

26th ALICE RRB

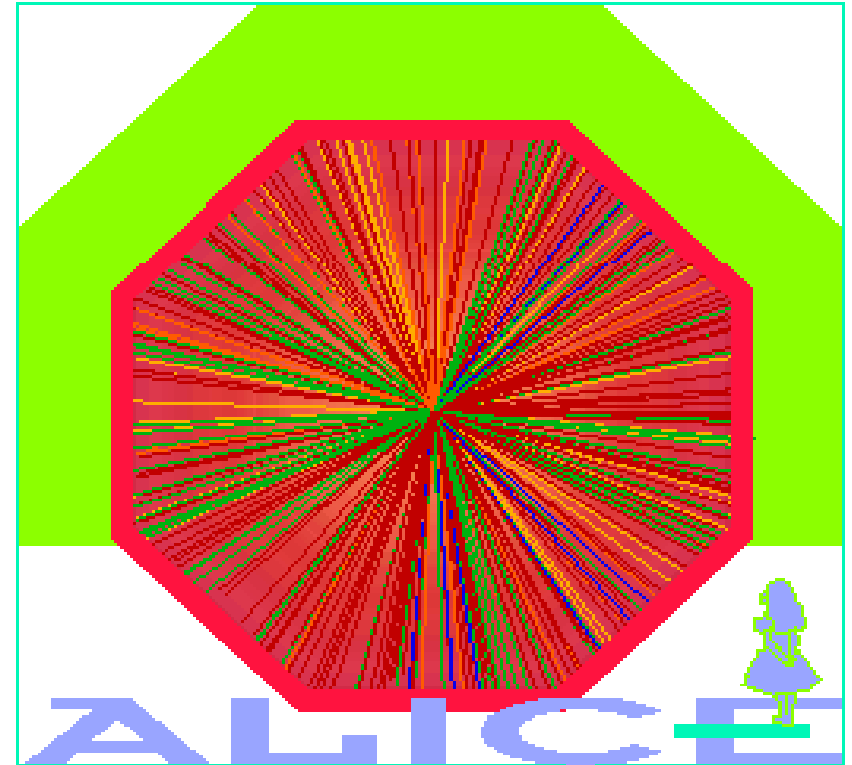
- **Collaboration News**

- **ALICE Status**

- ⇒ **Shutdown activities**

- ⇒ **Detector status**

- ⇒ **Planning**





Collaboration News



● New Institutes

⇒ No change since November (108 Institutes, 31 countries, ~ 1100 members)

● Ongoing discussions

⇒ Comsats, Pinstec (Pakistan)

Physics, computing

★ progressing but not concluded; small T2 center now working at Comsats

⇒ Egypt, Lebanon

Physics, computing

★ first contacts with 2 independent groups

● EMCAL TDR

⇒ 44 m² em jet calorimeter (US DOE Nucl Phys; France, Italy)

⇒ **Approved** by LHCC in Feb 2009

⇒ construction + installation: 2009 – 2011

● ALICE upgrades

⇒ more formal internal organization, coordinated by P. Giubellino (Deputy SP)

★ first upgrade WS in March '09, ranging from 'conceptual ideas' to 'detector R&D' results

★ mostly aiming for upgrades in 2013/14 (LHC phase I) or 2016/17 (LHC phase II)



Shutdown Activities



- ALICE in shutdown mode since mid October 2008
 - ⇒ re-arrange cabling on mini-frame (ITS,TPC) to allow better access to electronics
major activity, requiring > 6 months of work both underground & surface
 - ⇒ detector and infrastructure consolidation
TPC capacitors; recover some ITS modules, improve SPD cooling, ...
 - ⇒ detector installation (TRD, EMCAL, PHOS, PMD,) ...
3 PHOS, 6-7 TRD modules, 2-4 EMCAL modules, complete PMD
 - ⇒ add capacity to DAQ (40% -> 100%) and HLT (20% -> 60%)
 - ⇒ improve experiment control and operation (DCS, ECS systems)
- Analysis of beam and cosmic data taken in 2008
 - ⇒ check detector performance, alignment & calibration
- Restart commissioning and cosmic data taking
 - ⇒ first 2 week cosmic run of muon spectrometer in March



ALICE Detector Installation mid 2008



Complete:

ITS, TPC, TOF, HMPID,
FMD, T0, V0, ZDC,
Muon arm, Acorde

Partial installation:

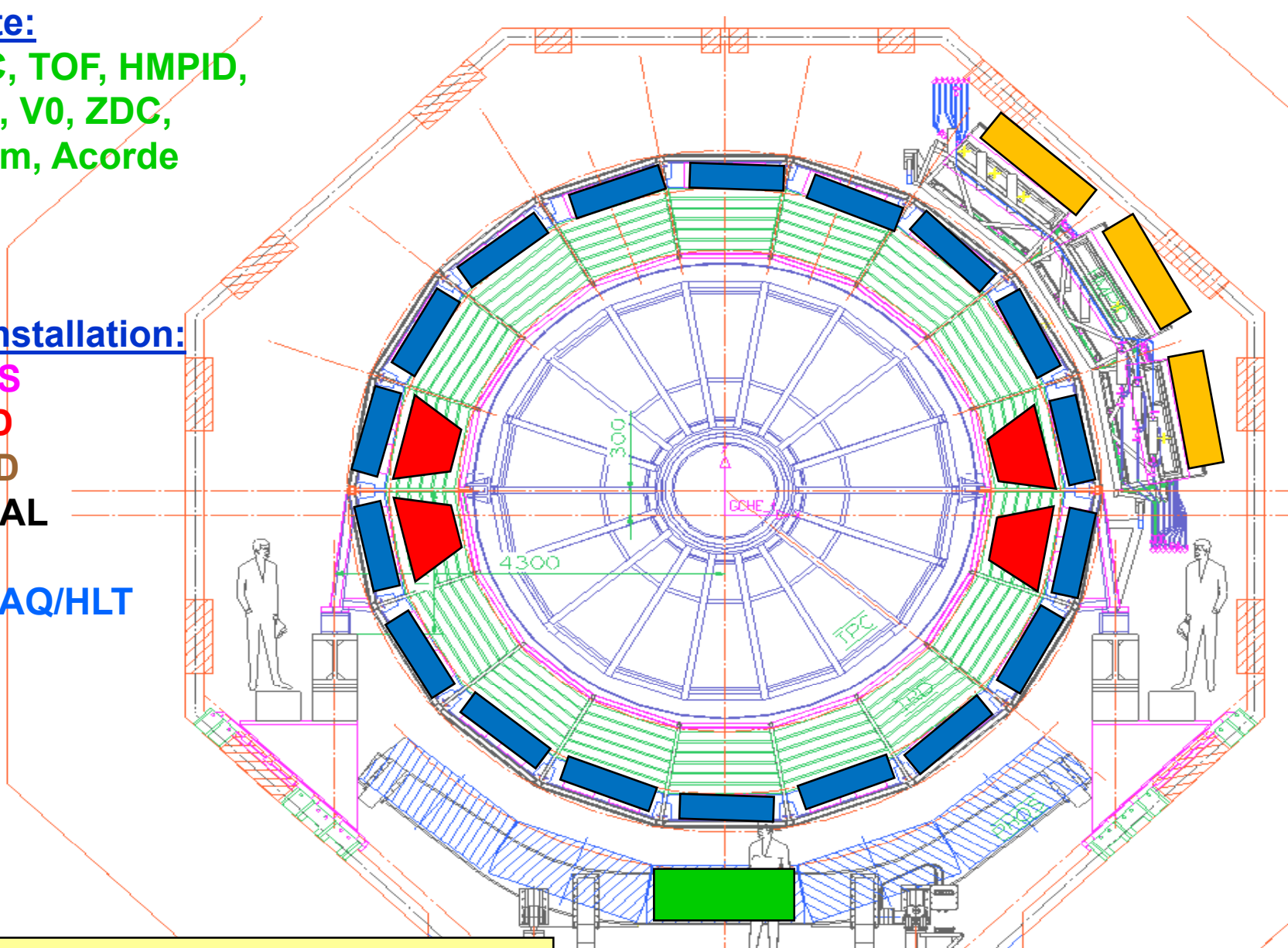
1/5 PHOS

4/18 TRD

9/48 PMD

0/6 EMCAL

~ 40% DAQ/HLT



Installation targets met by mid 2008



ALICE Detector Installation Goal 2009



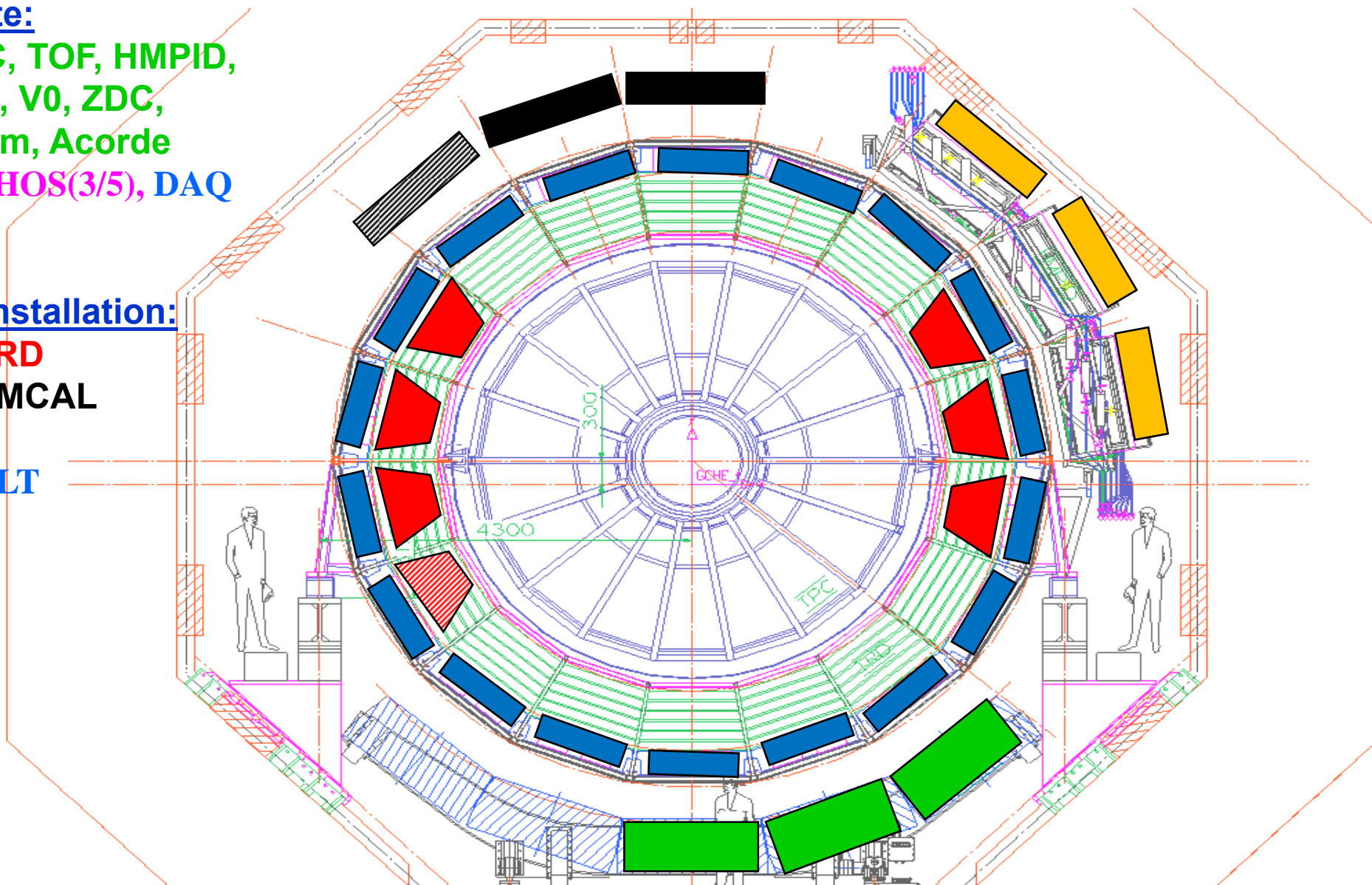
Complete:

ITS, TPC, TOF, HMPID,
FMD, T0, V0, ZDC,
Muon arm, Acorde
PMD , PHOS(3/5), DAQ

Partial installation:

6-7/18 TRD
2-4/12 EMCAL

~ 60% HLT



Number of TRD & EMCAL modules depends on access conditions during LHC power test !



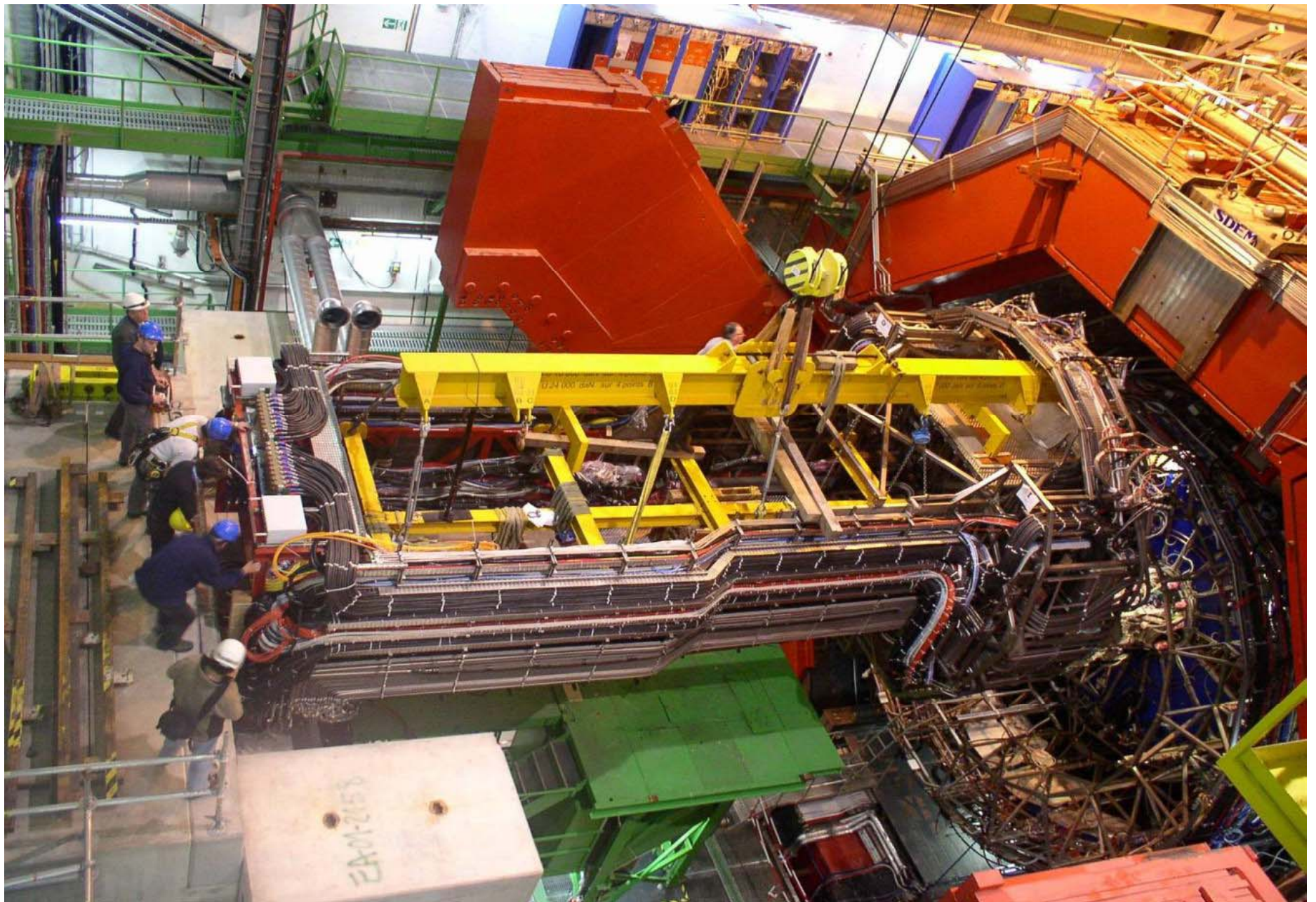
Miniframe Recabling



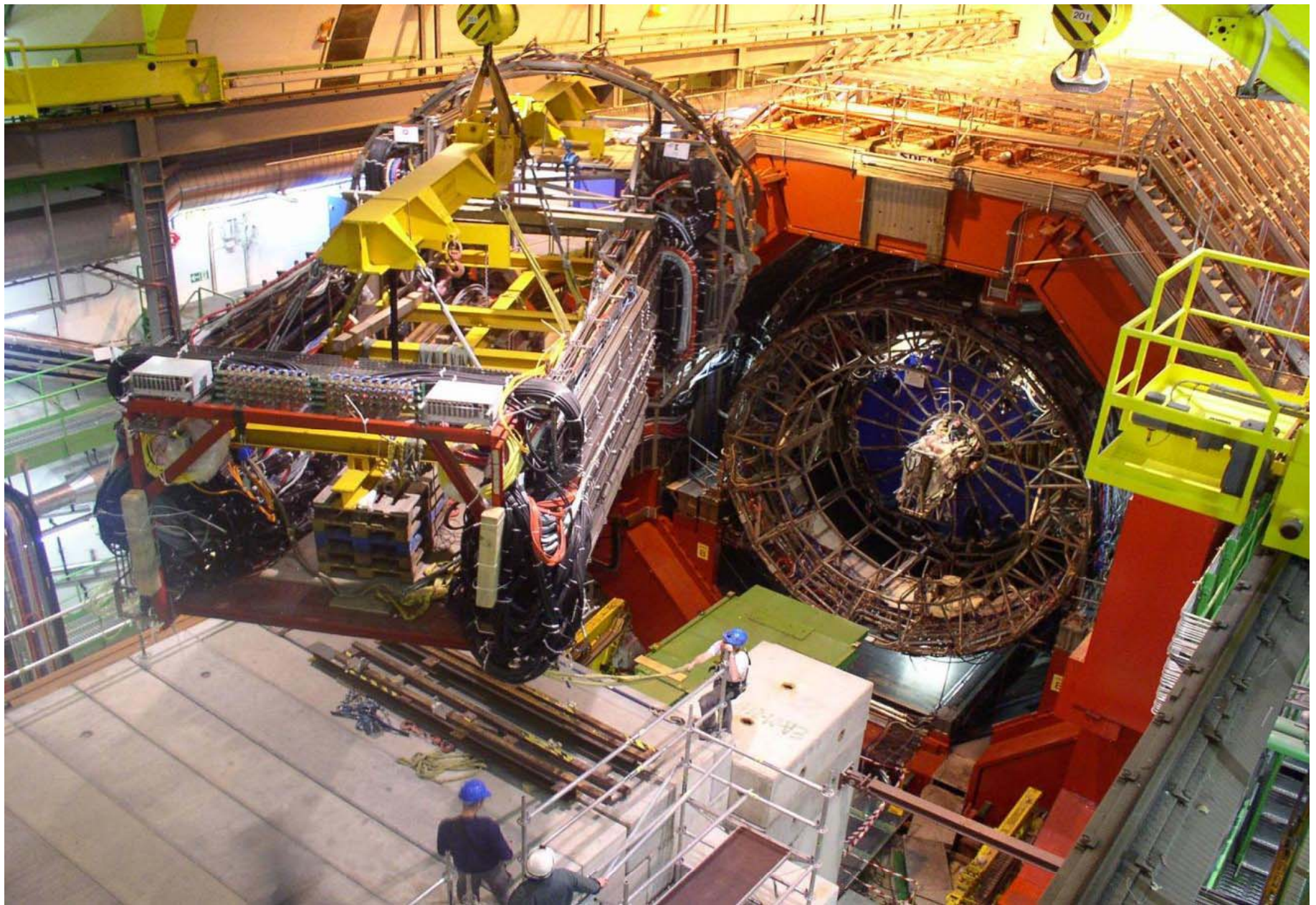
needed to improve access
to TPC FEE



10.08: Removal of shielding and ventilation ducts



12.11.08: Removal of miniframe (after extensive uncabling)

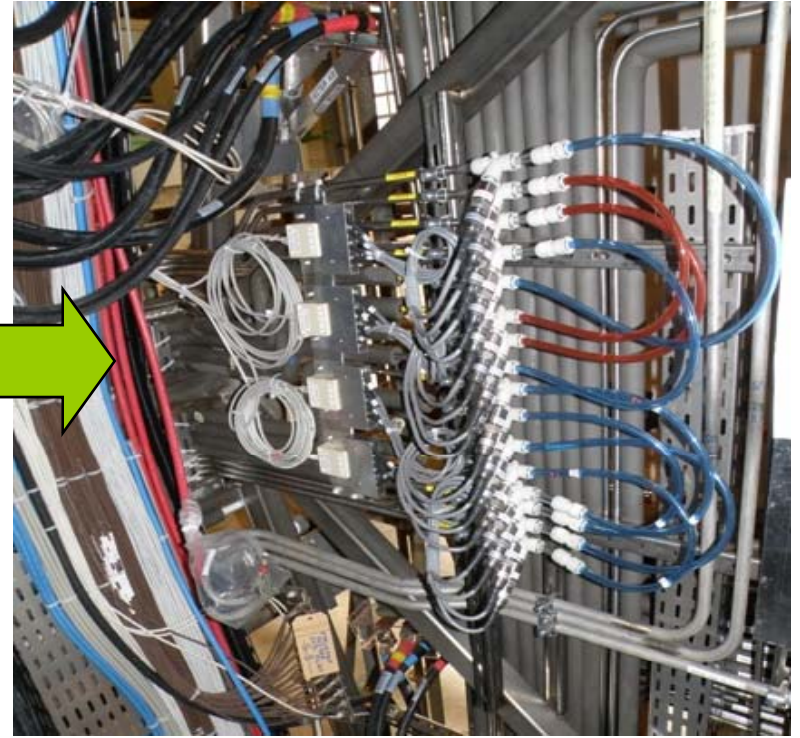


12.11.08: Lifting of miniframe to surface

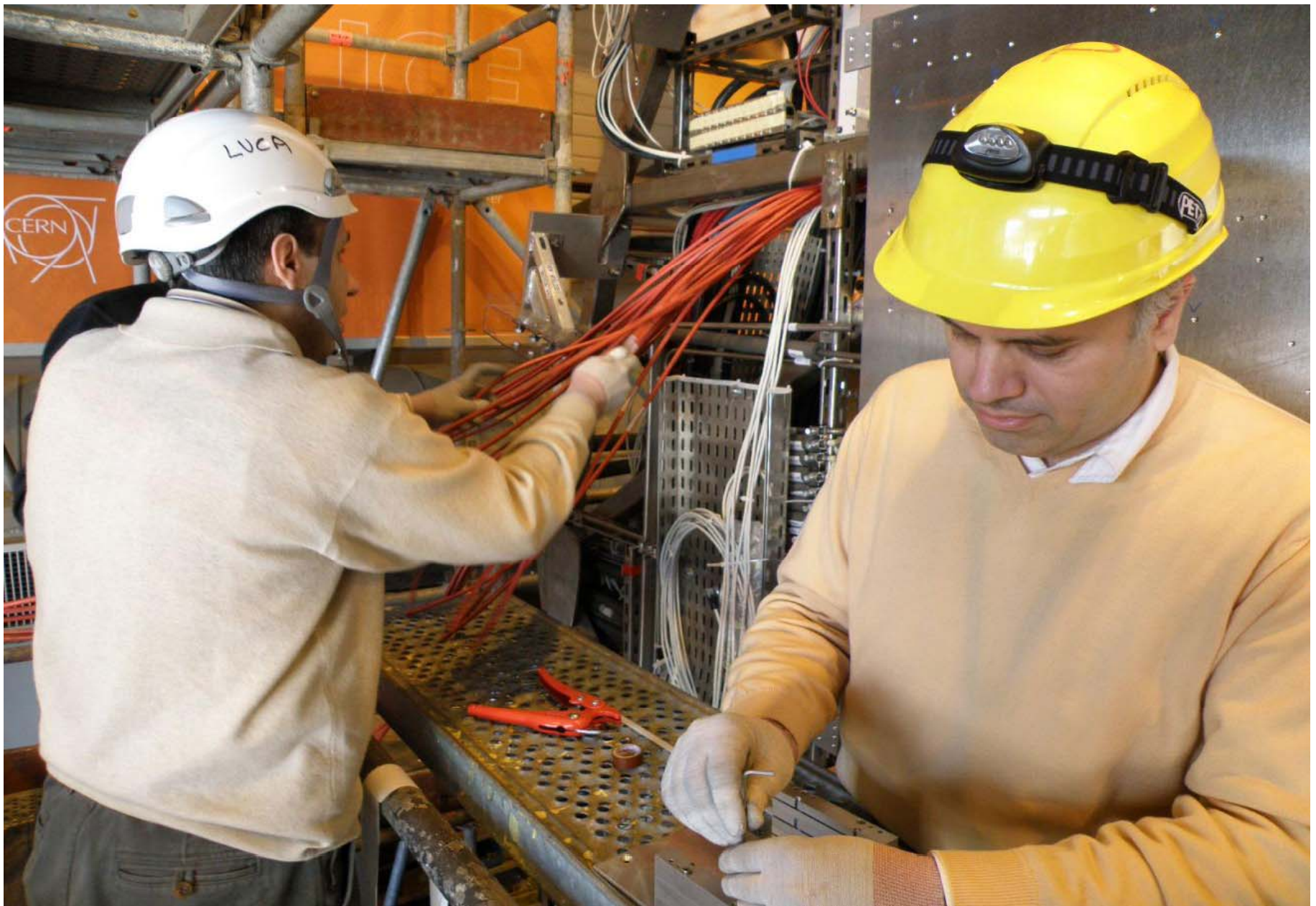
This part to be changed to create 40 cm of space between miniframe and TPC electronics



13.11.08: Miniframe sitting in SX2. Installation of the scaffolding to prepare recabling



Jan 09: Re-routing of SSD cooling pipes on miniframe



19.3.09: SDD cabling sectors 0-1 (MNF)



Infrastructure Consolidation



● Some examples

⇒ **primary electricity distribution**: circuit breakers (LEP legacy)

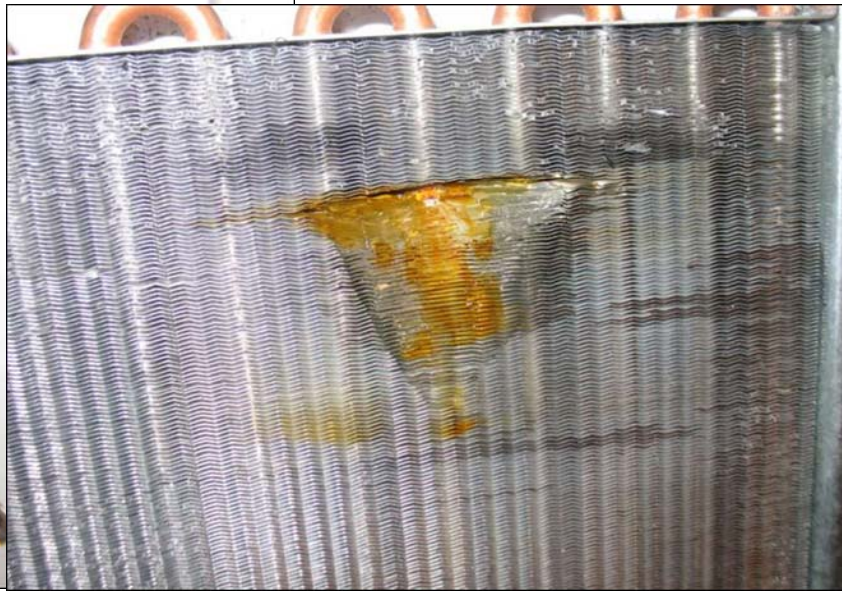
★ preventive maintenance to ensure reliable remote operation

⇒ **rack ventilation turbines** (problem in all 4 experiments)

★ vibration -> noise -> mechanical failure

★ one turbine disintegrated -> cut heat exchanger -> inundated & damaged electronics

★ all turbines are being exchanged





Transition Radiation Detector (TRD)



● Detector status

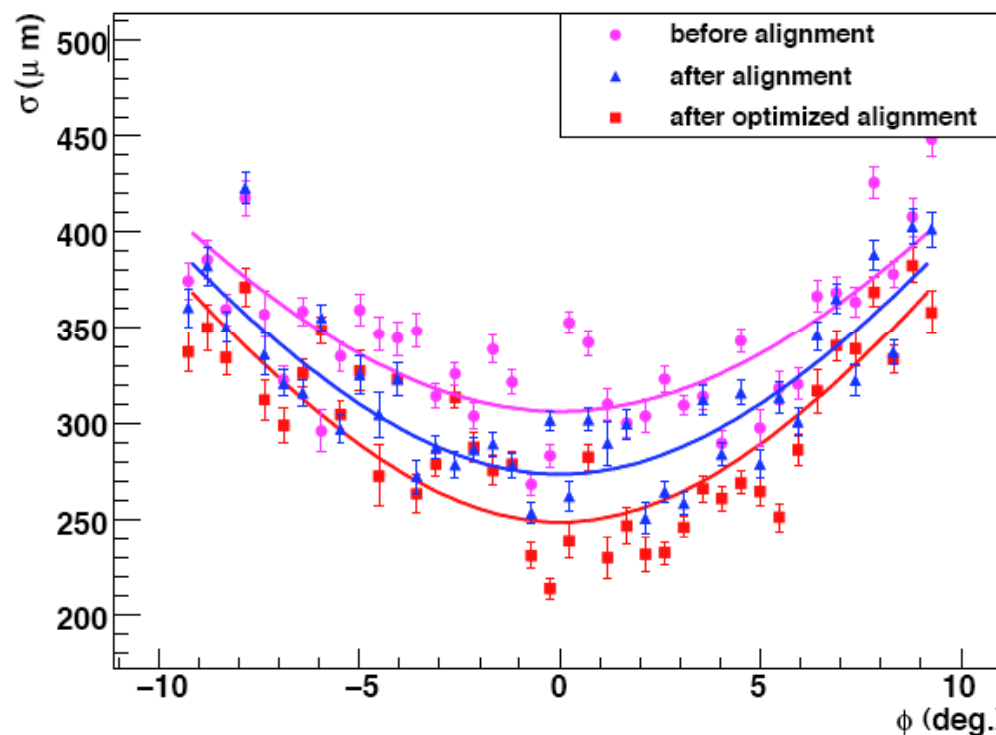
- ⇒ Chamber production **completed** (working on spares)
- ⇒ Electronics production **about to be resumed** (yield problems identified)
- ⇒ 2 'leaky' super-modules **repaired**

● Installation status

- ⇒ 5 SM's installed
- ⇒ 2 additional SM's **ready** for June/August
- ⇒ **remaining** 11 SM's ready for next **WS 2010**

● Commissioning

- ⇒ TRD L1 **trigger working** and used in 2008
- ⇒ **alignment, calibration, track matching** with TPC ongoing





Electromagnetic Calorimeter (EMCAL)



- **Detector status:**

construction started early 2008

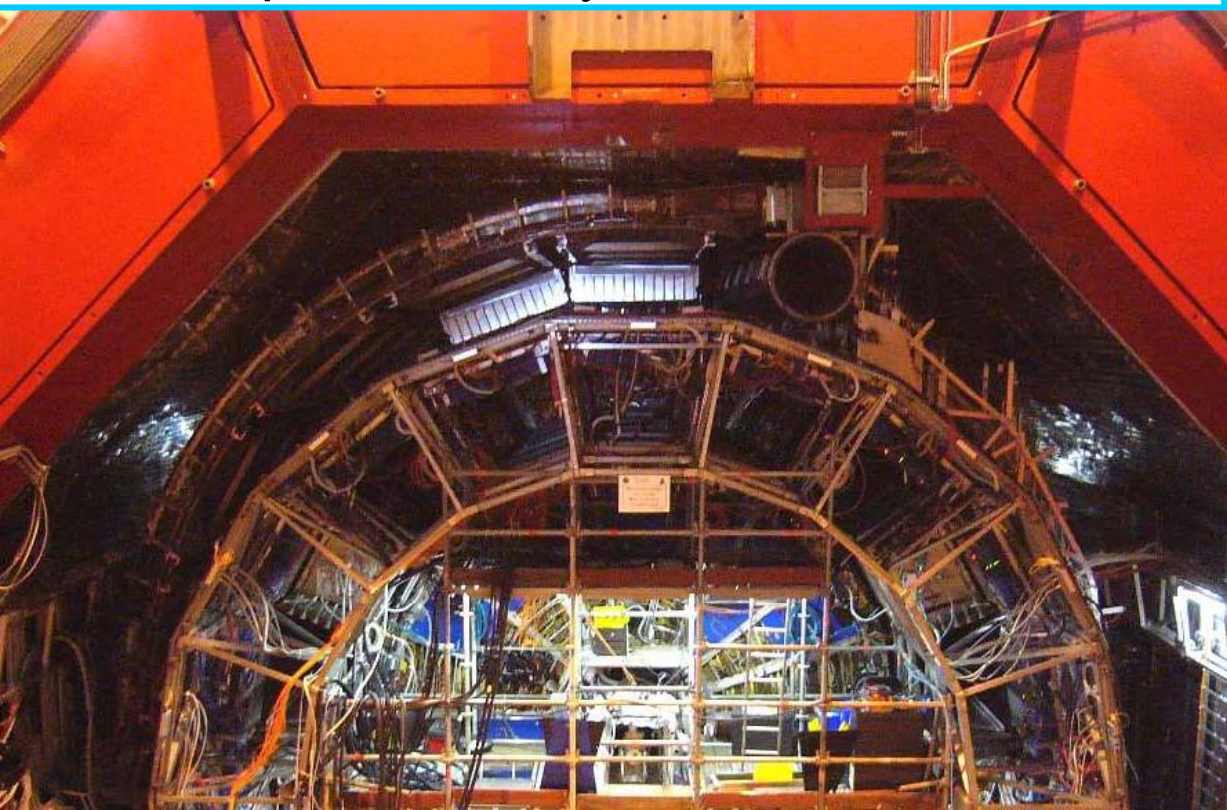
⇒ production in US and EU at full capacity and on (actually slightly ahead of) schedule

- **Installation schedule**

⇒ 2 (of 12) SM's assembled, calibrated with cosmics and installed (May)

⇒ 1-2 more SM at CERN end June

⇒ end of production early 2011

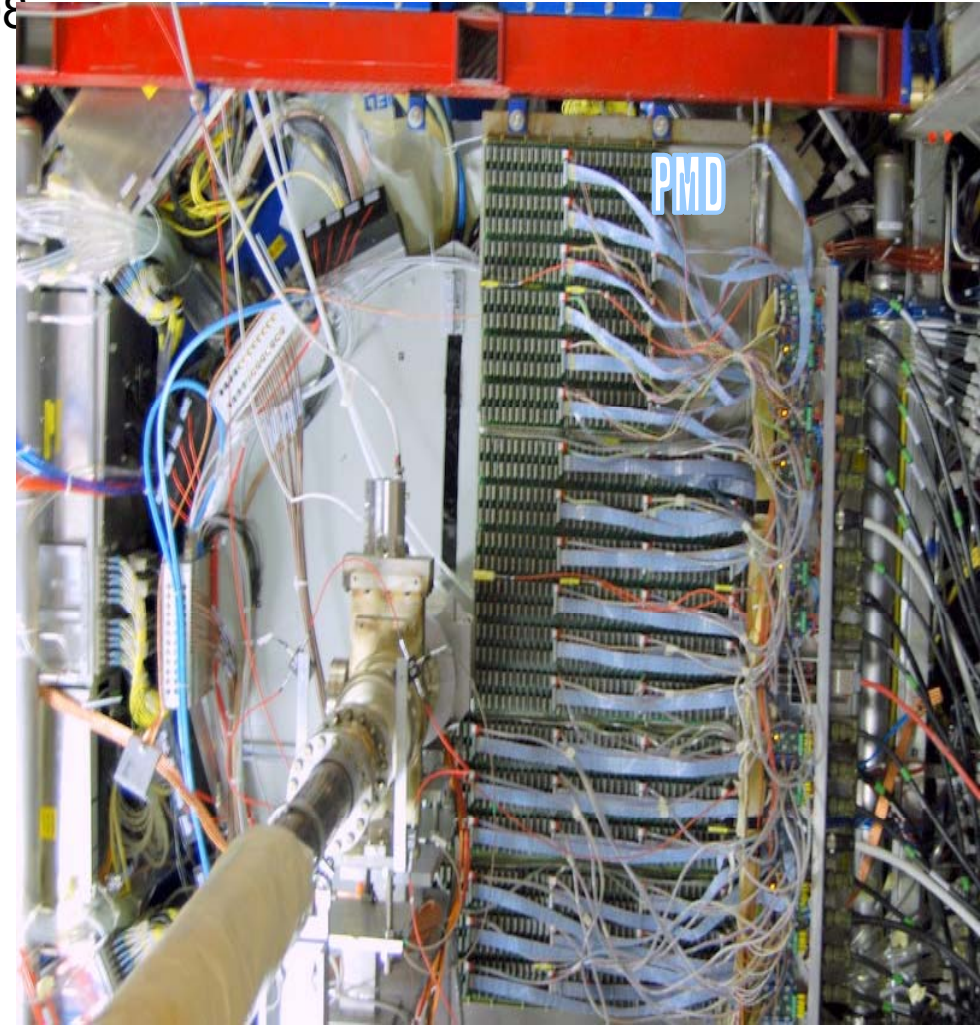




Photon Multiplicity Detector (PMD)



- **Detector status:** (improved spark protection was needed)
 - ⇒ **modification** of FEE **finished** (spark protection circuits implemented)
 - **Installation schedule**
 - ⇒ 9/48 modified modules already installed in 2008 (and commissioned)
 - ⇒ remainder **installed by end June 2009**
- PMD is the last detector to be installed on A side



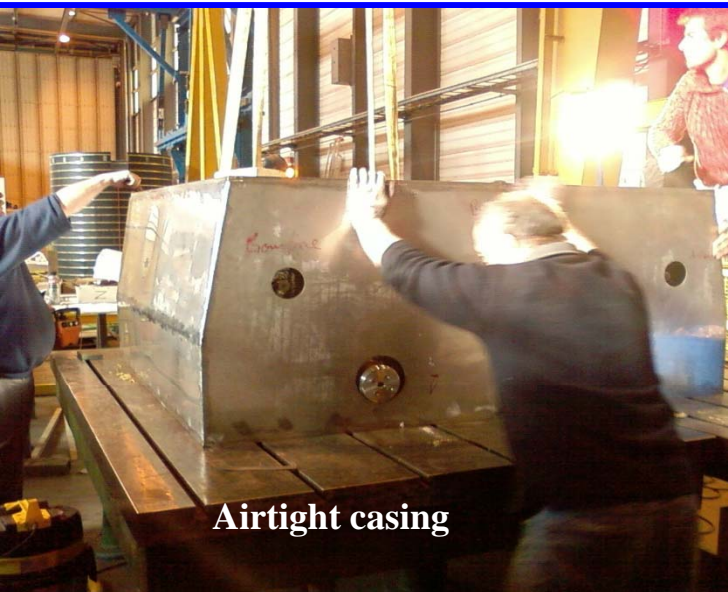


Photon Spectrometer (PHOS)



- **Detector status:** (casing needed improvement because of water condensation when cooled)
 - ⇒ Production of improved and airtight casings for 3 PHOS modules started end 2008.
 - ⇒ First PHOS **module assembled** in the new casing. Test & commissioning until end April
- **Installation schedule**
 - ⇒ **1 module** to be installed **early May**
 - ⇒ **2 more modules** to be installed **end June.**

Assembly of the module
in the new, airtight casing



Airtight casing





Detector Consolidation



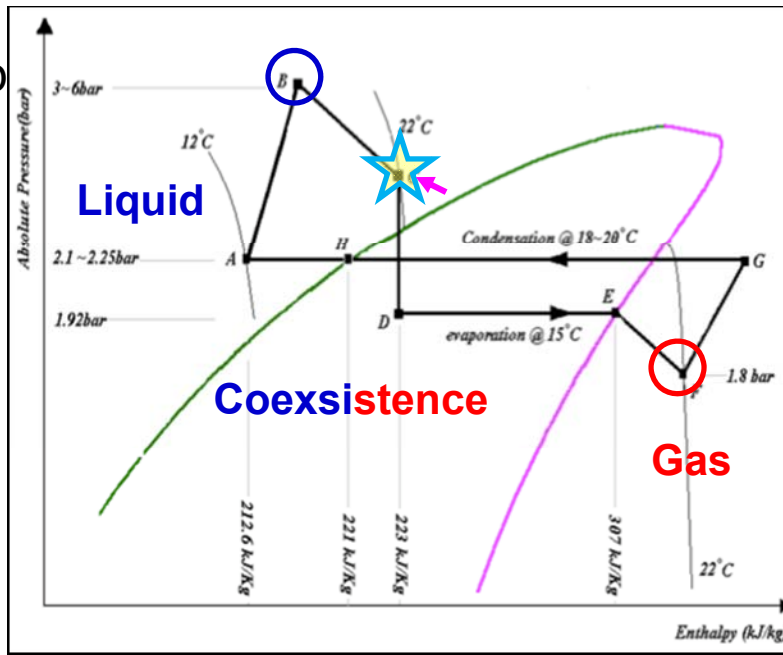
● replacing TPC decoupling capacitors

- ⇒ one 'bad' batch of IROC decoupling capacitors shows leakage after months of operation
- ⇒ replace all 18 IROC capacitors on A side (several days/sector)
- ⇒ additional cooling circuit improvements

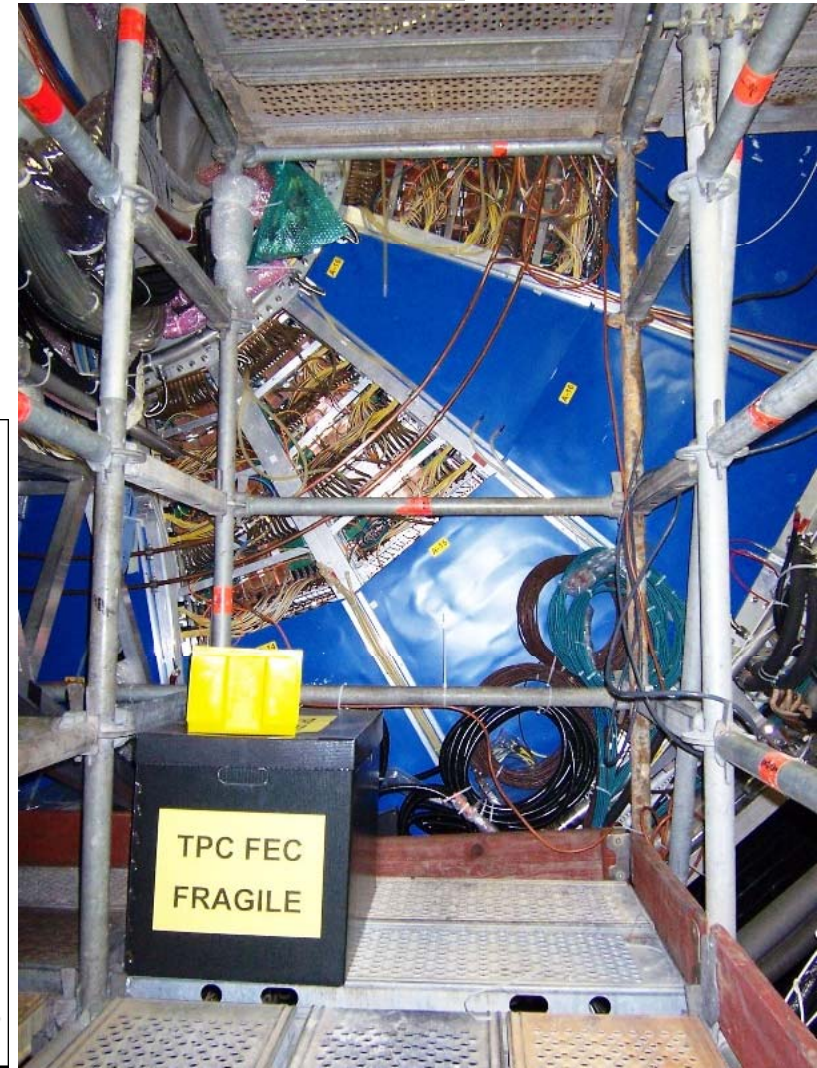


● Improving SPD cooling

- ⇒ 2008, several ladders could not be operated because of insufficient cooling flow
 - ★ increase press.
 - ★ decrease Temp



SPD:
1 (of 2) dead
half-staves
recovered !



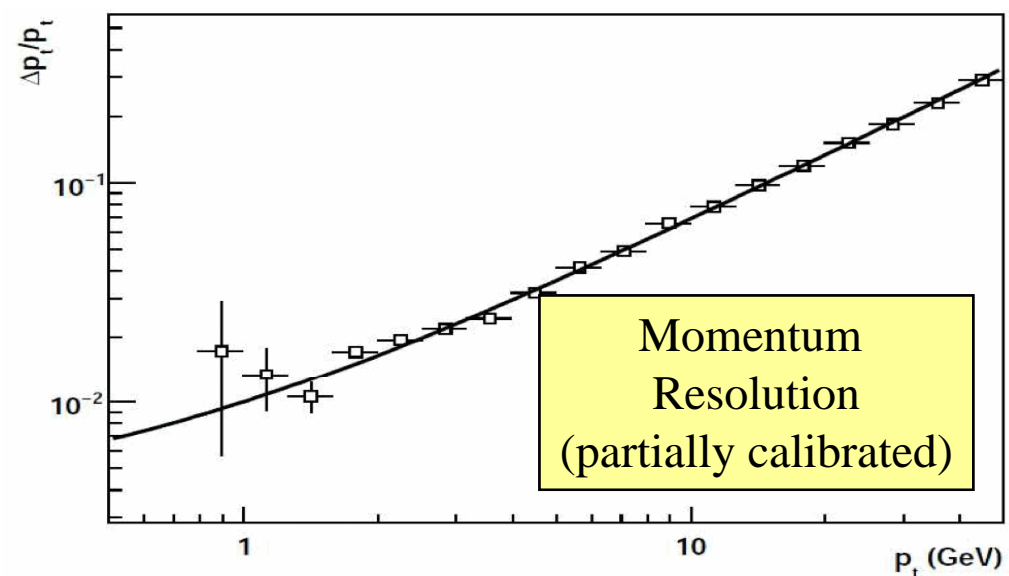
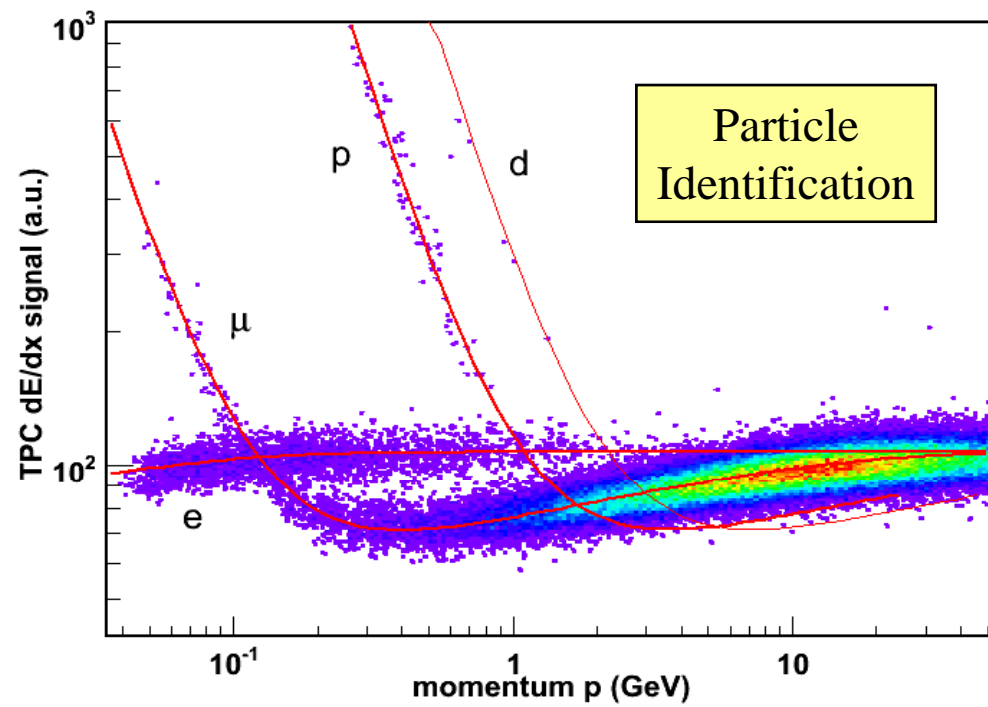
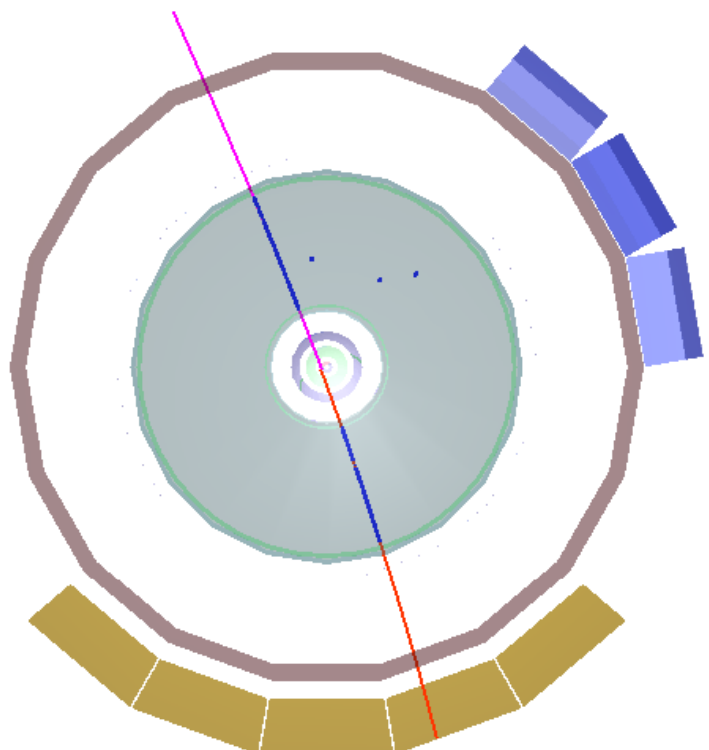


TPC Performance



● Results from cosmics

- ⇒ dE/dx resolution (PPR goal: ~ 5.5%)
 - ☆ < 6%
- ⇒ p_t resolution (PPR goal: ~ 5% @ 10 GeV)
 - ☆ ≈ 6.5% @ 10 GeV partial calibration
(was 10% in October 2008)





ITS Alignment with Cosmics

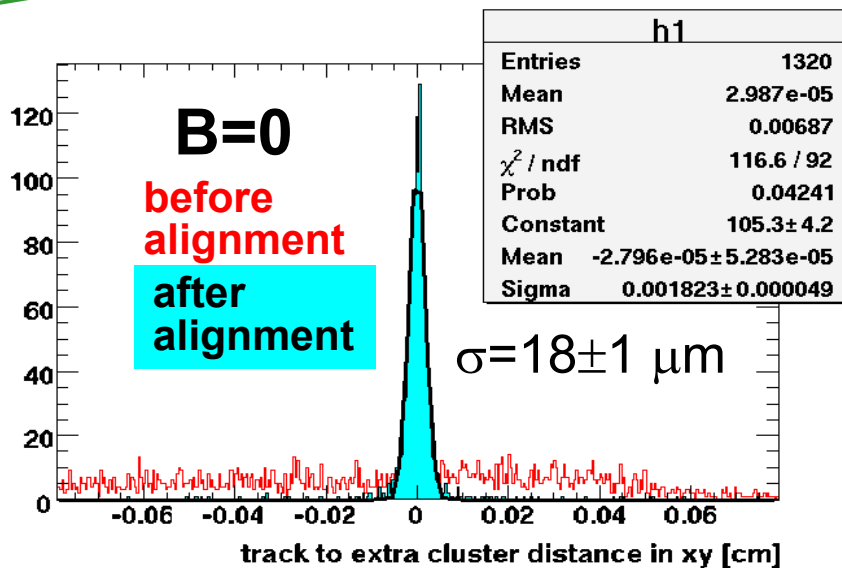
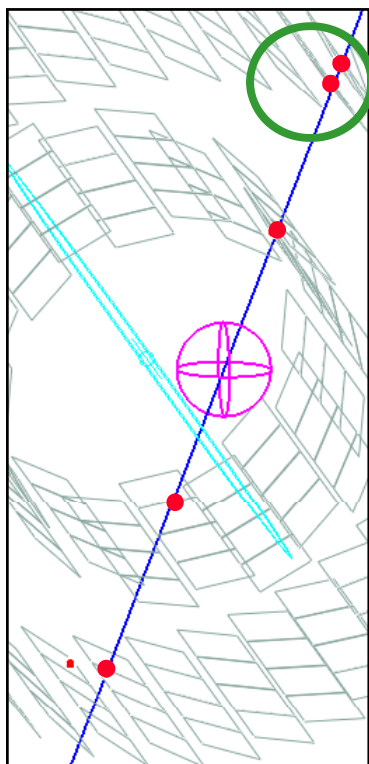


● Preliminary results

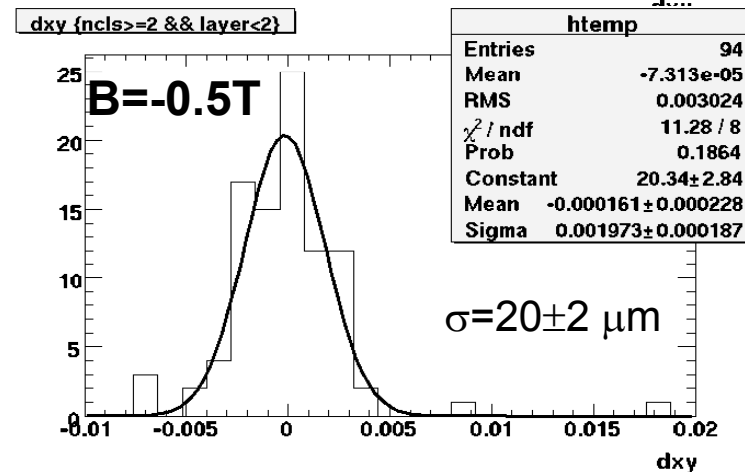
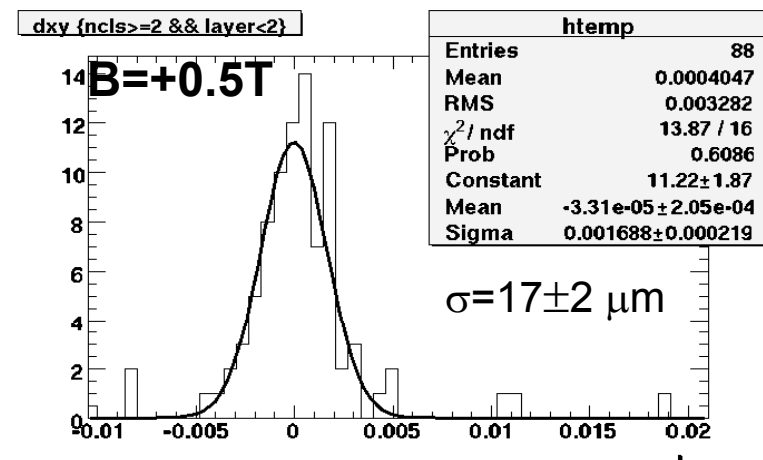
⇒ SPD: $\approx 80\%$ aligned, residual misalignment $< 10 \mu\text{m}$,

★ no change with B field

Track-to-“extra clusters” distance in transv. plane (SPD overlap)



was $21 \mu\text{m}$ in October!
(simulation with ideal alignment $\sigma = 15 \mu\text{m}$)





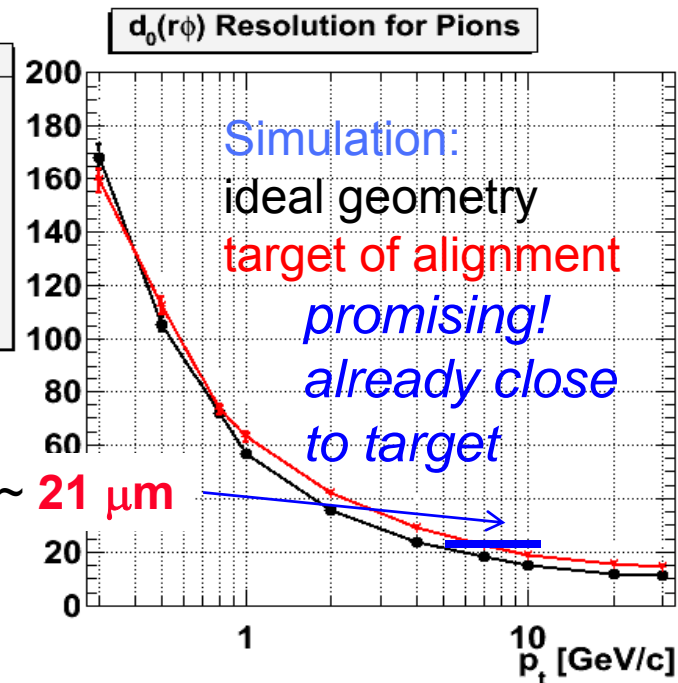
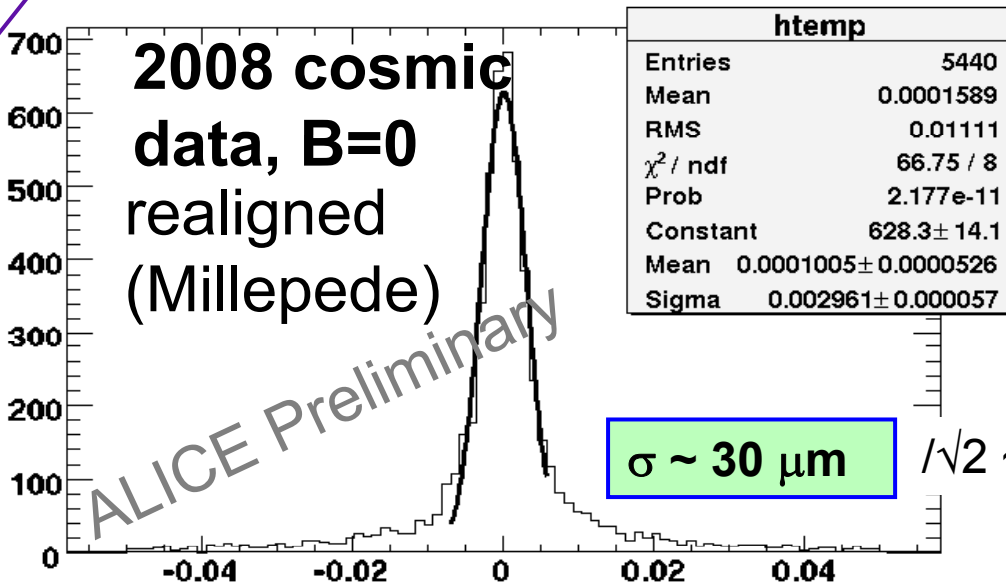
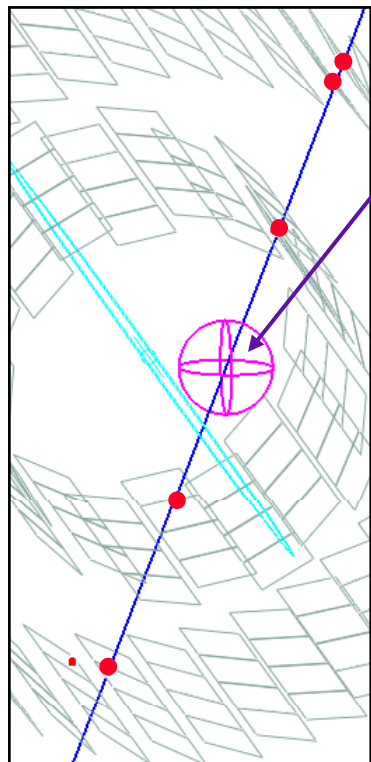
ITS Alignment with Cosmics



● Preliminary results

- ⇒ SPD: $\approx 80\%$ aligned, residual misalignment $< 10 \mu\text{m}$
- ⇒ SSD: optical survey implemented, residual $< 15 \mu\text{m}$, $\approx 50\%$ aligned with cosmics
- ⇒ SDD: drift velocity calibration ongoing (needed before geometrical alignment)

Track-to-track (top vs bottom) distance in transv. plane (SPD+SSD)



track-to-track transverse distance at $y=0$ [cm]

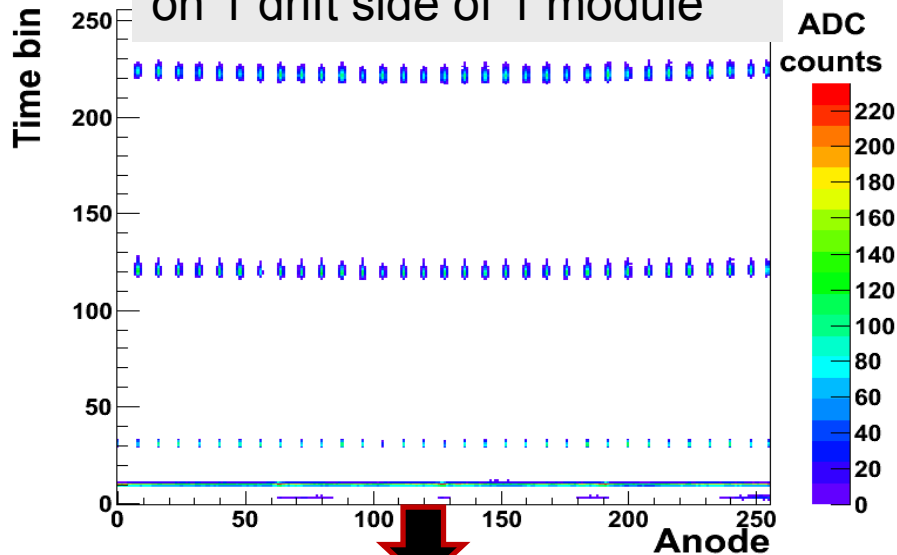
ALICE Preliminary



SDD operation and calibration

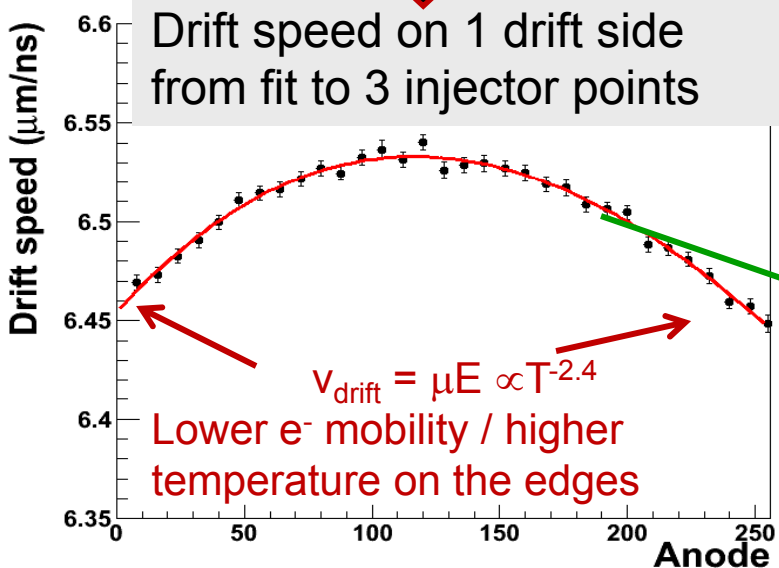


Display of 1 injector event on 1 drift side of 1 module

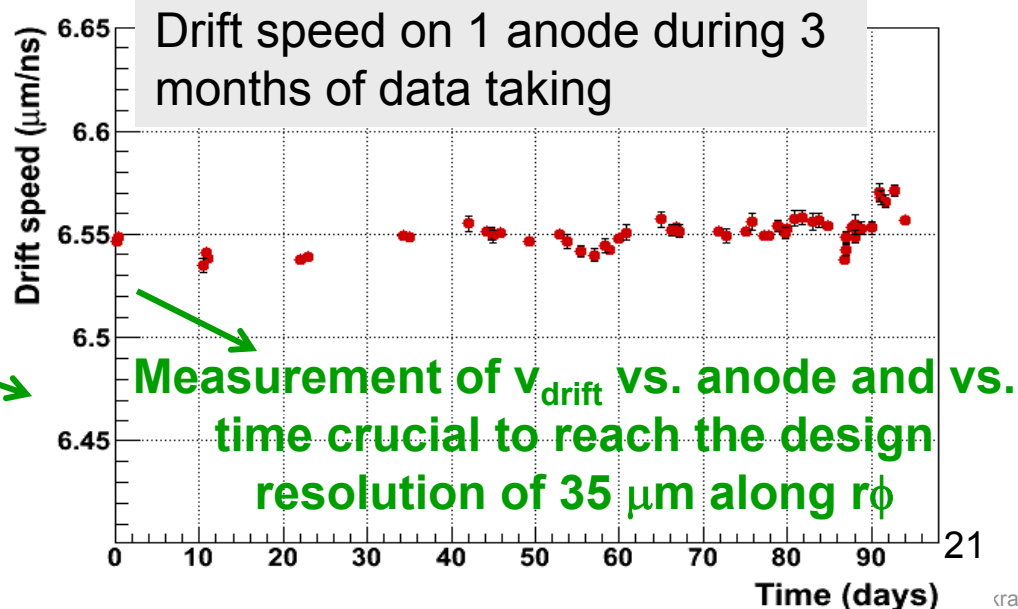


- 247 out of 260 modules in DAQ
- Calibration monitored every ≈ 24 h
 - \Rightarrow Fraction of **bad anodes** $\approx 2\%$
 - \Rightarrow **<Noise>** ≈ 2.5 ADC counts (better than design value) and stable.
 - ☆ Signal for a MIP on anodes ≈ 100 ADC
 - \Rightarrow **Drift speed** from dedicated runs with charge injectors

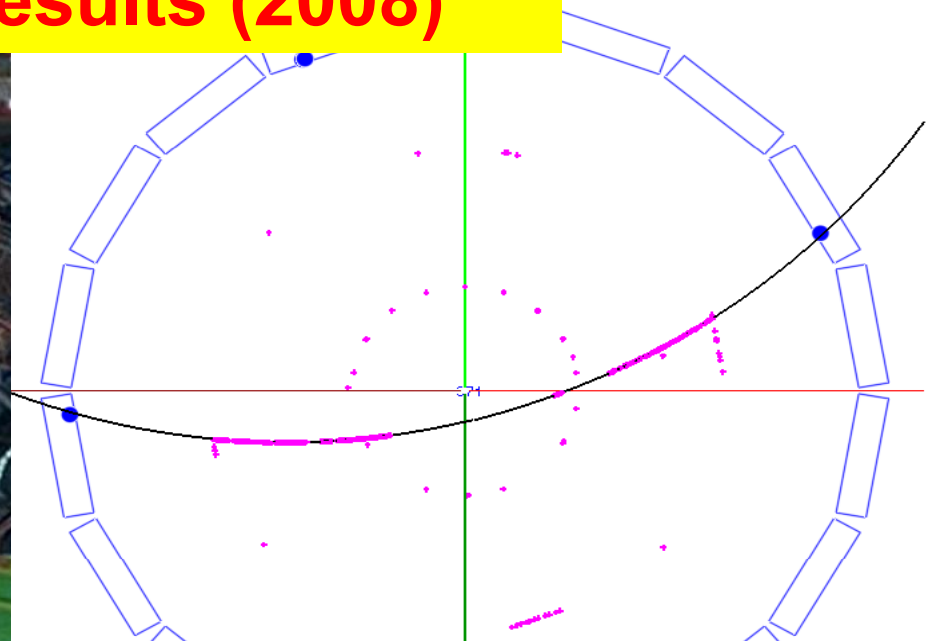
Drift speed on 1 drift side from fit to 3 injector points



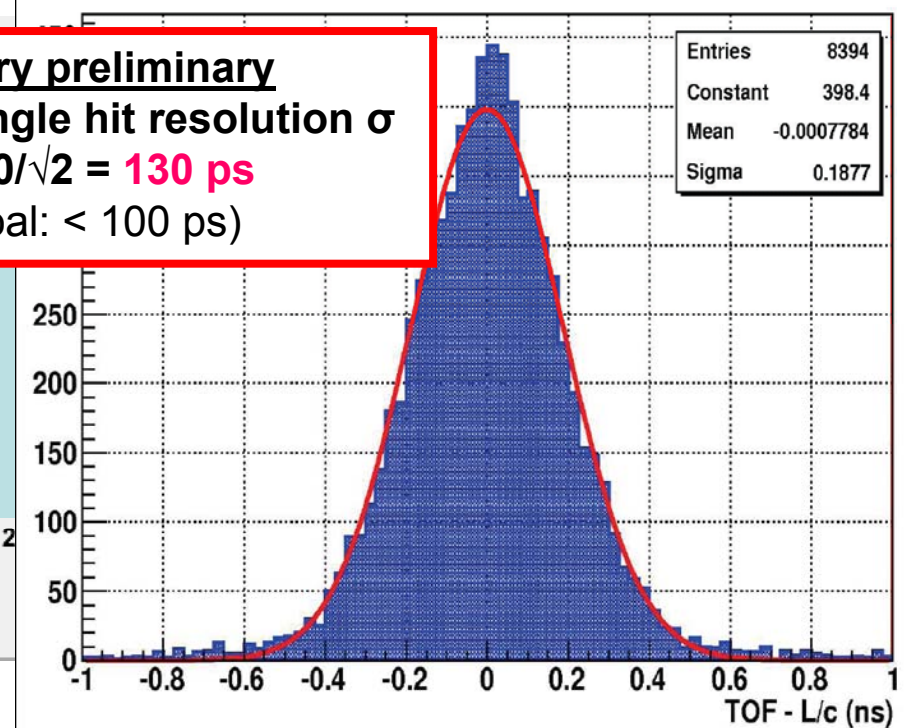
Drift speed on 1 anode during 3 months of data taking



TOF cosmic rays results (2008)



Very preliminary
Single hit resolution σ
 $190/\sqrt{2} = 130$ ps
(goal: < 100 ps)



- Detector fully installed, trigger operational
- Calibrations with cosmics very promising despite **low statistics (10K tracks)** and many 10,000 calibration parameters

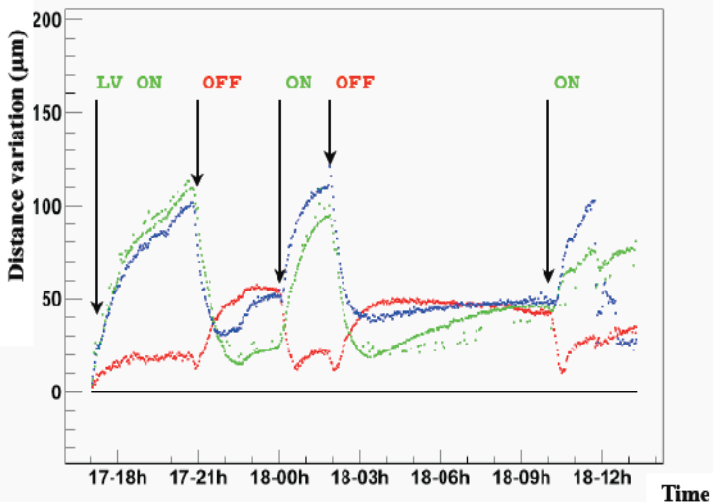


Muon Status

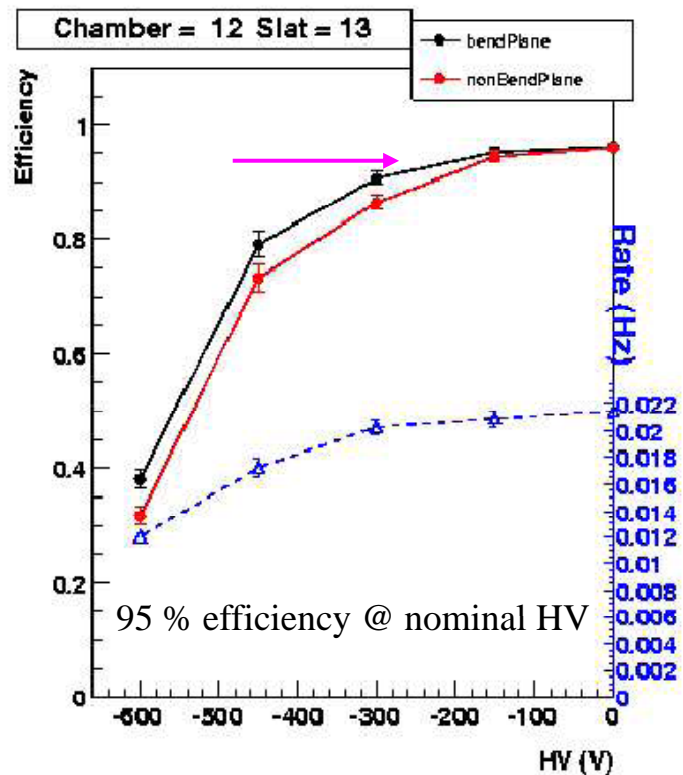
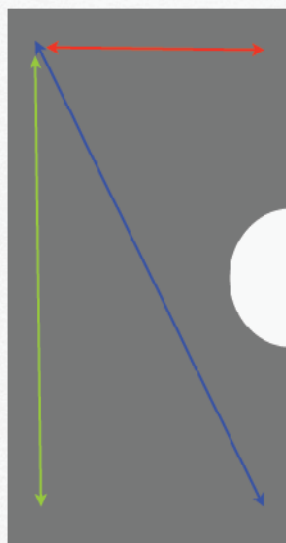
● 2 weeks cosmic run end March 2009

- ⇒ 8 ½ (of 10) planes fully commissioned and read out
- ⇒ excess noise identified and removed
(cooling unit in the LHC tunnel !)
- ⇒ HV scans to measure chamber efficiency of muon trigger RPC's
- ⇒ position monitoring system commissioned

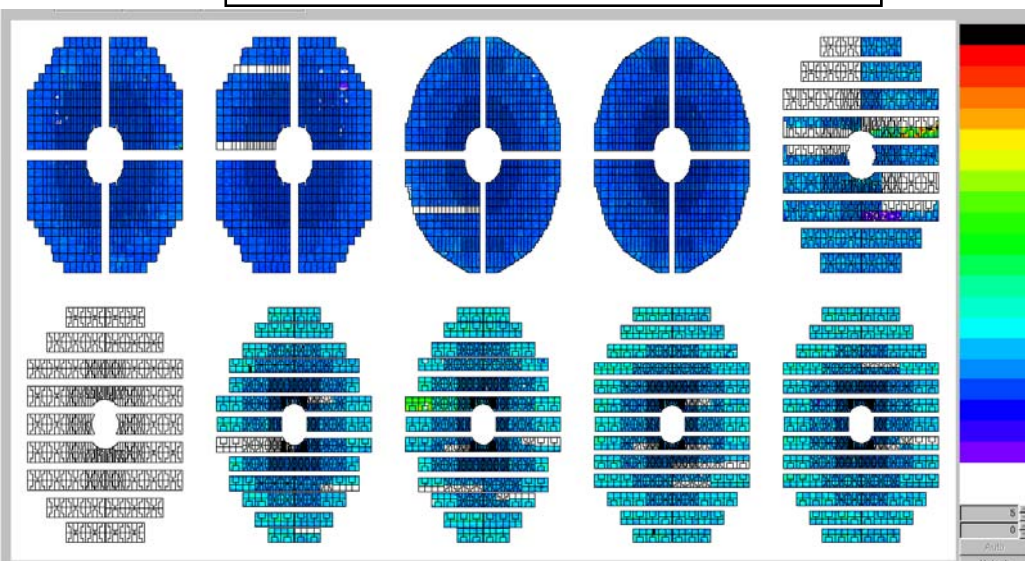
Laser Position Monitoring



About 100 µm dilation of the support plan



Chamber noise < 2 ADC counts





Data Acquisition (DAQ)



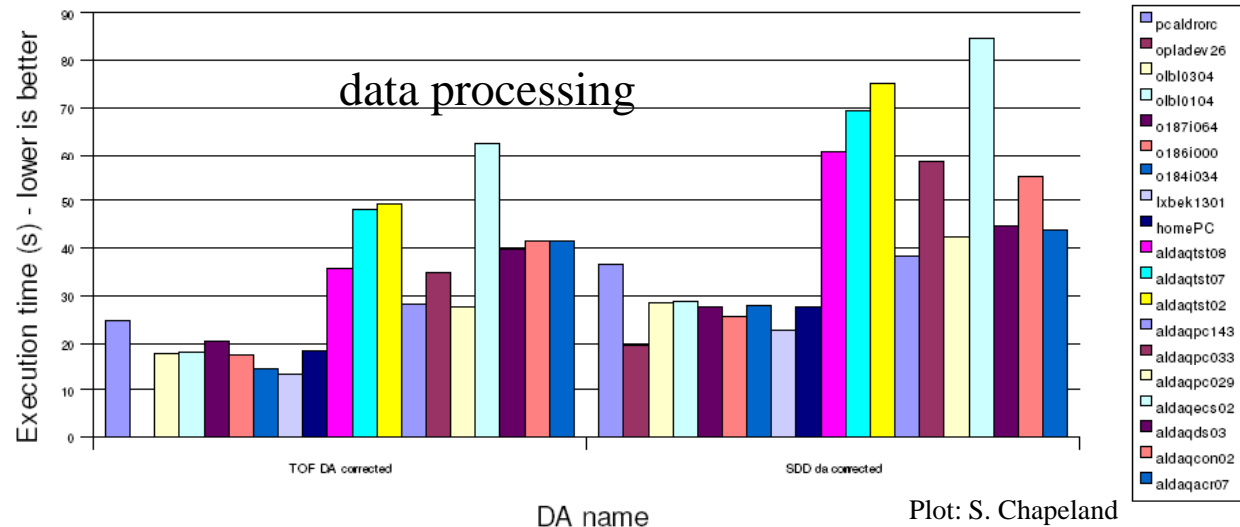
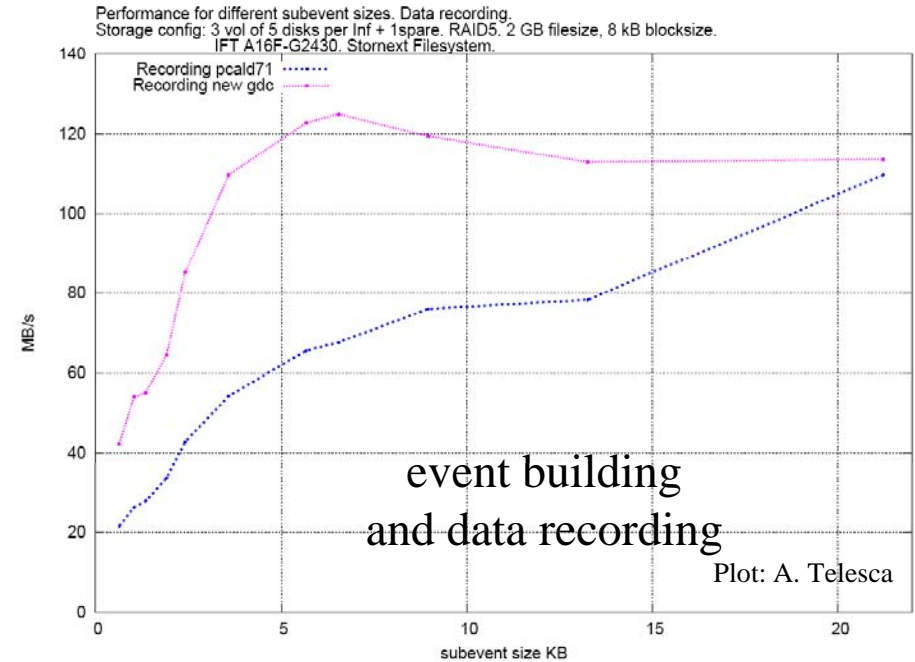
● DAQ deployment 40% -> 100 %

⇒ Event building and data recording performance increased by a factor 3

⇒ Data quality monitoring processing power increased by a factor 4

● Benchmarking new PC's:

⇒ relative performance of present and new generations of Intel processors



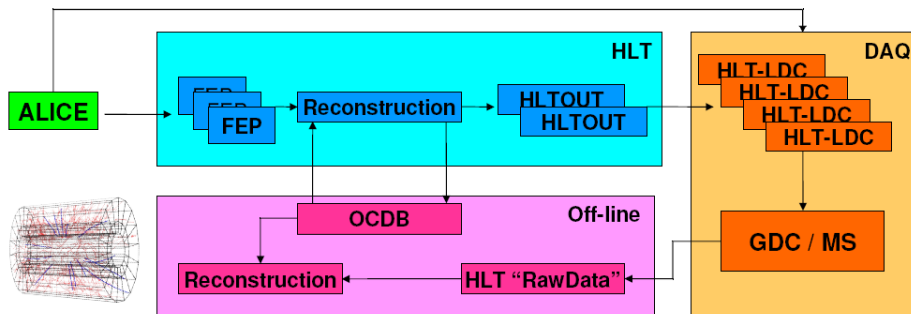


High Level Trigger (HLT)



- 2009 - HLT: 500 CPU's, very successful operation (online reconstruction, data reduction)

⇒ Full data path tested



- Hardware upgrade in process

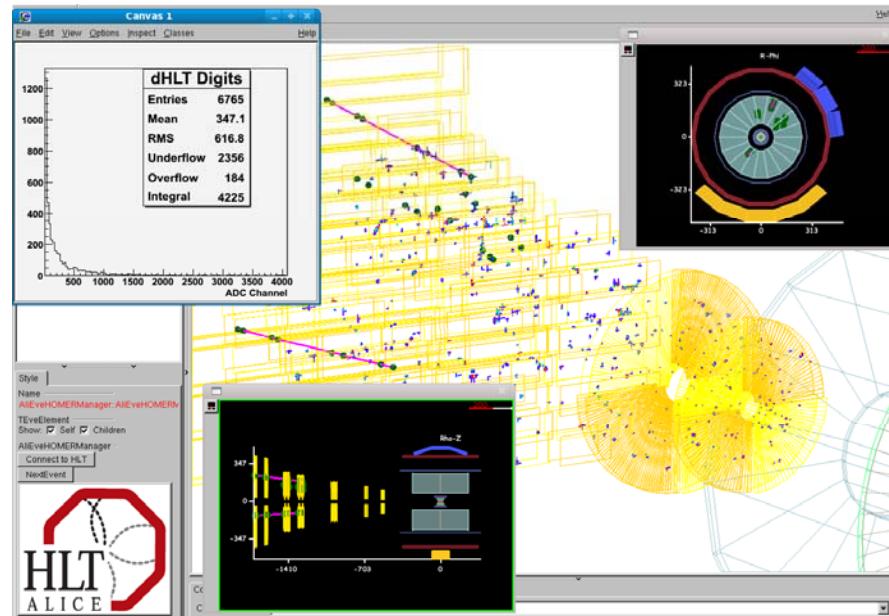
⇒ Adding 900+ more CPU cores (~ 60% capacity)

- Software developments

⇒ ITS and EMCAL reconstruction included

⇒ HLT Trigger framework implemented

⇒ Physics trigger implementation ongoing





Computing



Updated resource requirements 2009/10 (following new LHC schedule)

⇒ 10 months pp

★ ideal low Lumi conditions for ALICE !!

⇒ 1 month PbPb (end 2010)

⇒ reduced Monte Carlo (save resources)

⇒ Resource situation 09/10

★ ok for 2009

★ 2010: CPU T2 and MSS better (ok)

★ CPU T1 and Disk: sign. shortfall

⇒ **conseq. to be discussed with LHCC**

Requirements vs pledges

		2009		2010	
		T1	T2	T1	T2
CPU	Requested	10,7	9,0	25,6	20,2
	Missing	-4%	43%	-41%	-0%
Disk	Requested	4 263,54	4 380,9	9 889	12 365
	Missing	-9%	-6%	-31%	-52%
MSS	Requested	5 887,01		11 648	
	Missing	5%		-12%	

Table 2.: CPU requirements for 2009-2010 and comparison with previous requirements

	new requirements (MSI2K)				old requirements (KSI2K)				variation (%)			
	TO	CAF	T1	T2	T0	CAF	T1	T2	T0	CAF	T1	T2
2009Q1	7,9	2,6	8,0	8,1	9,1	2,6	19,9	14,3	-11 %	1 %	-55 %	-37 %
2009Q2	7,9	2,6	8,0	8,1								
2009Q3	7,9	2,6	8,0	8,1								
2009Q4	8,1	2,6	10,7	9,0								
2010Q1	8,4	2,6	10,7	9,0	9,1	2,6	23,6	25,1	0 %	0 %	9 %	-19 %
2010Q2	8,4	2,6	10,7	9,0								
2010Q3	8,5	2,6	10,7	9,0								
2010Q4	9,1	2,6	25,6	20,2								

Table 3.: Disk requirements for 2009-2010 and comparison with previous requirements

	new requirements (PB)			old requirements (PB)			variation (%)			
	CERN	T1	T2	CERN	T1	T2	CERN	T1	T2	
2009Q1		1,7	2,4	1,7	2,5	9,9	9,6	-4 %	-56 %	-54 %
2009Q2		1,9	3,0	2,6						
2009Q3		2,2	3,6	3,5						
2009Q4		2,4	4,3	4,4						
2010Q1		2,6	4,9	5,3	4,2	9,9	10,3	8 %	-0 %	21 %
2010Q2		2,9	5,5	6,2						
2010Q3		3,1	6,1	7,0						
2010Q4		4,5	9,9	12,4						

Table 4.: Custodial Storage (integrated) requirements for 2009-2010 and comparison with previous requirements

	new requirements (PB)		old requirements (PB)		Tape variation (%)			
	CERN	T1	CERN	T1	Tape	T1		
2009Q1		3,3	2,4		7,7	10,6	-52 %	-44 %
2009Q2		3,4	3,6					
2009Q3		3,6	4,7					
2009Q4		3,7	5,9					
2010Q1		4,1	7,0		8,1	19,7	-18 %	-41 %
2010Q2		4,6	8,2					
2010Q3		5,0	9,3					
2010Q4		6,7	11,6					

ALICE Shutdown Planning (April 21st 2009)

Date	Week	Installation	Commissioning	LHC
20-Apr	17	Install Comp. Platform	Standalone Tests	
27-Apr	18			
4-May	19			
11-May	20	Reinstall Miniframe/PHOS1		
18-May	21	Miniframe Connections TRD8, 2 PHOS V0/FMD1/PMD		L3 Commissioning
25-May	22			
1-Jun	23			
8-Jun	24			
15-Jun	25			
22-Jun	26			
29-Jun	27		July 5th Det. Ready	
6-Jul	28	EMCAL EMCAL EMCAL EMCAL	DAQ integration	
13-Jul	29			
20-Jul	30			
27-Jul	31			
3-Aug	32	TRD16, Close L3 Doors		
10-Aug	33	L3 magnet ON	24/7 Cosmic Run	High Current
17-Aug	34	L3 magnet ON		High Current
24-Aug	35			High Current
31-Aug	36	Shielding, Ventillation		
7-Sep	37			Beam1 Injection Test
14-Sep	38			
21-Sep	39	First Beam Sept 21		
28-Sep	40			
5-Oct	41			
12-Oct	42			
19-Oct	43	High Energy Collisions		



Summary



- Shutdown activities:

- ⇒ going on according to schedule

- Calibration/alignment, detector performance

- ⇒ progressing very well with 2008 cosmic data

- ⇒ most detectors already very close to (or within) specifications

Alice was in good shape and ready to take data in 2008

We will be even better (and more complete) in 2009 !!

