ATLAS Status Report

1. The ATLAS Collaboration
2. Construction and Integration Progress
    - Magnet systems
    - ID, Calorimeters, Muons, DAQ
    - Software/Computing not covered – see talk by D.Barberis covering the TDR
3. Installation Status and Planning
4. Commissioning Work in the Pit
5. Physics Preparation
6. Operation-, Finance-, and High Luminosity Planning
7. Summary and Conclusion

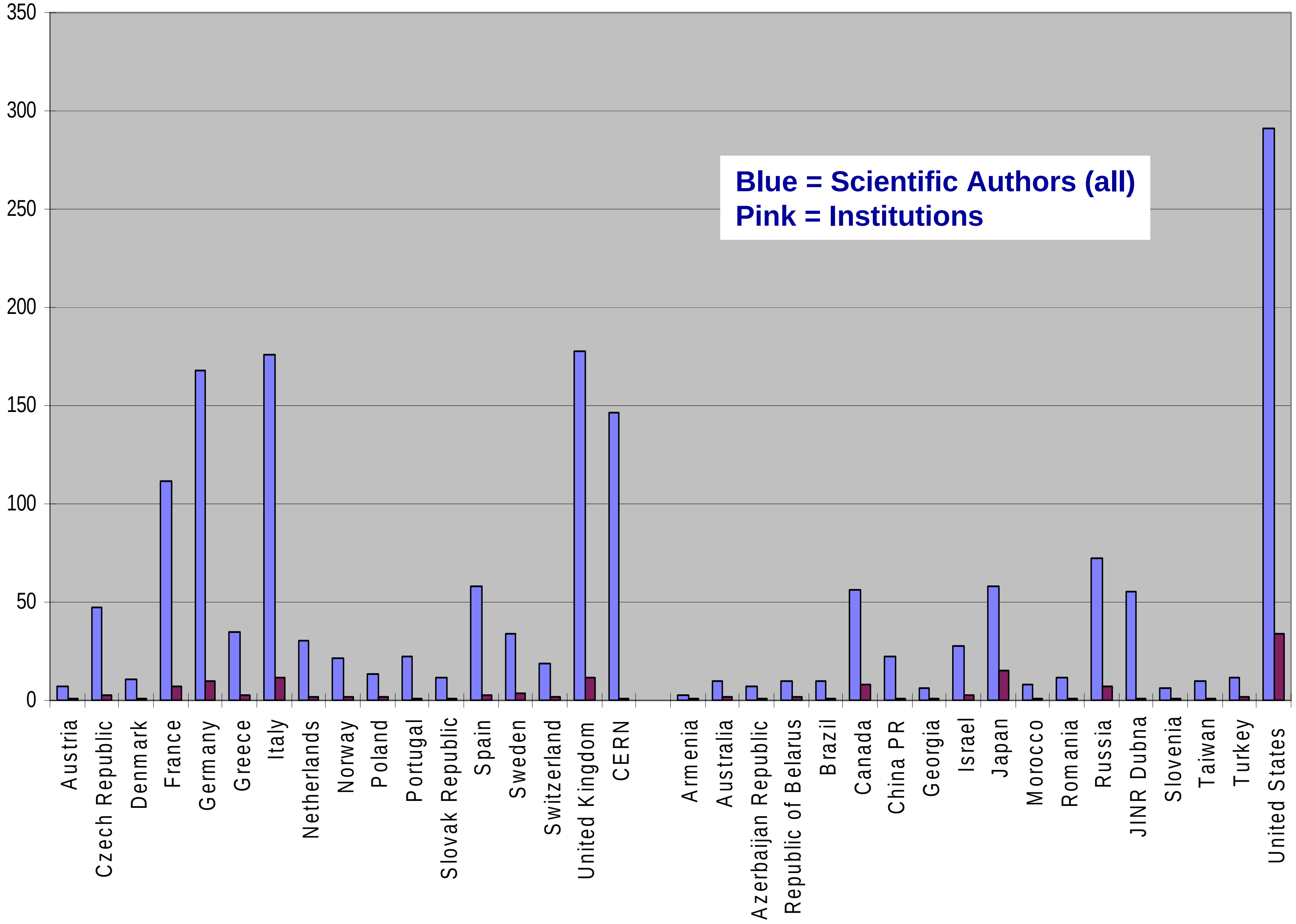
1) The ATLAS Collaboration

34 Countries
151 Institutions
1770 Scientific Authors

We can be pleased that new groups have initiated the procedure to join!

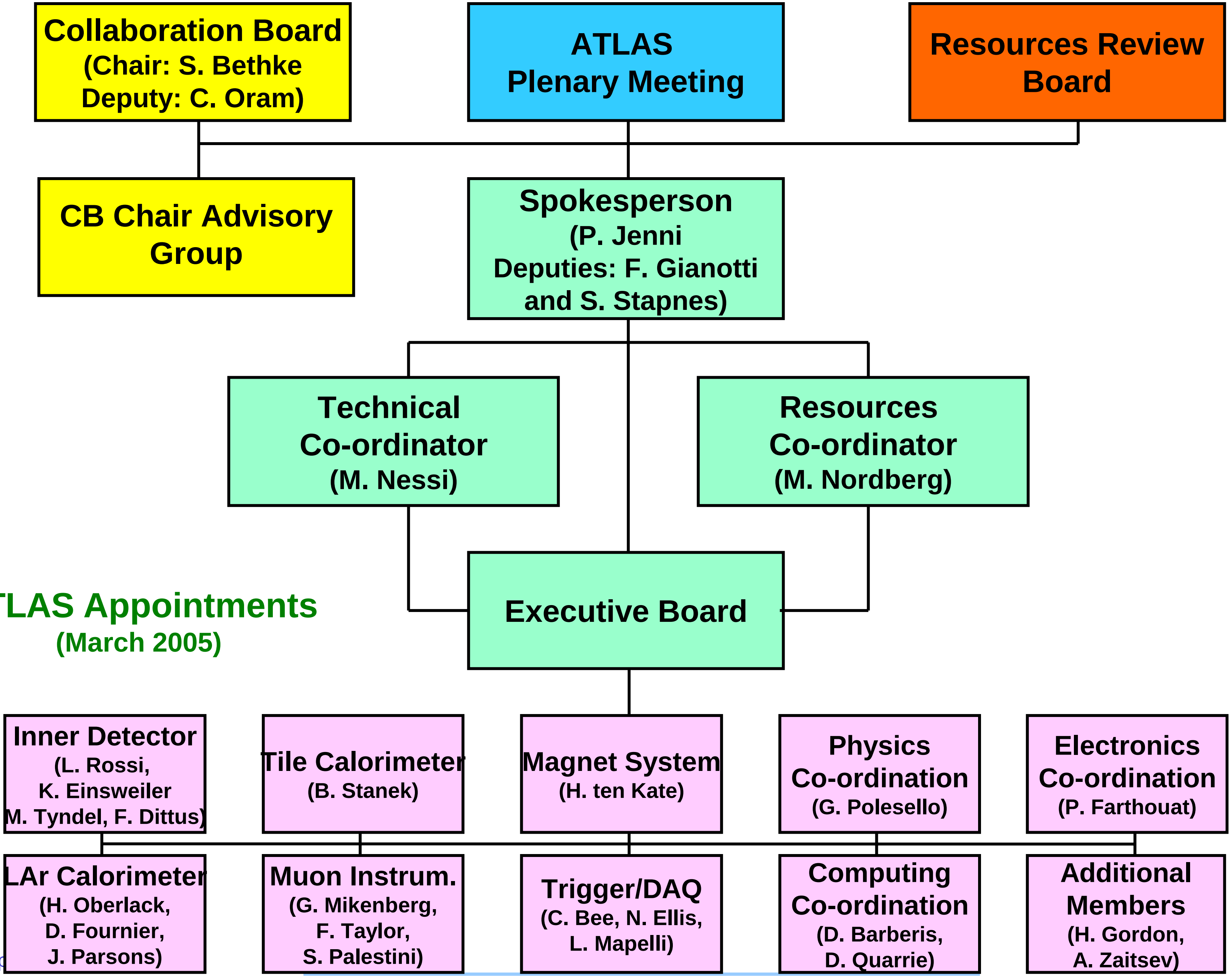
Albany, Alberta, NIKHEF Amsterdam, Ankara, LAPP Annecy, Argonne NL, Arizona, UT Arlington, Athens, NTU Athens, Baku, IFAE Barcelona, Belgrade, Bergen, Berkeley LBL and UC, Bern, Birmingham, Bonn, Boston, Brandeis, Bratislava/SAS Kosice, Brookhaven NL, Bucharest, Cambridge, Carleton, Casablanca/Rabat, 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, 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, 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, Tokyo UAT, Toronto, TRIUMF, Tsukuba, Tufts, Udine, Uppsala, Urbana UI, Valencia, UBC Vancouver, Victoria, Washington, Weizmann Rehovot, Wisconsin, Wuppertal, Yale, Yerevan

ATLAS authors



ATLAS Appointments

(March 2005)



Collaboration Board
(Chair: S. Bethke
Deputy: C. Oram)

ATLAS
Plenary Meeting

Resources Review Board

CB Chair Advisory Group

Spokesperson
(P. Jenni
Deputies: F. Gianotti
and S. Stapnes)

Technical Co-ordinator
(M. Nessi)

Resources Co-ordinator
(M. Nordberg)

Executive Board

Inner Detector
(L. Rossi,
K. Einsweiler
M. Tyndel, F. Dittus)

Tile Calorimeter
(B. Stanek)

Magnet System
(H. ten Kate)

Physics Co-ordination
(G. Polesello)

Electronics Co-ordination
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LAr Calorimeter
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D. Fournier,
J. Parsons)

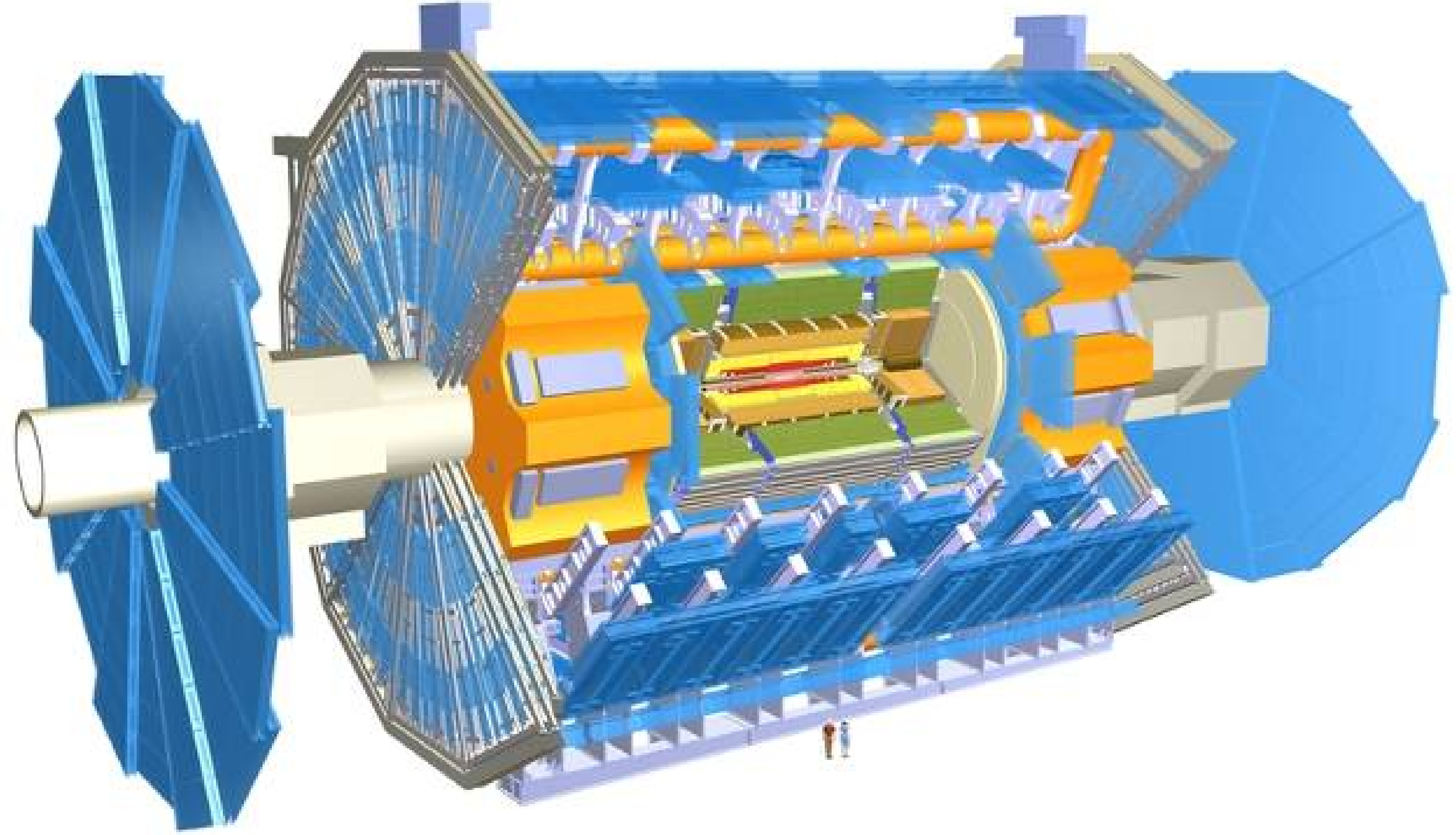
Muon Instrum.
(G. Mikenberg,
F. Taylor,
S. Palestini)

Trigger/DAQ
(C. Bee, N. Ellis,
L. Mapelli)

Computing Co-ordination
(D. Barberis,
D. Quarrie)

Additional Members
(H. Gordon,
A. Zaitsev)

2) ATLAS Construction, Integration and Installation Progress




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

Flow of Parts

Construction:

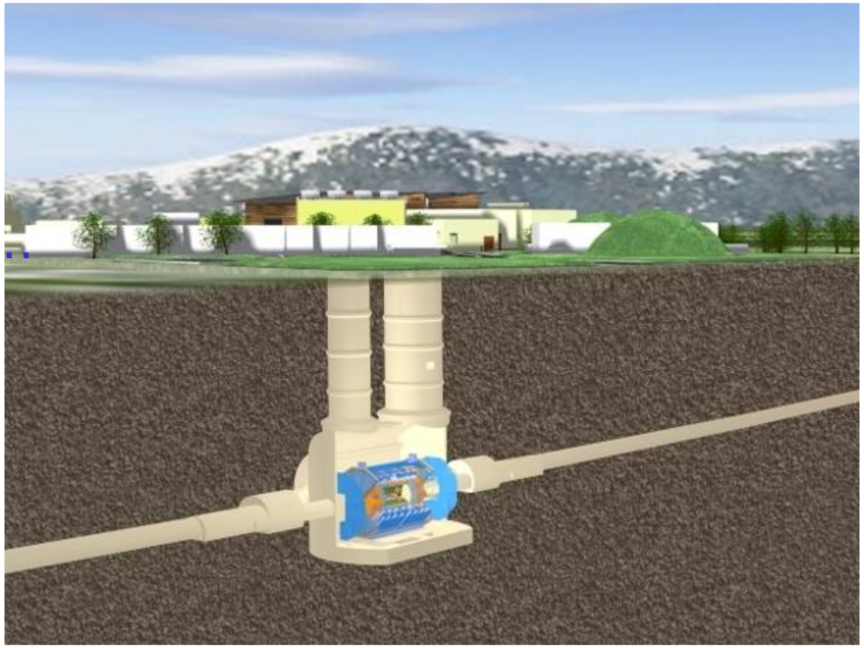
- In ATLAS Institutes or Industry

Assembly/Integration:

- Hall 180: BT assembly/testing and LAr integration, now being allocated to End Cap Muons
- Hall 185: Tiles Assembly Area
- Hall 191: End Cap Toroid assembly
- BB5: Muon barrel Assembly Facility
- SR1: ID assembly area
- … and more, but these are the ones discussed in the following slides …

Installation and Commissioning:

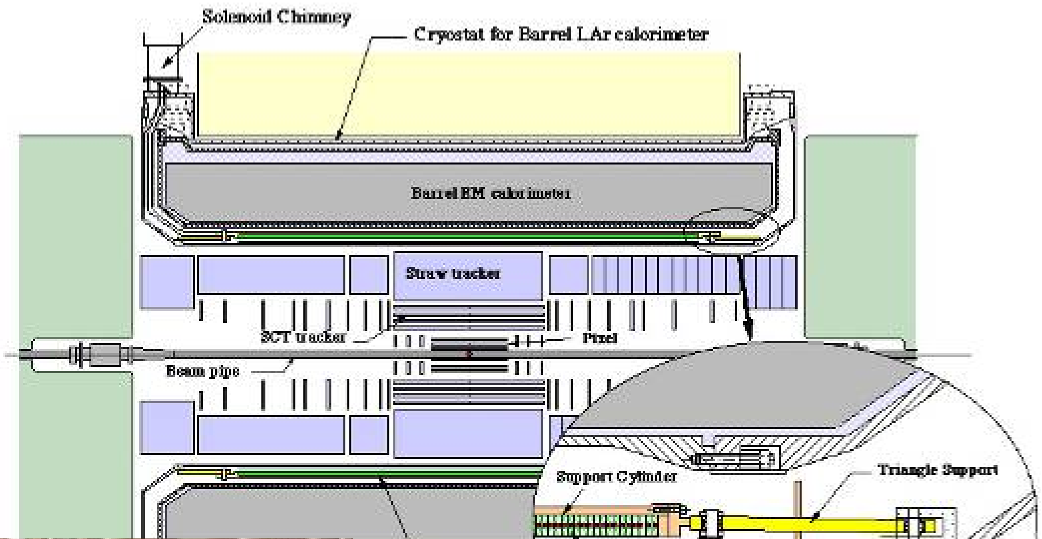
- In the final home on the right



The central solenoid

2T field with a stored energy of 38 MJ

Integrated design within the barrel LAr cryostat

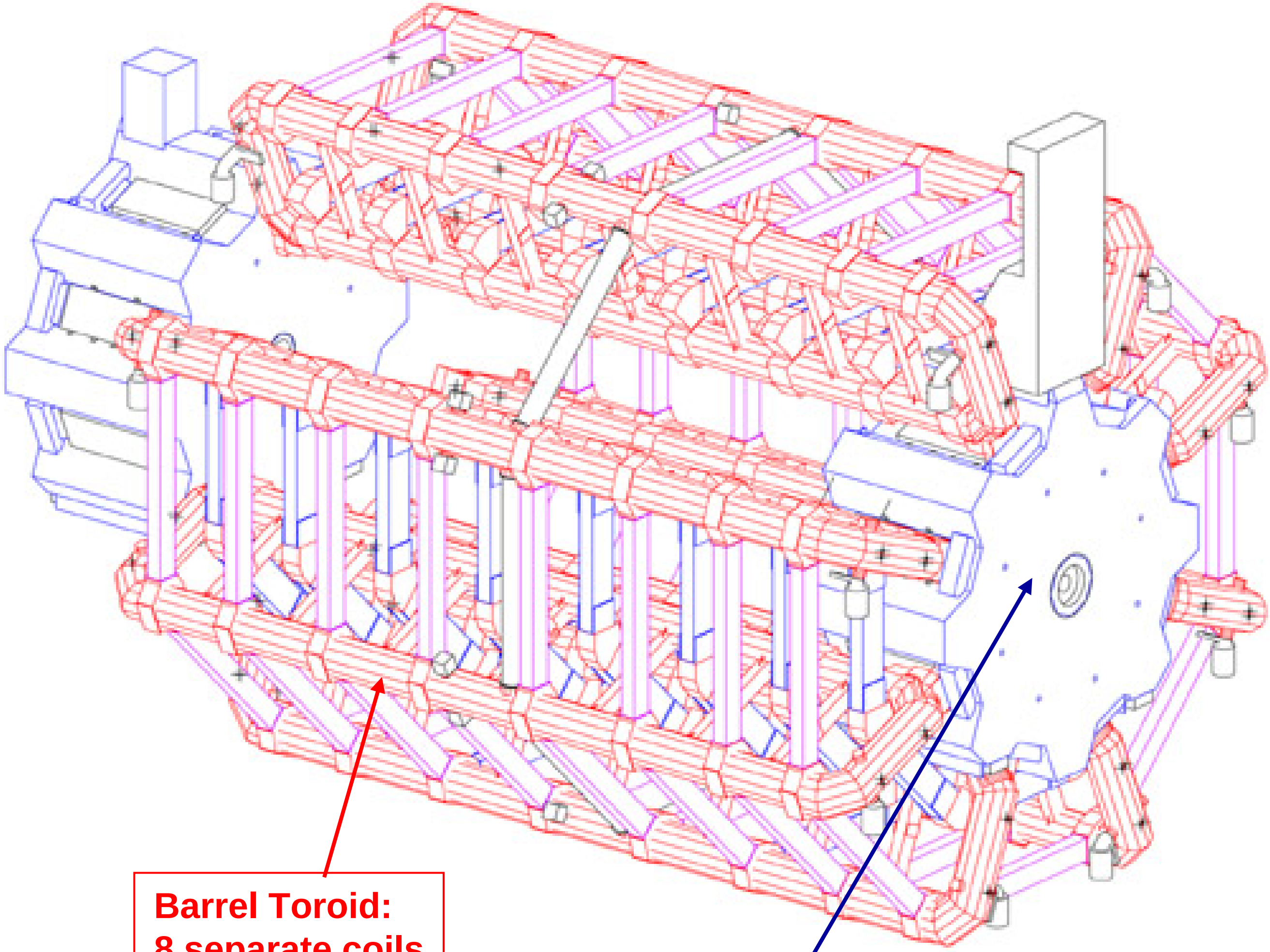


The solenoid has been inserted into the LAr cryostat at the end of February 2004, and it was tested at full current (8 kA) during July 2004

Toroid Systems

Barrel Toroid parameters
25.3 m length
20.1 m outer diameter
8 coils
1.08 GJ stored energy
370 tons cold mass
830 tons weight
4 T on superconductor
56 km Al/NbTi/Cu conductor
20.5 kA nominal current
4.7 K working point

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



Barrel Toroid:
8 separate coils

End-Cap Toroid:
8 coils in a common cryostat

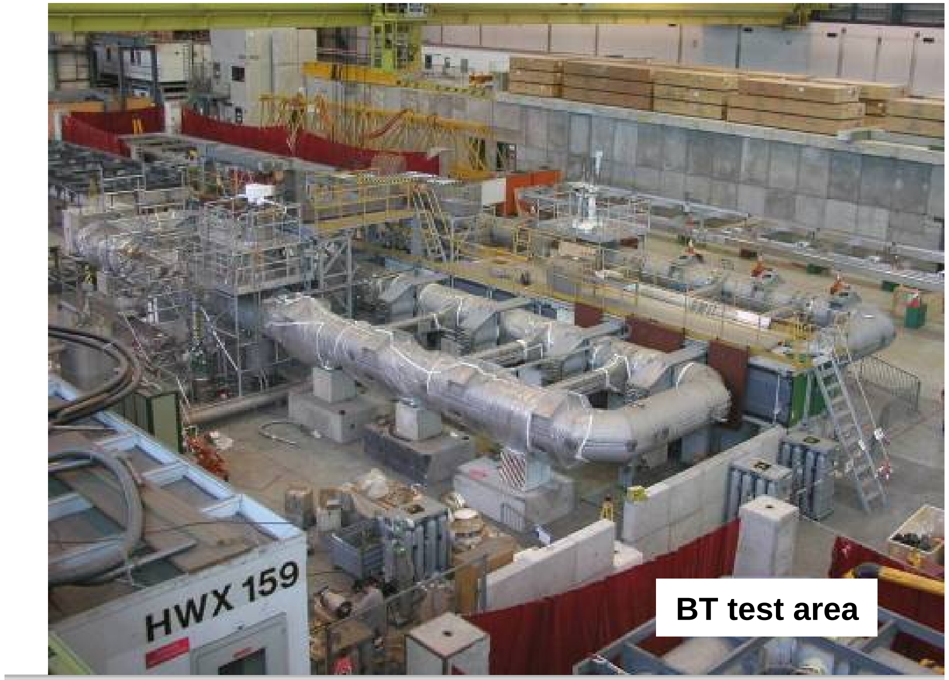
Barrel Toroid Construction Status

Series integration and tests of the 8 coils at the surface will be finished end of June 2005

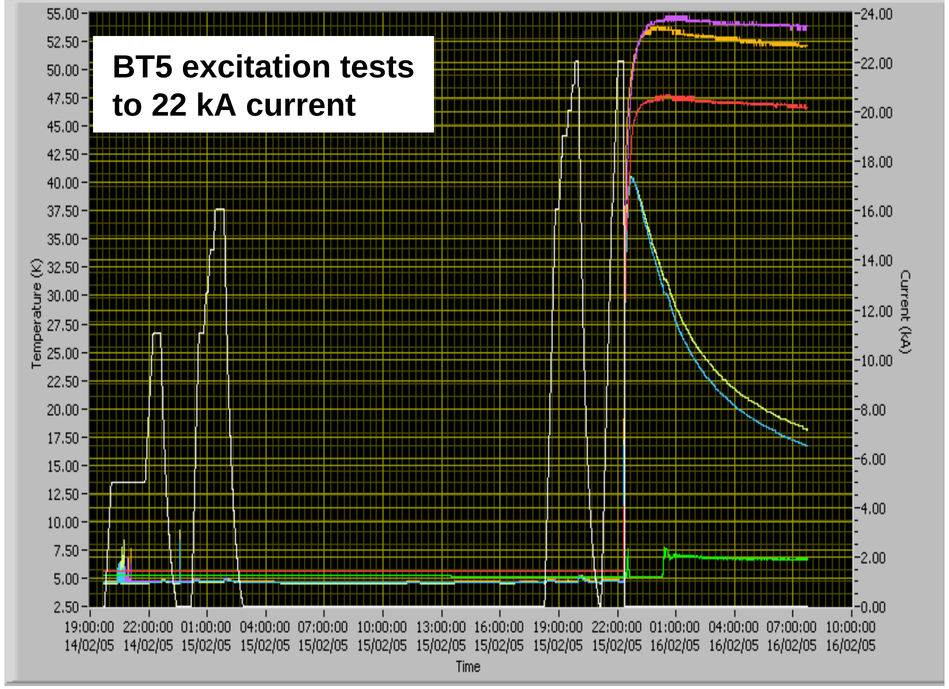
B1 installed in cavern
B2 installed in cavern
B3 installed in cavern
B4 installed in cavern
B5 installed in cavern
B6 tested and moved to cavern, lowered yesterday
B7 tested ok and will be moved in July
B8 (former B3) test completed, cooled down three times - consistently with the resistance to ground well above the acceptance value of 10 kOhm (the three cycles following a recommendation of the LHCC MAG). Cold the typical resistance values are in the MOhm range.
Then install it as last coil close to current input

Schedule for installation and commissioning in the cavern:

- **BT8 installation in August 2005**
- **BT functional test by end of 2005**



BT test area



BT5 excitation tests to 22 kA current

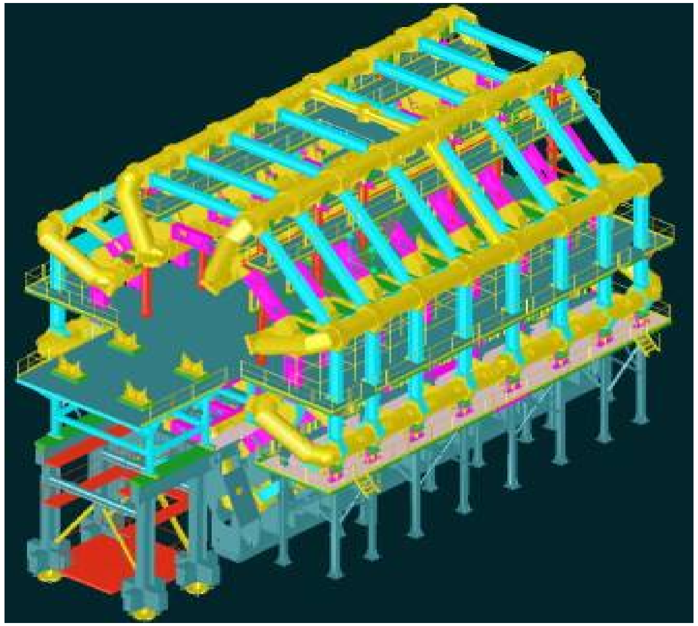
Barrel Toroid Coil transport and Installation

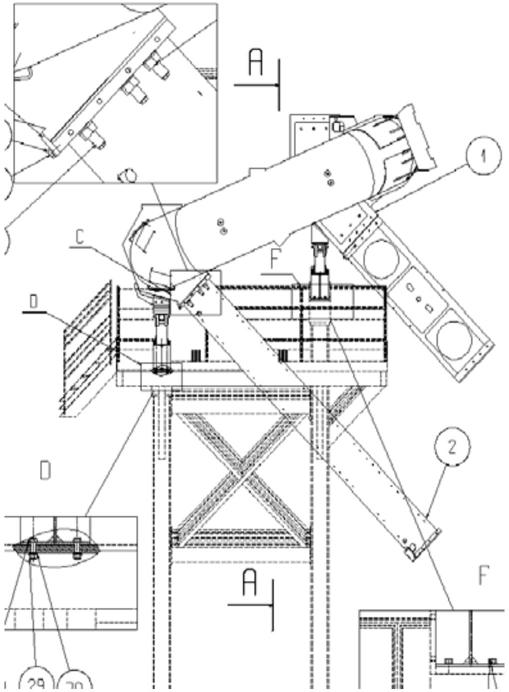
BT current status

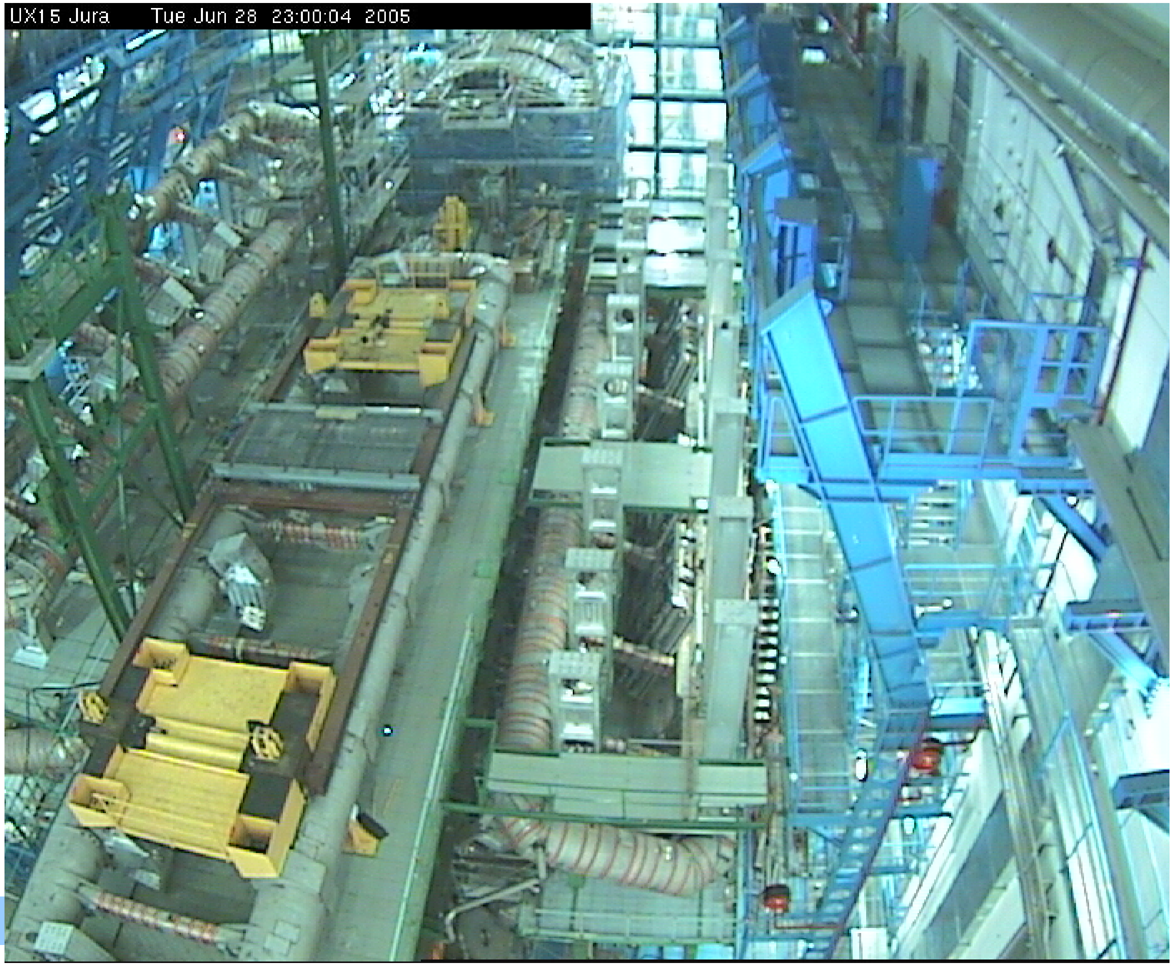
The preparations for installation of the sixth BT coil in the cavern are well-advanced

The warm structure components production is finished

The cryoring for the first four coils is in place



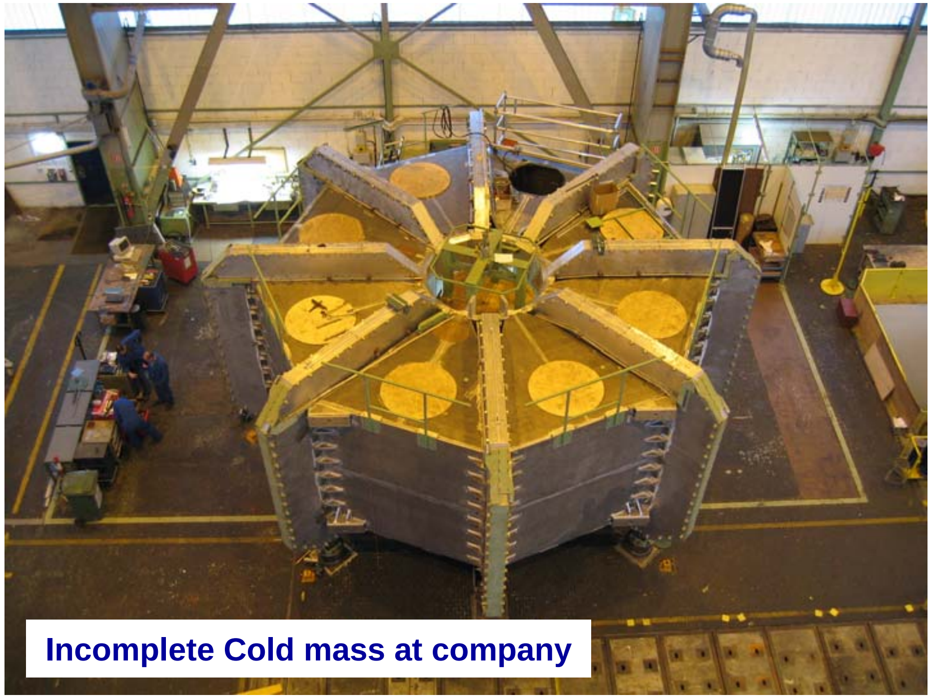




ATLAS End Cap Toroid Update

Both ECT vacuum vessels have been at CERN since long,
including the shell parts of the thermal shield and superinsulation, as well as all components for the assembly of the ECTs

The cold mass production in industry failed, contract with company cancelled and the work moved to CERN in 9/04



Incomplete Cold mass at company

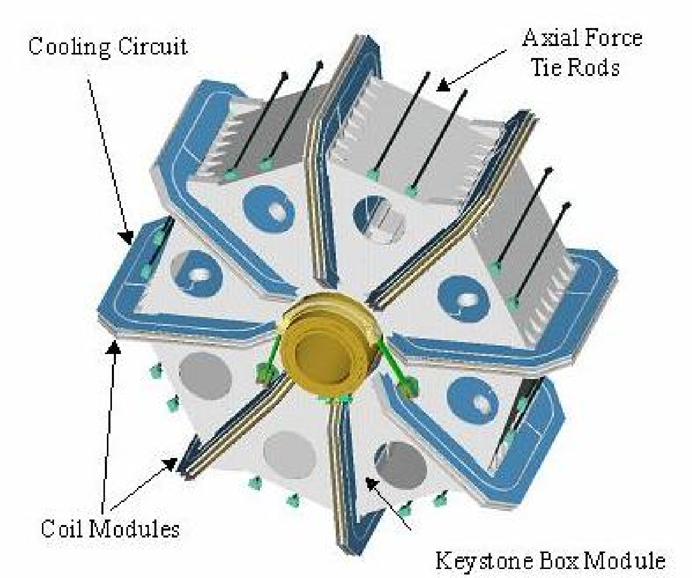
ECT vacuum vessel in Hall 191

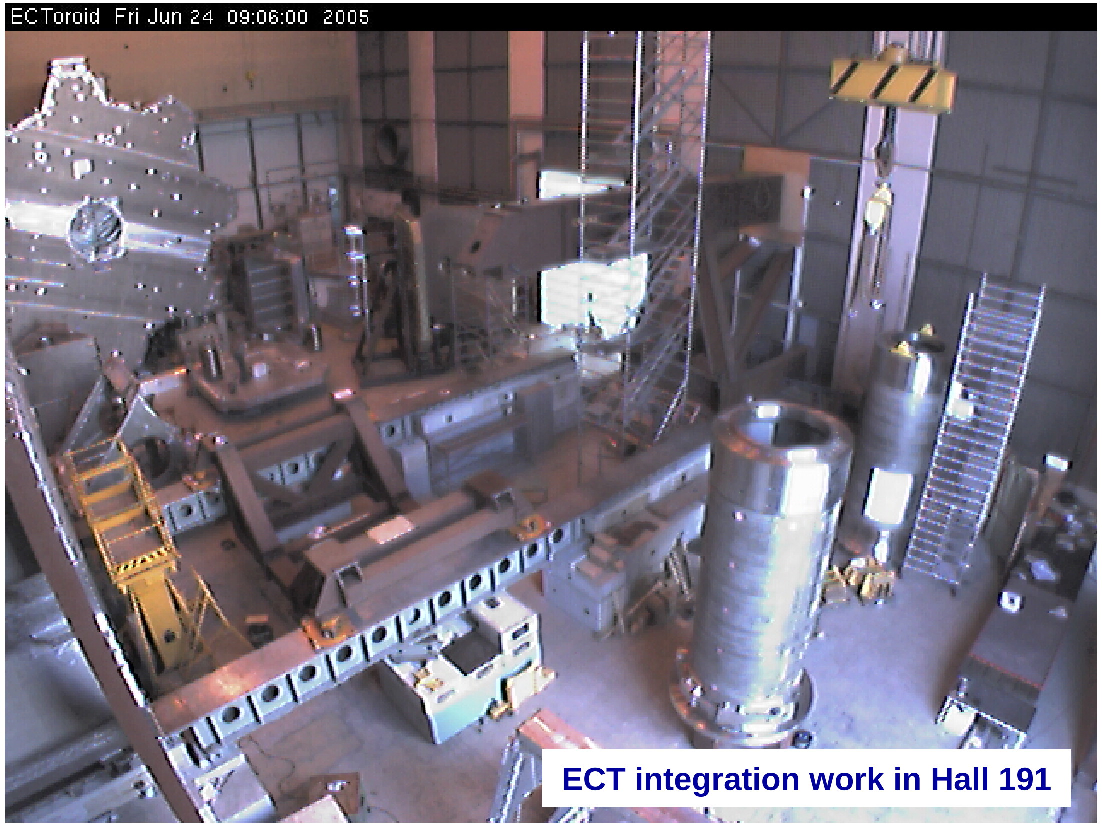
ATLAS End Cap Toroid Update

All 16 coils and keystone boxes were prepared and are ready for assembly
Assembly of ECT-C has started now, cold mass is ready by early Sept and will then be inserted in the vacuum vessel

ECT-C is ready by Jan 06, on surface testing in Feb/Mar 06 and installation in cavern in Apr 06; ECT-A follows in in Sep 06

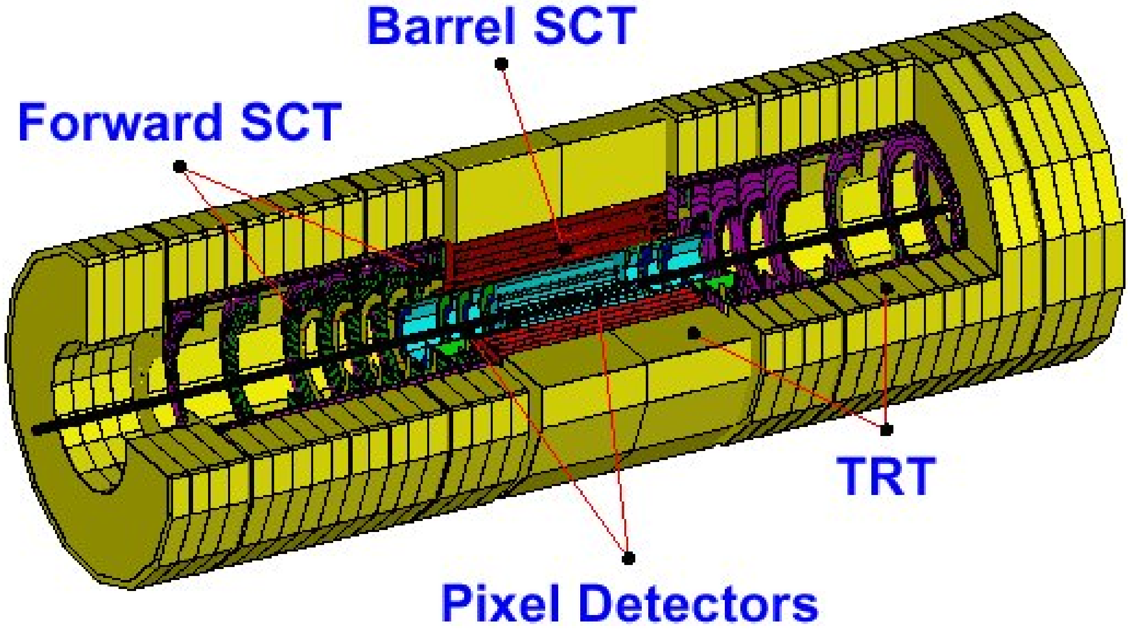
The major problems solved





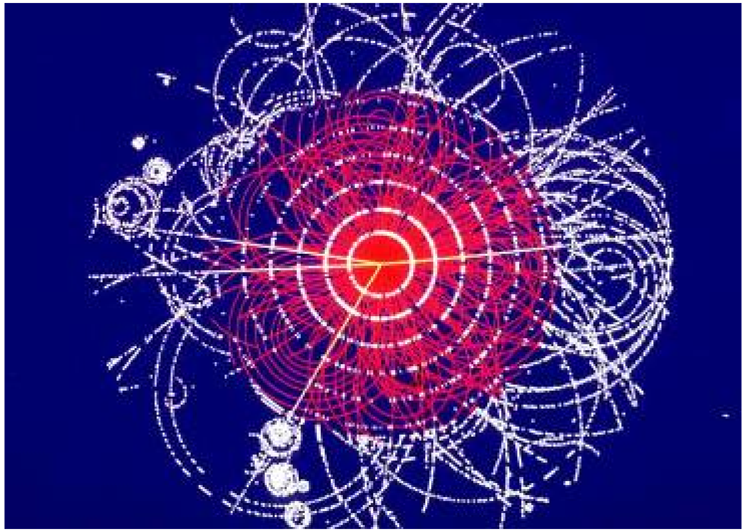
ECT integration work in Hall 191

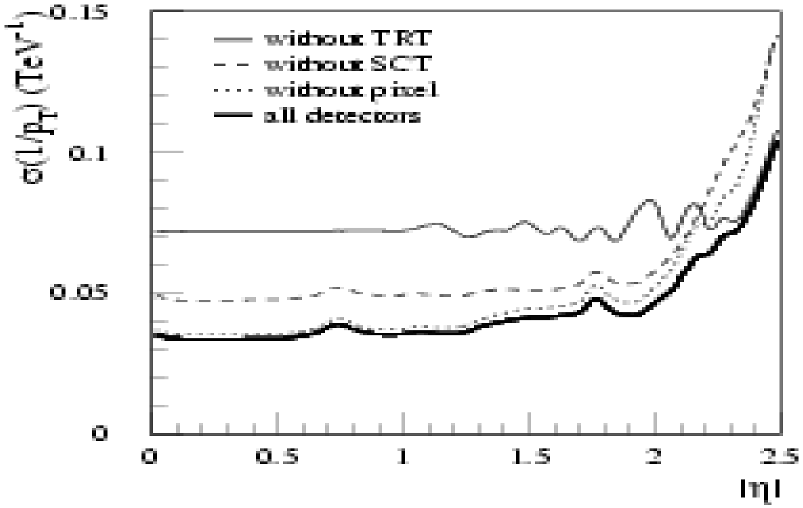
Inner Detector (ID)



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

- Pixels
  (80 10^6 channels)
- Silicon Tracker (SCT)
  (6 10^6 channels)
- Transition Radiation Tracker (TRT)
  (4 10^5 channels)
- Common ID items





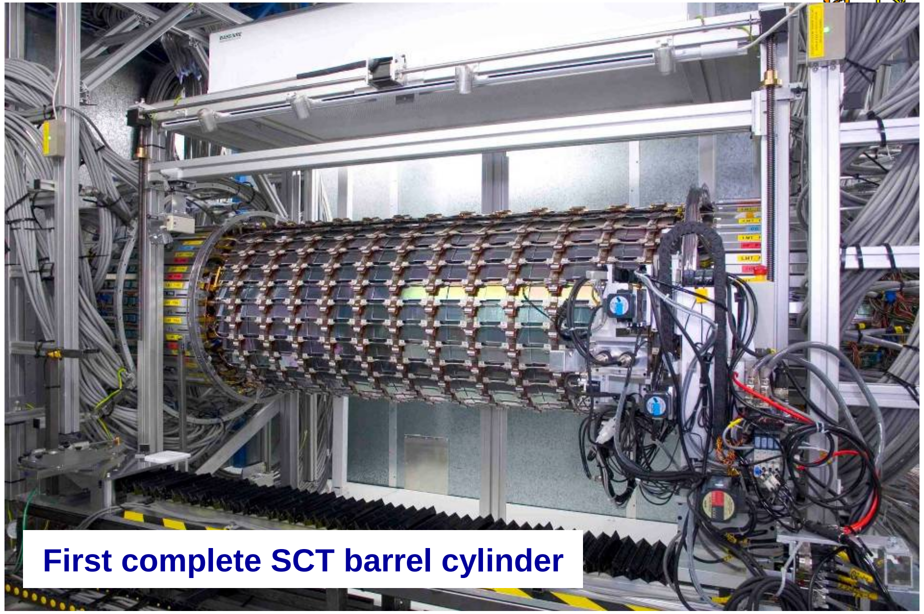
ID progress summary

Pixels: Progress on all aspects of the subsystem for 3 layers
Two recent problems related to modules and staves being solved but valuable time lost.

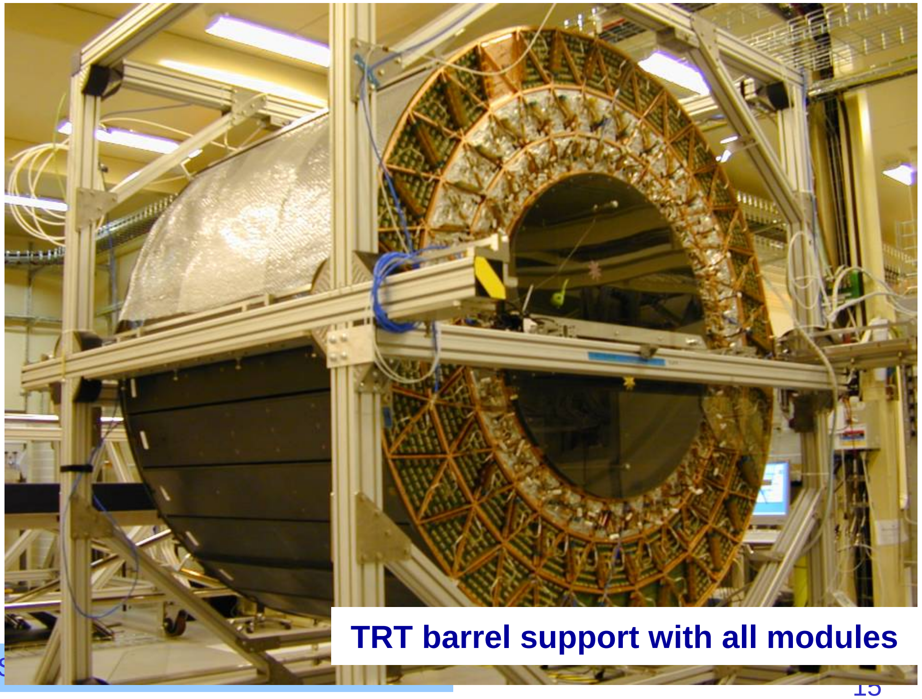
SCT: Module mounting ('macro-assembly') on the 4 barrel cylinders ongoing (the first two cylinders are finished and tested, and both are now at CERN)
The module mounting progressing on the end-cap disks (7 disks completed)
We have to recover a problem with LMTs (low mass tapes for the electrical services)

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 progressing well.
Failure rate of HV fuses still being watched

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



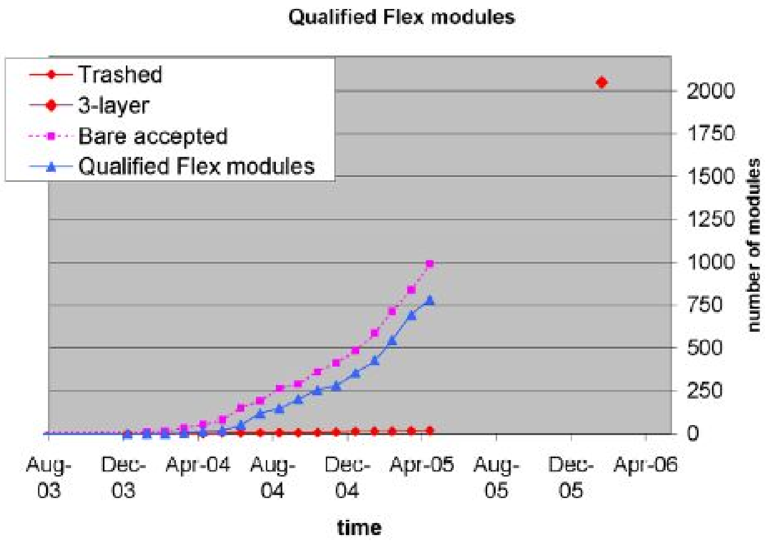
TRT barrel support with all modules

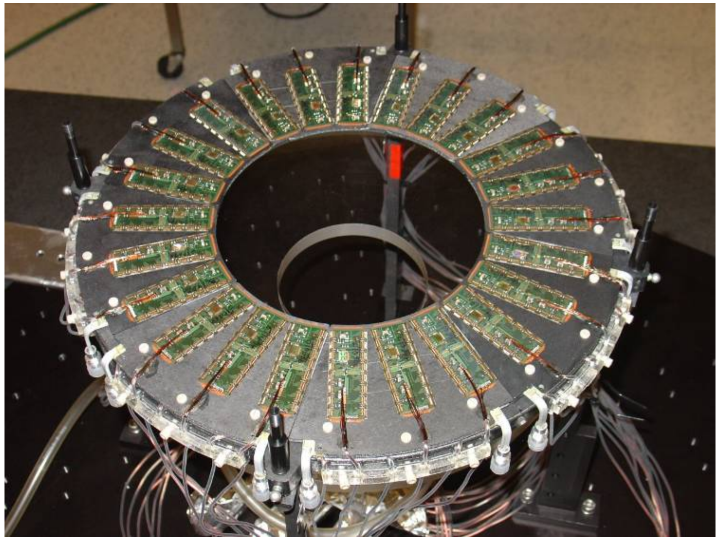
PIXELs

All FE chips have been delivered (all tested, showing a yield of 82%)

The sensor production is finished for 2 layers, and on time for 3 layers

The module production rate (with bump-bonding in 2 industries) has improved, on track for 3 layers in time (45% made) – the potting of the controller chip caused wire bond breakage during thermal cycling, repairs needed (caused dip in the blue curve below)

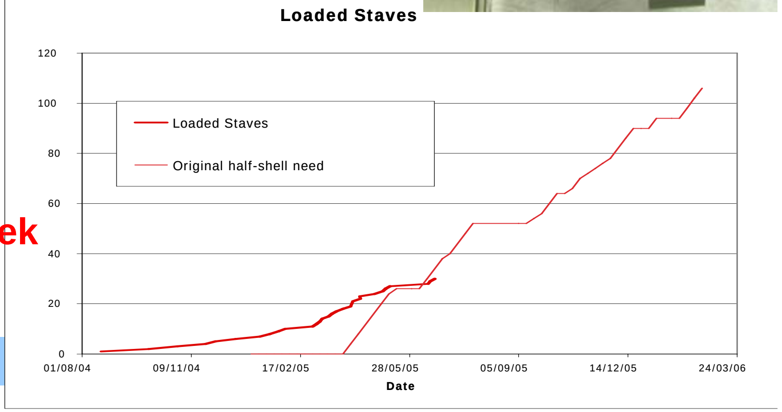




First completed disk (two layers of 24 modules each, with 2’200’000 channels of electronics

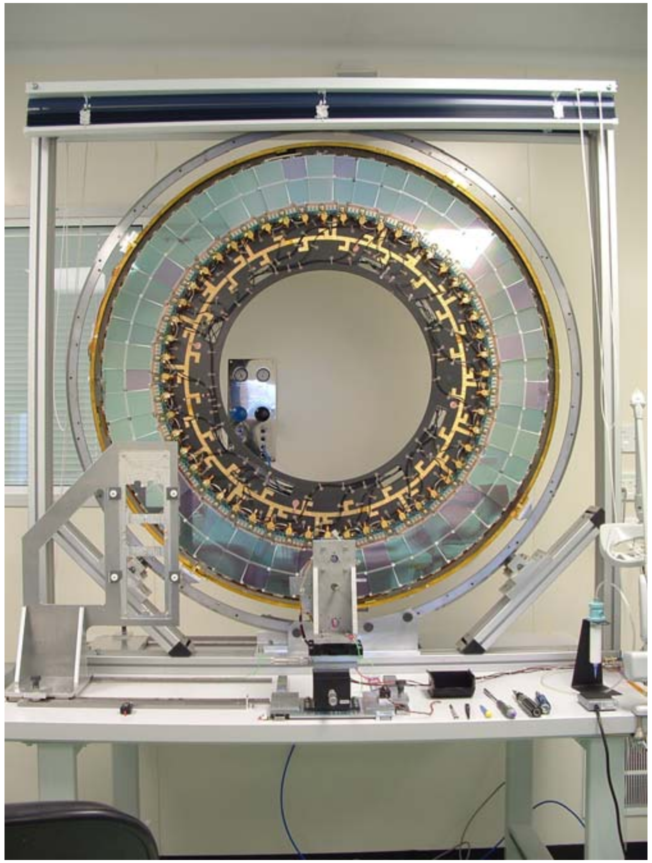
The series production of final staves (barrel) and sectors (end-cap disks) passed the 10% mark, this activity is now on the critical path of the Pixel project

There has been a de-lamination problem on the staves, being solved now by adding a small peek collar at each end

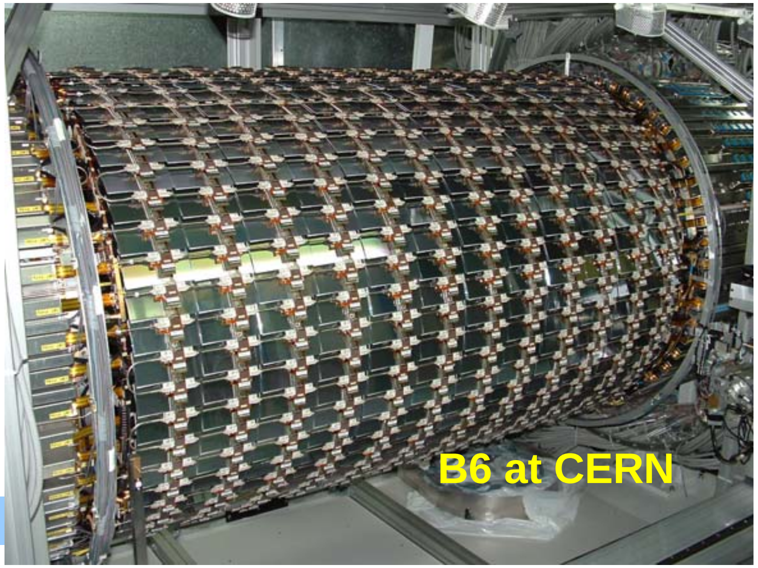


SCT

- ECs
  - **Module production has reached 96% level**
  - **Disk loading proceeds well at the two assembly sites**
    - ECC: D9→D4 completed, D9→D6 aligned in cylinder.
    - ECA: D8 started. Working in parallel on all disks.
  - **Reprocess tapes along disk cylinders: have arrived at a 'just-in-time' production schedule**
    - First harnesses for D9 available by end July
    - Harnesses arrive in batches every 2 weeks until Nov.
  - **As an insurance against further delays**
    - Transport for EC-C will be ready by Aug 2005
    - SR1 will be prepared to receive and work on 1 EC by Sep; 2 ECs by Nov



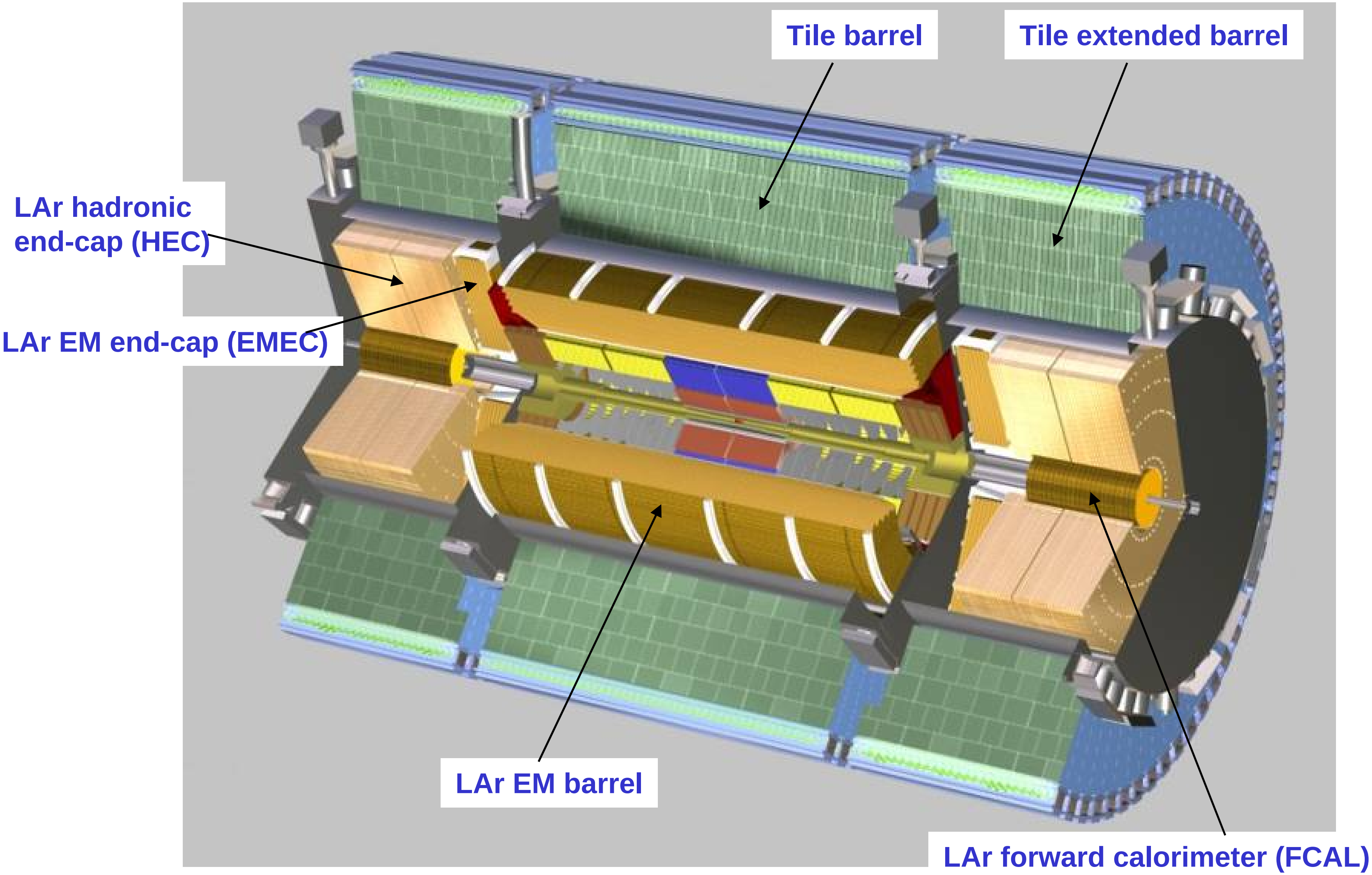
- Barrel
  - **Modules completed and module mounting going well**
  - **B6 at CERN. B5 to be completed on 5/7 (all modules on, testing on-going), B4 on 18/8**
  - **Barrel on schedule**



TRT EC (A stack) has been rotated and is now in position in the transfer trolley

Gas tightness remains the same.
Electrical tests underway, so far so good.

LAr and TILE calometers



Tile barrel

Tile extended barrel

LAr hadronic end-cap (HEC)

LAr EM end-cap (EMEC)

LAr EM barrel

LAr forward calorimeter (FCAL)

LAr EM barrel and Solenoid Commissioning on the surface

The barrel EM calorimeter is installed in the cryostat, and after insertion of the solenoid, the cold vessel was closed and welded

A successful complete cold test (with LAr) was made during summer 2004 in hall 180:

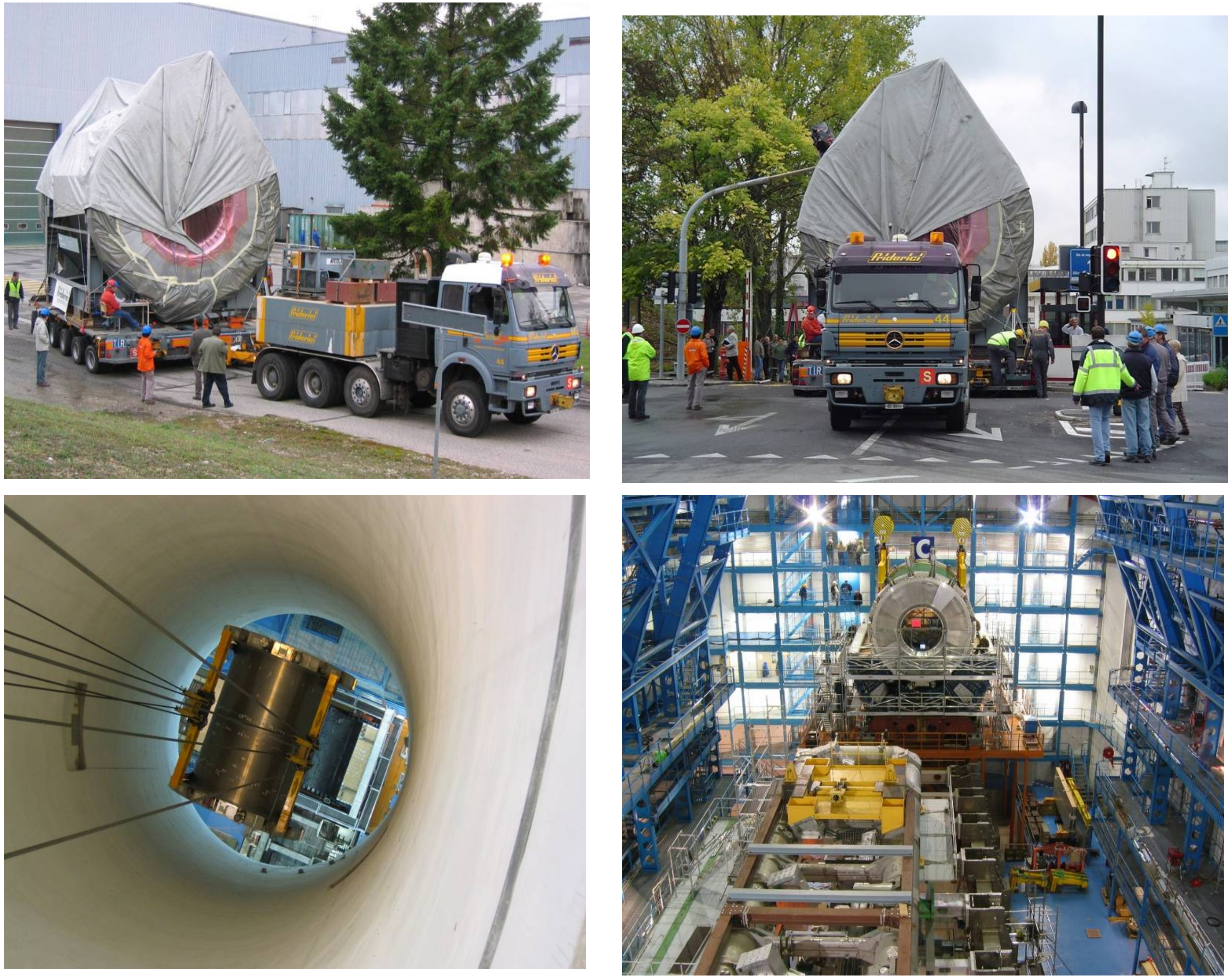
- 0.22% dead channels (0 Ohm HV to GND for one sector)
- A few additional HV problems observed - recoverable due to HV redundancy or by running at lower voltage for these channels

End of October the cryostat was transported to the pit, and lowered into the cavern

LAr barrel EM calorimeter after insertion into the cryostat

Solenoid just before insertion into the cryostat

Transport and installation



ATLAS Barrel Calorimeters

The mechanical installation of the LAr and Tile Barrel Calorimeters in the pit has been completed end of 2004 on the support trucks below the access shaft on the C-side

The installation of electronics and services is ongoing

<ins>Issues to watch:</ins>

FEB production:
Restarted after addressing “QPLL problem”, however also affected (now determined) by delivery rate of Optical Transmitters (OTx)

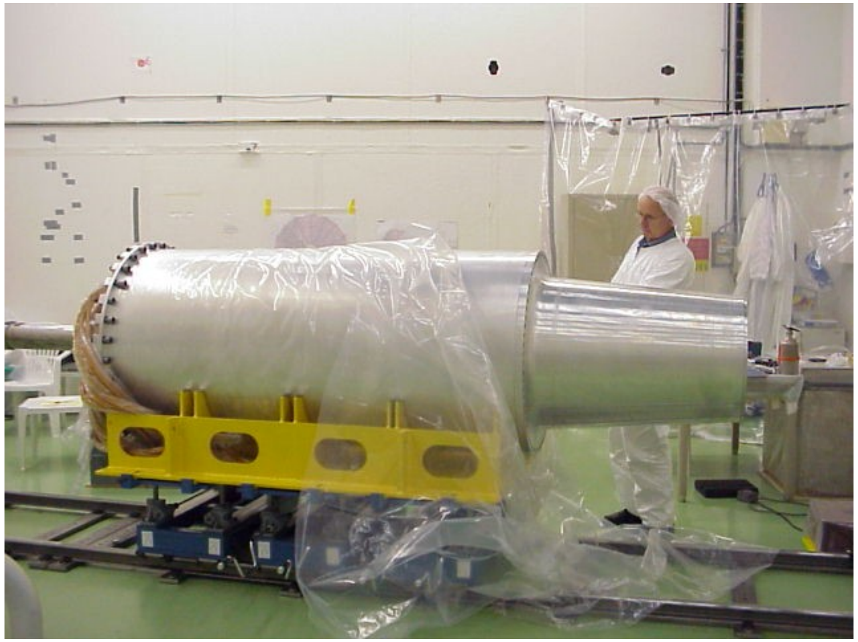
- Delay accumulated: ~ 6 months
- Aggressive production/testing schedule to recover part of delay
- Aim to have all FEBs for barrel in time to install while in garage position (very difficult), rest by November
- >1100/1628 FEBs produced, being QC tested

LV PS:
Many small delays in getting started have placed the LV supplies also on the critical path.

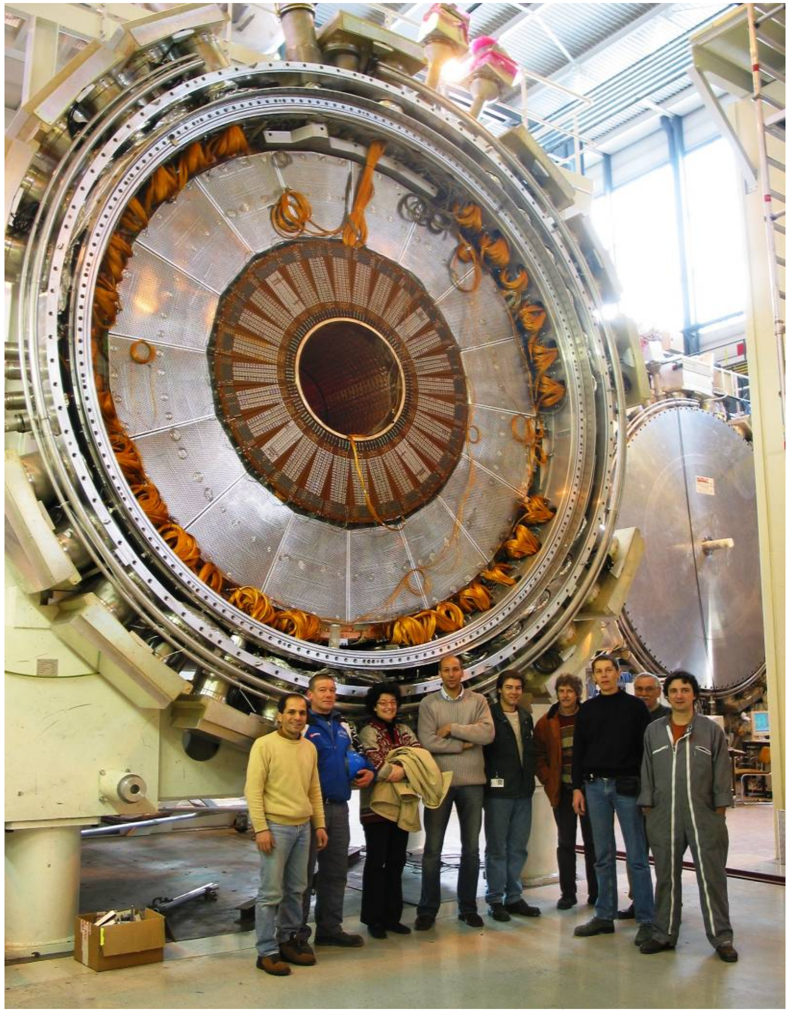
LAr End-caps

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

End-Cap A: **Integration is finished, and cool down for surface test started**

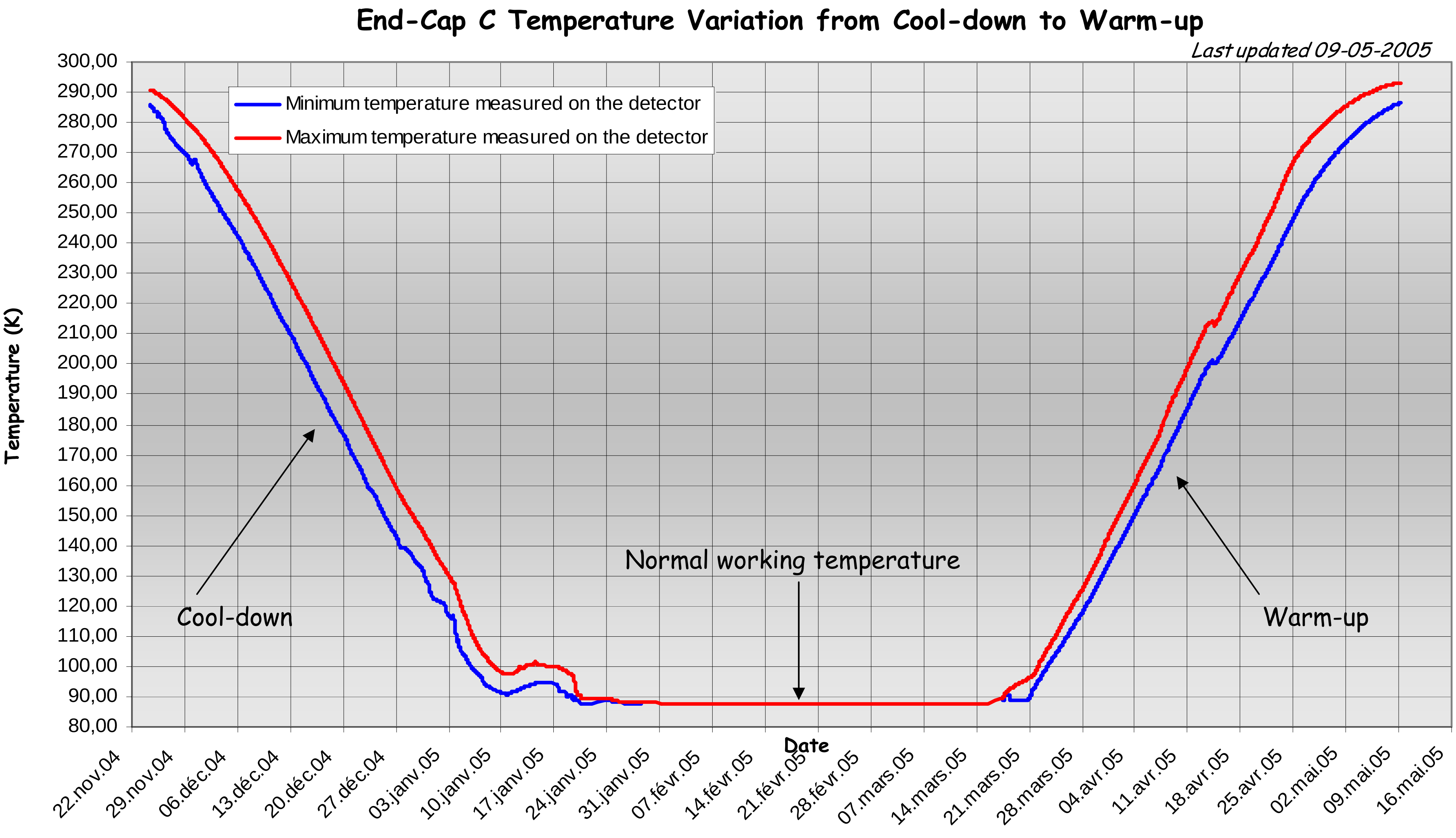


FCAL A before insertion



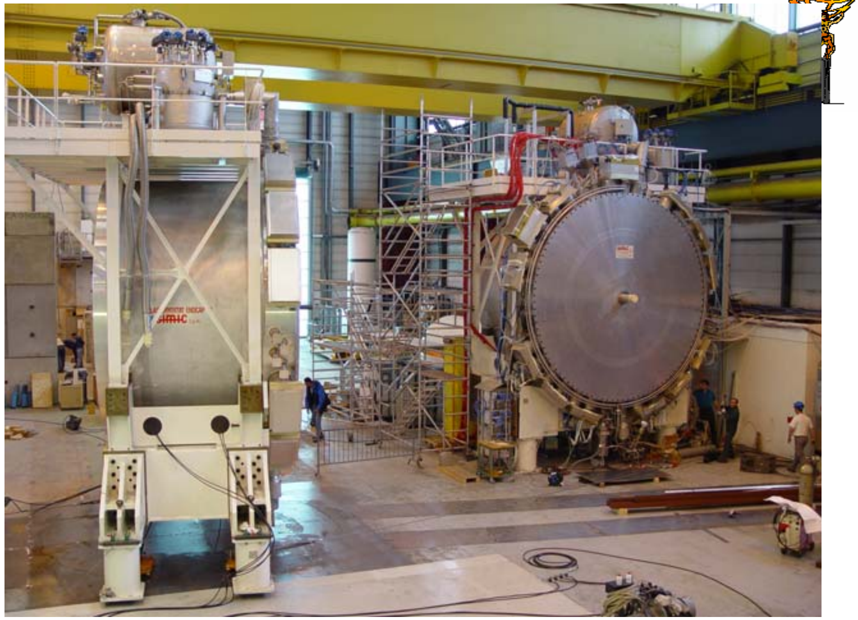
End-Cap cryostat A before closure

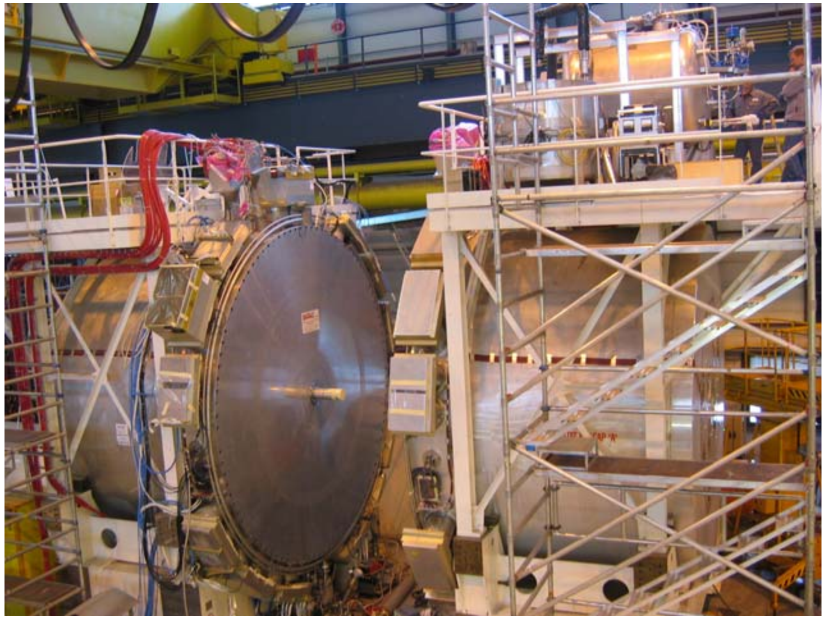
LAr EC cool down / warm-up



LAr EC status

Cold test EC-C:
EC-C accepted by LAr system to be inserted in ATLAS





EMEC:

- HV tests, TPA tests, reflection tests, LC measurements and precision measurements of the calibration resistors
- A few additional HV problems (correctable) appeared during or after the filling of the cryostat with LAr
- TPA tests confirm the excellent results obtained at warm, only 6 dead channels out of 31872 channels (0.19‰)

HEC:

- HV tests show a few problems (only 2.4‰ of electrodes have a short, physics signal can be corrected)
- Reflectrometry measurements, cross talk measurements and TPA tests have confirmed the excellent condition of the HEC detector
- HEC operates with cold electronics, only 2 dead channels out of a total of 3072 signal channels (0.65 ‰)

FCAL:

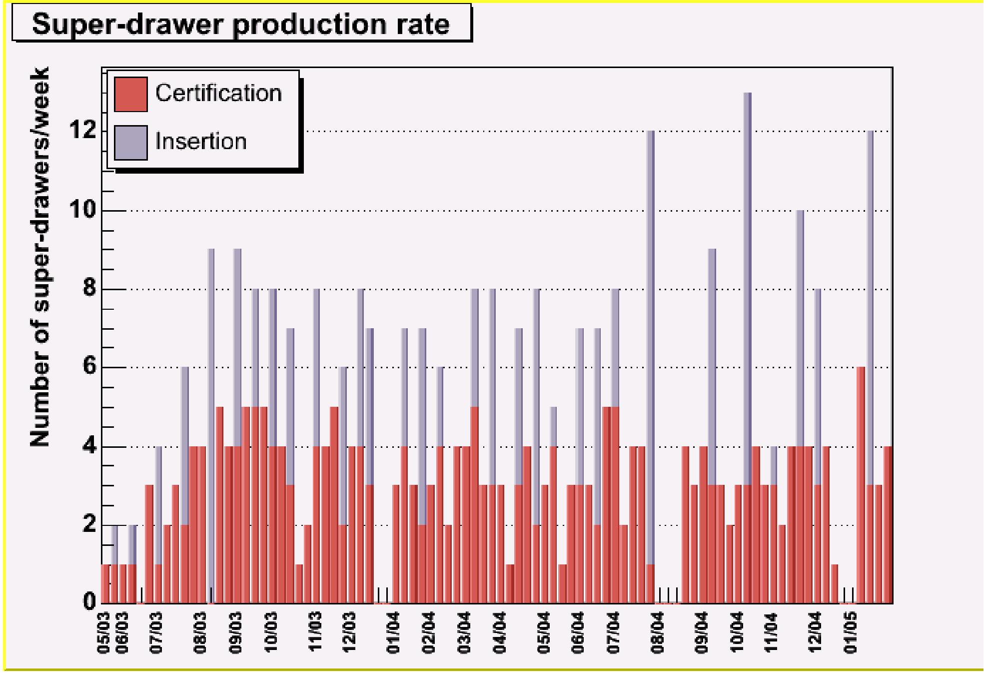
- Reflection Tests from the baseplane down to the electrodes
- HV tests: 0.2 % dead channels
- HV Continuity test

Tile Calorimeter

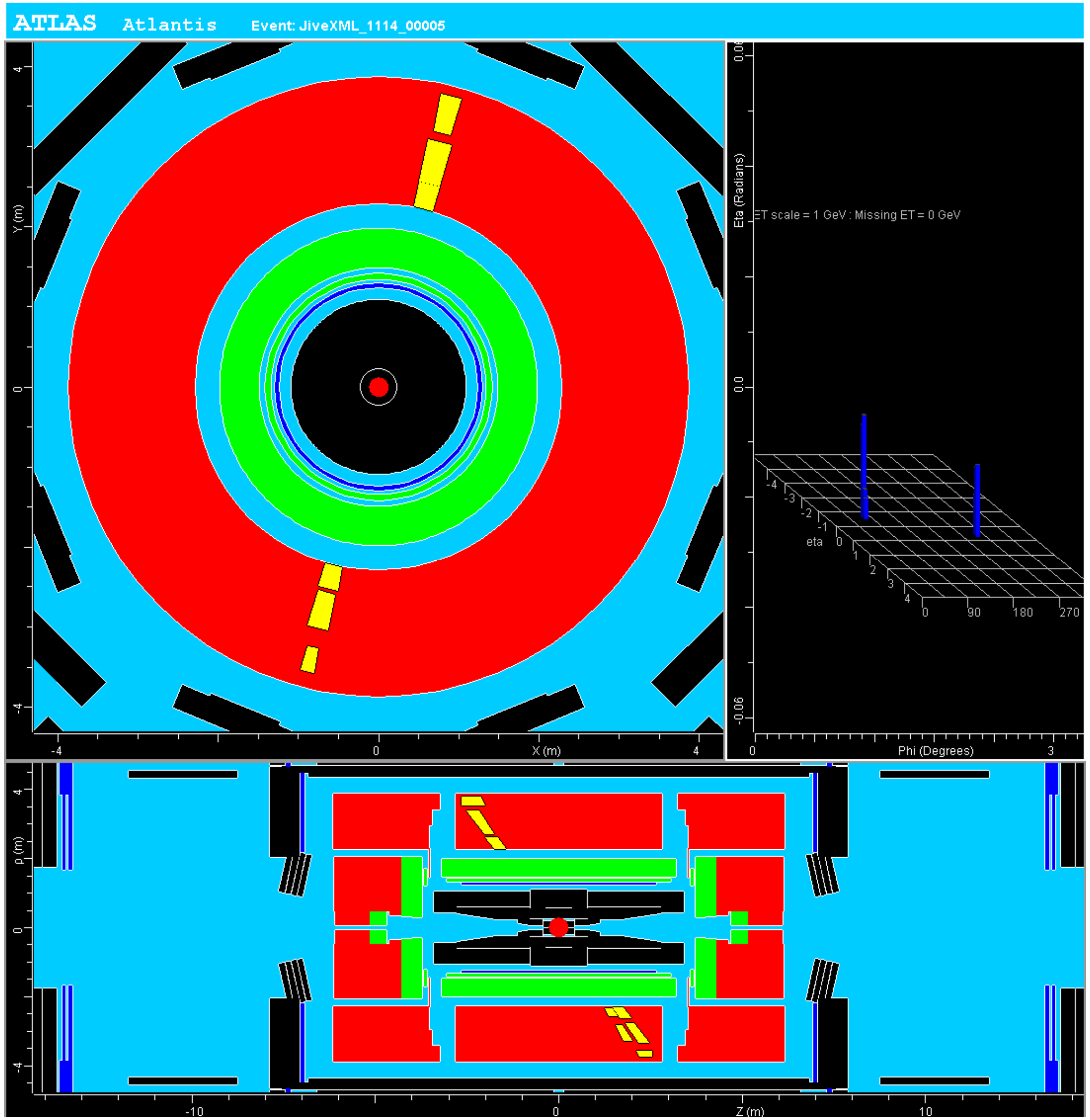
- **Barrel ready to move to z=0 in pit in August**
- **Extended Barrel C assembly in pit starting in September**
- **EB A assembly start in pit in November**

A long and difficult job, comes to an end: Super-drawer electronics production, insertion and certification. 81% now certified.

Issues to watch but good recent progress: LV power supplies are on the critical path, but now taking off with two production lines (Prague and CERN)

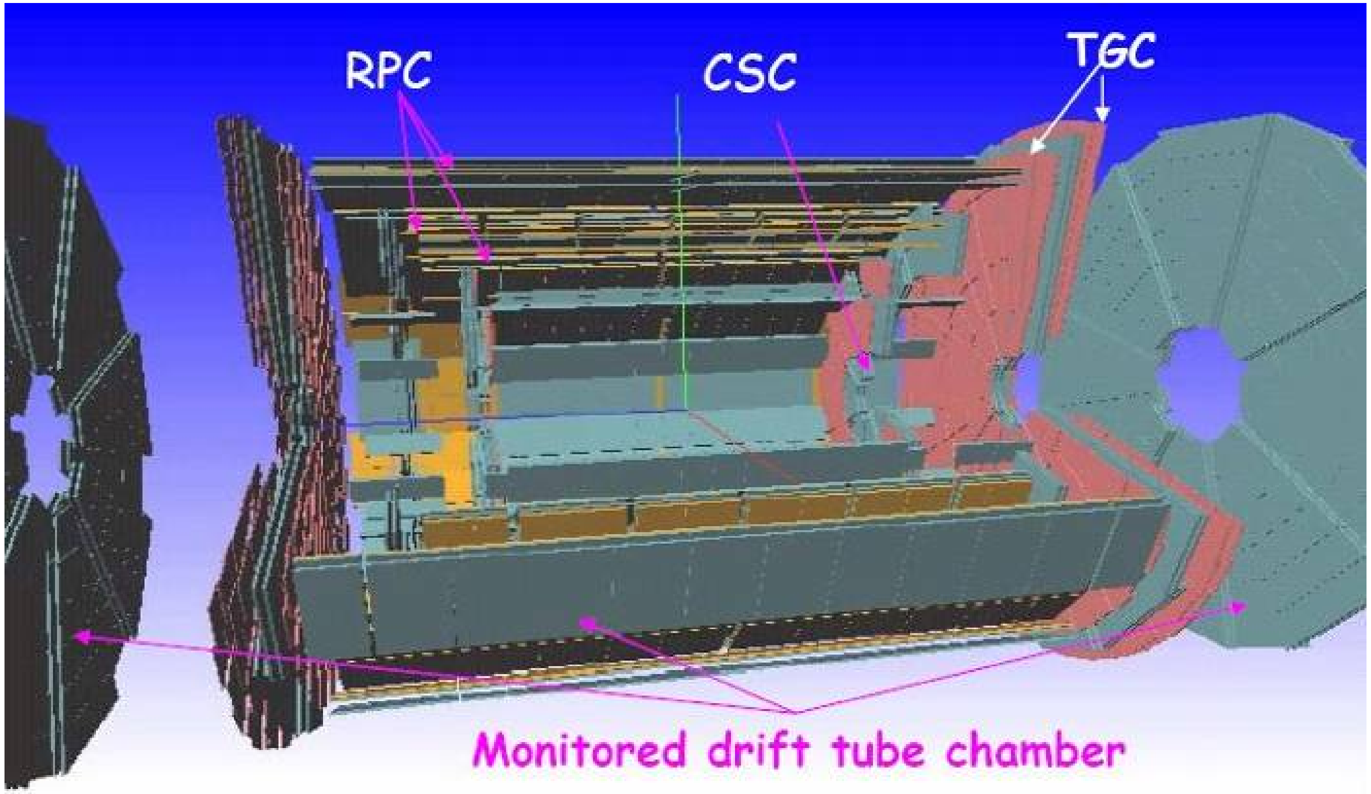


First cosmics seen by ATLAS in the pit (TILES)



S. Stapnes, Univ. of Oslo

Muon System



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

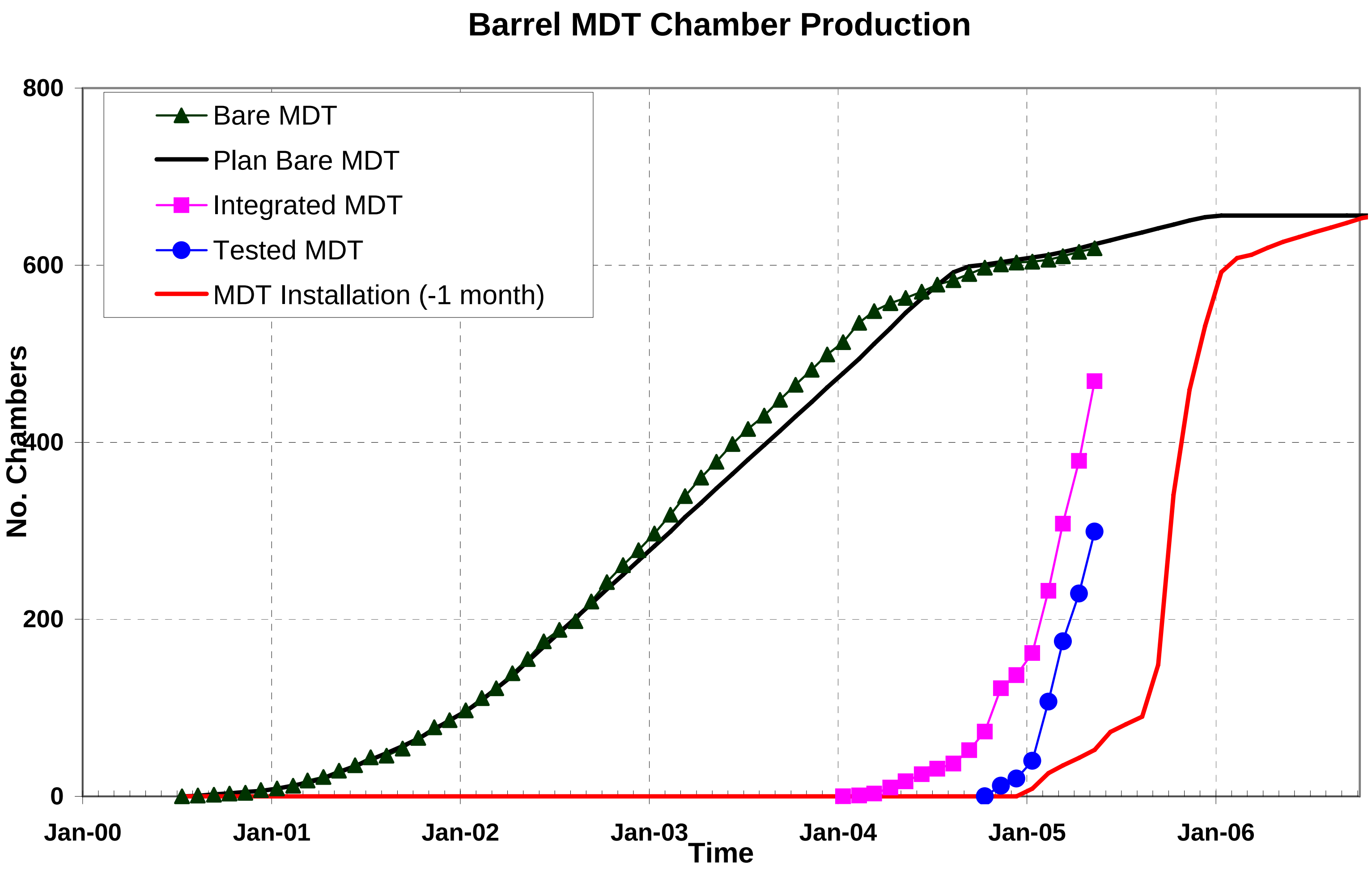
Precision chambers:

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

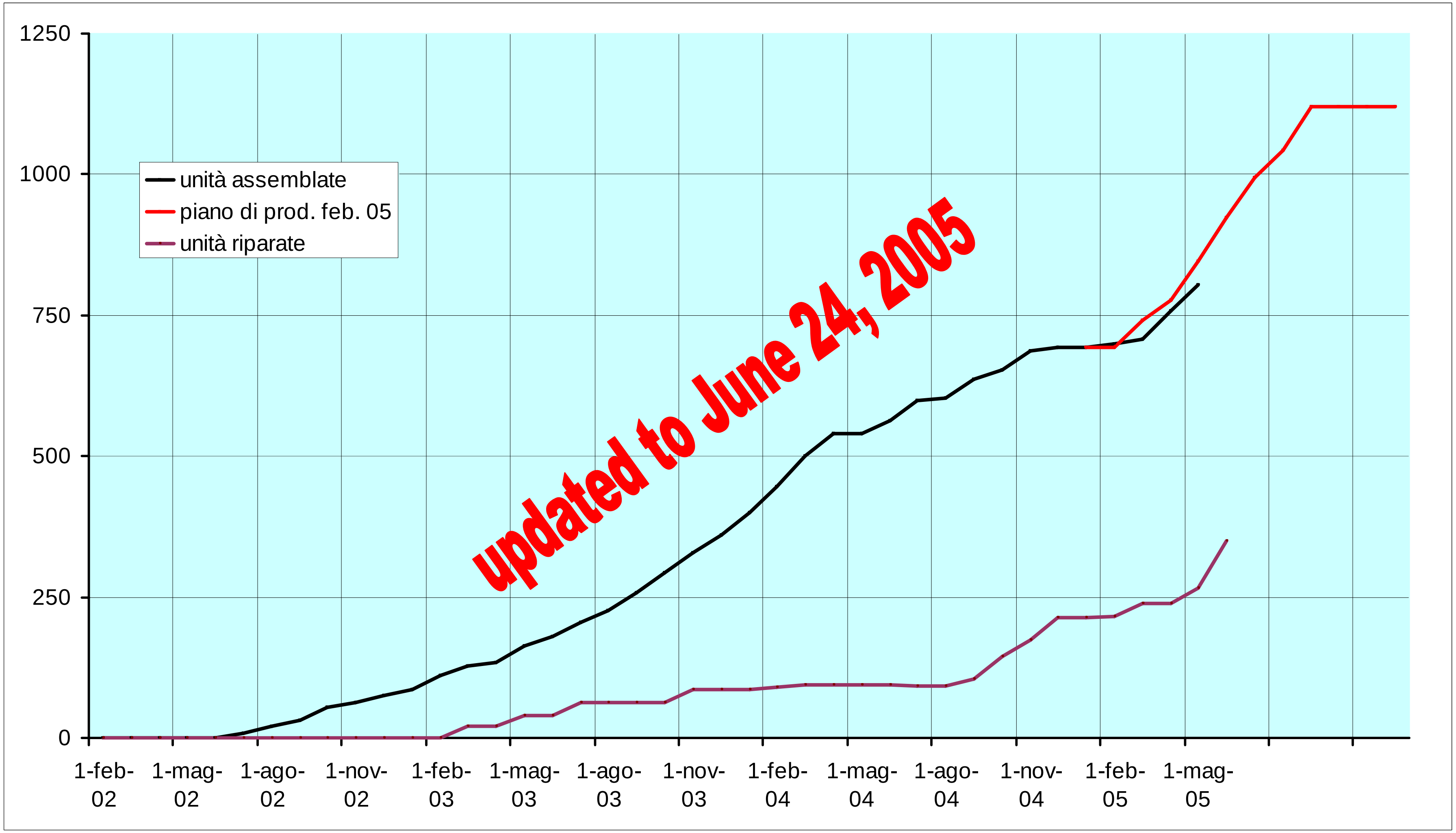
Trigger chambers:

- RPCs in the barrel
- TGCs in the end-caps

Muon Chamber Production

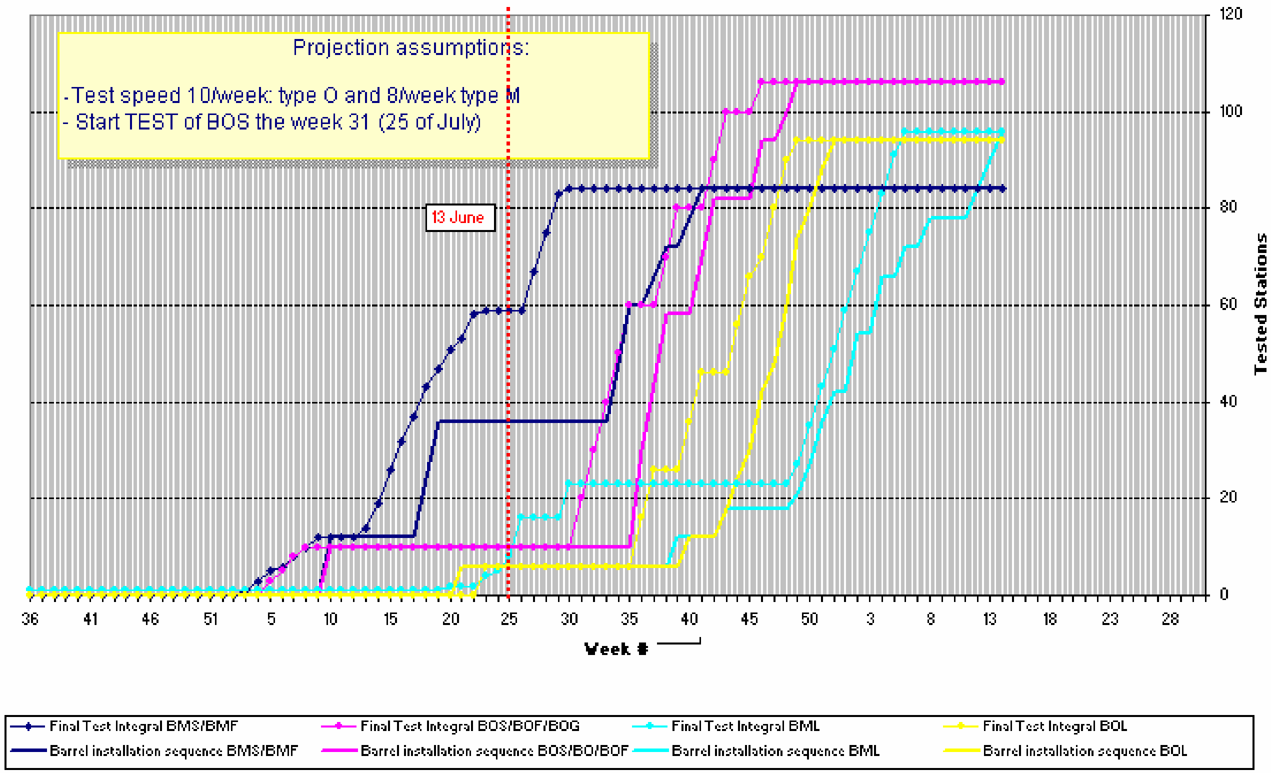


RPC production



Muon assembly/certification status

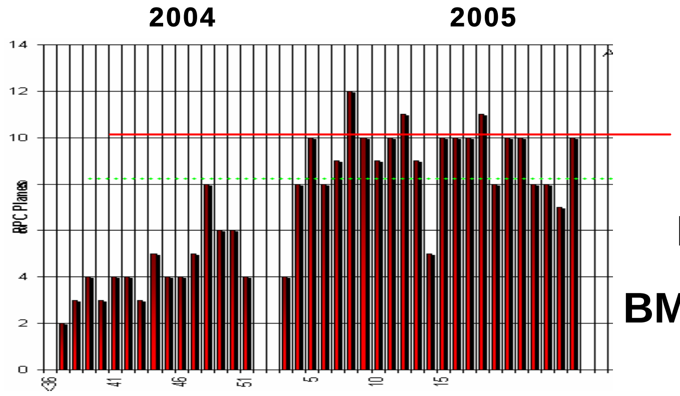
Certified barrel stations


Projection assumptions:

- Test speed 10/week: type O and 8/week type M
- Start TEST of BOS the week 31 (25 of July)

13 June

8-10 planes/week stably reached in 2005 with a team of 8 tech. + 1 coord. physicist



Percentage of Integrated Barrel Stations

BML: 82%

BOL: 3%

BIL: 70% ready for Inst.

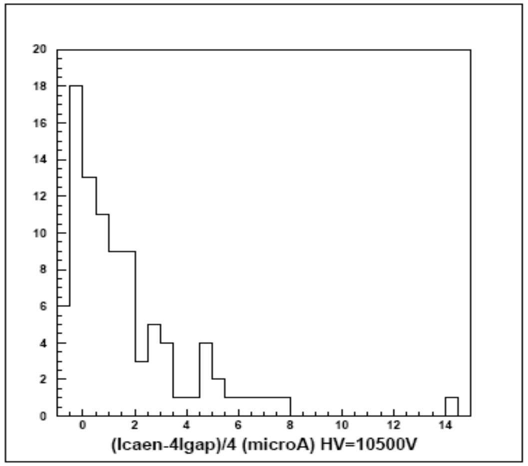
BMS/BMF: 90%

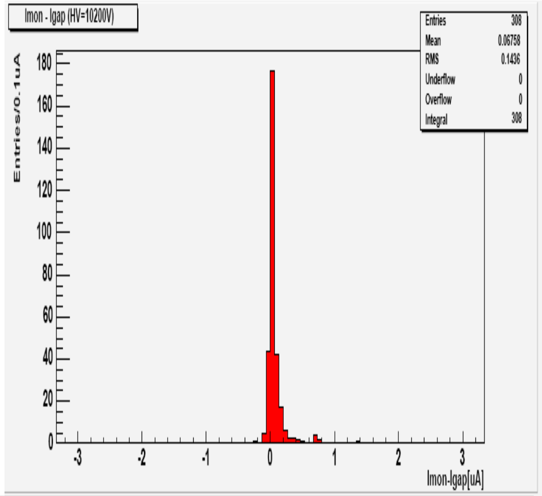
BOS/BOF/BOG: 9%

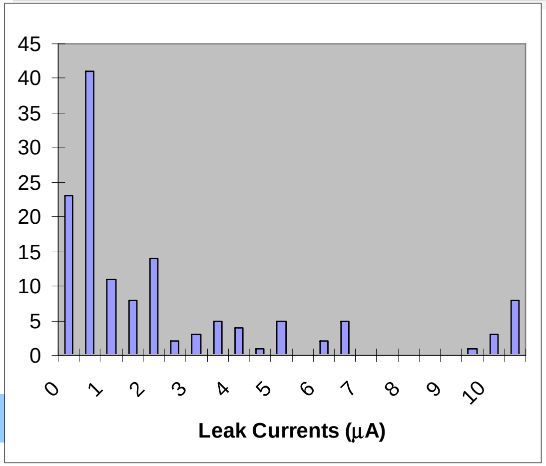
BIS: 64% ready for inst.

Muon Critical Items

- Problems with some RPC chambers (panel de-lamination) solved, production continuing
- Some early RPC chambers have higher leakage currents; some uA (upper plot) instead of less than one (middle plot):
  - As a part of work to improve yield extra c-profiles were introduced after 10% of the chambers were made, some of the chambers before have higher leakage currents (but still very small)
- We will re-measure these early chambers (on-going – see lower plot), will change those in the very tail, and also optimize installation sequence to avoid delays
- Assembly and certification rates for barrel chambers in BB5 critical – followed closely



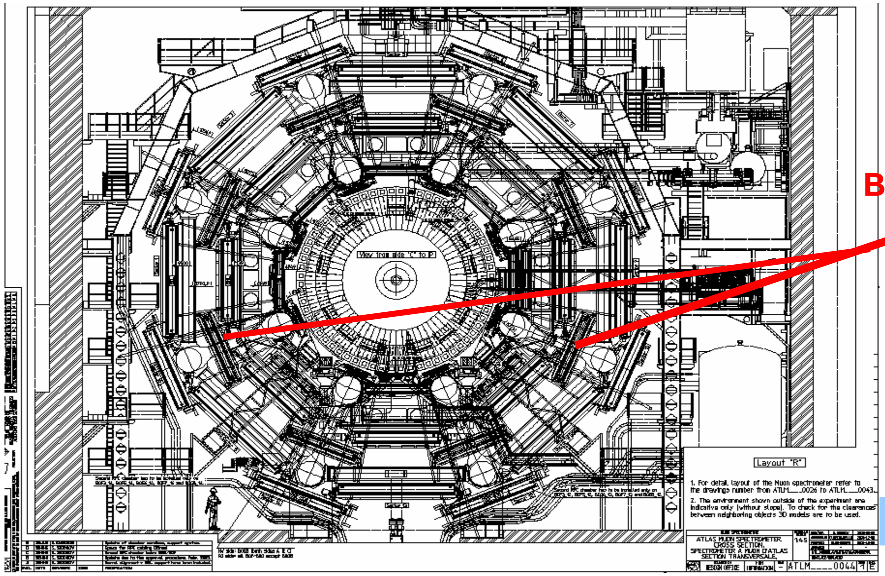




Muon installation

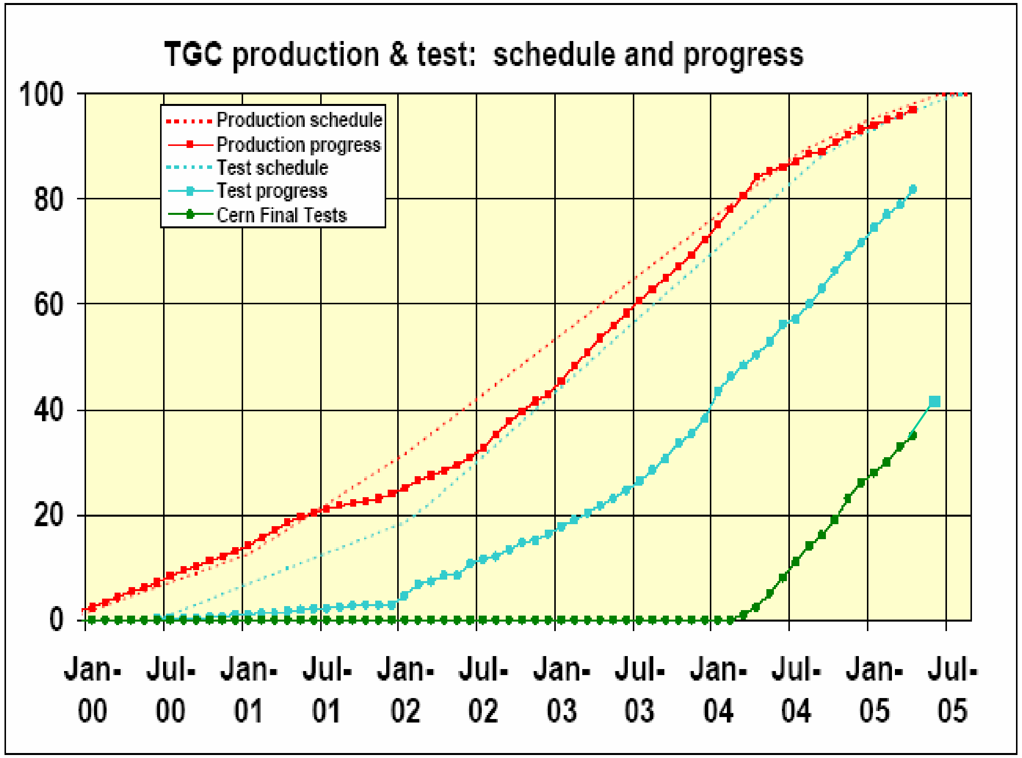
Phased installation:-

- Phase 1 was all 12 BMF, 6 BOG, and 4 BOF (Jan/Feb) - completed.
- Phase 2a will be BMS chambers in sectors 10 – completed.
- Phase 2b will be BMS chambers in sector 16 – half way completed.
- Phase 3 will be some of BML and BOL in sector 13 (July).
- Phase 4 is installation after the release of the jacks of the BT coil



BMS Chambers

Pre-assembly of End-Cap wheels



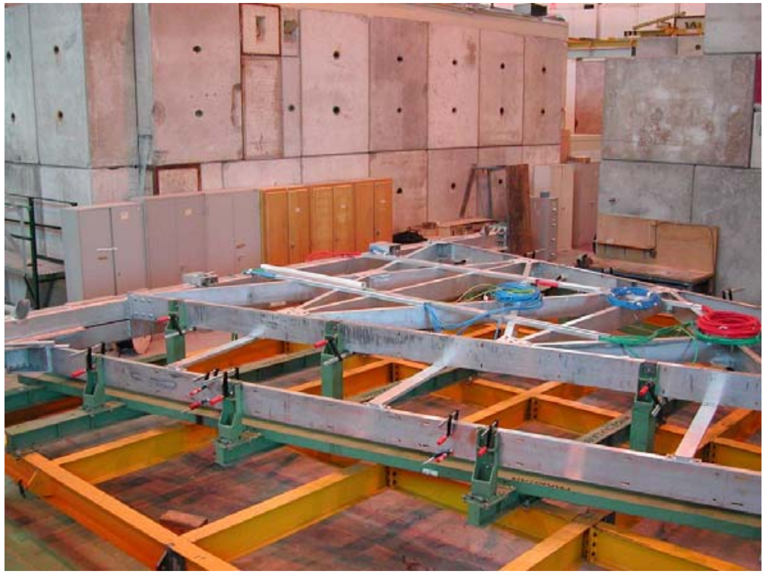
72 TGC sectors and 32 MDT have to be assembled from Q2 2005 to Q3 2006

TGC end-cap trigger chamber production is nearing completion

First TGC sector has been assembled and equipped with services. It will be rotated vertical this week to begin installation of chambers.

TGC Sector equipped with services.
Last pieces of tooling for sector handling expected for early July.

End-Cap sector assembly in hall 180



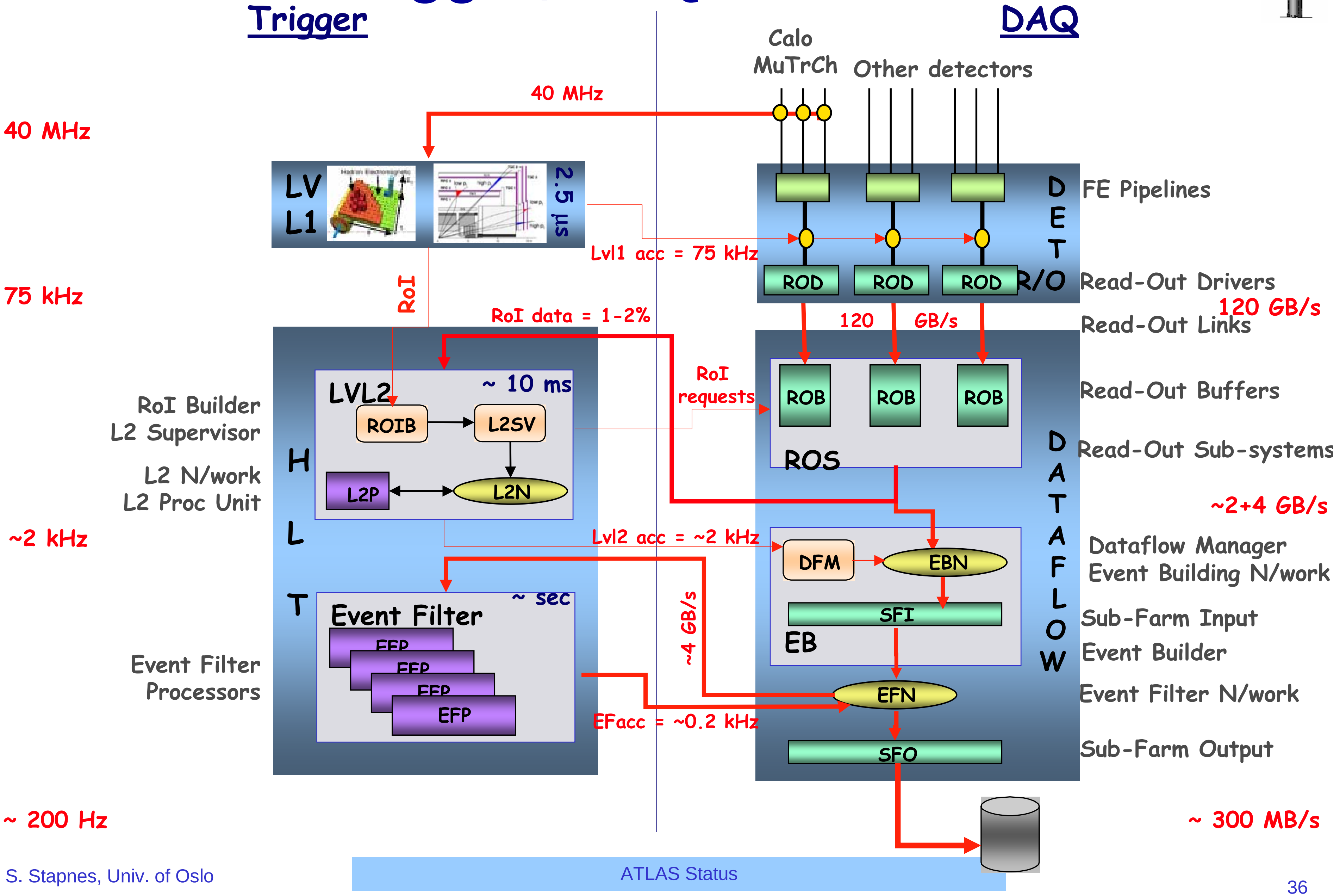
MDT-L first frame mechanics complete, being equipped with services and chamber mounts.

Tooling for handling MDT sector for chamber assembly and Big Wheel installation

3rd assembly table being mounted. 4th (last) table to arrive this week

First MDT-S sector (mechanics) under shipment to CERN.

Trigger, DAQ and DCS



Trigger

DAQ

Calo
MuTrCh
Other detectors

40 MHz

40 MHz

LV L1

2.5 μs

FE Pipelines

Lvl1 acc = 75 kHz

ROD ROD ROD

DET R/O

Read-Out Drivers

75 kHz

RoI

RoI data = 1-2%

120 GB/s

120 GB/s

Read-Out Links

RoI requests

ROB ROB ROB

Read-Out Buffers

ROS

Read-Out Sub-systems

RoI Builder
L2 Supervisor
L2 N/work
L2 Proc Unit

LVL2 ~ 10 ms

ROIB
L2SV
L2P
L2N

HLT

~2 kHz

Lvl2 acc = ~2 kHz

~2+4 GB/s

DFM
EBN

Dataflow Manager
Event Building N/work

SFI

EB

Sub-Farm Input
Event Builder

DATAFLOW

~4 GB/s

Event Filter ~ sec

EFP EFP EFP EFP

Event Filter
Processors

EFN

Event Filter N/work

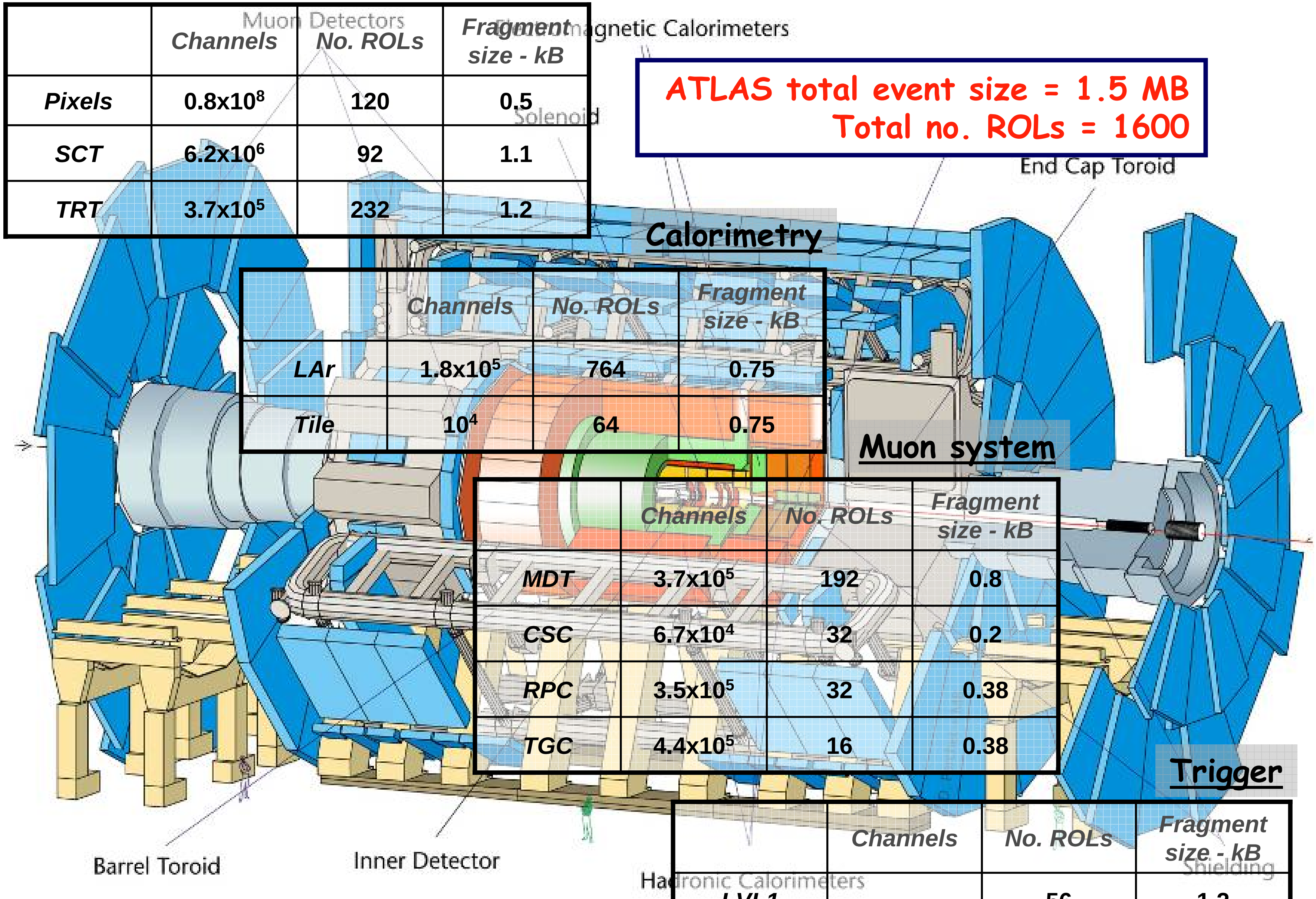
EFacc = ~0.2 kHz

SFO

Sub-Farm Output

~ 200 Hz

~ 300 MB/s



Inner detector

	Channels	No. ROLs	Fragment size - kB
Pixels	0.8x10^8	120	0.5
SCT	6.2x10^6	92	1.1
TRT	3.7x10^5	232	1.2

ATLAS total event size = 1.5 MB
Total no. ROLs = 1600

Calorimetry

	Channels	No. ROLs	Fragment size - kB
LAr	1.8x10^5	764	0.75
Tile	10^4	64	0.75

Muon system

	Channels	No. ROLs	Fragment size - kB
MDT	3.7x10^5	192	0.8
CSC	6.7x10^4	32	0.2
RPC	3.5x10^5	32	0.38
TGC	4.4x10^5	16	0.38

Trigger

	Channels	No. ROLs	Fragment size - kB
LVL1		56	1.2

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, examples:

- a 70-node, Gigabit Ethernet system in bdg. 32
- a Large Scale System (~400 PCs today, growing to 700+ in mid-July) of the LXSHARE system at CERN on which we run the full DAQ/HLT software release

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

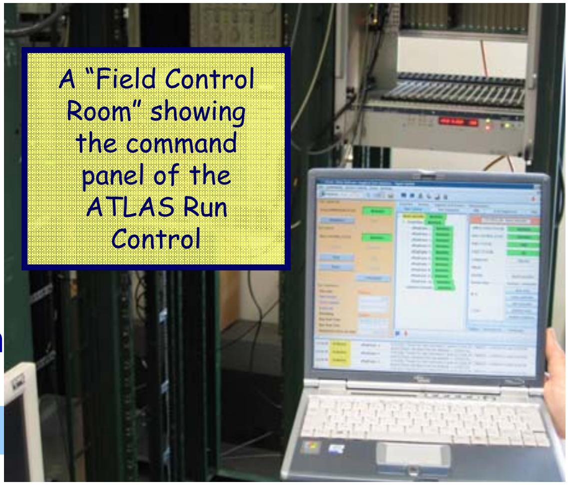
Local DAQ capability is being set up at the Pit-1 for initial detector commissioning, using The Read Out Driver (ROD) crate DAQ

SysAdmin group formed (for TDAQ and general support at Point 1)

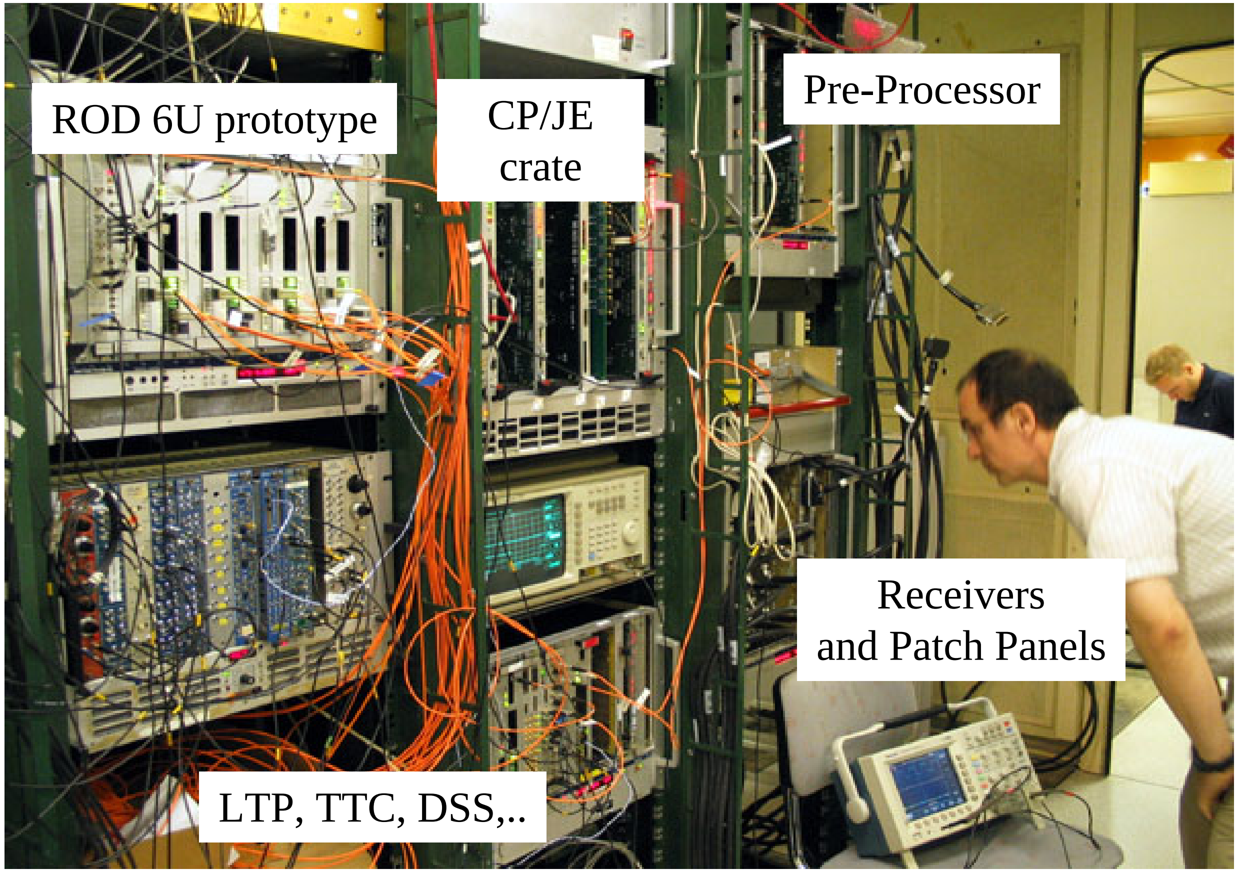
Components of the DCS are in fabrication, and are already widely used, and the DCS is one of the first systems brought into operation at Pit-1

Final ROBIN module from pre-series

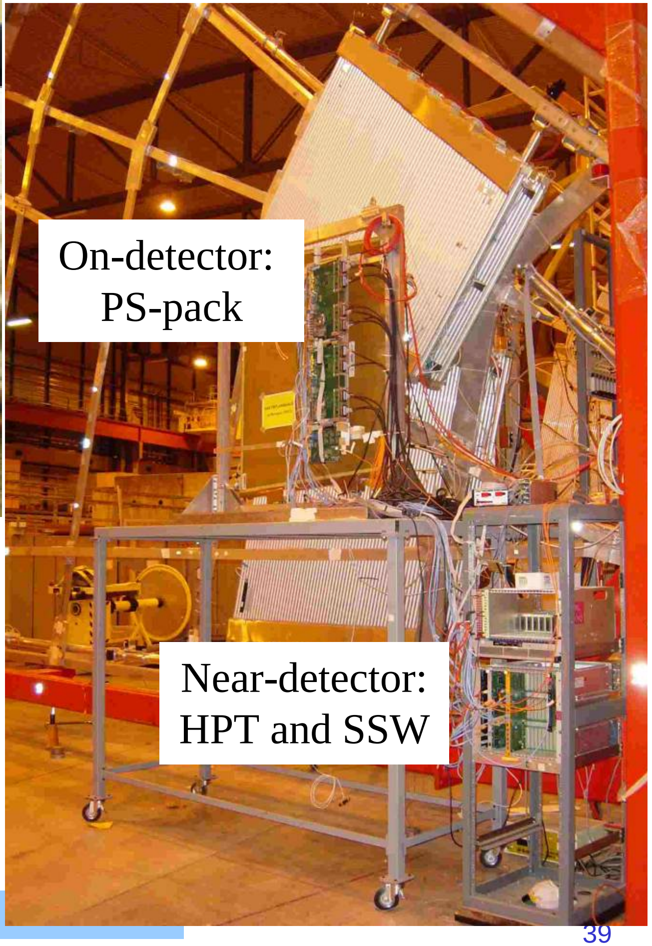
SDX1 HLT/DAQ room at the Pit-1 surface



A "Field Control Room" showing the command panel of the ATLAS Run Control



Calorimeter Level-1 trigger at the combined test beam



Muon Level-1 trigger at the combined test beam

Pre-series (module 0) of the final system

USA15 **SDX1**

- 8 racks at Pit-1 (10% of final dataflow but less of HLT power)

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

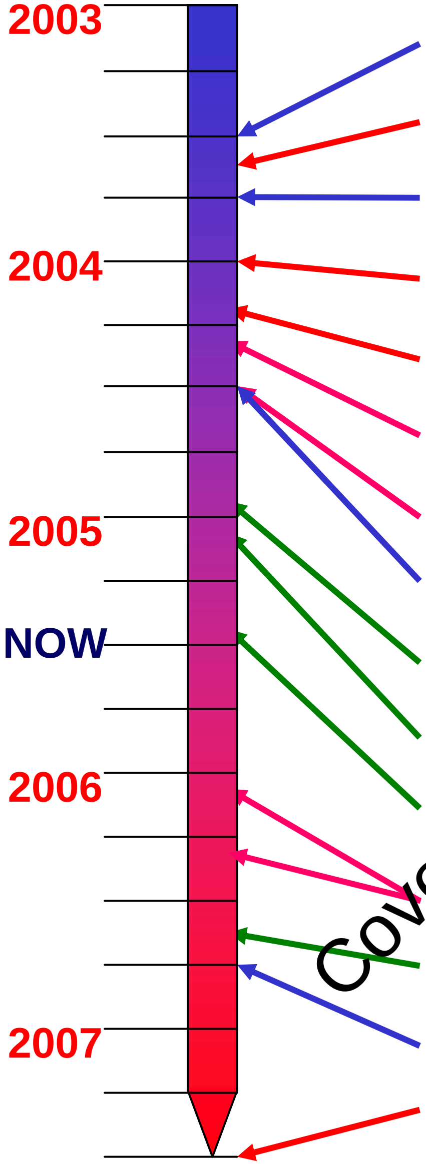
Partial ONLINE rack
-
TDAQ rack
-
4 HLT PC
(monitoring)
2 LE PC
(control)
2 Central
FileServers

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

Electronics status

	ASICS	FE SYSTEMS	BACK END	POWER SUPPLIES
Pixel	Produced	Production on-going	In production	PRR done. Order soon
SCT	Produced	All barrel modules and more than 1/2 of the EC modules produced	In production	In production.
TRT	Produced	Barrel and end-cap production on-going	Prototype done	HV ordered. LV to be ordered soon (tender done)
LArg	Produced	Production on-going Some delays	Being produced	HV produced. Some problems LV in production. Some delays
Tile		In production	Being produced	HV produced PRR for LV done. Production on-going
MDT	Produced	In production	New design available	Tenders for LV and HV done
CSC	Produced	In production	PDR done	Selection done
RPC	CMA ASIC prototypes work and ASIC mass production is due for delivery in July	On-detector trigger electronics in production (tight)	PDR done	Selection done
TGC	SLB ASIC prototypes work and ASIC mass production is due for delivery in July	On-detector trigger electronics in production (tight)	FDR done	Selection done

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!)
- Combined test beams (barrel wedge) (done)
- Computing Model paper (done)
- Computing Memorandum of Understanding (done)
- ATLAS Computing TDR and LCG TDR (done)
- Computing System Commissioning (detailed planning now)
- Physics Readiness Reports
- Start main cosmic ray run
- **GO!**

Covered by D. Barberis later in this session

3) Installation

Currently the largest activity in ATLAS.

Picture: Infrastructure getting installed Calorimeters, BT installation and muon chamber installation already mentioned and shown.

Some other items:

- **Counting rooms are taking shape**
- **The services installation have now started in earnest – with some initial difficulties**

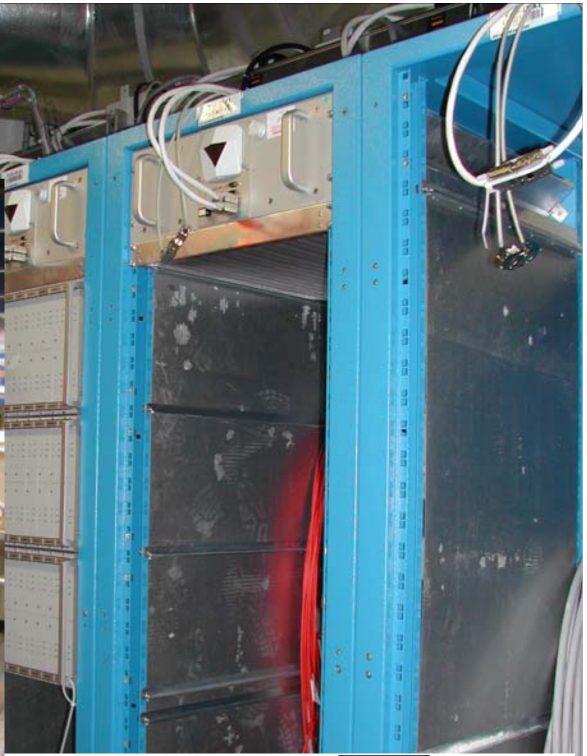
He tanks

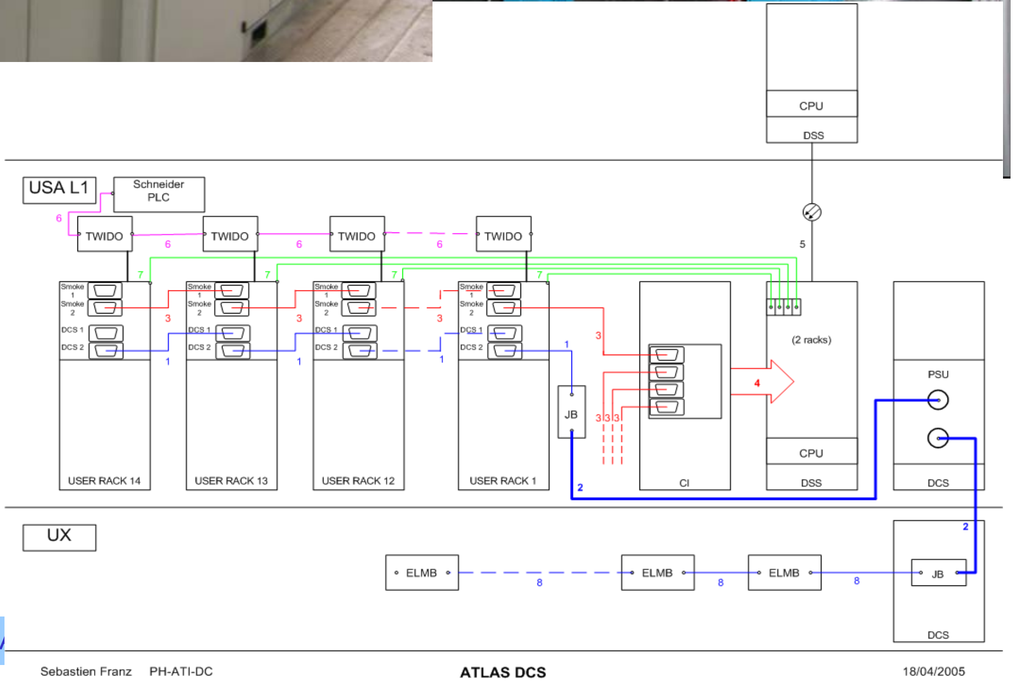
Compressor room SUX1

He refrigerator in USA15

25.02.2004

Counting rooms





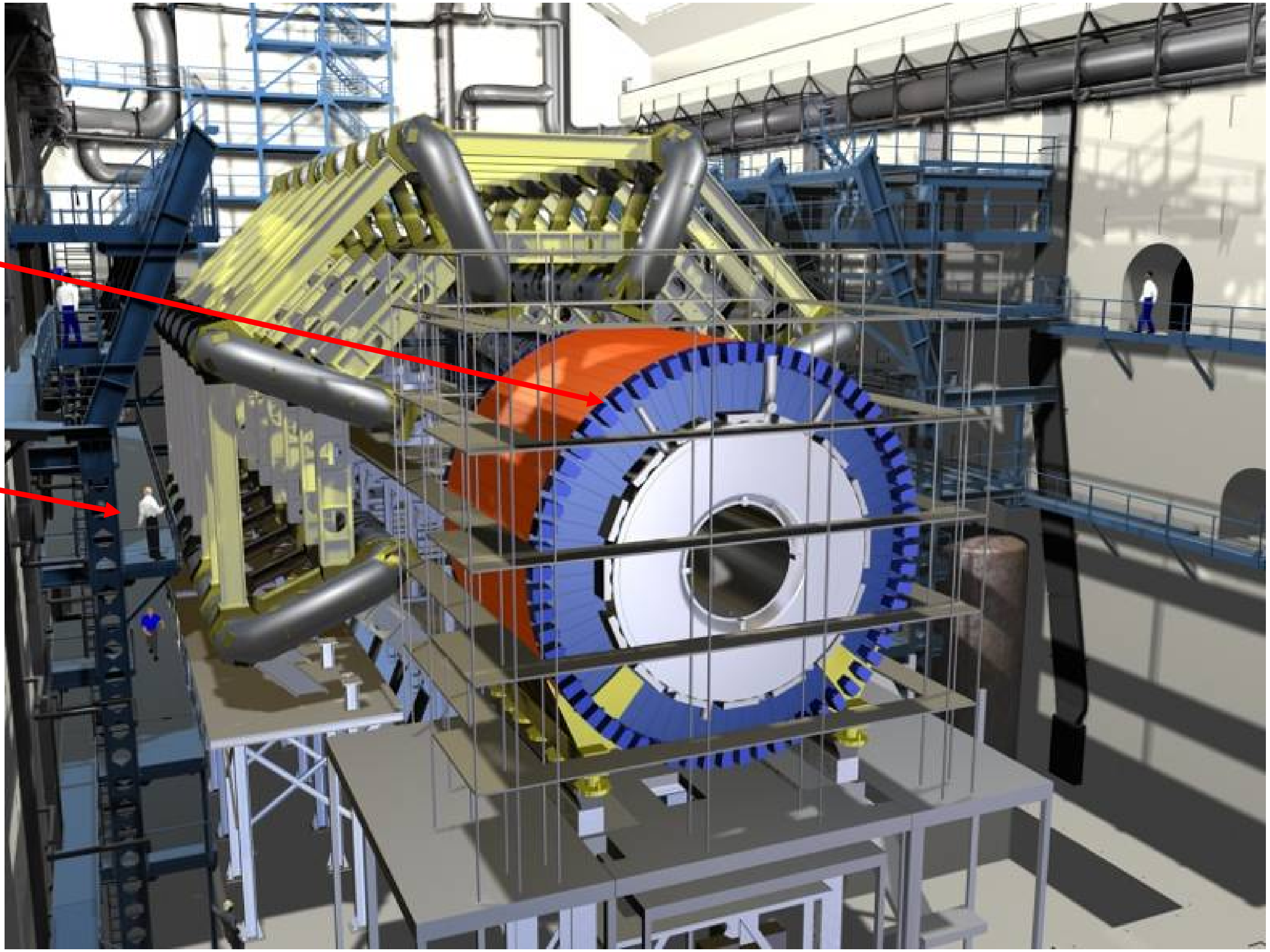
Planned status by end summer

Sequence of services installation:

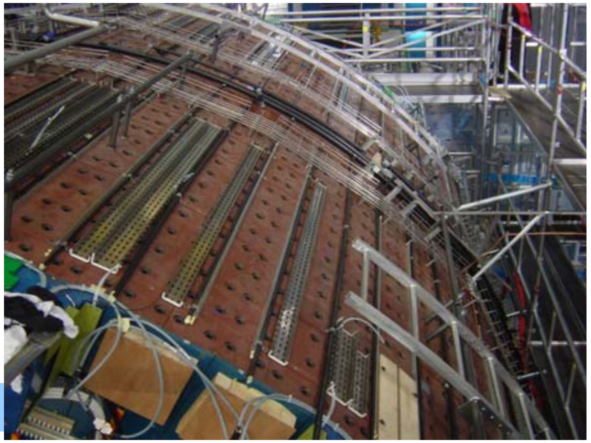
- Can now install pipes on calorimeter, out to z=0, and local cables on calorimeters
- And can install cables from counting rooms to platforms

(on both sides)

- When barrel calorimeter moved into final position we can connect from barrel systems to platforms (large campaign)



Services Installation



TC cable installation team
- Leaders from TC team plus 22 persons from IHEP Protvino
- 20 are working underground
- 7 p. since 10/May
- 13 p. since 13/May
- 2 p. just arrived

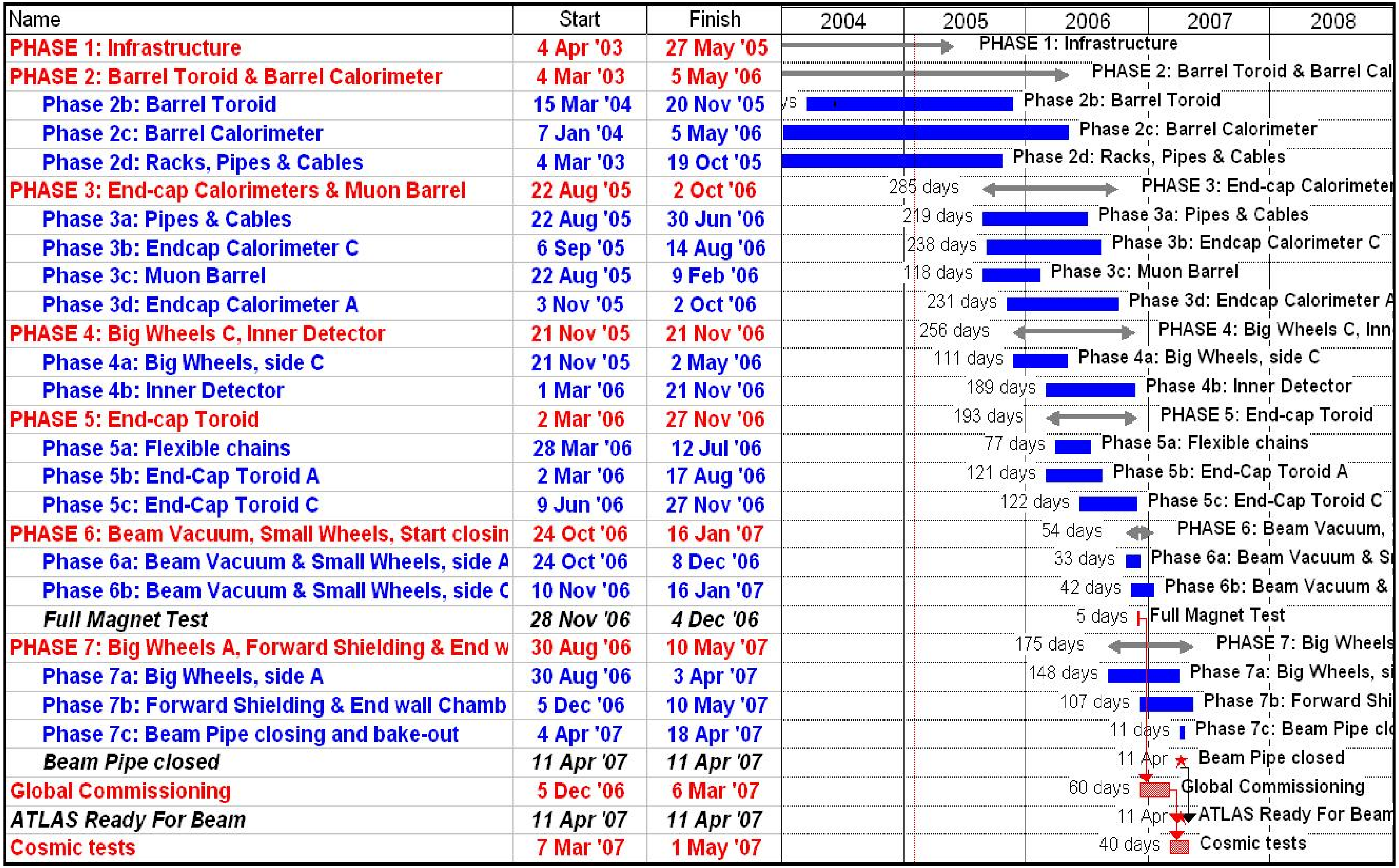
Cables installed:
- 16 optical bundles between SDX1 and USA15
- 20 optical patch panels installed
- 142 Tilecal cables from USA15 to UX15, sectors 11,13,15,1
- 192 SCT type IV cables between UX15 and US15
- 20 LARG cables between USA15 and UX15, sectors 11,13
- 76 LARG cables for sectors 11,13,15,1 prepared (cut and rolled up) by cable installation team, installation is ongoing
- 370 cables = 178 long cables (80-130 m) + 192 short cables (20 m) installed during 5 weeks

Learning process takes a time

TC pipe installation team:
- Pipe installation teams from Russia, Poland, Pakistan also in place (10 persons)
- Calorimeter cooling pipes installed
- Have started to install ID pipes (cooling, gas) on barrel cryostat flange and surface to z=0 (difficult)

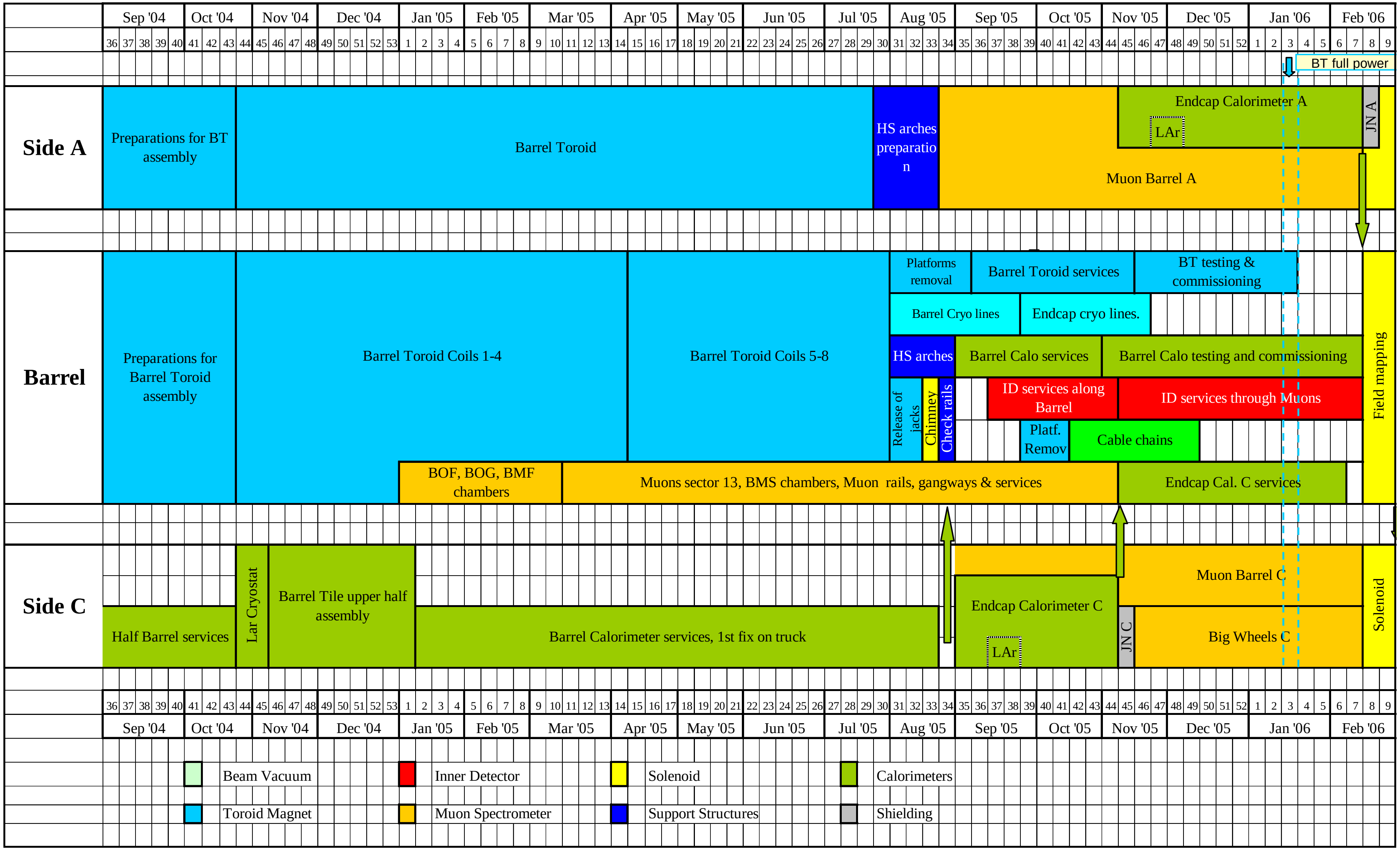
Overall summary installation schedule version 7.0

(New baseline approved in the February 2005 ATLAS EB)

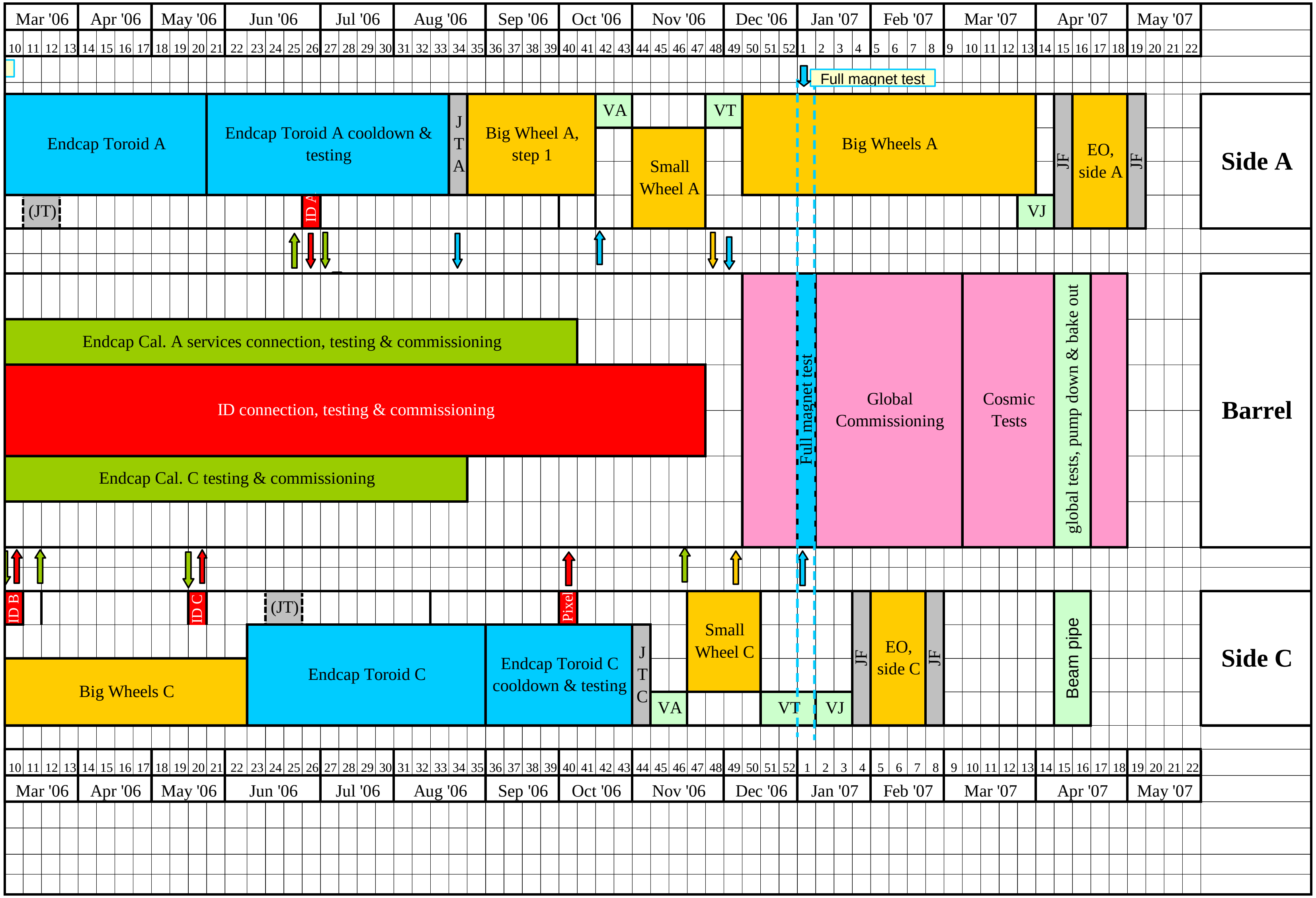


Name	Start	Finish
PHASE 1: Infrastructure	4 Apr '03	27 May '05
PHASE 2: Barrel Toroid & Barrel Calorimeter	4 Mar '03	5 May '06
Phase 2b: Barrel Toroid	15 Mar '04	20 Nov '05
Phase 2c: Barrel Calorimeter	7 Jan '04	5 May '06
Phase 2d: Racks, Pipes & Cables	4 Mar '03	19 Oct '05
PHASE 3: End-cap Calorimeters & 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

Installation activity planning in the cavern (part I)



Installation activity planning in the cavern (part II)



4) Commissioning activities

https://edms.cern.ch/document/570036/1

More details in https://edms.cern.ch/document/570036/1
Including pointers to relevant WP documents
Draft commissioning schedule in https://edms.cern.ch/document/572535/1

Sub-system	WP	Description	Start	Sign off
ID	Cables Type 4	US15 to Patch Panel 3 cables	June 05	
	Pipes on cryostat	Gas pipes on barrel cryostat	June 05	
LAr	F/E electronics infrastructure	Installation of F/E electronics infrastructure (e.g. cooling) in truck position	Jan 05	Combined Barrel sign off. May 05
	Sniffer pipes	Installation of sniffer system pipes on the detector	March 05	Combined Barrel sign off. May 05
	F/E electronics 1 FEC	On truck test (temporary cables and R/O) of the first F/E electronics Crate	1 June	15 June
	F/E electronics All	On truck commissioning of all F/E electronics Crates	15 June	September
	B/E electronics	Installation and commissioning of Barrel R/O hardware (RODs)	16 May	September

Commissioning activities

https://edms.cern.ch/document/570036/1

Sub-system	WP	Description	Start	Sign off
Tiles	F/E electronics installation (truck)	Installation and tests of F/E electronics	7 March	Combined Barrel sign off May 05
	F/E electronics Tests (truck)	Commissioning of F/E electronics (on truck, temporary cables & R/O)	7 March	September
	USA15 racks	Infrastructure for Tiles electronics racks	7 March	September
	Cs calibration system	Cs calibration source infrastructure (pipes)	2 Jan	Combined Barrel sign off. May 05
	Cables (step I)	Installation and QA of local barrel cables	7 Mar	May
Muons	Sector 12-14	Installation (w/o commissioning) of MDT and RPC chambers.	3 Jan	May
	Alignment system	Installation and commissioning of the reference system (on BT) and alignment system (on chambers)	April	At BT completion At Barrel completion
	Sector 13 (SX1)	Muon barrel commissioning surface test station	15 March	9 May
	Sector 13 (USA15)	Muon barrel commissioning underground test station	9 May	31 May
	Sector 13 (MDT & RPC)	Installation and commissioning of sector 13 MDT and RPC chambers	June	September

Commissioning activities

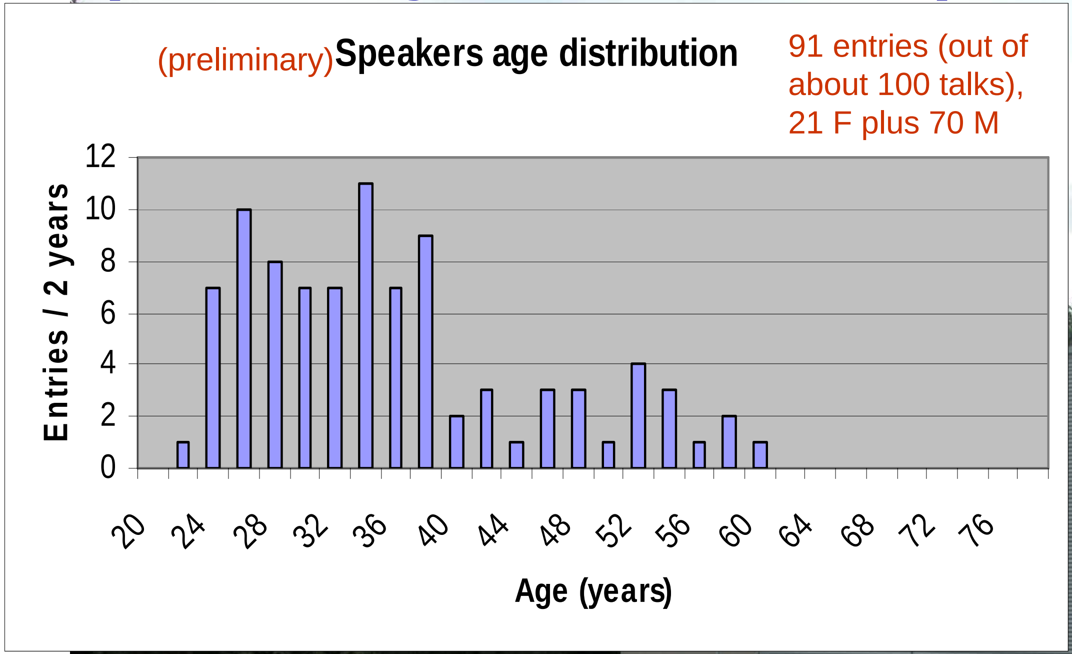
https://edms.cern.ch/document/570036/1

Sub-system	**WP**	**Description**	**Start**	**Sign off**
DCS/DSS	DCS USA15 L1 racks	Installation and commissioning of stand alone DCS system (USA15 L1)	April	May
	DSS USA15 L1 racks	Installation and commissioning of stand alone DSS system (USA15 L2)	Done	May
	USA15 sector	Common controls of a sector (group of fully equipped racks) in USA15	April	June
Magnets	MCS/MSS (PCS)	Proximity cryogenics controls and safety systems	29 March	June
DAQ	Pre-series	Small scale HLT/DAQ vertical slice	April	June
	DAQ infrastructure	Server computers and online software services	May	June
	ROD crate DAQ	Main detector R/O DAQ tool for phase 1	February	Scheduled in sync with detector RODs

Important current activity:

Planning for phase II (combined running of several detectors with event-building and more DCS functions) and cosmics data-taking now on-going

5) The Physics Workshop in Rome this month



(preliminary)Speakers age distribution

91 entries (out of about 100 talks), 21 F plus 70 M

441 people

Combined Performance and Physics Groups

Four groups combined performance groups:

  - Flavour tagging
  - e/gamma
  - Muon Combined
  - Jet/Etmiss/Tau
- Integrate into the sessions:
  - Results of trigger studies:
    - One introductory and one final talk providing the frame for detailed presentations embedded in relevant sessions
  - Combined Testbeam analyses
    - Use data from full ATLAS slice collected in 2004 to validate on real data reconstruction algorithms

Seven physics groups:

- B-physics
- Top
- Higgs
- Standard Model
- SUSY
- Exotics
- Heavy Ions

- Concentrate on analyses possible with few fb-1
- Continue displacement of center of interest from exploration of the breadth of ATLAS potential over full LHC lifetime to:
  - Control of detector systematics affecting measurements and discovery
  - Study of dependency of discovery potential from achieved level of alignment calibration
  - Development of strategies for estimate of systematics on background evaluation

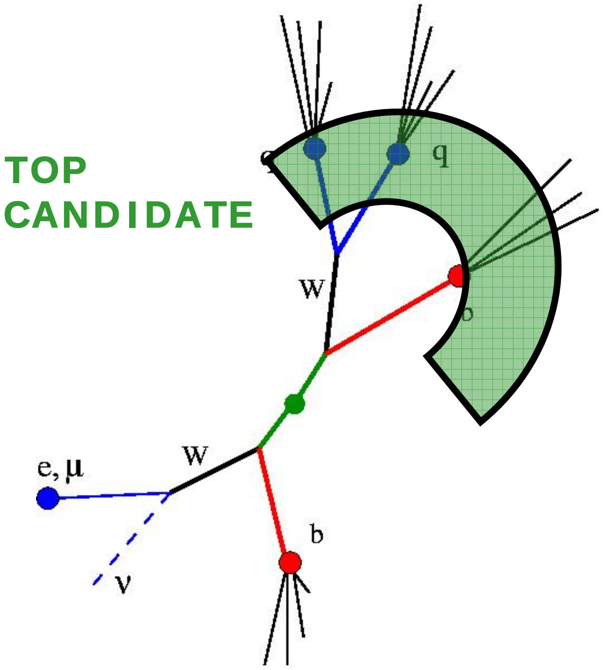
Experiences

- Main emphasis of the workshop is moving the physics community towards data taking.
- Necessary step is achieving widespread use of Athena software, and providing feedback on it
- Large preparation effort:
    - Full simulation and reconstruction of 8M events in two months using the Grid tools, events made available to the community in the form of AOD's
    - Implementation of prototype analysis tools, using the full power of the ATLAS Event Data model
- Exceptionally positive response from the community, every talk based on Rome data sample, even if short delay, and most analyses use the new tools

- Lots of feedback on software during talks, and good response to questionaire
- Feedback talks in the last day on
    - Large scale production experience
    - Software performance
    - Report on Users Task Force, aimed at assessing useability of ATLAS software for non expert users
- Main conclusions
    - User-driven production on the grid did deliver data, but required too much human intervention, need evolution in that sector
    - The transition G3/G4 is now accomplished, should continue validation, using CTB data
    - ATLAS framework usable for analyses, now there is a need to address performance issues and evolving analysis tools according to feedback received

Example: Commissioning with top

- Top production: basic calibration tool for early physics at the LHC
  1500 ttbar->bW(ln)bW(jj) requiring 4 jets above 40 GeV/day at low L.
- Need to select clean top sample from the beginning
  Rome work: perform signal and background analysis in full simulation



Monte Carlo Event samples: full simulation AOD

MC@NLO ttbar – 175K events → 303 pb-1

W+Jets – 145K events → 61 pb-1

Plots shown for 303 pb-1 (one week low lumi)

Hadronic top:

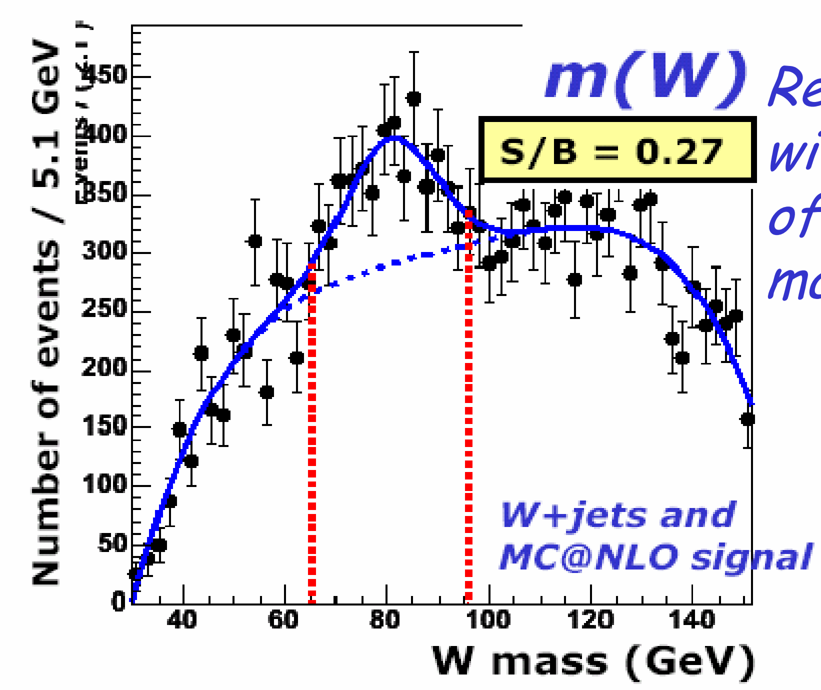
Three jets with highest vector-sum pT as the decay products of the top

W boson:

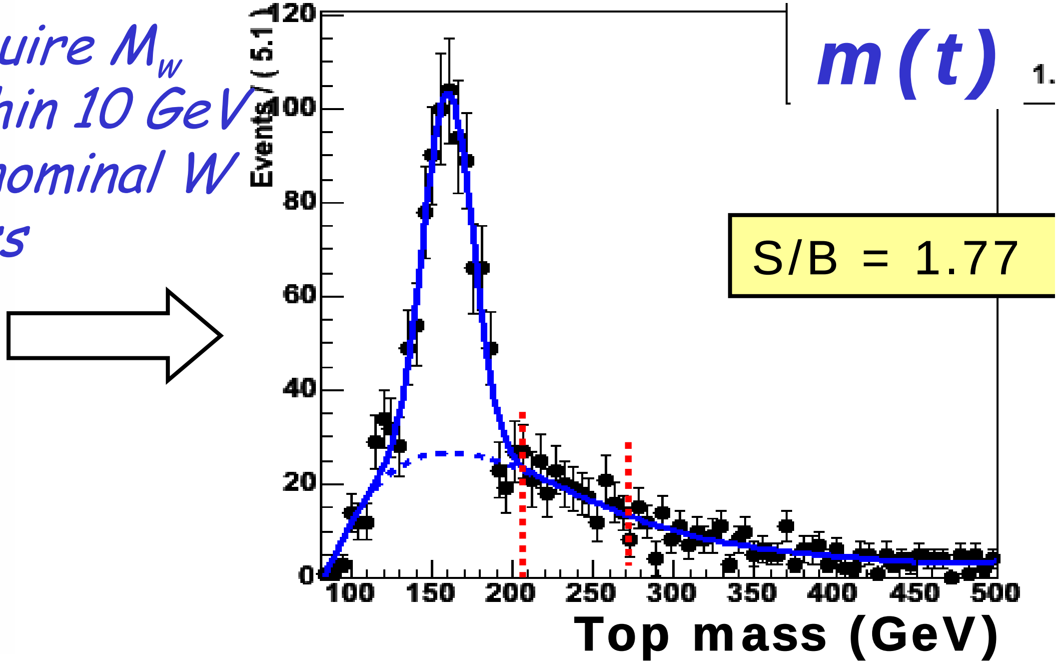
Two jets with highest momentum in reconstructed jjj C.M. frame.

Selection cuts: E_{Tmiss} > 20 GeV, 1 lep Pt > 20 GeV, 4 jets Pt > 20 GeV

No trigger selection efficiency taken into account yet



Require M_w within 10 GeV of nominal W mass



Top peak clearly visible after 1 week of LHC data

Measured top mass 160.0 ± 1.0 GeV , stat error on xs: 8.3%

Work in progress on systematics

6) Operation, Finances, High Lum. planning

Developing an ATLAS operation model

First proposal for an ATLAS organization and operation model to initiate discussions in the Collaboration

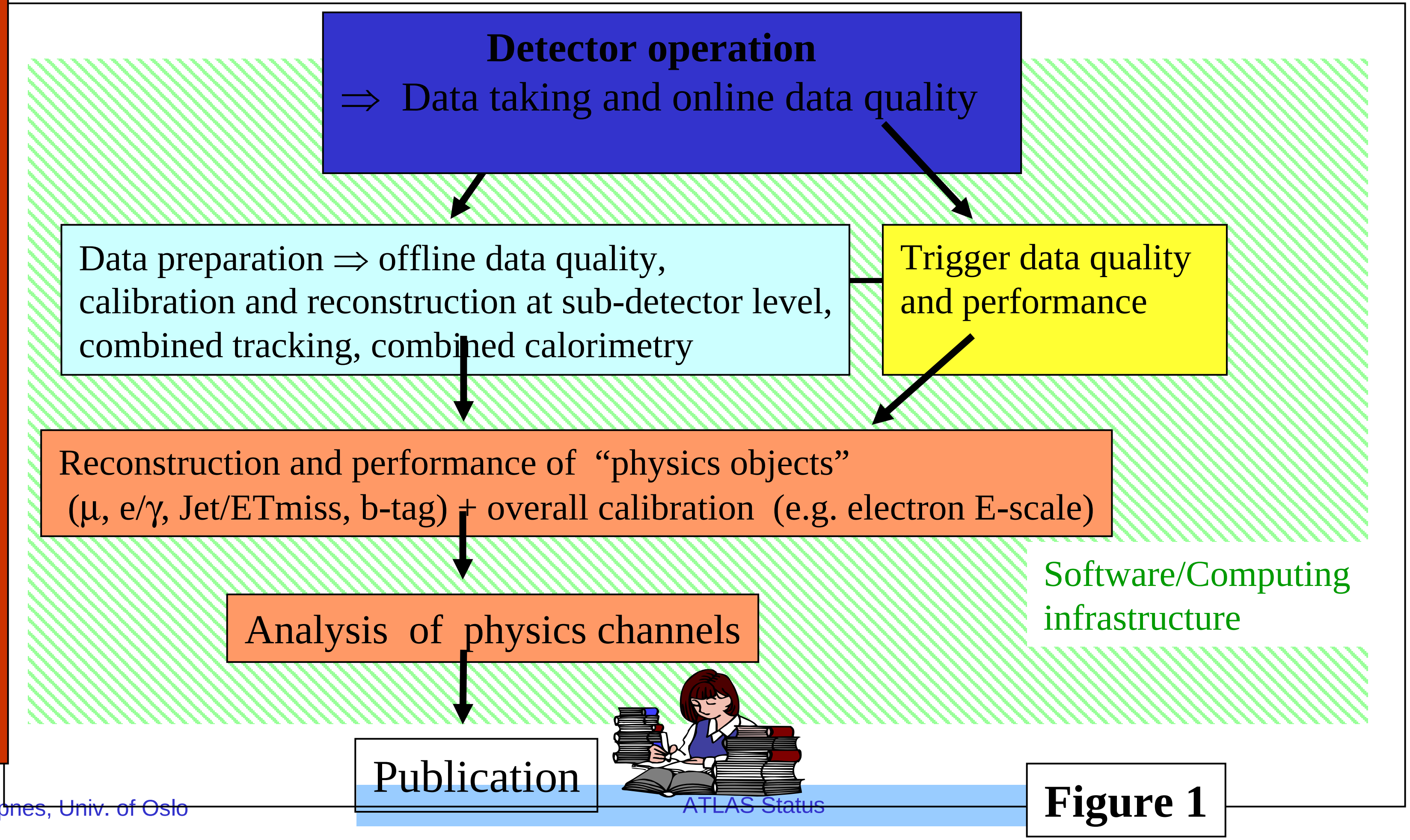
Two major poles of activity:

-- operate the detector and take data

-- analyze the data and extract physics results

In practice, several steps need to be addressed from data taking to physics publications

→ Important that Institutes and individuals involved in several steps of the chain, and not only in physics analysis (for the quality of physics results and for fair share of tasks, including service work)



Detector operation

⇒ Data taking and online data quality

Data preparation ⇒ offline data quality, calibration and reconstruction at sub-detector level, combined tracking, combined calorimetry

Trigger data quality and performance

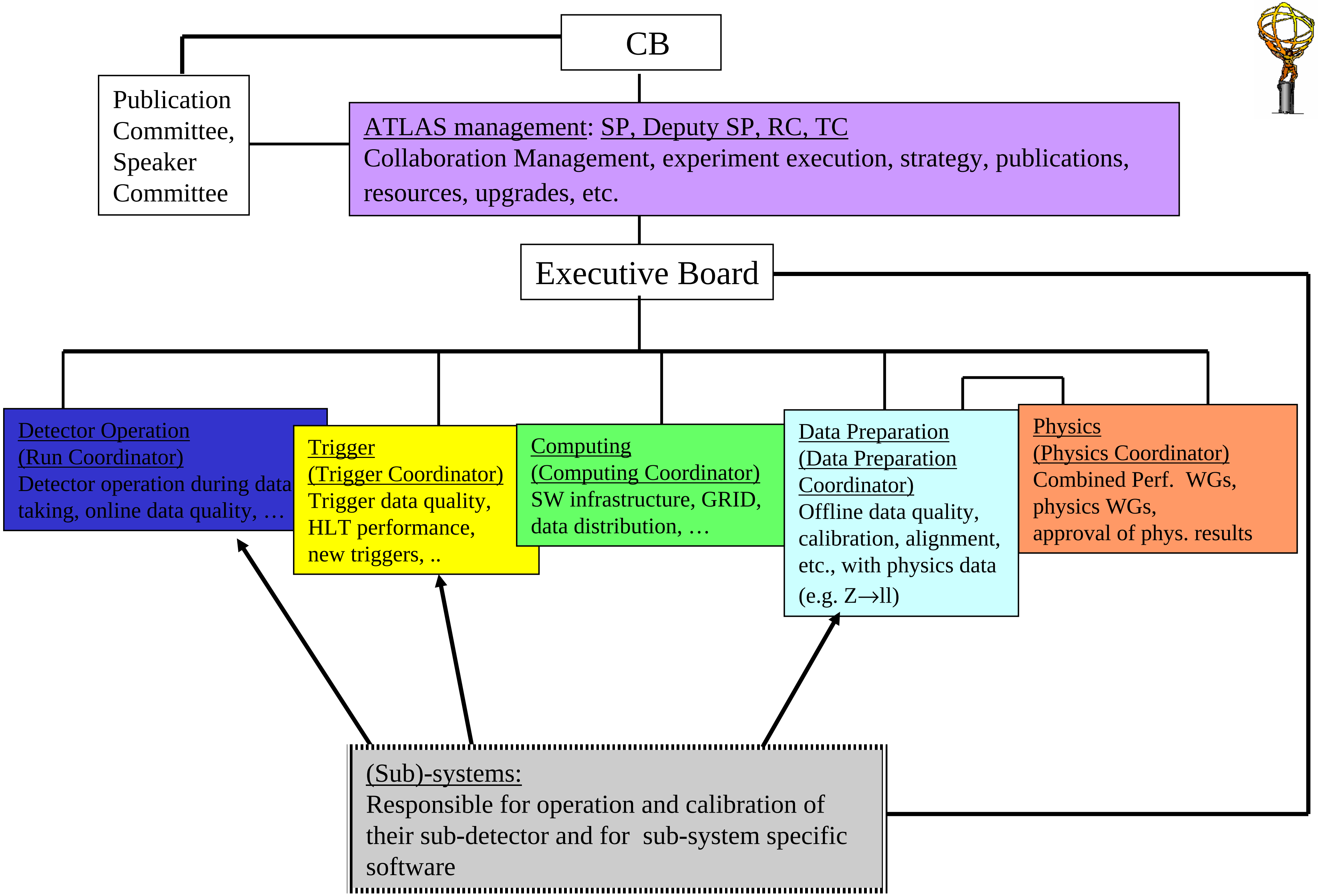
Reconstruction and performance of "physics objects" (μ, e/γ, Jet/ETmiss, b-tag) + overall calibration (e.g. electron E-scale)

Software/Computing infrastructure

Analysis of physics channels

Publication

Figure 1



CB

Publication Committee, Speaker Committee

ATLAS management: SP, Deputy SP, RC, TC
Collaboration Management, experiment execution, strategy, publications, resources, upgrades, etc.

Executive Board

Detector Operation
(Run Coordinator)
Detector operation during data taking, online data quality, …

Trigger
(Trigger Coordinator)
Trigger data quality, HLT performance, new triggers, ..

Computing
(Computing Coordinator)
SW infrastructure, GRID, data distribution, …

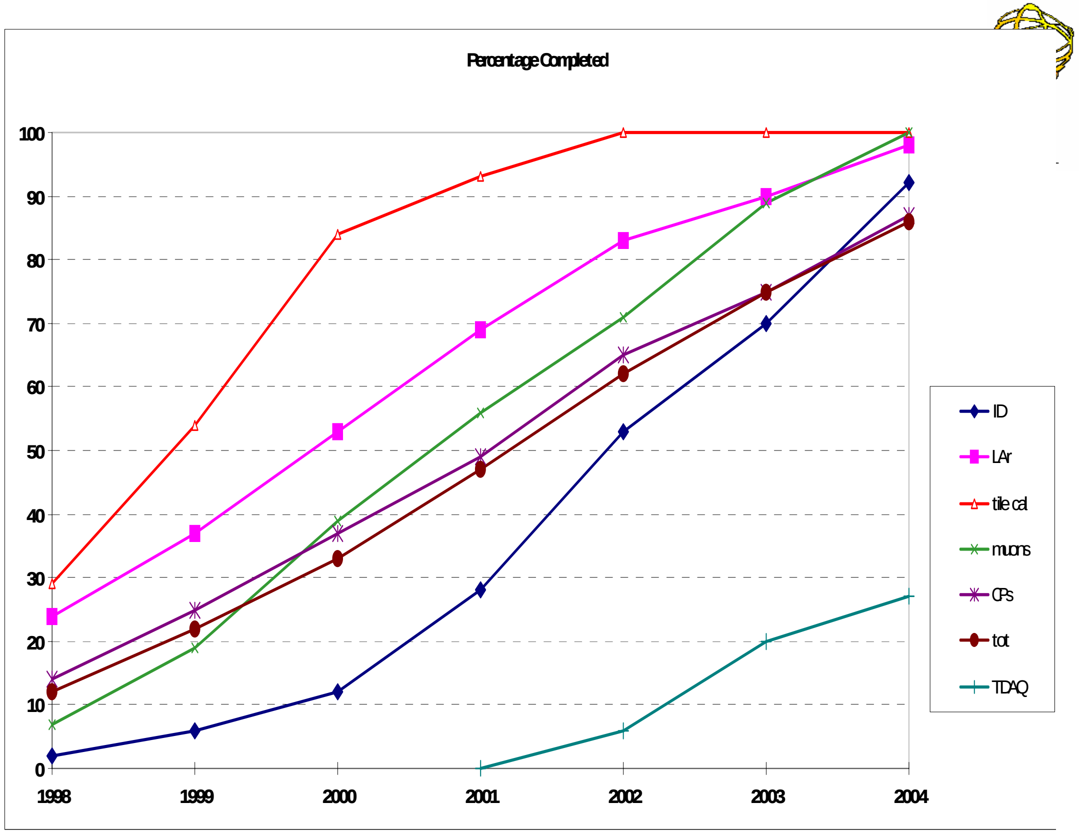
Data Preparation
(Data Preparation Coordinator)
Offline data quality, calibration, alignment, etc., with physics data (e.g. $Z \rightarrow ll$)

Physics
(Physics Coordinator)
Combined Perf. WGs, physics WGs, approval of phys. results

(Sub)-systems:
Responsible for operation and calibration of their sub-detector and for sub-system specific software

Figure 2

ATLAS financial issues



Baseline Construction MoU

The construction MoU expenditures are at about 85% total

A major issue is that there are some delays in Common Fund contributions adding up to about 12 MCHF

Cost to Completion Funding

The ATLAS construction of the initial staged detector proceeds within the Completion Plan accepted by the October 2002 RRB (over-costs on detector construction, in addition to the deliverables, and C&I pre-operation costs, in total 68 MCHF)

At this point only 55 MCHF are pledged as new resources, therefore the detector completion for the initial running foresees a major staging and deferral of components, limiting the initial performance

Funding Agencies are late to make deferral funds (about 15 MCHF) available (2006 and 2007 only), creating a cash-flow problem in addition

High Luminosity Upgrade

ATLAS is preparing the framework for R&D for a possible future upgrade of the detector to exploit the LHC potential for luminosities beyond the design value

A Steering Group is in place since more than half a year, and a substantial workshop took place at the beginning of the previous ATLAS Week (see agenda, and talks all accessible on the Web)

There will be a 3 days workshop in Genoa, from 18-20 July, to focus on the ATLAS tracker upgrades

Common approaches with CMS will be investigated where applicable

http://agenda.cern.ch/fullAgenda.php?ida=a045387

Sunday 13 February 2005

Introduction (14:00->15:00)
Description: *Introductory part, describing the scope of upgrading ATLAS*
Discussion of common issues for the various sub-systems
Chairperson: Tapprogge, S.
Room: 40-SS-A01

14:00 **Physics motivation and machine upgrade scenarios** (15') (🗎 more information 🗎 transparencies) Tapprogge, S. *(Mainz Univ.)*
Wrap-Up on physics motivation and needs for detector performance, possible machine upgrade scenario
and overview of ongoing activities (also outside of ATLAS)

14:15 **Radiation background and shielding** (15') (🗎 more information🗎 transp
Description of the expected fluences for radiation background and ac
discussion of access scenarios and options for changes to shielding

14:30 **Overview of TC issues** (10') (🗎 more information)
Discussion of major constraints from installation and access scenaric
space for services and more

14:40 **Electronics: issues and roadmap** (15') (🗎 transparencies)
Survey of future trends and roadmap, major issues common to all sub
hardness, services volume, bunch crossing frequency)

Upgrade of tracking detectors (15:00->18:00)
Description: *Discussion of necessary per*
Issues related to large area
luminosity, materials for radi
data links, trigger based on t
Chairperson: Darbo, G. & Seiden, A.
Room: 40-SS-A01

15:00 **Lessons learned from ATLAS construction effort** (20') (🗎 trans
15:30 **Simulation results for an initial tracker geometry** (20') (🗎 transp
16:00 coffee/tea break
16:30 **SLHC Pixel Options** (20') (🗎 transparencies)
17:00 **Strip detector issues, both Mid and Large Radius** (20') (🗎 tran
17:30 **Data Transmission Challenge** (20') (🗎 transparencies) Weidberg, T. *(Univ. of Oxford)*
18:00 **Progress on Detector Materials and RD50 Programme** (20') (🗎 transparencies) Moll, M. *(CERN)*

Monday 14 February 2005

Upgrade issues for calorimetry (09:00->10:00)
Description: *Discussion of limitations for LAr and TileCal, e.g. space charge effects, radiation damage/tolerance, electronics changes*
Discussion of overall calorimetry performance issues
Chairperson: Lanni, F. & Pallin, D. & Zeitnitz, C.
Room: 40-SS-A01

09:00 **LAr: detector issues** (20') (🗎 transparencies) Oram, C. *(TRIUMF)*
09:25 **LAr: electronics issues** (20') (🗎 transparencies) de la Taille, C. *(IN2P3, Paris XI)*
09:50 **TileCal issues and Combined Performance** (30') (🗎 more information) Pallin, D. *(Clermont-Ferrand)*
10:30 coffee/tea break

Upgrade issues for muon system (11:00->12:00)
Description: *Discussion of issues for the precision and the trigger chambes, incl. high rate stability, occupancy increase, timing*
Chairperson: Kawamoto, T. & Palestini, S.
Room: 40-SS-A01

11:00 **Overview of muon system issues** (20') (🗎 transparencies) Kawamoto, T. *(ICEPP, Tokyo)*
11:30 **Trigger rates: performance issues** (15') Nisati, A. *(Roma 1)*
11:55 **TGC chamber issues** (15') (🗎 transparencies) Sasaki, O. *(KEK)*

Upgrade issues for Trigger/DAQ (12:20->13:00)
Description: *Discussion of impact due to higher bunch crossing frequency, increase in data bandwidth, TTC system*
Performance aspects, such as loss in rejection power, development of refined algorithms
Chairperson: Tapprogge, S.
Room: 40-SS-A01

12:20 **TDAQ upgrade system aspects** (25') (🗎 transparencies) Lankford, A. *(UC Irvine)*

- **A rather positive, and reasonably well-focused, attitude was visible at the dedicated workshop**
- **There is good awareness in the Collaboration that we have to find the right balance between finishing first of all the construction of the present ATLAS detector, but also assuring its future potential over the full LHC lifetime**

7) Summary and conclusion

- The ATLAS Construction is moving ahead – several critical items (schedule) and several technical issues to worry about - but steady progress
- Assembly and Integration for BT and Calorimeters close to completion, for Muons, ECT and ID ongoing (again with their own set of worries) but again with good progress
- Installation progress very impressive, move soon to new critical phase with combined installation of muon chambers and services requiring probably more effort than foreseen
- Commissioning in pit started but urgent to get ATLAS wide team established – to co-ordinate current activity but also to prepare for combined running.

  DAQ/DCS tools in place

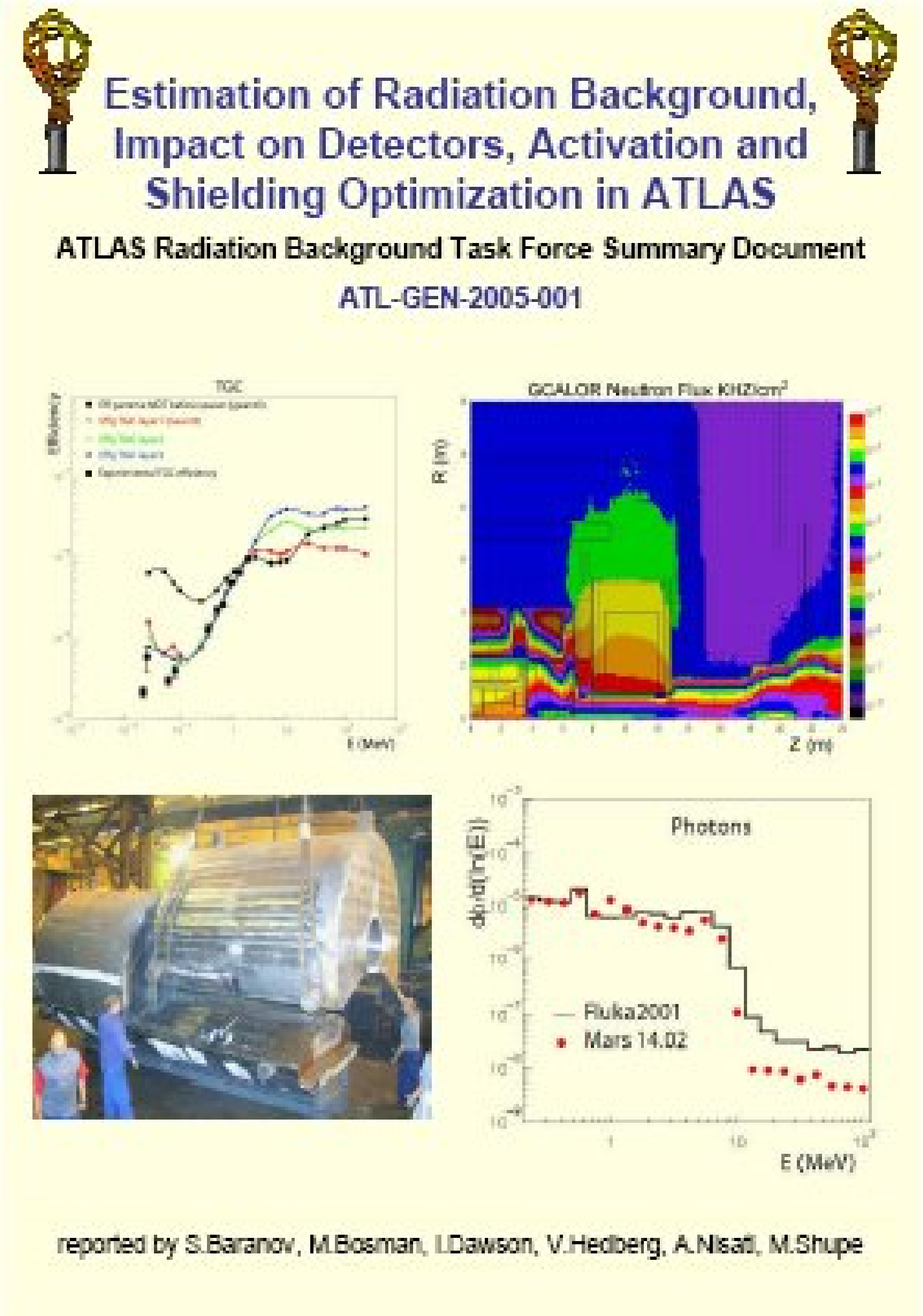
  Basic counting room infrastructure becoming available
- Software and Physics Preparation moving ahead well, next focus will be calibration/alignment and inclusion of not perfect detectors
- Overall the last 12 months have shown very good progress

Important document that has been completed:

The Radiation Task Force
has concluded its work with a rather substantial document

It is easily accessible on the Web, and will certainly serve as an important reference document for ATLAS

http://atlas.web.cern.ch/Atlas/GROUPS/PHYSICS/RADIATION/RadiationTF_document.html



Estimation of Radiation Background, Impact on Detectors, Activation and Shielding Optimization in ATLAS

ATLAS Radiation Background Task Force Summary Document

ATL-GEN-2005-001

reported by S.Baranov, M.Bosman, I.Dawson, V.Hedberg, A.Nisati, M.Shupe