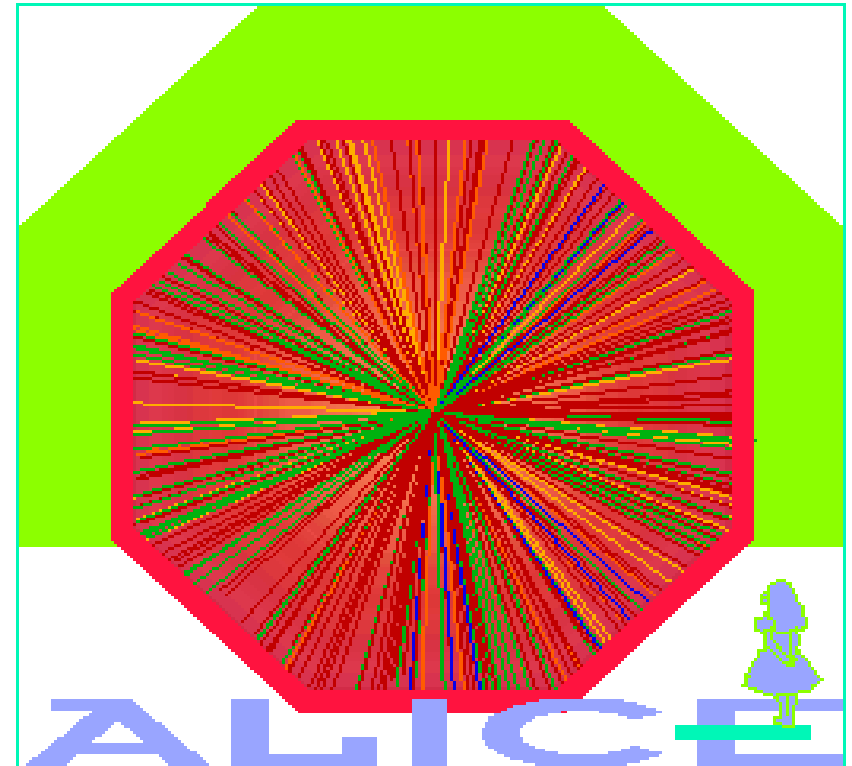


19th ALICE RRB

- **Collaboration Status**
- **Project Status**
 - ⇒ **Integration, large structures**
 - ⇒ **Detectors (selection)**
 - ⇒ **Milestones & Summary**





Organization & News



● Institutes:

- ⇒ New: **Sejong University** (Korea) offline computing
- ⇒ Applying: **Grenoble** (France) muon arm (alignment)

● Elections

- ⇒ JS re-elected as Spokesperson for 3 years (spring 2006 – spring 2009)
 - ★ **Deputies:** H. A. Gustafsson (Lund), P. Giubellino (Torino)
- ⇒ 3 new MB member: **R. Kamermans (Utrecht), JP Revol (CERN), Y. Schutz (Nantes)**

● Organization

- ⇒ start work on '**authorship policy**',
 - ★ also in connection with M&O (non)payments
 - ★ ideas are similar to ATLAS/CMS proposals

- Computing TDR submitted June 2005

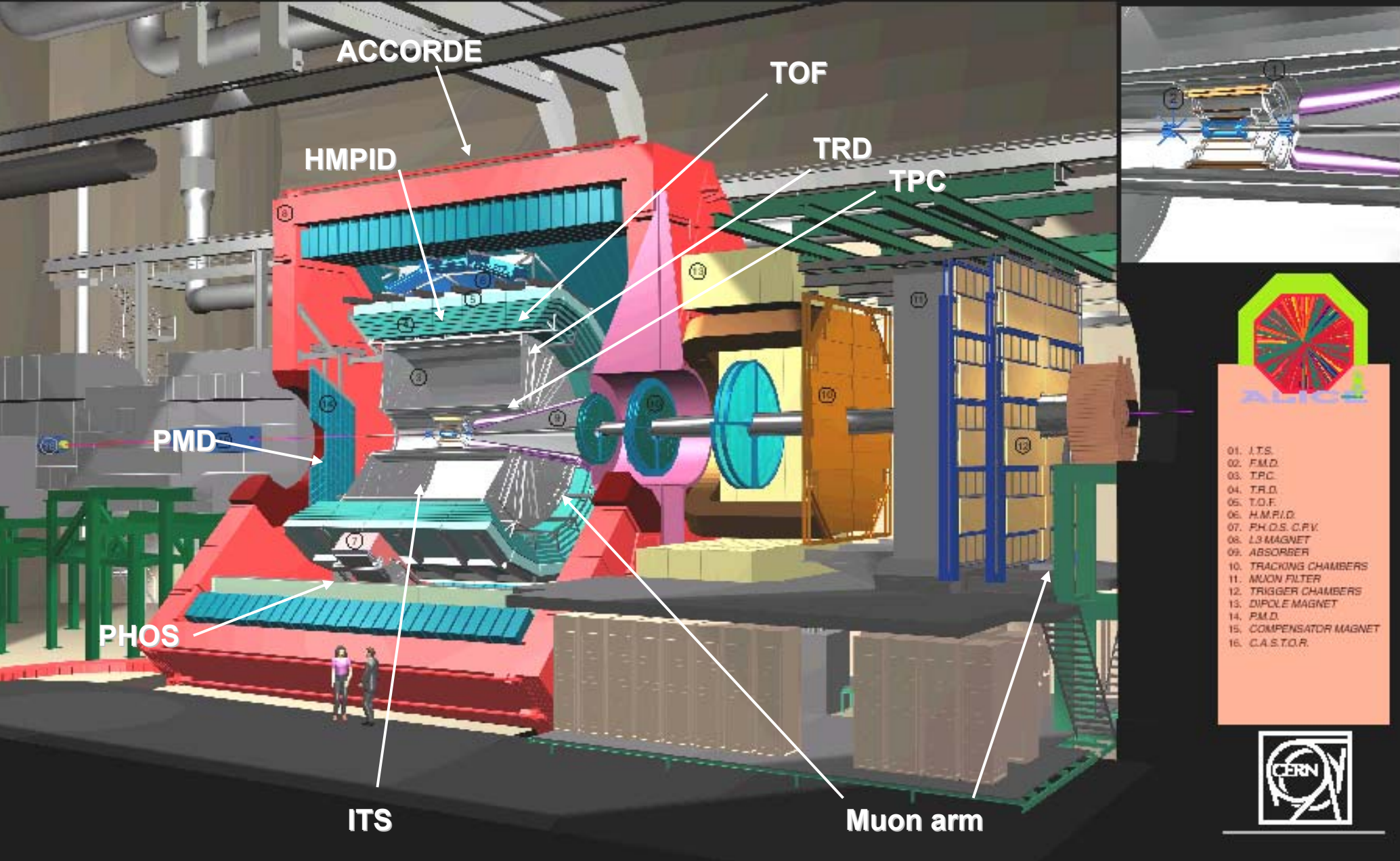


Funding Issues



- **US participation** ~ 10 M\$: **EMCAL** for jet physics
 - ⇒ **slowly making progress !**
 - ☆ 1st phase (partially) agreed for ~ 1.5 M\$, to be reviewed Dec. 2005
 - ☆ includes R&D, support structure (to be installed early) + 1st supermodule (1/12th)
 - ☆ full proposal to be submitted for Dec. review
 - ⇒ **growing interest in Europe to participate in emcal project**
 - ☆ driven by convincing physics case ('jet quenching')
- **China** ~ 1-2 MSF: **PHOS, Installation & Integration**
 - ⇒ **current proposal:** combined **funding from Institutes and MoE**
 - ☆ **Wuhan** has agreed, **CIAE** is positive, under consideration by **MoE**
 - ☆ additional support from **NSFC** and **MoST** envisaged for later
- **Japan** ~ 10 M\$: **TRD, PHOS**
 - ☆ **proposal not funded** in 2005, assessing options....
 - ☆ continued strong interest by strong HI groups in Japan, some R&D money still available

First, preliminary discussions have started with some ALICE FA's to explore alternative means to eventually **complete the PHOS and TRD** coverage in case a significant participation from China and Japan would not materialize



ALICE Detector



Installation, Large Structures



● L3 & muon magnets:

- ⇒ final **assembly & commissioning** of muon magnet **finished**
 - ⊕ final parameters are at (eg field) or better (stray field, cooling) than specs !
- ⇒ **field mapping** (L3, dipole) **done**
 - ⊕ 3 week worry with short in the L3 magnet which could however be 'burned' away !

● Muon Wall

- ⇒ installation **completed**

● Space frame load tests and installation tests completed

- ⇒ **deformations** at or below specifications

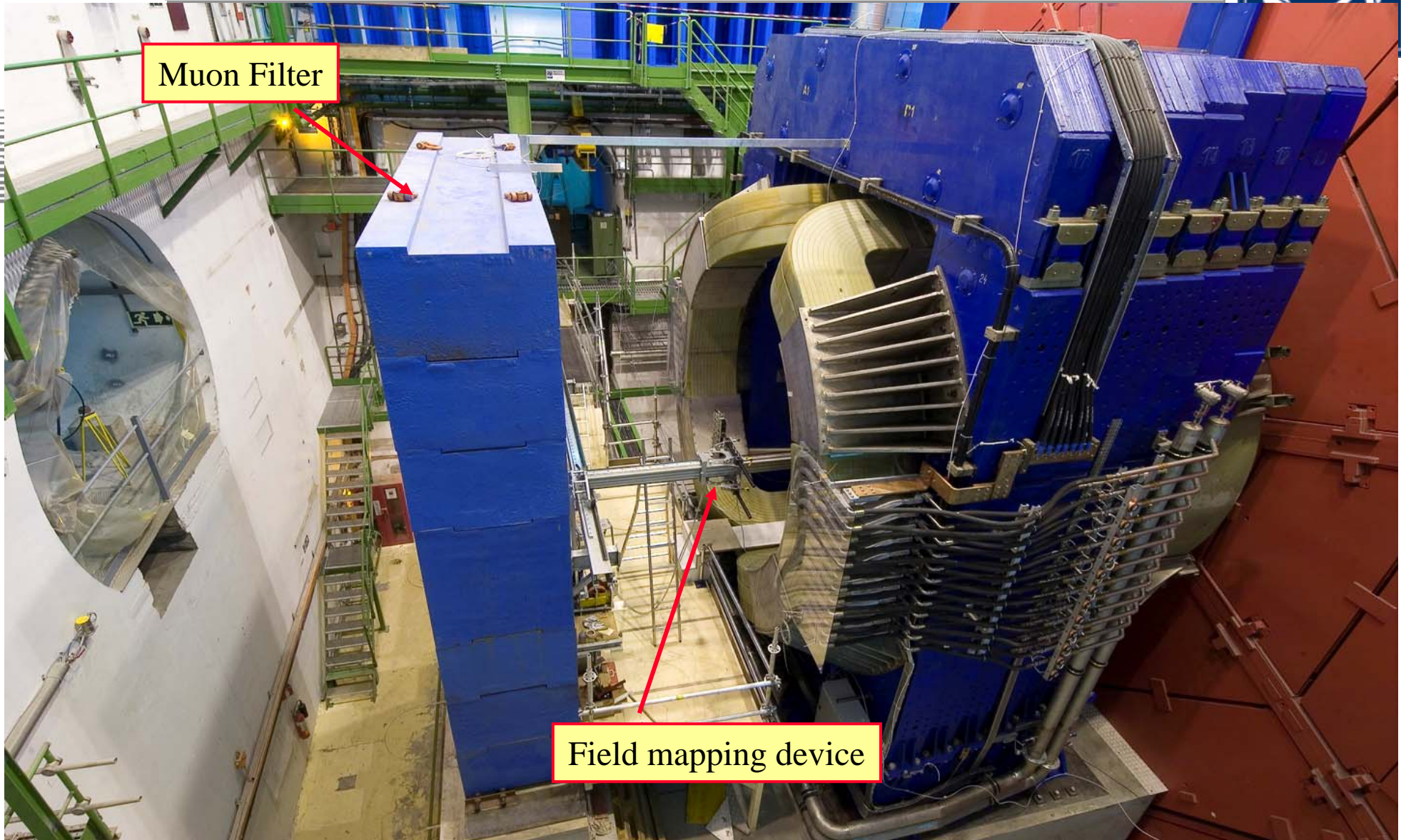
● Installation, services, infrastructure

- ⇒ **platform for low $-\beta$** (focusing) magnets installed
- ⇒ installation of **muon platform** started
- ⇒ **installation** of racks, cables, bus bars etc.. **ongoing**

● Overall Status

- ⇒ progress & performance essentially according to plan
- ⇒ **no major concerns**

ALICE Magnet field mapping



Muon Filter

Field mapping device

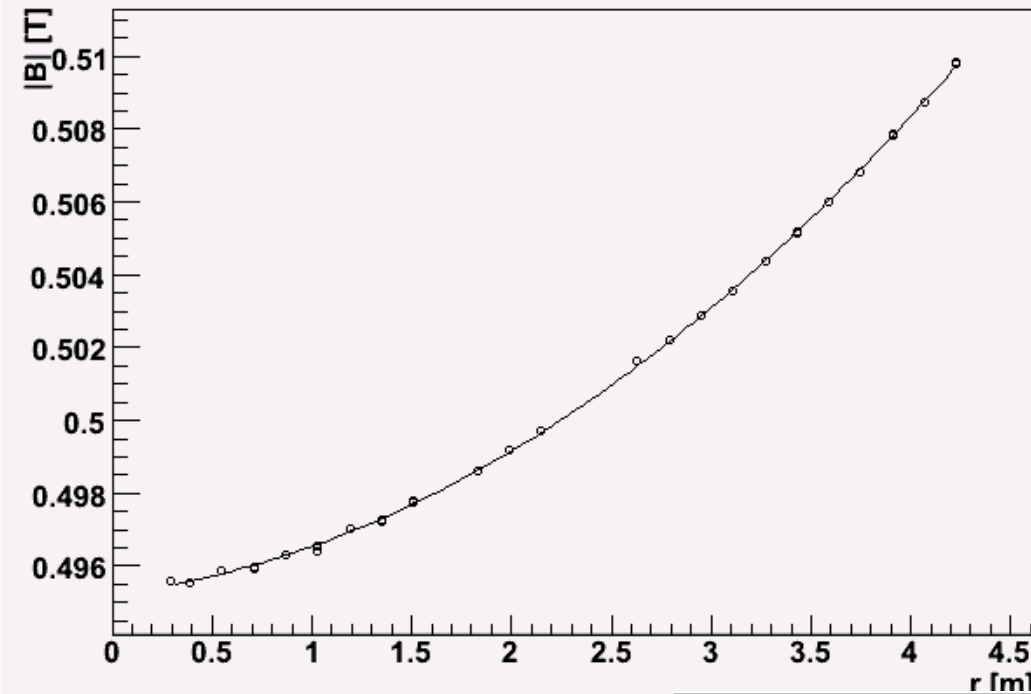
ALICE Dipole Magnet Main Parameters



Parameter	Spec. Value	Meas. Value	Unit
Max Flux density	0.67	0.68	T
Bending Strength	3.00		Tm
Avg. Gap width	3.30		m
Ampere turns	1.97		MA
Operating Current	5.86	6.00	kA
Coil Voltage	590	597	V
Power	3.46	3.58	MW
Inductance	1.00	1.00	H
Stored energy	17	18	MJ
Diff. Pressure	10.9	12	Bar
Flow rate	115	130	m ³ /h
Diff. Temperature	30	24	°C

Solenoid I = 30 kA

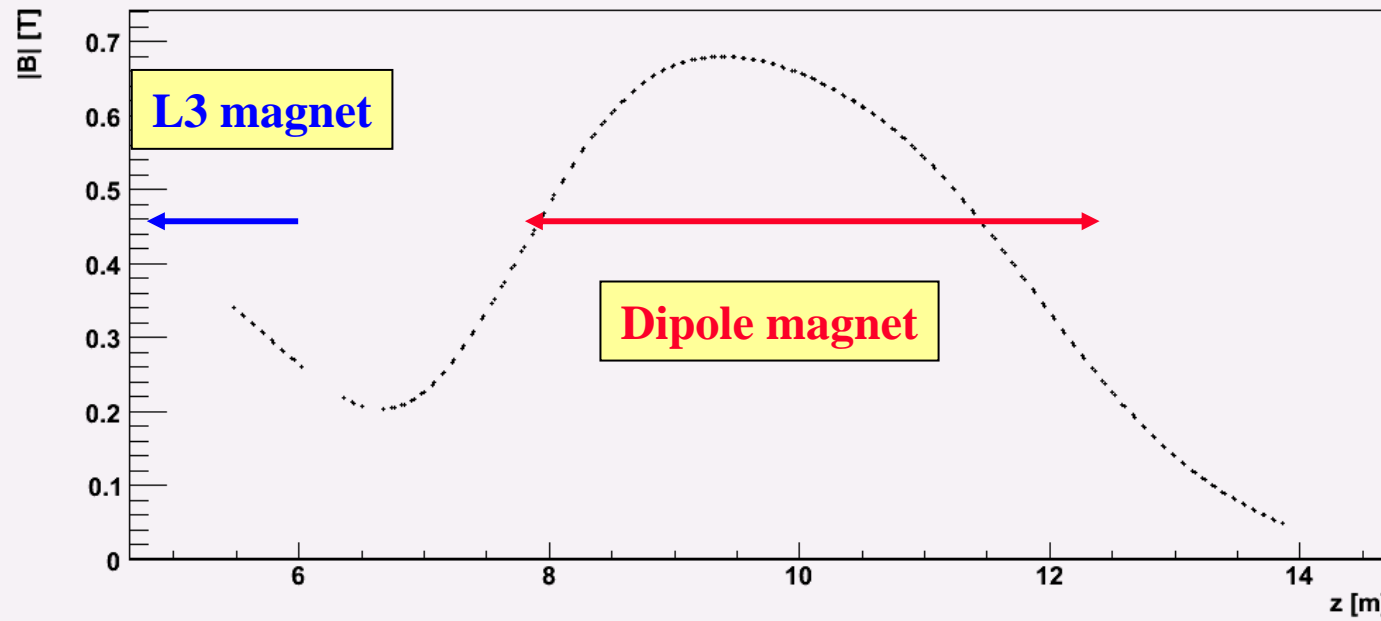
Field Mapping



L3 magnet at nominal current ($B = 0.5$ T)

Muon Dipole at nominal current
 $B_{\text{max}} = 0.67$ T
Field integral $Bdl = 3.22$ Tm

Dipole I = 6 kA | Solenoid I = 30 kA



L3 magnet

Dipole magnet

Space Frame LOAD TEST



LOW BETA PLATFORM



PLATFORM COMPLETED ON 21/09/05.



Muon Chamber Support Structure





Silicon Pixels SPD



- **One sector completed ($\approx 1\text{M}$ pixels)**

- ⇒ now being integrated at CERN (cooling, electronics)
- ⇒ uses mixed AL/Cu/polyimide bus

- **Component production & test**

- ⇒ MCM substrates all
- ⇒ bump-bonded ladders ≈ 120 out of 240
- ⇒ Al/polyimide pixel bus ≈ 20 out of 120
 - ★ yield problem understood, process qualified
 - ★ final test method developed (time consuming)
 - ★ **production ==> 4 to 6 bus/week**

- **Assembly of half-staves and sectors**

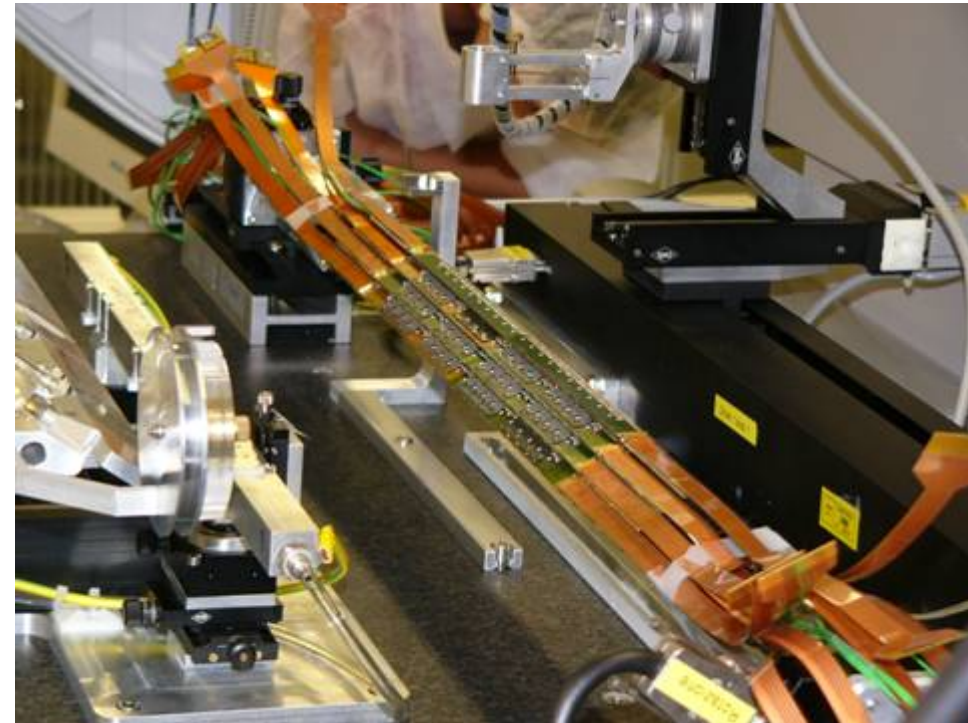
- ⇒ additional effort to **increase production** speed
 - ★ half-staves **2nd line operational** (4 HS/week capacity)
 - ★ sectors **making provisions** to increase speed

- **Sector integration & commissioning**

- ⇒ at CERN in DSF dedicated area

- **Concerns**

- ⇒ currently **NO technical concerns**
- ⇒ manpower (testing, sector assembly, integration)



12 ⇒ sufficient access to CERN DSF facility



Silicon Drift Detector SDD



● Status

⇒ **detector** production **regular** (now **25 det/month**)

★ 91/260 good detectors produced

★ **yield (~ 50%) below expectations (~65%)**

★ improved QA being implemented

⇒ **FEE** (PASCAL/AMBRA, CARLOS) & **boards**

★ **FEE testing** 70-90% complete, ready 2/06

★ **board production** finished end Nov

⇒ **Assembly** : prototypes done, mass production awaiting cable deliveries

⇒ **Support** structure: ready before end 2005

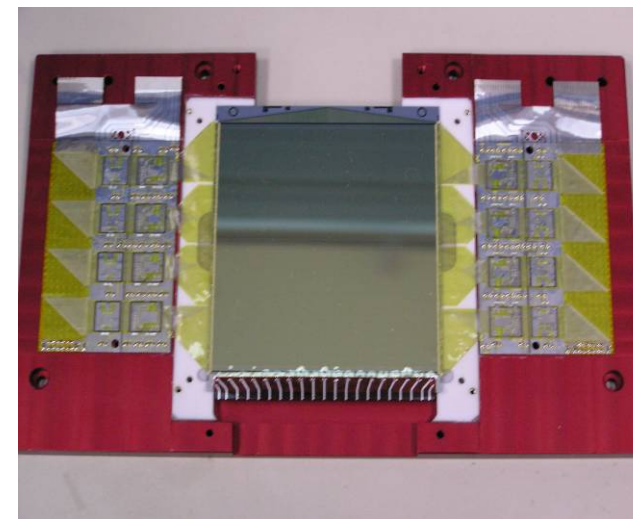
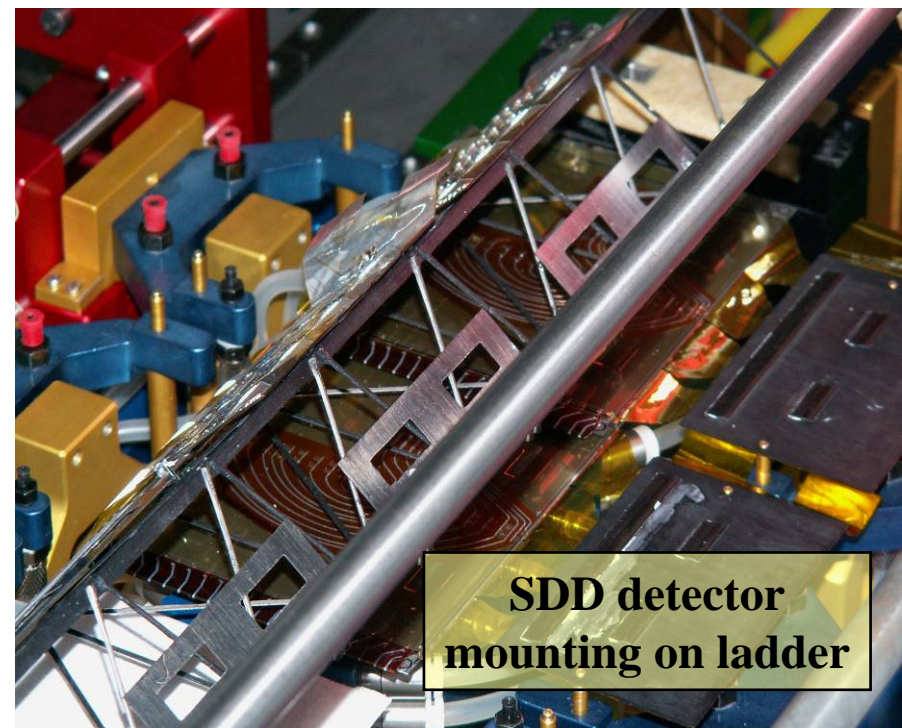
● Concerns

⇒ **detector delivery & assembly** speed

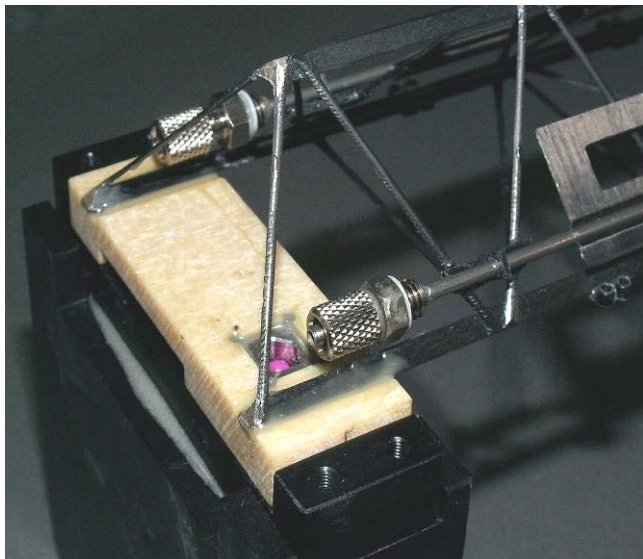
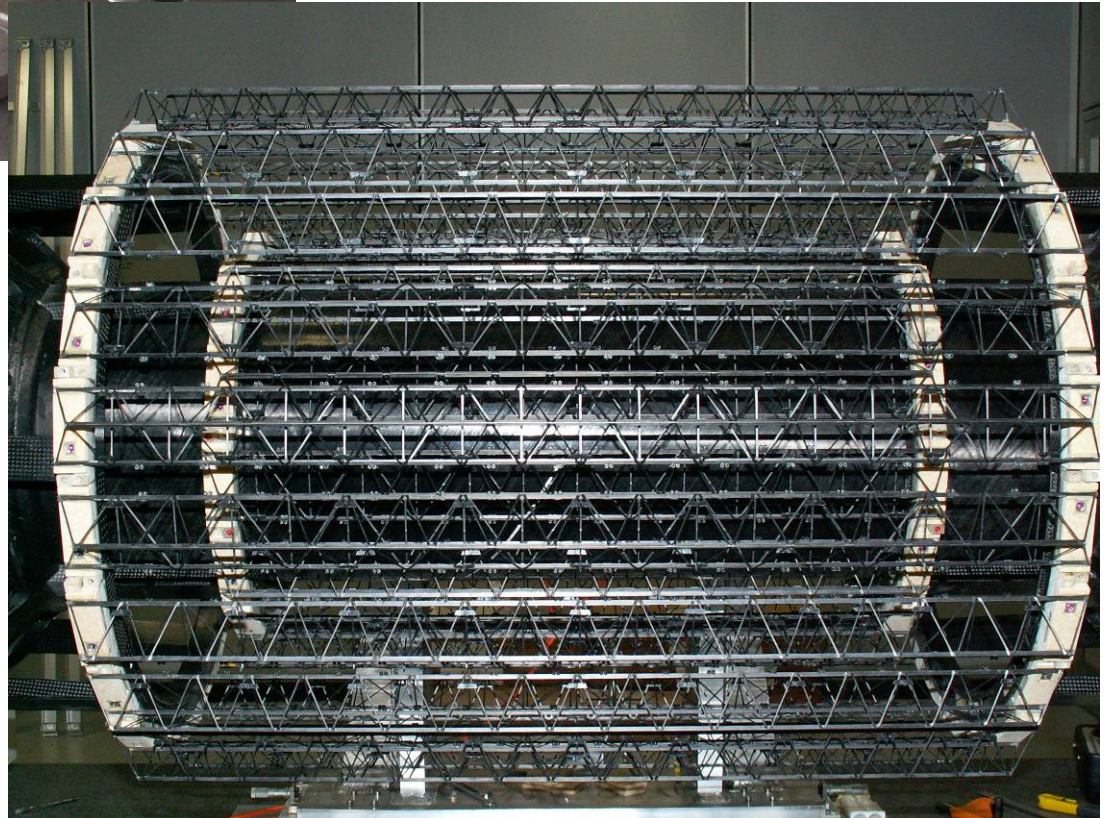
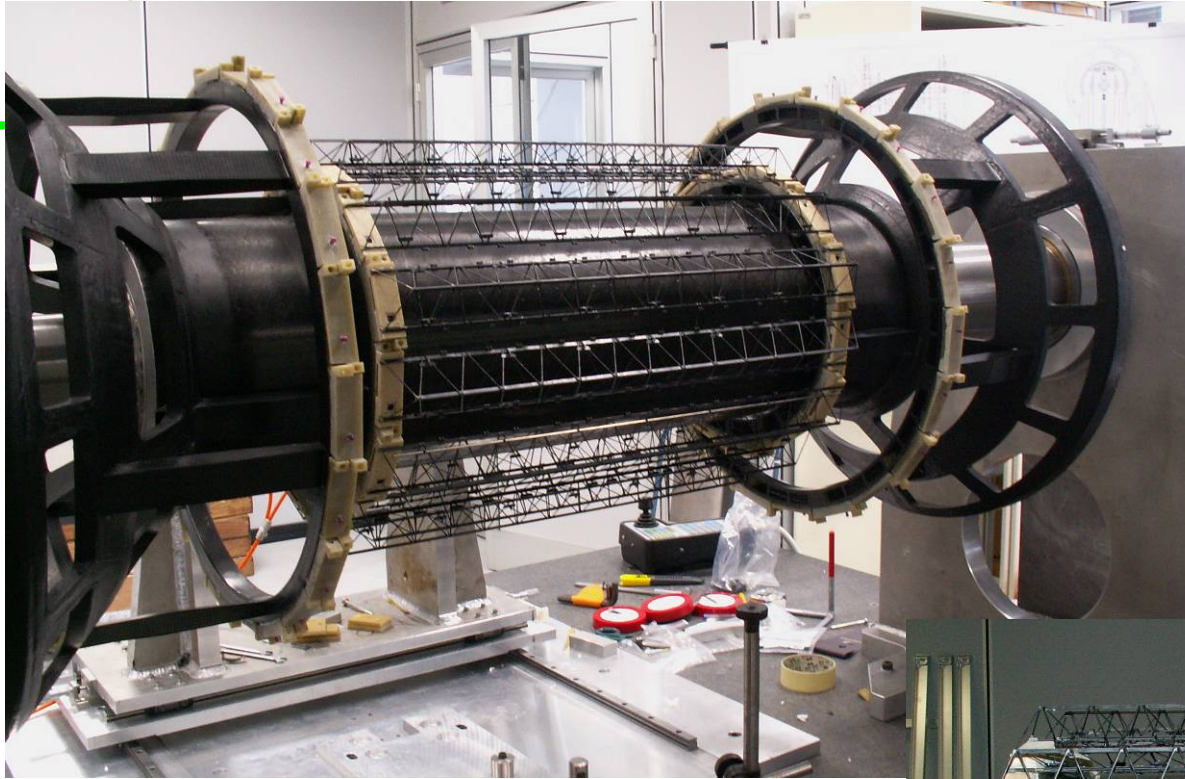
● Actions

⇒ increase **detector production** speed & yield (Canberra)

⇒ increase **assembly** speed to generate 1-2 months contingency



ITS mechanics being assembled





Silicon Strip Detector SSD



● Status

- ⇒ **sensor deliveries** (> 50% accepted)
 - ★ SINTEF problems: contracts revised, late deliveries put testing on critical path
- ⇒ **chip bonding** (> 50% done)
 - ★ all 3 sites show **good speed** (> 50/day) and **yield** (> 90 %)
- ⇒ **hybrid bonding** (~ 50%)
 - ★ current production speed **adequate**
- ⇒ **module assembly** (~ 40%)
 - ★ **all sites are fully operational**, peak speed o.k.
 - ★ folding not yet routine in Strasbourg and Trieste
- ⇒ **EndCap electronics** (>30 % produced & tested)
- ⇒ **ladder assembly**
 - ★ first semi-mechanical ladder in Nikhef, Nantes will start next week

● Concerns

- ⇒ **ladder cables** not yet in mass production
- ⇒ assure **flow of components** to mass production sites

● Actions

- ⇒ increase production/testing speed: chipcables, **modules, ladders**

First SSD Ladder

- without ladder-cables
- second quality modules: not intended for ALICE use
- positioning noise 10 μm
- tooling to be improved for cooling connections
- next in Nantes this month





- TPC-ITS integration test in Space frame : **finished** May05
- chamber installation & survey : 5/05 – 11/05
 - ⇒ **EXTREMELY delicate operation**, went very smooth
 - ⇒ Oct/Nov05 precision survey, alignment and final leak test
- **Electronics**: produced, testing well advance
- **Electronics installation** : 12/05 -2/06
 - ⇒ working and **complete TPC by March 2006**
- **TPC commissioning** : 3/06 – 8/06
 - ⇒ including tests with cosmics & laser

FEE test assembly of complete sector



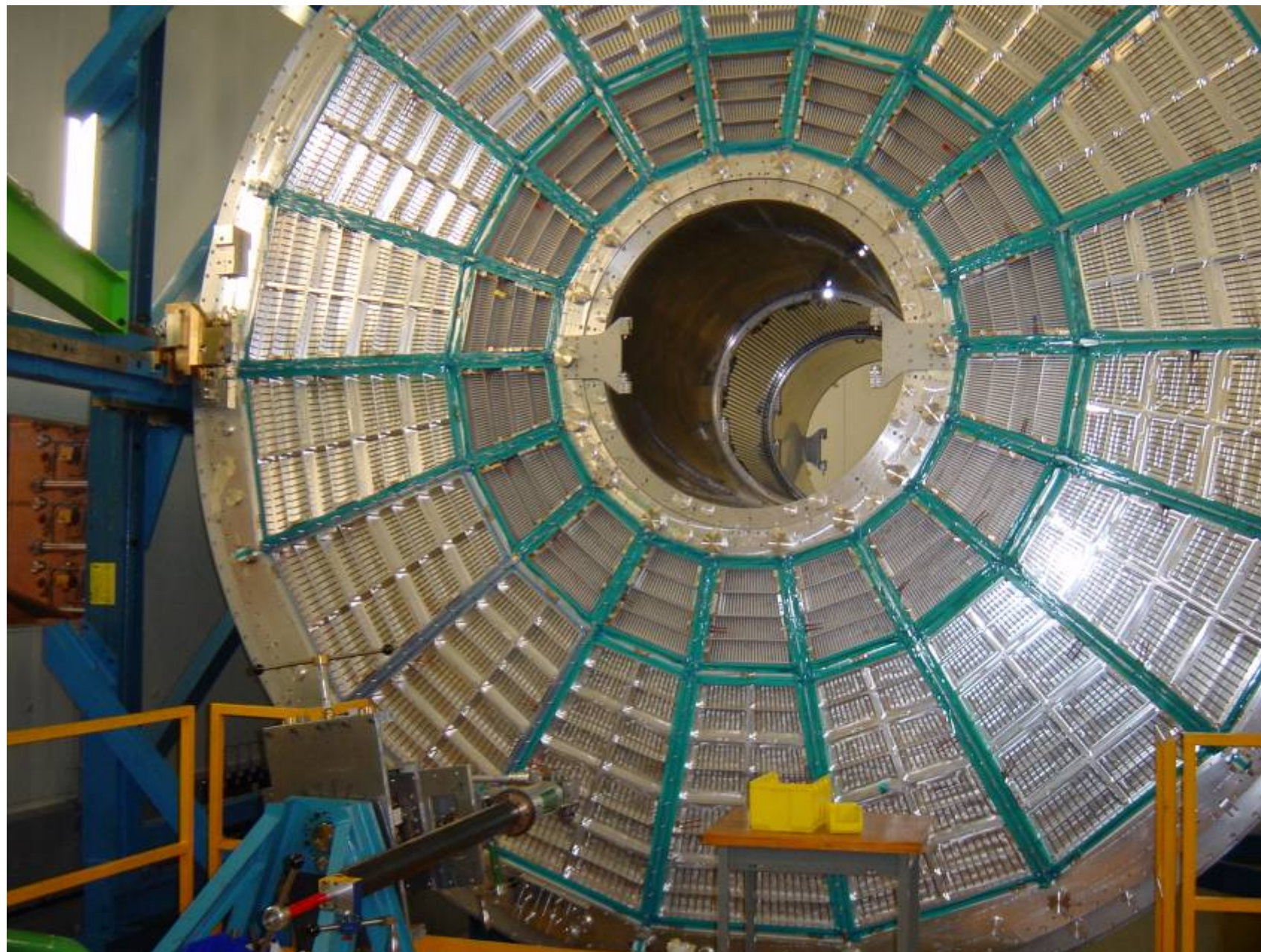


TPC ROC Installation





TPC ROC Installation





● Chambers: end 8/05: 100 chambers done (>25%)

⇒ mass production : ongoing, including new layer 0 chambers

⇒ mechanical design revision finished

● Electronics:

⇒ PASA finished

⇒ Digital chip: first batch delivered, testing starting

⇒ R/O board: noise problem solved

● System integration: test Oct/Nov 04

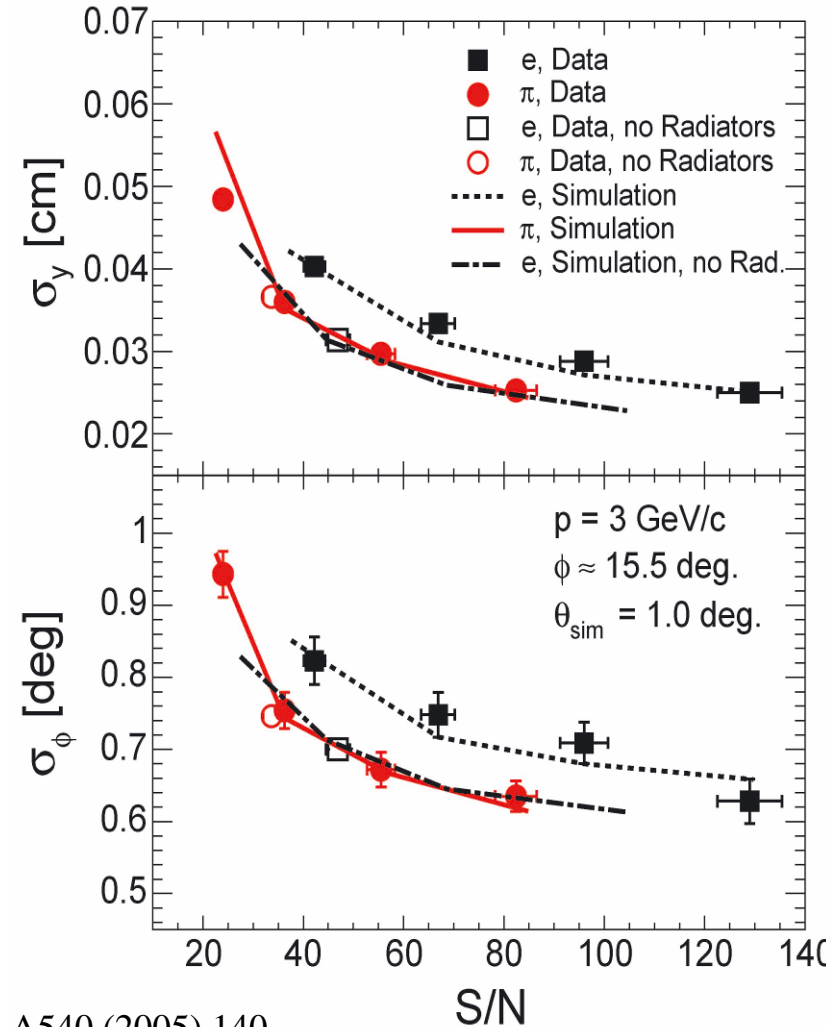
⇒ final analysis: performance < specs

● Concerns

⇒ tight schedule

✱ electronics delays, chamber 0 redesign

TRD test results (final FEE)





Muon Arm



● Tracking

⇒ Chamber production going very well

★ St1/2: ~ 70% produced, finished by Feb. '06

★ St 3/4/5: 80% produced, 70% tested, finished end '05

⇒ FEE electronics (MANAS): **Major problem appeared (and solved)**

★ production chips showed **loss of gain** at elevated temperature

★ traced to contamination at the producer; **new chips ok**

● Trigger

⇒ component production complete

⇒ 60% chambers assembled, 50% tested

● Concerns

⇒ **delay in tracking electronics**

⇒ **software** for read-out crates (CROCUS)

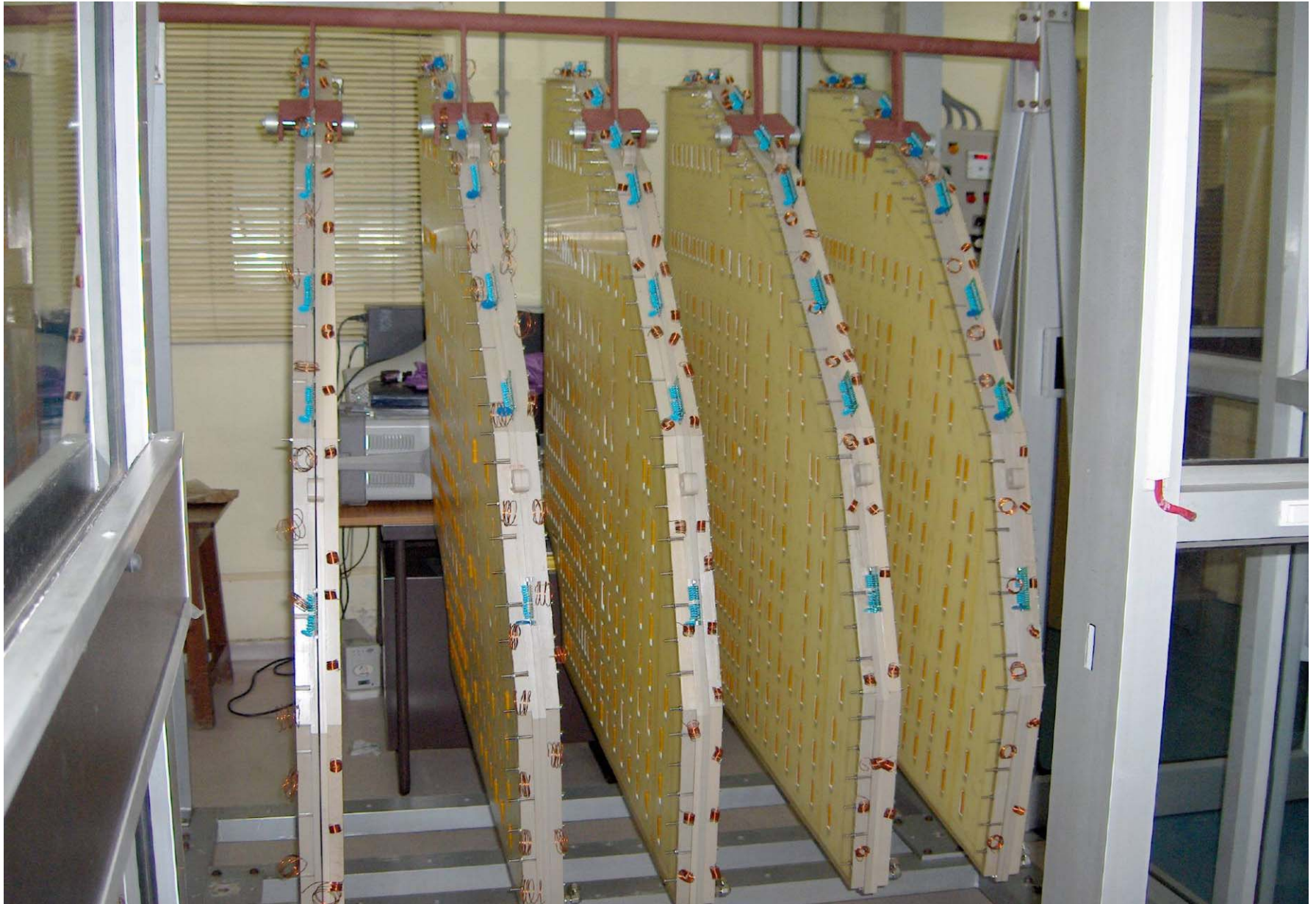
⇒ **overall not on critical path**

Local Trigger Crate

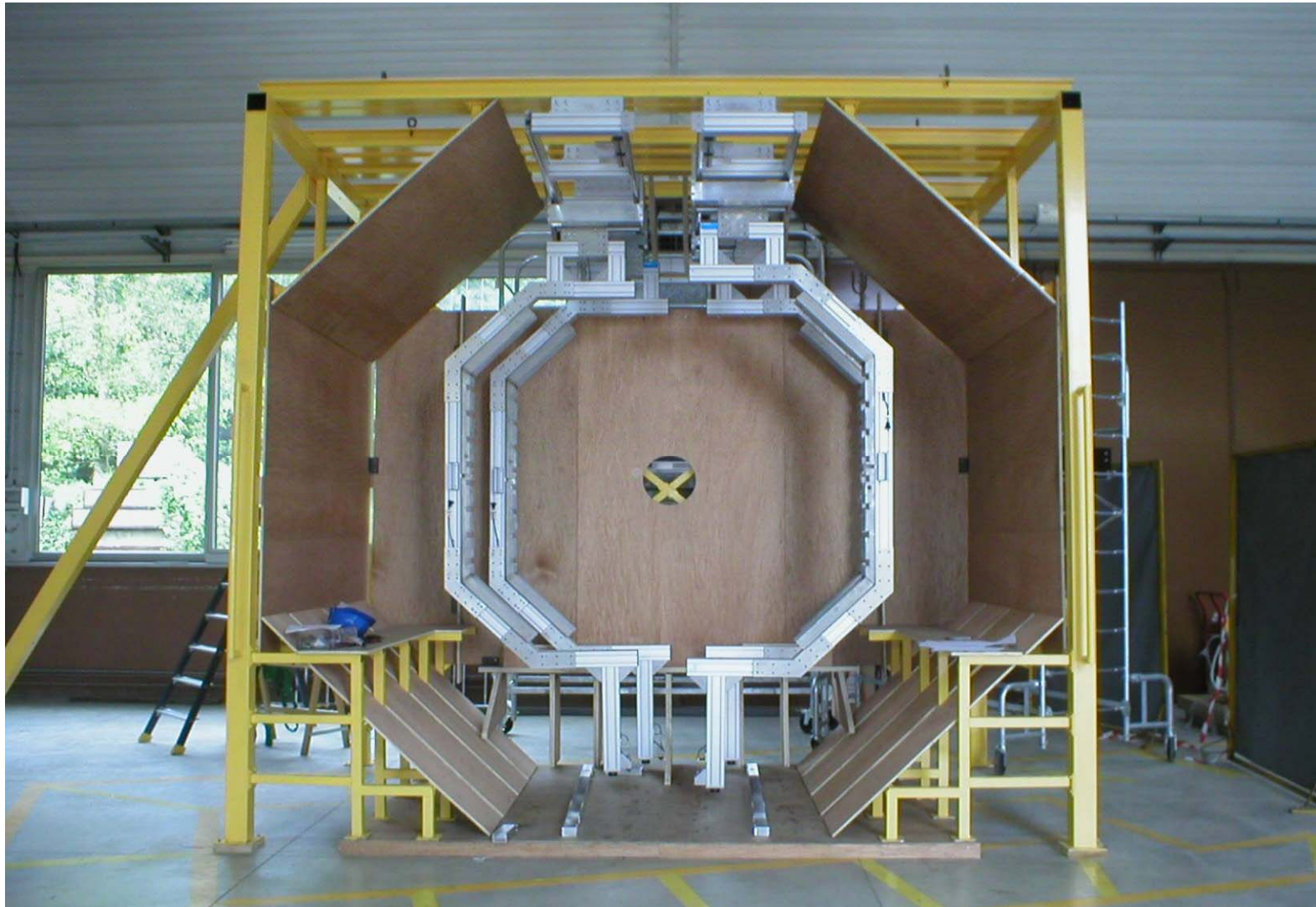


Trigger chambers in cosmic test

5 quadrants assembled in Kolkata



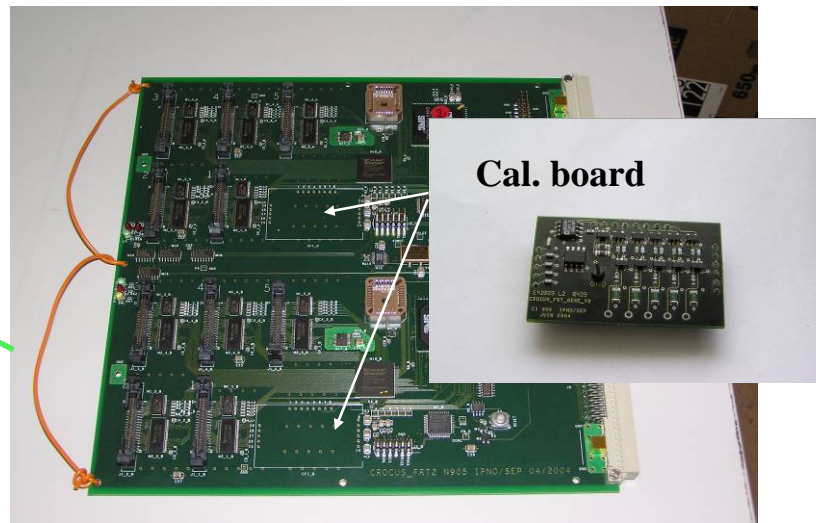
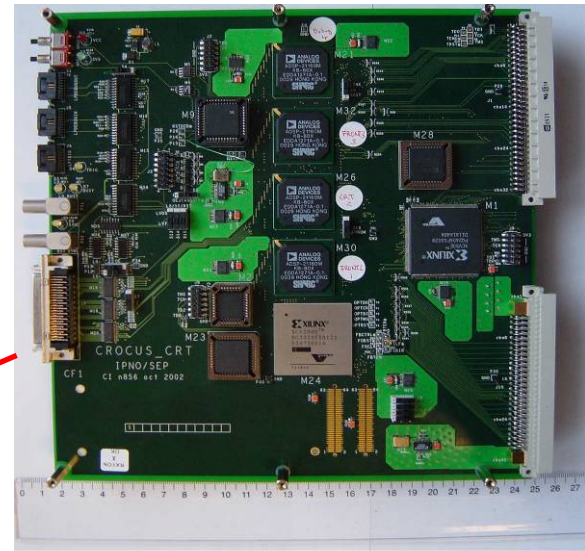
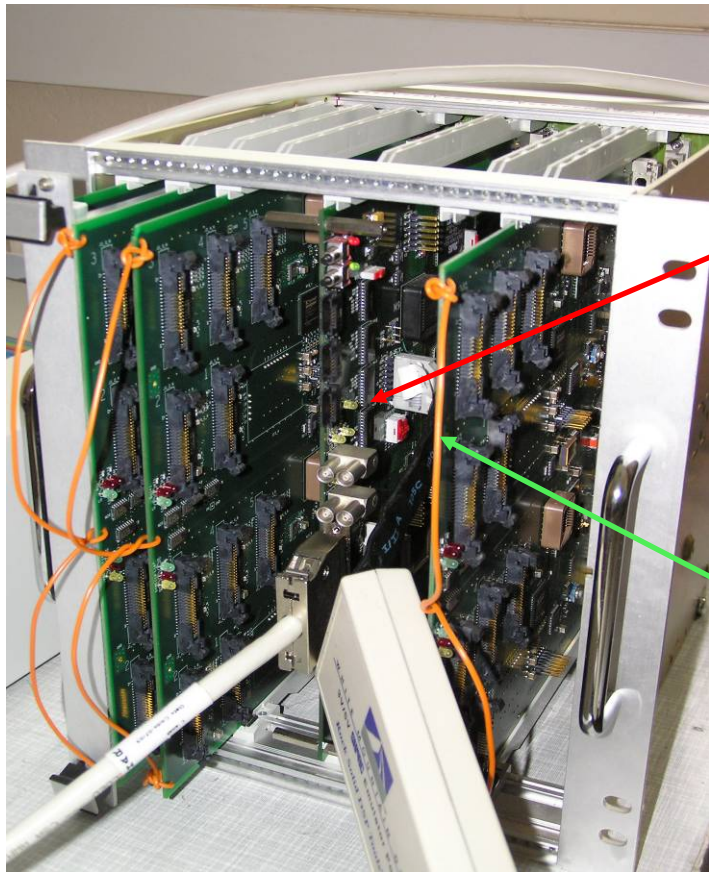
Chamber supports for station 1
(in a Hall at Orsay where the assembly and tests will be done
in the first semester of 2006 before sending chambers to



Muon Chamber Read-out electronics

CROCUS

1 CRT



5 FRT



Other Detector Systems



- **HMPID: well on track**

- ⇒ **all 7 modules completed**, cosmic test station ready end 05
- ⇒ 26/42 photocathodes ready (rate ~ 1/week).
- ⇒ HMPID **ready for installation**: May 06

- **PHOS: on (reduced) track**

- ⇒ **Crystal production (Apatity): >10,500** (of 18,000) accepted
- ⇒ **FEE production** started in China, **Trigger** card prototyping, **1st module** finished end 2005
- ⇒ **Concern**: funding in Russia for mechanics & cooling (modules 2-3)

- **TOF: no major concerns**

- ⇒ **strip mass production** ongoing, **FEC** production and **module assembly** started

- **Forward Detectors (V0, T0, FMD, PMD, ZDC):**

- ⇒ **all in production**, on track

- **Trigger, DAQ, HLT, Control (DCS, ECS):**

- ⇒ all systems progressing **well and on schedule**

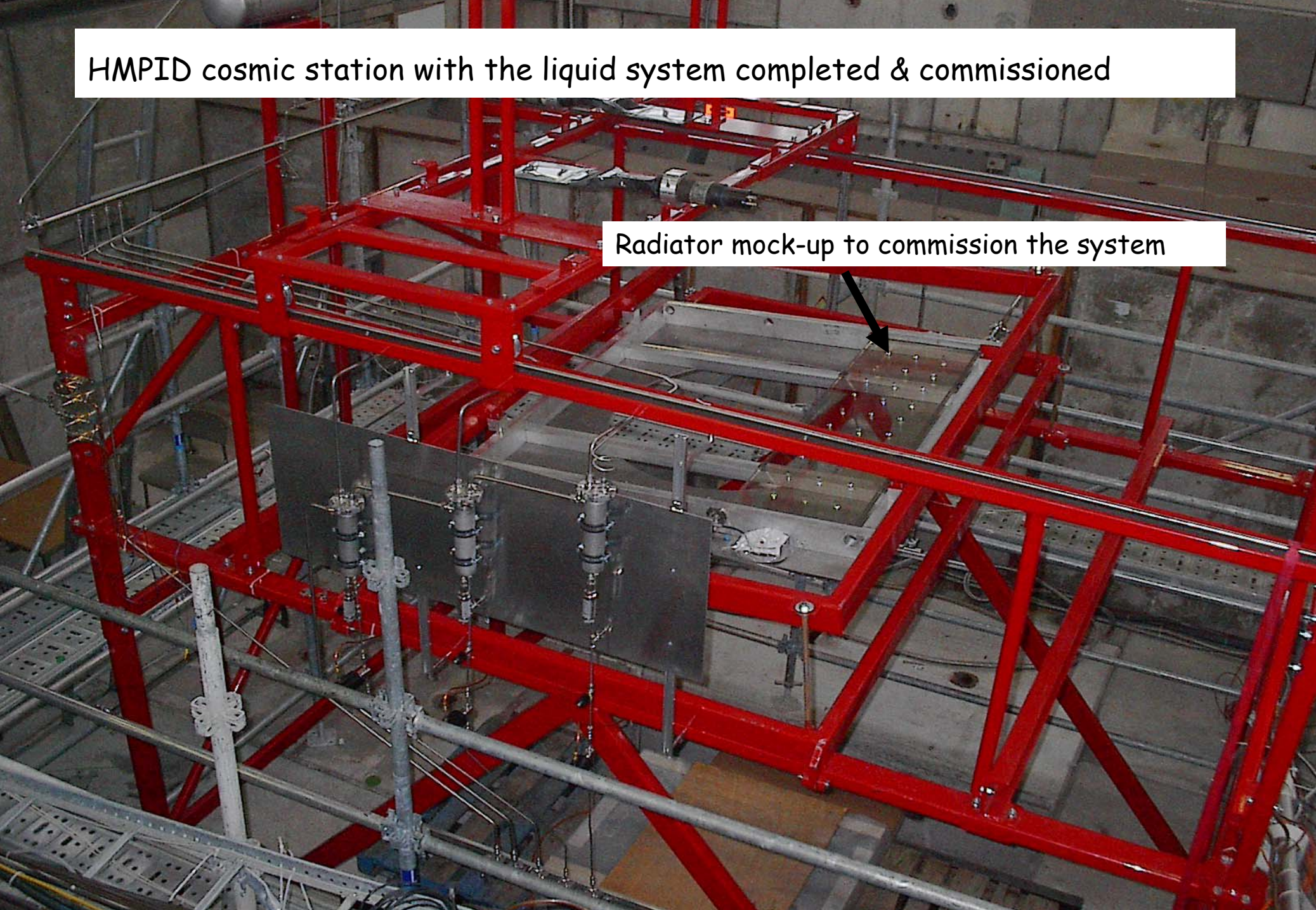


**HMPID support structure
(incl. services for liquids and gas)**



HMPID cosmic station with the liquid system completed & commissioned

Radiator mock-up to commission the system



PHOS



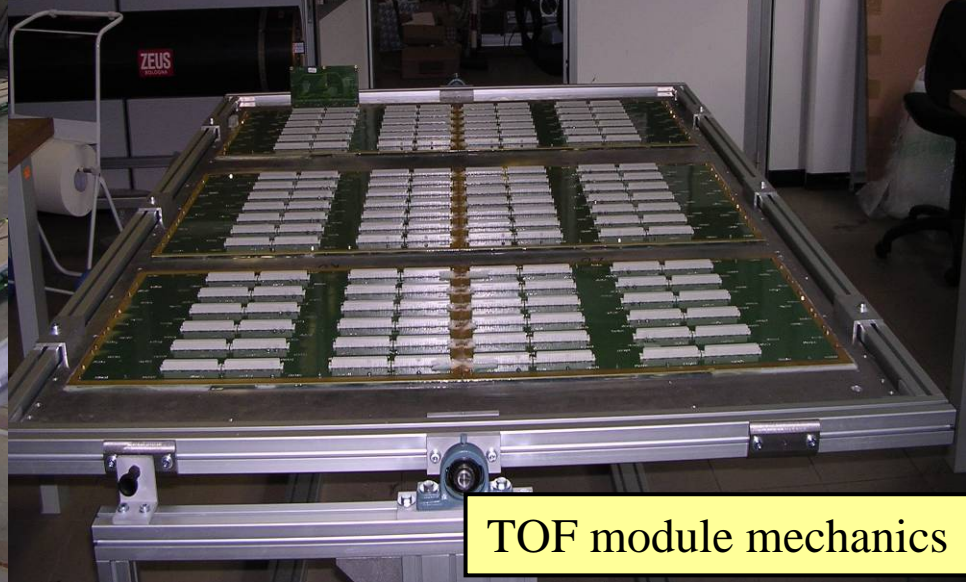
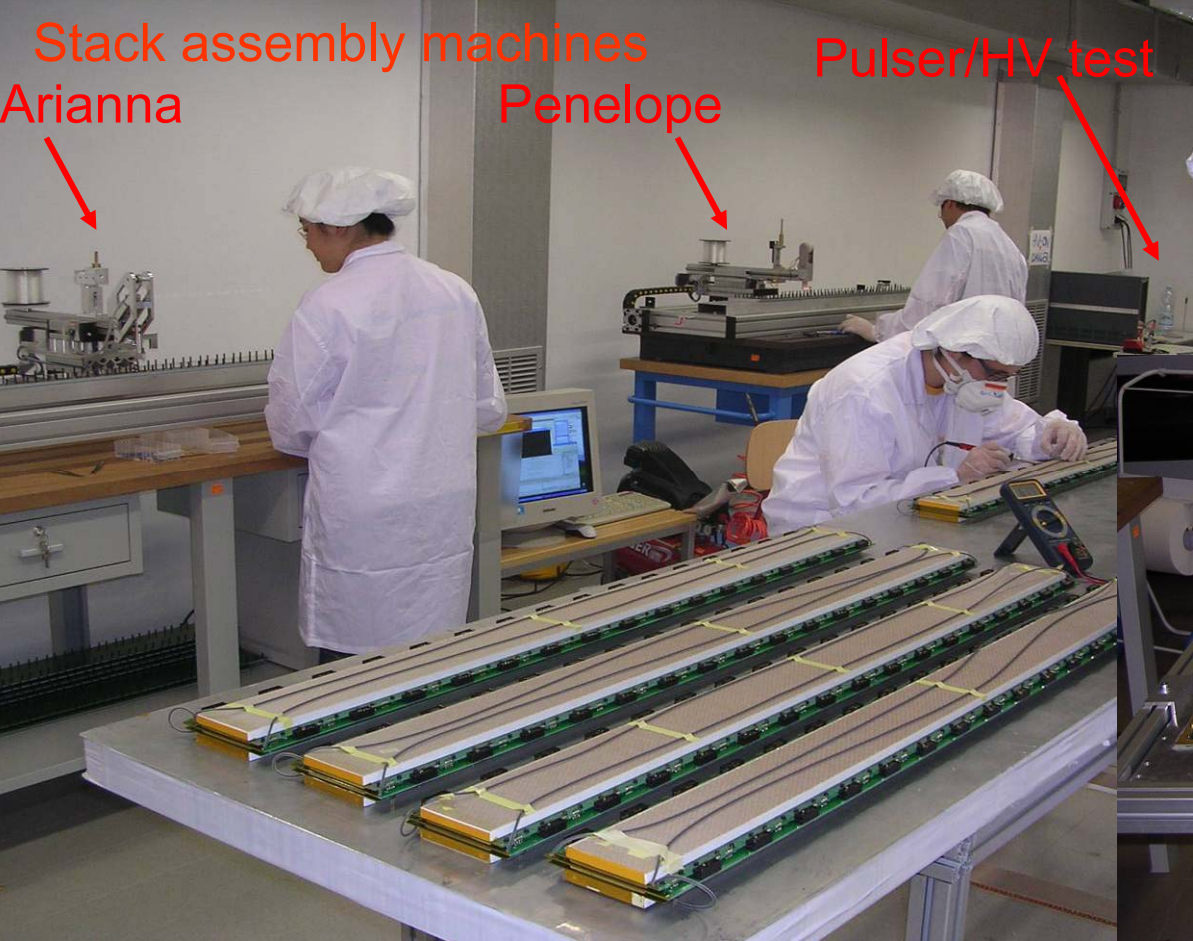
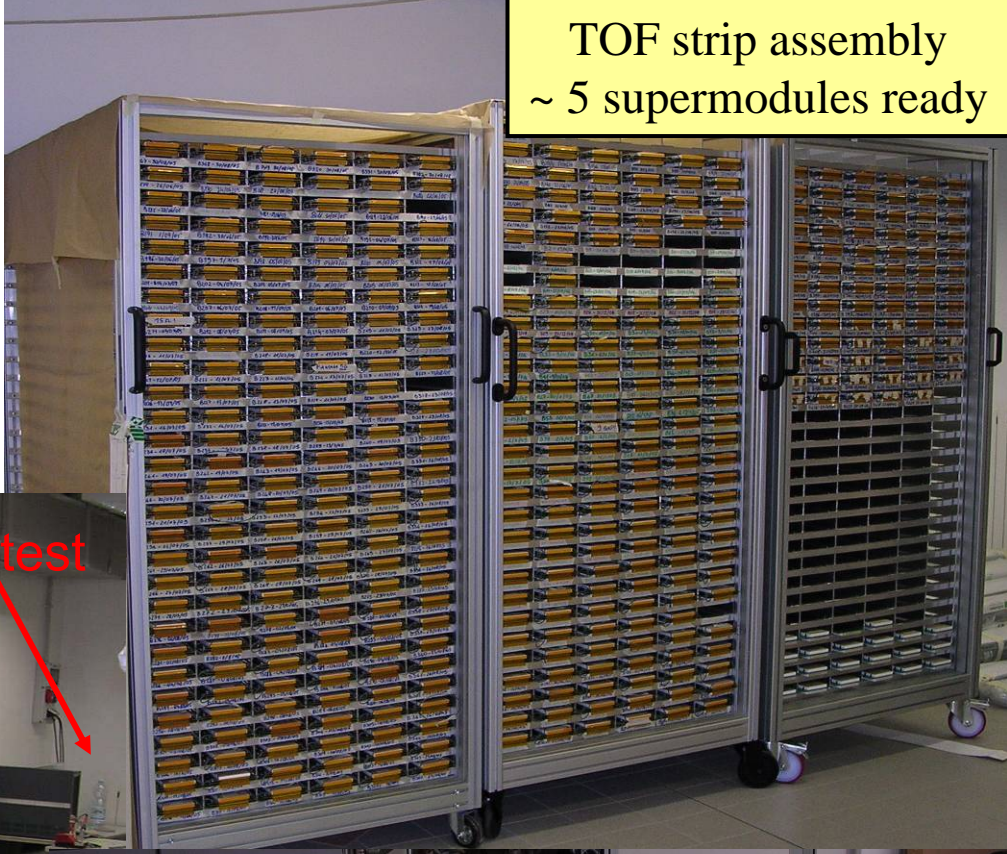
The PHOS eradle at CERN



Control assembly of the module in Moscow

TOF

TOF strip assembly
~ 5 supermodules ready



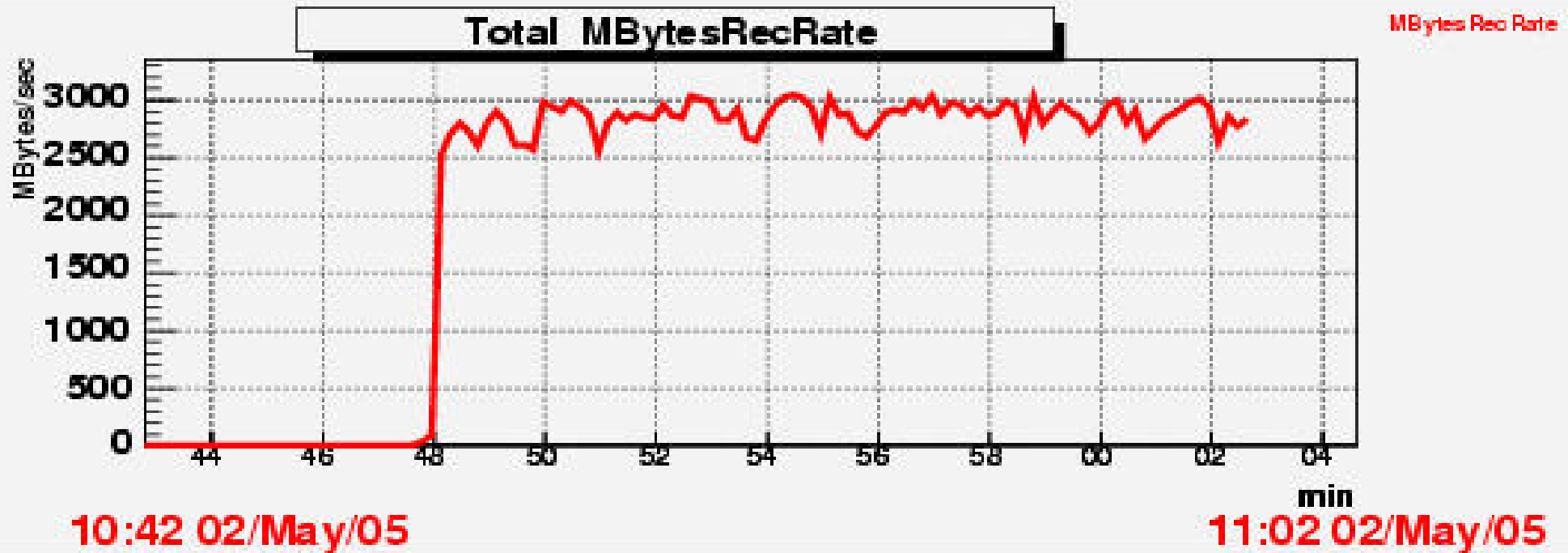
TOF module mechanics

The new HLT-RORC



- Xilinx Virtex-4 LX40
- PCI 66/64 interface
- up to 4 x 128 MBit memory for co-processor functionality
- can handle two DDL-DIUs

Data Challenge 2005



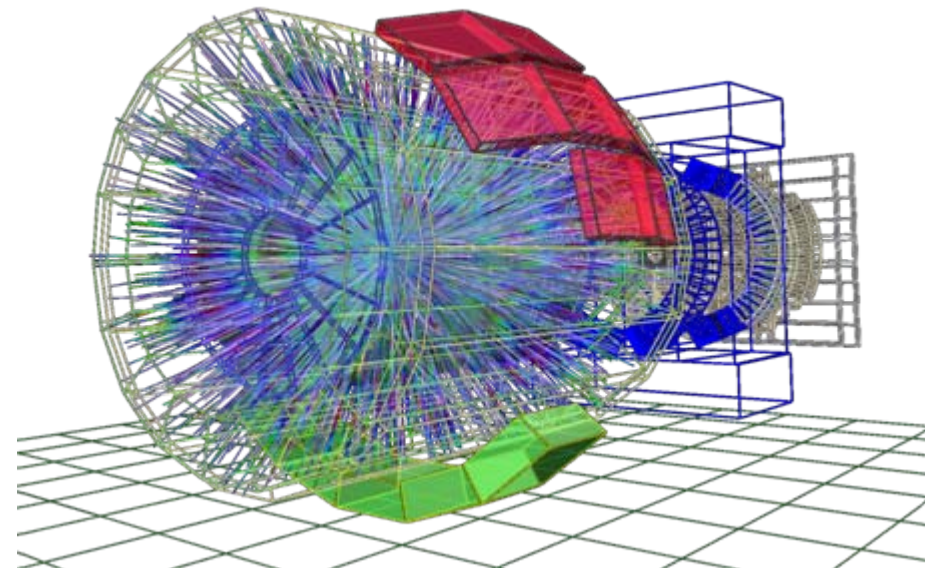
DAQ event building at more than 2.5 GByte/s !



Computing



- **Physics Data Challenge 04** (10% of real data volume)
 - ⇒ **generation and reconstruction successfully** achieved as planned
 - ⇒ **distributed analysis cancelled**
 - ✦ because of unavailability of middleware with required functionalities (we do a limited 'local analysis' instead)
- **Physics Data Challenge 05** (Intermediate new step)
 - ⇒ Taking up **LCG/EGEE baseline services** complemented with **ALICE specific services**
 - ⇒ Has now started (phase 1) together with LCG SC3
- **Framework/software**
 - ⇒ **development ongoing**
 - ✦ Calibration and alignment framework ready, implementation by detectors starting
- **TDR submitted to LHCC**
 - ⇒ review last week





Computing Resources



● pledged resources well below requirements (30% - 50% deficit)

- ⇒ **T0:** **ok** (CERN resource allocated in proportion to TDR requirements)
 - ⇒ **T2:** resource listing **incomplete**, to be re-assessed
 - ⇒ **T1:** ALICE **requirements (~data volume!)** **comparable to ATLAS/CMS** (>> LHCb)
 - ★ relative resource **sharing** in participating centres looks **a priori reasonable**:
Germany, Italy, France, Nordic countries, Netherlands, (CERN CAF, not included)
 - ★ Alice has **no (or few)** collaborators in many major LHC **T1 centres**:
USA, Canada, Spain, UK, Japan(T2)
 - ★ computing requirements (per physicist, per T1 centre, per CORE \$) **relatively high**
- Heavy Ion experiments (NA49, RHIC) are very data & CPU intense**

Pledged by external sites versus required MoU

		2007		2008		2009		2010	
		T1	T2	T1	T2	T1	T2	T1	T2
CPU	TDR requirement (MSI2K)	4,9	5,8	12,3	14,4	16,0	18,7	20,9	24,3
	Missing %	-48%	-52%	-46%	-65%	-35%	-57%	-28%	-65%
Disk	TDR requirement (PB)	3,2	1,3	8,0	3,3	10,4	4,3	13,6	5,6
	Missing %	-65%	-46%	-65%	-57%	-57%	-48%	-52%	-46%
MS	TDR requirement (TB)	2779	-	6947	-	9031	-	17880	-
	Missing %	-56%	-	-54%	-	-33%	-	-49%	-



Computing Resource Deficit



- overall LCG resources : tight but ‘right order of magnitude’
 - ⇒ comparing integrated pledges versus sum of requirements
 - ⇒ **LHCC**: noted issues with the differential distribution between experiments
 - ★ ALICE missing resources, ATLAS <-> CMS
- options to address the ALICE deficit
 - ⇒ situation may improve somewhat if and when USA and Japanese groups join
 - ★ deficit may already be somewhat smaller when including CERN CAF
 - ⇒ is it possible to revisit the resource sharing between LHC experiments in some ALICE T1 centers, taking into account program specific needs and deficits in addition to the current estimators (number of people, CORE investments etc..) ?
 - ⇒ ALICE collaboration will have to discuss how to respond to a possible remaining (hopefully much smaller) shortfall



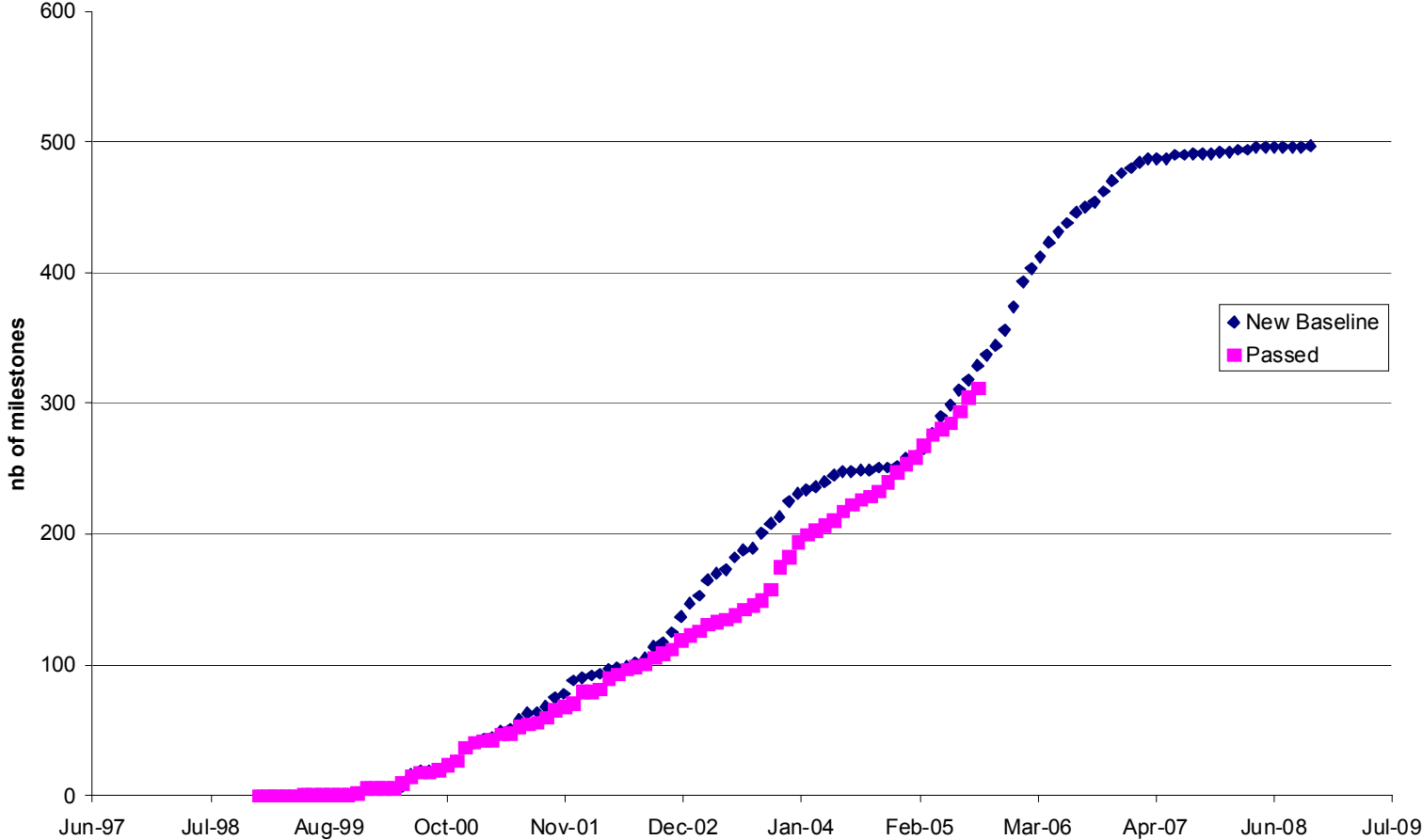
Milestone dates : Phase 2 to 4



PHASE	Detector	Start	Finish
PHASE 2 - 3	Muon detectors	Jan 2006	End 2006
PHASE 2	HMPID	09.01.2006	07.05.2006
	TOF / TRD	08.03.2006	31.07.2006
	PHOS + services, emcal support frame	01.08.2006	End Aug. 2006
PHASE 3	TPC in parking position	01.09.2006	02.10.2006
→	ITS Barrel (SDD,SSD)	03.10.2006	16.10.2006
	Vacuum (central Be chamber)	17.10.2006	16.11.2006
	FMD/V0/T0 (RB26)	17.11.2006	28.11.2006
→	Pixel + ITS barrel + service	29.11.2006	12.01.2007
	TPC in final position	13.01.2007	16.02.2007
PHASE 4	FMD/V0/T0 and PMD (RB24)	17.02.2007	02.03.2007
2nd installation window	TOF/TRD/PHOS	03.03.2007	28.03.2007
→	Beam line + shielding	29.03.2007	<u>End April 2007</u>

Milestones

ALICE LHCC Milestones - September 2005



Since Feb 2005: ~ 50 milestones passed on time
- 6 milestones have been rearranged to optimize the planning
- 5 are delayed but not on critical path
- 3 delays on critical path (ITS); delayed by several weeks



Summary



● Major Milestones

- ⇒ first (small but concrete) step towards **US participation** in ALICE
- ⇒ **L3 and dipole** final commissioning
- ⇒ 1st **SPD sector**, 1st **SSD ladder**
- ⇒ **TPC ROC installation**
- ⇒ **HMPID** production complete

● Major Problems solved

- ⇒ **short in L3** magnet
- ⇒ **SSD module** start-up problems at one production site
- ⇒ Muon arm FEE (**Manas**) production defects
- ⇒ **TRD** r/o board noise
- ⇒ **additional manpower** for critical items largely secured

● Major Problems remaining or new

- ⇒ **PHOS financing** (China/Japan/Russia)
- ⇒ very tight **schedule for ITS**, to be reviewed in ALICE end 2005
 - ★ SSD & SDD sensor production, module & ladder assembly
- ⇒ **Computing resources**