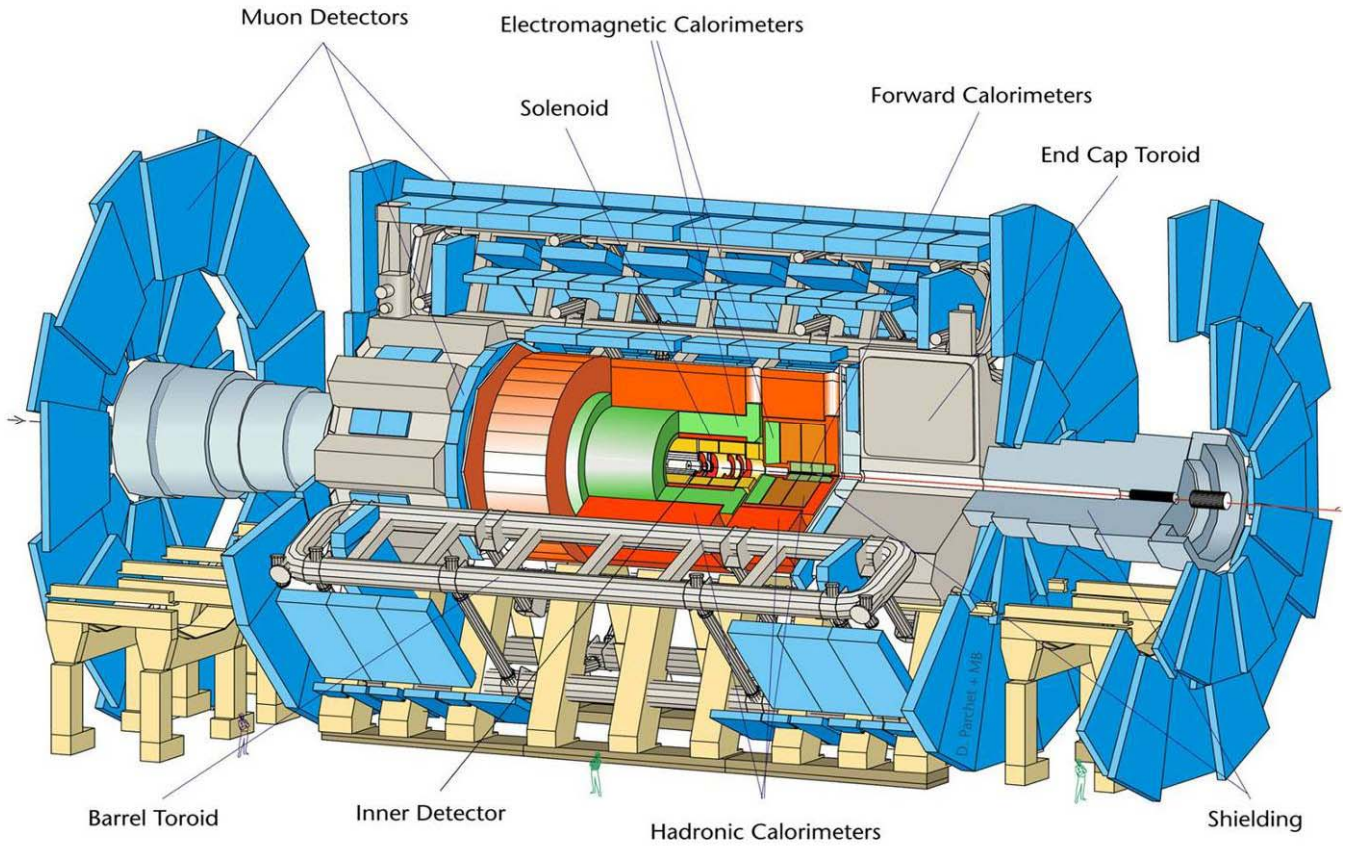
Tev4LHC 28th April 2005

ATLAS: detector status Test beams and Plans for Commissioning

The ATLAS Collaboration

(Presented by G. Mornacchi CERN/PH)

ATLAS Detector



ATLAS superimposed to
the 5 floors of building 40

Diameter	***25 m***
Barrel toroid length	***26 m***
End-cap end-wall chamber span	***46 m***
Overall weight	***7000 Tons***

Infrastructure at Point 1

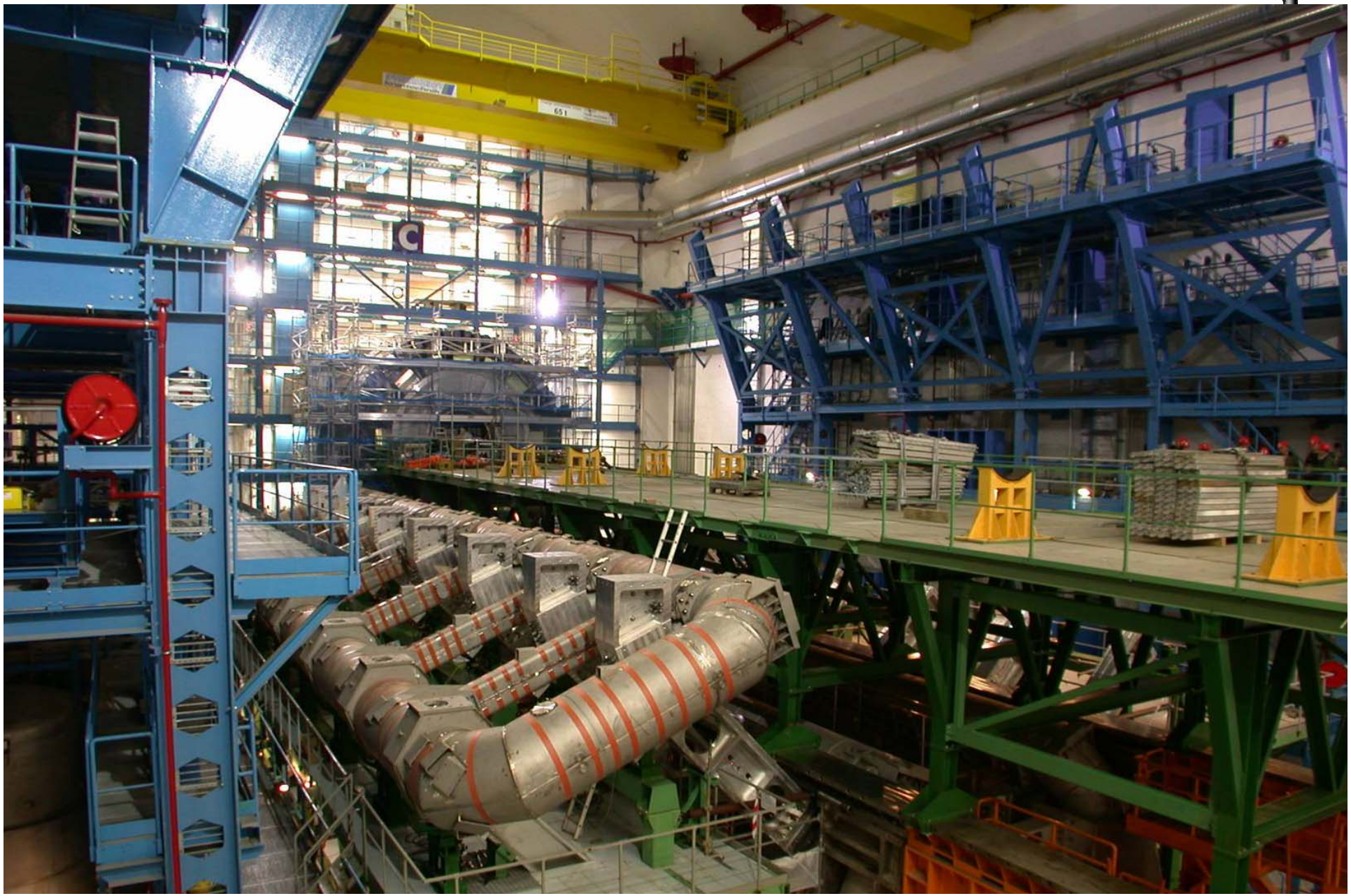
Point 1

All buildings delivered

All surface buildings infrastructure operational (air, power, safety,..)

For all these buildings we are already in M&O regime

UX15 Cavern



Examples of major infrastructure being now commissioned for the project

The external cryogenics, compressor room, the He refrigerators and transfer lines in the cavern

Compressor room SUX1

Infrastructure

- **Technical infrastructure 95% completed and operational**
- **Major activities ongoing : electrical infrastructure (up to end of May 05)**
- **Still in progress: cooling water distribution, various cable trays for services, racks power distribution, magnets power electronics racks installation + racks infrastructure**
- **Still to be done (but contracted) : magnet bus bars, metallic arches above toroid barrel, UPS & Diesel power distribution**
- **In the contractual phase : ID cooling fluids distribution between caverns, final access control system and safety doors**

--> ongoing activities will converge by September 2005

Infrastructure: Commissioning

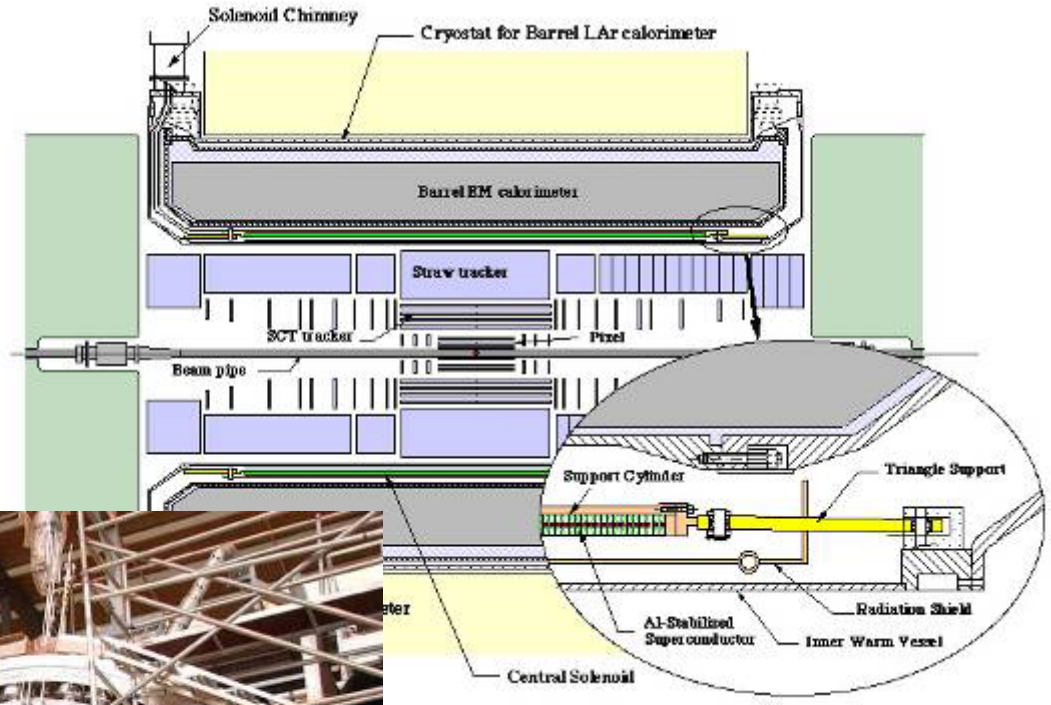
- **Include in ATLAS commissioning procedure those services that interface with the detector**
  - **Cooling and Ventilation**
  - **Cryogenics**
- **Designed and implemented as "external" projects**
  - **Have already their own commissioning etc.**
- **Limit ATLAS commissioning process to "sign off"**

Magnets

Central Solenoid

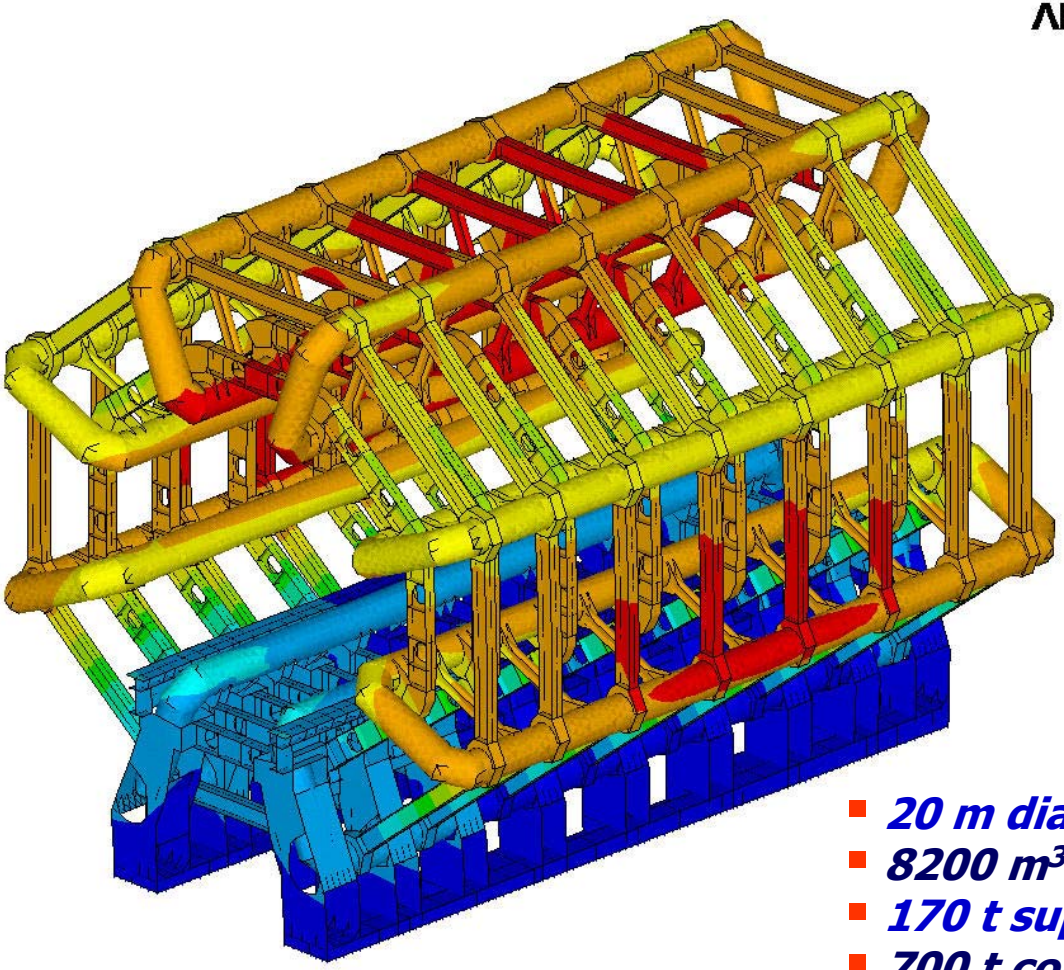
2T field with a stored energy of 38 MJ

Integrated design within the barrel LAr cryostat



The solenoid has been inserted into the LAr cryostat at the end of February 2004, and it was tested at full current (8 kA) during July 2004

The Barrel Toroid



8 coils interconnected with an aluminum warm structure

- ***20 m diam. x 25 m length***
- ***8200 m³ volume***
- ***170 t superconductor***
- ***700 t cold mass***
- ***1320 t total weight***
- ***90 km superconductor***
- ***20.5 kA at 4.1 T***
- ***1.55 GJ stored Energy***

✓ Engineering Design

✓ Components Manufacturing

Integration at CERN

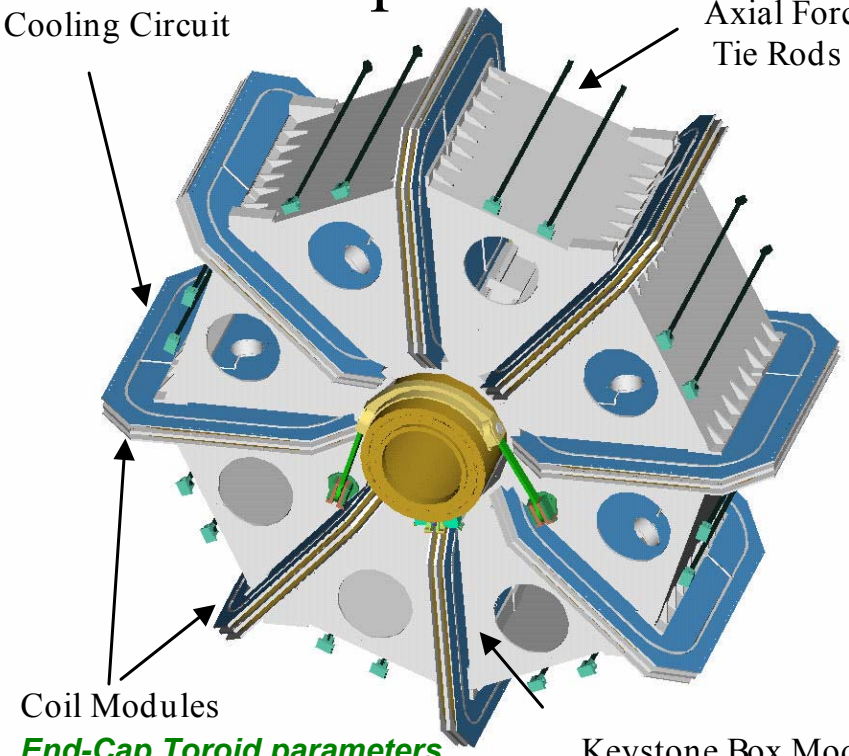
Installation in the PIT

Barrel Toroid

- **4 coils moved to Point 1, 4 lowered into the cavern**
- **4 coils installed in their final position**
- **Plan to install the last coil by end July 2005**

Barrel Toroid Coil Lowering

The End Cap Toroids



End-Cap Toroid parameters

5.0 m axial length
10.7 m outer diameter
2x8 coils
2x0.25 GJ stored energy
2x160 tons cold mass
2x240 tons weight
4 T on superconductor
2x13 km Al/NbTi/Cu conductor
20.5 kA nominal current
4.7 K working point

Engineering Design

Components Manufacturing

Integration at CERN

Installation in the PIT

Engineering & Monitoring @ RAL, NIKHEF

ECT Status

- **ECT cold mass production contract with company de-scoped for financial, technical and scheduling reasons, work successfully transferred to CERN and re-started in Oct 04**
- **Good progress, cold mass integration for ECT-C started and will be completed by Jul 05**
- **ECT schedule is now under our control, acceleration of work is planned when BT work is completed by June 05**
- **ECT-C and A will be ready for installation in March and Sept 06 respectively**

Detector Systems

Inner Detector (ID)

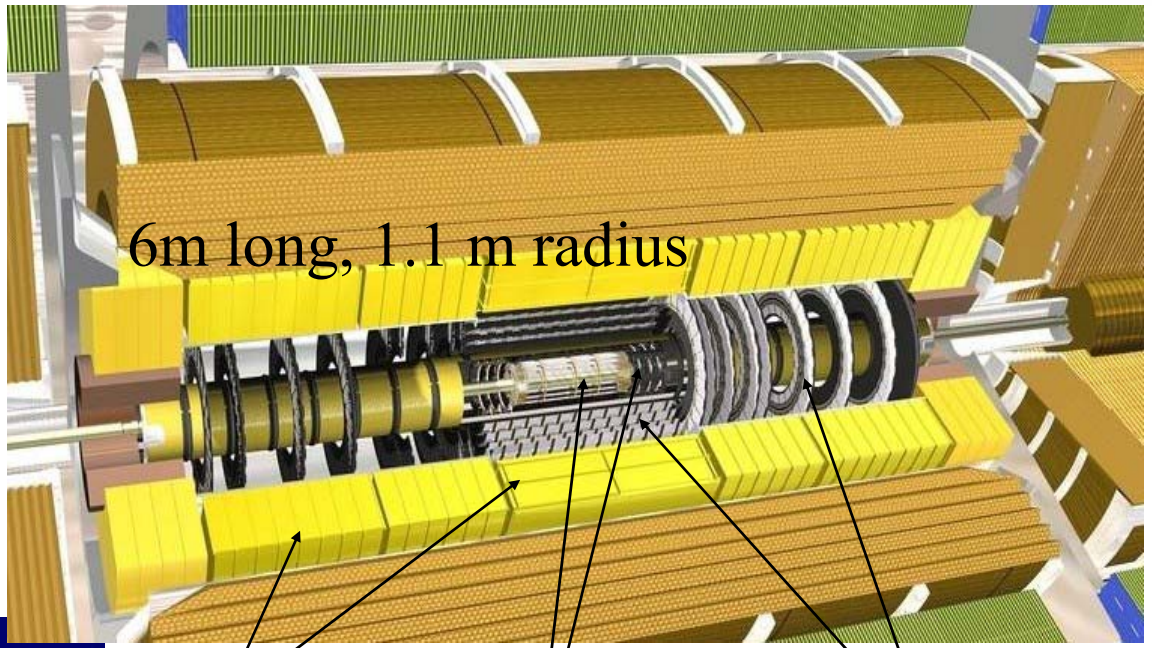
The Inner Detector (ID) is organized into four sub-systems:

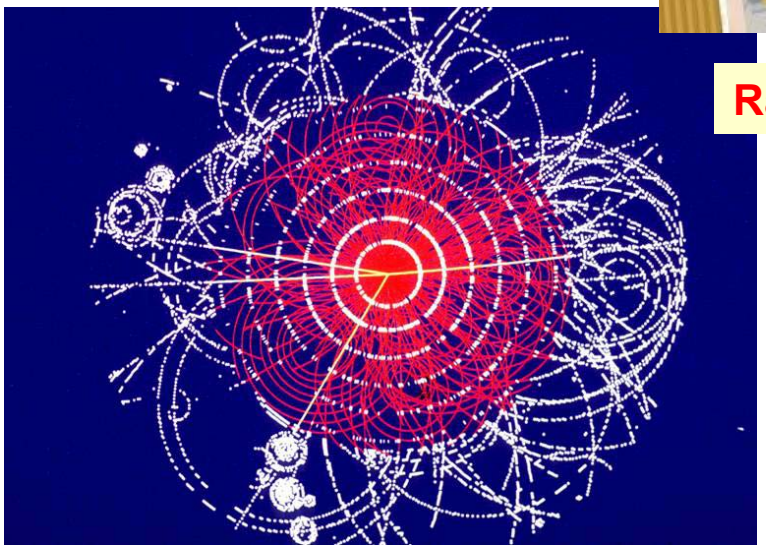
Pixels (0.8 10^8 channels)

Silicon Tracker (SCT)
(6 10^6 channels)

Transition Radiation Tracker (TRT)
(4 10^5 channels)

Common ID items





Inner Detector Progress Summary

Pixels: **Steady 'on-schedule' progress on all aspects of the sub-system for 3 layers**

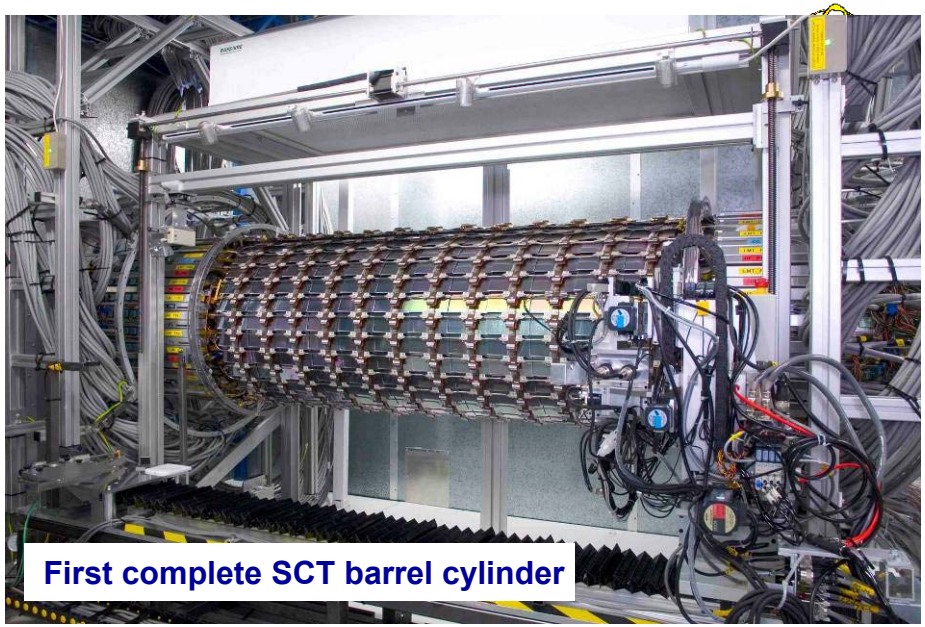
SCT: **Module mounting ('macro-assembly') on the 4 barrel cylinders is ongoing (the first cylinder is finished and tested, and is now at CERN)**

The module mounting is progressing on the forward disks (the first 4 disks are completed)

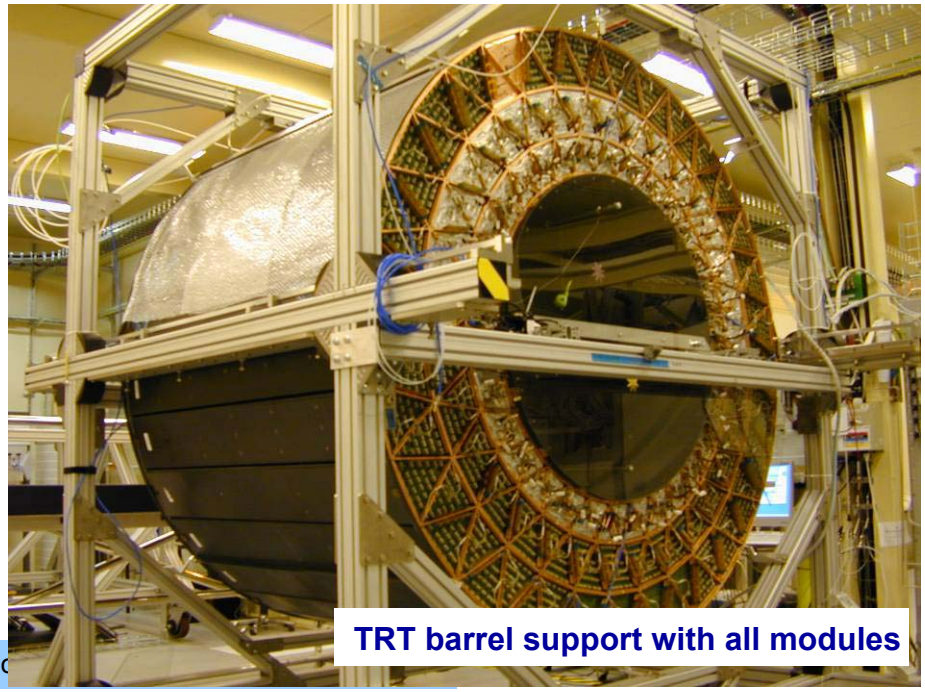
TRT: **Barrel module mounting into support structure is completed**

End-cap wheel production is now also smooth, and the stacking at CERN into the end-cap structures is well advanced

The schedule for the Inner Detector remains very tight, without any float left (critical path: all SCT, and second TRT end-cap)



First complete SCT barrel cylinder



TRT barrel support with all modules

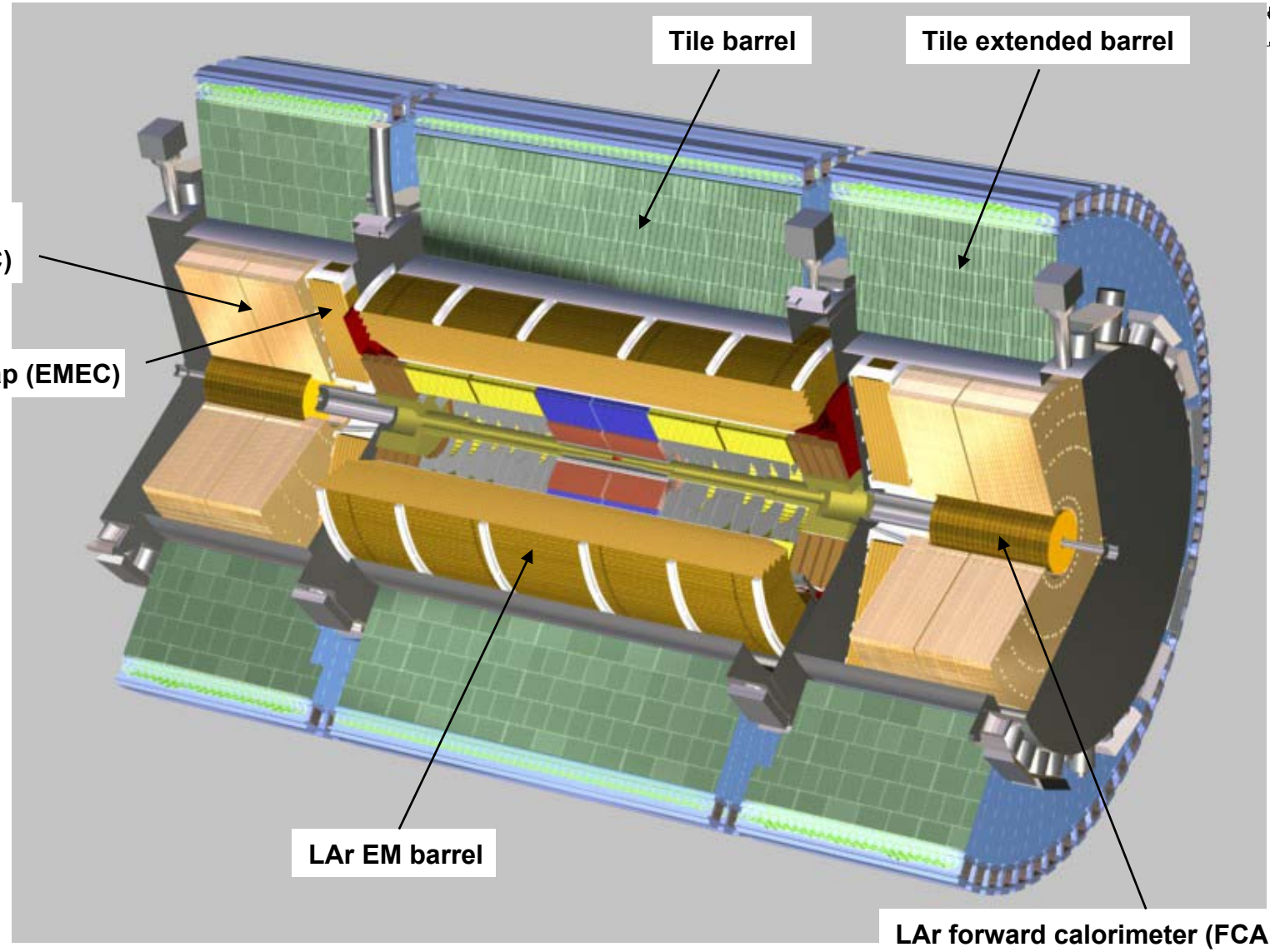
Inner Detector: Commissioning

- **Inner Detector assembled on the surface**

- **On surface tests (2005)**
  - **Pixel stand alone testing**
  - **SCT stand alone testing**
  - **TRT stand alone testing**
  - **Combined SCT + TRT (end 2005)**

- **Installation and commissioning in the pit (next months)**
  - **Installation and commissioning of services**
    - **Start with ID cables and pipes**

LAr and Tile Calorimeters

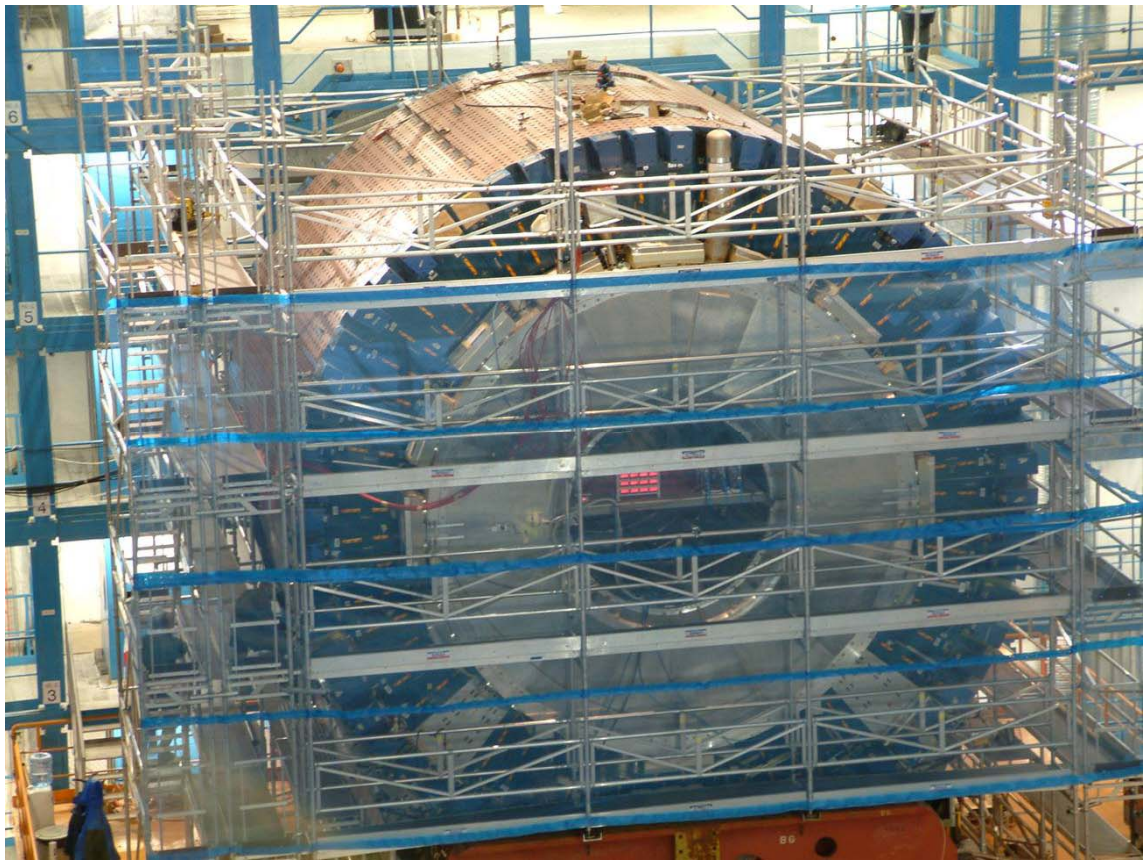


Complete ATLAS Barrel Calorimeter

The mechanical installation of the LAr and Tile Barrel Calorimeters in the pit has been completed on the support trucks below the access shaft on the C-side

The installation and commissioning of electronics and services is ongoing

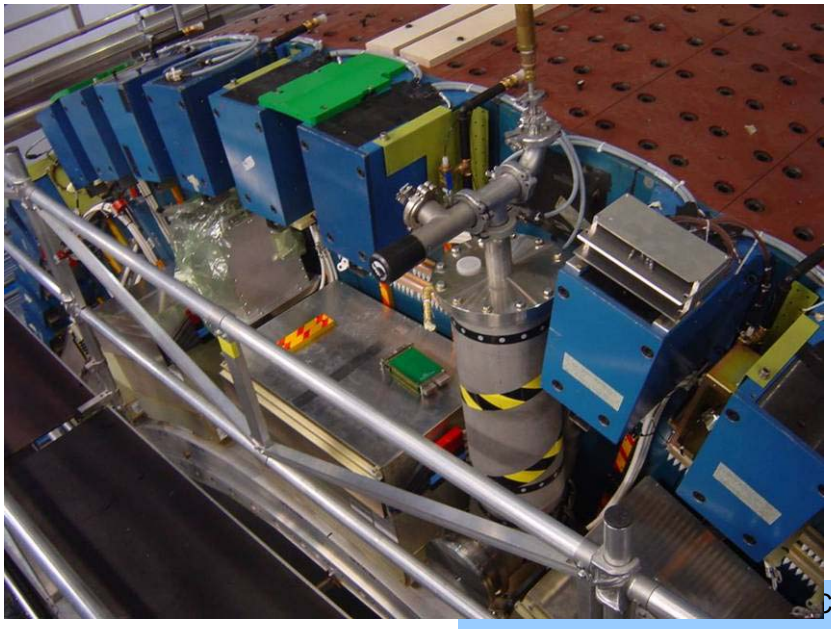
Barrel Calorimeters will be moved to Z=0 for their final position, inside the Toroid, once this latter is finished (August '05)



Barrel Calorimeters today

Cooling pipes, cable trays and local cables installed in the lower part

cable trays (for the calorimeters services) being installed on the rest of the cylinder



LAr electronics crates being installed

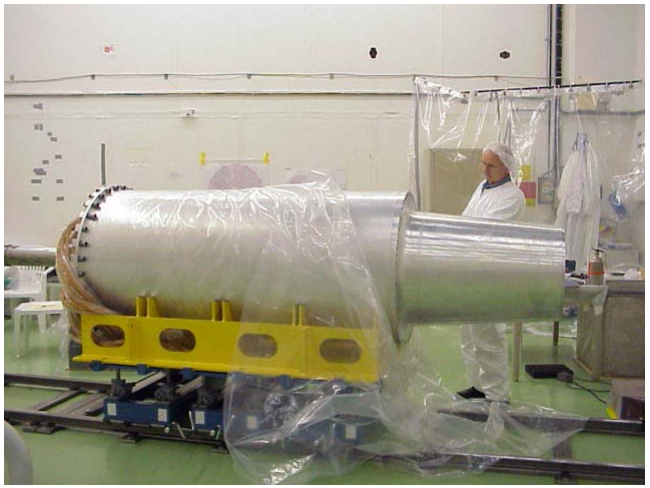
LAr End-Caps

End-Cap C: **Surface cold tests with LAr are finished, with very good preliminary results**

End-Cap A integration status:

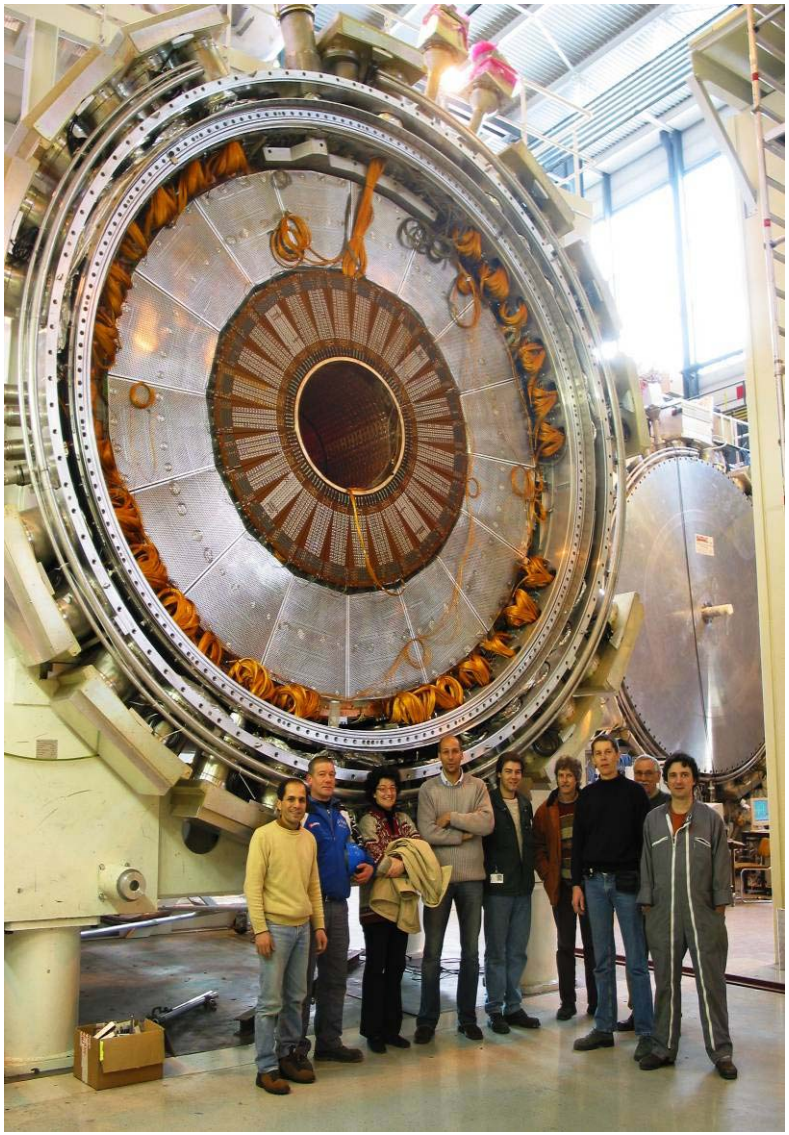
Cold cover was closed early February
FCAL inserted, cabled and tested
Welding of cold cover finished
Started purging of cold vessel

Next steps:
- Leak test of cryostat installation
- Displacement of the cryostat to the cold test station end of April



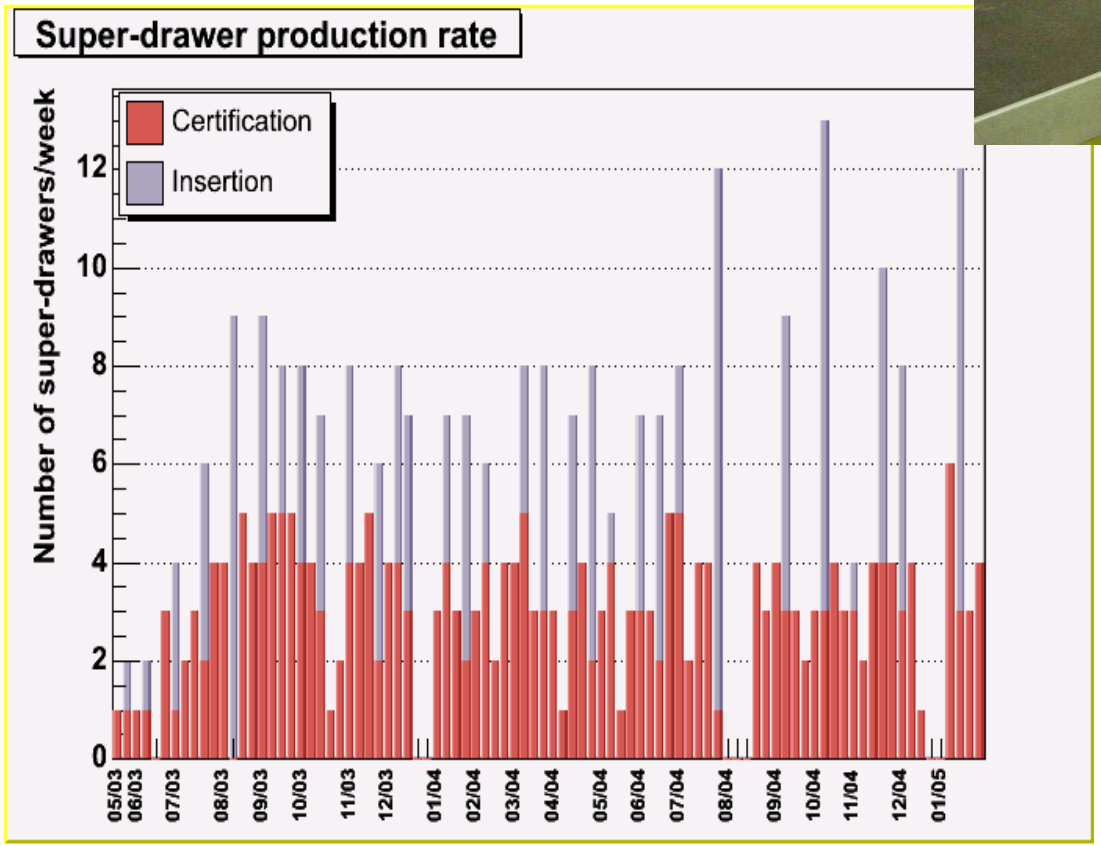
FCAL A before insertion

End-Cap cryostat A before closure



Tile Calorimeter

- **Barrel ready to move to z=0 in pit in August**
- **Extended Barrel C assembly in the pit starting in September**
- **EB A assembly will start in the pit in November**



A big effort coming to an end

Super-drawer electronics production, insertion and certification

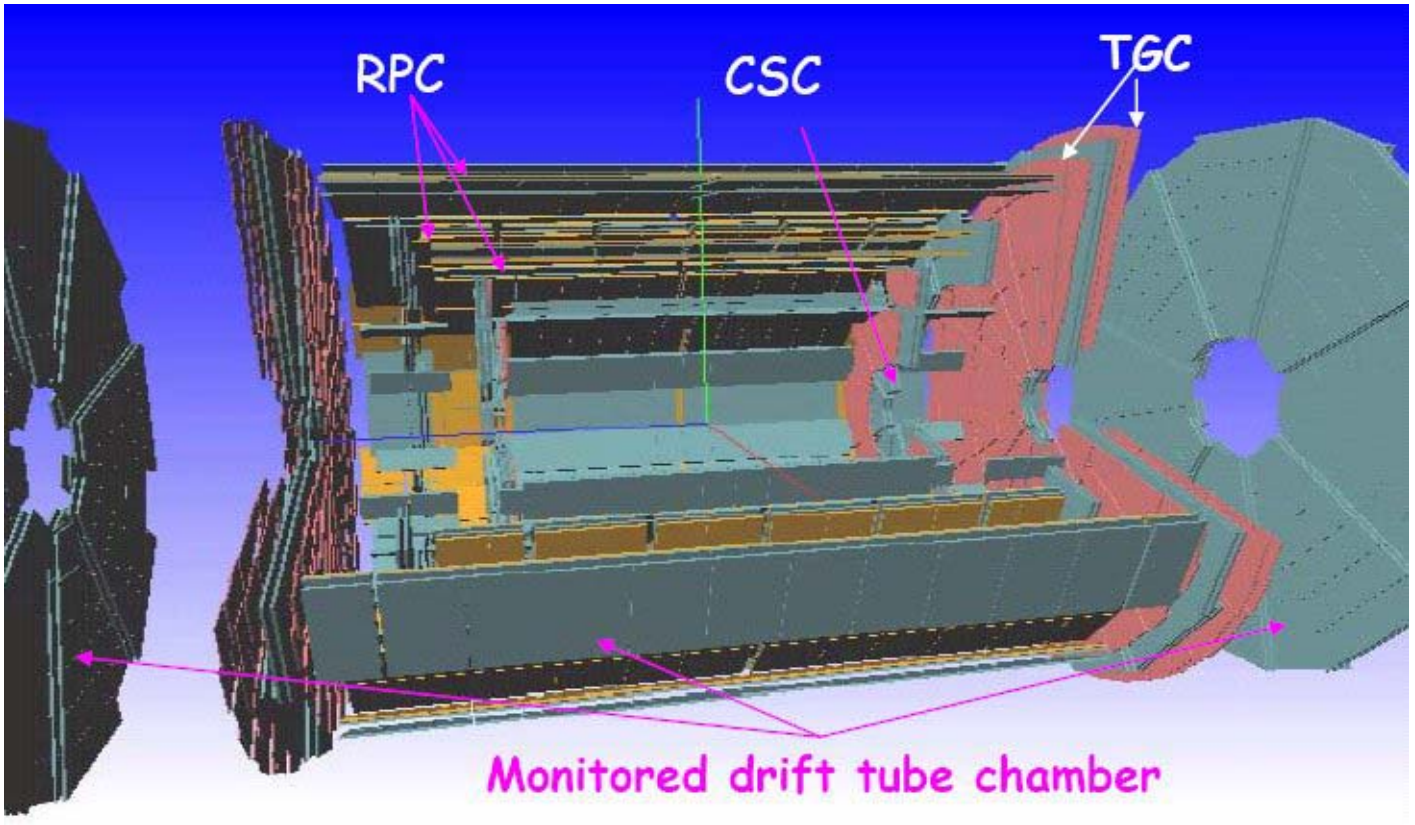
Expected completion by end April

LV power supplies are on the critical path, but now taking off with two production lines

Barrel Calorimeters: Commissioning

- **LAr Barrel**
  - **F/E electronics infrastructure: completed, ready for sign off**
  - **F/E electronics (detector in truck position) installation and commissioning**
    - **Starting May, completion in fall**
  - **Electronics racks infrastructure in Technical cavern**
    - **Starting in May**
  - **B/E electronics installation and commissioning**
    - **Starting in May, completion in August**
- **Tiles Barrel**
  - **F/E electronics infrastructure: ready for sign off**
  - **F/E electronics (detector in truck position) installation and commissioning**
    - **Ongoing until end of August**
  - **Cs source calibration system**
    - **Ongoing; first infrastructure ready for sign off**

Muon Spectrometer Instrumentation



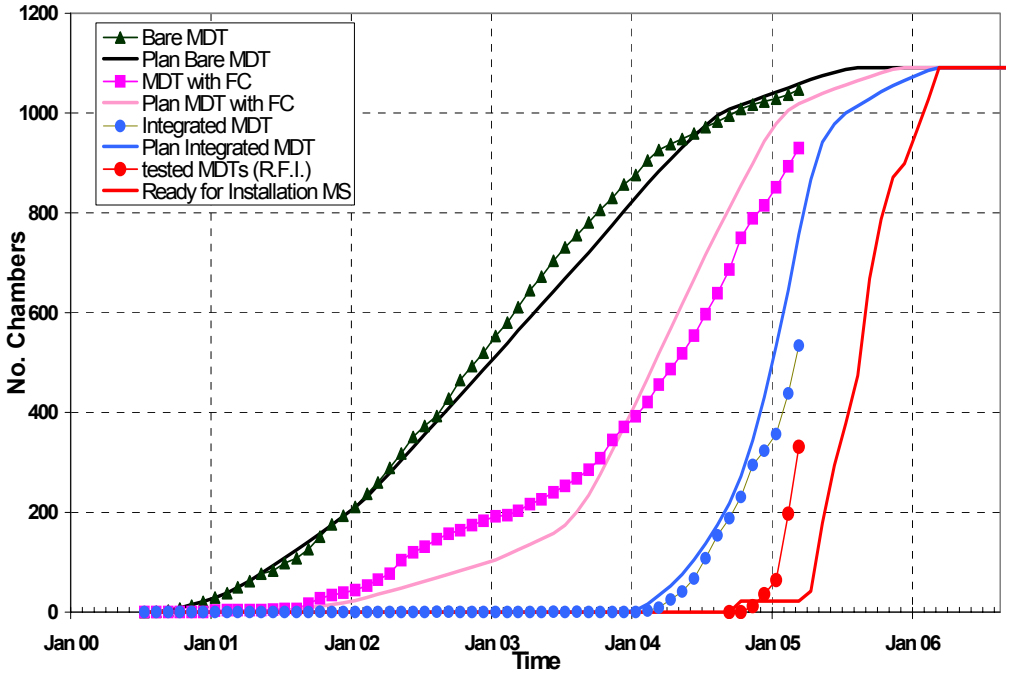
The Muon Spectrometer is instrumented with precision chambers and fast trigger chambers

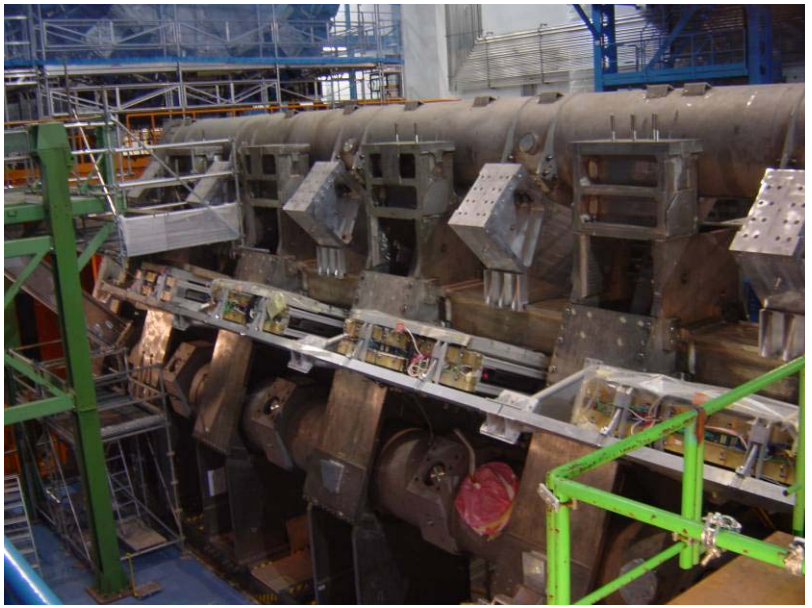
A crucial component to reach the required accuracy is the sophisticated alignment measurement and monitoring system

Precision chambers:
- **MDTs in the barrel and end-caps**
- **CSCs at large rapidity for the innermost end-cap stations**

Trigger chambers:
- **RPCs in the barrel**
- **TGCs in the end-caps**

Muon chamber production





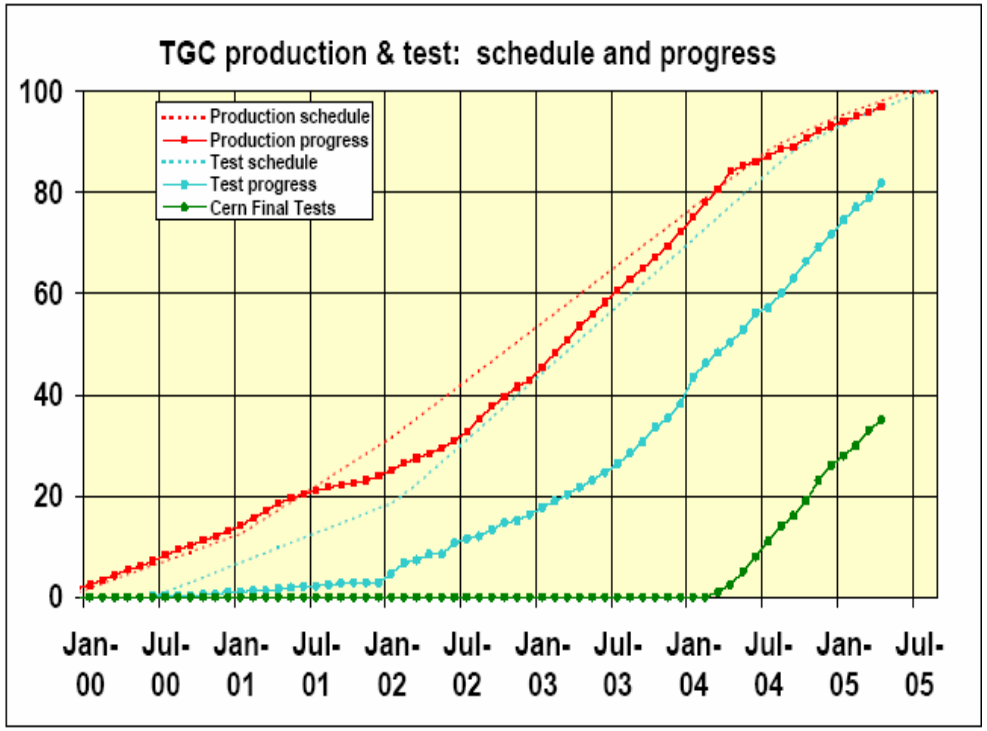
MDT precision chamber production progress (today: 95% produced, 50% equipped with electronics)

On the critical path is the RPC chamber construction, which was delayed because of a delamination problem for support panels

This is now solved, so far the preparation of the MDT+RPC barrel muon stations was meeting the installation requirements only *'just in time'*, but improvements are being implemented

The first 22 MDT+RPC muon stations have been installed in the feet region of the barrel toroid

Pre-assembly of the end-cap muon 'Big-Wheels'



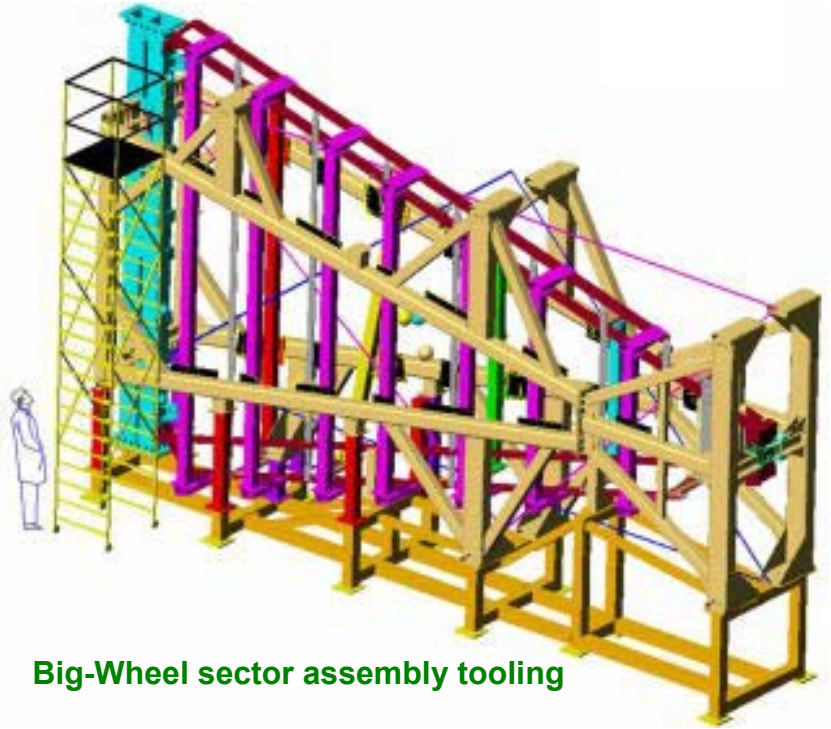
72 TGC sectors and 32 MDT have to be assembled from Q2 2005 to Q3 2006 (15 months)

TGC end-cap trigger chamber production is nearing completion

First MDT and TGC1 sectors and assembly tooling are now available at CERN

First TGC sector at CERN, and MDT sector also at CERN

Assembly crews are at CERN

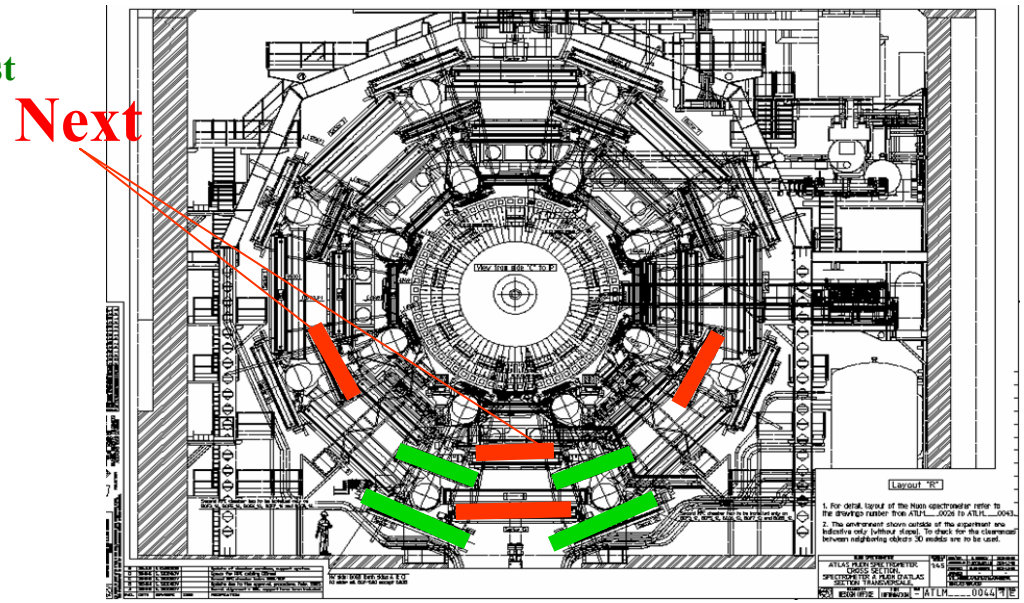


Big-Wheel sector assembly tooling

Muon Barrel: Commissioning

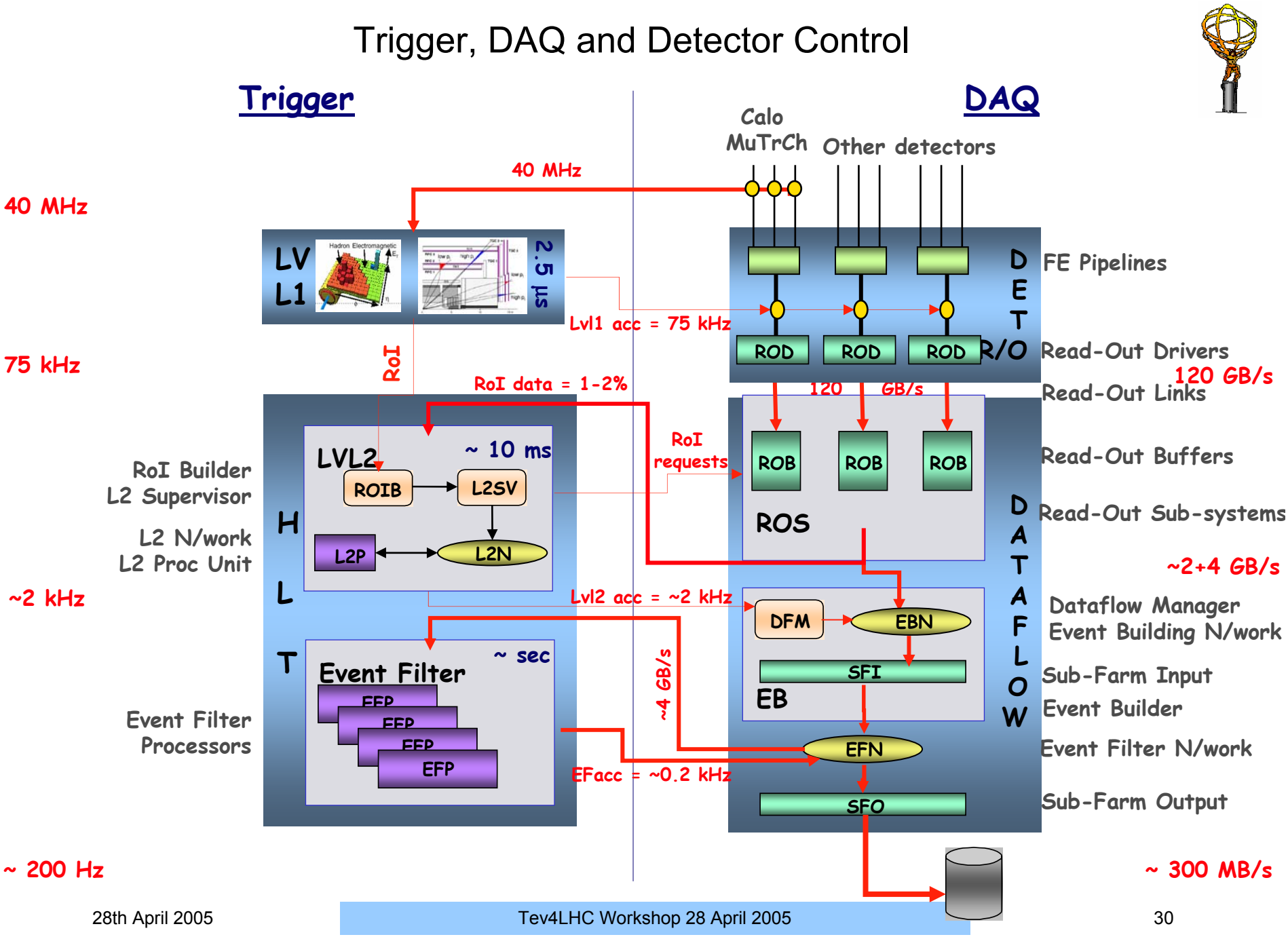
- **Sectors 12 and 14**
  - 22 chambers installed in the Toroid feet with initial commissioning procedure. Final commissioning will be applied when service and final cables become available

- **Alignement system**
  - Installed and commissioned in synch with toroid and chambers
- **Sector 13 chambers**
  - Install and commission chambers test stations (surface & underground)
    - Completed middle May
  - Install and commission sector 13 chambers
    - End May to end August
    - Includes validation of commissioning procedure



- **Muon Barrel chambers**
  - From September to end March 06

Trigger, DAQ and Detector Control



Level-1

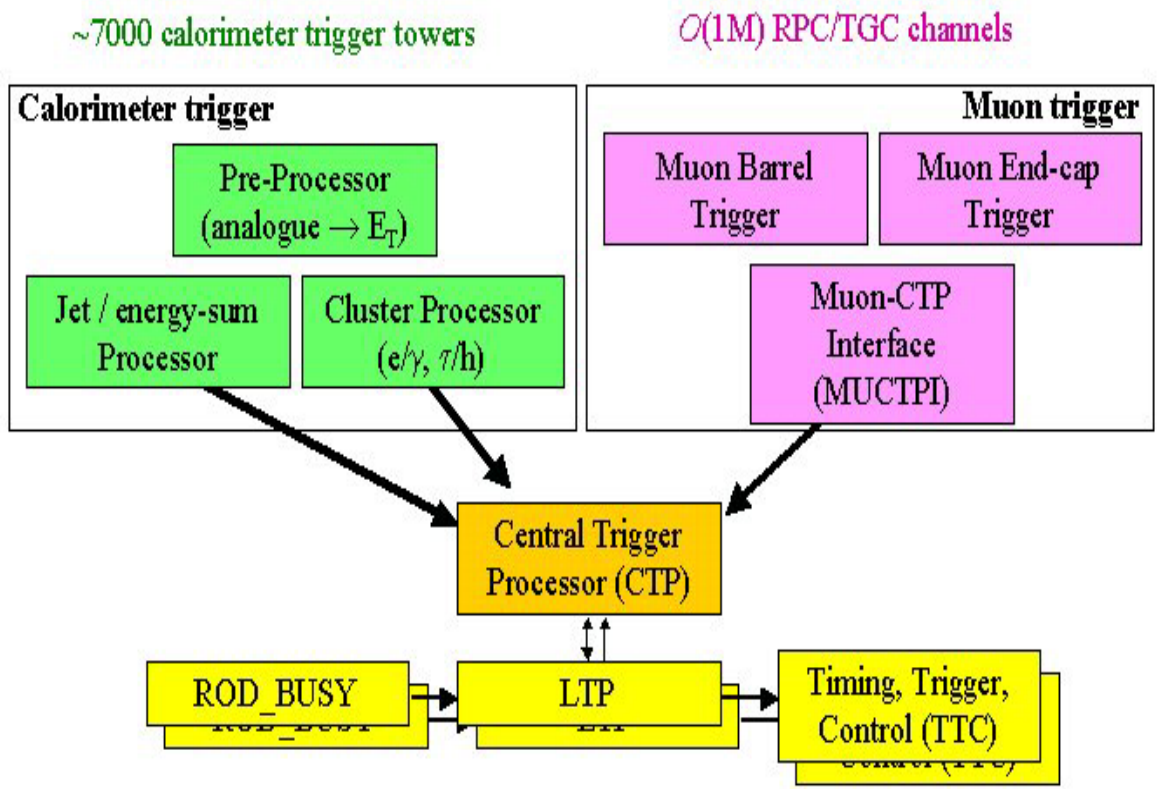
The level-1 system (calorimeter, muon and central trigger logics) completed the final ASICs developments and testing of full-functionality prototype modules; series production has started

The calorimeter level-1 trigger has worked successfully at the combined test beam in 2004

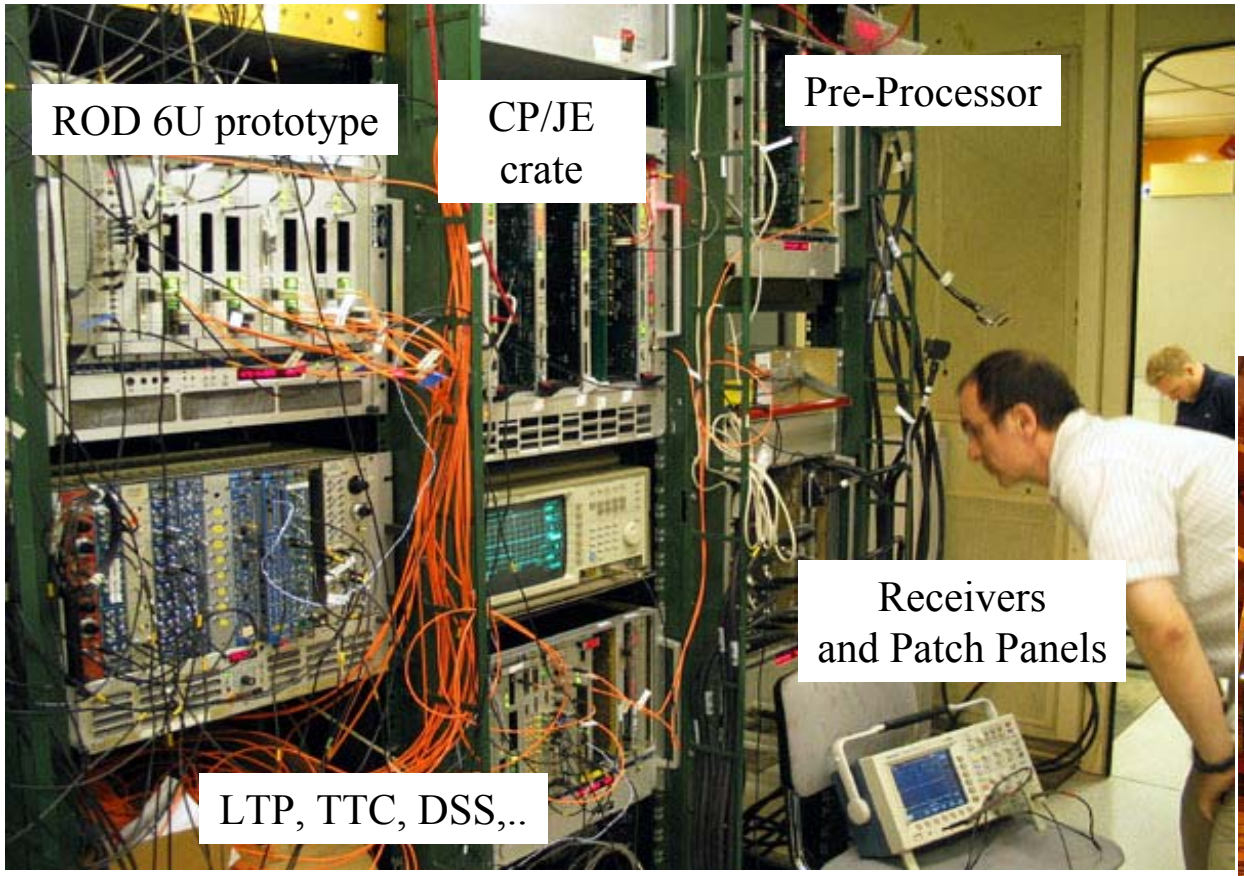
The muon level-1 trigger has been tested with 25 ns bunched test beams, final improvements were implemented in a last iteration

These final ASICs are under final tests, with positive results, and the series production is launched, however

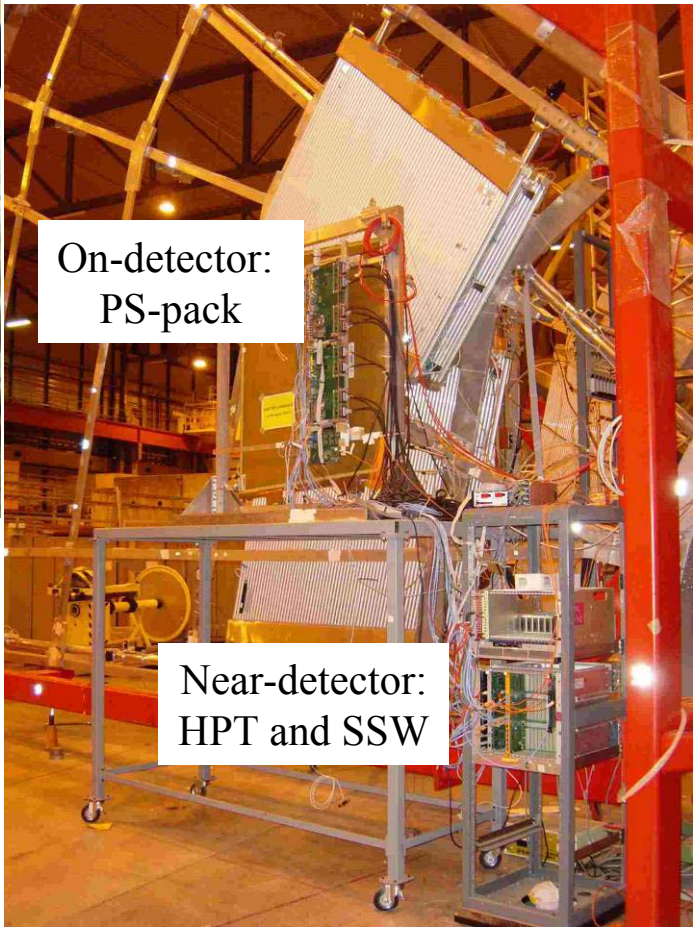
→ both the RPC and TGC ASICs are on the critical path (needed on-detector for integration)



The Central Trigger Processor progresses on schedule



Calorimeter Level-1 trigger at the combined test beam



Muon Level-1 trigger at the combined test beam

HLT/DAQ/DCS

The HLT/DAQ/DCS work proceeded within the framework of the TDR approved early 2004

HLT/DAQ prototypes worked in the 2004 Combined Test Beam, as well as in test beds for optimizing the final design

A pre-series system is now being purchased and will be installed in Pit-1 (as a 10% data flow test)

Local DAQ capability is being set up at the Pit-1 for initial detector commissioning, using the Read Out Driver (ROD) crate DAQ

It is recalled that an important criteria in the choice of the HLT/DAQ architecture was the ability to scale the system for staging needs during the initial running of ATLAS

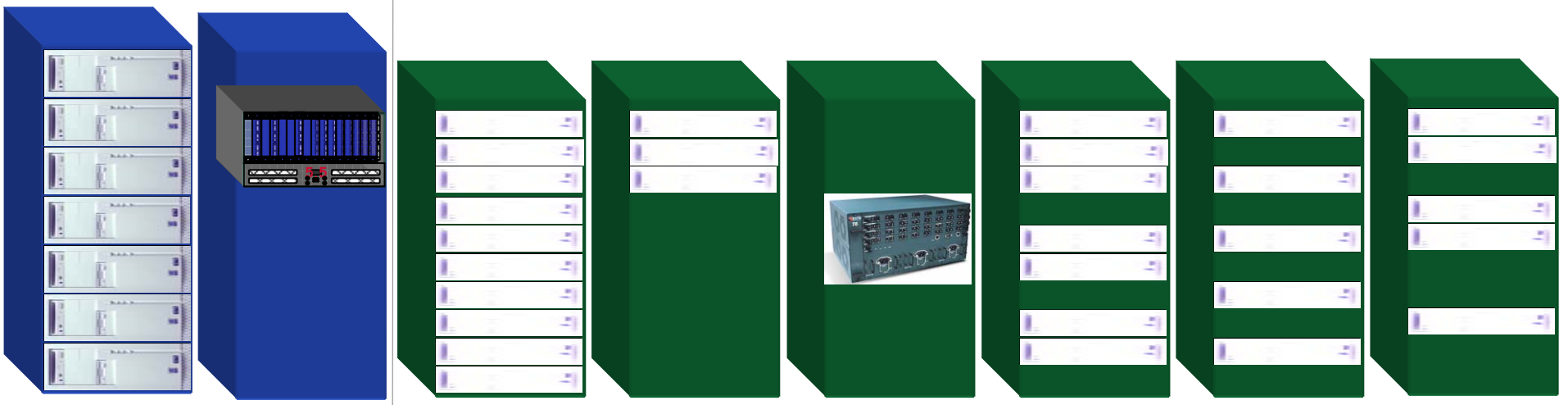
Components of the DCS are in fabrication, and are already widely used, and the DCS is one of the first systems brought into operation at Pit-1

Final ROBIN module from pre-series

SDX1 HLT/DAQ room at the Pit-1 surface

Pre-series “Module-0” of final system: 8 racks at Pit-1 (10% of final dataflow)

USA15 **SDX1**



One ROS rack
-
TC rack + horiz. Cooling
-
12 ROS
48 ROBINs

RoIB rack
-
TC rack + horiz. cooling
-
50% of RoIB

One Full L2 rack
-
TDAQ rack
-
30 HLT PCs

Partial Superv'r rack
-
TDAQ rack
-
3 HE PCs

One Switch rack
-
TDAQ rack
-
128-port GEth for L2+EB

Partial EFIO rack
-
TDAQ rack
-
10 HE PC (6 SFI - 2 SFO - 2 DFM)

Partial EF rack
-
TDAQ rack
-
12 HLT PCs

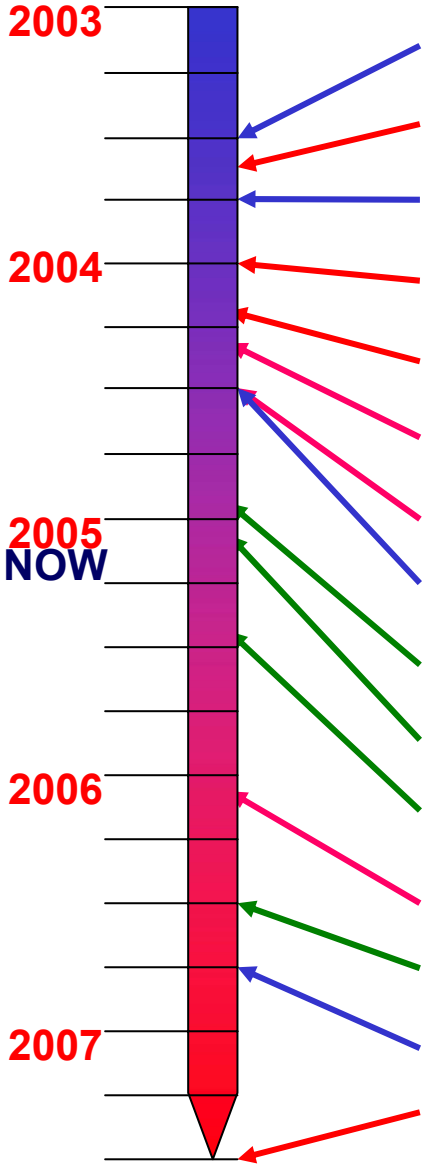
Partial ONLINE rack
-
TDAQ rack
-
4 HLT PC (monitoring)
2 LE PC (control)
2 Central FileServers

ROS, L2, EFIO and EF racks: one Local File Server, one or more Local Switches

DAQ/HLT/DCS: Commissioning

- **Installation and commissioning of DAQ/HLT pre-series**
  - **April - May**
- **DAQ Infrastructure**
  - **May**
- **Read-out Driver (ROD) crate DAQ**
  - **Ongoing in synch with detectors**
- **Detector Control and Safety systems**
  - **Installation and commissioning of underground control stations**
    - **Done**
  - **Common rack controls (temperature, smoke detection, etc.)**
    - **Ongoing; first underground sector by end of May**

ATLAS Computing Timeline



- POOL/SEAL release (done)
- ATLAS release 7 (with POOL persistency) (done)
- LCG-1 deployment (done)
- ATLAS complete Geant4 validation (done)
- ATLAS release 8 (done)
- DC2 Phase 1: simulation production (done)
- DC2 Phase 2: intensive reconstruction (the real challenge!) LATE!
- Combined test beams (barrel wedge) (done)
- Computing Model paper (done)
- Computing Memorandum of Understanding (in progress)
- ATLAS Computing TDR and LCG TDR (starting)
- Computing System Commissioning
- Physics Readiness Report
- Start cosmic ray run
- **GO!**

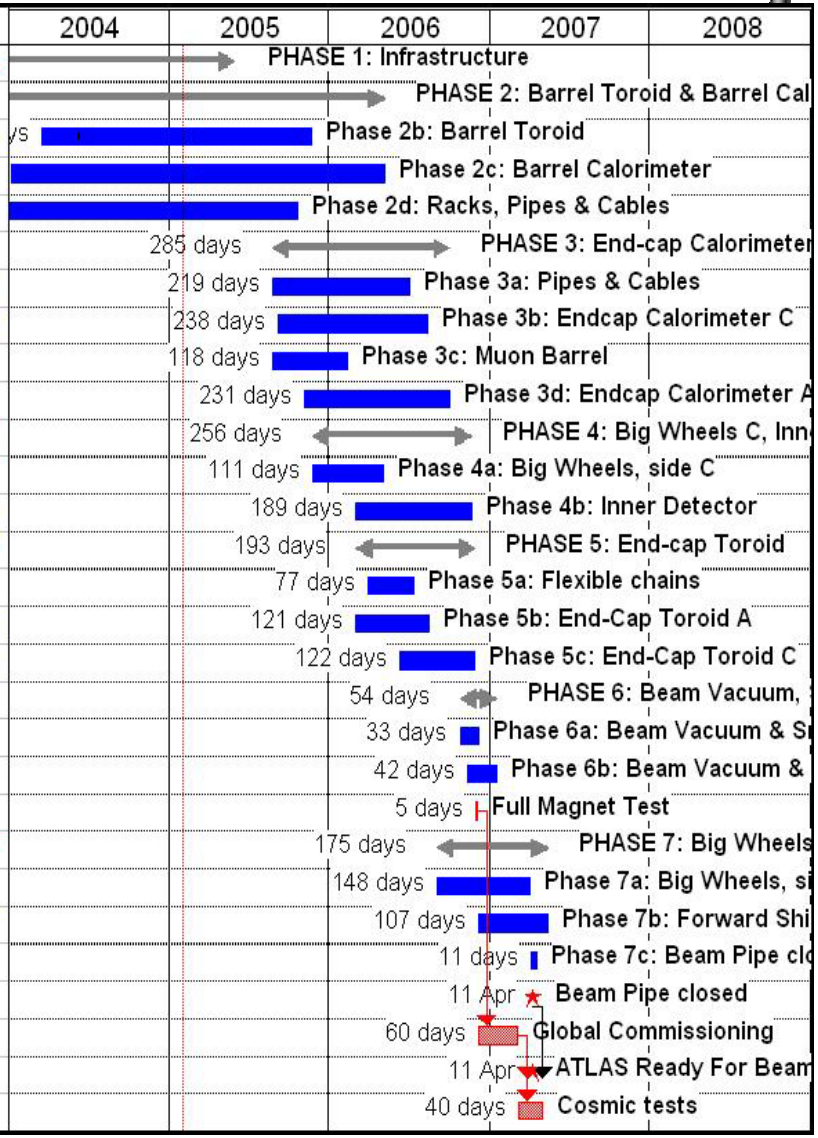
Computing System Commissioning Goals

- **We have recently defined the high-level goals of the Computing System Commissioning operation during the first half of 2006**
  - **Formerly called "DC3"**
  - **More a running-in of continuous operation than a stand-alone challenge**
- **Main aim of Computing System Commissioning will be to test the software and computing infrastructure that we will need at the beginning of 2007:**
  - **Calibration and alignment procedures and conditions DB**
  - **Full trigger chain**
  - **Tier-0 reconstruction and data distribution**
  - **Distributed access to the data for analysis**
- **At the end (mid-2006) we will have a working and operational system, ready to take data with cosmic rays at increasing rates**

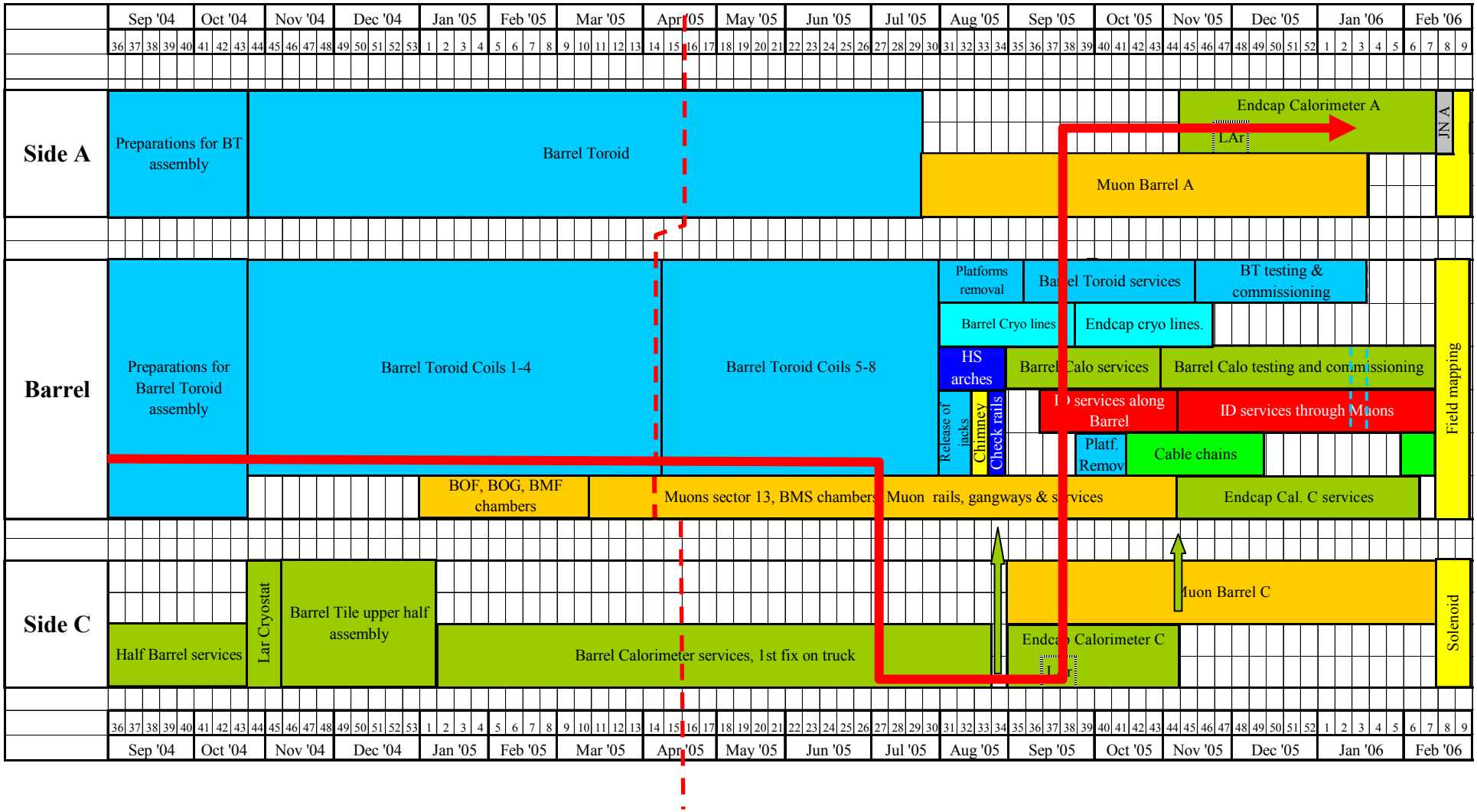
Overall summary installation schedule version 7.0

(New baseline approved in the February ATLAS EB)

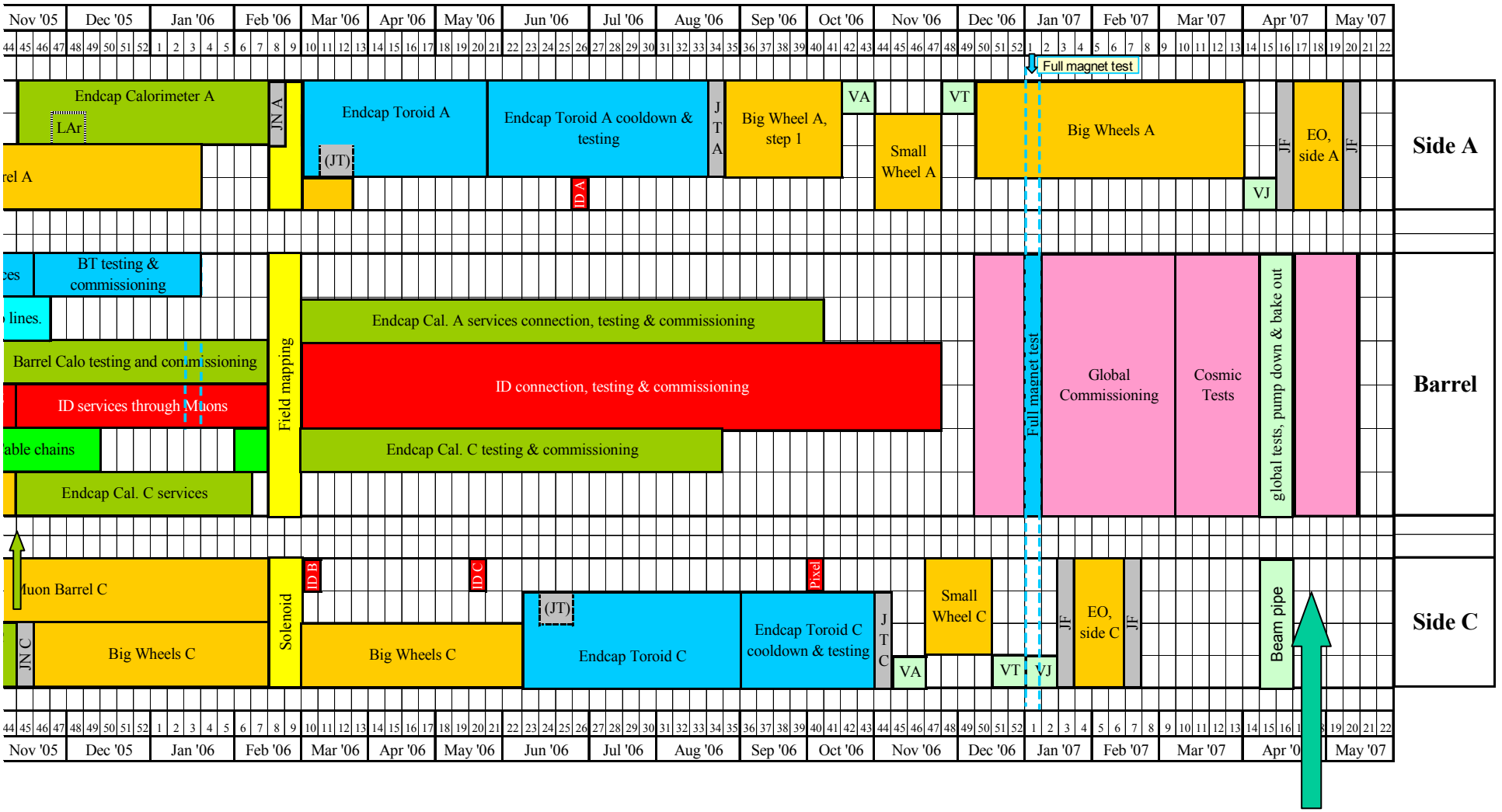
Name	Start	Finish
PHASE 1: Infrastructure	4 Apr '03	27 May '05
PHASE 2: Barrel Toroid & Barrel Calorimeter	4 Mar '03	5 May '06
Phase 2b: Barrel Toroid	15 Mar '04	20 Nov '05
Phase 2c: Barrel Calorimeter	7 Jan '04	5 May '06
Phase 2d: Racks, Pipes & Cables	4 Mar '03	19 Oct '05
PHASE 3: End-cap Calorimeters & Muon Barrel	22 Aug '05	2 Oct '06
Phase 3a: Pipes & Cables	22 Aug '05	30 Jun '06
Phase 3b: Endcap Calorimeter C	6 Sep '05	14 Aug '06
Phase 3c: Muon Barrel	22 Aug '05	9 Feb '06
Phase 3d: Endcap Calorimeter A	3 Nov '05	2 Oct '06
PHASE 4: Big Wheels C, Inner Detector	21 Nov '05	21 Nov '06
Phase 4a: Big Wheels, side C	21 Nov '05	2 May '06
Phase 4b: Inner Detector	1 Mar '06	21 Nov '06
PHASE 5: End-cap Toroid	2 Mar '06	27 Nov '06
Phase 5a: Flexible chains	28 Mar '06	12 Jul '06
Phase 5b: End-Cap Toroid A	2 Mar '06	17 Aug '06
Phase 5c: End-Cap Toroid C	9 Jun '06	27 Nov '06
PHASE 6: Beam Vacuum, Small Wheels, Start closin	24 Oct '06	16 Jan '07
Phase 6a: Beam Vacuum & Small Wheels, side A	24 Oct '06	8 Dec '06
Phase 6b: Beam Vacuum & Small Wheels, side C	10 Nov '06	16 Jan '07
Full Magnet Test	*28 Nov '06*	*4 Dec '06*
PHASE 7: Big Wheels A, Forward Shielding & End w	30 Aug '06	10 May '07
Phase 7a: Big Wheels, side A	30 Aug '06	3 Apr '07
Phase 7b: Forward Shielding & End wall Chamb	5 Dec '06	10 May '07
Phase 7c: Beam Pipe closing and bake-out	4 Apr '07	18 Apr '07
Beam Pipe closed	*11 Apr '07*	*11 Apr '07*
Global Commissioning	5 Dec '06	6 Mar '07
ATLAS Ready For Beam	*11 Apr '07*	*11 Apr '07*
Cosmic tests	7 Mar '07	1 May '07



Schedule


Sep '04
Oct '04
Nov '04
Dec '04
Jan '05
Feb '05
Mar '05
Apr '05
May '05
Jun '05
Jul '05
Aug '05
Sep '05
Oct '05
Nov '05
Dec '05
Jan '06
Feb '06
Side A
Preparations for BT assembly
Barrel Toroid
Endcap Calorimeter A
LAr
JN A
Muon Barrel A
Barrel
Preparations for Barrel Toroid assembly
Barrel Toroid Coils 1-4
Barrel Toroid Coils 5-8
Platforms removal
Barrel Toroid services
BT testing & commissioning
Barrel Cryo lines
Endcap cryo lines.
HS arches
Barrel Calo services
Barrel Calo testing and commissioning
Release of jacks
Chimney
Check rails
ID services along Barrel
ID services through Muons
Platf. Remov
Cable chains
Field mapping
BOF, BOG, BMF chambers
Muons sector 13, BMS chambers
Muon rails, gangways & services
Endcap Cal. C services
Side C
Half Barrel services
Lar Cryostat
Barrel Tile upper half assembly
Barrel Calorimeter services, 1st fix on truck
Muon Barrel C
Endcap Calorimeter C
Solenoid

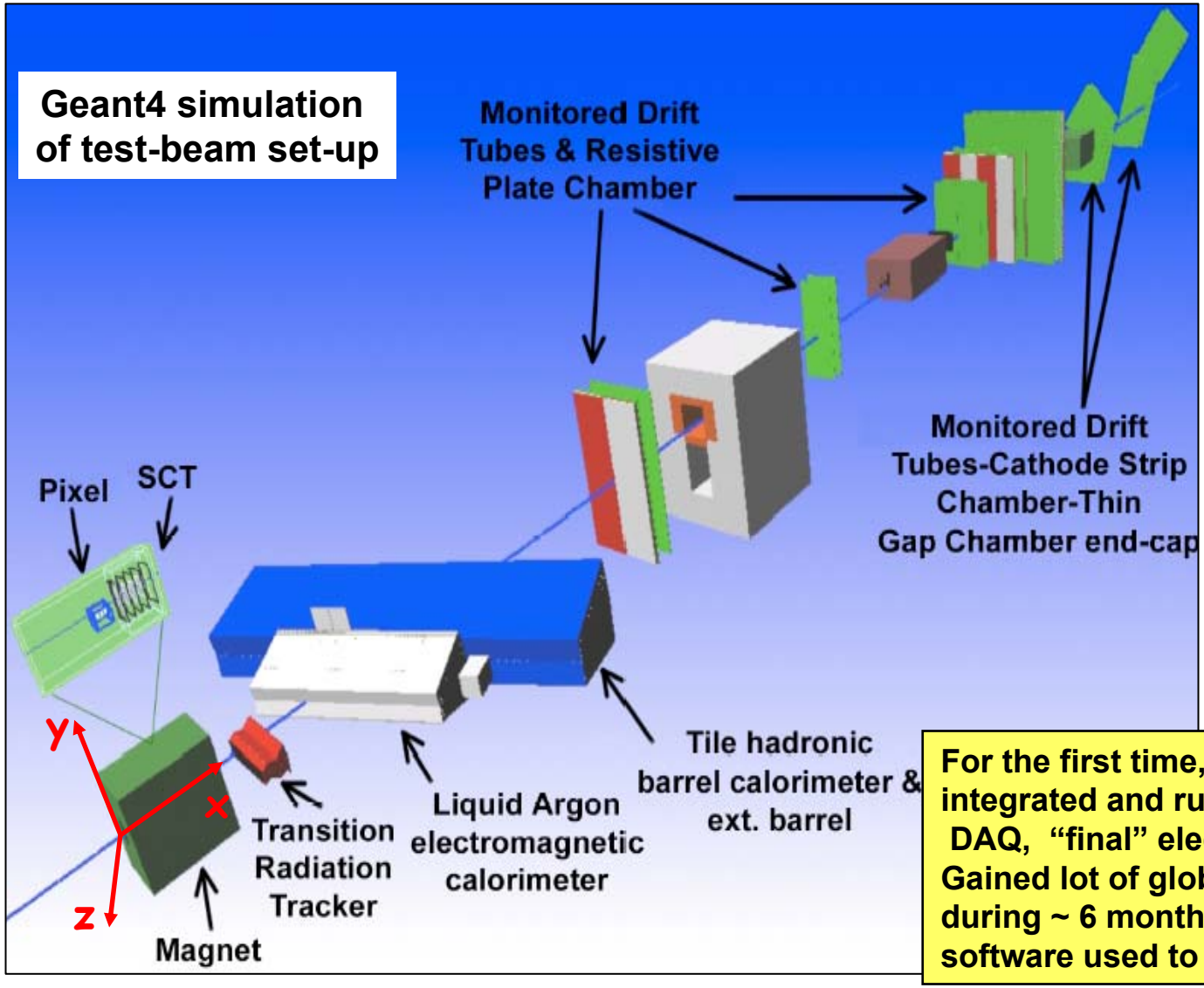
Schedule (2)


Nov '05
Dec '05
Jan '06
Feb '06
Mar '06
Apr '06
May '06
Jun '06
Jul '06
Aug '06
Sep '06
Oct '06
Nov '06
Dec '06
Jan '07
Feb '07
Mar '07
Apr '07
May '07
Full magnet test
Endcap Calorimeter A
LAr
JN A
Endcap Toroid A
(JT)
Endcap Toroid A cooldown & testing
ID A
J T A
Big Wheel A, step 1
VA
Small Wheel A
VT
Big Wheels A
VJ
JF
EO, side A
Side A
BT testing & commissioning
lines.
Barrel Calo testing and commissioning
ID services through Muons
able chains
Endcap Cal. C services
Field mapping
Endcap Cal. A services connection, testing & commissioning
ID connection, testing & commissioning
Endcap Cal. C testing & commissioning
Full magnet test
Global Commissioning
Cosmic Tests
global tests, pump down & bake out
Barrel
Muon Barrel C
JN C
Big Wheels C
Solenoid
ID B
ID C
Pixel
(JT)
Endcap Toroid C
Big Wheels C
Endcap Toroid C cooldown & testing
J T C
VA
Small Wheel C
VT
VJ
JF
EO, side C
JF
Beam pipe
Side C
LHC closing

2004 Combined Test Beam at H8

Towards the complete experiment: ATLAS combined test beam in 2004

Full "vertical slice" of ATLAS tested on CERN H8 beam line May-November 2004



For the first time, all ATLAS sub-detectors integrated and run together with common DAQ, "final" electronics, DCS, etc. Gained lot of global operation experience during ~ 6 month run. Common ATLAS software used to analyze the data

Commissioning

Commissioning

- **Definition: "Commissioning a system" means:**
  - **Make the system ready for its mission**
- **For the detector**
  - **bring it from its "just installed" state to an operational state.**

- **Commissioning activities started since may 2004**
  - **Organization of a commissioning structure within existing ATLAS organization (started in summer 04)**
  - **Design of commissioning Work Packages (started Fall 04)**
  - **Execution: "underground" commissioning (started January 05)**

Qualify “operational state”

- **Ability for all the hardware to run (power, cooling, gas, safety, record Slow Control parameters)**
- **Ability for the detector to take data : pedestal runs, electronic calibration runs, write data and run conditions and analyze them**
- **Ability to take and analyze cosmic data with complete detector**
- **Ability to take and analyze one-beam data, first collisions**

The detector is made of several sub-systems.
Divide in ≡ **Phase 1** (sub-systems),
≡ **Phase 2**, full detector.

≡ **Phase 3**

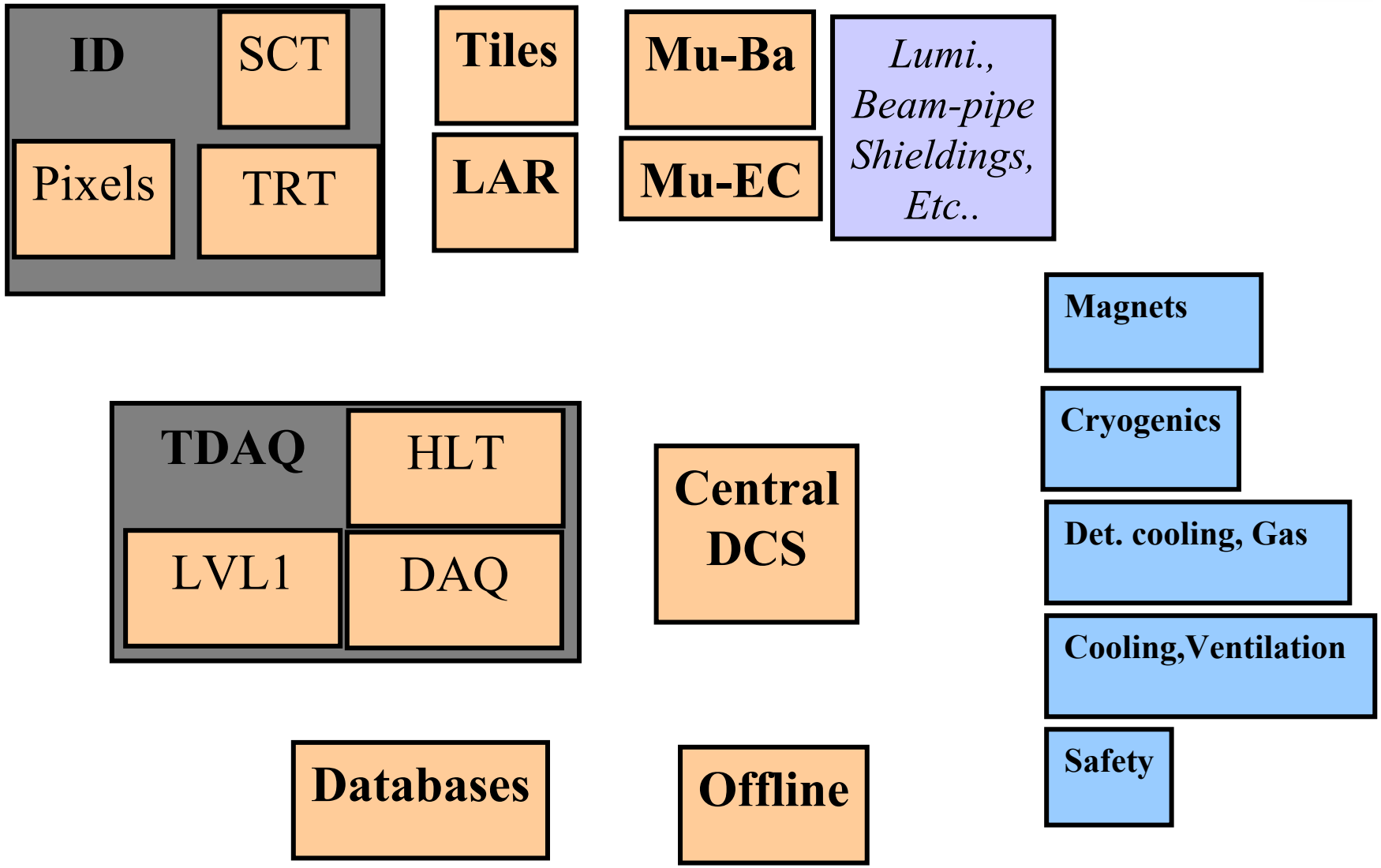
≡ **Phase 4**

Commissioning ATLAS

- **Phase 1 commissioning**
  - **Infrastructure, individual sub-systems**
- **Phase 2**
  - **Combined sub-systems**
  - **Evolve into an integrated experiment**
- **Phase 3, 4**
  - **Cosmic runs, one beam runs, first collisions [Dan Tovey's talk]**
- **Time scales**
  - **Phase 1 : 2004 - Early 2007**
  - **Phase 2 : Fall 2005 - Early 2007**
  - **Phase 3 : March 2007**

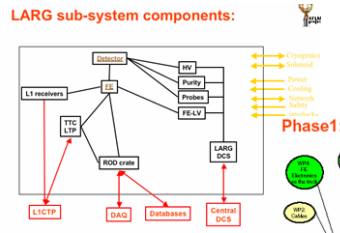
- **Phases 1, 2, 3 and installation will overlap**

ATLAS sub-systems and services:

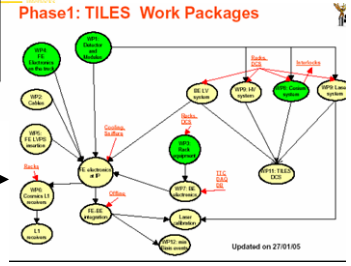


Process Overview

System Analysis
Break down
in components



Work Package
Break down



WP detailed
System document
Start end times
Tests & expected results

Documents stored in EDMS

Examples:

Tiles: https://edms.cern.ch/document/554895/3

ID: https://edms.cern.ch/document/499680/1

WP Elaboration
Detail schedule
and resources
Well ahead of execution

Requirements
WP Schedule -> ATLAS schedule
WP resources, safety document
Agree on WP outcome -> input to sign off

WP Execution

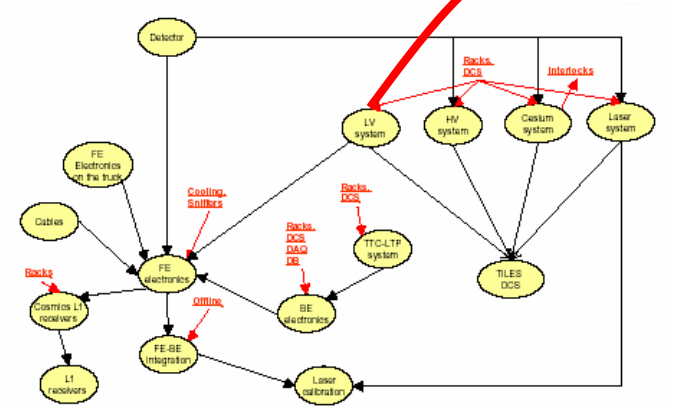
WP SIgn off

Document the results
Preserve operational information

Sign Off Process Flow

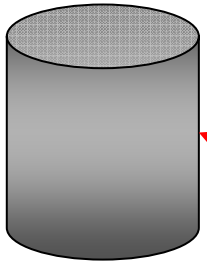
In the Work packages document:
WP outcome:
(Agreed before WP activation)

Work packages tree:



Execution of the WP
Follow-up during the Commissioning meetings

EDMS



Archive documents

Final sign-off procedure

- **Installation report**
  - Inventory, grounding, safety, …
- **Performance specifications**
  - Expected functionality
  - Quantitative performance figures
- **Test report**
  - Checklist of tests and results
- **Operational documents**
  - Indicates who is responsible, who to contact for problems
  - Maintenance procedures/plan
  - Pointers to relevant documentation
    - Operational procedures
    - Test procedures
    - Component manuals
  - List of open issues/problems

Activities (https://edms.cern.ch/document/570036/1)

WORK PACKAGES FOR PHASE 1

Sub-System and WP number	status	WP name	Location	Resp.	Ref. EDMS	WP elaboration date	WP analysis date	PPSPS location in EDMS	WP starting date	WP sign-off date(s)	Issues
		Pipework on cryostat (Truck)	UX15								
		PP2 at sector 13									
LARG											
		Detector									
569996	A	FE Infrastructure (WP 2.a)	UX15								581573
580613		FEC population on the truck (WP 2.b)	UX15								
		UX15-USA15 Cables checks on HS	UX/US								
580612		BE readout system (WP5)	USA15								
		L1 receivers	USA15								
		LV PS system	USA15								
		HV PS system	USA15								
		LARG local DCS (inc. purity, temp.)	USA15								
		FE electronics at z=0	UX15/US 15								
TILES											
		WP1: Modules installation including Gap and crack scintillators in EB's	UX15								
574033	A	WP2.1 Cables installation + QA	UX15								
		WP2: 2.2 and 2.3 Bring cables + put connector and test									
	A	WP3: USA15 racks equipment	USA15	E						05	
574028	A	WP8: Cesium calibration system	UX15 and USA15	A. Karyukhin	554895		1-Mar-05			2-May-05	581573
571104	A	WP4.1: drawers tests using local systems (Mobidick)	UX15	F. Martin	554895		1-Mar-05		-05	1-May-05	
571104	A	WP4.2: MobiDAQ tests on truck	USA15	G.Schlager	554895		1-Mar-05		ar-05	30-Jun-05	
		WP5: LV power supplies insertion + QA	USA15		554895				Nov-05	31-Jan-06	
		WP6: Calorimeter trigger receivers:	USA15		554895						
		6.1) Cosmics calorimeter receivers for phase 1 (Univ. of Chicago design):	USA15		554895						
		6.2) LVL1 calorimeter receivers for phase 2	USA15		554895						
		WP7: BE electronics: RODs etc.	USA15		554895				1-Jun-05	31-Aug-05	
		WP9: Laser calibration system	USA15								
		WP10: HV system	USA15								
		WP11: Local DCS	USA15								
		WP12: Minimum Bias system	USA15								
		WP13: Full detector parameters calibration (get calibration parameters from CIS, Laser, cesium systems and get timing of cells (phase 1 and 2)	USA15								

Some 130 WPs for Phase 1
~ 20 Active WPs
Expect ramp up in fall (after Barrel to z = 0)

Commissioning Phase II

- **Goal**
  - **Integrated, operational experiment without particles**
- **Issues**
  - **Sub-systems and services. For example**
    - **LARG + cryogenics; ID + gas system; Muons + gas system**
    - **Consider a "natural" extension of phase 1 for the sub-system**
  - **Integrated system (time scale end 2005)**
    - **Combined R/O of 2 calorimeter partitions; Common cosmics trigger**
    - **To be exploited e.g. for early cosmics runs, functional phase I detector tests**
  - **Experiment integration**
    - **Leading role played by a number of sub-systems**
      - **Trigger, DCS, DAQ, Offline/data bases**
- **Methodology: same as for phase I**
  - **Work Packages**
    - **Involve sub-systems for the design and execution of the WPs**
  - **Sign off**

Phase II: initial activities

- **Goals :**
  - **to make sure that we have the tools available and fully functional for the operations of commissioning**
  - **prepare integration of the various components.**

- **Address a number of integration issues:**

1. **"Phase II detector chain": work on all aspects on the chain "*Trigger - Detector – DAQ – Online monitoring - data storage – analysis, Cond. DB access*"**

2. **DCS full chain: detector – local DCS – global DCS – interlocks – cond DB.**

3. **Tests with magnetic field (Solenoid and Barrel Toroid): concerning both the magnets and the detectors.**

Phase II detector chain

Integrated detector chain, to provide the following **functionalities**:

-**Read out** a sizeable fraction of the detectors (including barrel calorimeters, barrel muon sectors)
-Being able to use the **condition database** to load initial parameters for runs.
-Being able to build an appropriate **trigger** (for pedestal or calibration runs and for first cosmic runs) for such a system
-Being able to do **online monitoring** on the data
-Being able to **store** and **analyze** offline data with a unique program (ATHENA)
-Being able to **write** (and reuse) into the condition database e.g. calibration parameters

WP design just started: time scale end 2005

Conclusions

Component construction is (almost) complete for several sub-systems, and emphasis has shifted to integration, installation and commissioning

Large-scale surface system tests, in particular the combined test beam runs, have been a very major activity in 2004

There is very good progress of the schedule-critical magnet assembly, and on the general installation status and activities in the cavern

The commissioning has started: organization, planning, activities

ATLAS is on track for LHC physics in 2007

We are slowly getting there!