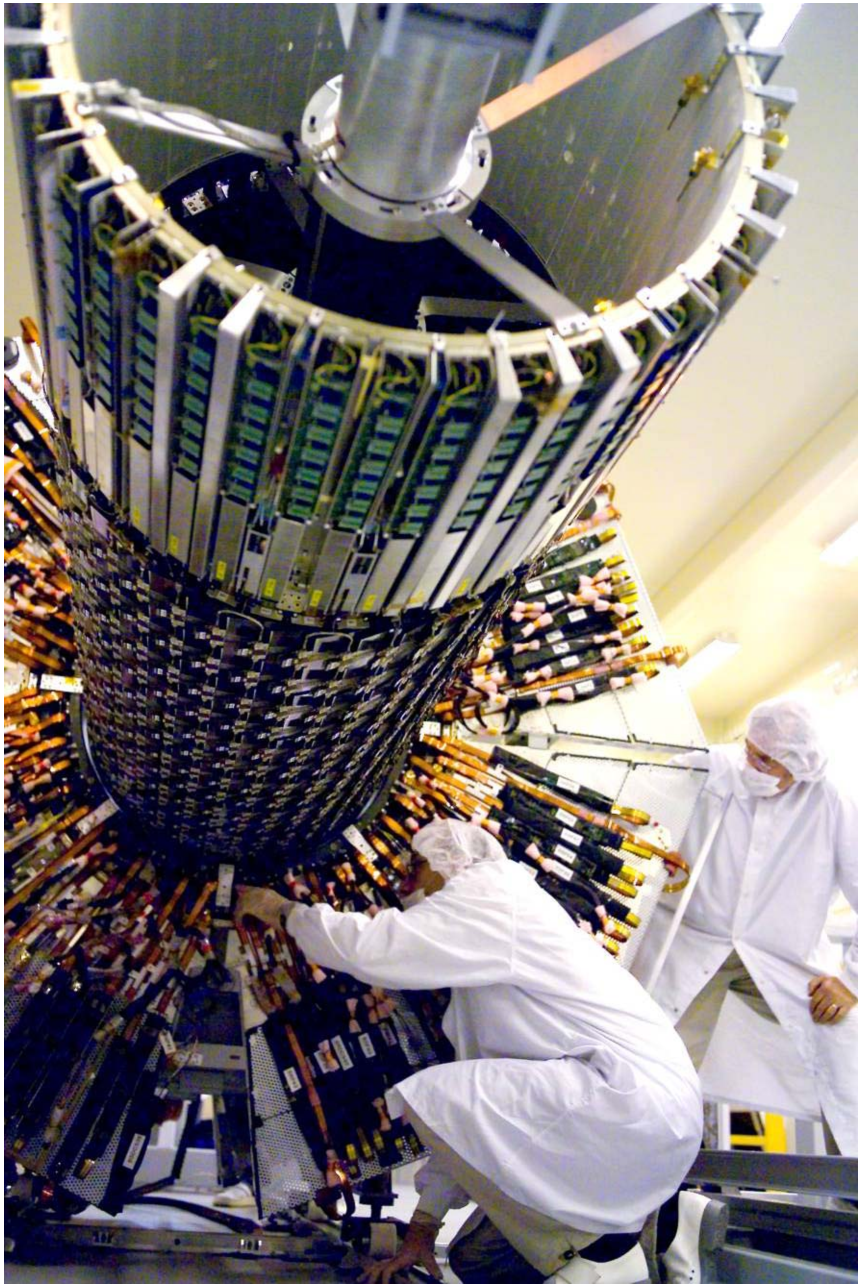
CERN-RRB-2005-092 17th October 2005

ATLAS Progress Report



Collaboration and management

Construction status of the detector systems
(Common Projects and installation: see Marzio Nessi's presentation)

Computing and physics preparation

Milestones and schedule

Brief account on other activities

Status of Completion Planning

Conclusions

Collaboration composition

Since the last RRB in April 2005 the admission procedures for the following new Institutions have been concluded, they were approved all unanimously by the Collaboration Board:

Department of Physics, University of Bologna and INFN Bologna, Italy
(RPC muon trigger chambers, luminosity monitor, high level trigger)

Department of Physics, McGill University, Montreal, Canada
(High level trigger)

Graduate School of Science, Osaka University, Japan
(TGC muon level-1 trigger)

In the case of the Osaka University, this Institution will replace the Tokyo University of Agriculture whose only member went to retirement

The RRB is kindly requested to endorse the admission of these three new Institutions in the ATLAS Collaboration

Formal Expression of Interest

The admission procedure has been initiated for several new groups from the following Institutions, which have submitted formal Expression of Interest letters

Institute of Nuclear and Particle Physics, Technical University Dresden, Germany

Institute of Physics II, Justus-Liebig-University, Giessen, Germany

Physics Department, Oklahoma State University, U.S.A.

Physics Department and Center for HEP, University of Oregon, Eugene, U.S.A.

National University of La Plata, Argentina

University of Buenos Aires, Argentina

Contacts

Contacts are being pursued with new groups from Germany, U.S.A., Turkey, and Chile

No action is requested at this stage from the RRB concerning these EoIs and contacts

ATLAS Collaboration

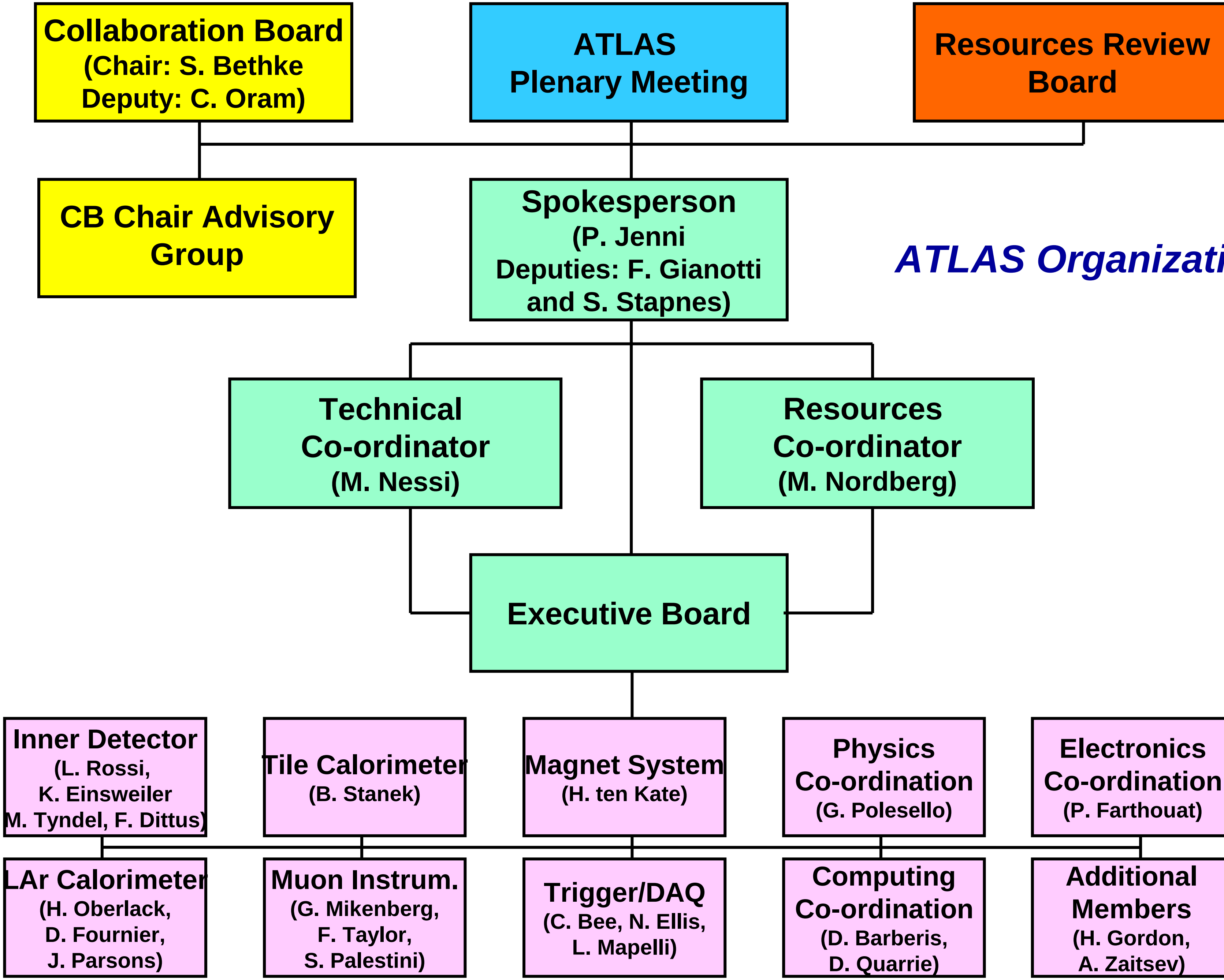
(Status September 2005)

Albany, Alberta, NIKHEF Amsterdam, Ankara, LAPP Annecy, Argonne NL, Arizona, UT Arlington, Athens, NTU Athens, Baku, IFAE Barcelona, Belgrade, Bergen, Berkeley LBL and UC, Bern, Birmingham, Bologna, Bonn, Boston, Brandeis, Bratislava/SAS Kosice, Brookhaven NL, Bucharest, Cambridge, Carleton/CRPP, Casablanca/Rabat, CERN, Chinese Cluster, Chicago, Clermont-Ferrand, Columbia, NBI Copenhagen, Cosenza, INP Cracow, FPNT Cracow, Dortmund, JINR Dubna, Duke, Frascati, Freiburg, Geneva, Genoa, Glasgow, LPSC Grenoble, Technion Haifa, Hampton, Harvard, Heidelberg, Hiroshima, Hiroshima IT, Indiana, Innsbruck, Iowa SU, Irvine UC, Istanbul Bogazici, KEK, Kobe, Kyoto, Kyoto UE, Lancaster, Lecce, Lisbon LIP, Liverpool, Ljubljana, QMW London, RHBNC London, UC London, Lund, UA Madrid, Mainz, Manchester, Mannheim, CPPM Marseille, Massachusetts, MIT, Melbourne, Michigan, Michigan SU, Milano, Minsk NAS, Minsk NCPHEP, Montreal, McGill Montreal, FIAN Moscow, ITEP Moscow, MEPhI Moscow, MSU Moscow, Munich LMU, MPI Munich, Nagasaki IAS, Naples, Naruto UE, New Mexico, Nijmegen, BINP Novosibirsk, Ohio SU, Okayama, Oklahoma, LAL Orsay, Osaka, Oslo, Oxford, Paris VI and VII, Pavia, Pennsylvania, Pisa, Pittsburgh, CAS Prague, CU Prague, TU Prague, IHEP Protvino, Ritsumeikan, UFRJ Rio de Janeiro, Rochester, Rome I, Rome II, Rome III, Rutherford Appleton Laboratory, DAPNIA Saclay, Santa Cruz UC, Sheffield, Shinshu, Siegen, Simon Fraser Burnaby, Southern Methodist Dallas, NPI Petersburg, Stockholm, KTH Stockholm, Stony Brook, Sydney, AS Taipei, Tbilisi, Tel Aviv, Thessaloniki, Tokyo ICEPP, Tokyo MU, Toronto, TRIUMF, Tsukuba, Tufts, Udine, Uppsala, Urbana UI, Valencia, UBC Vancouver, Victoria, Washington, Weizmann Rehovot, Wisconsin, Wuppertal, Yale, Yerevan

(153 Institutions from 34 Countries)

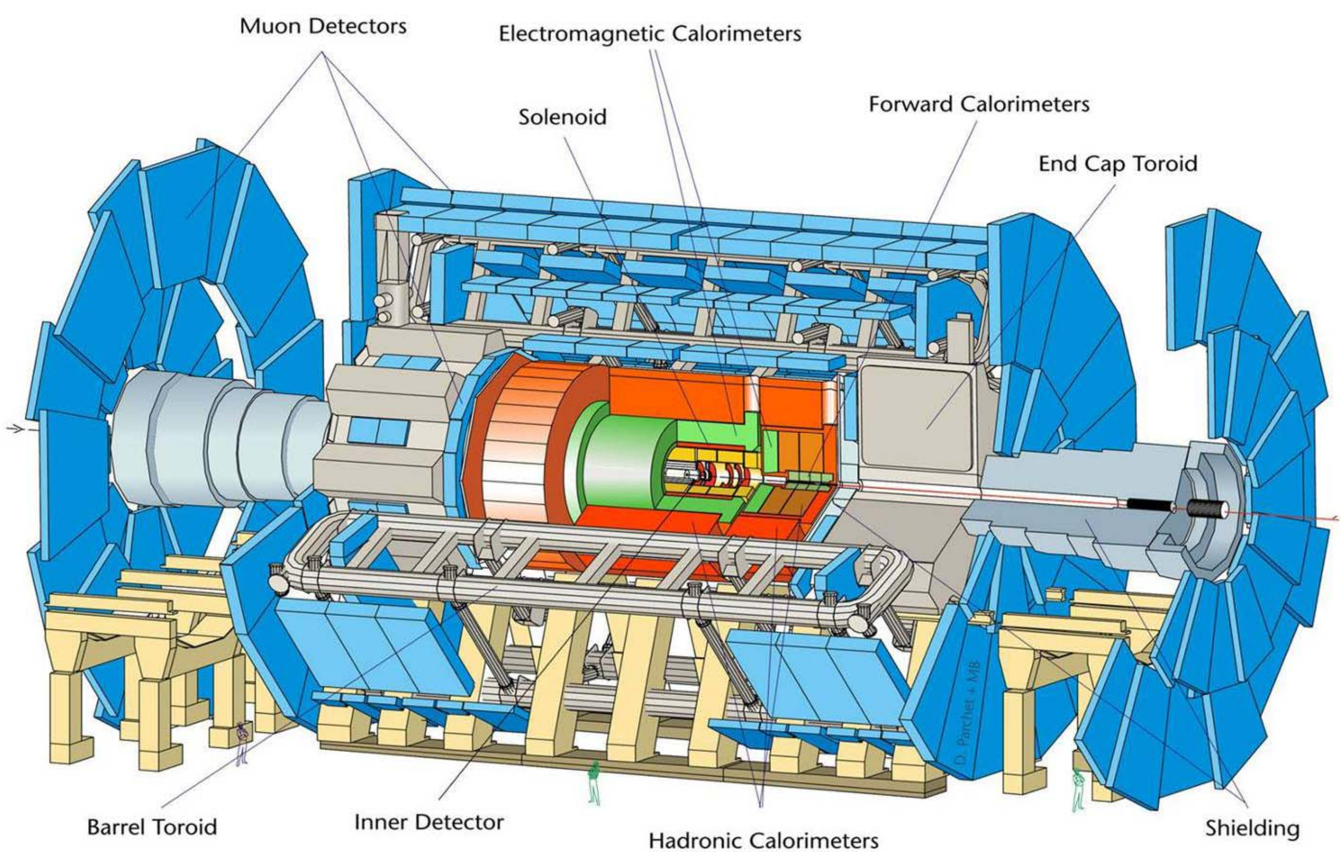
Total Scientific Authors	**1623**
Scientific Authors holding a PhD or equivalent	**1320**

ATLAS Organization



Construction progress of the detector systems

(The Common Projects and installation will be covered by M Nessi)



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***

Inner Detector (ID)

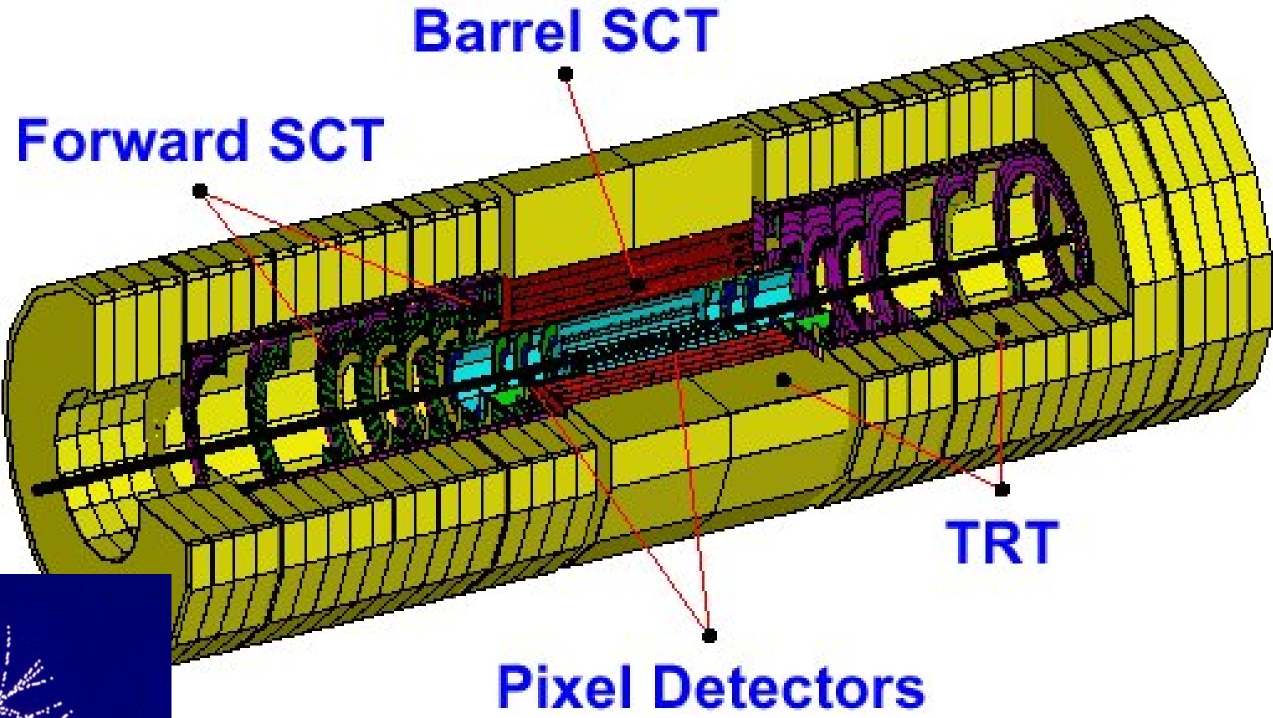
The Inner Detector (ID) is organized into four sub-systems:

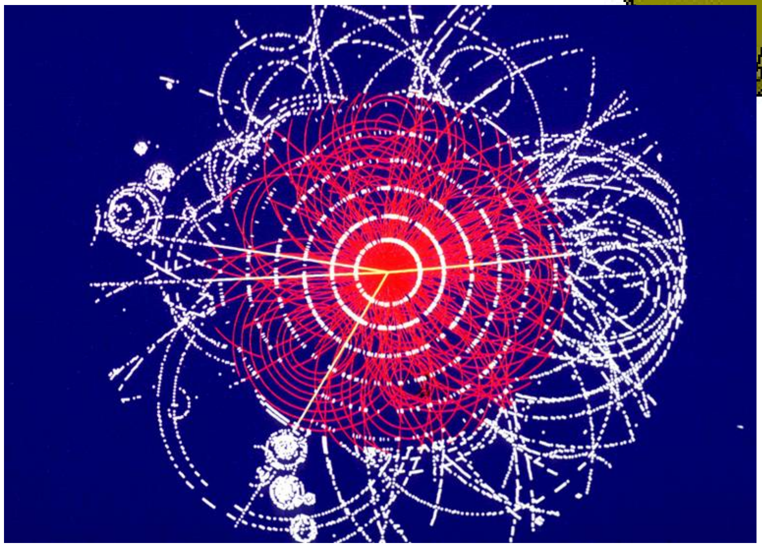
Pixels (0.8 10^8 channels)

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

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

Common ID items





Pixels

After excellent progress on the Pixel projects three technical problems have affected the schedule:

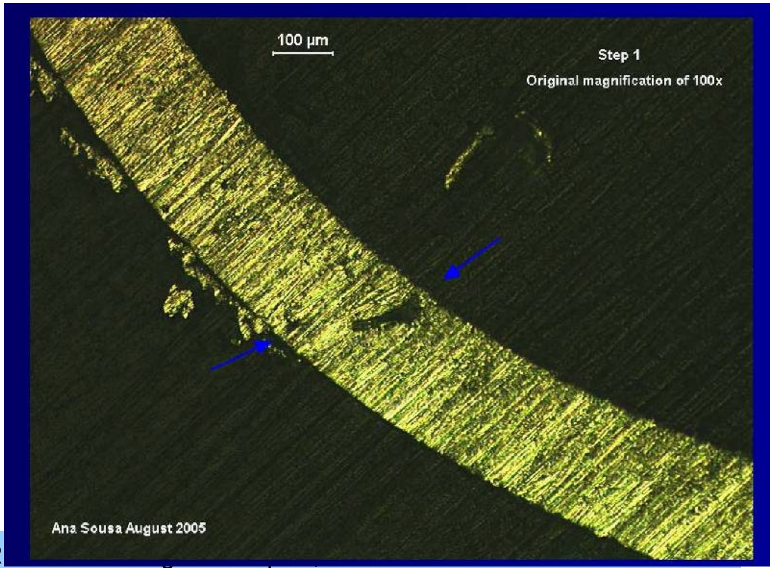
- **Faulty potting of controller chip on a fraction of barrel modules (solved)**
- **Delamination of a fraction of barrel stave supports (solved)**

- **Corrosion leaks in the barrel cooling tubes (highest priority is given to work out and implement an optimum strategy for repair and rebuilding of staves)**

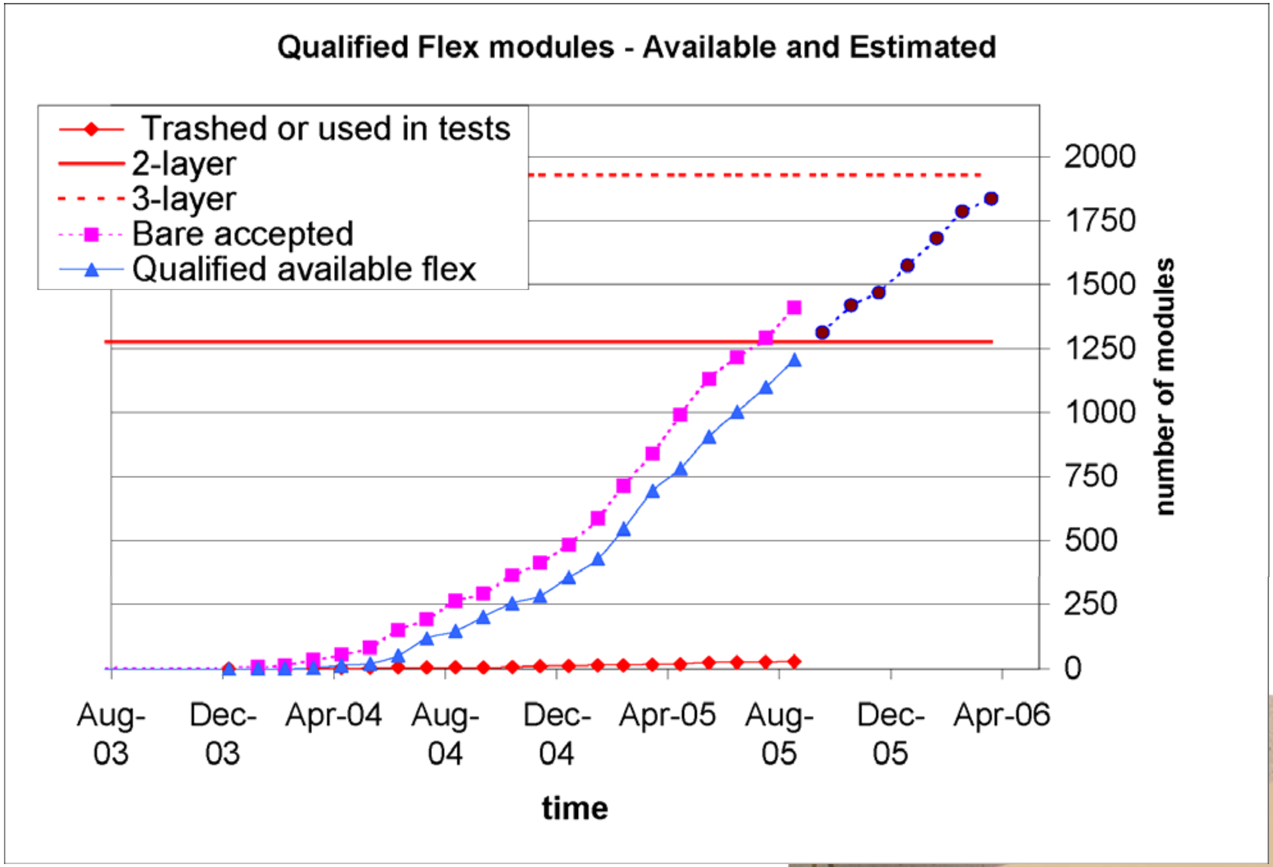
This means that there is a schedule risk for the installation of a 3-layer system in time for the start-up (the Pixel sub-system can be installed independently from the rest of the Inner Detector)

The installation schedule has been adapted to accommodate a late availability

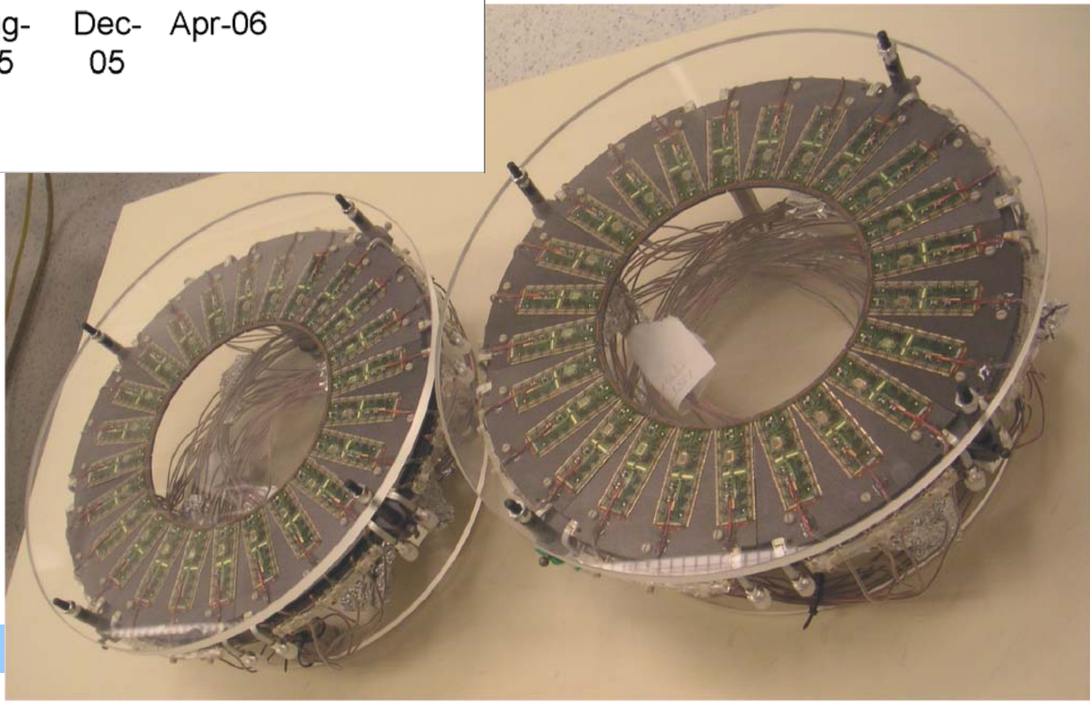
Completed barrel stave



Example of a galvanic corrosion hole that is opening

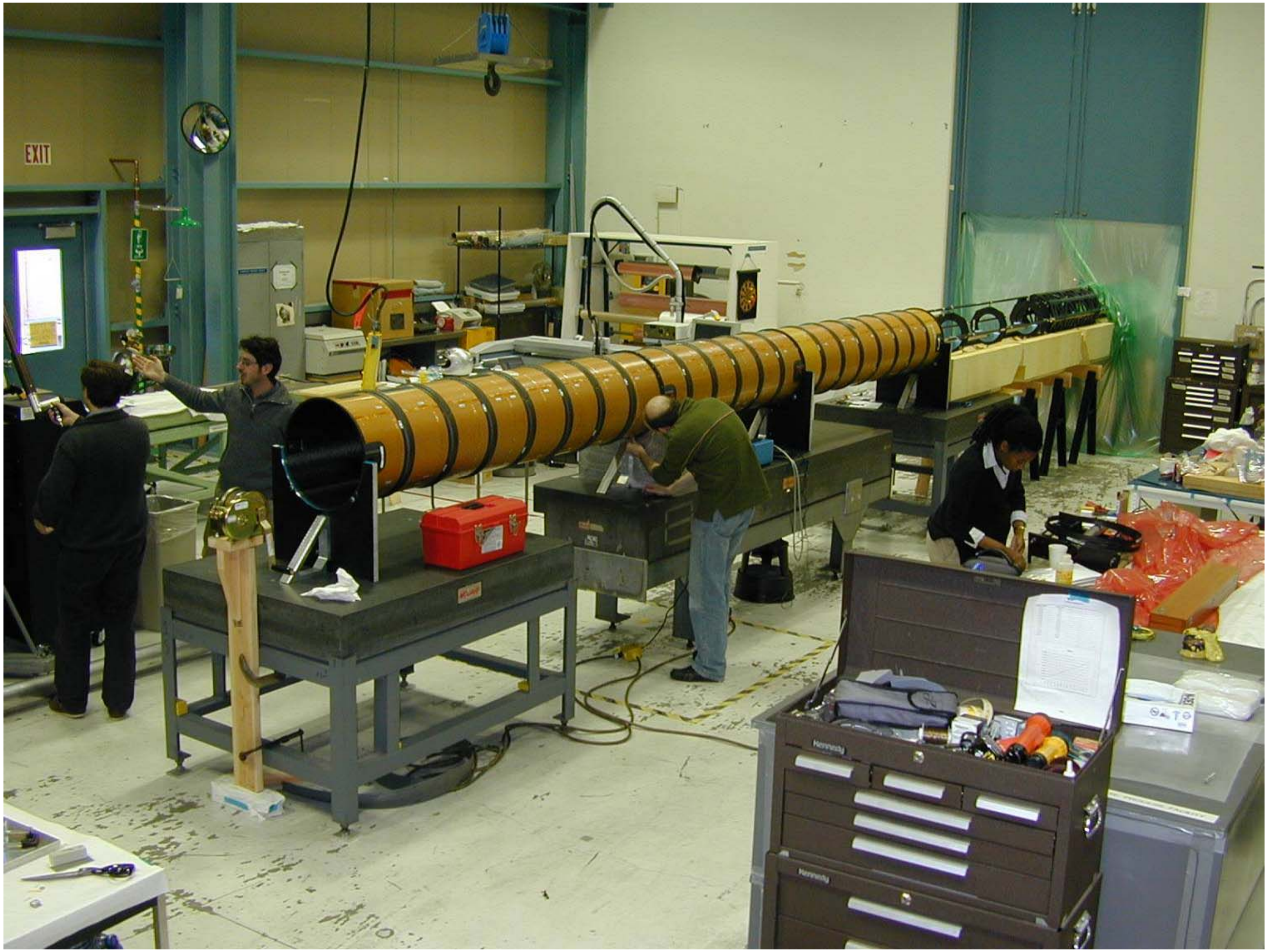


The rate for assembled and fully qualified modules meets the needs for a 3-hit system in time (1766 modules needed)



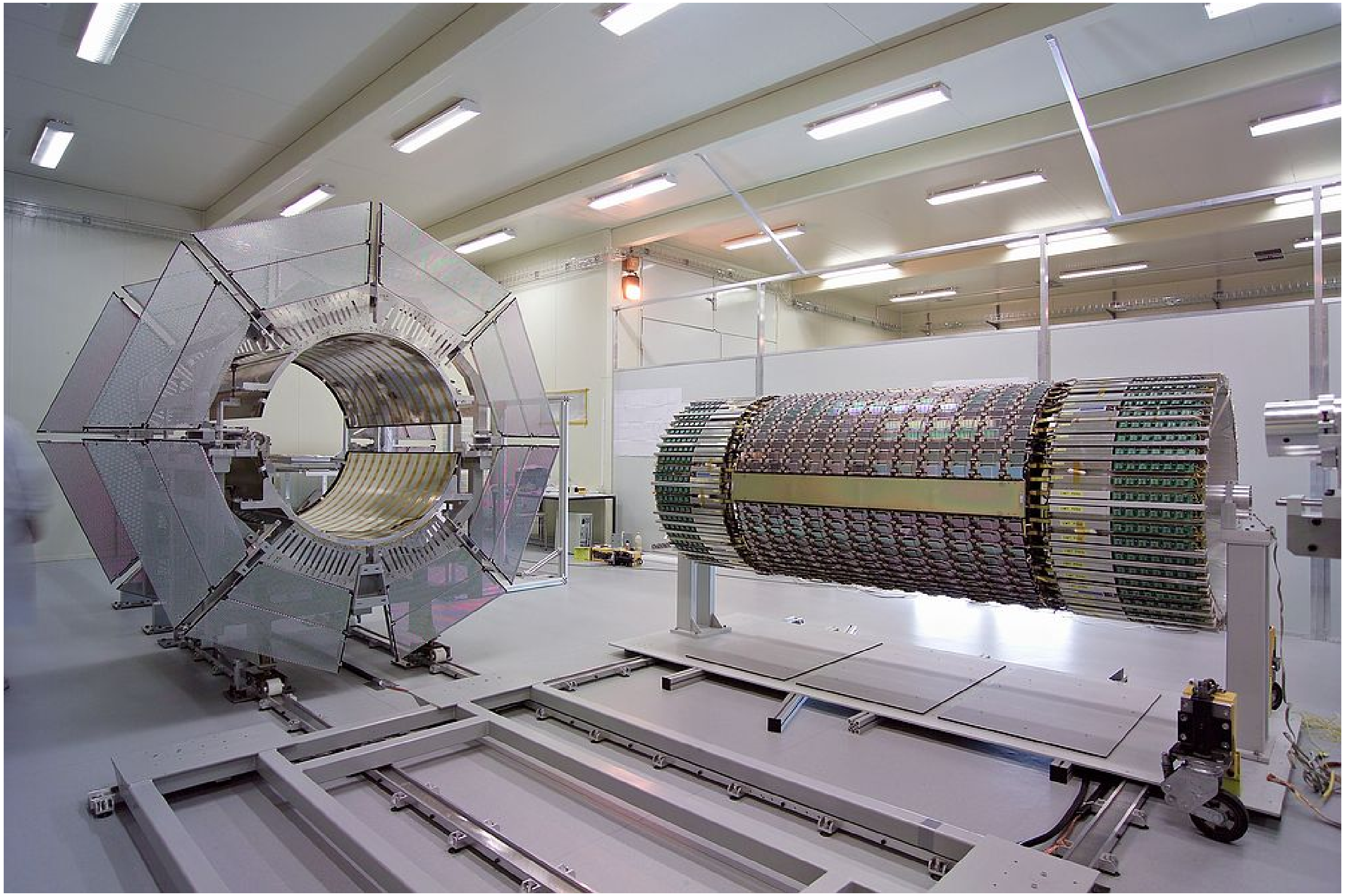
Two completed Pixel disks, each with 2.2 M channels

The low-mass global support frame for the Pixel detector and beam pipe is ready, shown here during a trial assembly with a dummy beam pipe



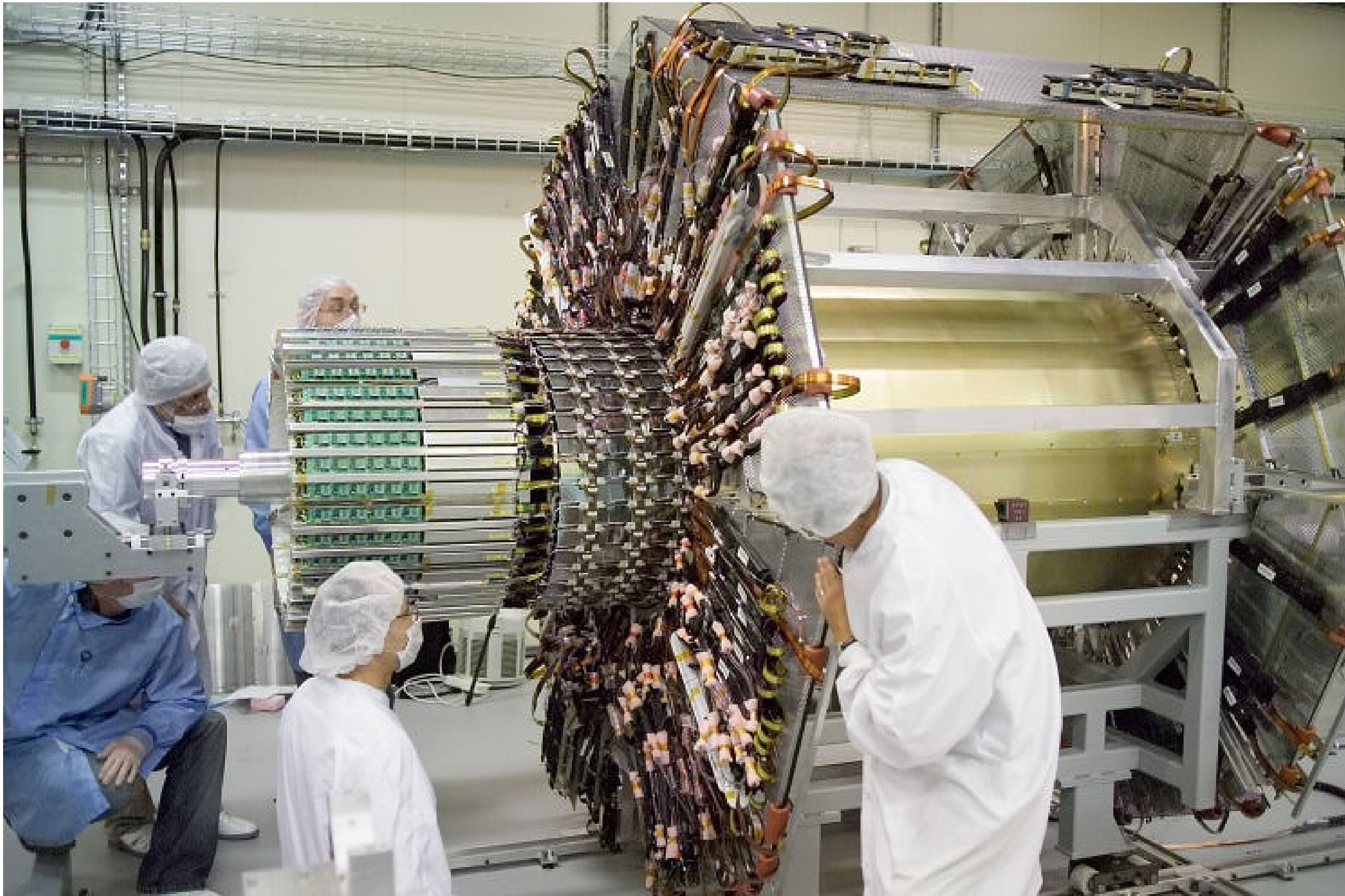
Silicon Tracker (SCT)

All four barrel cylinders are complete and at CERN, the integration into the barrel thermal enclosure has been completed



Outermost ATLAS SCT barrel cylinder before insertion into the thermal enclosure

Insertion of the 3rd cylinder (out of the four) into the barrel SCT

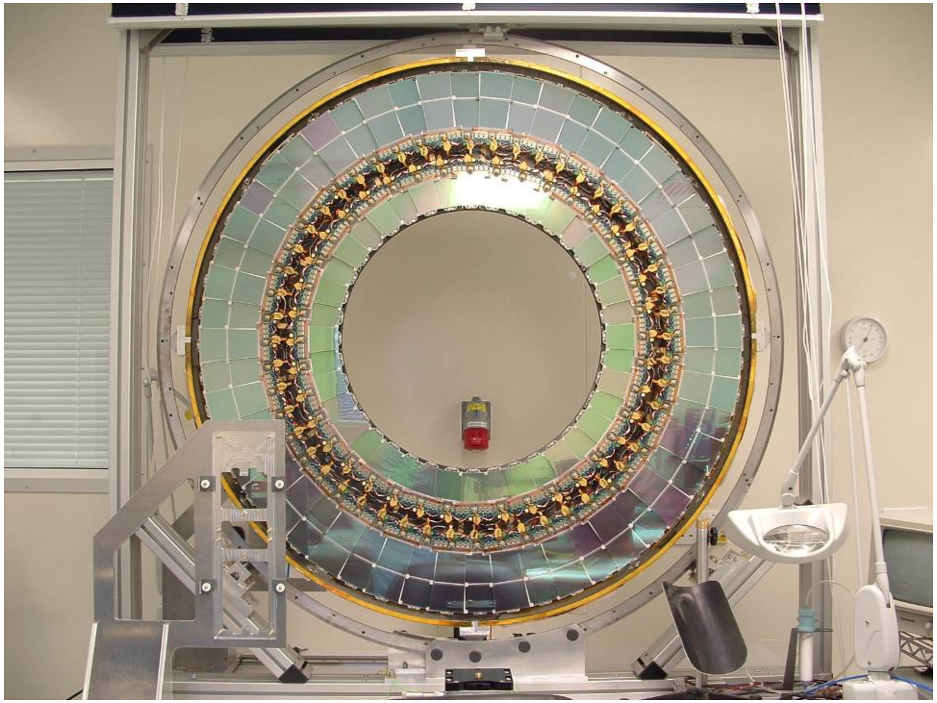


End-cap SCT

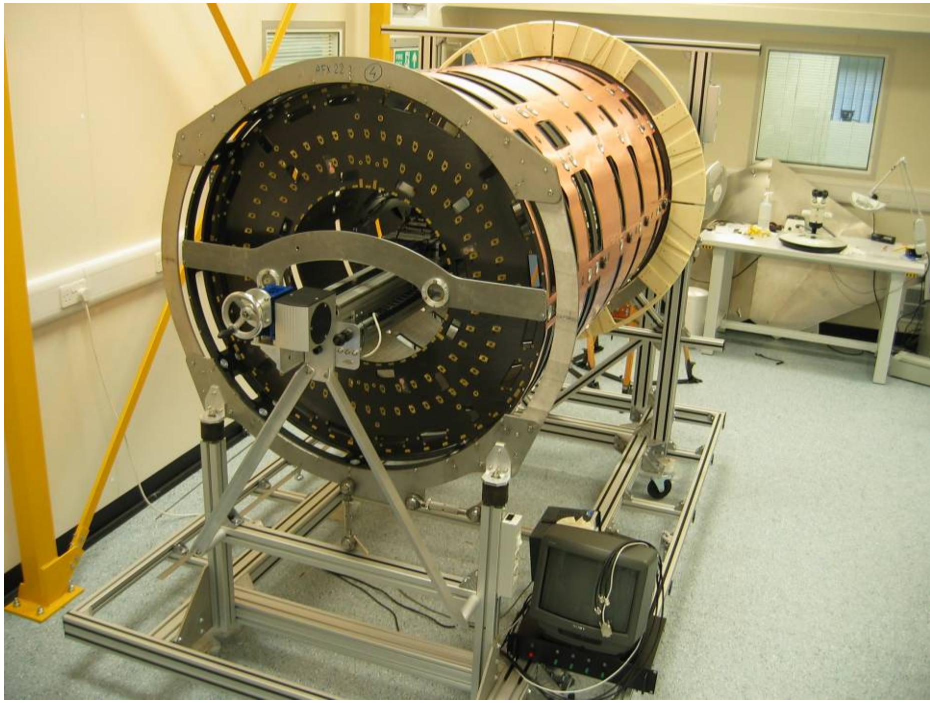
All disks for the first end-cap are finished, and they are well-advanced for the second one

The recovery of a failure in the end-cap LMTs (low mass tapes for electrical services) is proceeding according to the plans (requiring fabrication of new LMTs)

A completed end-cap SCT disk



Support cylinder to receive SCT end-cap disks



Transition Radiation Tracker (TRT)

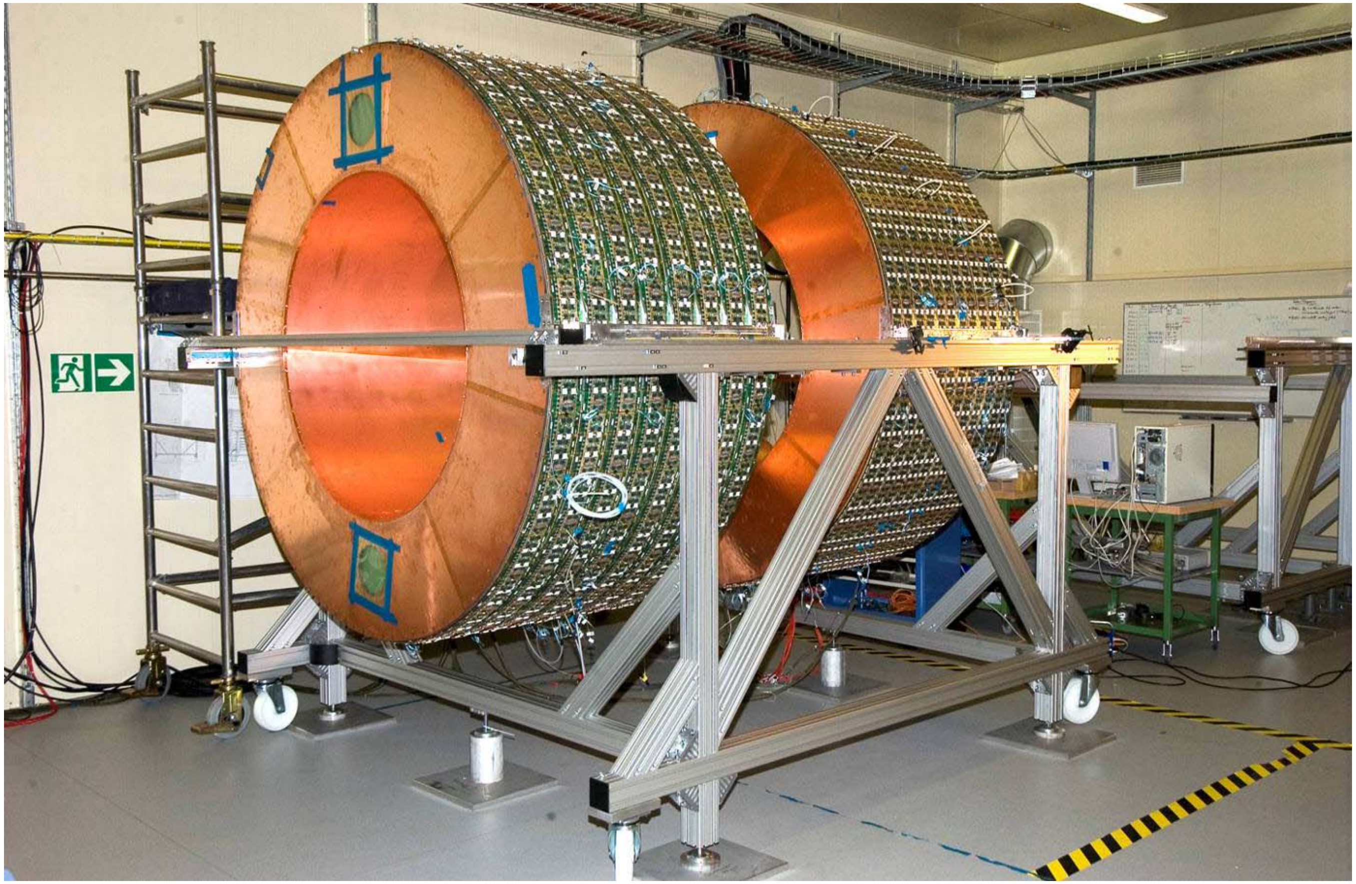
The module construction for the TRT is almost complete, and the first end-cap side (A and B wheels) has been assembled and integrated

A previously reported excessive failure rate of HV fuses has been overcome

Current status:

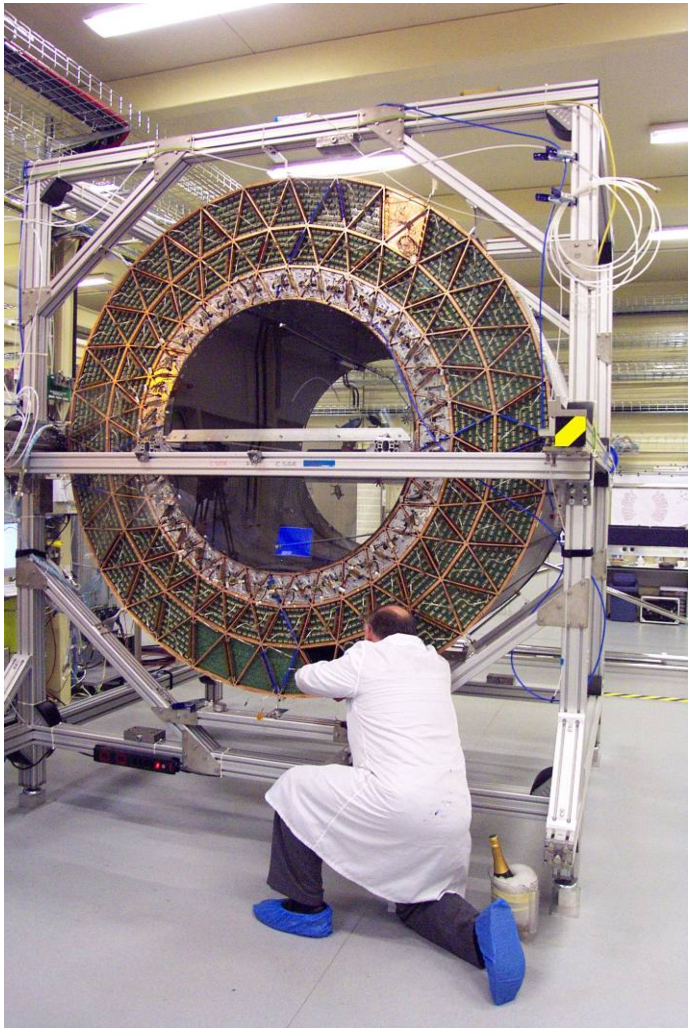
End-cap C completed (Sept 04 - Mar 05)

End-cap A 4 wheels stacked (complete by Dec 05)



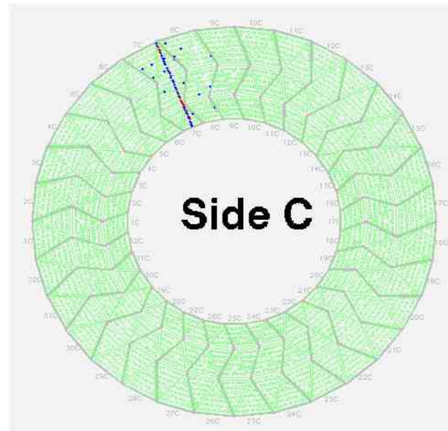
The first of the two end-cap TRTs (A and B type wheels) fully assembled

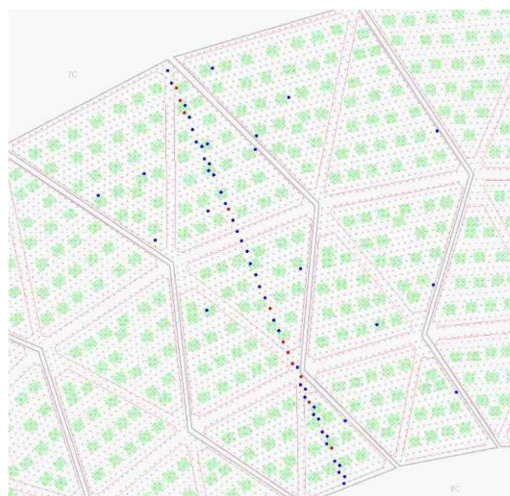
Two examples of cosmic rays registered in the barrel TRT in the Inner Detector surface clean room facility SR1



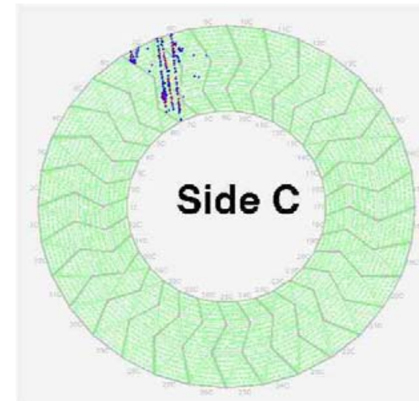
Barrel TRT during insertion of the last modules (February 2005)

Example 1





Example 2

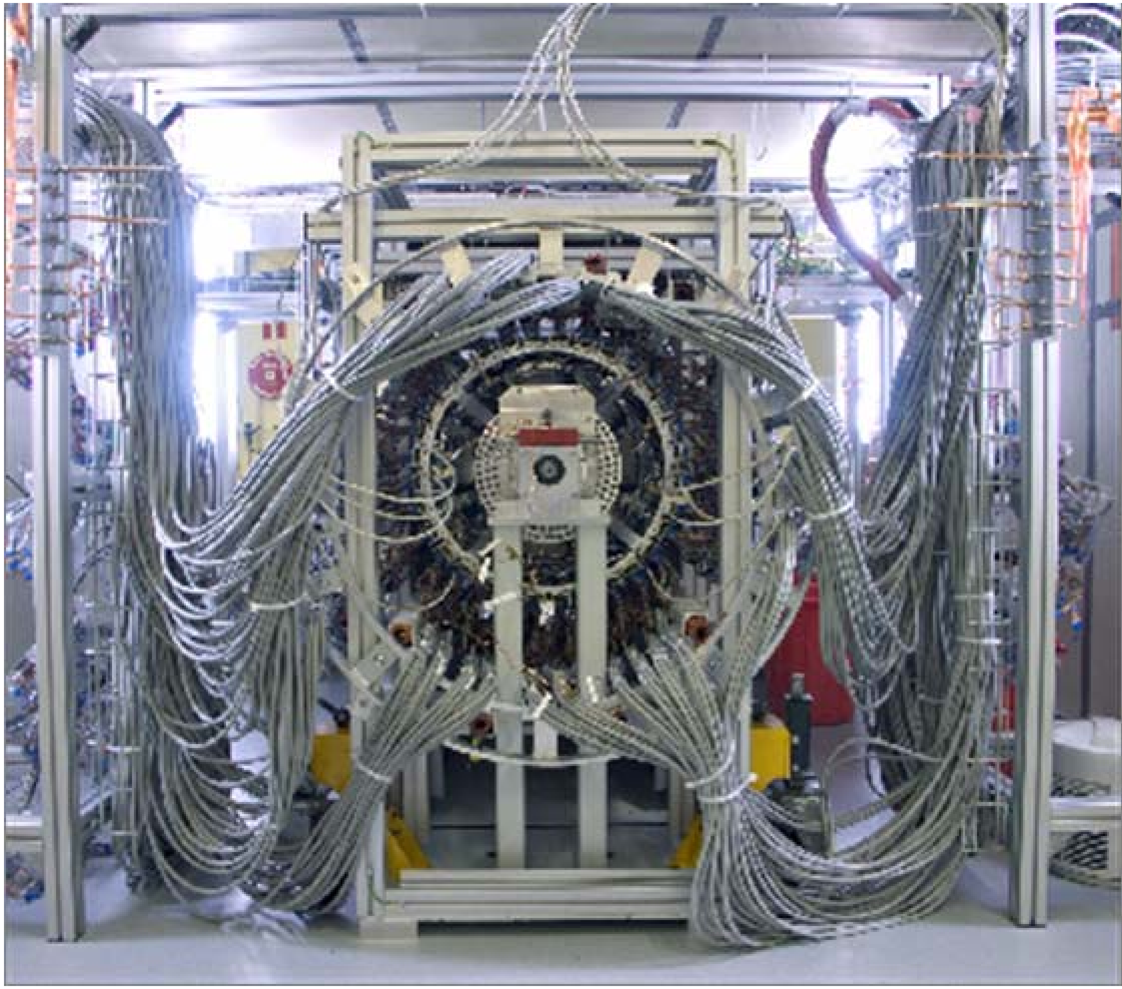


ID integration and commissioning at the surface

SCT acceptance tests
(each barrel was fully tested)

Barrel	Total Channels	Total Defects
3	589824	1483
4	737280	841
5	884736	1818
6	1032192	5720
Total	**3244032**	**9862**

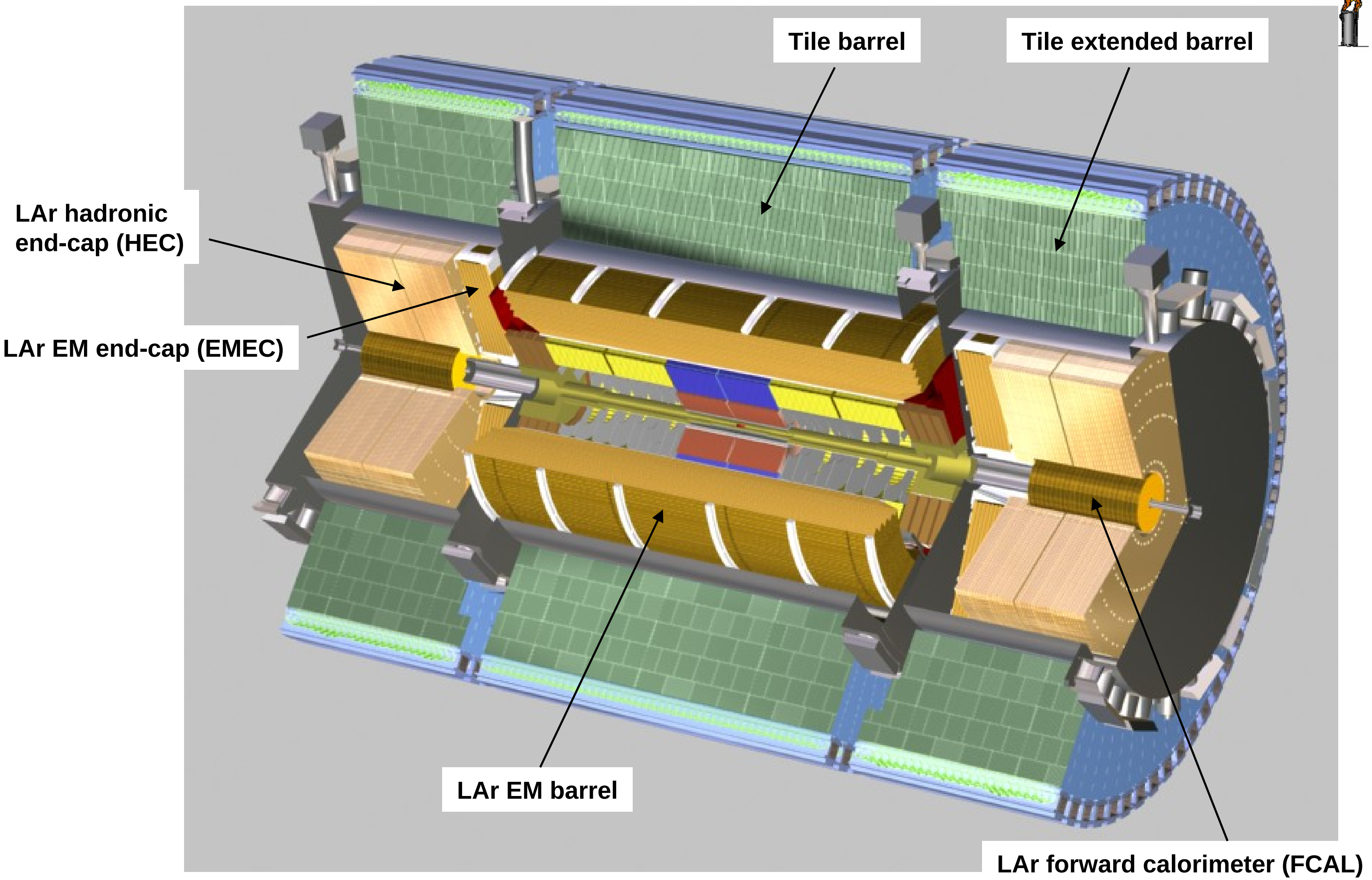
Total of 99.7% of all channels fully functional



SCT barrel during acceptance test

The next major milestone will be the integration of the barrel TRT and SCT in Dec 2005

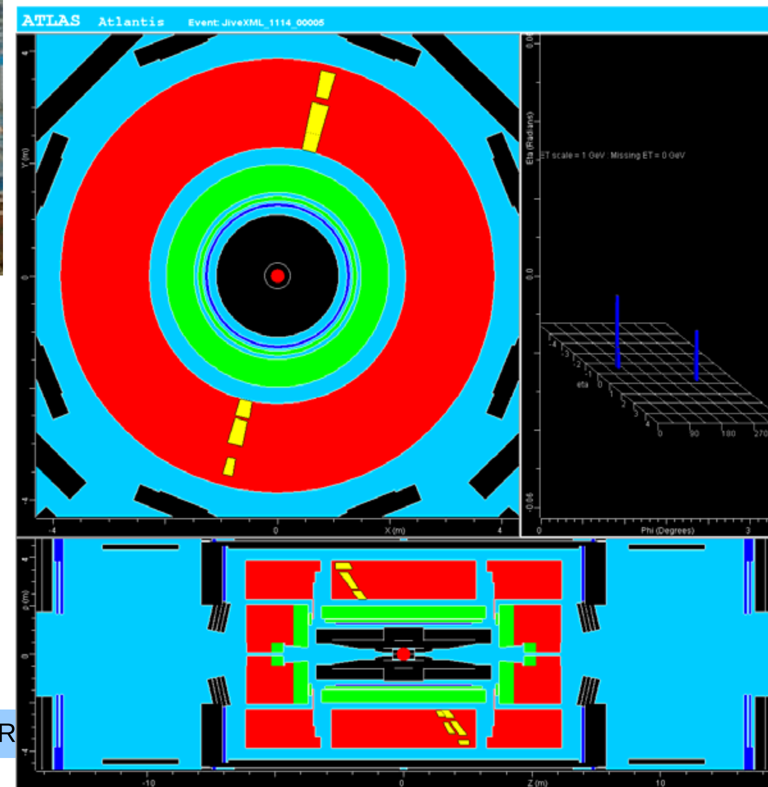
LAr and Tile Calorimeters



Barrel LAr and Tile Calorimeters

The barrel LAr and Tile calorimeters have been since some time in the cavern in their 'garage position' to be moved into their final position at the end of this month

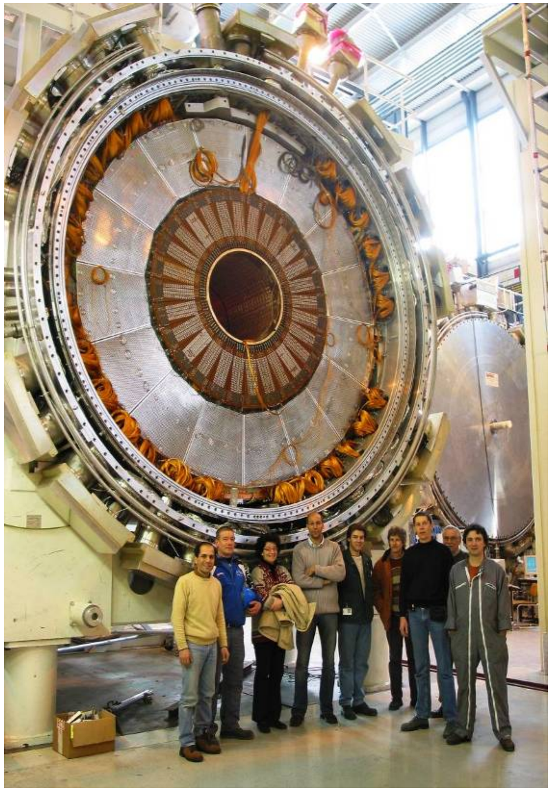
A cosmics muon registered in the barrel Tile calorimeter



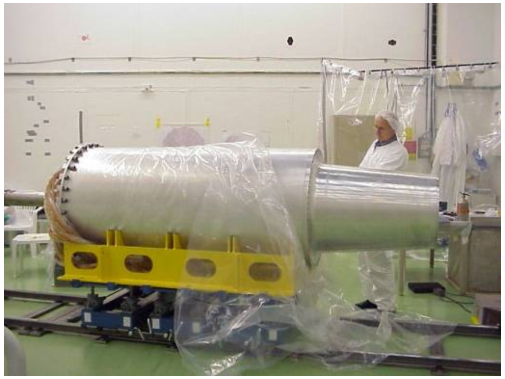
LAr End-Caps

End-Cap C: **Surface cold tests with LAr are finished, with very good results (dead channels well below 1%)**

End-Cap A: **Surface cold test measurements are finished, it is currently warming up and will be ready for transport in December**



End-Cap cryostat A before the insertion of the FCAL and closure



FCAL A before insertion

End-Cap A during the surface cold tests

The delicate transport of the first LAr End-Cap to point-1 (22nd Sep)

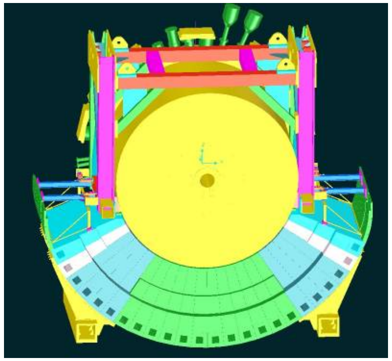
The lower part of the Extended Barrel Tile Calorimeter and the LAr End-Cap are ready for the lowering into the cavern (side C)

LAr and Tile Calorimeter End-Caps

Next major activities:

End-Cap C installation from Nov 05 → Jan 06

End-Cap A installation from Jan 06 → Mar 06

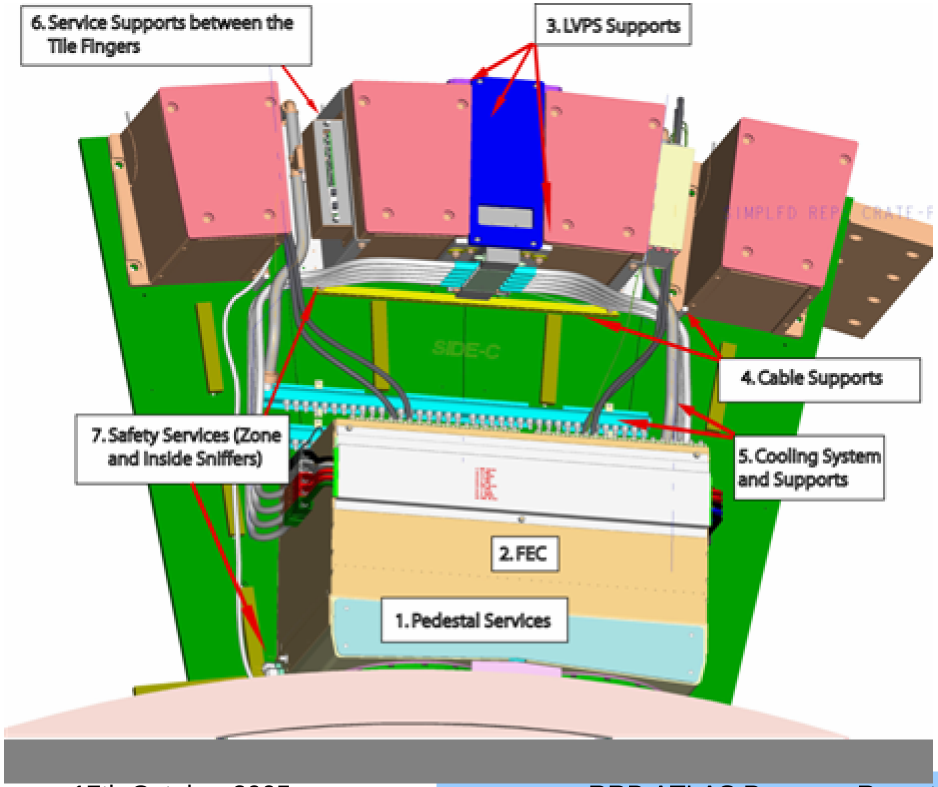


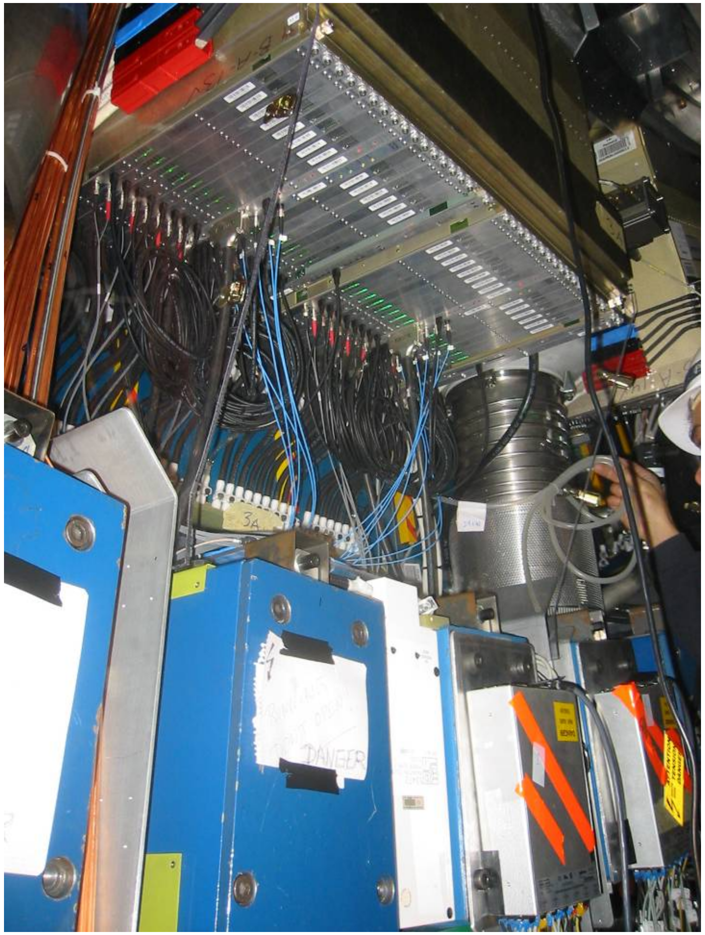
LAr Electronics

Front-End: **The Front-End Board (FEB) production and installation is in full swing, but on the critical path ('QPLL' timing problem and 'OTx' optical transmitter problems in components have been overcome)**

All (~1600) FEBs have been delivered, but testing and reworking still requires a great effort

Installation and commissioning on the barrel have started (4 out of 32 FE crates complete and tested)





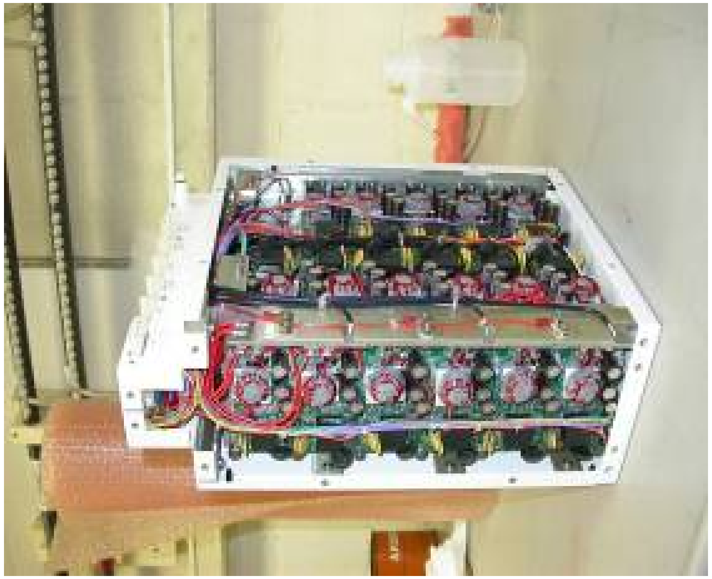
FE Crates and Boards installed on the barrel LAr calorimeter in-situ

Back-End: **There is excellent progress on the BE electronics, production is close to being completed, and the installation of the barrel Read-Out-Drivers (RODs) in the underground control room USA15 is successfully finished**

Power supplies: **Both the low-voltage DC/DC power supplies and the HV power supplies demand special attention, and in both cases very close collaboration with the factories**

LV PS: **Yield improved by component change, but long-term experience lacking, slow delivery**

HV PS: **Improved stability with component changes, but still not fully satisfactory**



LAr low-voltage power supply

LAr barrel ROD system in USA15

Tile Calorimeter Electronics

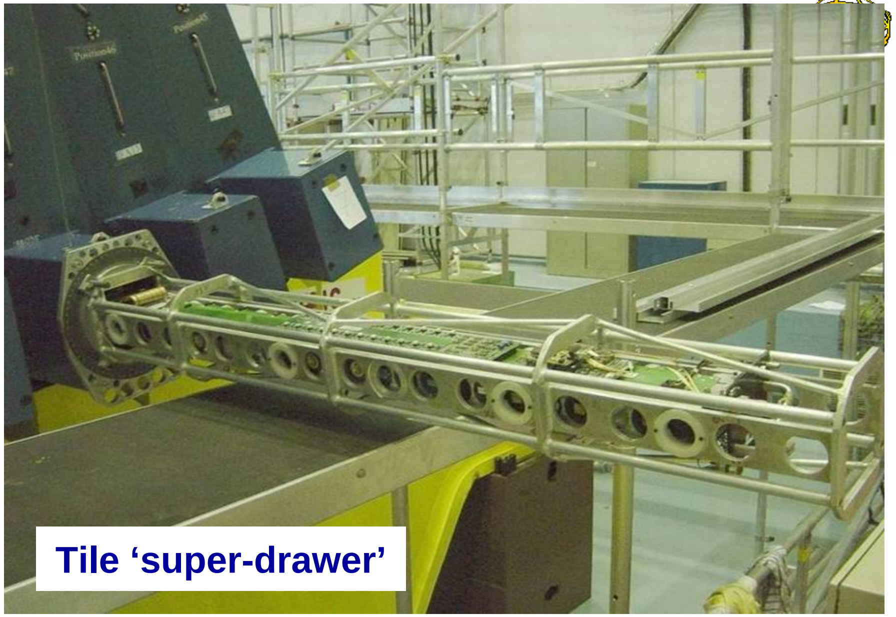
'Super-drawers':
Contain the full on-detector electronics chain, their production has now been completed

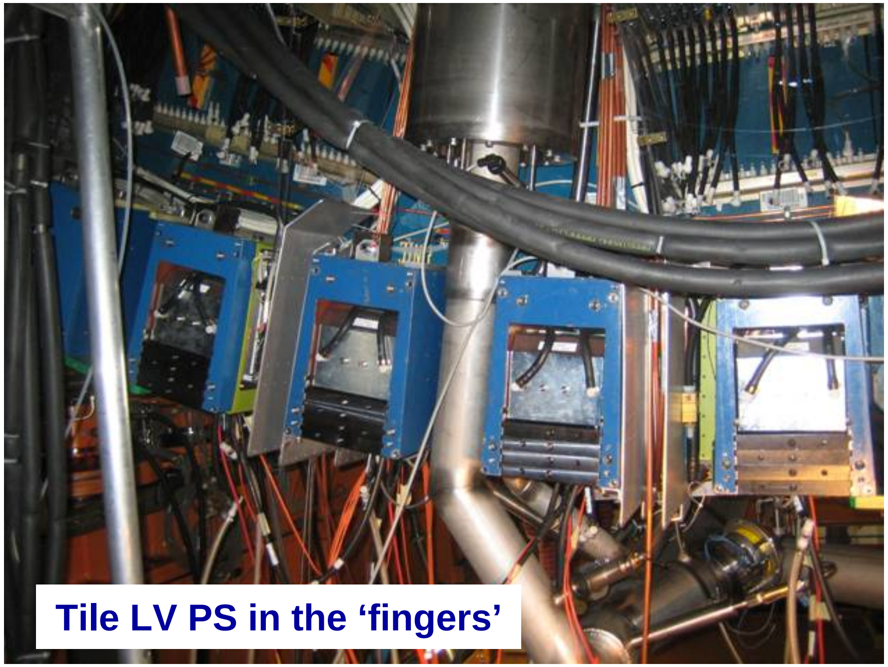
Power supplies:
The HV bulk supplies will be located in USA15, the production is done

Locally on the detectors, in the 'fingers', are the LV DC/DC power supplies based on custom-made 'bricks' for which the production is now ongoing (but on the critical path)

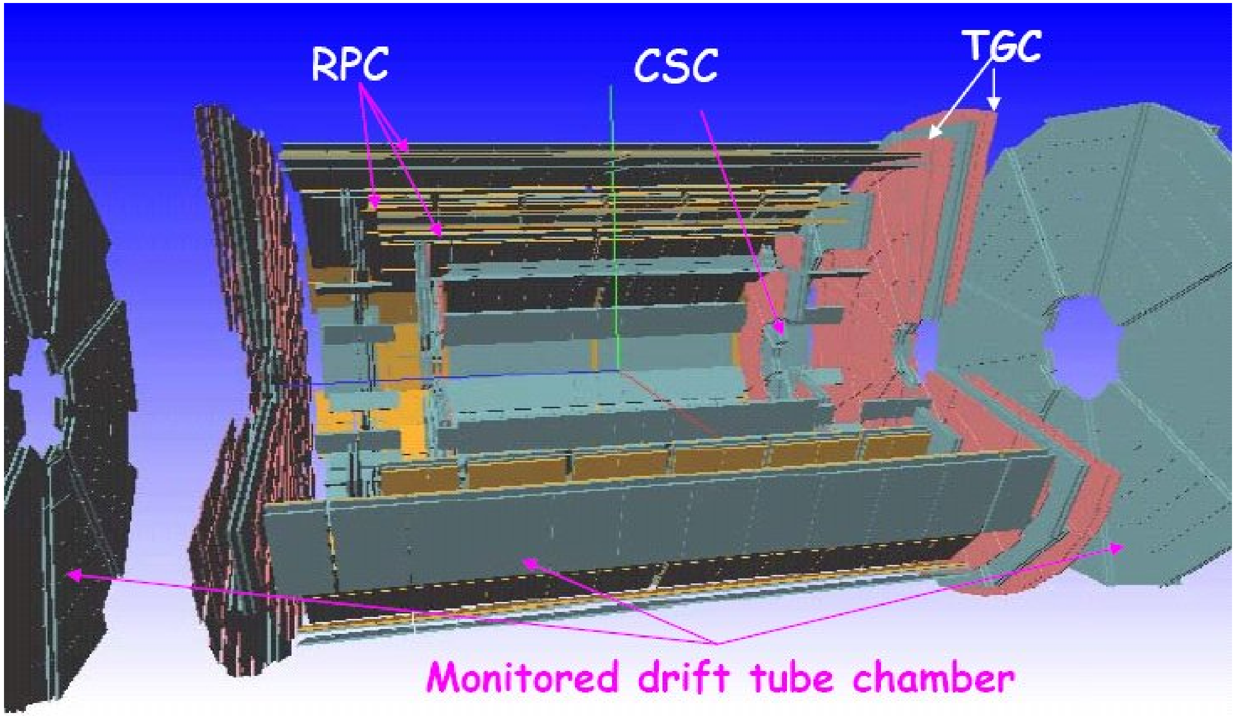
Calibration and BE electronics:
All is progressing on schedule

On-detector electronics commissioning:
An issue under investigation is a higher than expected rate of instabilities (HV trips)





Muon Spectrometer Instrumentation



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

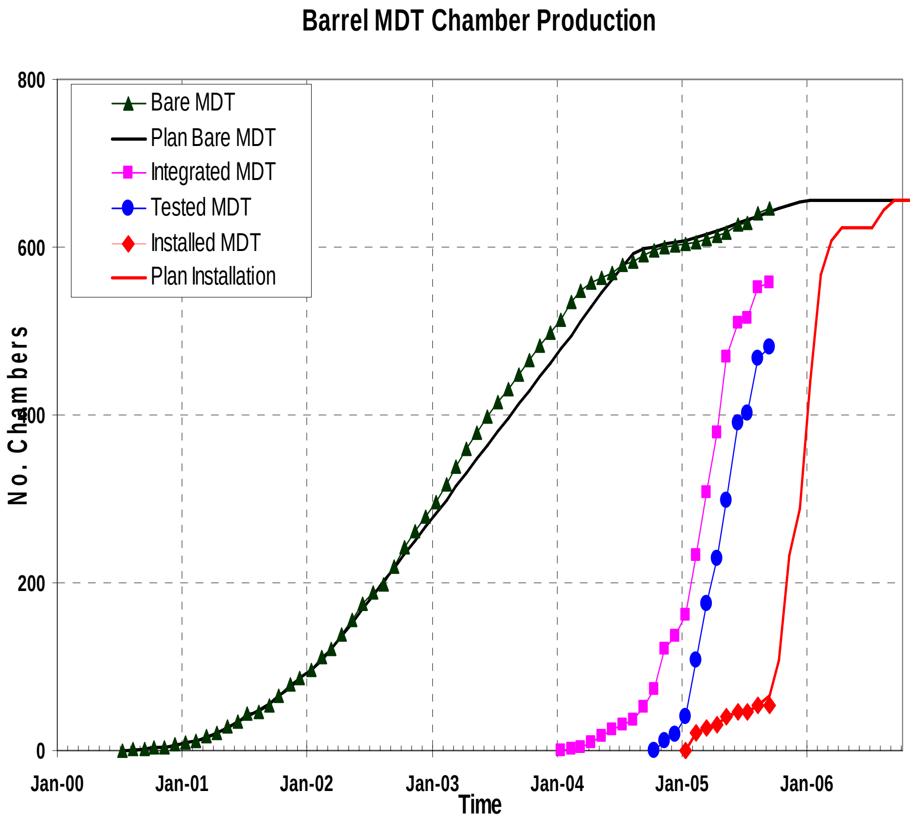
A crucial component to reach the required accuracy is the sophisticated alignment measurement and monitoring system

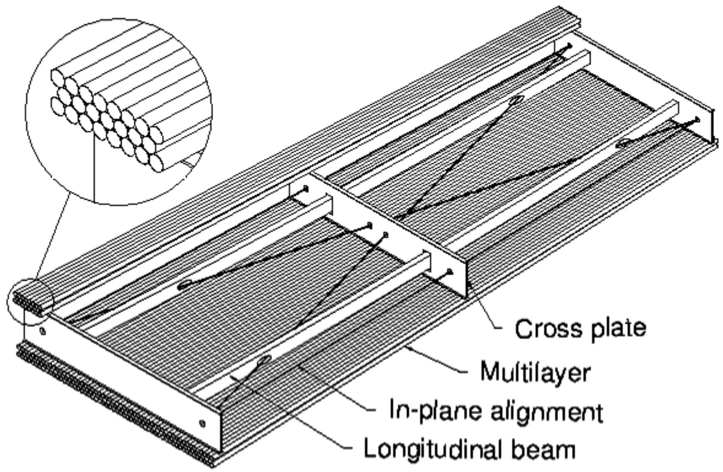
Precision chambers:
- **MDTs in the barrel and end-caps**
- **CSCs at large rapidity for the innermost end-cap stations**

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

At the end of this year the huge and long effort of series chamber production in many sites will be completed for all chamber types

Barrel MDTs






Installation of barrel muon station

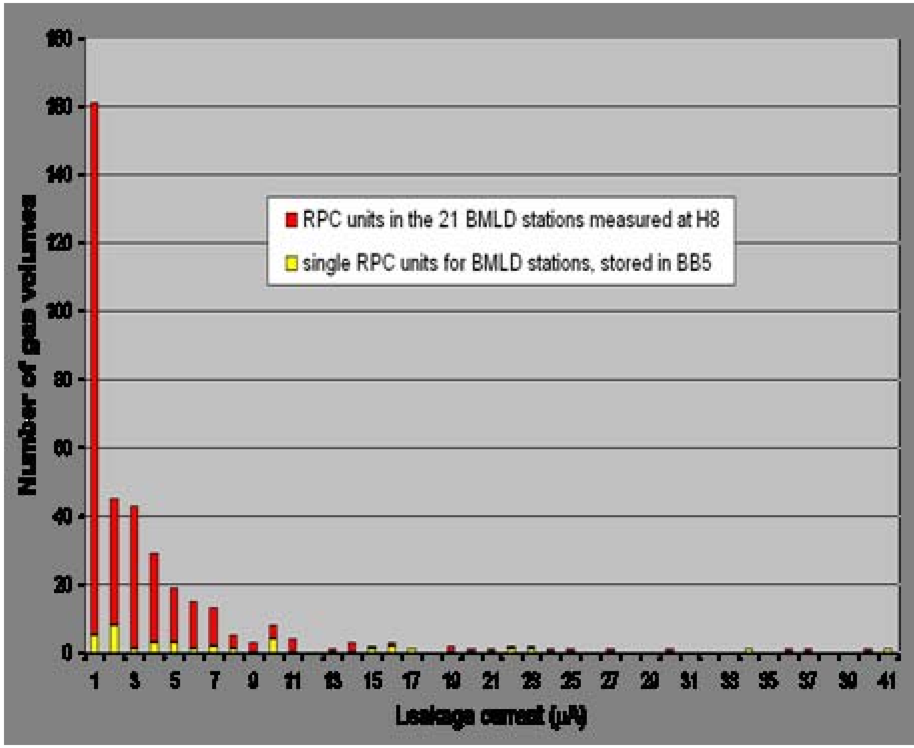
A major effort is spent in the preparation and testing of the barrel muon stations (MDTs and RPCs for the middle and outer stations) before their installation in-situ

The electronics and alignment system fabrications for all MDTs are on schedule

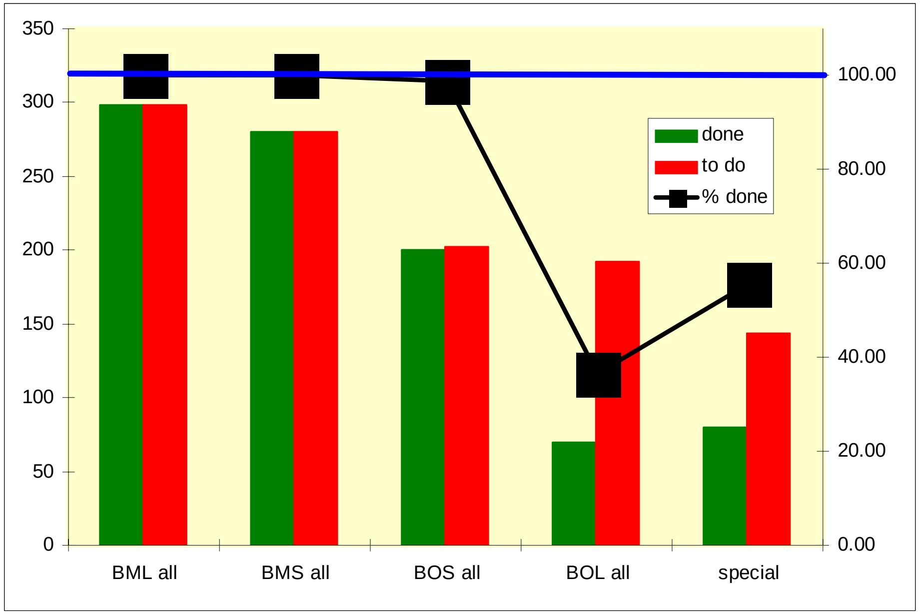
RPCs (barrel trigger chambers)

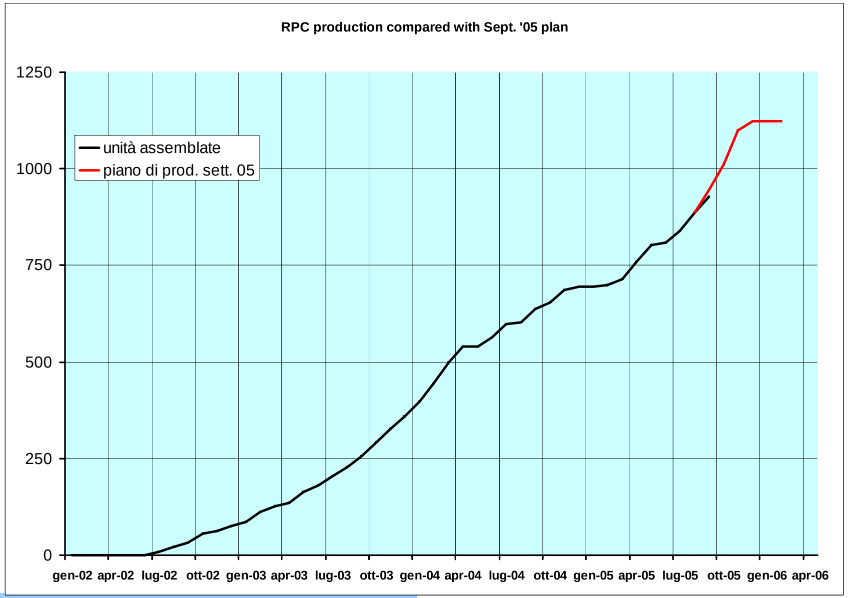
The series production had accumulated delays for technical problems (delamination), but is projected to end still this year

Very early gas volumes show large leakage currents (later fixed with improved design) → rework needed to eliminate long-term risks



Fraction of completed RPCs (different types)

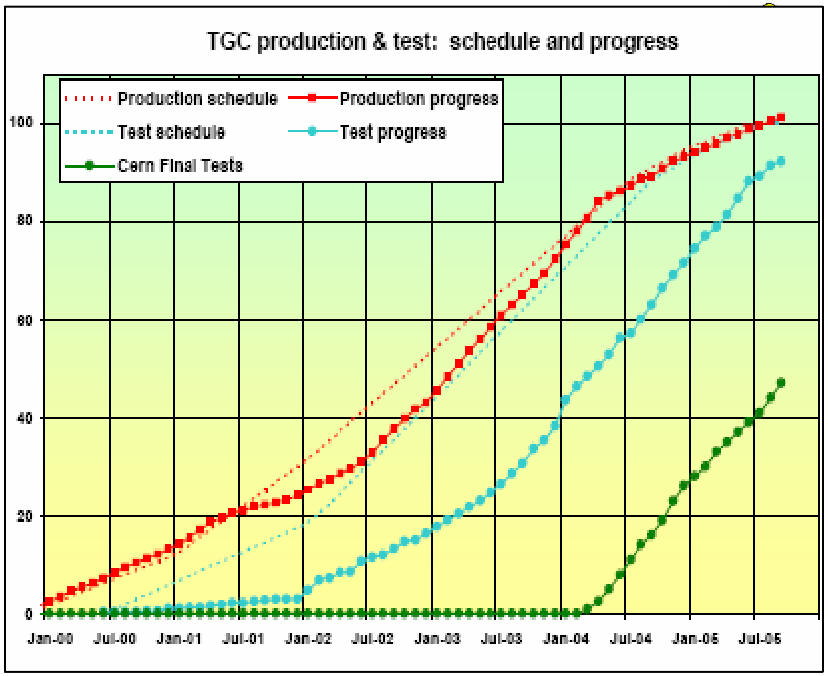


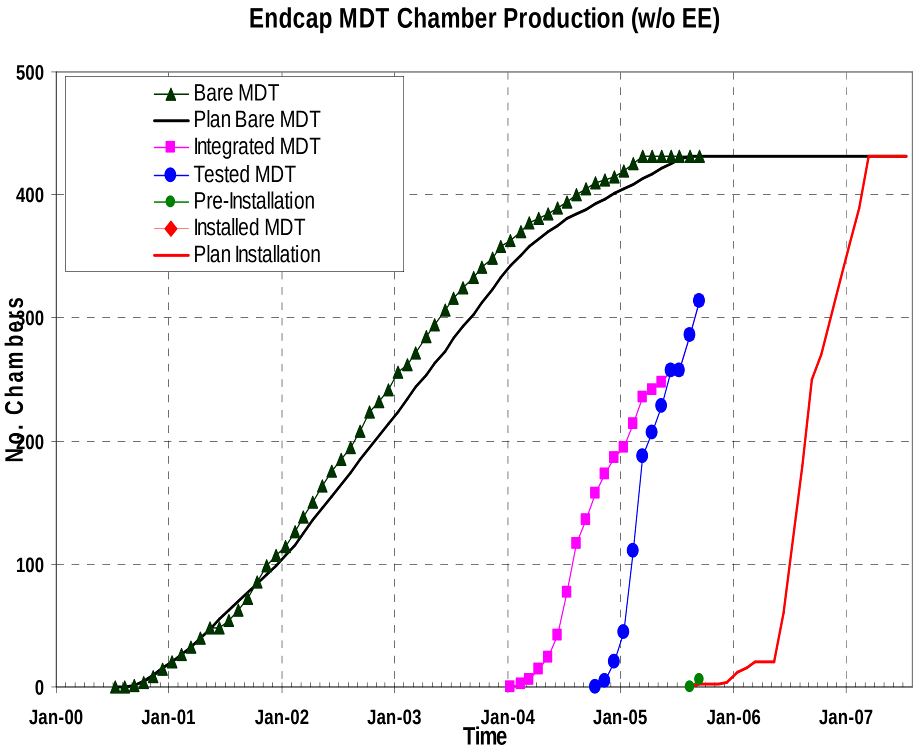


End-cap muon chamber production

All series raw precision chambers have been produced, including the CSCs

Essentially all trigger chambers (TGCs) are also constructed, and their testing is well advanced





First 'EIL4' MDT – TGC station ready for installation

End-cap muon chamber sector preparations

First ‘Big Wheel’ end-cap muon MDT sector assembled in Hall 180

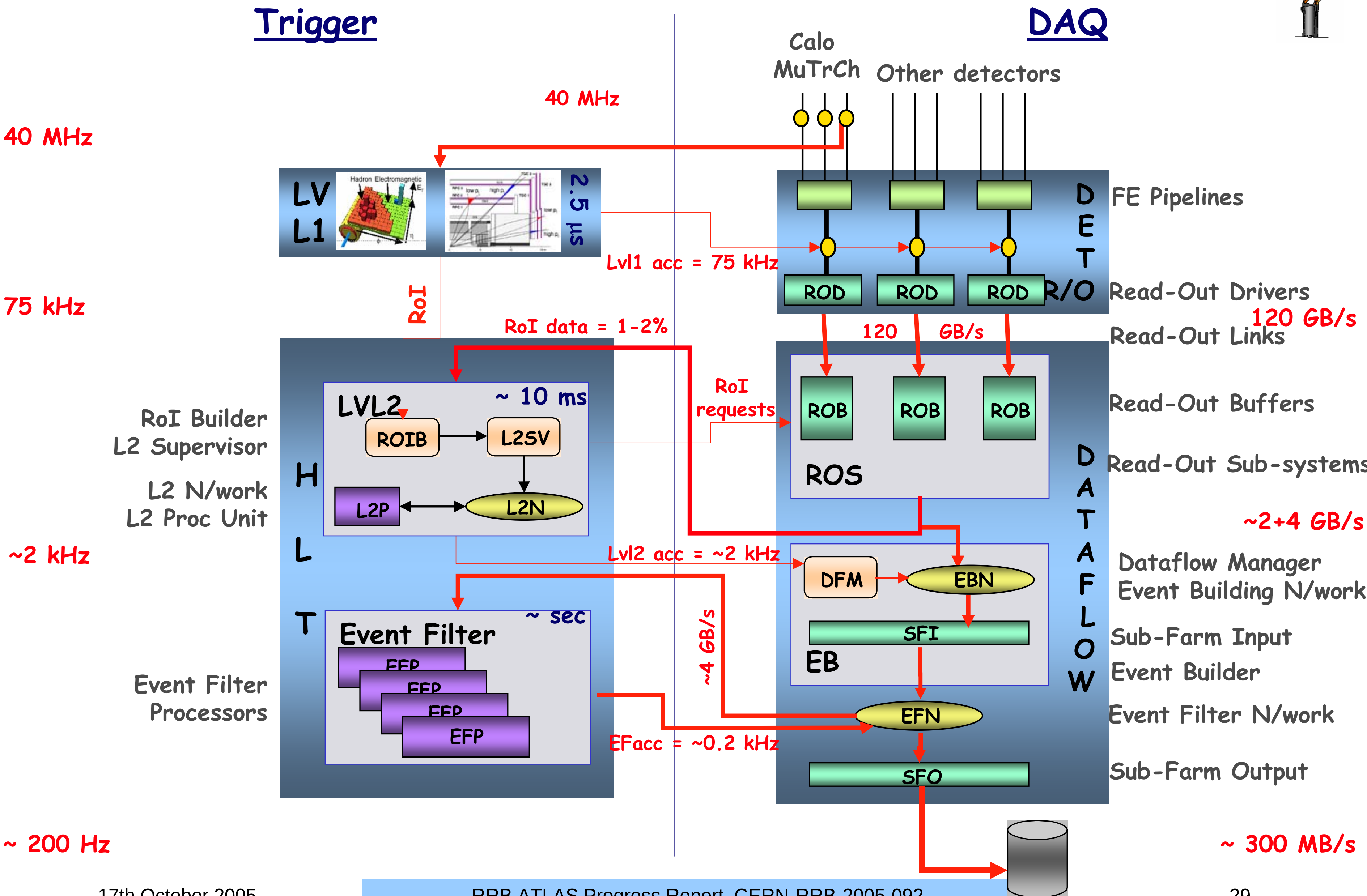
72 TGC and 32 MDT ‘Big-Wheel’ sectors have to be assembled

This work is now in full swing in the Hall where previously the Barrel Toroid and the LAr integration and tests were done

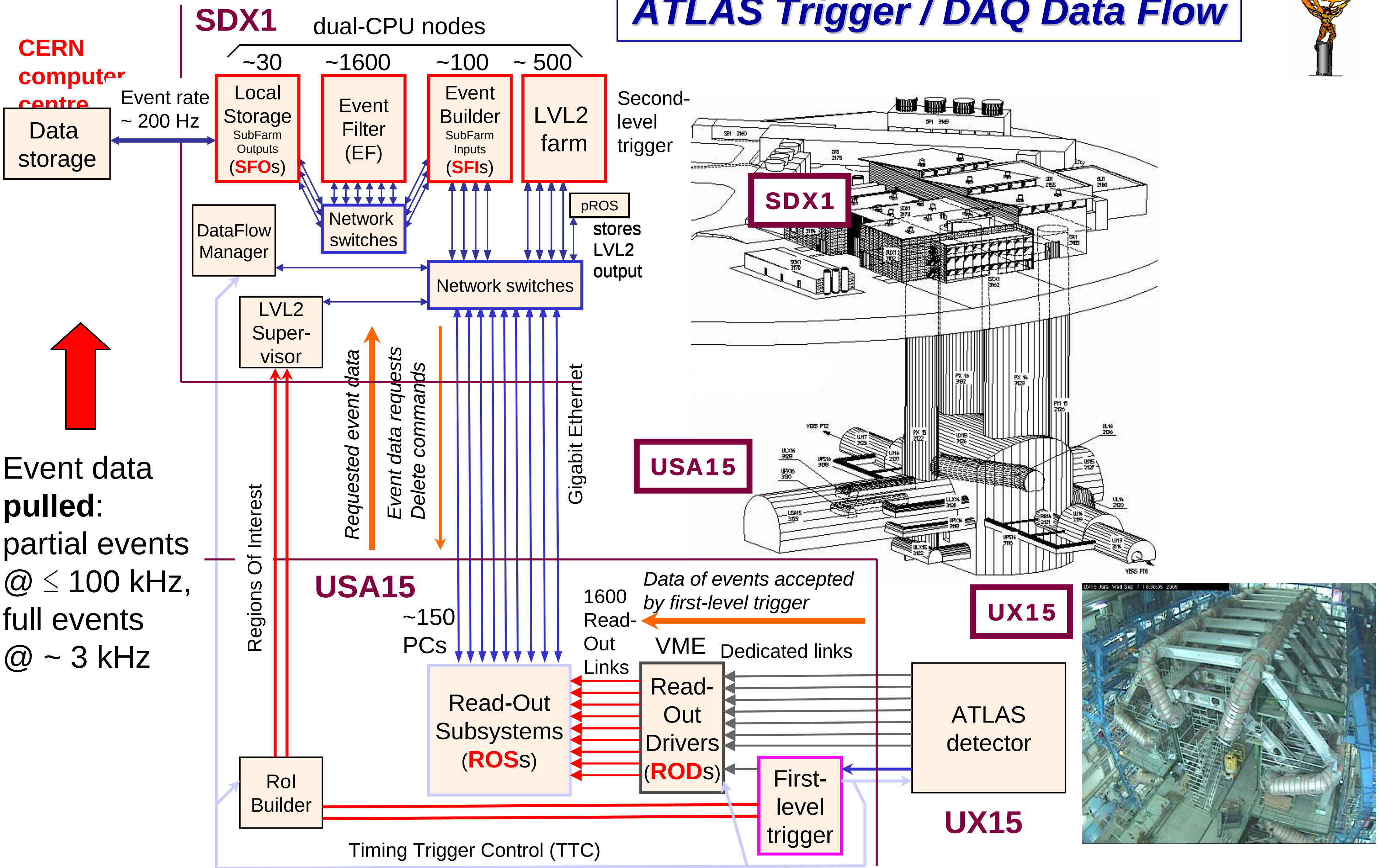
All HV and LV power supplies for the muon chambers are from the same firm, and ordered

First ‘Big Wheel’ end-cap muon TGS sector assembled in Hall 180

Trigger, DAQ and Detector Control



ATLAS Trigger / DAQ Data Flow



Event data **pushed** @ ≤ 100 kHz, 1600 fragments of ~ 1 kByte each

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

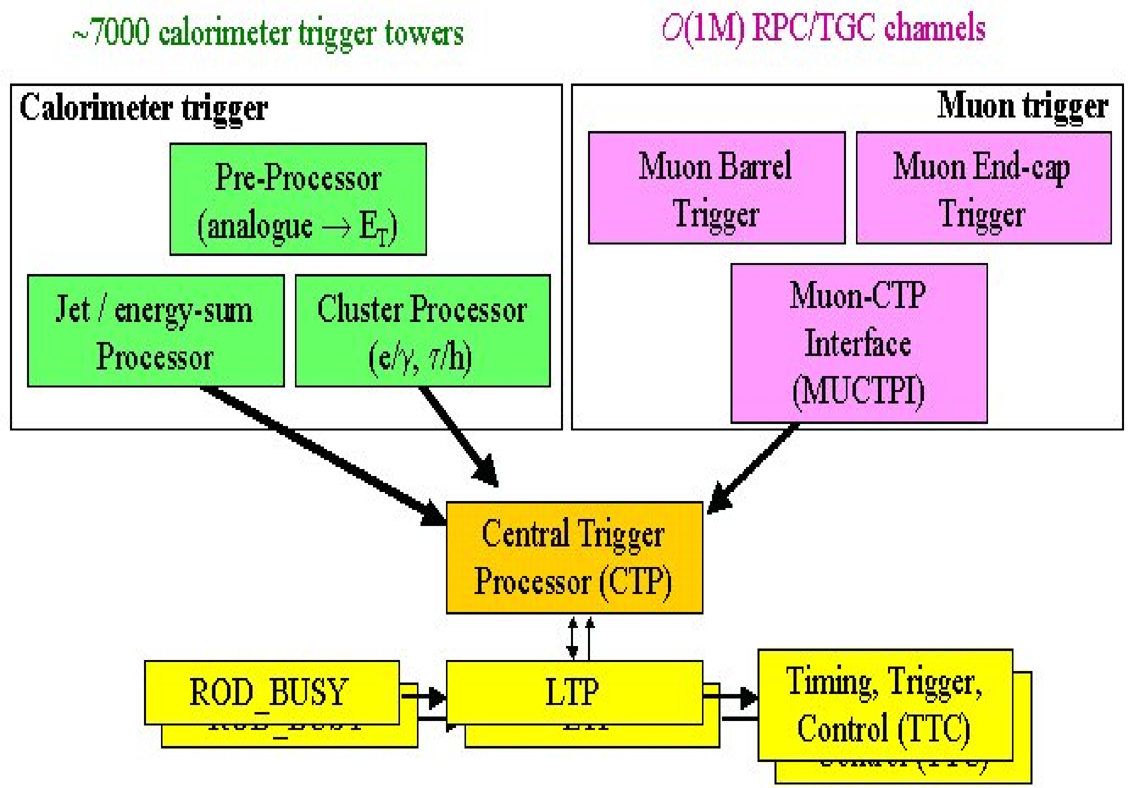
The calorimeter level-1 trigger has worked successfully at the combined test beam in 2004

The series production of the various modules is now starting, within a tight schedule for commissioning

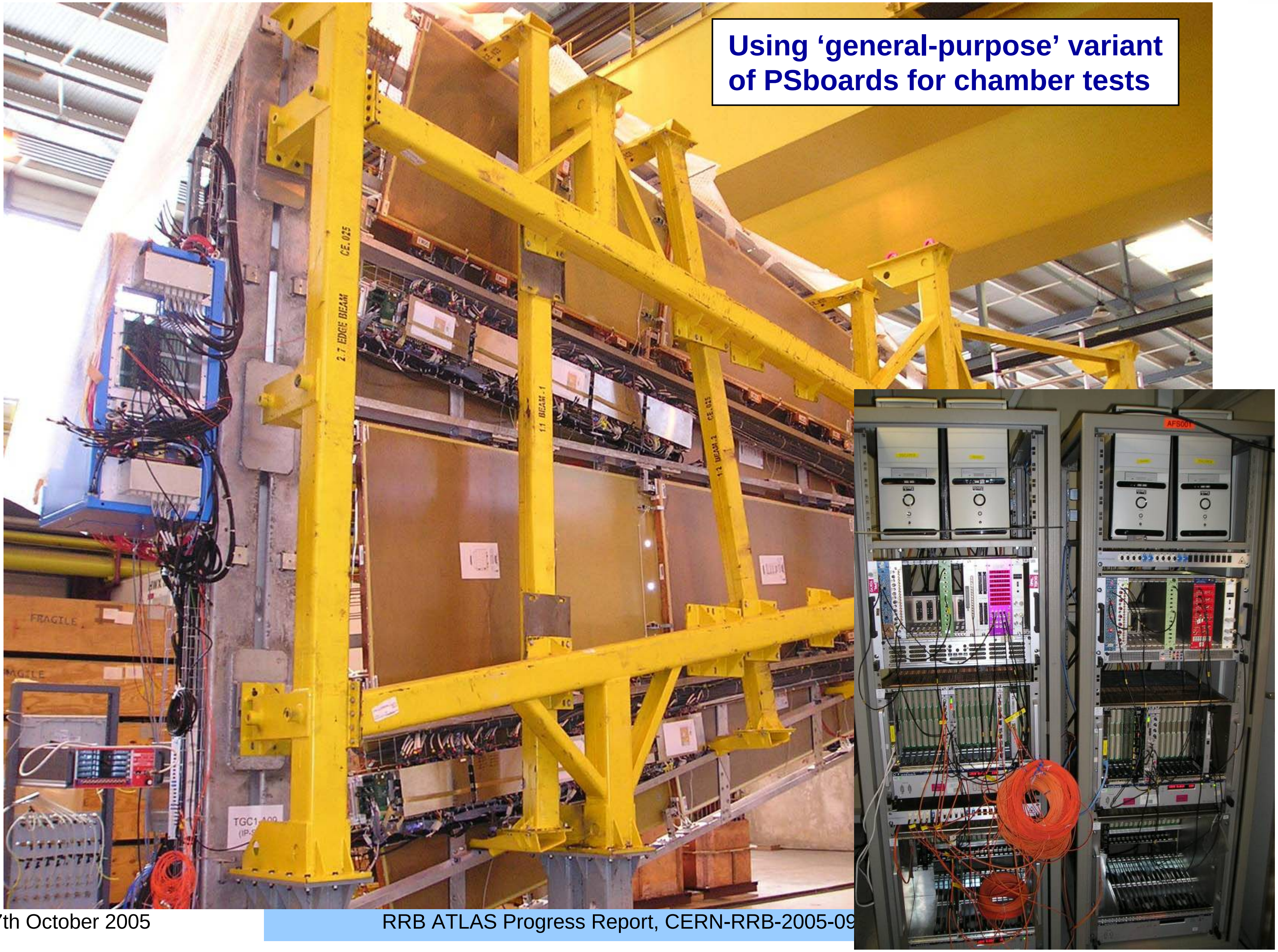
The muon level-1 trigger has been tested with 25 ns bunched test beams, final improvements were implemented in a last iteration

These final ASICs productions have been a success, but the on-chamber muon trigger electronics remain on the critical path (testing: appreciated contributions from new collaborators)

The Central Trigger Processor progresses on schedule



End-cap Muon Trigger System at TGC Big-Wheel Assembly Site



HLT/DAQ/DCS

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

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

Local DAQ capability is available at 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

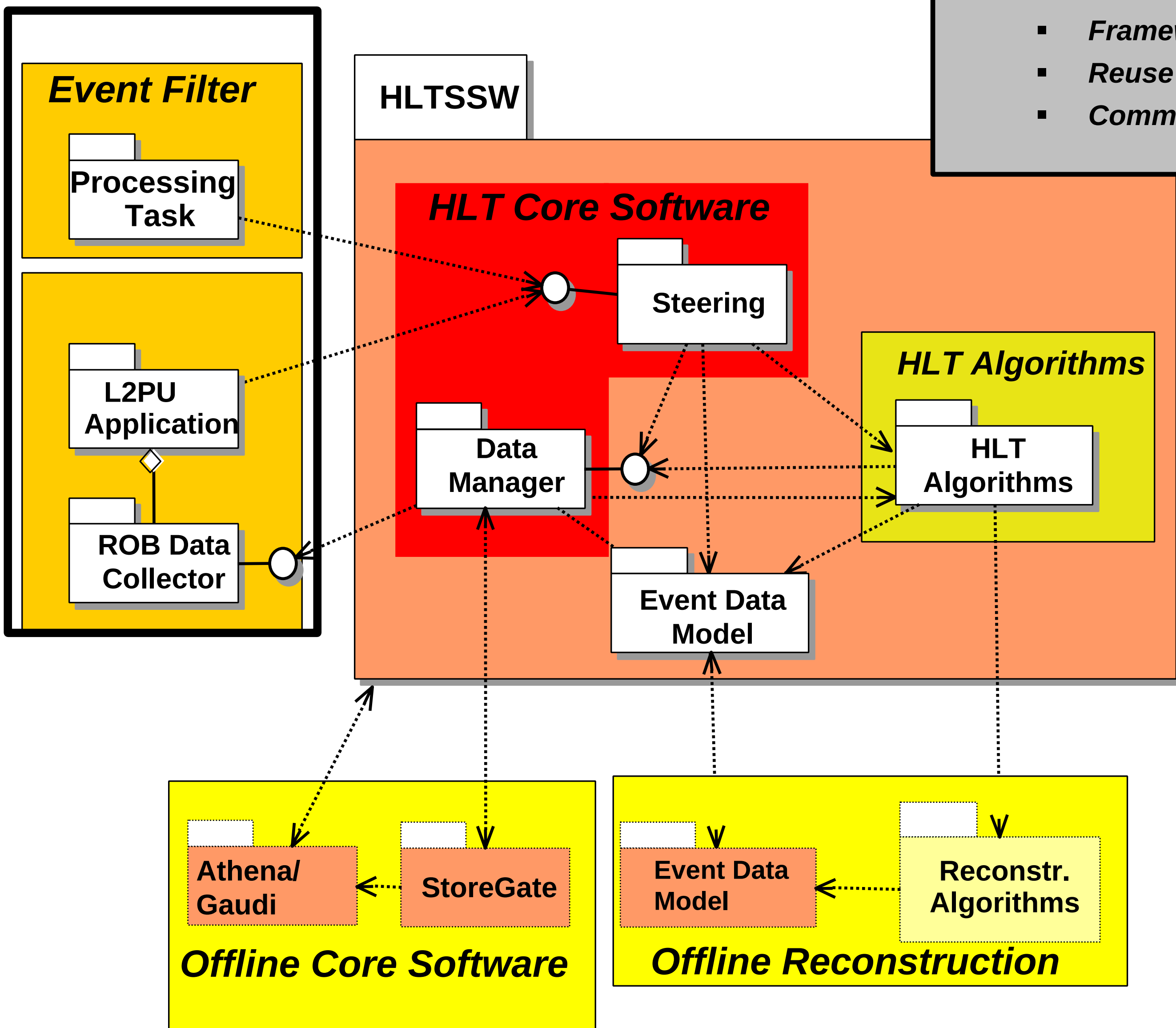
Components of the DCS are in fabrication or already finished (ELMB), and are already widely used, and the s/w components are available

The DCS is one of the first systems already in operation at Pit-1

The first full HLT rack in the SDX1 HLT/DAQ room at the Pit-1 surface

High Level Trigger Software

HLT Selection Software
- *Framework ATHENA/GAUDI*
- *Reuse some offline components*
- *Common to Level-2 and EF*



The pre-series of final system with 8 racks at Point-1 (10% of final dataflow) is now in operation

USA15

SDX1

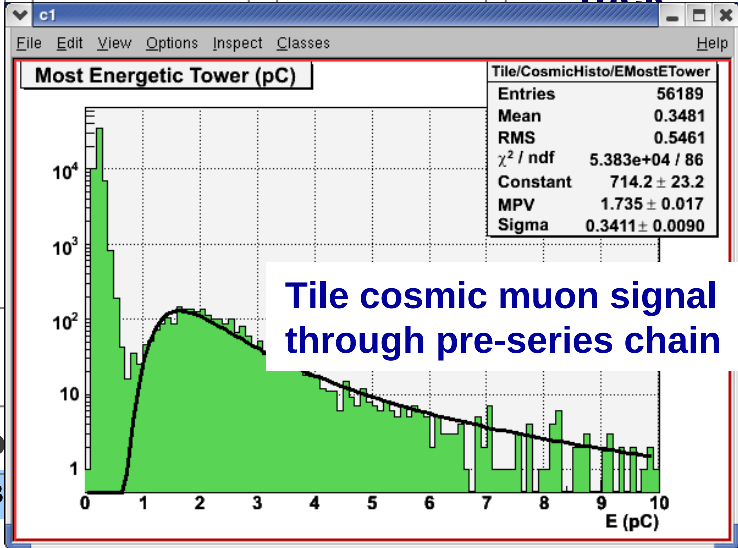
One ROS rack - TC rack + horiz. Cooling - 12 ROS 48 ROBINs	**RoIB rack** - TC rack + horiz. cooling - 50% of RoIB	**One Full L2 rack** - TDAQ rack - 30 HLT PCs	**Partial Superv'r rack** - TDAQ rack - 3 HE PCs	**One Switch rack** - TDAQ rack - 128-port GEth for L2+EB	**Partial EFIO rack** - TDAQ rack - 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

The pre-series of final system with 8 racks at Point-1 (10% of final dataflow) is now in operation

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	Partial EF rack	Partial ONLINE rack



Tile cosmic muon signal through pre-series chain

ROS, L2, EFIO and EF racks: one Local File Server, one o

DAQ/HLT Large-scale Tests

Large scale tests in previous years:

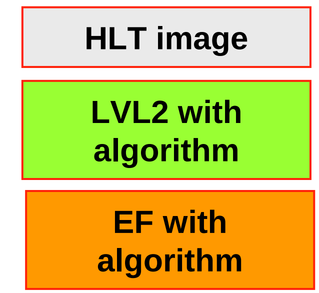
- Pure infrastructure tests at LXBATCH successful
Individual sub-systems had limited success
- DAQ/EF on the Westgrid cluster (Canada)
with 300 nodes and 1 day with 800 nodes

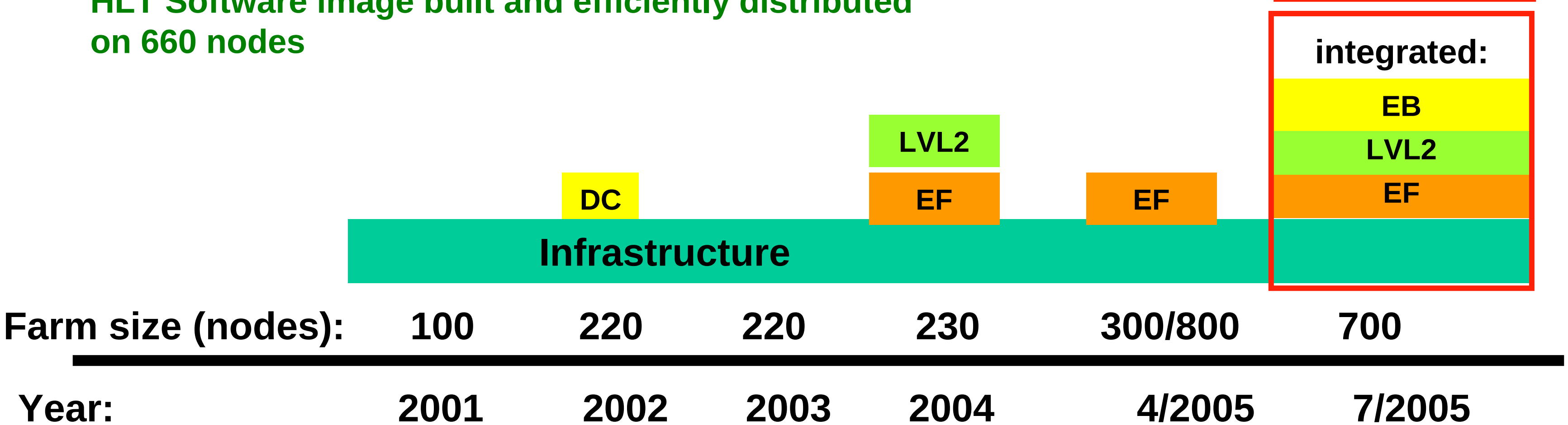
LXBATCH testbed at CERN
5 weeks, June/July 2005
100 – 700 dual nodes
farm size increasing in steps

Large Scale Tests July 2005

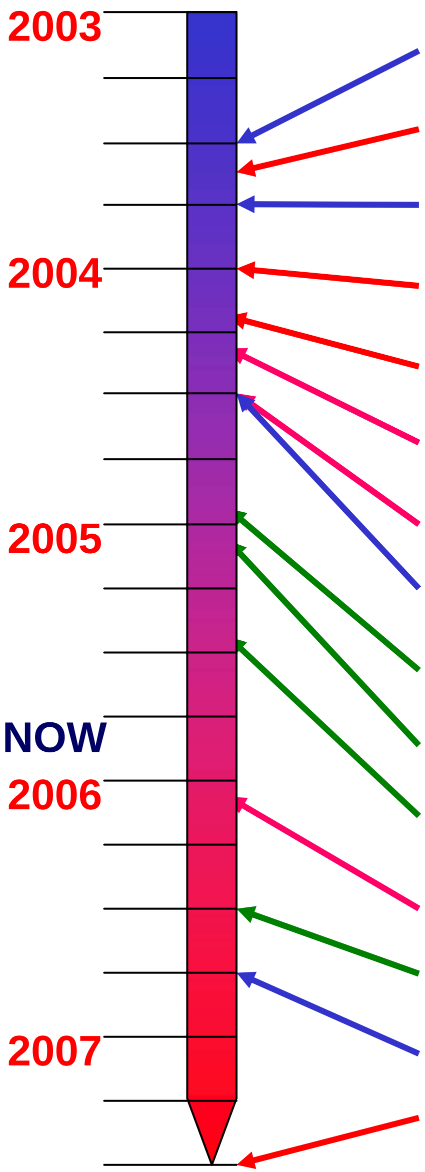
Integrated DAQ/HLT software system
- With real algorithms and geometry and conditions DBs
- Obtained useful feedback on performance

HLT Software image built and efficiently distributed on 660 nodes





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 (re-scheduled)
- Combined test beams (barrel wedge) (done)
- Computing Model paper (done)
- Computing Memorandum of Understanding (in progress)
- ATLAS Computing TDR and LCG TDR (done)
- Start of Computing System Commissioning
- Physics Readiness Report(s) (?)
- Start cosmic ray run
- GO!

The computing and software suite has progressed on a very broad front, with a particular emphasis to make it as accessible as possible to the user community

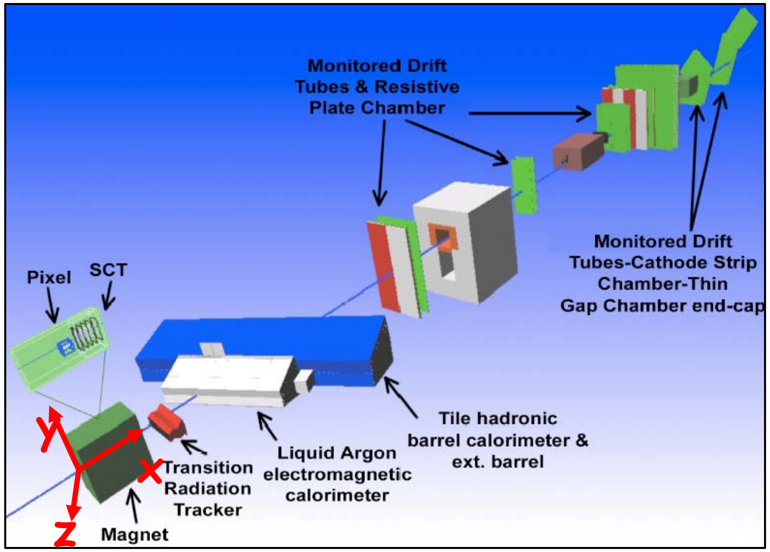
Examples:
- **GRID production tools**
- **Software infrastructure**
- **Detector Description and graphics**
- **Framework and Event Data Model**
- **Simulation**
- **Tracking (ID and Muons) and calorimeters (LAr and Tiles)**
- **Database and data management**
- **Reconstruction and Physics Analysis tools**
- **Distributed analysis**

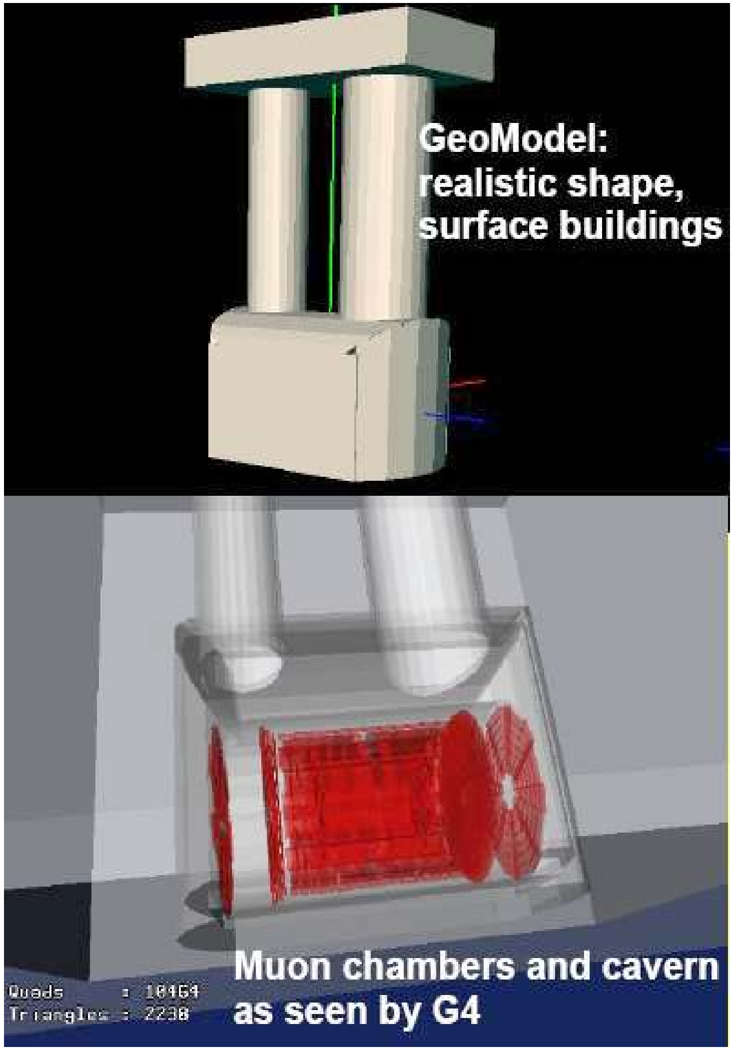
Computing System Commissioning along sub-system tests with well-defined goals, preconditions, clients and quantifiable acceptance tests

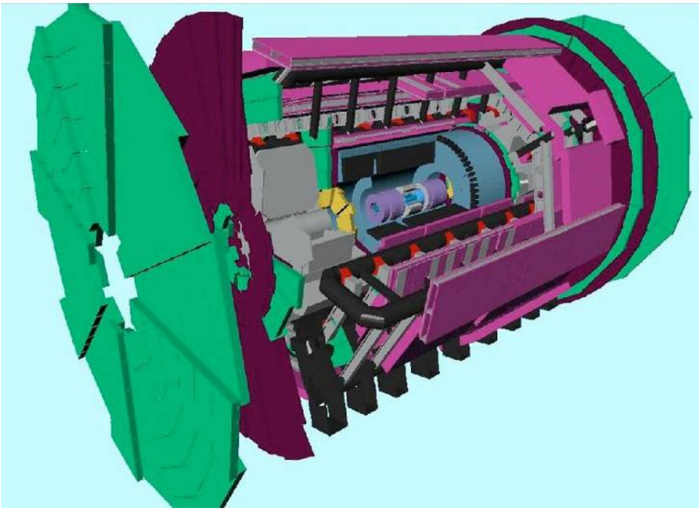
Examples:
- **Full Software Chain**
- **From generators to physics analysis**
- **Tier-0 Scaling**
- **Calibration & Alignment**
- **Trigger Chain & Monitoring**
- **Distributed Data Management**
- **Distributed Production (Simulation & Re-processing)**
- **(Distributed) Physics Analysis**
- **Integrated TDAQ/Offline**

ATLAS computing is fully embedded in, and committed to, the LCG framework

G4 Simulation: from combined test-beam to cosmic runs to pp collisions



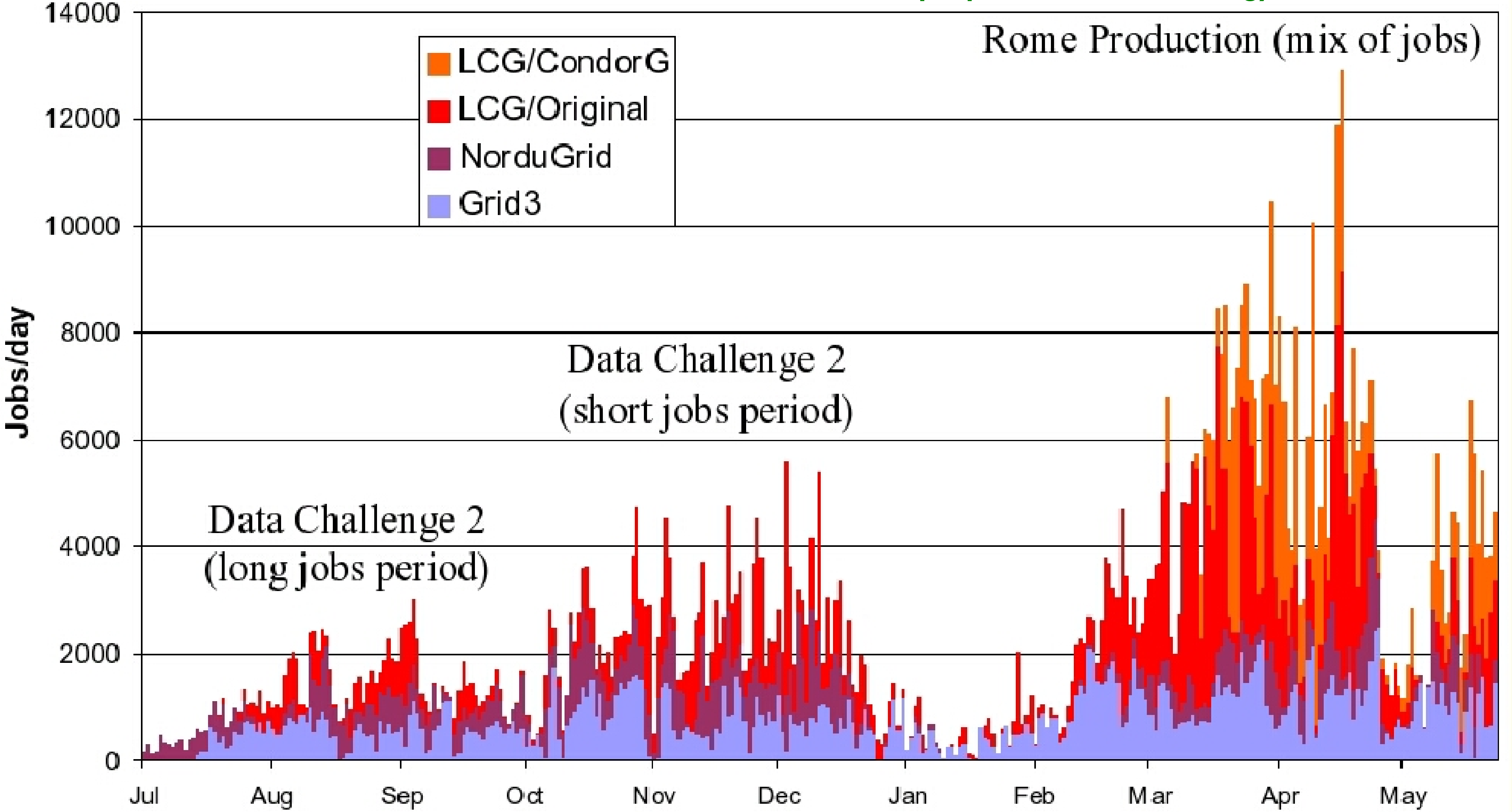


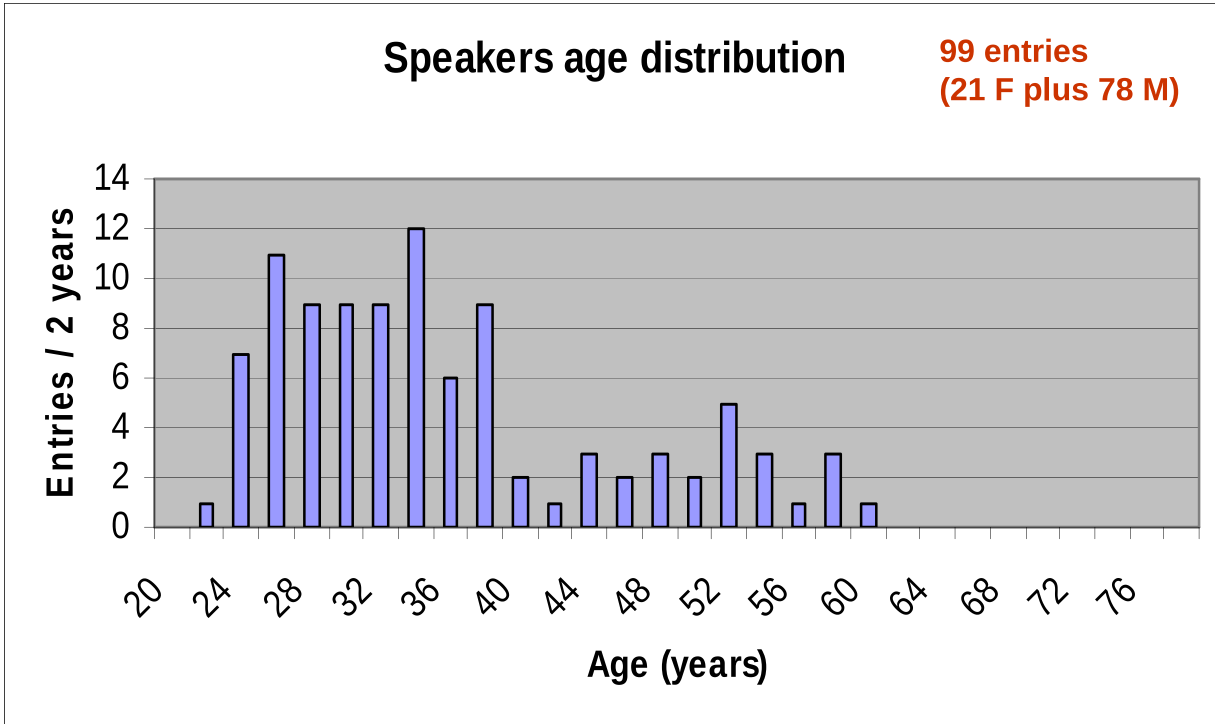


Physics simulation work on the Grid for the Rome Physics WS

This is the first successful use of the Grid by a large <u>user</u> community in ATLAS

Very instructive comments from the user feedback have been presented at the recent ATLAS Physics Workshop (obviously this was one of the main themes and purposes of the meeting)





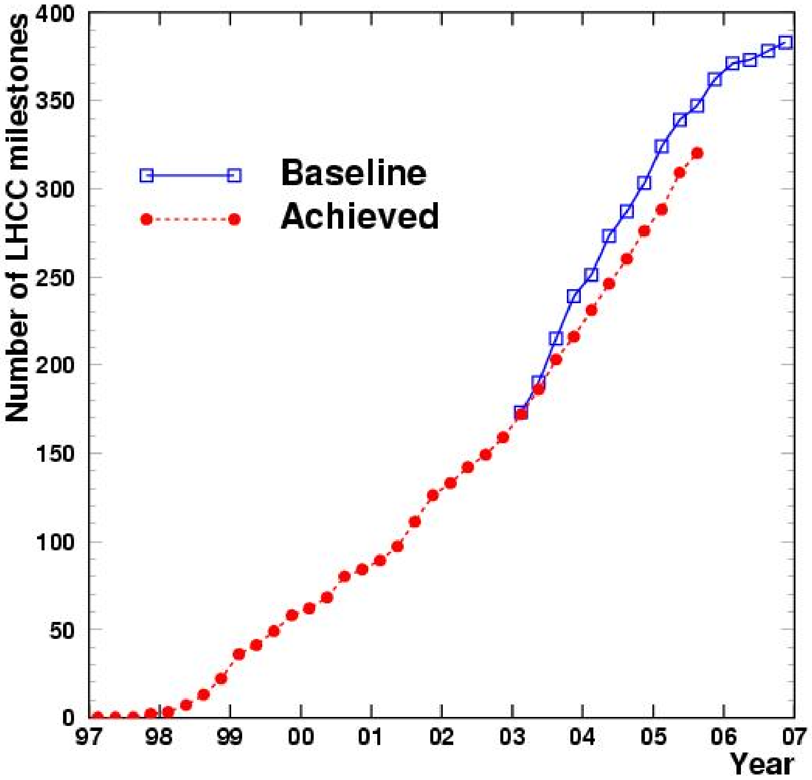
5th ATLAS Physics WS
Rome 6-11 June 2005

INFN Istituto Nazionale di Fisica Nucleare

ROMA TRE Università degli studi

441 registered participants

LHCC Milestones as followed-up at the EB



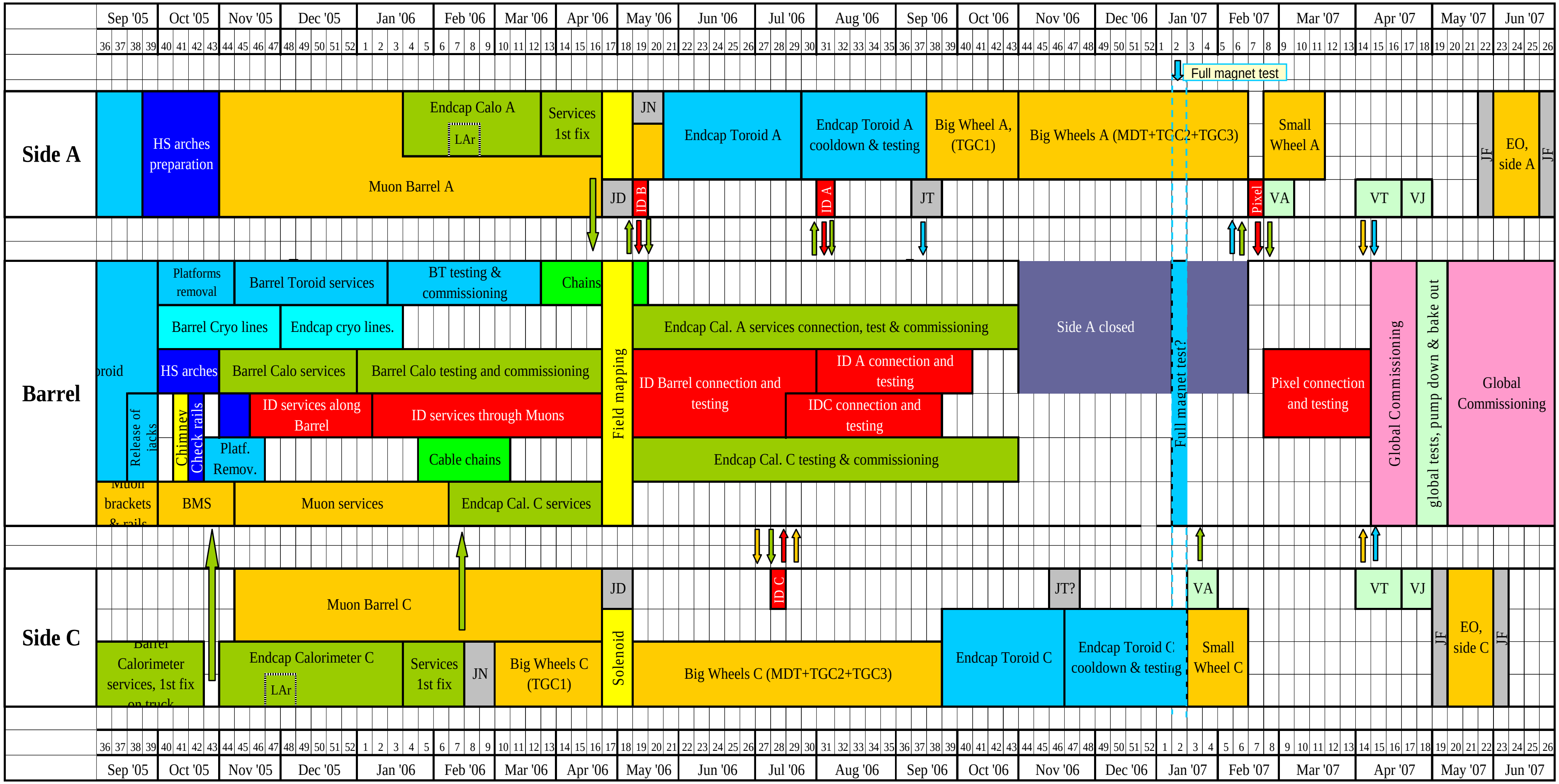
Construction issues and risks ('Top-Watch List')

A list of these issues is monitored monthly by the TMB and EB, and it is publicly visible on the Web, including a description of the corrective actions undertaken:

http://atlas.web.cern.ch/Atlas/TCOORD/TMB/

Summary representation of the installation activities in the experimental cavern at Point-1

(will be discussed by Marzio Nessi in the following presentation)

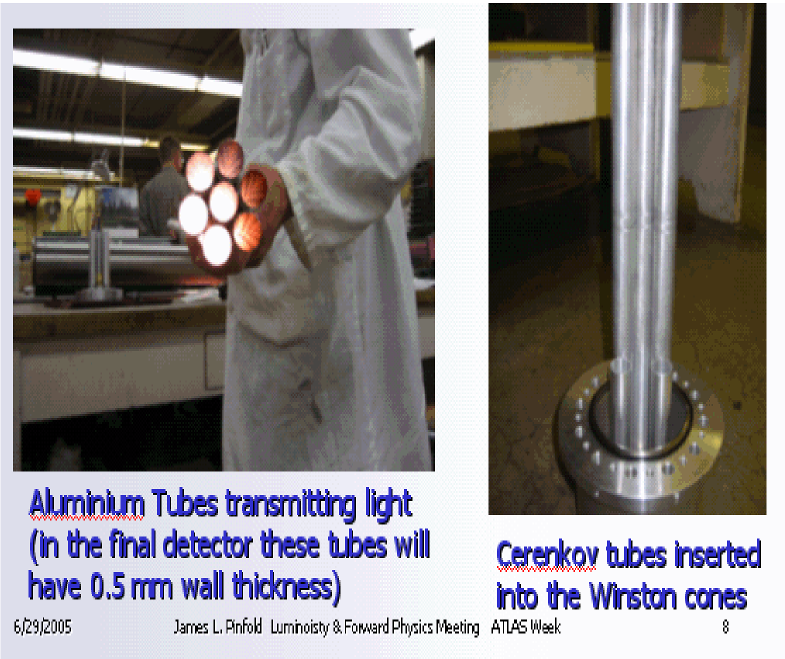


Updates on the Luminosity and Forward Detectors

Roman Pot (RP) detectors and LUCID (Cherenkov light luminosity monitor)

- **New collaborators for RP**
  - **Tracker: Lisbon, Giessen on the way**
  - **Electronics: Orsay and Lund**
- **New collaborators for LUCID**
  - **Electronics: Bologna**
- **First Prototypes built both for RP tracker and LUCID**
- **Beam test of both prototypes in DESY Oct-Nov 2005**

Both are part of the LHCC LoI, which was encouraged to be worked out towards a TDR



Zero degree calorimeter

- **Welcome collaboration with LHCf**
- **Interest to complement it with radiation-hard devices for luminosity tagging in heavy ion runs**

Longer term plans

- **R&D initiative from ATLAS/CMS physicists for future detectors further away from the IP (FP420)**

The ATLAS Experiment

High Luminosity Upgrade

In order to prepare for a possible upgrade (SLHC) of the LHC by one order of magnitude in luminosity beyond the design value, ATLAS has started to investigate necessary changes to the sub-detectors, in order to be able to exploit the increased physics potential of such an upgrade. An overview of the major issues and a first sketch for plan of work has been assembled and can be found here.

The following links provide more detailed information about the activities done so far:

- Overview of issues (ATLAS overview week 2004, Freiburg).
- First general ATLAS upgrade workshop (February 2005, CERN)
- Summary report of the first ATLAS upgrade workshop (February 2005 ATLAS week).
- ATLAS tracking upgrade workshop (July 2005, Genova).

The guidelines for the approval of R&D projects for an upgrade of ATLAS can be found here (CB web pages). The list of approved R&D projects (with links) is available.

Studies and activities towards a possible upgrade are coordinated inside ATLAS by the High-Luminosity steering group (present members)

The meetings and minutes of the upgrade steering group can be found here.

A list of further references concerning the SLHC and related issues:

- ATLAS scientific note on physics potential of an LHC upgrade
- CERN report on physics potential of an LHC upgrade
- Report on a feasibility study of an LHC machine upgrade
- CARE-N3 European Network on High Energy High Intensity Hadron Beams
- ATLAS studies on radiation and activation at high luminosity (ATL-TECH-2004-003)

ATLAS Approach to SLHC R&D

'Light-weight' internal ATLAS structure to deal with upgrades towards SLHC

- **Realistic and coherent upgrade plan**
    - ***addressing the physics potential***
- **Physics guiding the upgrades**
- **Retain detector experts in ATLAS**
    - ***challenging development besides detector construction/running***
- **Avoid wasting ATLAS resources**
    - ***with parallel work, or developments of no interest to ATLAS, but under ATLAS label***
- **Less attractive (but essential) aspects tackled in time**
    - ***services and supports, cooling, radiation issues, all aspects of increasing efficiency of data taking….***

Target date assumed for major upgrade: 2015 (tracking detectors)

- **R&D subject to optimization (with CMS and LHC machine) in the coming years**
- **Prototyping/Pre-series**
    - **Assume a duration of 3 - 5 years → start 2009 (until 2013)**
- **Production/Construction**
    - **Likely to take at least 3 years → start 2011 (until 2015)**

However, there is no ambiguity, ATLAS' priority is to complete, commission and exploit the TDR detector !

The Collaboration has endorsed the broad guidelines for an ‘Operation Model’ for the data-taking phase

(Details can be found at http://uimon.cern.ch/twiki//bin/view/Main/OperationModel)

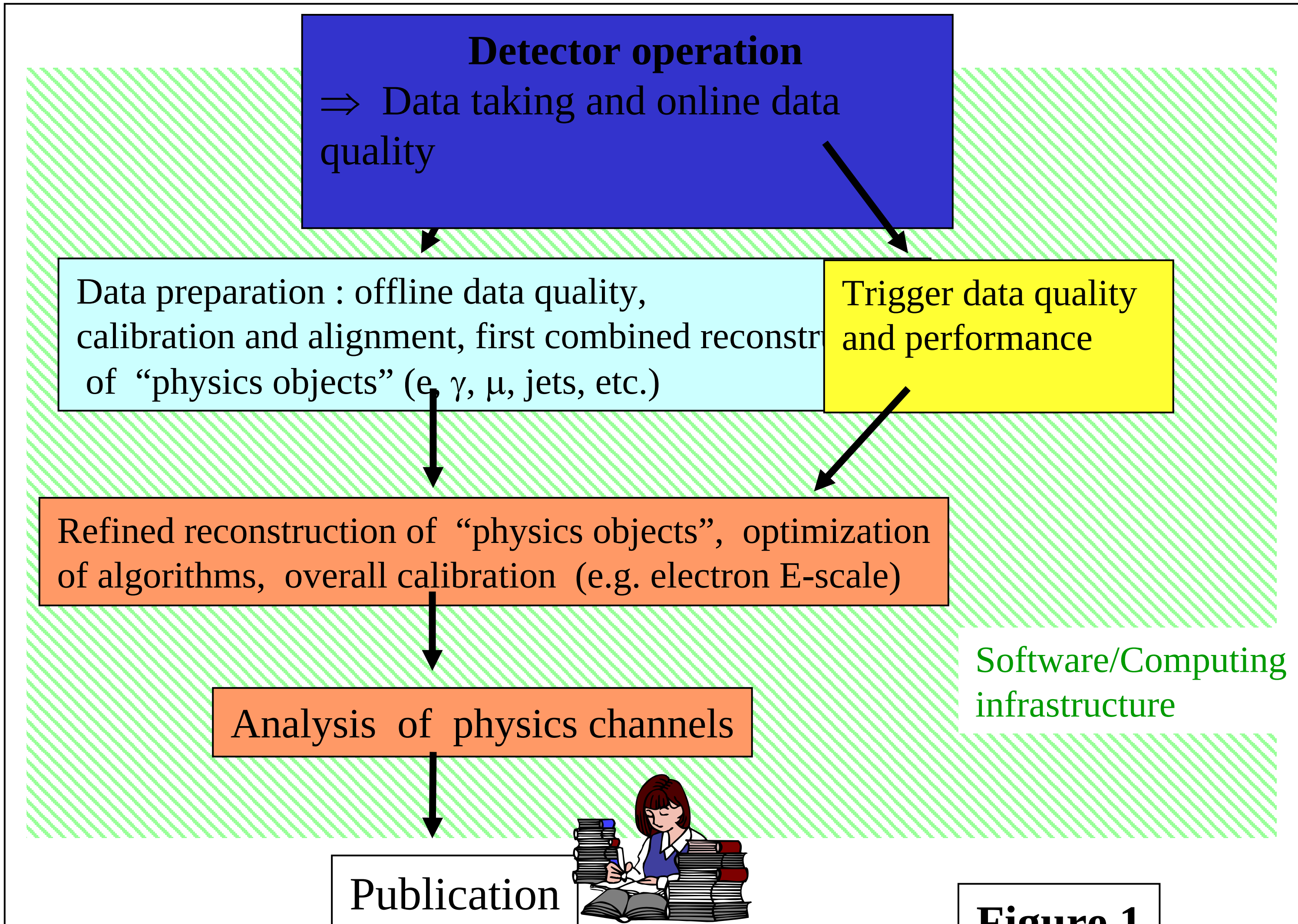


Figure 1

Operation Model (Organization for LHC Exploitation)

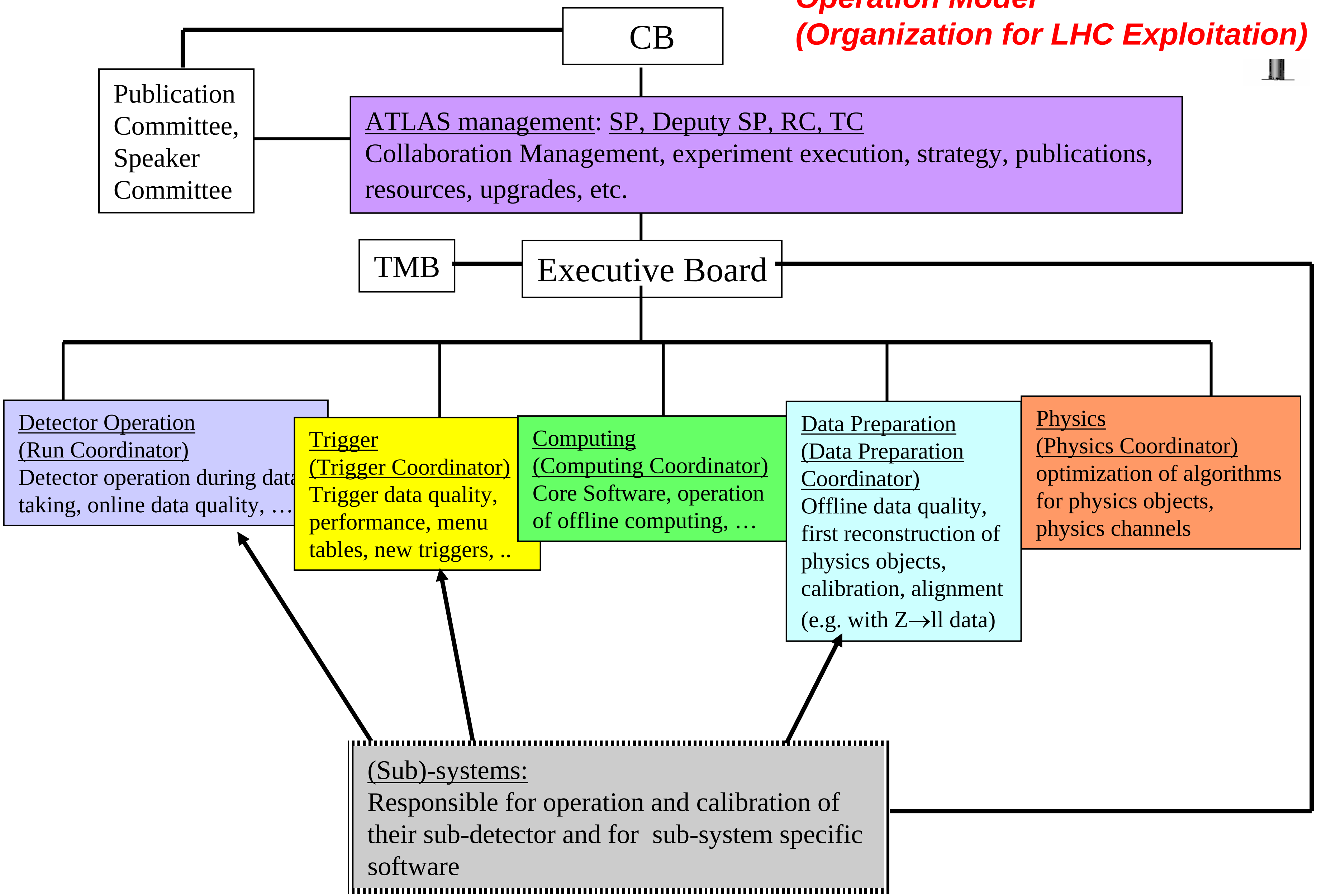


Figure 2

Cost to Completion, and initial staged detector configuration

As a reminder from previous RRB meetings:

The Cost to Completion (CtC) is defined as the sum of Commissioning and Integration (C&I) pre-operation costs plus the Construction Completion (CC) cost in addition to the deliverables

The following framework was accepted at the October 2002 RRB (ATLAS Completion Plan, CERN-RRB-2002-114rev.):

CtC 68.2 MCHF (sum of CC = 47.3 MCHF and C&I = 20.9 MCHF)

Commitments from Funding Agencies for fresh resources (category 1)	**46.5 MCHF**
Further prospects, but without commitments at this stage (category 2)	**13.6 MCHF**

The missing resources, 21.7 MCHF, have to be covered by redirecting resources from staging and deferrals

The funding situation will be reviewed regularly at each RRB, and is expected to evolve as soon as further resources commitments will become available

The physics impact of the staging and deferrals was discussed in detail with the LHCC previously

It has to be clearly understood that the full potential of the ATLAS detector will need to be restored for the high luminosity running, which is expected to start only very few years after turn-on of the LHC, and to last for at least a decade

ATLAS has pursued, since the October 2002 RRB, its initial detector construction within the accepted framework of the ATLAS Completion Plan, CERN-2002-114rev.

Many constructive interactions continue to take place with Funding Agencies, and the national communities continue actions to secure the funding required to complete the detector

Step by step the overall funding situation is slowly improving, even though ATLAS is still short to meet its initial detector requirements, and therefore will be forced to start up with a significantly staged initial configuration

At the last RRB France CEA announced inclusion of a further BT work-package as CtC offer; since the last RRB NSERC Canada and Switzerland have made the highly appreciated commitments to secure the full calculated share of their CtC, and JINR has declared the intention to do so as well

The present status of the Completion Funding planning is given in the updated table (CERN-RRB-2005-088 and revision for this meeting)

There remains also a serious issue of cash flow, mainly due to late contributions to the baseline MoU Common Fund construction funding, which will be addressed in the budget discussion later on by Markus Nordberg

For the successful implementation of the Completion Plan it is also very important that the funds for deferred items will be made available early on, documented to the RRB based on ATLAS agreements specifying in a transparent way the corresponding accounting

The Collaboration is very grateful to all the Funding Agencies that have already agreed to the category 1 completion funding and found new resources, and it hopes very much that the others will be able to support the ATLAS completion as well in the future

Cost to Completion Funding Planning (all in kCHF, revised 17th October 2005)

(CERN-RRB-2005-088 and updates)

Funding Agency	Cost to Completion proposed sharing Total	Constr. Comp.	C&I	Member fee 2004-6 (included in Constr. Comp.)	New funding (category 1) including member fee Total	New funding requests as prospects (category 2) without commitment from FA Total
Armenia	**66**	48	18	38	**45**	
Australia	**357**	242	115	75	**140**	238
Austria	**67**	52	15	38	**67**	
Azerbaijan	**43**	38	5	38	**38**	
Belarus	**85**	75	10	75	**75**	
Brazil	**64**	47	17	38	**41**	
Canada	**2090**	1528	562	263	**2090**	
China NSFC+MSTC	**141**	99	42	38	**141**	
Czech Republic	**316**	196	120	113	**316**	
Denmark	**422**	290	132	38	**58**	375
France IN2P3	**5890**	4176	1714	225	**4260**	1630
France CEA *)	**1940**	1379	561	38	**1334**	
Georgia	**42**	37	5	38	**38**	
Germany BMBF	**4531**	3250	1281	338	**4531**	
Germany MPI	**1093**	761	332	38	**1093**	
Greece	**261**	173	88	113	**113**	148
Israel	**739**	497	242	113	**739**	
Italy	**6638**	4650	1988	450	**4000**	
Japan	**4362**	3029	1333	563	**4362**	
Morocco	**57**	47	10	38	**41**	
Netherlands	**1934**	1368	566	75	**1934**	
Norway	**581**	391	190	75	**581**	
Poland	**136**	94	42	75	**80**	56
Portugal	**446**	265	181	38	**339**	107
Romania	**140**	85	55	38	**140**	
Russia	**2991**	1995	996	263	**1561**	212
JINR	**1066**	660	406	38	**521**	
Serbia					**300**	
Slovak Republic	**72**	53	19	38	**82**	
Slovenia	**223**	152	71	38	**223**	
Spain	**1706**	1109	597	113	**1706**	
Sweden	**1691**	1121	570	150	**1691**	
Switzerland	**2372**	1701	671	75	**2372**	
Taipei	**445**	318	127	38	**445**	
Turkey	**85**	75	10	75	**75**	
United Kingdom	**4387**	3063	1324	450	**3133**	1254
US DOE + NSF	**12245**	8438	3807	1238	**6200**	
CERN	**8452**	5770	2682	38	**13700**	
Total	**68176**	47272	20904	5563	**58605**	4020

*) The commitment shown does not include a 1 MCHF additional engineering contribution provided on the initial BT contract (see MoU Annex 8.A)

Conclusions

The ATLAS detector construction is proceeding within the framework of the accepted Completion Plan

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

The remaining construction concerns are regularly reported to, and reviewed with, the LHCC referees, in considerable detail most recently last week with the yearly Comprehensive Review

Large-scale surface system tests, in particular the combined test beam runs 2004, have been very major activities in the past years, and the experience and results will be of great benefit for an efficient start-up of the experiment

M Nessi will report on the evident progress of the schedule-critical magnet assembly, and on the general installation status and activities in the cavern

Very major software and computing activities proceed according to plans

The detector commissioning has started, and the global planning for the early physics phase is well underway

ATLAS is on track for LHC physics in 2007

To really make it, a great effort is still required from all partners in terms of resources to complete the project