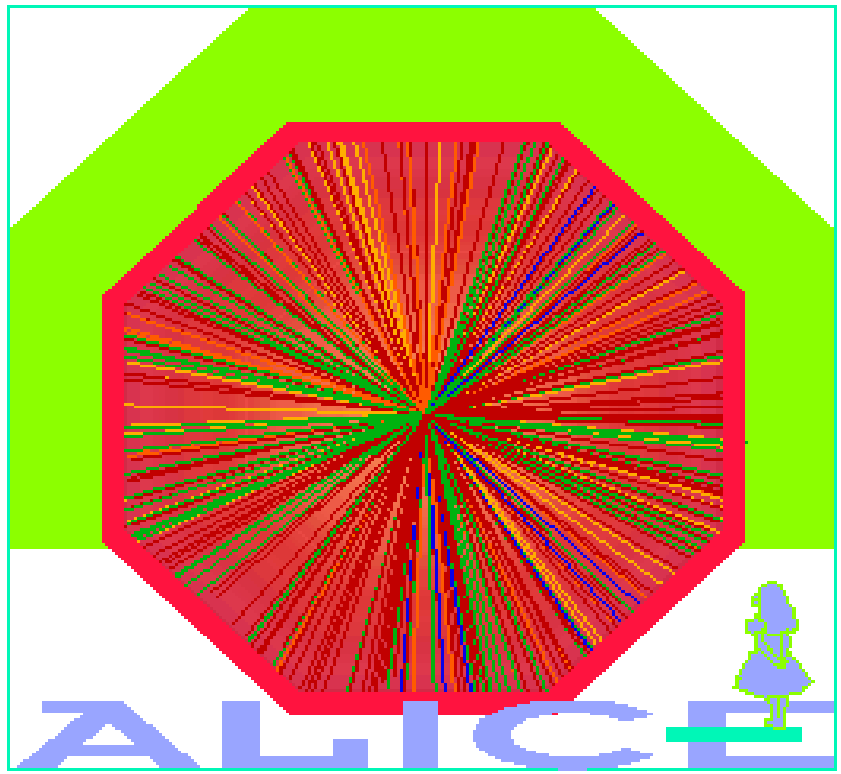
22nd ALICE RRB

- Collaboration News
- Project Status
  - ⇨ **Installation & Planning**
  - ⇨ **Detector Status**

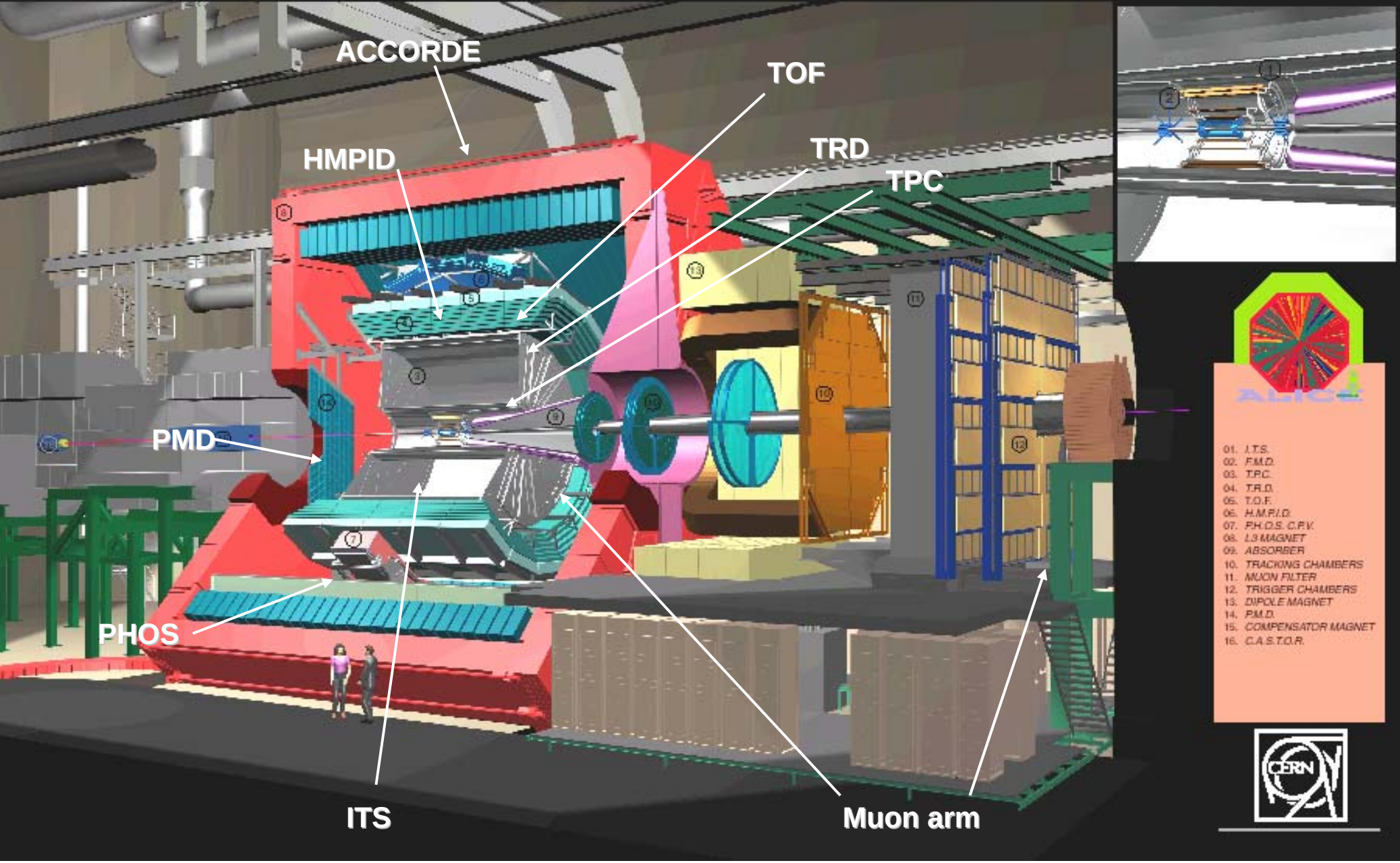


Collaboration News

- Collaboration composition
  - ⇨ **Mexico:** 'Universidad Autónoma de Sinaloa' **replaces** 'Universidad Michoacana de San Nicolás de Hidalgo'. M&O MoU ready for signature
  - ⇨ Institutes applying:
    - ✪ **6 US Universities**, review by DOE in May
    - ✪ PUCP (**Peru**), Yonsei (**Korea**)
- Funding
  - ⇨ **EMCAL** project **approved in France** by CNRS in March (ca 1 M Euro)
    - ✪ **Italy**: INFN discussion in September **USA**: DOE CD2/3 in September
  - ⇨ **V0:** Finland increases CORE contribution by 35 kCHF
    - ✪ allowed some increased trigger functionality
- ALICE Industrial awards (March 2007)
  - ⇨ Fibernet Ltd, Yokneam, Israel
    - ✪ Assembly of Silicon Strip Detector cables
  - ⇨ ADIC/Quantum Corp, Munich, Germany (San Jose, CA, USA)
    - ✪ StorNext Cluster File System software for DAQ

Intelligent Storage™

- 7th LHCC Comprehensive Review (CR7 : 19/20 March)
  - ⇨ no major concerns



ALICE Detector

Planning (end March 2007)

- Physics plan
  - ⇨ 'day 1' physics in 2007 with pp: **global event properties** (**at 900 GeV**)
  - ⇨ ' early pp physics' 2007/2008: **detailed studies** of pp ('QCD at 14 TeV')
  - ⇨ first heavy ion run **end 2008** ('after first long pp run')

    will certainly also depend on physics landscape end 2008

- Work-plan in 2007
  - ⇨ shifted **ITS installation** back to give maximum time for construction and pre-comissioning
    - ✪ experiment closed by end August 2007
    - ✪ ~ 2-3 months for final commissioning w/o beam
  - ⇨ expected start-up configuration mid 2007
    - ✪ **complete**: ITS, TPC, HMPID, muon arm, PMD, trigger dets (V0, T0, ZDC, Acorde),..
    - ✪ **partially complete**: PHOS(1/5), TOF(7/18), TRD (2-3/18), DAQ/HLT (20-30%)

- Beyond 2007
  - ⇨ complete **DAQ** capacity (2008/9)
  - ⇨ complete modular detectors: **TOF (2008), TRD (2009), PHOS** (**2010**)
  - ⇨ **EMCAL (2010)**

Installation Milestones (CR7)

PHASE	Detector	Start	Finish
	Muon detectors	Apr 2006	May 2007
PHASE 3 ✓	Initial TPC installation + ITS rails	11.01.2007	02.02.2007
✓	ITS Barrel (SDD,SSD) + Vacuum (central Be chamber) + Bake-Out	15.03.2007	05.04.2007
✓	FMD/V0/T0 (C side)	10.04.2007	26.04.2007
⟹	Pixel + ITS barrel + services	27.04.2007	07.06.2007
	TPC + ITS in final position	08.06.2007	21.06.2007
	EMCal support frame / PHOS	22.06.2007	02.07.2007
	TOF/TRD 2nd installation window	03.07.2007	30.07.2007
PHASE 4	Compensator magnet platform / Mini Frame (services)	31.07.2007	22.08.2007
	Final Vacuum Installation / Beam Line Closed	23.08.2007	05.09.2007
	FMD/V0/T0/PMD (A side)	06.09.2007	25.09.2007
	Commissioning and Mobile Shielding	26.09.2007	start of beam

Shift of about 6 weeks compared to schedule shown in October 2006
due to later completion of SDD

Pixel Detector Incident

- end March, during final commissioning of pixel half-barrel 2
  - ⇨ Incident attributed to power supply damaged 6 half-staves (~7.5% of acceptance)
    - ✪ reason not yet understood, under investigation
  - ⇨ consequence: significant, but not catastrophic:
    - ✪ pixel detector crucial for secondary vertexes and momentum resolution
    - ✪ loss of resolution for high p_t for 7.5% of tracks (partially recoverable ?)
    - ✪ 15% loss of statistics for two-body decays (charm, bottom, Hyperons, ..)
  - ⇨ options:
    - ✪ live with reduced performance, continue with installation (close detector end August 2007)
    - ✪ repair damaged sector: ~ 8 weeks
- ALICE decided to go for SPD repair
  - ⇨ gain on the long term **versus** detector installation/commissioning for engineering run 2007
  - ⇨ installation/commissioning schedule has been rearranged
    - ✪ closure of beam pipe early October (shift by ~ 4 weeks)

      4 weeks could be recovered by rearranging activities/reducing commissioning time
    - ✪ can be anticipated to early September if needed (6 weeks notice)

      however, in this case not all detectors would be installed or in operation mode

Installation Milestones

PHASE	Detector	Start	Finish
	Muon detectors	Apr 2006	May 2007
PHASE 3 ✓	Initial TPC installation + ITS rails	11.01.2007	02.02.2007
✓	ITS Barrel (SDD,SSD) + Vacuum (central Be chamber) + Bake-Out	15.03.2007	05.04.2007
✓	FMD/V0/T0 (C side)	10.04.2007	20.04.2007
	Commissioning TPC + ITS barrel + services	21.04.2007	15.06.2007
⟹	Pixel + ITS barrel + services (27.4->18.6)	18.06.2007	25.07.2007
	TPC + ITS in final position	26.07.2007	09.08.2007
	EMCal support frame / PHOS	10.08.2007	04.09.2007
	Compensator magnet platform / Mini Frame / Magnet tests	05.09.2007	21.09.2007
	TOF/TRD installation	24.09.2007	24.10.2007
PHASE 4	Final Vacuum Installation / Beam Line Closed	24.09.2007	04.10.2007
	FMD/V0/T0/PMD (A side)	05.10.2007	24.10.2007
	Commissioning and Mobile Shielding	25.10.2007	start of beam

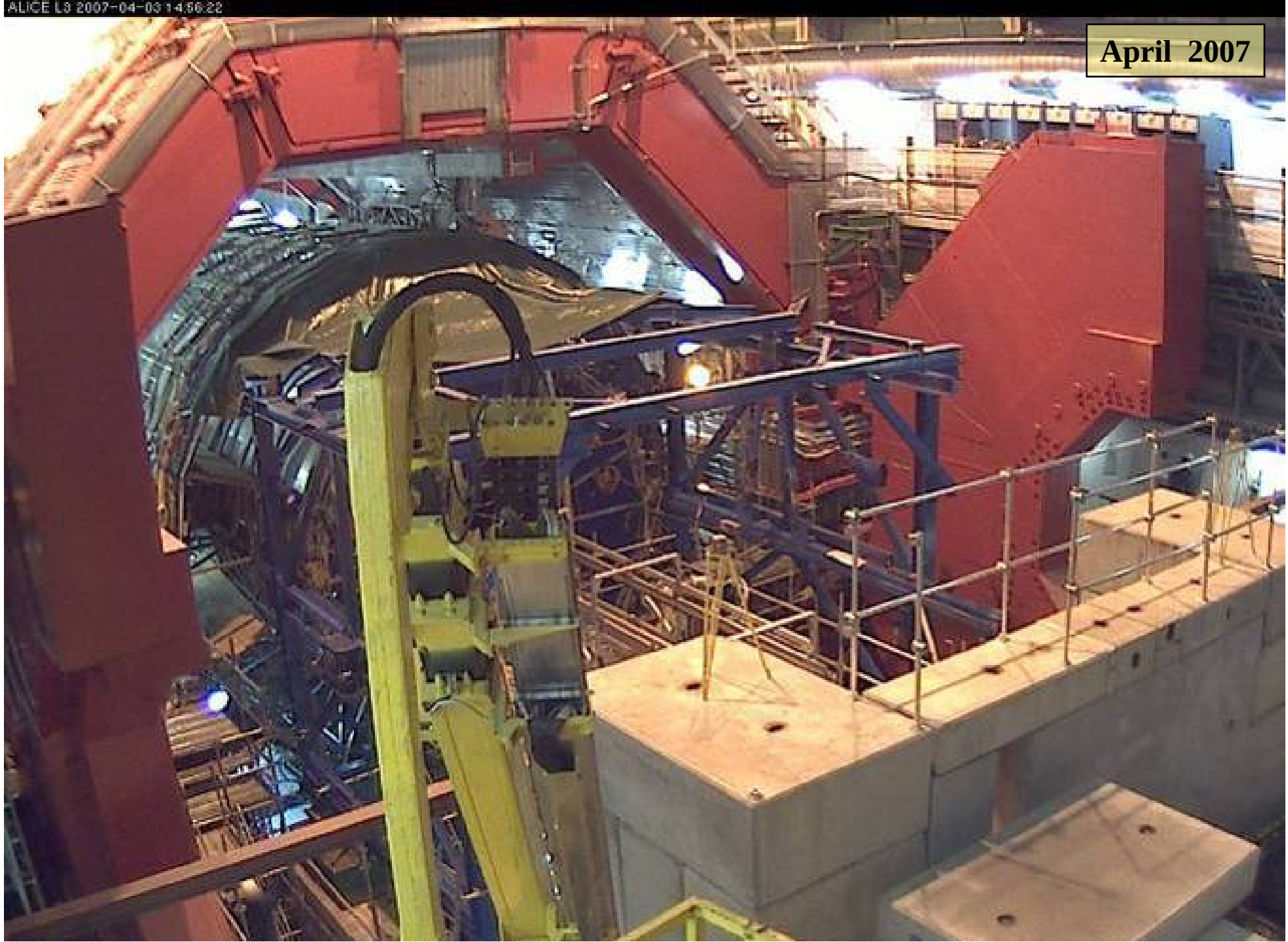
Installation & Services

- Large support structures
  - ⇨ **essentially completed & installed**
  - ⇨ EMCAL support arrived, installation in August
    - ✪ several weeks delay in transport (Mt Blanc tunnel)
- Central Beryllium beam pipe (4 m)
  - ⇨ installed mid March
  - ⇨ bake-out finished early April ($5*10^{-11}$ torr)
    - ✪ ALICE acknowledges excellent work and very good collaboration with CERN Vacuum group


EMCAL Support

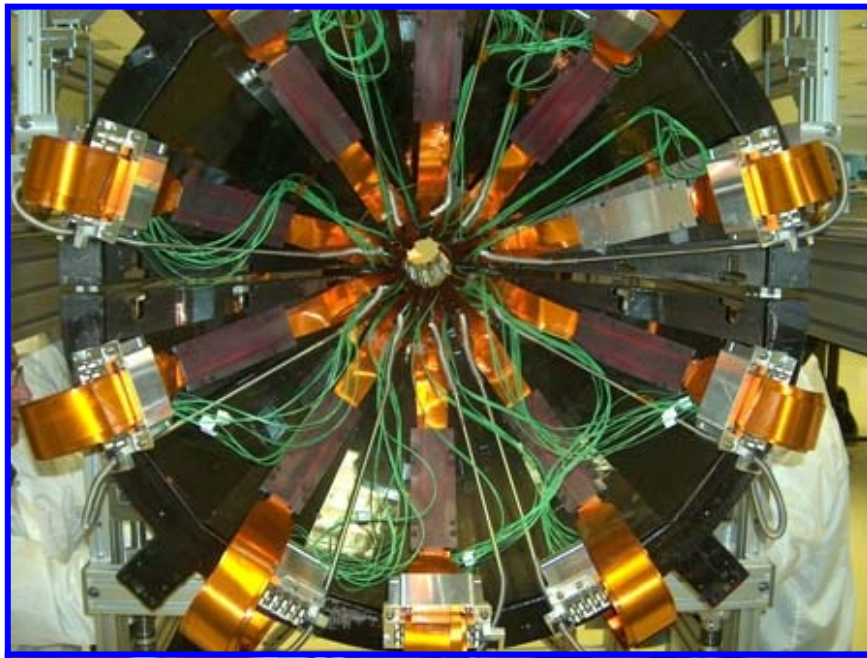
- Installation, services, infrastructure
  - ⇨ **installation** of racks, cables, bus bars, gas/cooling pipes etc.. **ongoing**
    - ✪ stainless steel gas **piping finished** early April !
    - ✪ aim to have services in place when required for detector commissioning
- Overall Status
  - ⇨ progress & performance **satisfactory**
  - ⇨ **large effort ongoing for service installations & testing !**
    - ✪ significant amount of work: ~ 30 km pipes (done !), 10 000 cables
    - ✪ coordination of large number of parallel activities


Status in fall 2006
ITALMEC JIB18


ALICE L3 2007-04-03 14:56:22
April 2007

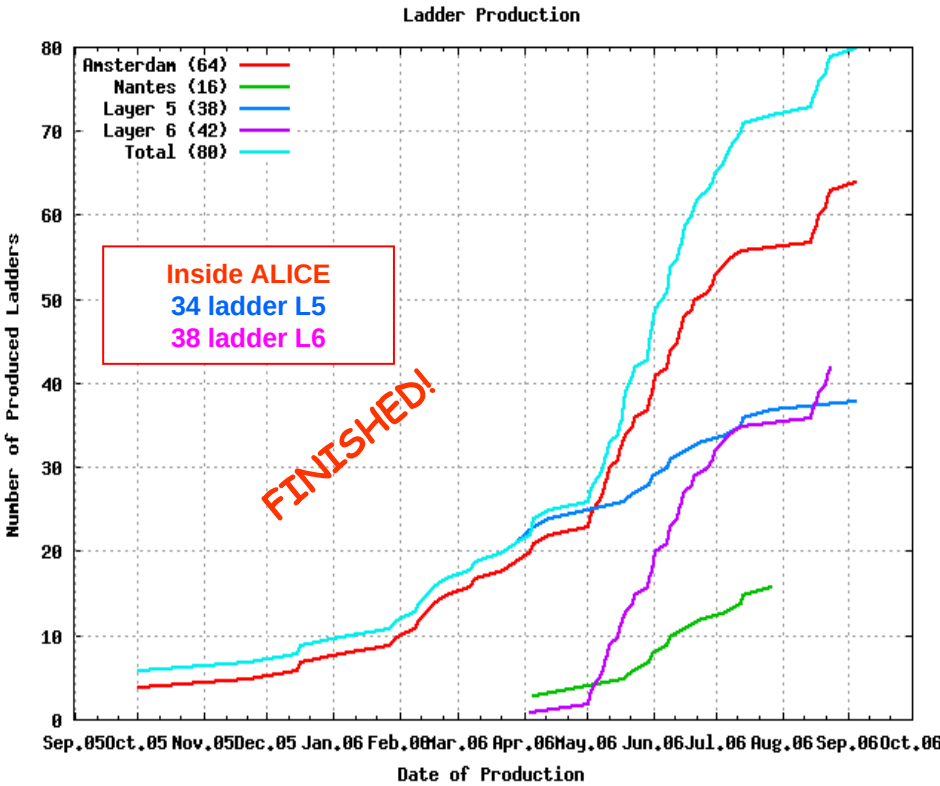
Silicon Pixels SPD

- Production & integration of half-barrels (HB)
  - ⇨ produced additional sector to replace sector 0 (mixed Cu/Al bus)
  - ⇨ 1st HB test & commissioning in DSF mid March
    - ✪ including source and cosmic runs
  - ⇨ 2nd HB mechanical integration mid March
    - ✪ electronic test, **power supply incident**
  - ⇨ 1st+2nd HB full SPD mechanical test 5 April
  - ⇨ 2nd HB repair of damaged sector 8 weeks
  - ⇨ **start installation** **mid June**
- Read-out, services
  - ⇨ DAQ and DCS systems fully operational
    - ✪ tested with long cosmics run
  - ⇨ FastOR trigger system prototypes under test
  - ⇨ cabling in the experimental area well advanced
- Concerns
  - ⇨ **delicate repair** and final **installation**
  - ⇨ late **delivery** of LV **power supplies** (CAEN)



Silicon Strip Detector SSD

- Production
  - ⇨ module assembly **completed**
  - ⇨ ladder assembly (80 ladders) **completed**
  - ⇨ Ladder mounting on SSD cone **completed**
  - ⇨ FEROM (read-out crates)
    - ✪ 4 (of 8) ready for installation, other 4 in test
  - ⇨ cables and patchpanels on C-side **installed**
    - ✪ A-side: ready for installation

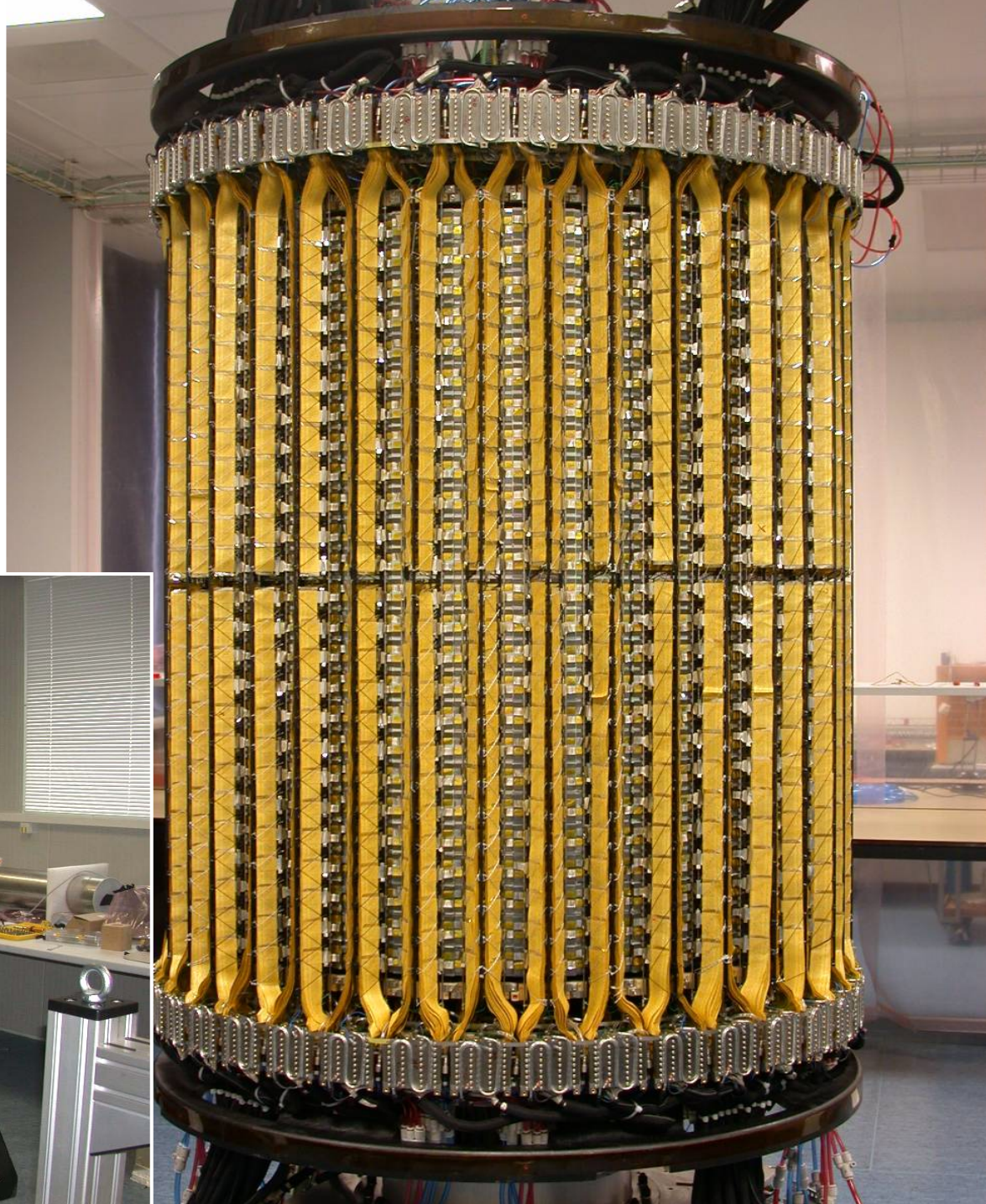


- Installation
  - ⇨ **transport** to CERN **14 December**
  - ⇨ tests after transport completed
    - ✪ one broken connection repaired
    - ✪ good channels ~ 96.5%
  - ⇨ **Installation** **15 March**

- Concerns
  - ⇨ **delivery of LV power supplies** (CAEN)

SSD assembly completed

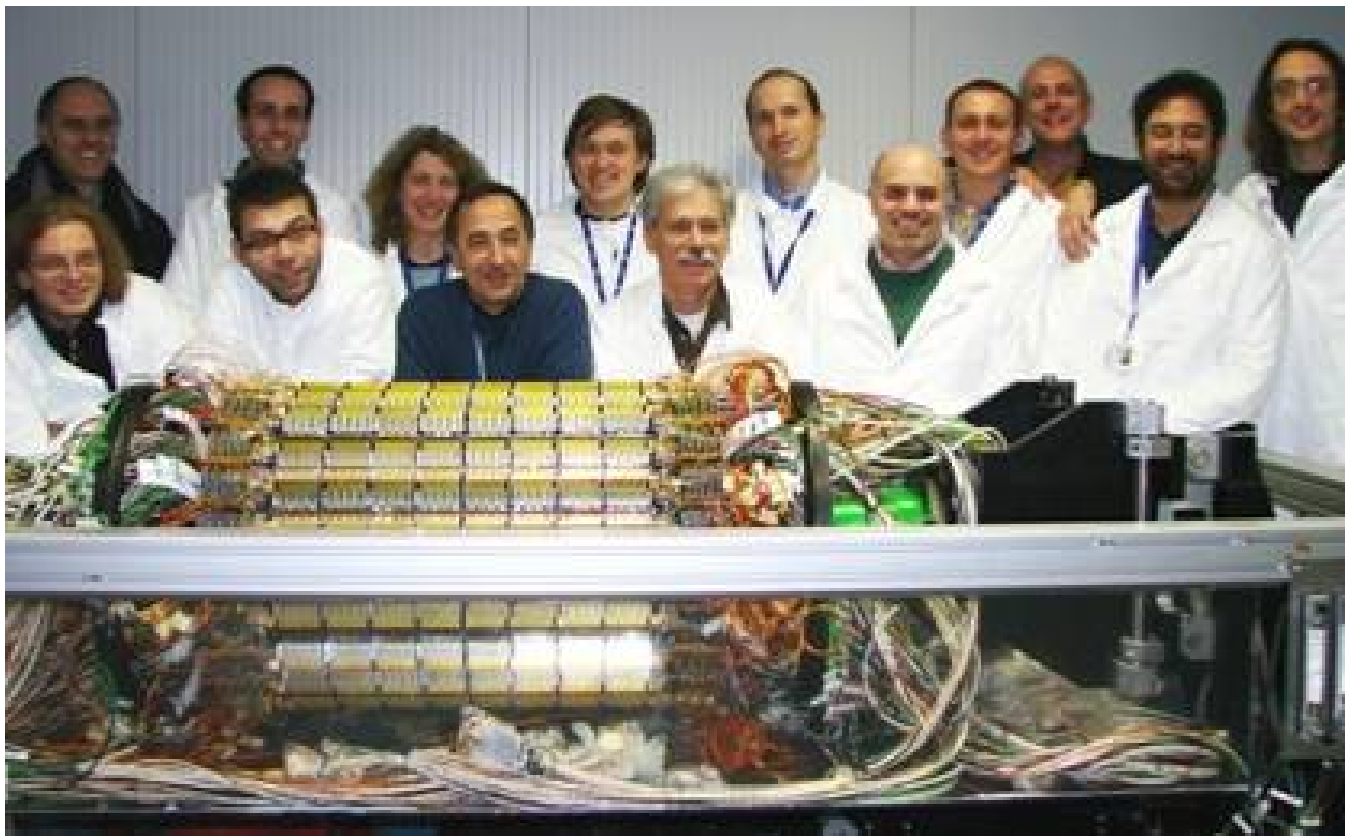
SSD at CERN 14 Dec. 2006



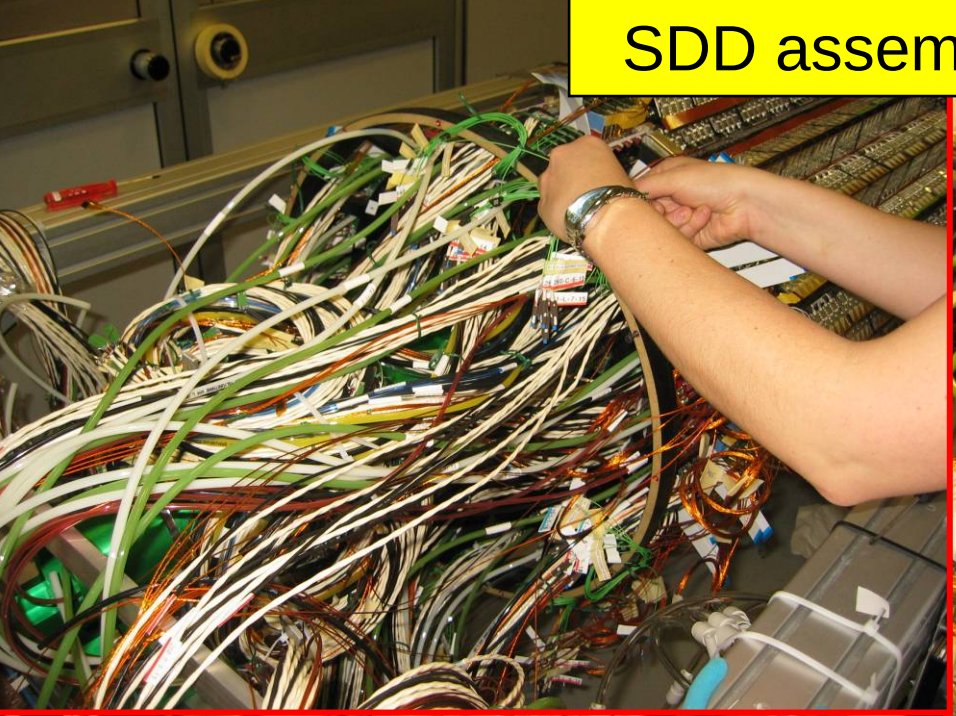
Silicon Drift Detector SDD

- Production
  - ⇨ detector production **(including spares)** **completed**
  - ⇨ modules assembly & cable connections: **completed**
  - ⇨ ladder Assembly & test: **completed** (January)

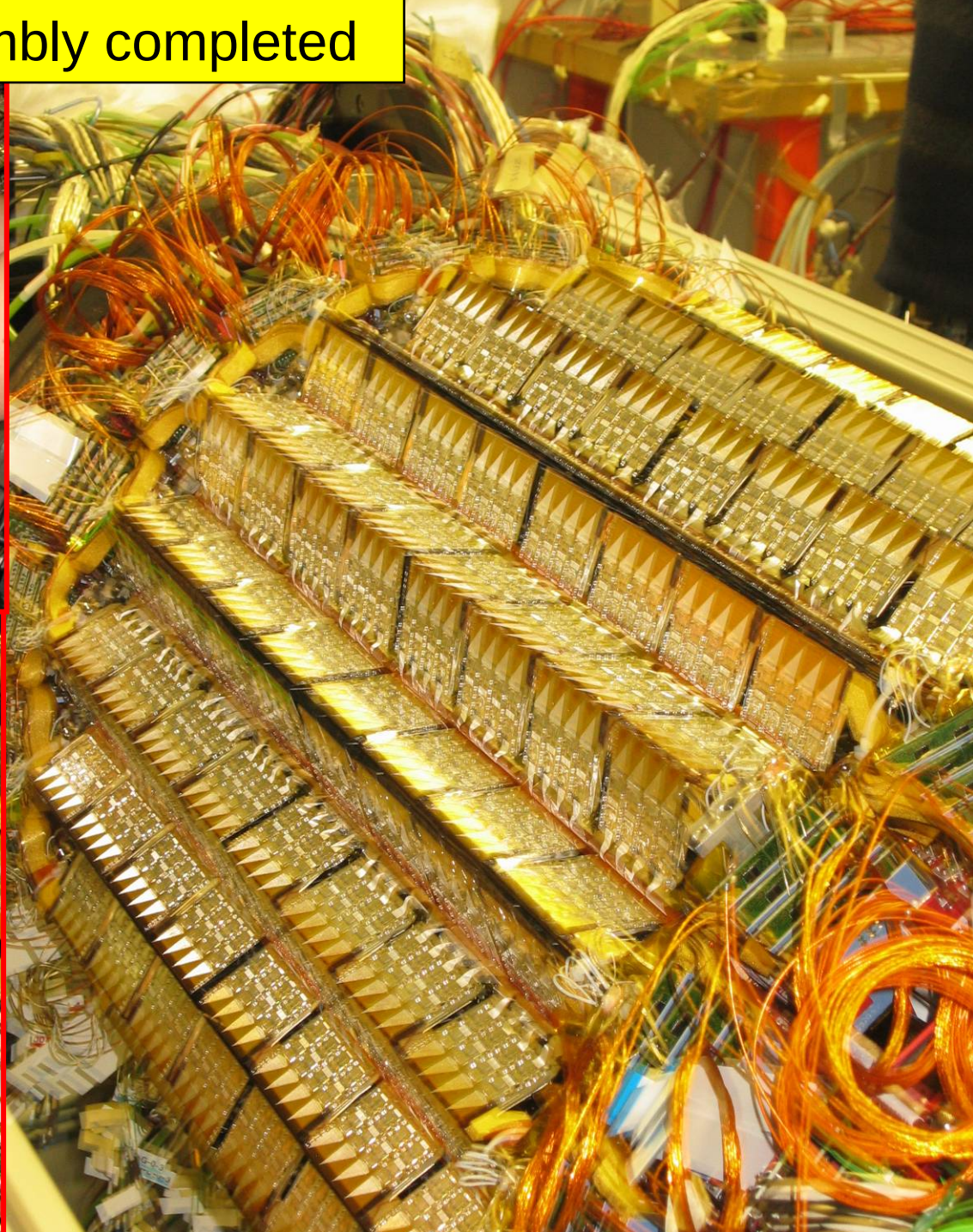
- Installation
  - ⇨ transport to CERN 31st Jan
    - ✪ integration/testing with SSD
    - ✪ good channels ~ 98%
  - ⇨ **Installation 15 March**



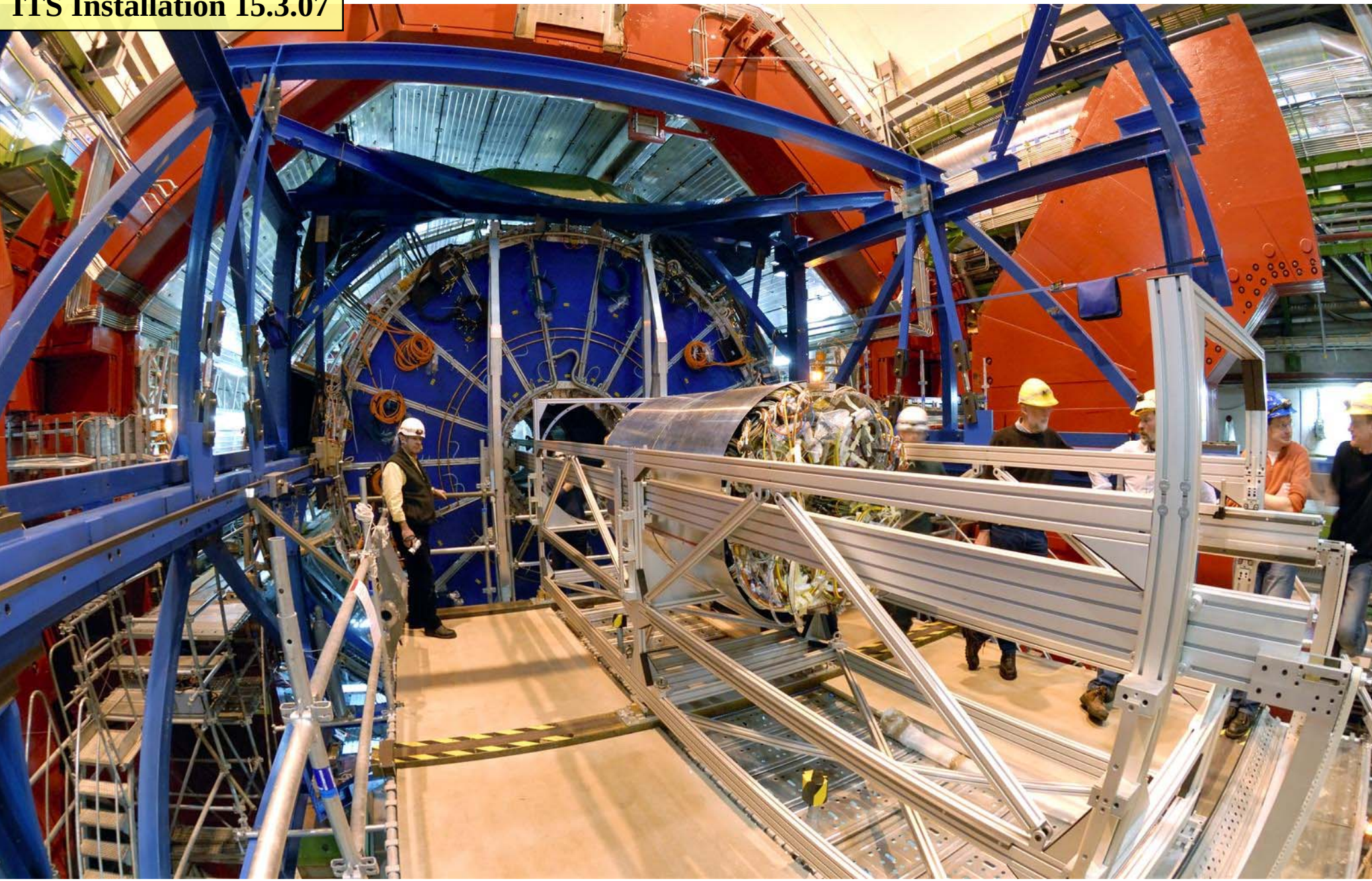
SDD assembly completed

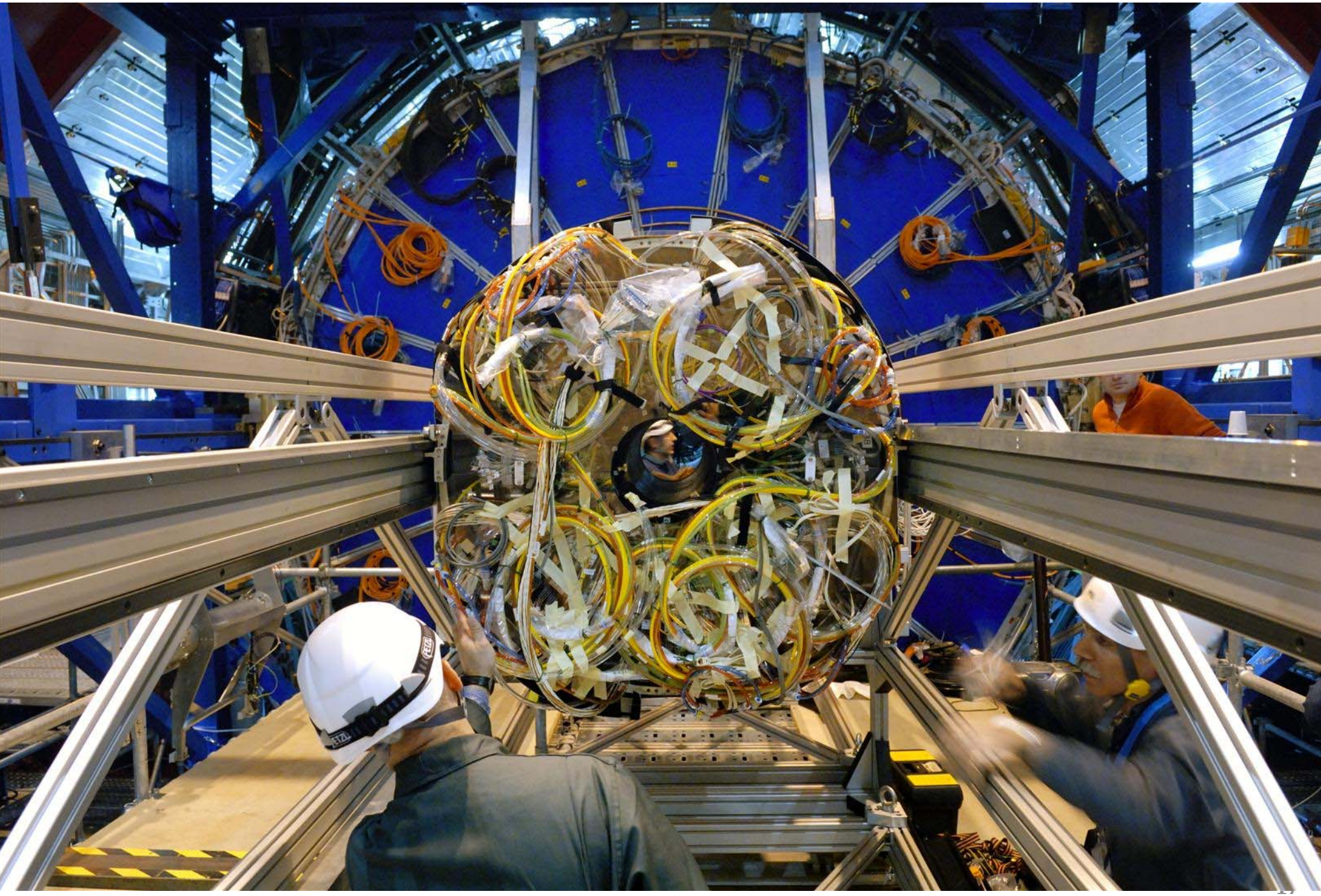


SDD at CERN 31st Jan 2007

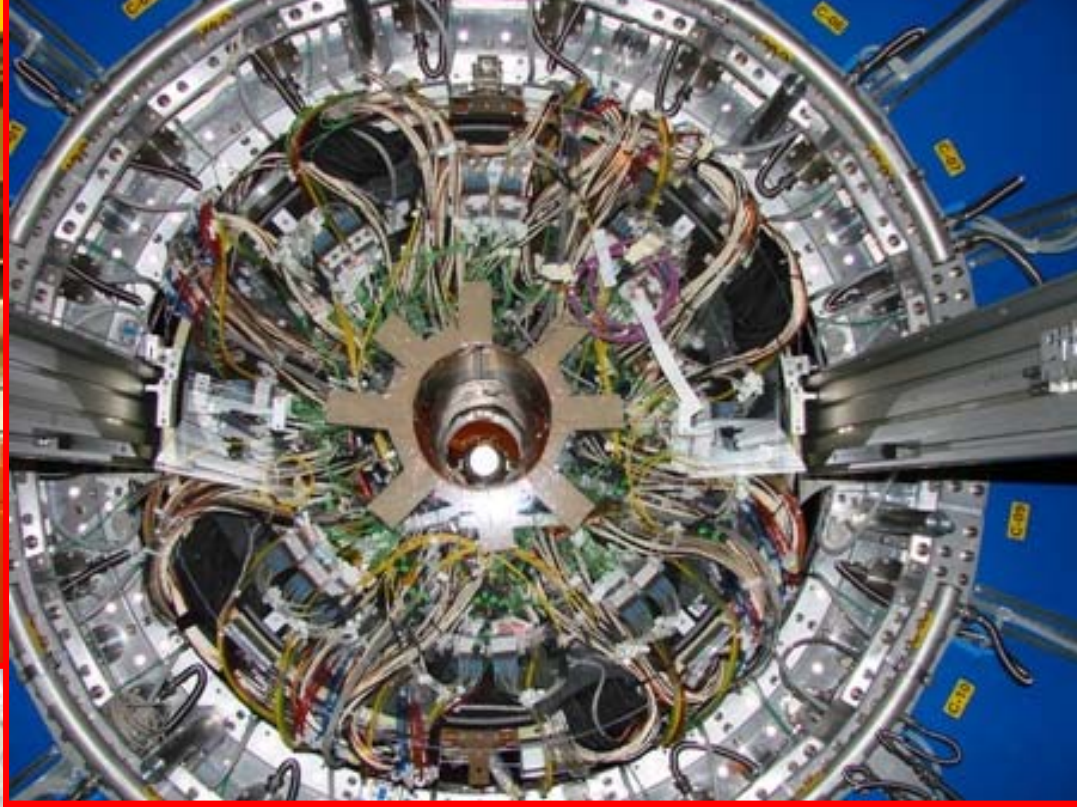


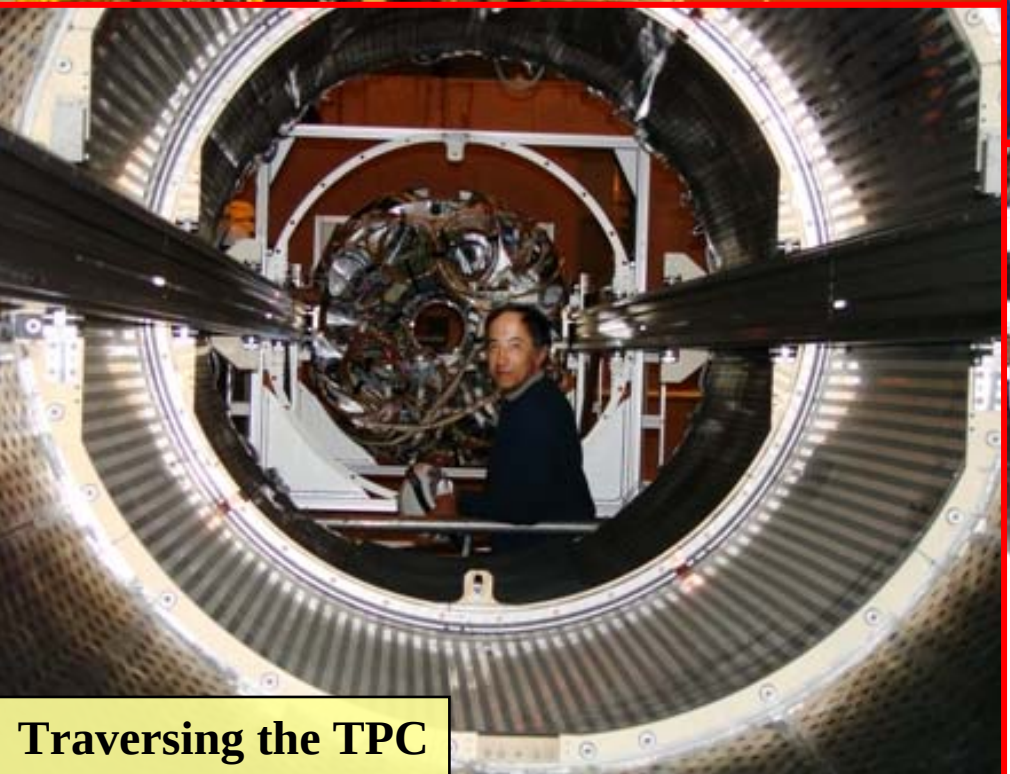
ITS Installation 15.3.07






ITS Installation 15.3.07

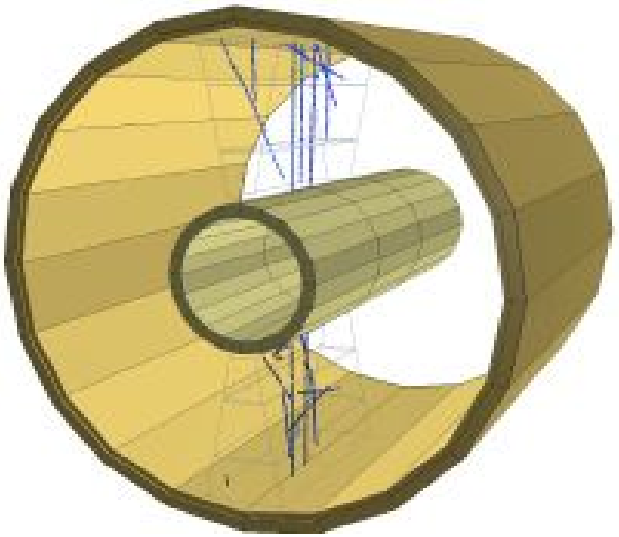



Traversing the TPC


Be beam pipe

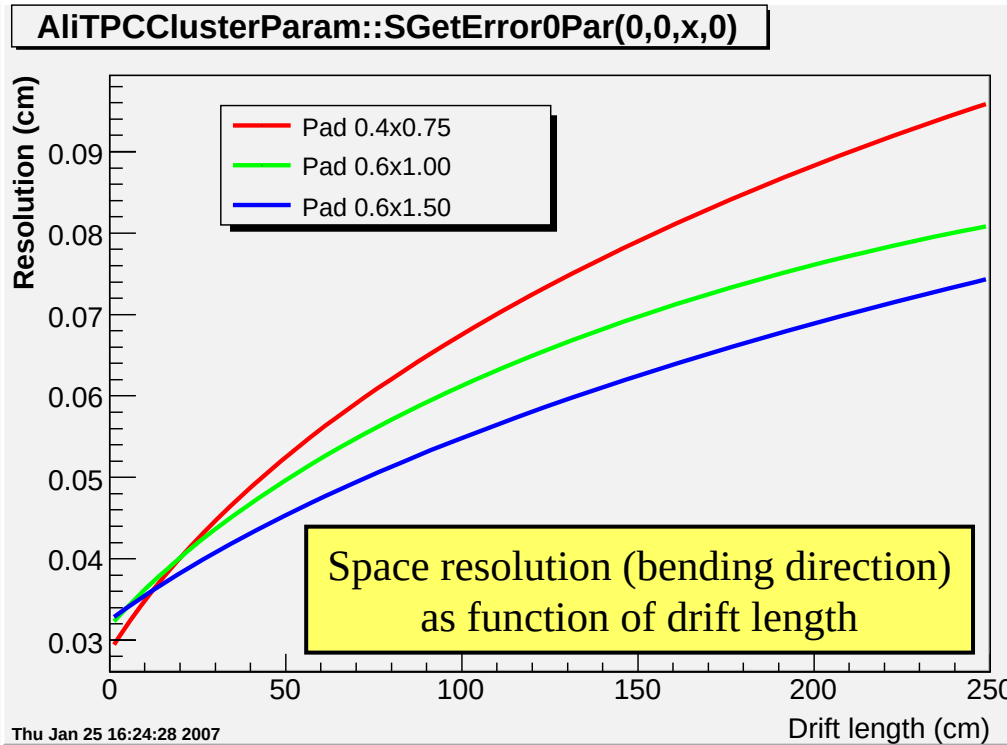
TPC Status

- 2006: ~ 7 month commissioning cosmics/laser
  - ⇨ including DCS, Trigger, HLT, final DAQ system
    - ✪ first tracks observed 16 May 2006
    - ✪ 2 complete rounds of tests for all chambers
  - ⇨ several faulty cards/connections repaired
  - ⇨ exercised laser calibration system
  - ⇨ **one OROC chamber had to be replaced** (Nov 06)

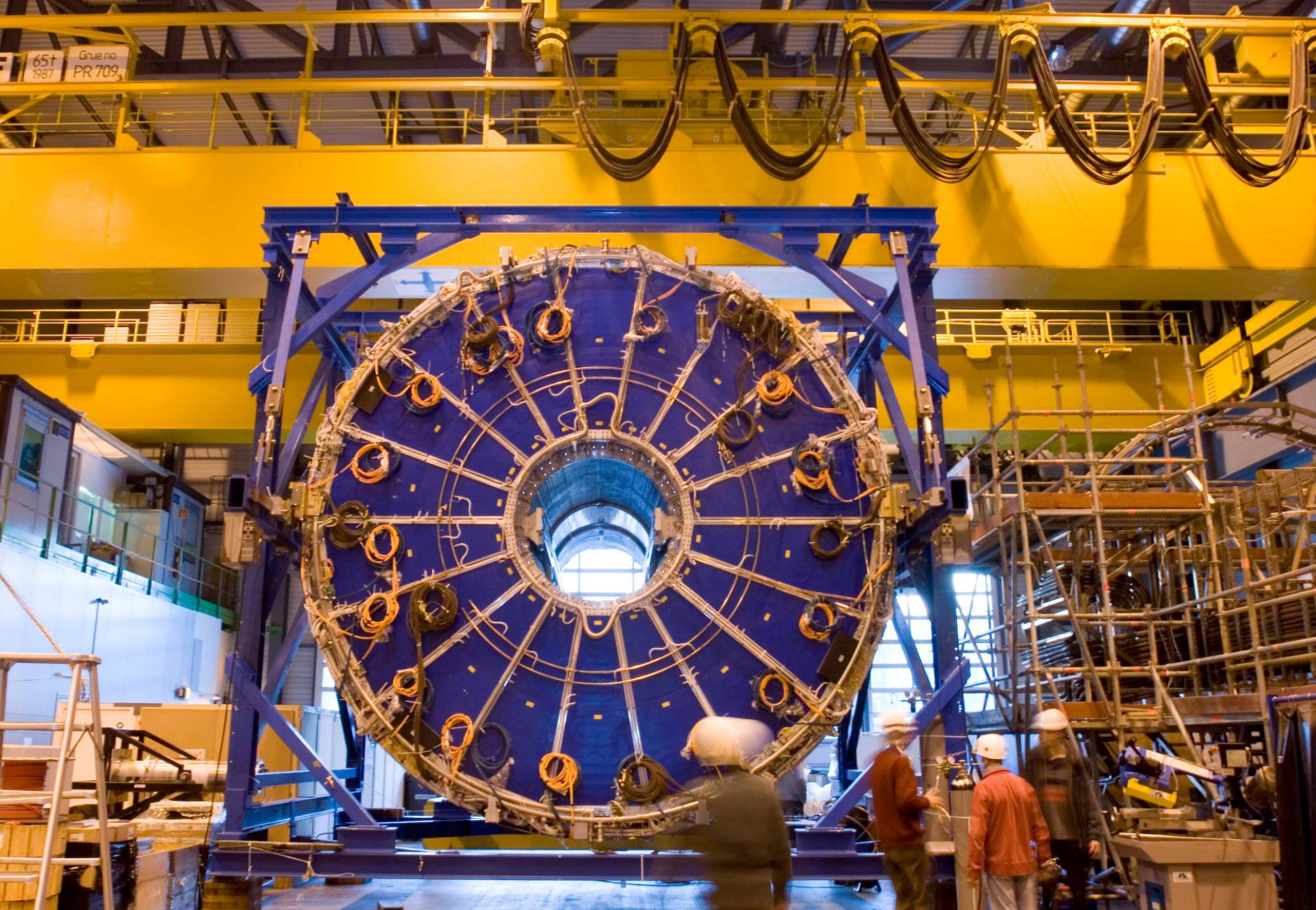


  - ⇨ **resolutions according to specifications**
    - ✪ FEE actually better than specs !

- Installation
  - ⇨ transport to pit 11 January 2007
  - ⇨ now: testing & connecting services
  - ⇨ start operation: June (C-side), Oct (A-side)




TPC transport
(January 11 2007)

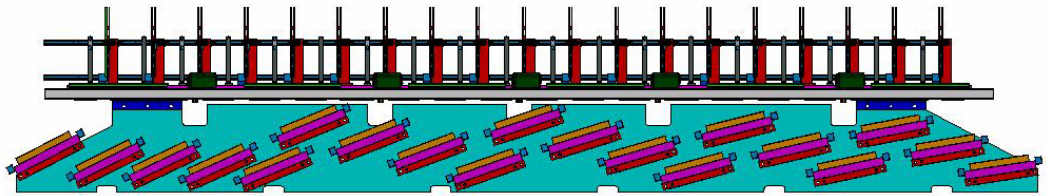

65t
1987
Grue no
PR 709

TPC in final position

TOF

Production

- ⇨ strip construction: 100% done
- ⇨ module production : 50 % done
- ⇨ FEE cards: 100 % done

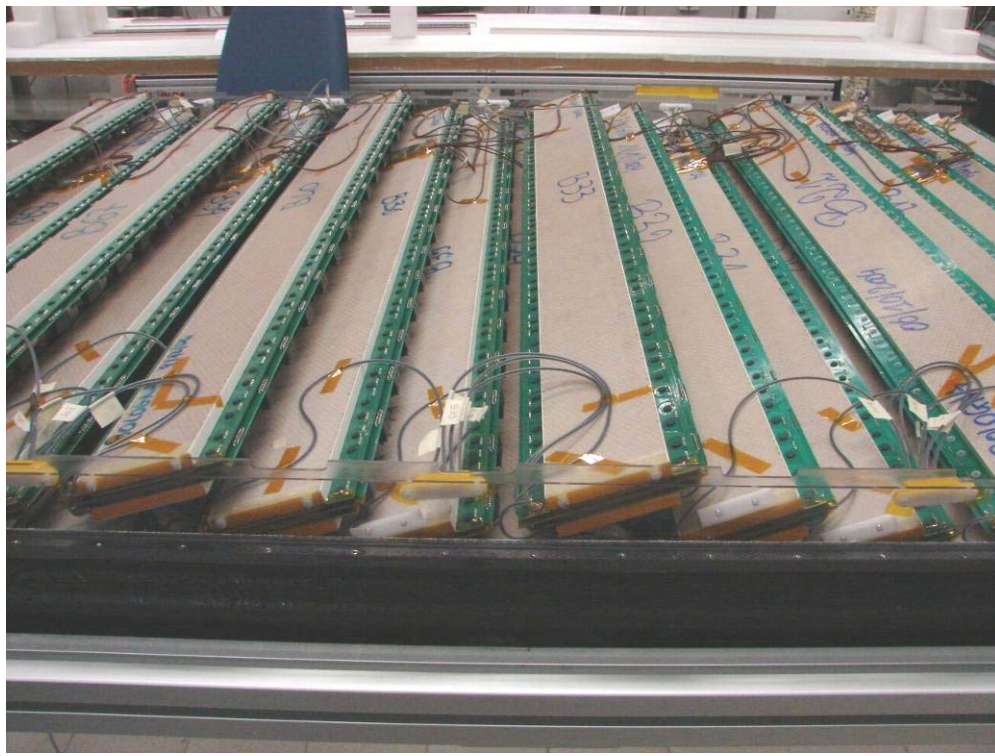


Assembly & Installation

- ⇨Supermodule assembly : started in **May 06**
- ⇨2 SMs installed **Oct 06**

Schedule

- ⇨ modules completed: **Nov 07**
- ⇨ 5 more SMs ready for installation : **July 07**
  - ✪ 8 – 10 by October
- ⇨ TOF production complete: **end 2007**
  - ✪ installation during winter shutdown 2007/8

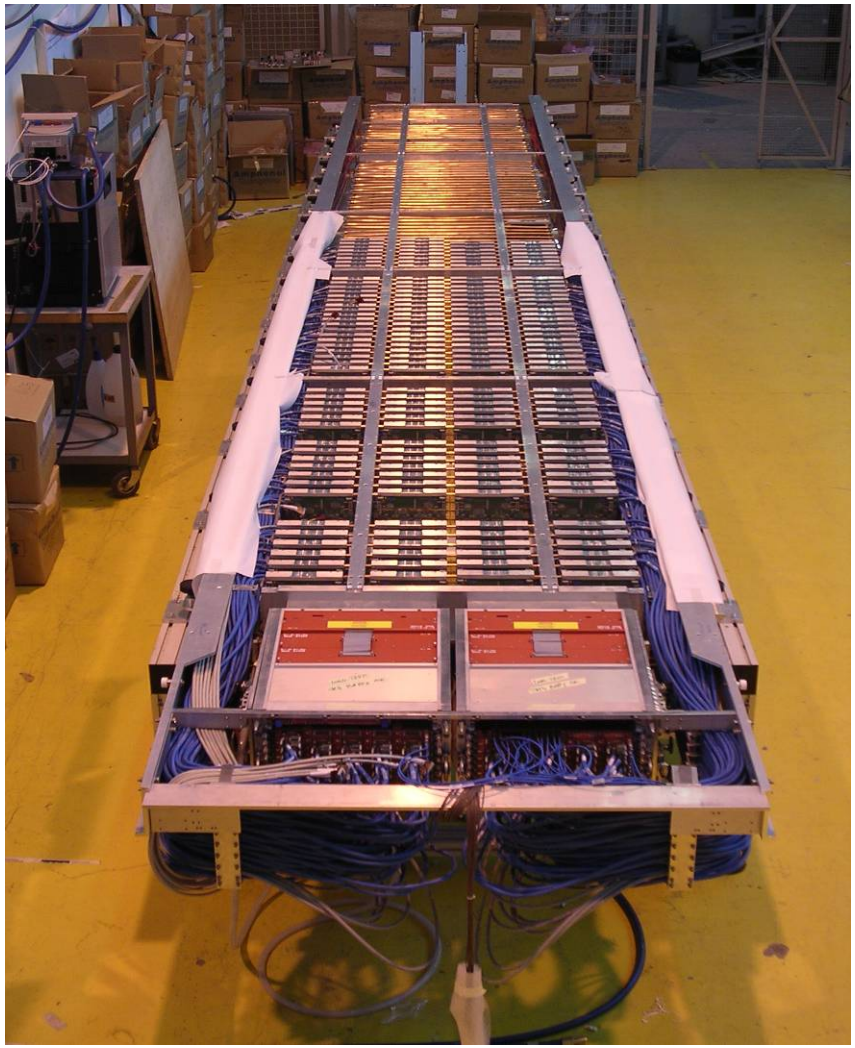


TOF strips
stacked in modules

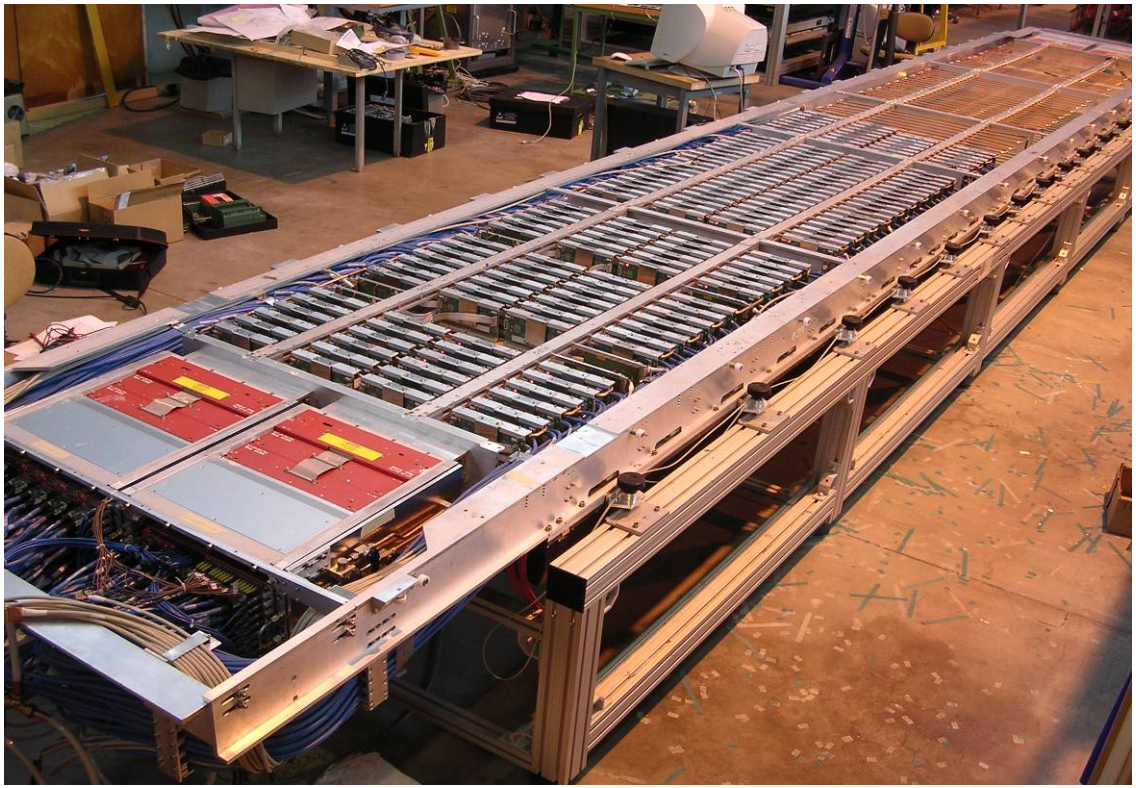
Status of assembly for SuperModules 3 and 4

(March 7th, 2007)

S.M.3



S.M.4



TRD

- **Chambers**: 60% of full TRD done, in line with SM assembly
  - ⇨ parallel assembly in 5 labs + Muenster (radiators, SM assembly)

- **Electronics**:
  - ⇨ **Digital chip, R/O board & MCM:** in **production** with good yield
  - ⇨ **GTU (Global Trigger Unit)**: production finished, installation ongoing

- **Assembly & Installation**
  - ⇨ 1st Supermodule completed Sept 2006,
    - ✪ fully tested at CERN prior to installation in October
    - ✪ in situ test end March
  - ⇨ 2 more SM's for installation in 2007
    - ✪ SM2: end May
    - ✪ SM3: mid July
  - ⇨ Installation window: July 2007 -> Sept/Oct
  - ⇨ aim to have all 18 SM ready for installation early 2009
    - ✪ assembly: ~ 1/SM every 6 weeks

TRD Services

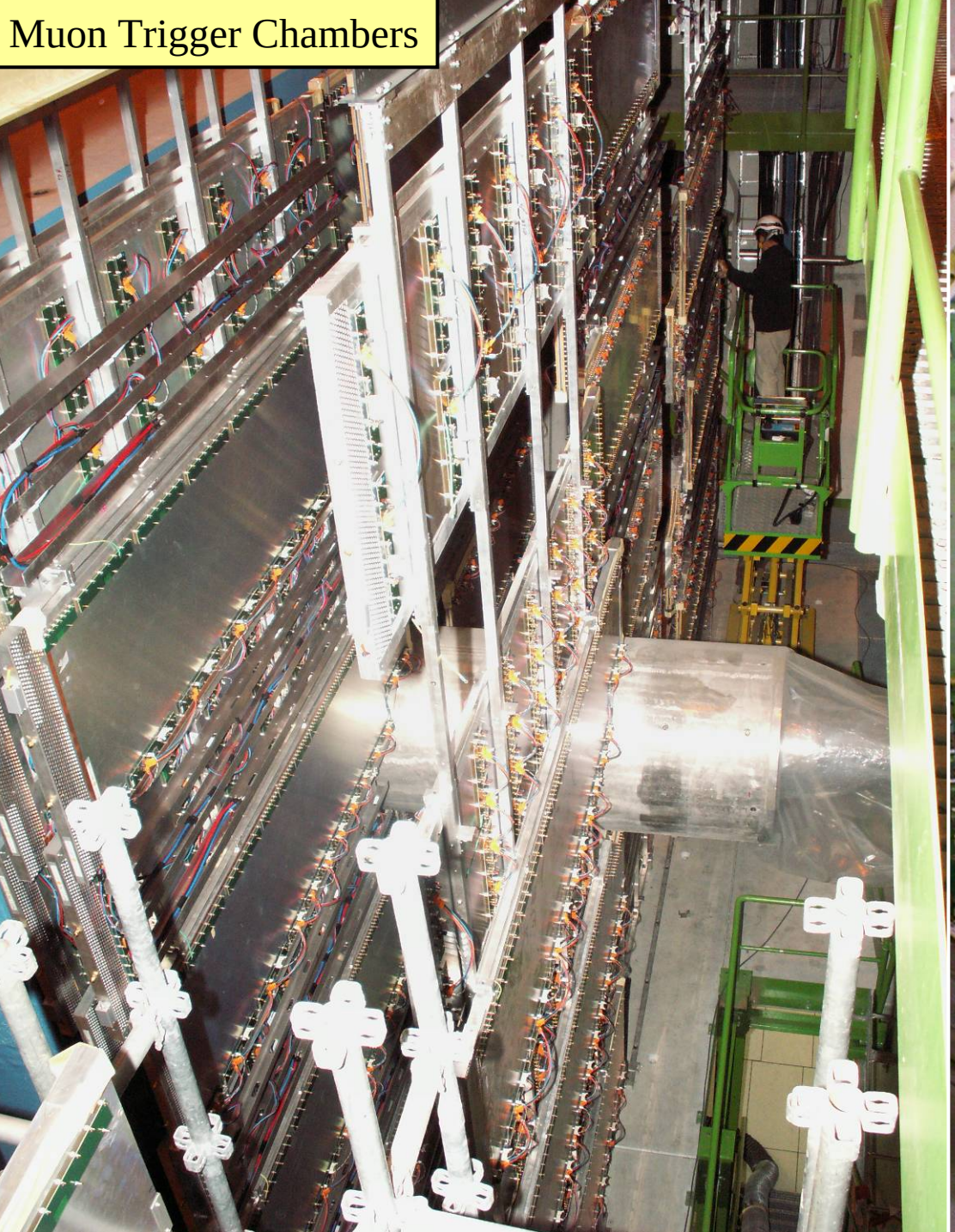
Muon Arm

- Tracking
  - ⇨ assembly & installation ongoing
    - ✪ Station 1, 4, 5 installed, service installation ongoing
    - ✪ Station 2: April/May Station 3: June/July
      Station 2 was modified to increase HV stability
    - ✪ FEE board MANU ~ 80% complete
  - ⇨ commissioning (ST1, ST4) has started

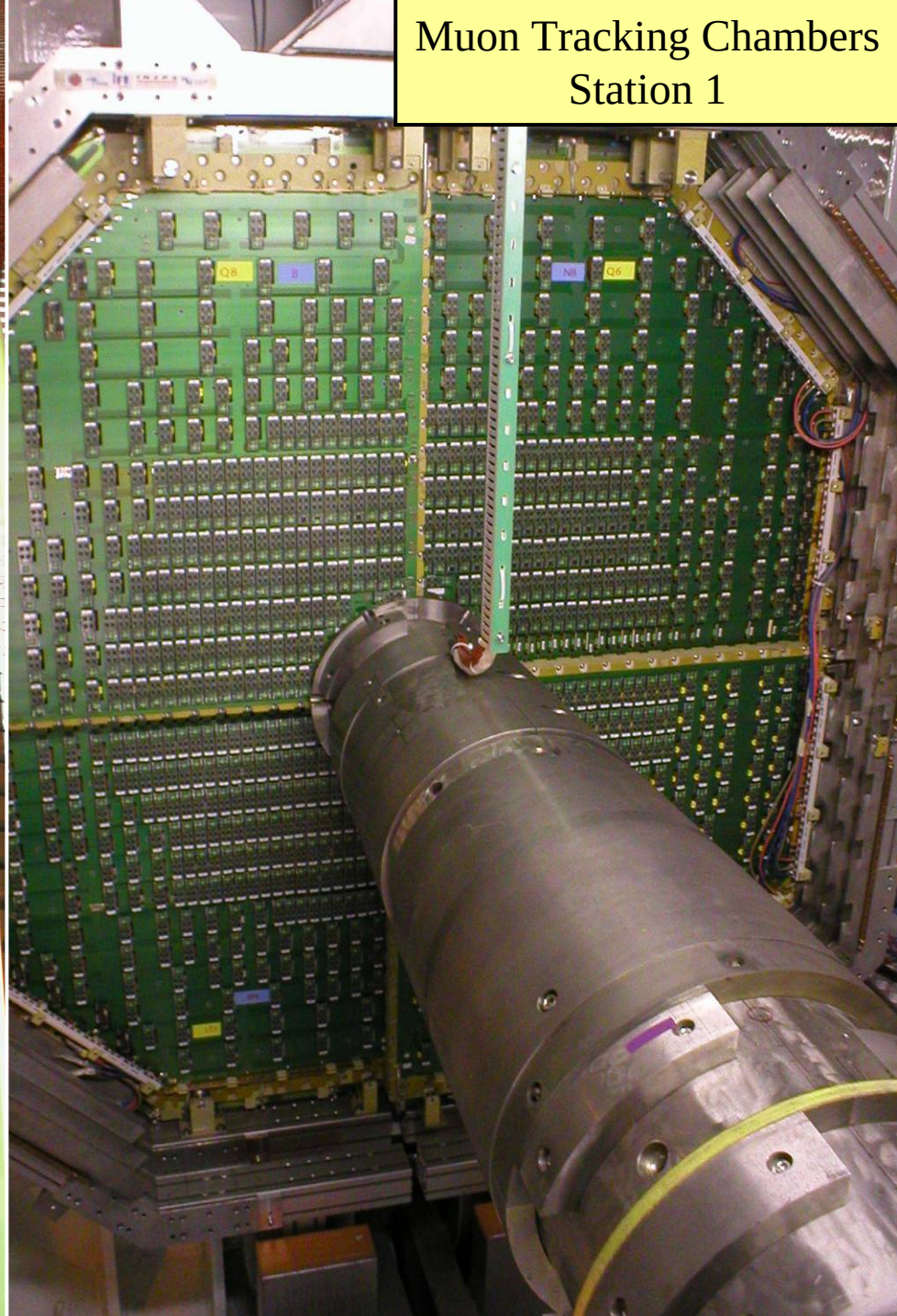
- Trigger
  - ⇨ service installation ongoing
  - ⇨ commissioning started

Muon tracking chamber

Muon Trigger Chambers

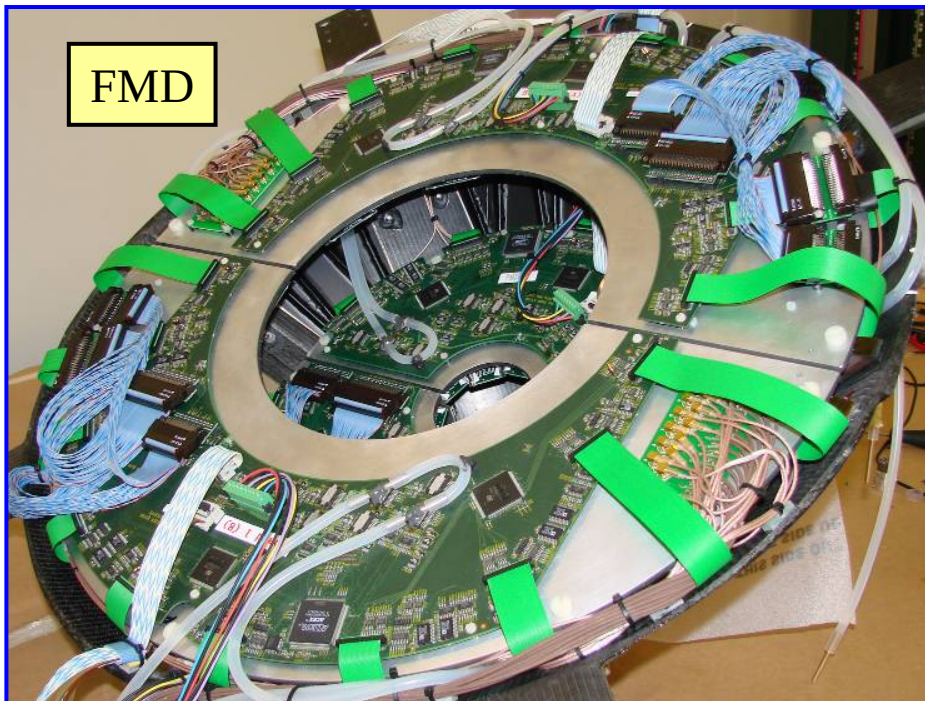


Muon Tracking Chambers
Station 1



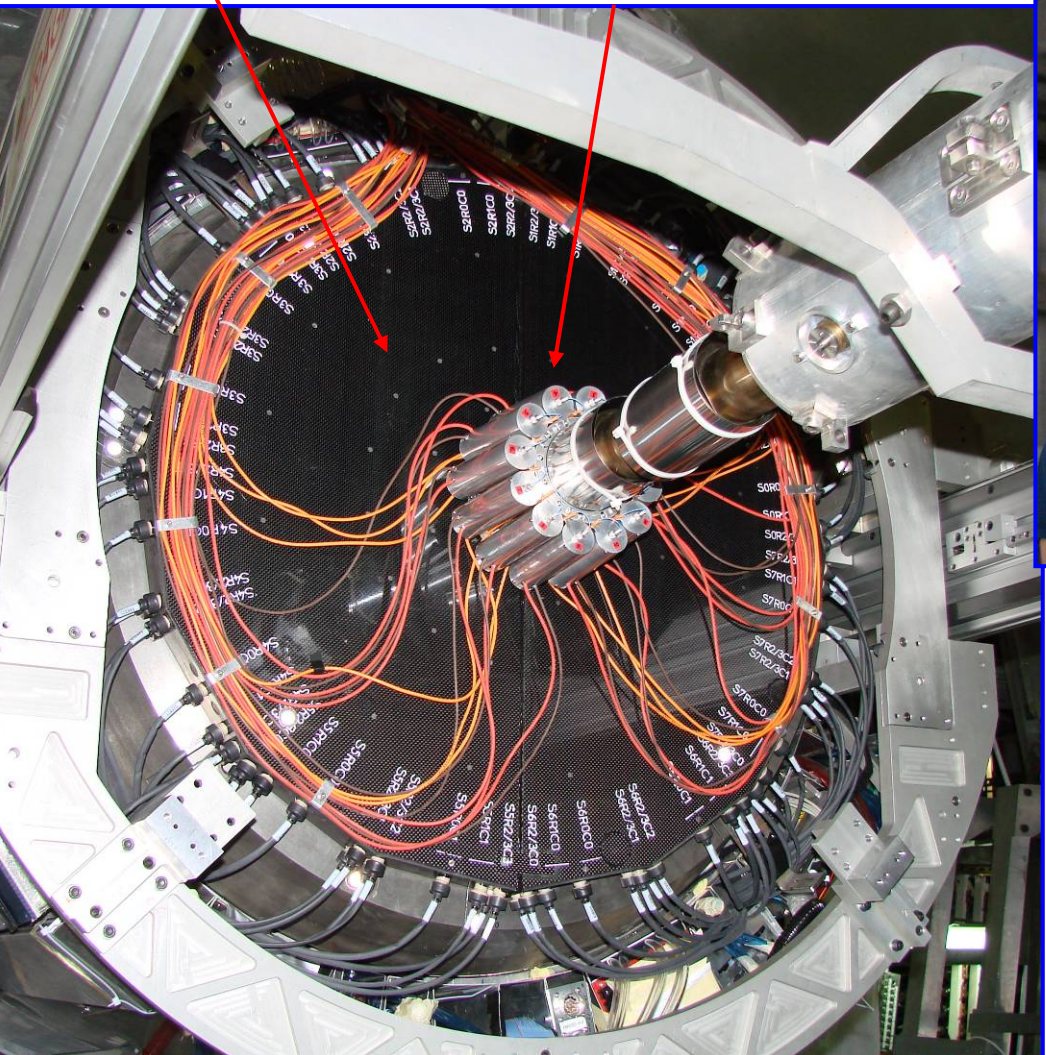
Other Detector Systems

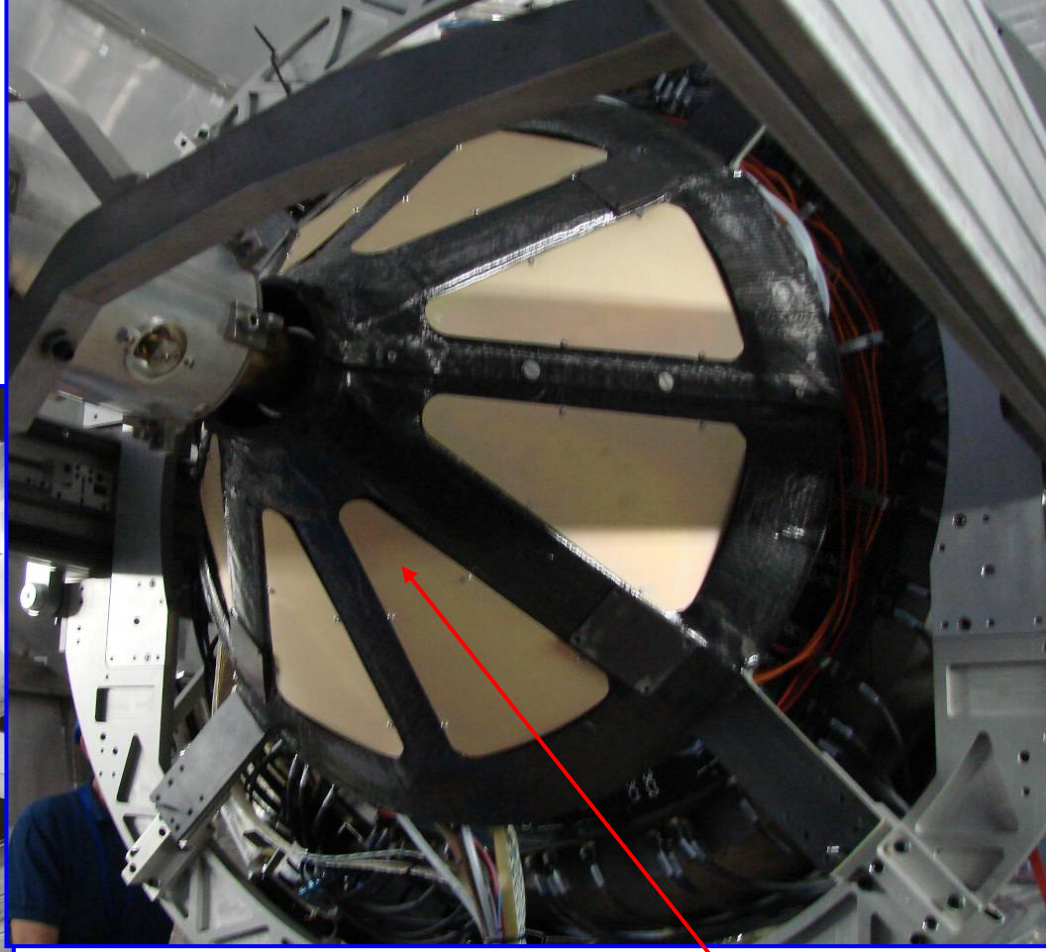
- **PHOS**:
  - ⇨ module #1 ready for installation
    - ✪ Trigger cards produced
  - ⇨ modules 2 & 3 to be produced and calibrated in 2007
- **HMPID**:
  - ⇨ **commissioning started**
- **Forward Detectors** (V0, T0, FMD, PMD, ZDC):
  - ⇨ **all on schedule**
    - ✪ C-side detectors (V0/T0/FMD) are installed
- **ACORDE** cosmic trigger:
  - ⇨ 1/3 installed , commissioning started
  - ⇨ remaining parts being installed



Interaction Trigger (V0)

Trigger & Timing (T0)





Forward Multiplicity Detector
FMD

Trigger/DAQ/HLT/DCS

- Trigger
  - ⇨ all boards produced & tested, at CERN. Software development/User interface ongoing
- DAQ
  - ⇨ DDL SIU (rad hard) and D-RORC produced
  - ⇨ Selection, purchase, installation of Transient Data Storage and Cluster File System done
  - ⇨ ALICE Data Challenge VII (end 2006): reached 1020 MB/s to T0 storage
  - ⇨ initial configuration (30%) installed & commissioned during TPC tests
- HLT
  - ⇨ New H-RORC produced and commissioned (TPC)
  - ⇨ initial configuration (~ 100 PC's, 400 CPU's) installed
    - ✪ commissioned during TPC tests
  - ⇨ software, online-displays ongoing
- DCS
  - ⇨ back-end system & control PC's installed
  - ⇨ rack control, gas systems installed & being commissioned
- Integration **Trigger/DAQ/ECS/DCS/HLT/Detectors** is ongoing

Detector/DAQ integration (Apr. 07)

- DATE V5, DDL SIU + RORC delivered - Detector algorithms framework ready	SPD	SSD	SDD	TPC	TRD	TOF	MUONTK	MUONTG	HMPID	PHOSCPV	FMD	T0	V0	ZDC	PMD	ACORDE	EMCAL
Final electronics with DDL & DATE																	
Trigger with LTU and TTC																	
Common Data Header (TRG info)																	
Data format check																	
SOD, EOD																	
Data quality monitor. (MOOD)																	
Detect. Algorithms on monitor servers																	

Detector/ECS Integration (Apr 07)

ECS skeleton ready	SPD	SSD	SDD	TPC	TRD	TOF	MUONTK	MUONTG	HMPID	PHOSCP	FMD	T0	V0	ZDC	PMD	ACORDE	EMCAL
DCS FSM implemented																	
Det.-specific Trigger sequences																	
Calibrations runs defined																	
Calibrations runs implemented in ECS																	
Detect. Algorithms for calibration runs																	

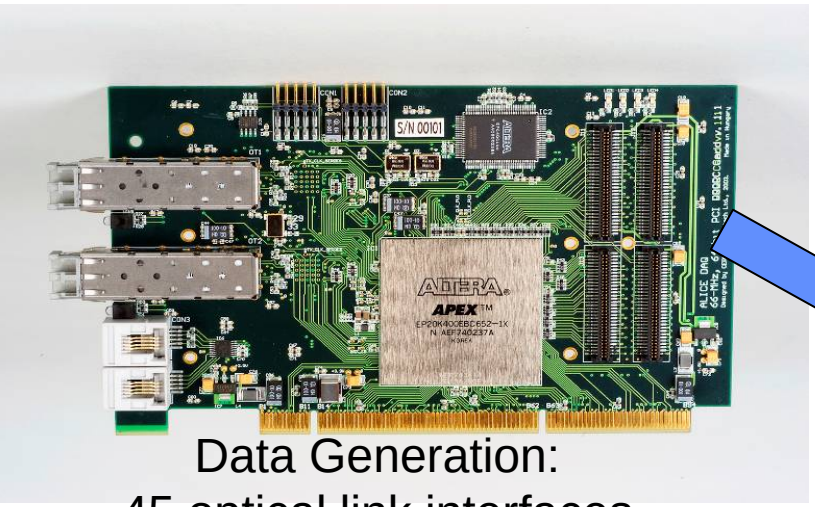
Detector/Trigger integration

Function	ACORDE	CPV	DMTrack	DMTrig	EMCAL	FMD	HMPID	PHOS
Receive LTU								
Install LTU								
Basic Readout								
BUSY handling								
Header to DAQ								
Calibrations	N/A							
Stability								
Error Handling								
Trigger toggling			N/A			N/A	N/A	
Trigger Signature			N/A			N/A	N/A	
Retested at Point 2								

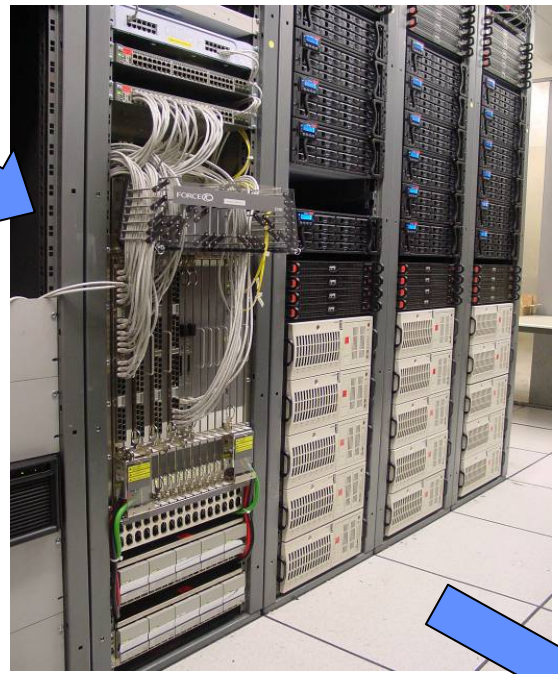
Function	SDD	SPD	SSD	T0	TOF	TPC	TRD	V0
Receive LTU								
Install LTU								
Basic Readout								
BUSY handling								
Header to DAQ								
Calibrations								
Stability								
Error Handling								
Trigger toggling	N/A		N/A			N/A		
Trigger Signature	N/A		N/A			N/A		
Retested at Point 2								
DATE	Apr-07							

ALICE Computing Data Challenge 06

Realistic test of data flow from ALICE to IT Computing Centre

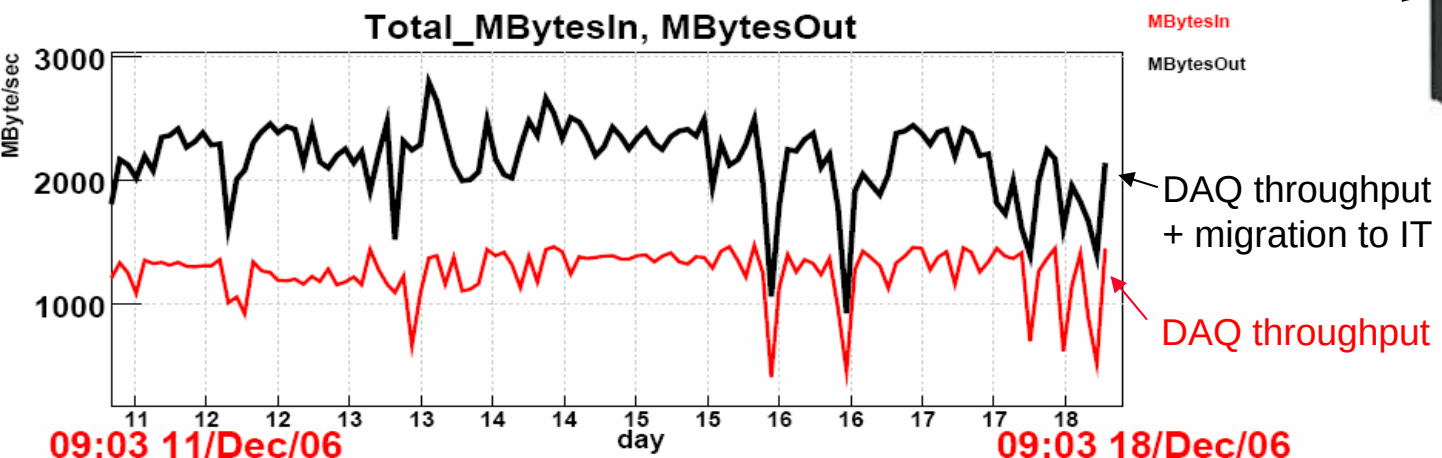


Data Generation:
45 optical link interfaces



Data Storage in the GRID Tier0
in CERN Computing Centre
on the Meyrin site

Global Performance Sept – Dec 2006
- **4 days at 1020 Mbytes/s** : 336 TB
- 18 days at 700 MBytes/s : 1 PB

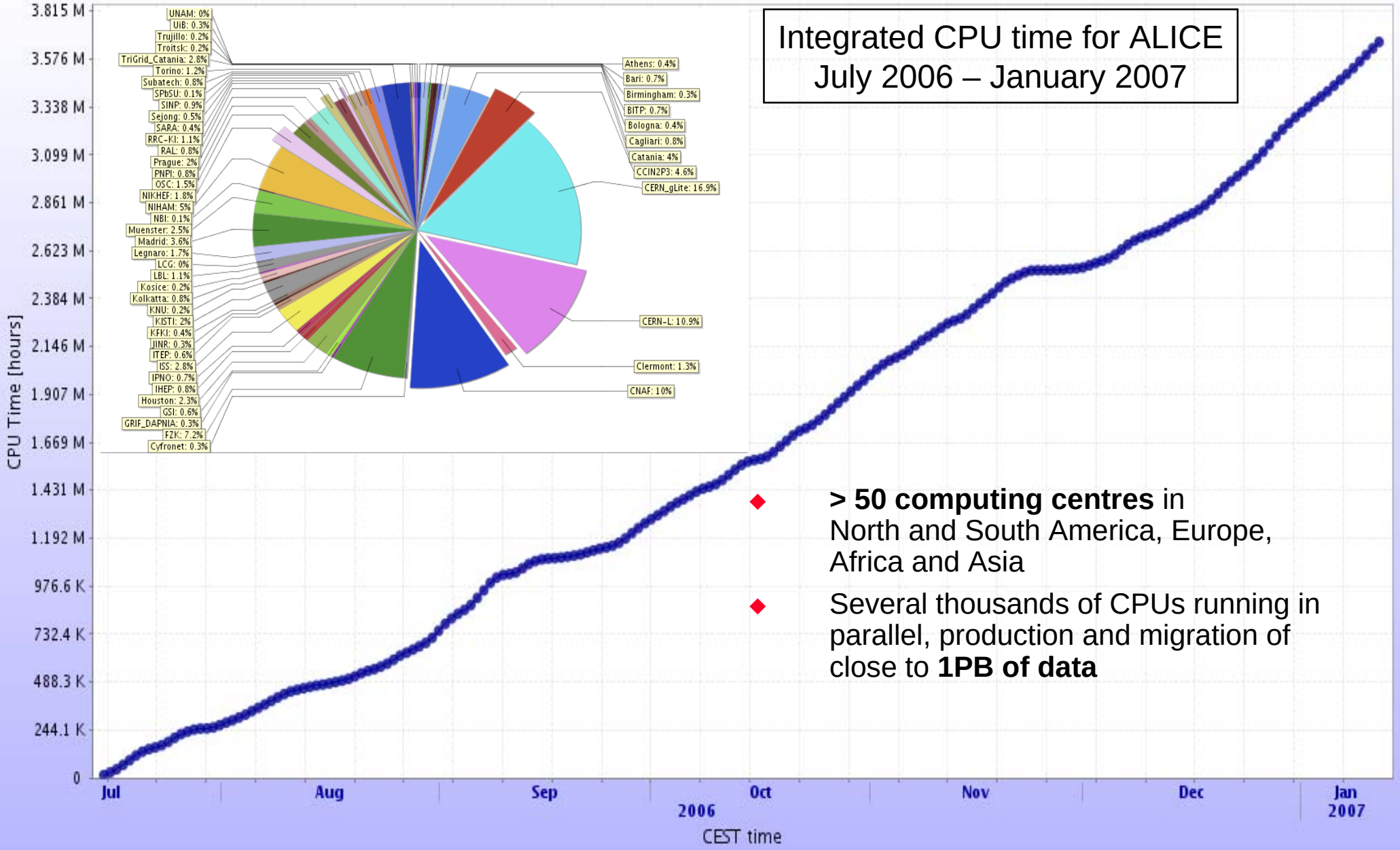


DAQ throughput
+ migration to IT

DAQ throughput

ALICE Physics Data Challenge 06

Distributed production of Monte-Carlo data for detector and software studies



- **> 50 computing centres** in North and South America, Europe, Africa and Asia
- Several thousands of CPUs running in parallel, production and migration of close to **1PB of data**

Computing

- Computing Resources
  - ⇨ ALICE **deficit in 2008/9** (after recent updates of pledges/requirements) ~ 30%
    - ✪ includes recent **new resources** from US, Japan, Korea, Spain
  - ⇨ **integral LCG resource balance** significantly better than ALICE specific balance
    - ✪ room for better distribution of pledged resources within WLCG…
  - ⇨ we will **contact individual countries** to discuss how to address the issue
    - ✪ in particular those whose pledged contributions seems to be bellow a 'fair share'
- usability of installed or pledged resources in 2006 ~ 50%
  - ⇨ inefficiency comparable for all experiments
    - ✪ resource installation below pledges
    - ✪ start-up problems with efficient integration
    - ✪ missing local support and/or very poor response
    - ✪ inflexible & cumbersome sharing between users (allocation of idle resources !!)
  - ⇨ strong variations between countries, from 0% to > 100% !
    - ✪ not yet efficiently integrated or installation well below pledged:
      Greece, India, Mexico, Russia, China, Croatia
    - ✪ resources installed, but could not be used efficiently:
      Denmark, Finland, Norway, Sweden, Poland

Summary

- Major Milestones
  - ⇨ **TPC** installed
  - ⇨ **SSD/SDD end of production** , integrated & installed
  - ⇨ **Beampipe & trigger** detectors installed
  - ⇨ good **progress in services & cabling**

- Biggest Concerns
  - ⇨ **SPD repair**, delay of installation sequence
    - ✪ **ITS/TPC installation** is very delicate & complex
  - ⇨ **Computing resources:** still some way to go
  - ⇨ LV power supply delivery schedule (until April 2008)