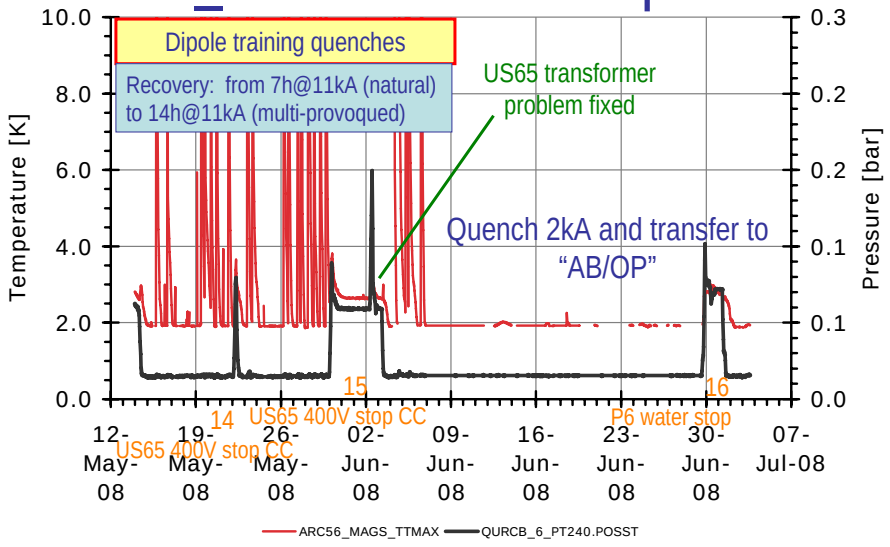
LHC Cryogenics

- Sectors with powering activities (56-78-81-23-67)
- Sectors with cryo tuning (34-12)
- UX85 phase 1 for cryo electronics
- Few facts for stand-alone magnets

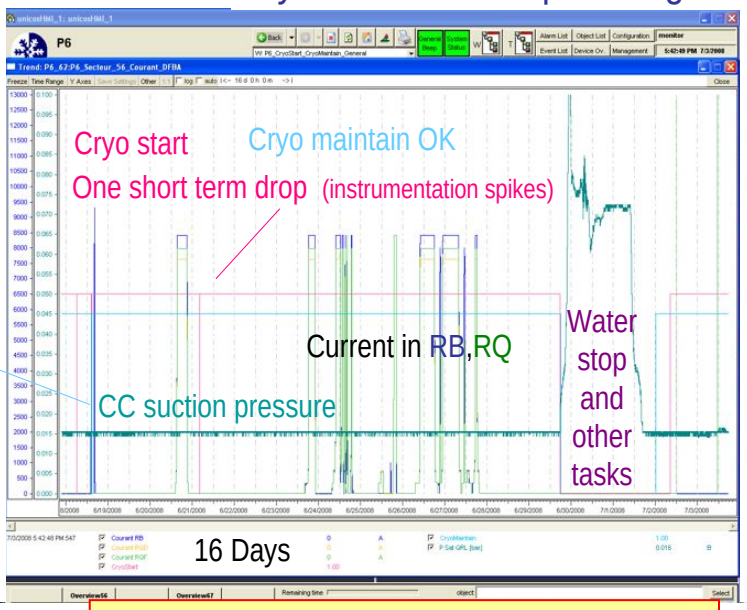
S. Claudet,
on behalf of LHC Cryogenics

LHC_56: from HWC to operation



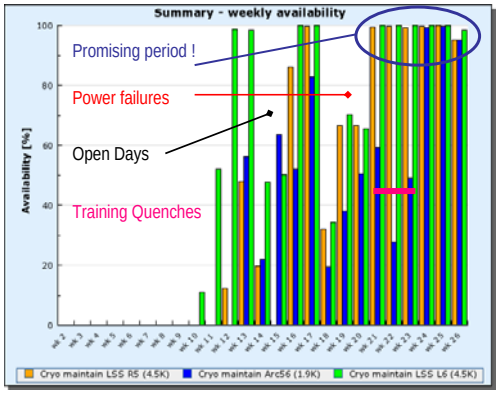
Close to four weeks stable !!!

Cryo conditions for powering ARC_56



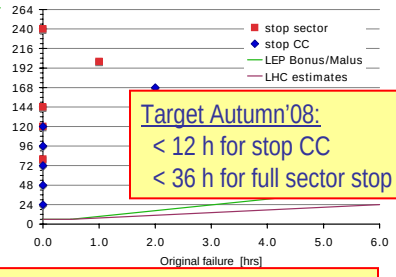
10 days of powering without cryo intervention !

Downtime - Availability



sector 56

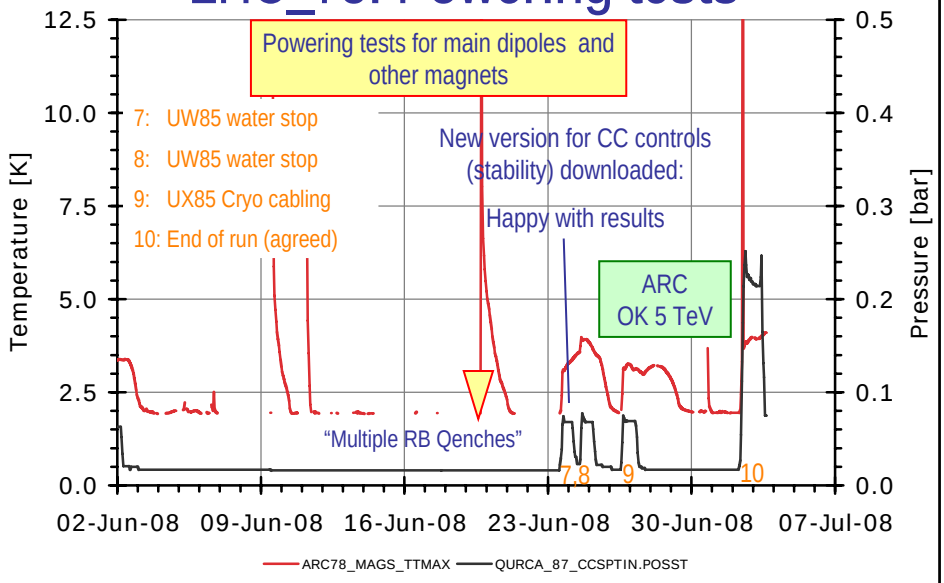
		origin (hrs)			stop (hrs)
1	29-Feb-08	Elec	2.0	Stop 400V (Pb AUG loop)	stop CC	168
2	12-Mar-08	Cryo	0.0	Controls CC (AL)	stop CC	not applicable
3	14-Mar-08	Cryo	48.0	Leak in 18kW Cold Box	stop CC	240
		Cryo		Controls CC (AL)	stop CC	not applicable
		Cryo		Stop 18kW Comp. (LS oil)	**stop entire sector**	not applicable
		Water		Stop 400V P5 (water)	partly blind	not applicable
		Cryo		Stop 18kW Comp. (LS oil)	**stop entire sector**	not applicable
		Elec	0.0	Low 400kV	stop CC	96
		Elec	0.0	CERN 400kV failure	**stop entire sector**	120
		Elec		US65 400V stop	stop CC	not applicable
		Elec		US65 400V stop	stop CC	not applicable
		Elec		US65 400V stop	stop CC	not applicable
		Elec	0.0	24 VDC power unit down	**stop entire sector**	80
		Elec	0.0	US65 400V stop	stop CC	24
		Elec				
		Water				



Target Autumn'08:
< 12 h for stop CC
< 36 h for full sector stop

⇒ Rather good availability already a few weeks after 5 TeV qualification
⇒ Failure rates of services to be improved
⇒ Cryo recovery time to be improved with more robust automation

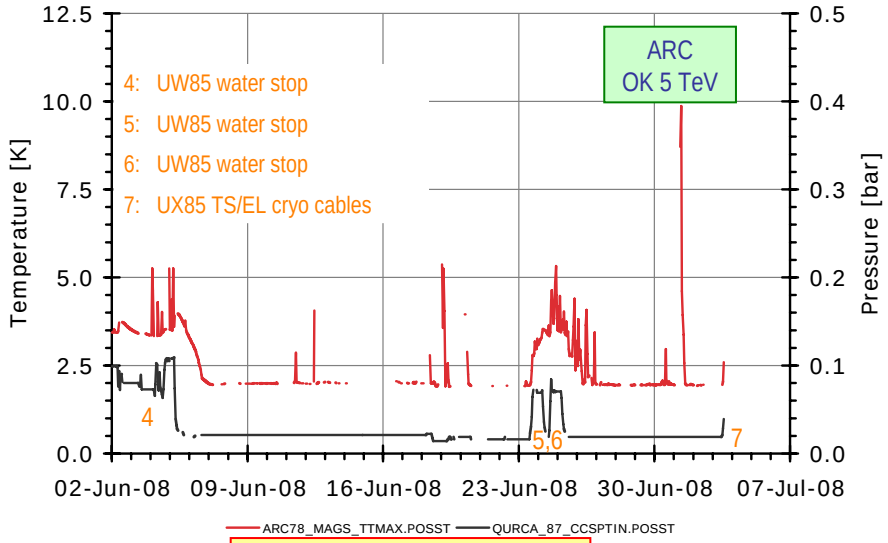
LHC_78: Powering tests



SC - 04Jul'08

LHC Cryogenics - Status for ICC

LHC_81: Powering tests

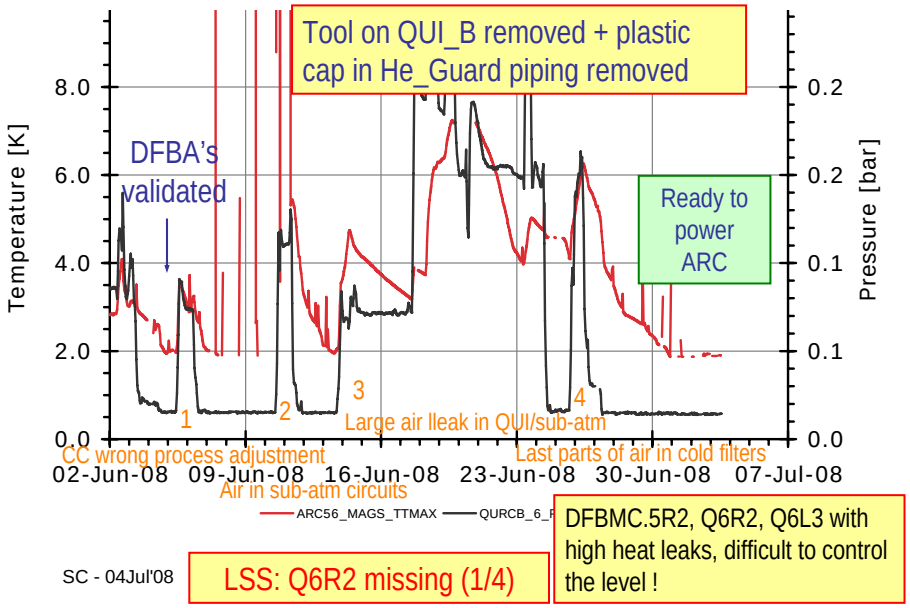


SC - 04Jul'08

LSS: Only Q5_R8 released

LHC Cryogenics - Status for ICC

LHC_23: Getting air out



SC - 04Jul'08

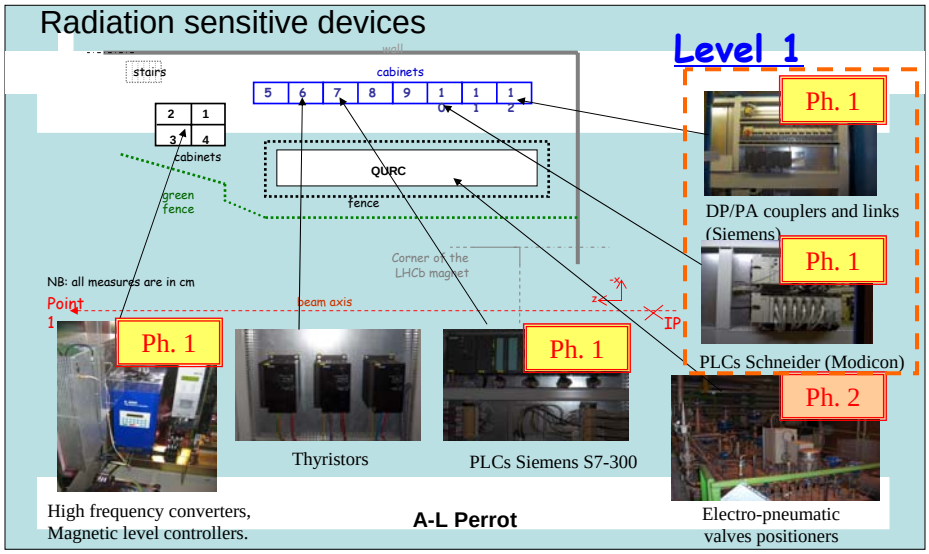
LSS: Q6R2 missing (1/4)

DFBMC.5R2, Q6R2, Q6L3 with high heat leaks, difficult to control the level !

Other activities

- 6-7: Entire sector delivered for HWC next week (wk 27)
- 3-4: Now with all instrumentation required to manage pump-down
  Delicate to cool-down DFB's due to NC from Cryo & MEI
  => Cryo tuning done, with some NC to be terminated for stand-alones
  => Doubts for a heat-exchanger pipe NC (Y line 23-25 L4)
- 1-2: Cryo tuning of instrumentation
- 4-5: Preparing LHe filling for next week (wk28)

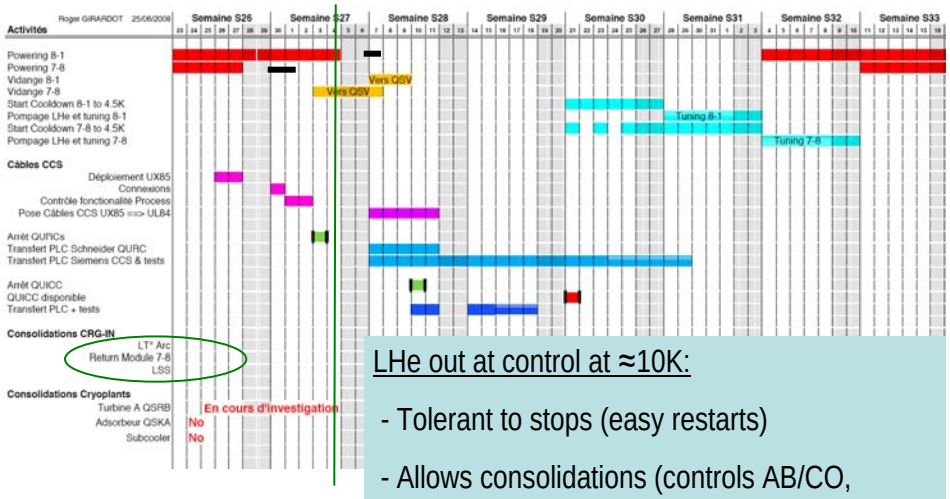
UX85 Cryogenics Installation



SC - 04Jul'08

+ QUI Ph1: PLC incl I/O cards + DP/PA

UX85 Phase 1: schedule



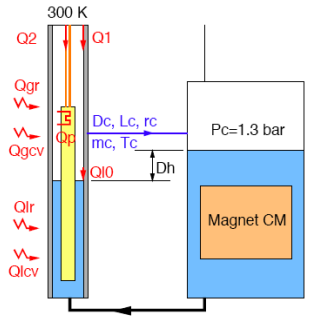
LHe out at control at ≈10K:

- Tolerant to stops (easy restarts)
- Allows consolidations (controls AB/CO, Instrumentation, Level gauges ?)

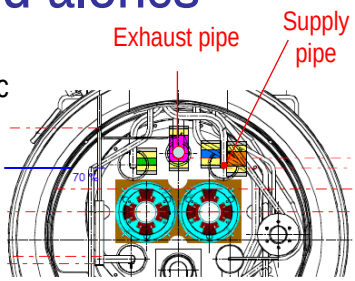
SC - 04Jul'08

LHC Cryogenics - Status for ICC

LHe level for stand-alones



- Dh due to mc, Dc
- Too short range to allow control of level!
- Possible difference in behaviour

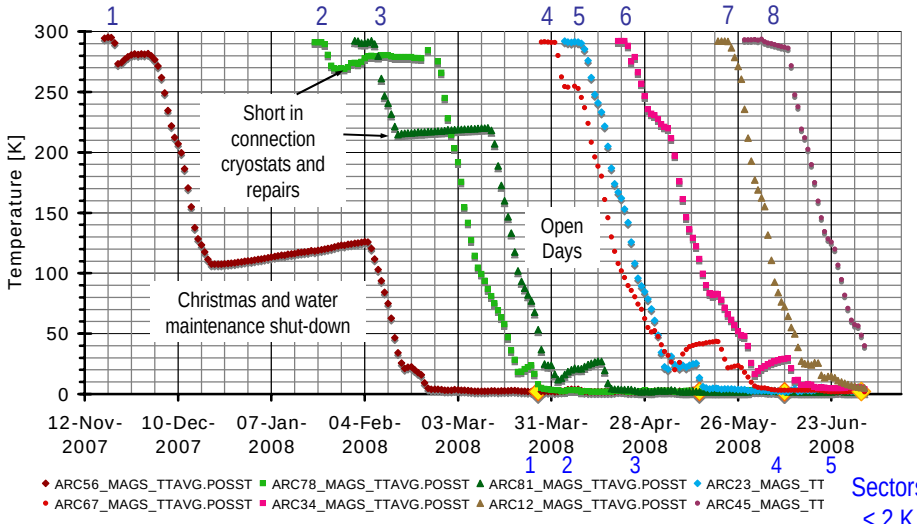


Risk of filling instabilities & over-filling in nominal & degraded conditions !

Complete presentation to be made at next MaRiC by L. Tavian,

Including short term proposals (2008) and long term (shut-down)

Cool-down of LHC sectors

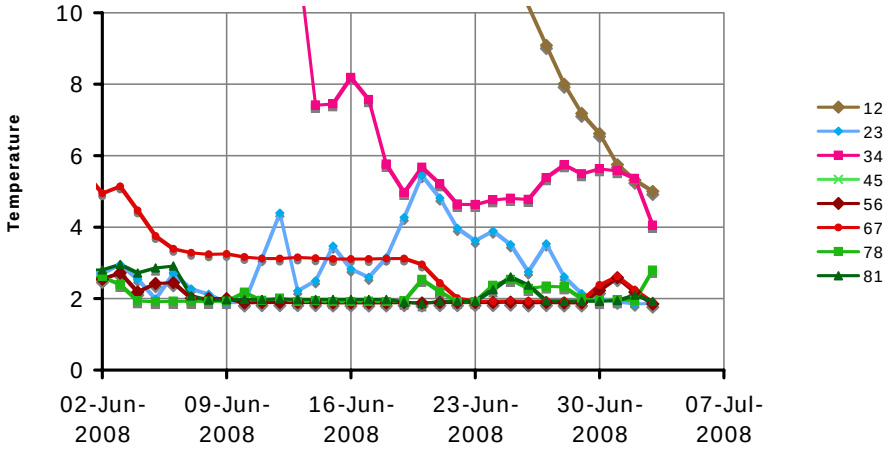


Sectors < 2 K

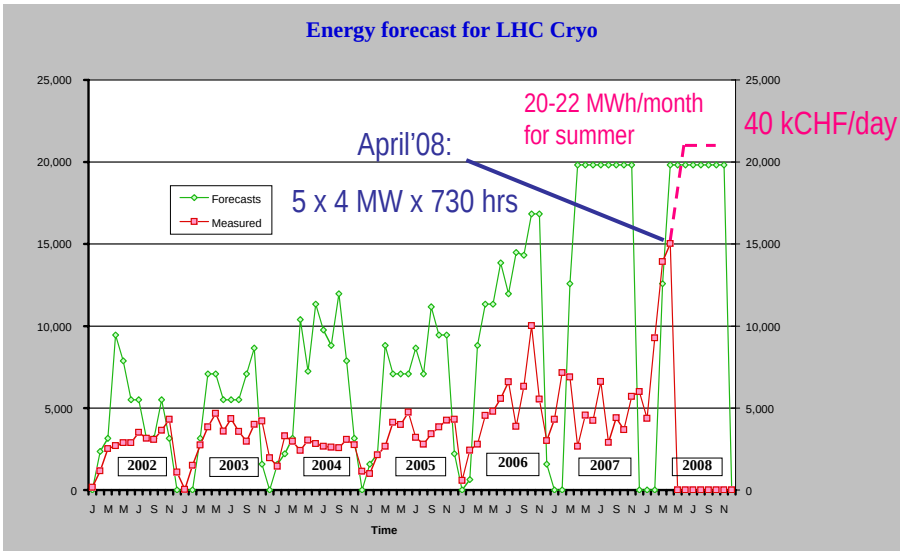
Cooling sectors + Cryo tuning + Powering activities

+ 2 < 5 K

LHC sectors: Average temperature of ARCS



Towards nominal power consumption

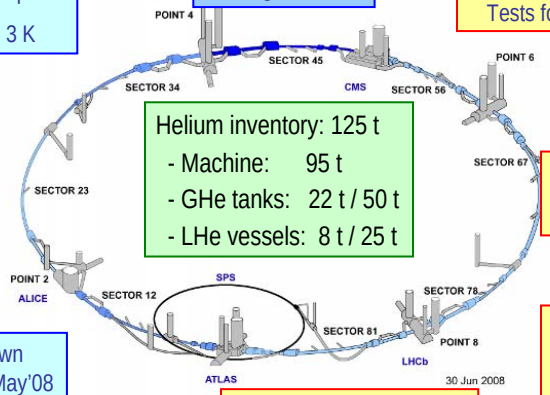


Summary LHC Cryogenics

Cool-down
Started 29May'08
Tavg ≈ 25 K

Cool-down
Started 23Apr'08
Tavg ≈ 3 K

ARC < 2 K
qualified 6 TeV
Tests for operation



Helium inventory: 125 t
- Machine: 95 t
- GHe tanks: 22 t / 50 t
- LHe vessels: 8 t / 25 t

ARC < 2 K
ELQA / QPS

ARC < 2 K
ELQA / QPS

ARC < 2 K
qualified 5 TeV
Powering tests

Cool-down
Started 22May'08
Tavg ≈ 4.5 K

ARC < 2 K
ARC qualified 5.3 TeV
Cryo tuning LSS

Intervention UX85
electronics Ph. 1 started