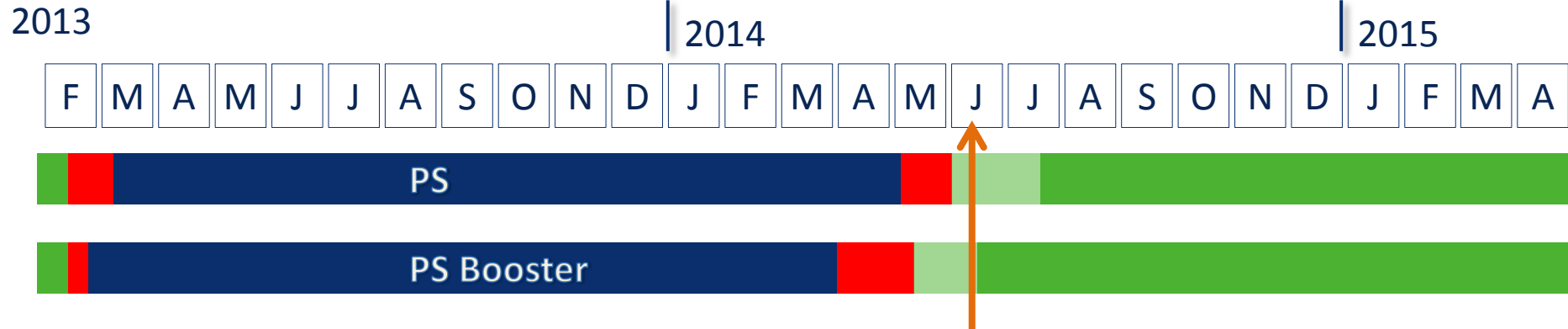


# Injectors & LHC report

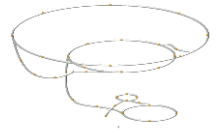
K. Foraz

on behalf of OSS members

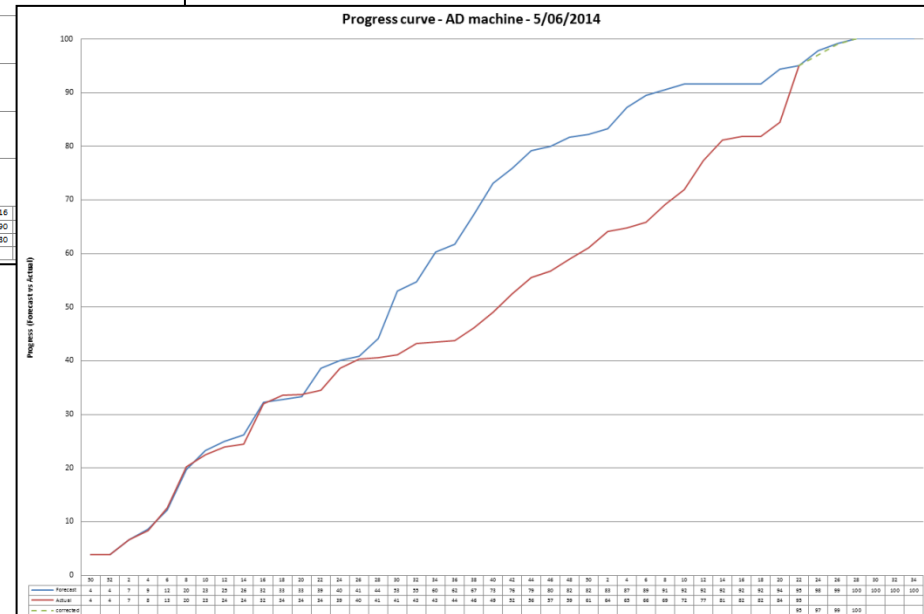
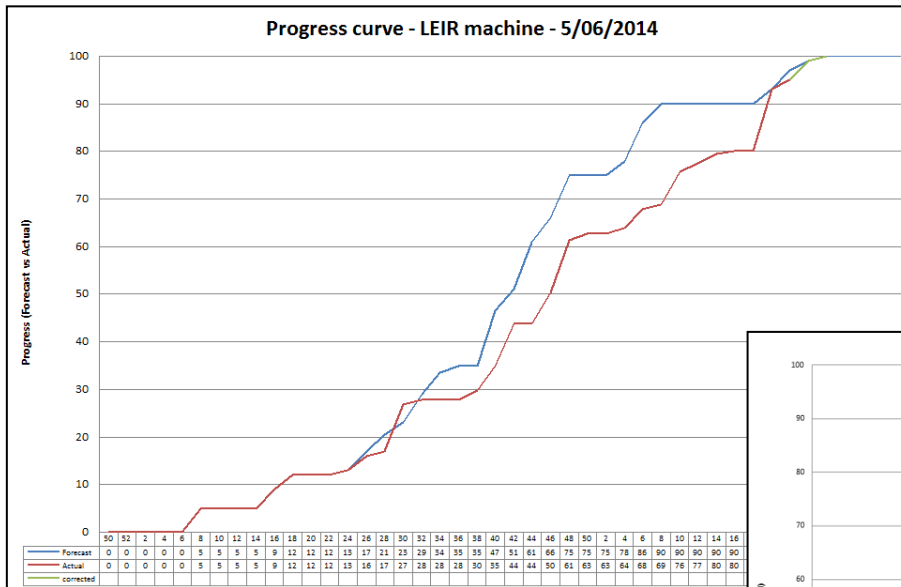
# Pre-injectors: PS & PSB



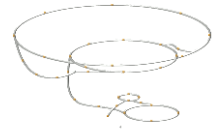
- PSB
  - Cold check out from week 20-22
  - First beam injected into PSB on Monday June 2<sup>nd</sup>
  - Now setting up RF etc..
- PS
  - cold check-out phase
  - First injection of beam from the PS Booster planned for June 20th



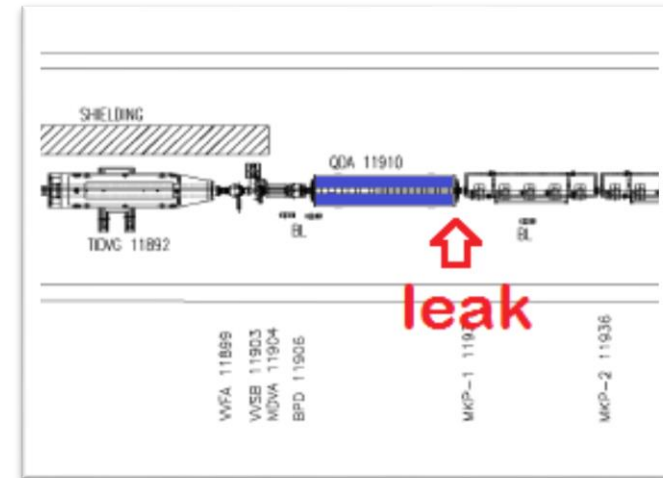
## Hardware tests in progress



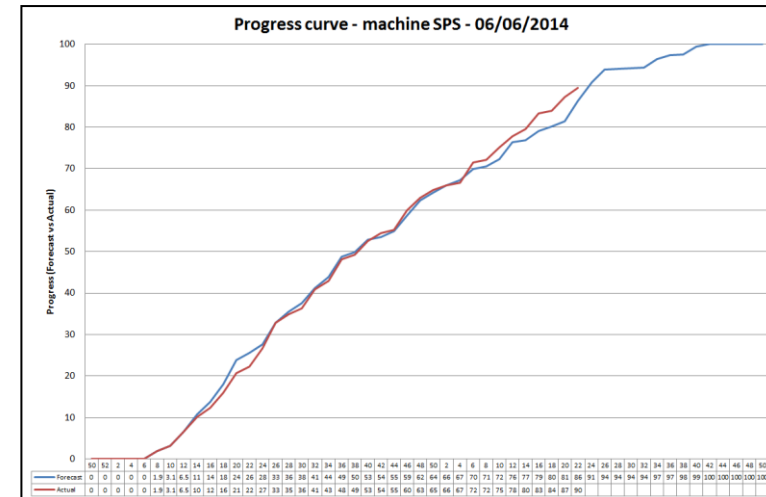
# SPS



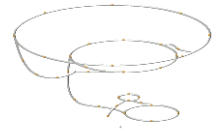
- BA1:
  - A vacuum leak appeared on the downstream bellow of QDA11910. Local repair was impossible and therefore the magnet had to be removed from the SPS to be repaired. The initial repair failed and now it is being repaired again before being re-tested. If this repair works, then the magnet will be put back into the SPS early next week.
  - **Any more of a delay and it will become increasingly difficult to be complete in this area by the 27<sup>th</sup> June!**
  - **With current schedule, we foresee a delay of 1wk for beam injection**



- Other Areas:
  - All major works are now complete.
  - A cleaning campaign of the SPS has begun.
  - All AUG tests are complete.
  - GS/ASE are in the process of doing access tests at each point in preparation for closure at the end of the month.
  - EN/CV have nearly finished re-filling all main water circuits.
  - TE/EPC have started tests of the Aux converters.
  - With the exception of BA1, All other vacuum sectors are now either under vacuum or in the process of being pumped down.
  - A new cable trench is being constructed between the CCC and BA3.



# LHC - P1



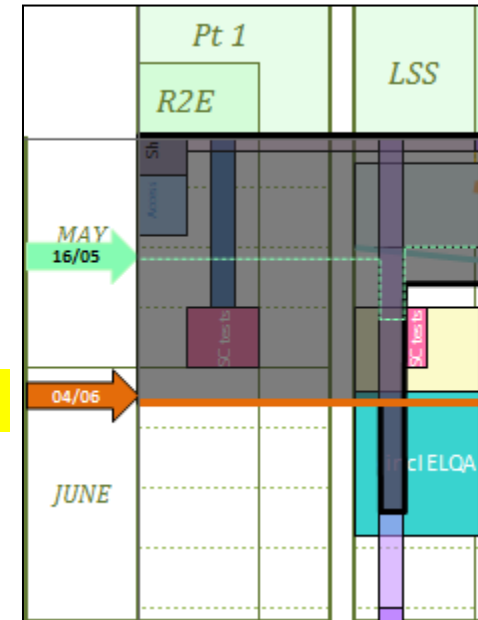
## • R2E – Pt1:

- Done
  - Short Circuit tests
  - PAD-MAD installation
- In progress
  - Water cooled cables orientation
  - Access commissioning: Today & June 20<sup>th</sup> – No access (mid arc-mid arc)



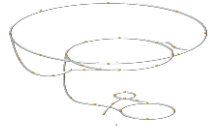
## • LSS1:

- Vacuum work in progress
  - A7L1, A6L1(TCL6), A6R1(TCL6), A7R1
- Sealing in progress
- Warm magnet tests next week



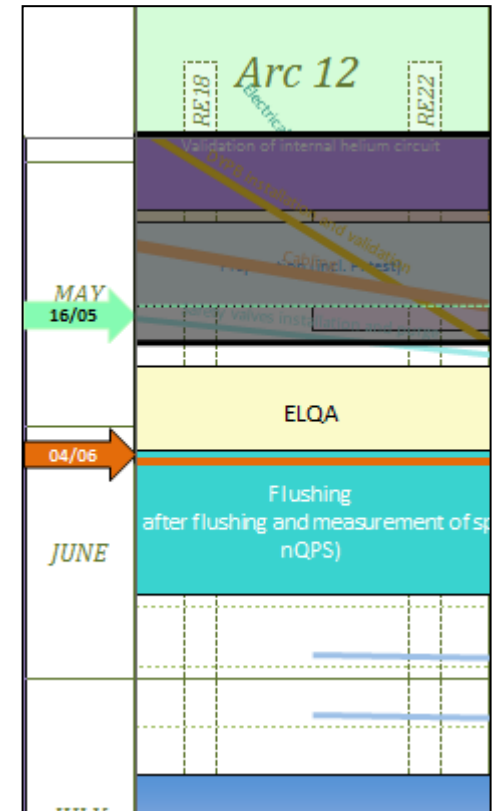
Sectors	Equipment readiness	Δ Equi / new version	Bake-out	Δ Bake-out / new version	Comments
A7L1	XRP (wk.20)	-2	wk.23	-1	Finished within next 2 weeks 😊
A6L1	new TCL6		wk. 24		
A6R1	new TCL6		wk. 25		
A7R1	XRP (wk.21)	-3	wk. 24	-3	

# LHC – P1 ➡ P2



## • Arc 12 :

- Pressure test **successful, but**
  - New leak on QRL ( $1.7 \cdot 10^{-5}$  mbar l/s @10 bar) - just localized (14L2) on header C
  - New leak on line E ( $4 \cdot 10^{-7}$  mbar l/s @10bar,  $2.5 \cdot 10^{-6}$  @19bars) – being investigated to decide on repair strategy
- ELQA at warm **next 2 weeks (24 & 25)**
- **From wk.27 repair**
- DYPB reinstallation and reconnection **done**



# LHC - P2

## • Point 2 & LSS2

- New control cabling campaign **done**
- Survey – maintenance of Inner triplets **done**
- **Survey in low-beta in progress**
  - **Procedure not yet defined**
- 600A IST **done** – 13kA **in progress**
- Cryogenic maintenance in progress
- **Short circuit tests next week**
- Around Vacuum
  - MKI areas: MKI installed - mechanical work in progress
  - C4L2, A4R2: TCTP installed, mechanical work in progress
  - B4L2: TDI will be installed on wk 27

**From:** Helene Mainaud Durand  
**Sent:** 23 May 2014 17:26  
**To:** Massimo Giovannozzi; Rogelio Tomas Garcia  
**Cc:** Dominique Missiaen  
**Subject:** charges sur vérin central du Q2

Bonsoir Massimo et Rogelio,

Vous trouverez ci-joint le rapport des tests réalisés sur le vérin central du Q2 du triplet 2R. Pour une baisse de charge sur le vérin central de 3.6 t (soit une charge passant de 12.4 t à 8.8 t) et des charges acceptables concernant les vérins extérieurs, la flèche mesurée au niveau du cryostat est de 0.64 mm (voir la courbe en page 2 du rapport). Pourriez-vous regarder l'impact d'une telle flèche sur l'ouverture de Q2 ?

Sincères salutations,

Hélène.

Salut Dominique,

We did not have time to analyse the situation, yet. In any case, this would reduce the beam aperture, which would be a really pity!

On the other hand, I had proposed another procedure that would be free of any aperture loss. As you might remember, I proposed that the procedure to re-align the triplet should have been to: i) unload the central jack; ii) align the triplet; iii) move the central jack back in its original position. This would have the advantage of allowing the alignment of the triplet, while leaving untouched the beam aperture. Could you please comment on this proposal?

Merci d'avance. Amicalement  
 Massimo

Sectors	Equipment readiness	Δ Equi / new version	Bake-out	Δ Bake-out / new version	Comments
MKI.A5L2 ↔ D5L2	Last MKI wk.21	+1	wk. 25	-1	linked with cool-down of sector 12
C4L2	TCTP (wk. 22)	+2	wk. 27	+2	Delay of production at CINEL
B4L2	TDI (wk. 27)	+10	wk. 28-29	+8	Pb with NEG coating after bake-out
A1L2	MBWMD (ALICE)	-5	wk. 28		
A4R2	TCTP (wk. 22)	+2	wk. 25	+4	Delay of production at CINEL + resources leveling

- **Access commissioning- No access from mid arc to mid arc**
  - 20<sup>th</sup> June
  - 4<sup>th</sup> July

# LHC – P2 → P3

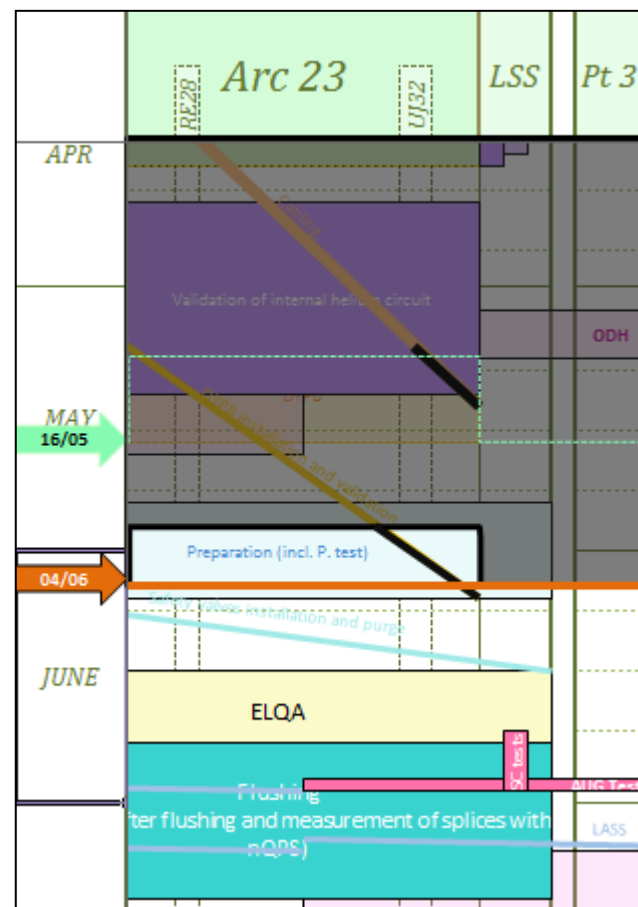


## • Arc 23

- DYPB transport **done**
- New Wfip repeater **done**
- Pressure test **just done**
- Leak status
  - Suspicion on A23R2 (residual  $3 \cdot 10^{-7}$ ), will be repaired after pressure test - Leak localisation from 10th June afternoon (wk24)
  - External leak on jumper 25R2
- ELQA on wk. 26 & 27 (1 wk delay w.r.t new schedule)

## • LSS3

- Raising pump consolidation in progress
- Access commissioning- No access from mid arc to mid arc - July 04<sup>th</sup>





# LHC - P3 → P4

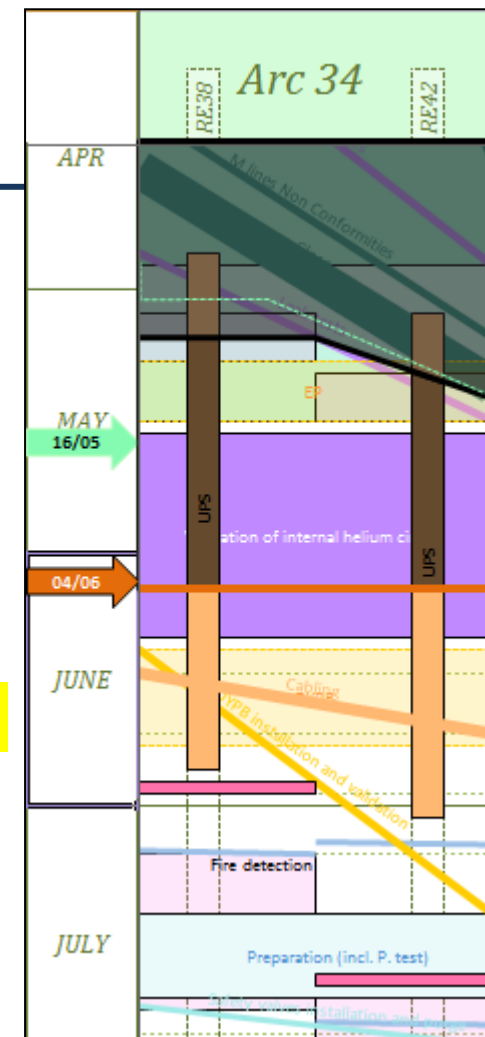
## • Arc 34

- W leak test in progress: 8 done – 6 being tested (/14)
- UPS replacement in progress

## • LSS4 & P4

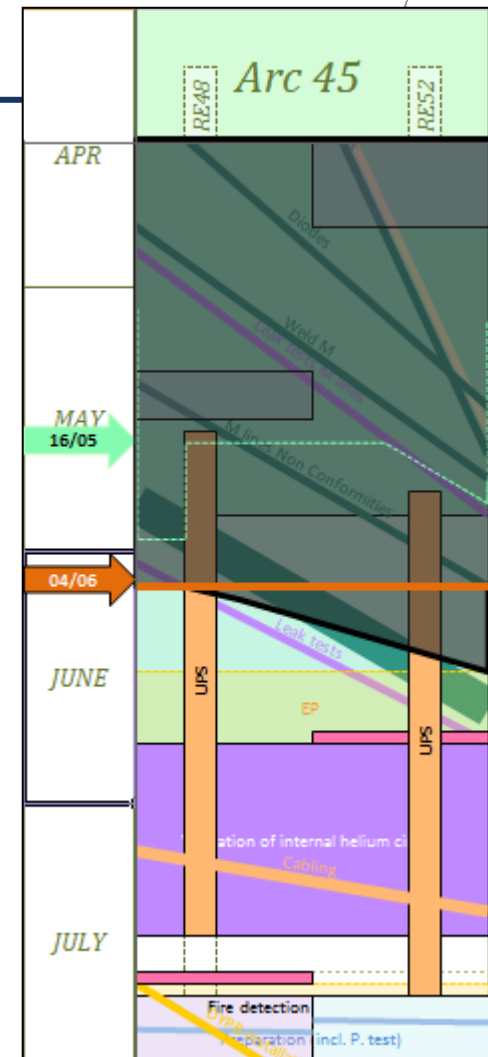
- SF and UW, cryogenic, RF maintenance in progress
- R2E cabling campaign in progress
- Access commissioning- No access from mid arc to mid arc - July 04<sup>th</sup>
- Around vacuum
  - A6R4: BCT being installed

Sectors	Equipment readiness	Δ Equi / new version	Bake-out	Δ Bake-out / new version	Comments
B7L4	BGV (wk.27)	+3	wk. 30	+2	unforeseen additional post-production steps - 1 week gained
E5L4	BWS (wk. 31)	+13	wk.34	+13	Leak discovered on wk.14 due to impurities on material - Last chance, After cool-down is starting scratches on the sealing surfaces & leaky feedthrough -> preparation of the spare window flanges & repair of broken feedthrough in
D5L4	BGIs (wk. 20) - BSRTM (wk. 18-19)	+3, +2	wk. 22	+1	scratches on the sealing surfaces & leaky feedthrough -> preparation of the spare window flanges & repair of broken feedthrough in
D5R4	BSRT (wk. 20) - BGI (wk. 25)	+4, +6	wk. 27	+3	scratches on the sealing surfaces & leaky feedthrough -> preparation of the spare window flanges & repair of broken feedthrough in
E5R4	BQS (wk. 26) - BWS (wk. 31)	+9, +13	wk. 34	+13	BQS: re-assembly more challenging than expected (damages threads, jammed connectors- Last chance, After cool-down is starting
A6R4	BPLX ( wk. 15) - BCTD (wk. 23) - BCTRFB (wk. 23)	+3, +3, +3	wk. 26	+3	Late delivery of components
A7R4	BQS (wk. 20)	+4	wk. 23	+2	BQS: re-assembly more challenging than expected



# LHC – P4 ➡ P5

- **Arc 45**
  - SMACC
    - M leak test **complete**
    - Closure ~80%
    - W leak tests: 3 being pumped
  - DFBAs consolidation **complete**
  - UPS replacement **in progress**



# LHC – P5

## • LSS5:

- Vacuum work in stand-by (waiting for TCTP and TOTEM)
- Survey and alignment of Inner Triplets in progress
  - Waiting for ABP and MSC answers
- Installation of new WCC on DFBLD **done** (Totem-Alfa)
- Short circuit test w.25
- 600A IST in progress
- New cabling campaign from next week

## • R2E – P5

- Safe room
  - Ventilation being installed
- Fire detection installation in progress– No access wk.26
- RR57 shielding in progress
- Commissioning will start wk. 27

Sectors	Equipment readiness	Δ Equi / new version	Bake-out	Δ Bake-out / new version
A6L5	XRP (wk. 25)	+6	wk. 28	+2
B4L5	TCTP (wk. 29)		wk. 32	
B4R5	TCTP (wk. 26)	+2	wk. 28	+1
A6R5	XRP (wk. 24)	+2	wk. 28	+3
E5L6			wk. 21	+1
A4L6	TCSP - TCDQ - BPM		wk.31	+15
A7L8	DFBA (wk. 20)	+4	wk. 22	+2
A5L8	MCWBH		wk. 26	+6
A4L8	TCTP (wk. 23) - BTVST	-	wk. 26	
A1R8			Nov.	
B4R8	TDI (wk. 28)	+8	wk.30-31	+7
C4R8	TCTP (wk. 16) - BTVST		wk. 21	+2
MKI.A5R8 - D5R8	Last MKI (Wk. 35)	+4	wk. 39	+3

# LHC – P5 ➔ P6



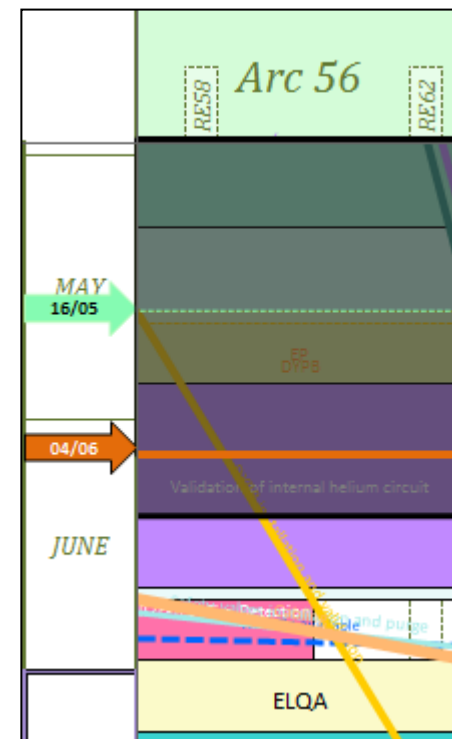
## • Arc 56

- Leak hunting
  - DFBAK leak between HCM and LCM on DFBAK, on external envelop, treated after the Pressure test.
  - DFBAK Internal leak on LCM, header C, leak @  $4 \cdot 10^{-7}$  mbar l/sec; being investigated if a 2<sup>nd</sup> internal leak exists.
  - A31L6 internal VSC “clapet”, to be consolidated after the P test
- Pressure test wk.25 (as originally scheduled)

## • LSS6 & P6

- TCDQ IST done
- In progress
  - LBDS tests
  - Survey measurement of magnets and intermediate elements
  - PZ65 lift consolidation

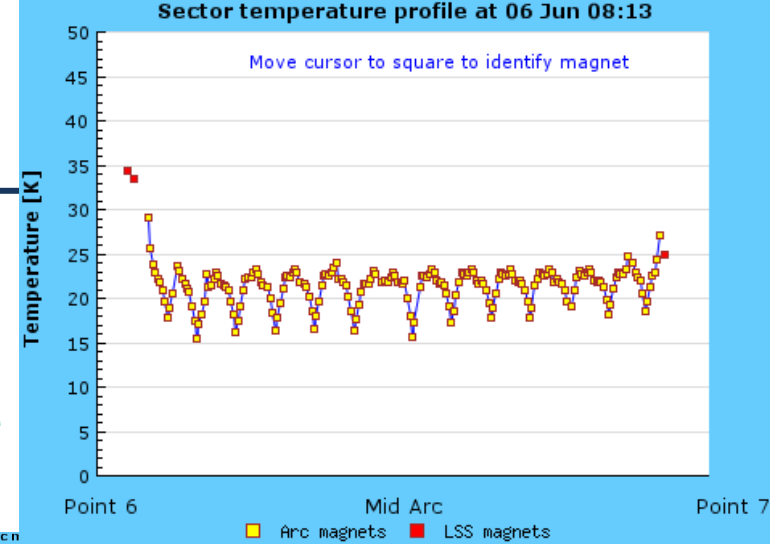
– Access commissioning no access from mid arc to mid arc June 13<sup>th</sup>



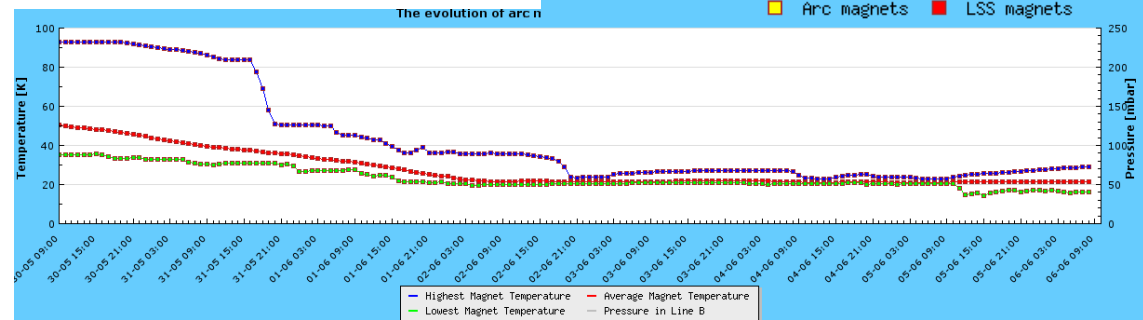
Sectors	Equipment readiness	Δ Equi / new version	Bake-out	Δ Bake-out / new version
E5L6			wk. 21	+1
A4L6	TCSP - TCDQ - BPM		wk.31	+15

# P6 ➡ P7

- **Arc 67 :**
  - Cool-down in progress - 1week ahead of schedule
  - Magnet smoothing in progress
  - CSCM wk.26-28

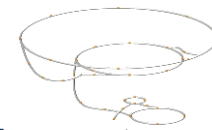


- **LSS7**
  - Collimation commissioning
  - Chilled water pipe removal in progress
  - Access commissioning no access from mid arc to mid arc June 13<sup>th</sup>



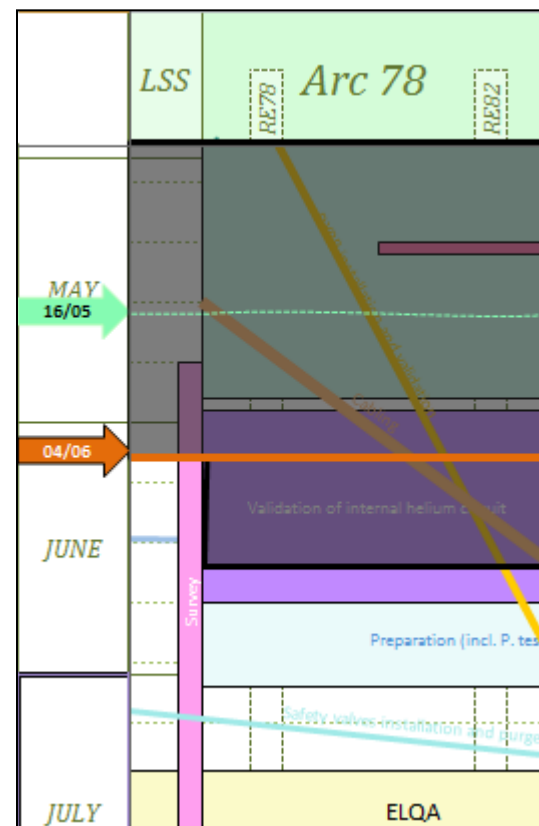
- **R2E – P7:**
  - Commissioning of equipment in progress

# LHC - P7 ➡ P8

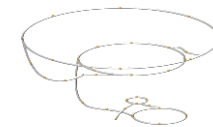


- **Arc 78**

- Short cables campaign done
- Leak status
  - Validation of the W with Helium@Pa completed by W23.
  - 1 New internal leak in A27L8 ( $4 \cdot 10^{-8}$  mbar l/s) on c'k circuit. will be solved AFTER the Pressure test
  - A11L8 being checked
  - DFBAO internal leak on related vacuum subsector
  - External leaks: the 2 external leaks on the magnet ("pied") will be repaired
- Pressure test on wk. 27 (as originally scheduled)



# LHC - P8 ➡ P1



## • LSS8 & P8

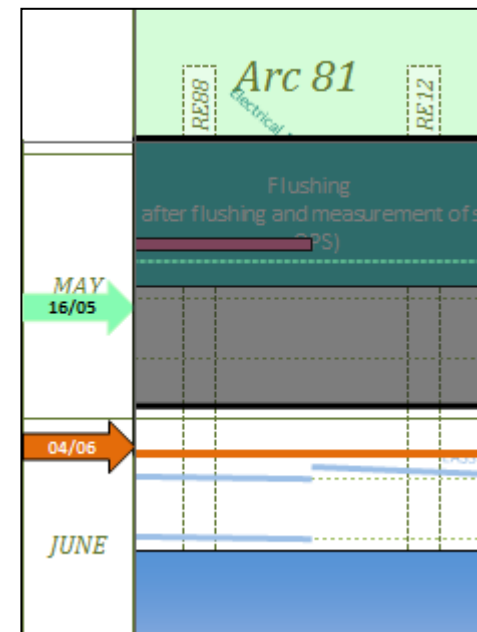
- In progress
  - LHCB cables in RBs in progress
  - Survey on Inner Triplets **done**
- Around vacuum
  - A4L8: TCTP installed

Sectors	Equipment readiness	Δ Equi / new version	Bake-out	Δ Bake-out / new version
A7L8	DFBA (wk. 20)	+4	wk.26	+2
A5L8	MCWBH		wk. 26	+6
A4L8	TCTP (wk. 23) - BTVST	-	wk. 26	
A1R8			Nov.	
B4R8	TDI (wk. 28)	+8	wk.30-31	+7
C4R8	TCTP (wk. 16) - BTVST		wk. 21	+2
MKI.A5R8 - D5R8	Last MKI (Wk. 35)	+4	wk. 39	+3

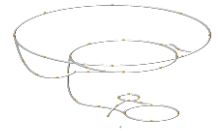
- Access commissioning no access from mid arc to mid arc June 13<sup>th</sup>

## • Arc 81

- Pressure test done
- Leaks being solved
  - 4 external leaks – repaired, being pumped;
  - 1 internal leak remaining, localization in progress
- Cool-down will start wk.26 (4 days delay)



# Marzia's Summary table



Activities	P1	Sector 12	P2	Sector 23	P3	Sector 34	P4	Sector 45	P5	Sector 56	P6	Sector 67	P7	Sector 78	P8	Sector 81
CRYO lockout Status		UNLOCKED		UNLOCKED		LOCKED		LOCKED		UNLOCKED		UNLOCKED		UNLOCKED		UNLOCKED
SMACC completed		Done		Done		W24		w29		W23		Done		W25		Done
P test		Done		W23		W29		W31		W25		Done		W27		Done
Leak loc.		W21-22-23		W24		W29-30		W31		W25-26		Done		W27		Done
Purge		W23		W25		W30-31		W31-32		W26		Done		W28		Done
ELQA		W24-25		W26-27		W31-32		W32-33		W27-28		Done		W28-29		Done
Flushing		TBD		W27-28		W32-33		W33-34		W28-29		Done		W30-31		Done
ELQA + nQPS		TBD		W28		W33-34		W35		W30		Done		W31-32		Done
Non Conf		From W25		W29-30-31		W34-35		W35-36		W30-31-32		Done		W32->34		W22->25
Start of cryo system			W19-> W22				W28-29				Done				Done	W26
Cool Down start		W29 - TBC		W31		W35		W36		W33		Done		W34		W32-> 34
CSCM												W26-> 28				W23->24
CPC6		Done		Done		W21->23		W25-26		Done		Done		Done		
R2E Completed	W25 (1L); W27 (1R)						W27		W32				W24		Done	
SCT	Done		W24		W26		W28		W25 + W30		Done		Done		L8-> W25- 26; R8-> W20-21	
UPS	Done	Done	Done	Done	Done	W18-> W25	Done	W21->W28	Done	Done	Done	Done	Done	Done	Done	Done
SF Maintenance			Done				W 23-24-25				W 43-44-45				W 48-49-50	
Survey meas.&align.		W32-> 36		W34-> 38		W39-> 43		W41->45		W36-> 40		W23->25		W46-> 50		W28->30
Powering Ph I		W37->39		W39->41		W44->46		W46->48		W41->43		W29+30		W43->45		W48+49
Powering Ph II		W40+41		W42+43		W47+48		W49+50		W47+48		W33->35		W44->46		W38->41
Sector test				WE 44-45								W36+37		W46+47		W42+43
DSO test																
Done																
In progress																
Coming soon																

Updated 30th May 2014  
EN-MEF-OSS  
M. Bernardini



# LHC – Vacuum status in LSS



- 82 vacuum sub-sectors concerned
  - 58 complete
  - 24 to be done (~~38%~~ → 28%)

Sectors	Equipment readiness	Δ Equi / new version	Bake-out / new version	Δ Bake-out / new version
A7L1	XRP (wk.20)	-2	wk.23	-1
A6L1	new TCL6		wk. 24	
A4L1	TCTP (wk.16) - TCLP		wk.19	
A1L1	BPM5W			
A1R1	BPM5W			
A4R1	TCTP - TCLP		wk. 17	-2
A6R1	new TCL6		wk. 25	
A7R1	XRP (wk.21)	-3	wk. 24	-3
A6L2				
ISL2				
MKL,ASL2 ↔ D5L2	Last MKI wk.21	+1	wk. 25	-1
ASL2				
C4L2	TCTP (wk. 22)	+2	wk. 27	+2
B4L2	TDI (wk. 27)	+10	wk. 28-29	+8
A4L2				
B1L2				
A1L2	MBWMD (ALICE)	-5	wk. 28	
A1R2				
A4R2	TCTP (wk. 22)	+2	wk. 25	+4
ASR2				
A7L3				
BSL3	TCAPD		wk. 15	-3
ASL3				
A4L3				
IP3				
ASR3				
BSR3	TCAPD		wk. 15	-3

Sectors	Equipment readiness	Δ Equi / new version	Bake-out / new version	Δ Bake-out / new version
C47L4				
B7L4	BGV (wk.27)	+3	wk. 30	+2
A7L4				
ESL4	BWS (wk. 31)	+13	wk.34	+13
D5L4	BGLs (wk. 20) - BSRTM (wk. 18-19)	+3, +2	wk. 22	+1
BSL4	APWL			
IP4				
ASR4	ACGSA			
BSR4				
DSR4	BSRT (wk. 20)- BGI (wk. 25)	+4, +6	wk. 27	+3
ESR4	BQS (wk. 26) - BWS (wk. 31)	+9, +13	wk. 34	+13
A6R4	BPLX ( wk. 15) - BCTD (wk. 23) - BCTRFB (wk. 23)	+3, +3, +3	wk. 26	+3
A7R4	BQS (wk. 20)	+4	wk. 23	+2
A6L5	XRP (wk. 25)	+6	wk. 28	+2
ASL5				
B4L5	TCTP (wk. 29)		wk. 32	
A4L5				
A1L5	BPM5W			
A1R5	BPM5W			
A4R5				
B4R5	TCTP (wk. 26)	+2	wk. 28	+1
ASR5				
A6R5	XRP (wk. 24)	+2	wk. 28	+3

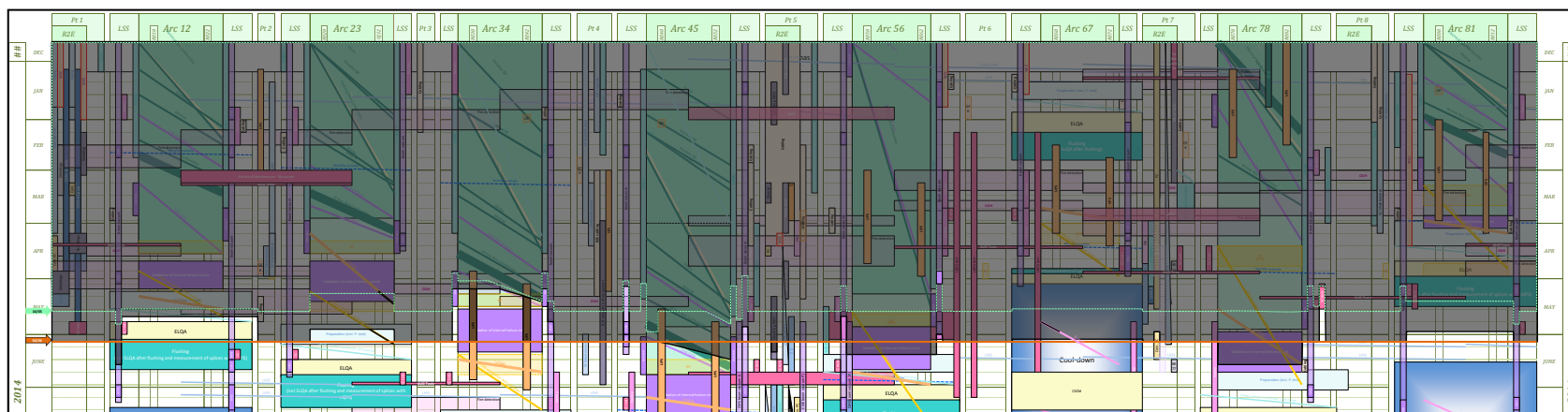
Sectors	Equipment readiness	Δ Equi / new version	Bake-out / new version	Δ Bake-out / new version
A4L6	TCSP - TCDQ - BPM		wk.31	+15
BD62	MKB			
IP6	TCDS - BPM - BTV			
BD68	MKB			
A4R6	TCSP - TCDQ - BPM		wk.16	
ASR6				
C5R6				
A6L7	Door - TCP		wk. 14	
BSL7	MQWA - TECGV (wk.14)		wk. 16	
ASL7				
A4L7	TECGH (wk.14)		wk. 17	
IP7	Door		wk. 15	
A4R7	Door - MCBWV		wk. 15	
ASR7				
BSR7				
A6R7	Door - TCP		?	
A7R7				
A7L8	DFBA (wk. 20)	+4	wk.26	+2
A6L8				
ASL8	MCWBH		wk. 26	+6
A4L8	TCTP (wk. 23) - BTVST	-	wk. 26	
A1L8				
A1R8			Nov.	
A4R8				
B4R8	TDI (wk. 28)	+8	wk.30-31	+7
C4R8	TCTP (wk. 16) - BTVST		wk. 21	+2
ASR8	BTVE0 - BTVE1			
MKL,ASR8 - D5R8	Last MKI (Wk. 35)	+4	wk. 39	+3
ISR8	BTVE1			
A6R8	BTVE5			
A7R8				

# Conclusions



- Injectors
  - PSB & PS back to OP
  - LEIR & AD hardware test in progress
  - SPS: leak on QDA to follow
- LHC
  - SMACC almost completed !!
  - LHC entering in tests phase – Beware of access constraints

**SO FAR SO GOOD**



# LHC overall progress

