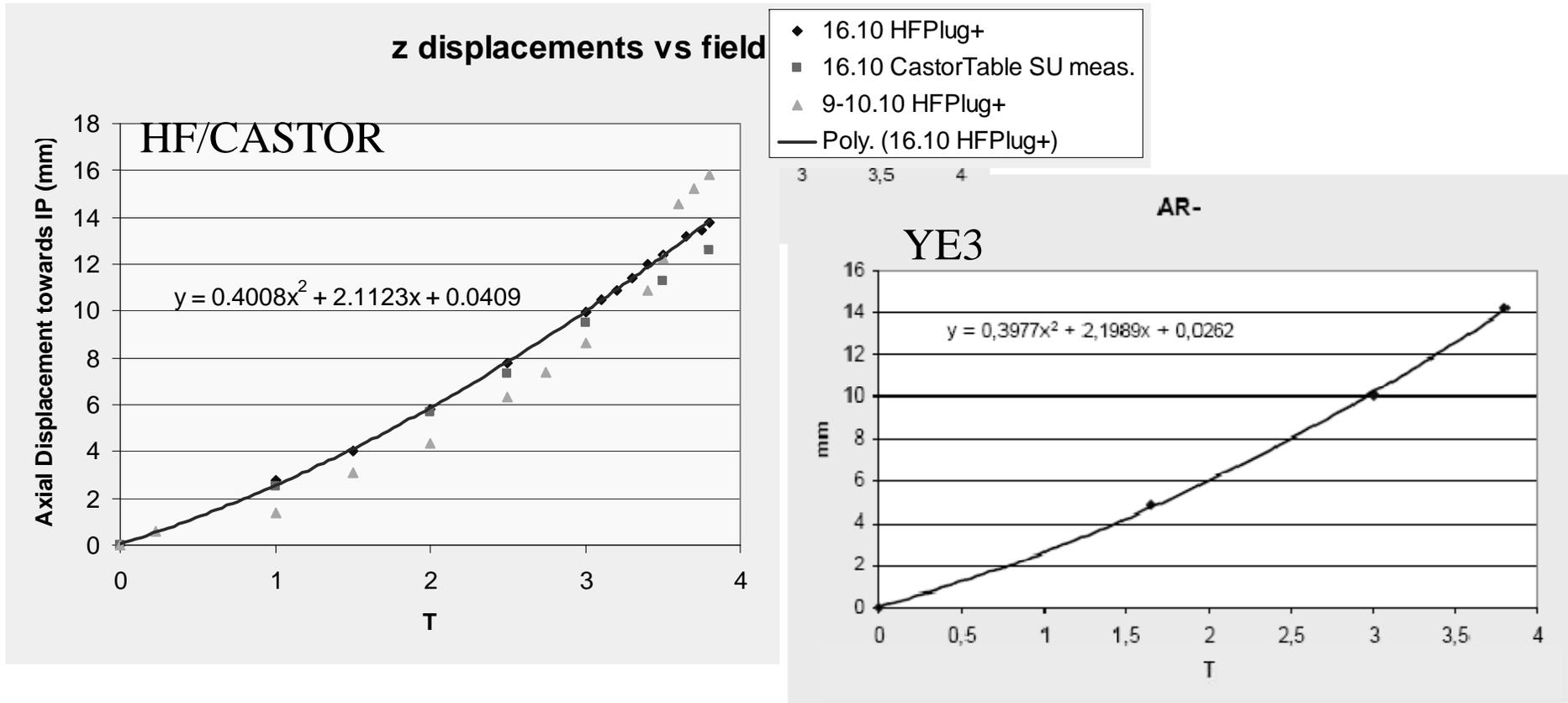
Investigate mechanical stability of forward structures ...ongoing
(HF, platforms, risers and shielding, BP support, CASTOR & TOTEM support)
during full field ramp-up/discharge and implement modifications as needed.

Master magnetic field effects on LHC equipment. ...started continuing after CRAFT

Test stability margin at 4T, fast discharge from 3.8T after CRAFT



Field-induced displacements in forward region



- Elastic after an initial adjustment. some aspects still to understand
- Follows endcap
- Beampipe x-y movement minimal



Set-up

Beam-pipe to Ne @ 1atm to reduce risk if damaged by work or field distortions....done

De-classify UXC as controlled radiation area... ..done

Defer imposition of ZDN material classification ...done

Establish obligatory annual infrastructure maintenance activity and safety checks
and possible timeframes

...done



Highest CMS priorities

Modifications to closing system of wheels, disks and shielding

- safer closing of CMS: reduce risk to detector and beampipe.
- reduced exposure of personnel to activated parts.
(in particular re-work of some 2008 forward system fixes)

Modification to access platforms - reduce risks to detector and beampipe
- speed up logistic changes

Infrastructure (eg cooling, elec supply) diagnosis, repair and improvement to reduce risk to detector, UXC access requirements and inefficiency (eg leaks, blockages, fan failures).

Repairs necessary to achieve required 2009 performance (integrated lumi $\cong 100\text{pb}^{-1}$?)

Repair or re-work, necessary for final performance, in areas which will acquire significant activation. (ALARA).

Preshower installation - needs complex logistic set-up and thus long shutdown
- work area will acquire significant activation (ALARA)

TOTEM T1 and T2 installation - work area will acquire significant activation (ALARA)

Set-up of full radiological screening and material tagging/classification/tracing for 2009 run.



Elective activities

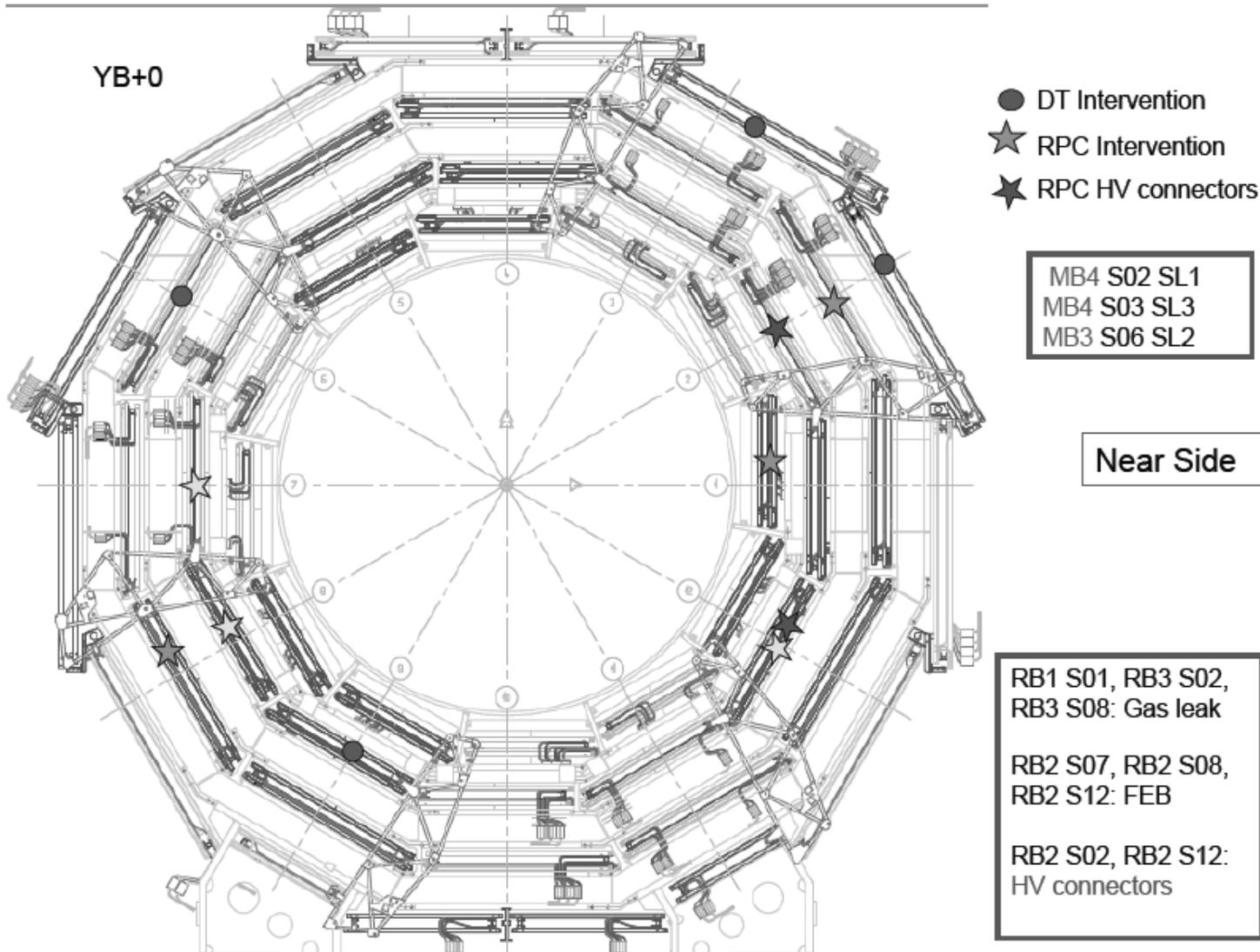
- Non-critical repairs which allow untried routine maintenance procedures to be tested, (especially if work area will acquire activation)
- Non-critical new installation, repairs or improvements which can be done off the critical path.
- Non-critical new installation, repairs or improvements not subject to ALARA which require a long shutdown.

all subject to availability of resources after highest priorities satisfied

- All CMS systems (except BCM!) have made intervention requests.
see TCM 09 Oct : <http://indico.cern.ch/conferenceDisplay.py?confId=42919>
 - priority, required configuration and resources for each are being discussed in TCM/TIG, MTP,EB,MB meetings.
 - preliminary filtering has excluded EB and EE work, based on present knowledge.
 - final decisions on priority and time allocation once we have a sound framework planning (majority of activities are parasitic to CP)



Eg: DT/RB maintenance on YB0





CSC required maintenance work

Location/station	Priority 1	Priority 2	Priority 3	
YE+3 +z /ME+4	Repair 1 CSC (3h)	Repair 1 CSC (3h)		Total 2 CSC (1d)
YE+2 +z /ME+3	Repair 2 CSC (4h)	Remove 1 (1d) & repair 1 (3h) CSC	Remove 3 CSC (1.5 d)	Total 7 CSC (3d)
YE+2 -z /ME+2	Repair 1 CSC (3h)	Remove 3 CSC (3 d)	Remove 1 CSC (1 d)	Total 5 CSC (4d)
YE+1 -z /ME+1	Remove 3 CSC (1.5 d)	Remove 5 CSC (2.5 d)		Total 8 CSC (4d)
YE-3 -z /ME-4			Repair 1CSC (3h)	Total 1 CSC (3h)
YE-2 -z /ME-3	Repair 1 CSC (3h)	Remove 3 (3 d) & repair 1 (3h) CSC	Remove 1 (1d) & repair 1 (3h) CSC	Total 7 CSC (6d)
YE-2 +z /ME-2		Remove 2 CSC (2d)	Remove 1 CSC (1d)	Total 3 CSC (3d)
YE-1 +z /ME-1	Remove 4 (2 d) & repair 1 (3h) CSC	Remove 7 (4d) & repair 1 (3h) CSC	Remove 1 (1d) & repair 1 (3h) CSC	Total 15 CSC (8d)
	Total 13 CSC (6 d)	Total 25CSC (18 d)	Total 10 CSC (6 d)	Gran Tot ~30d

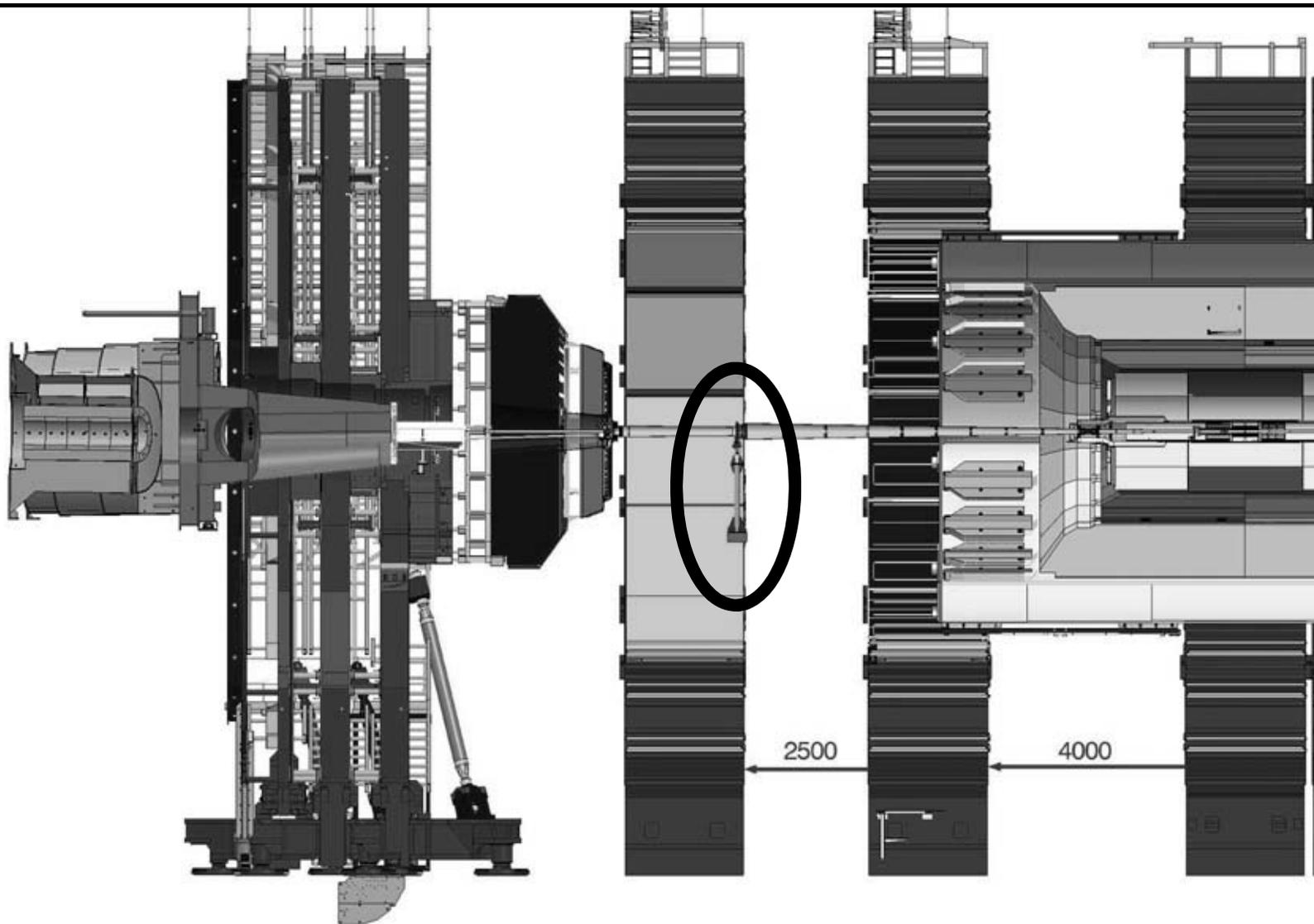


Overall strategy

- 1) Assumptions:
 - start opening 17 Nov.
 - closed and operational 15 May.
 - parallel shutdown and re-commissioning as soon as possible in 09.
 - no explicit contingency: awaiting LHC start-date estimate
 - no allowance yet for prohibited periods due to LHC re-commissioning (discussion started in shutdown coordination meetings)
- 2) Concentrate services interruptions either side of end-of-year break, straight after CRAFT
Make limited cooling and power re-available asap to test new or repaired items.
- 3) Preshower installation Feb-Mar when detector and tooling are ready.
- 4) Define a minimum set of configurations of experiment and services,
consistent with:
 - overall timeframe, with best options for exploiting additional time.
 - presence of beampipe and need for 10.6 m support (limits the number of configurations)
 - optimised access for priority activities, with parasitic activity where possible



Possible configuration during opening





CMS open: 5 Nov 2008 AB

Critical path: Logistic phases

Critical path falls naturally into 5 (partially overlapping) phases:

Phase 1: 17 Nov-15 Jan

Open + end

Access windows to endcap disks during opening.

Surkov frame in YB0, access to TK PP1's, EB cabling

Configure for access to barrel wheels individually, YB0 most complex.

Phase II: 8 Dec- 4 Feb

Repeat for – end

Phase III: late Jan- early April: Barrel wheels closed

ES installation, Fpix removal and rework/repair

Phase IV: Late Mar- late April: closing yoke , with semi-parasitic work on wheels and disks,
and inside YB0

Phase V: Late April- Mid May: TOTEM installation, Closing HF and shielding,
Magnet recommissioning



Working groups developing work packages

Activity can be partially factorised: 4 working groups being created

Working group 1: Opening/(Closing) and CSC maintenance

Working group 2a: work on the barrel wheels (driven by DT/RPC)

Working group 2b: work inside the vac tank once Surkov frame in place

Working group 3: ES and pixel installation

Relevant subdetectors will meet with EAM (Martin G) and WG coords to work out details.
Review and refine in TIG. (field coords + TC)

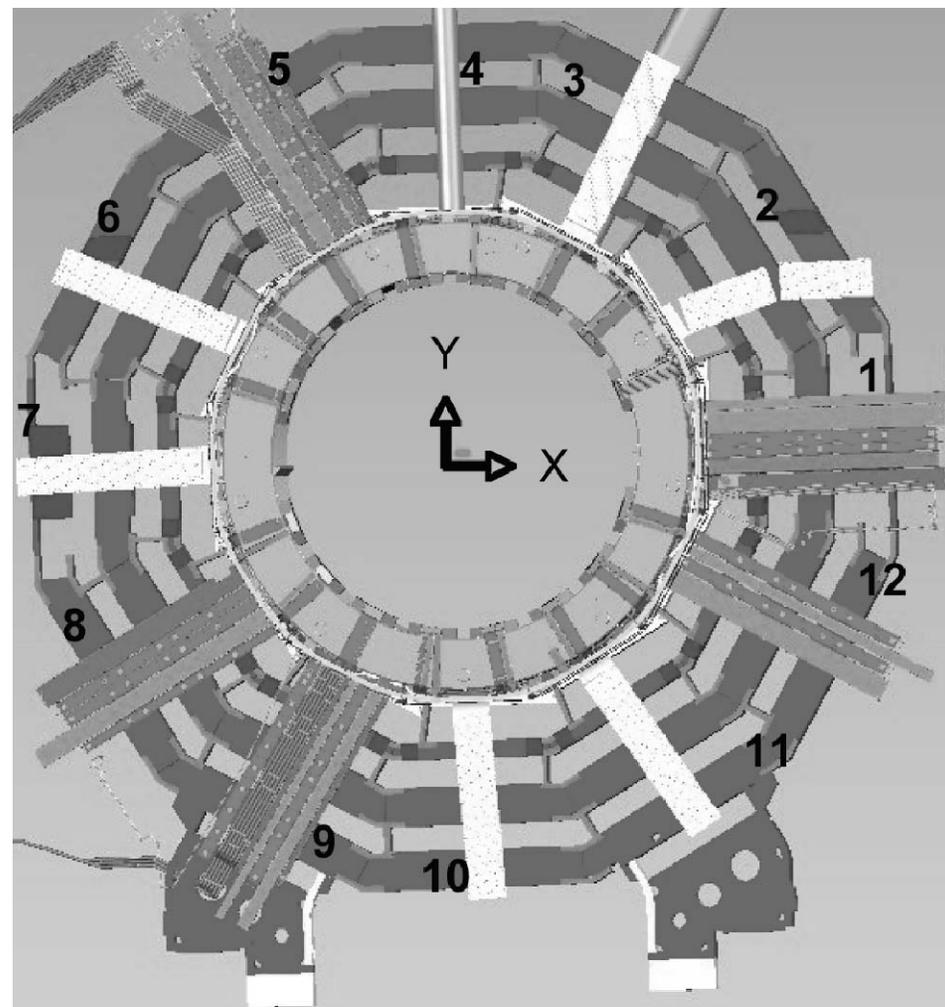
Work packages, with subsequent risk/ co-activity analysis and
VIC needed for each major activity ...as done for construction.



Working group 2a

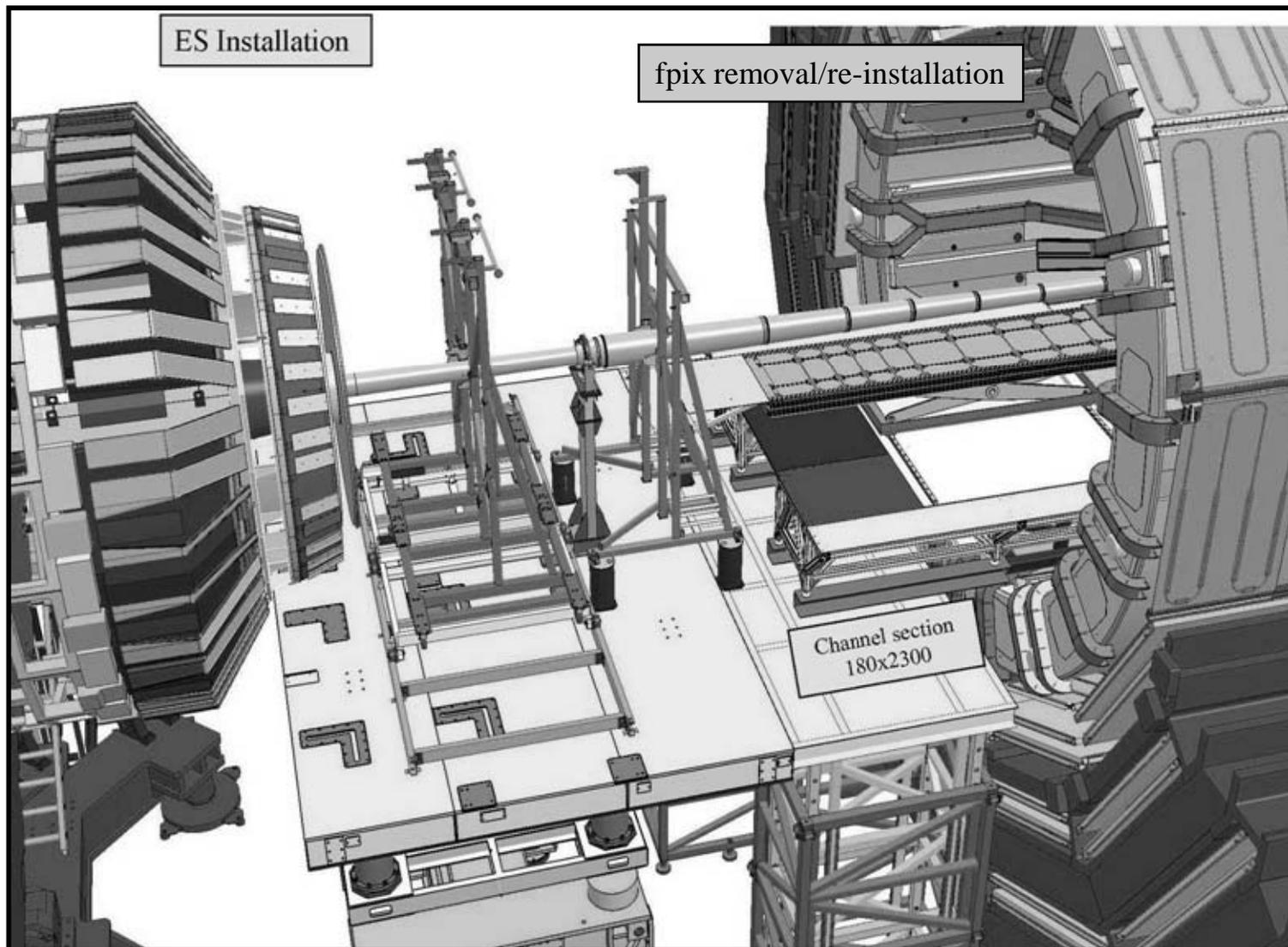
Maintenance of barrel DT/RPC,
Requiring removal of EB “removeable” services
and extraction of a chamber.

DT
RPC,
Align
INFRA





Working group 3: ES and fpix work



Parasitic work

HCAL,
EB
TK
INFRA

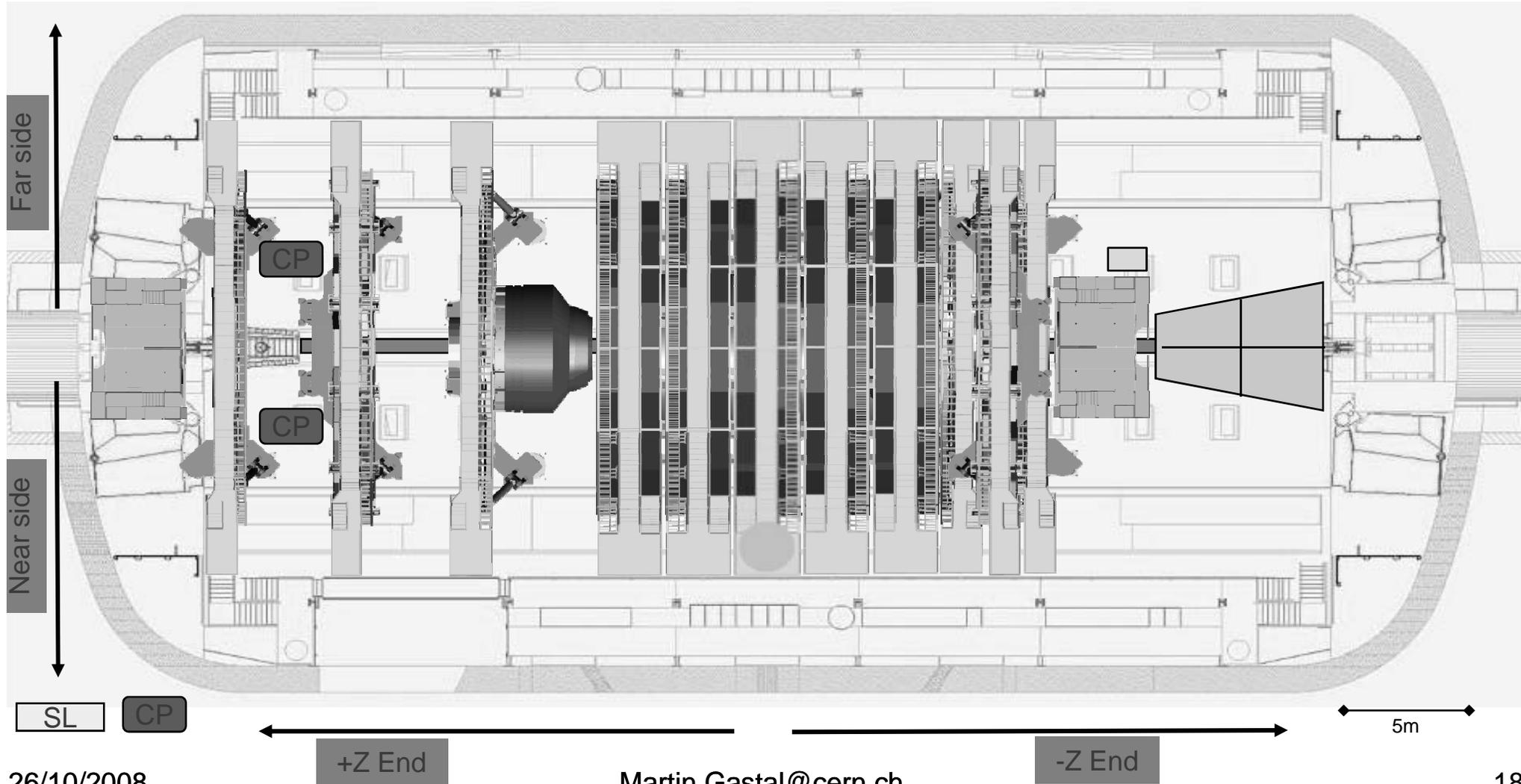


WP Title: Repair 2 CSC on YE+2+Z & Maintain RPC YE+3-Z

1. Subsystem(s): YE+2+Z CSC
2. Duration: 1/2d
3. Manpower:
 - Local: CSC 2pers
 - Central:
 - Contractor:
4. Tooling:
 - Scaffolding:
5. Handling:
 - UXC55 Crane: %
 - Cherry Picker: 1
 - Scissor lift:
6. Activity break down: Replace ALCP boards
7. Impact on Physics:
2 full chambers out of order (3/2/10 3/1/10)

1. Subsystem(s): YE+3+Z RPC
2. Duration: 1d
3. Manpower:
 - Local: RPC 2pers
 - Central:
 - Contractor:
4. Tooling:
 - Scaffolding:
5. Handling:
 - UXC55 Crane: %
 - Cherry Picker: 1
 - Scissor lift:
6. Activity break down: Fix HV, LV, DCS, noise problems
7. Impact on Physics:
16/72 of chambers out of order

Repair 2 CSC on YE+2+Z & Maintain RPC YE+3-Z: Cavern configuration

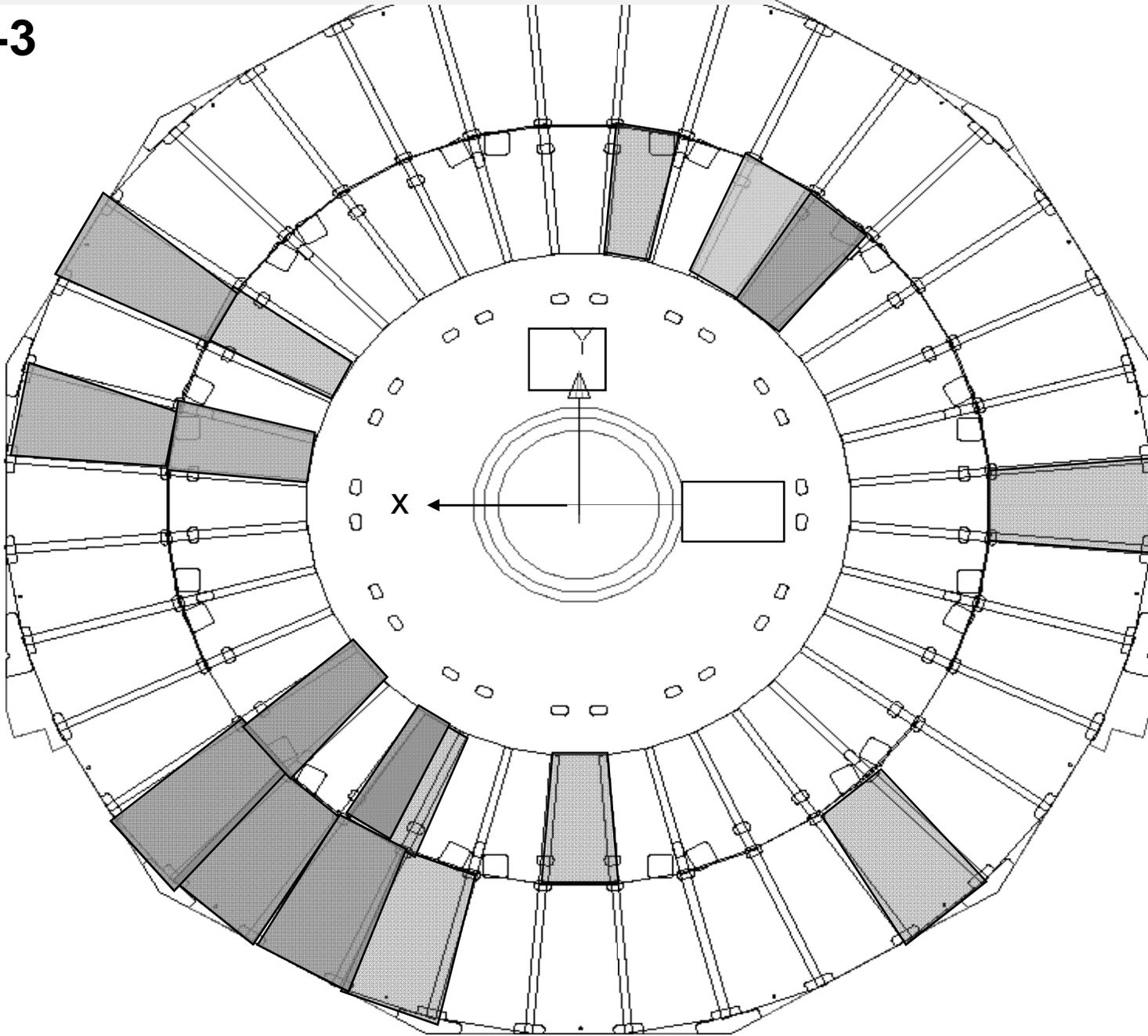


26/10/2008

Martin.Gastal@cern.ch

Repair 2 CSC on YE+2+Z & Maintain RPC YE+3-Z

RE+3



- HV t/b
- HV c
- DCS c
- LV db/c
- Noise



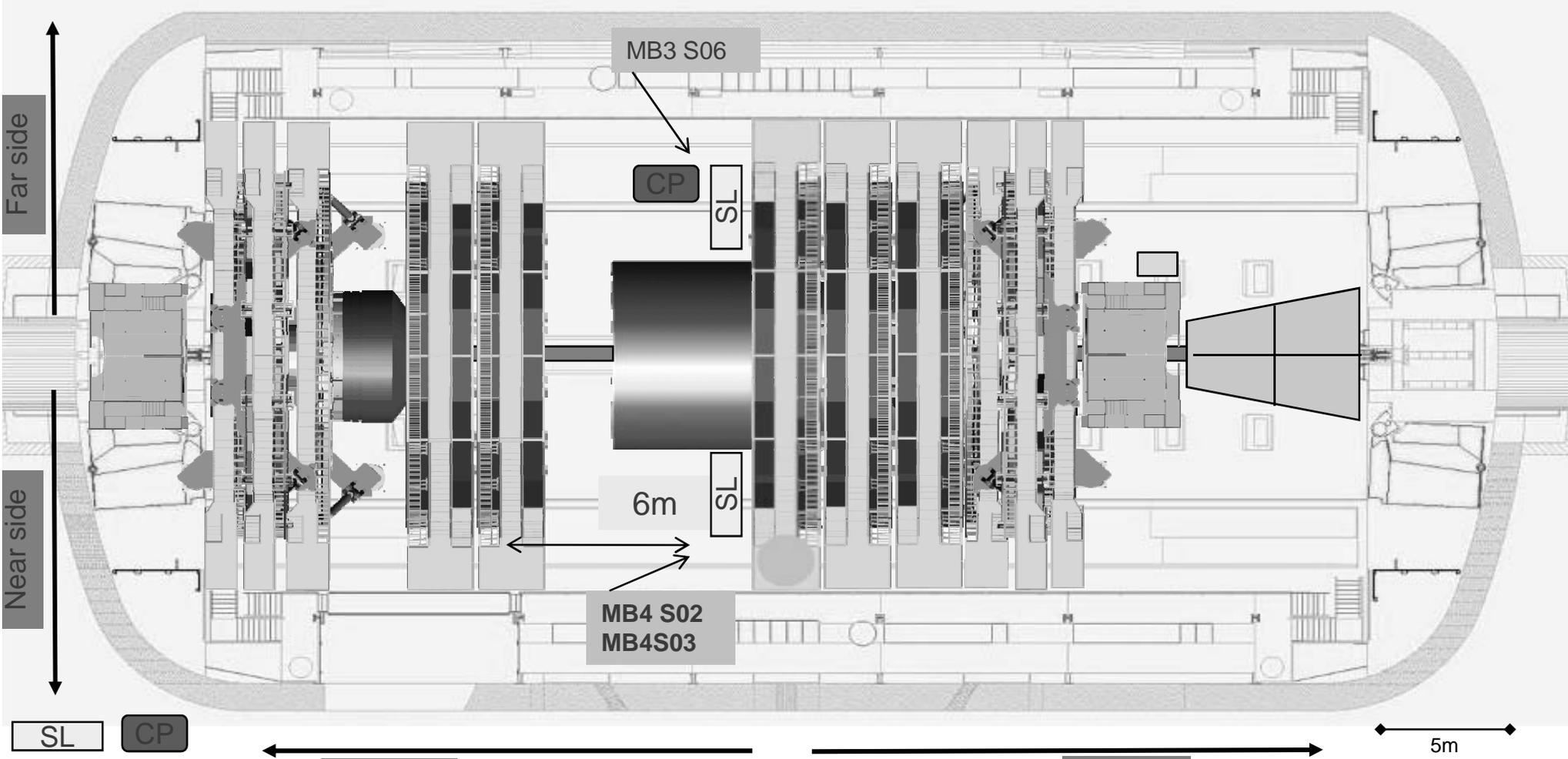
WP Title: Service DT chambers on YB0+Z

to be combined with work on YB+1

1. Subsystem: DT
2. Duration: 8 days
3. Manpower:
 - Local: ECAL-2pers uncabling; DT 6tech + 3 Phy
 - Central: Sandro
 - Contractor: 1 crane driver
4. Tooling:
 - Scaffolding:
 - Platform: on top of Vac Tank (P Petiot)
5. Handling:
 - UXC55 Crane: 20%
 - Cherry Picker: 1
 - Scissor lift: 2
6. Activity break down: Remove ECAL LVcables from S02 and S03 S06; Remove MB4S02 pose on the ground; Repair HV problem and install; Pull MB3 S06 out of the iron; Repair HV problem and push back; Remove MB4S03 pose on the ground; Repair HV problem and install; Put DT RPC cables back in S02 and S03 S06; Test MCs; Put ECAL LV Cables back in S02 and S03 S06
7. Impact on Physics:

MB4S02 32 channels; MB3S06 20 channels 1 layer; MB4S03 80 channels 1 layer

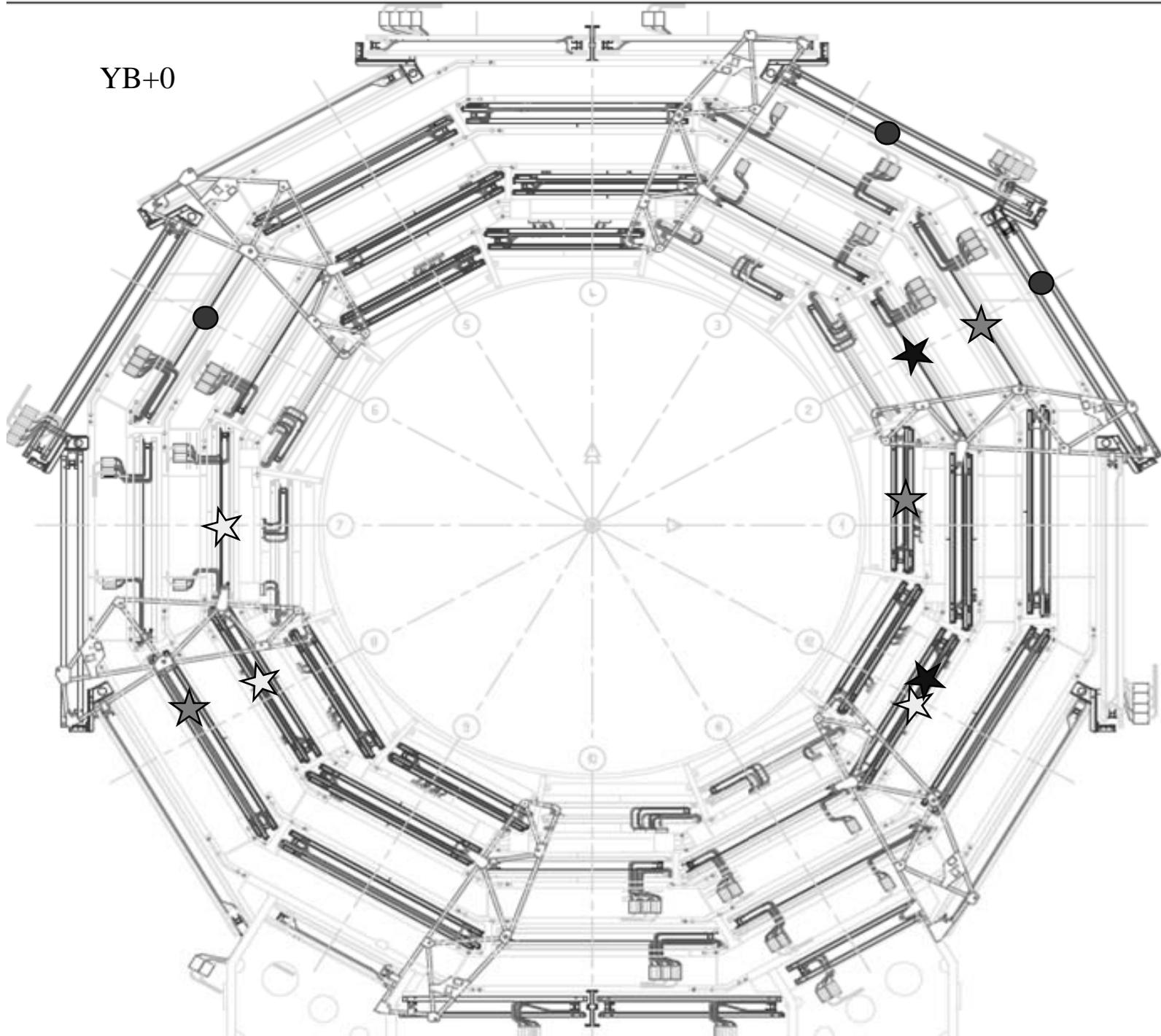
Service DT chambers on YB0+Z: Cavern configuration



26/10/2008

Martin.Gastal@cern.ch

YB+0



- DT Intervention
- ★ RPC Intervention
- ★ RPC Repair

MB4 S02 SL1
MB4 S03 SL3
MB3 S06 SL2

Near Side

Access needed from z+:
MB4 must be removed;
M3 can be repaired in situ

RB1 S01, RB3 S02, RB3 S08: Gas leak

RB2 S07, RB2 S08, RB2 S12: FEB

RB2 S02, RB2 S12: HV connectors



Conclusion

Moving towards a coherent planning

Still awaiting real constraints from LHC

Very extensive work involving almost all CMS systems

Most requests look feasible ...but

schedule and risk/benefit may have to be modified based on experience
eg feedback from YB0+z DT/RPC work may affect decision on how to
proceed with rest of DT maintenance requests.