CERN Future Prospects and Plans

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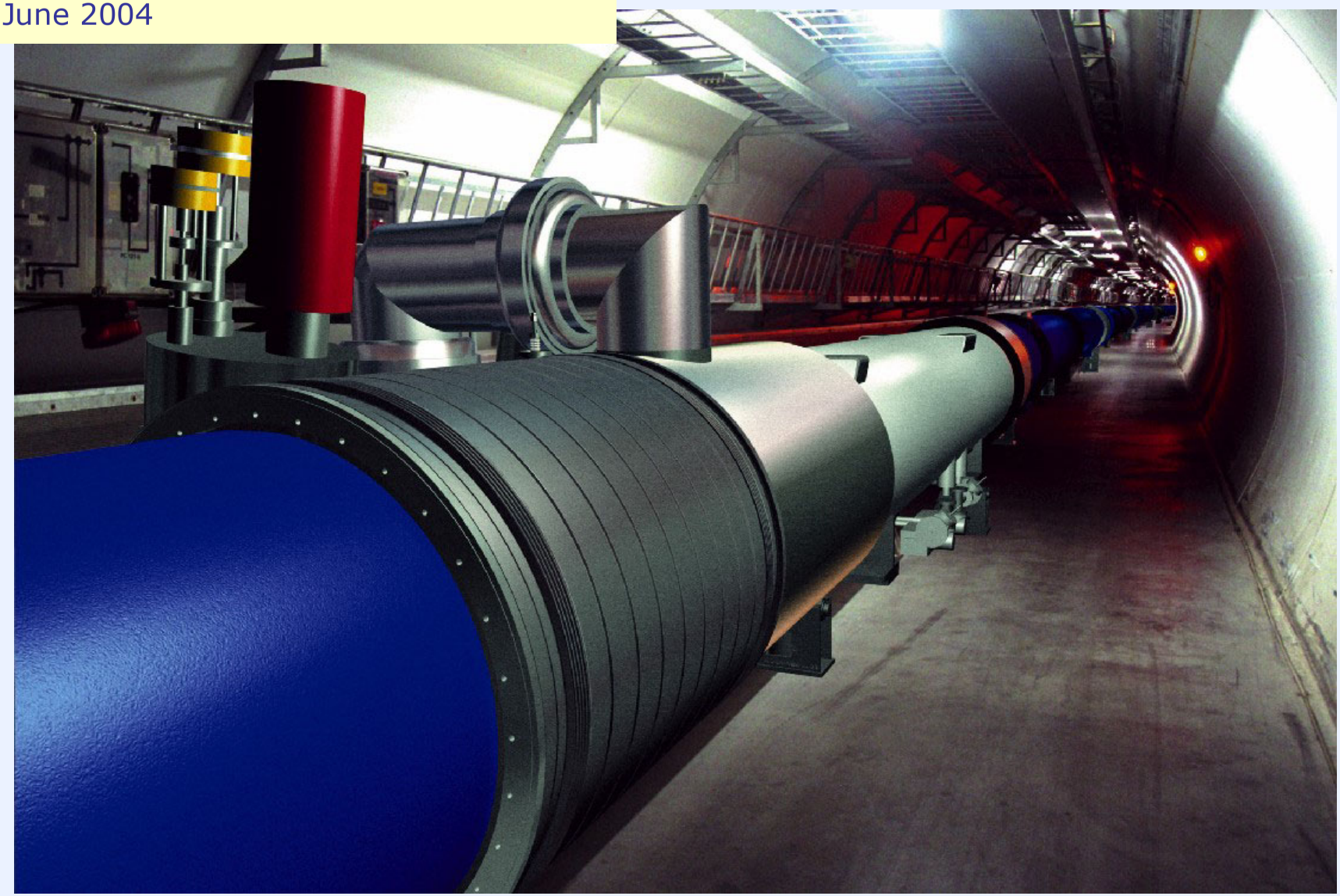
Fermilab Users' Meeting

3 June 2004



Contents

- Status of LHC construction
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- LHC operation and upgrade
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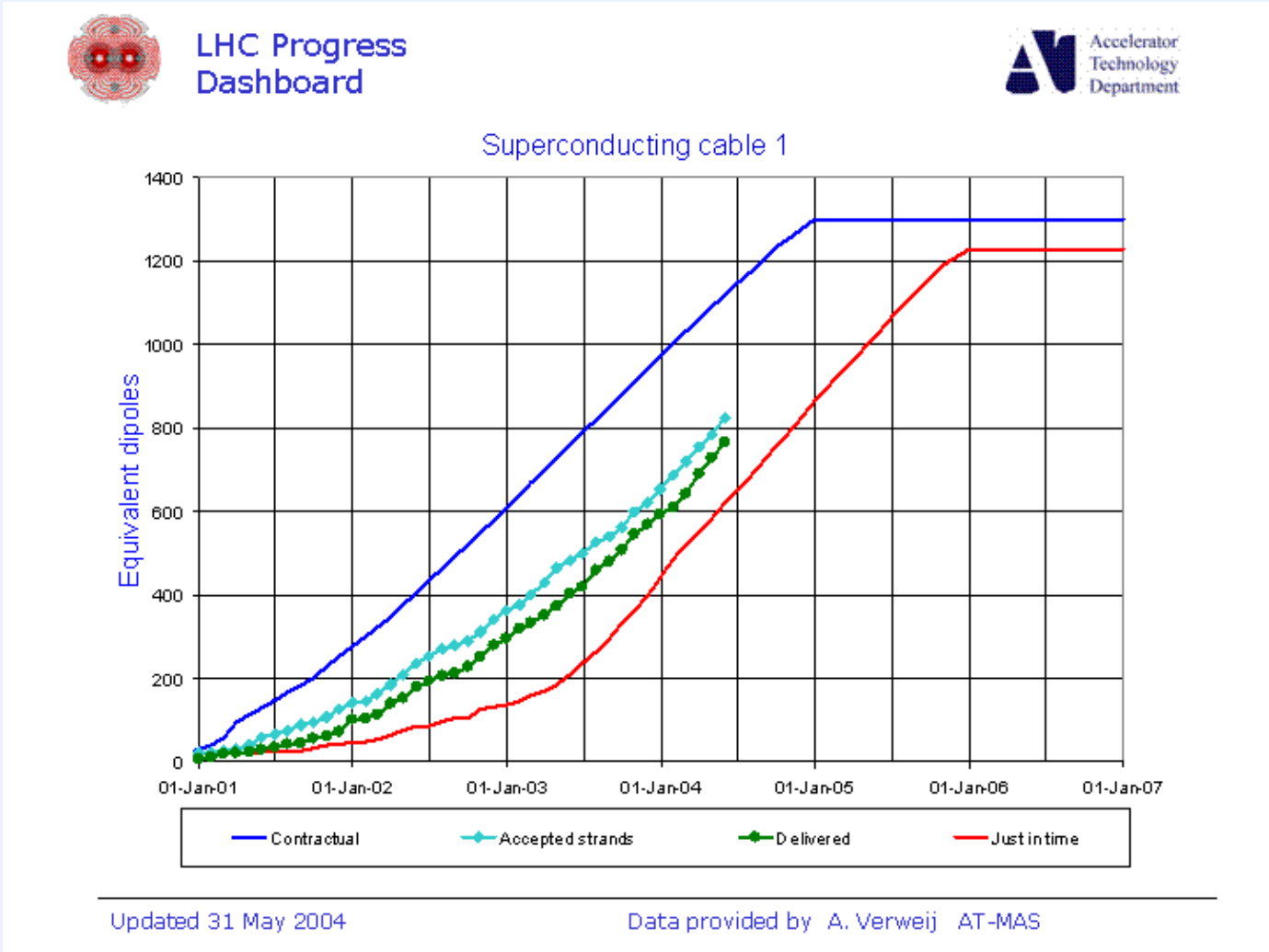
Dipoles

TI8 - MBIAV

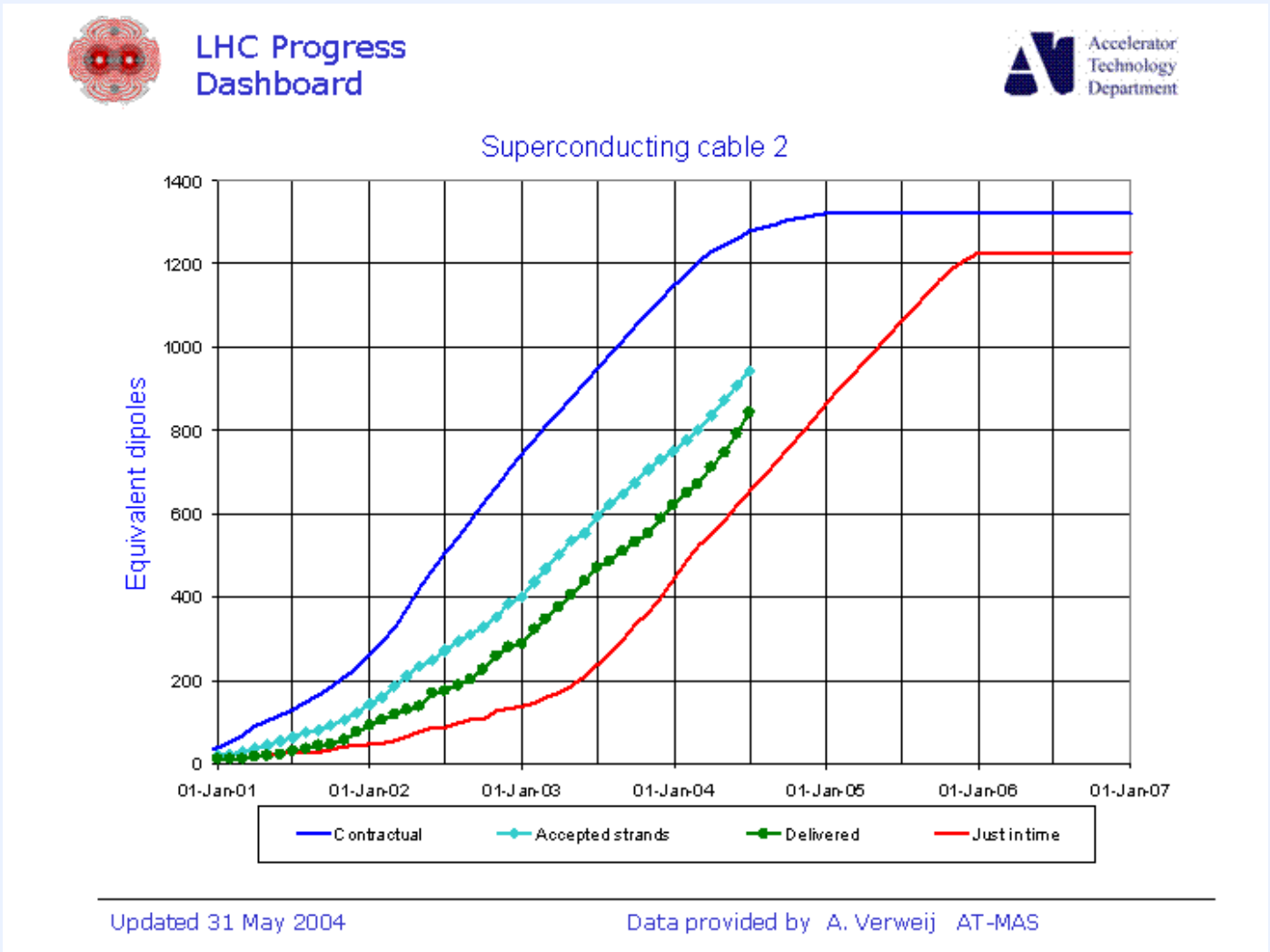
TI8 - MBIT

TI8 - MBIBV

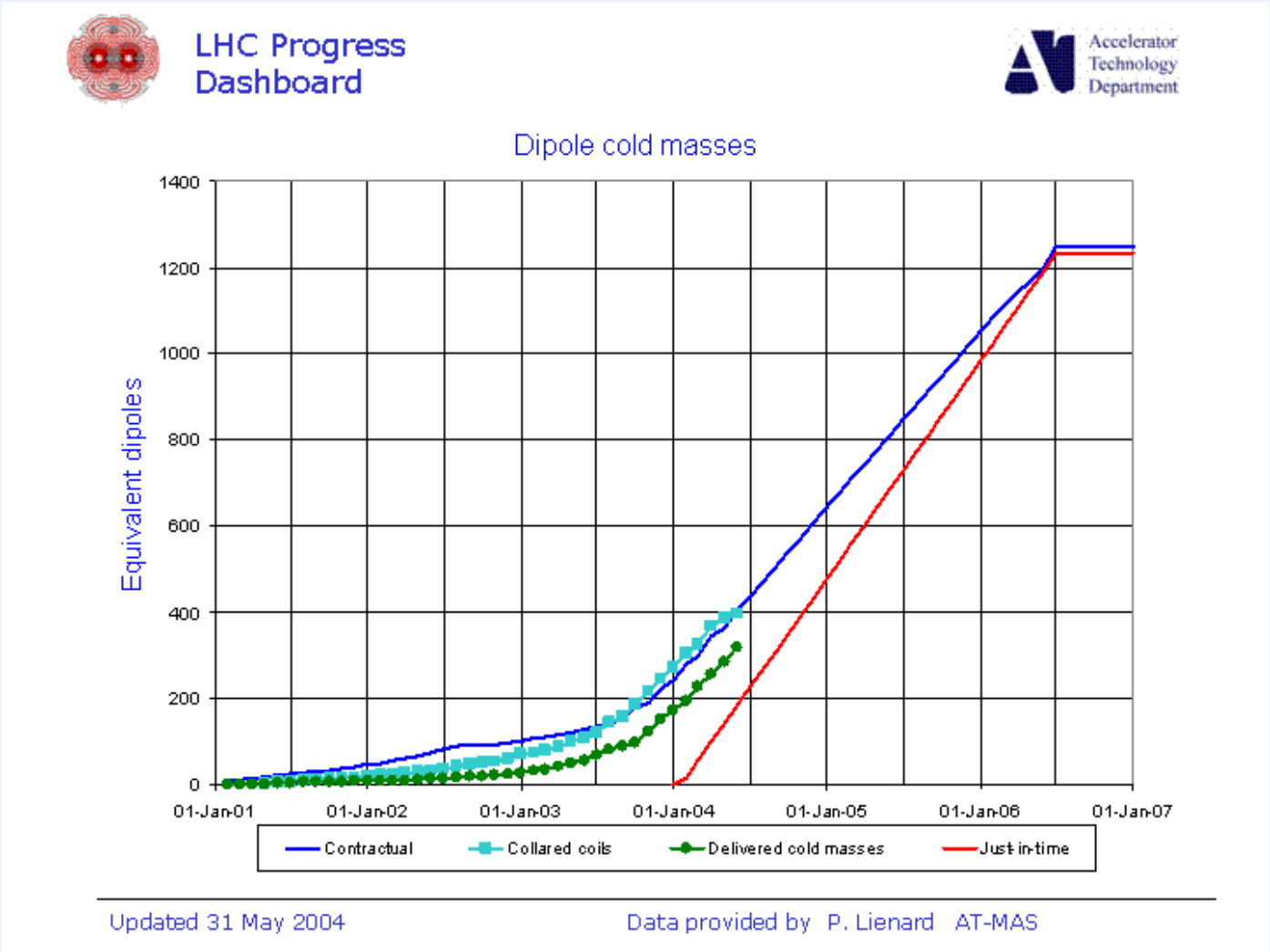
Cable 1


LHC Progress Dashboard
Accelerator Technology Department
Superconducting cable 1
Equivalent dipoles
1400
1200
1000
800
600
400
200
0
01-Jan-01
01-Jan-02
01-Jan-03
01-Jan-04
01-Jan-05
01-Jan-06
01-Jan-07
Contractual
Accepted strands
Delivered
Just in time
Updated 31 May 2004
Data provided by A. Verweij AT-MAS

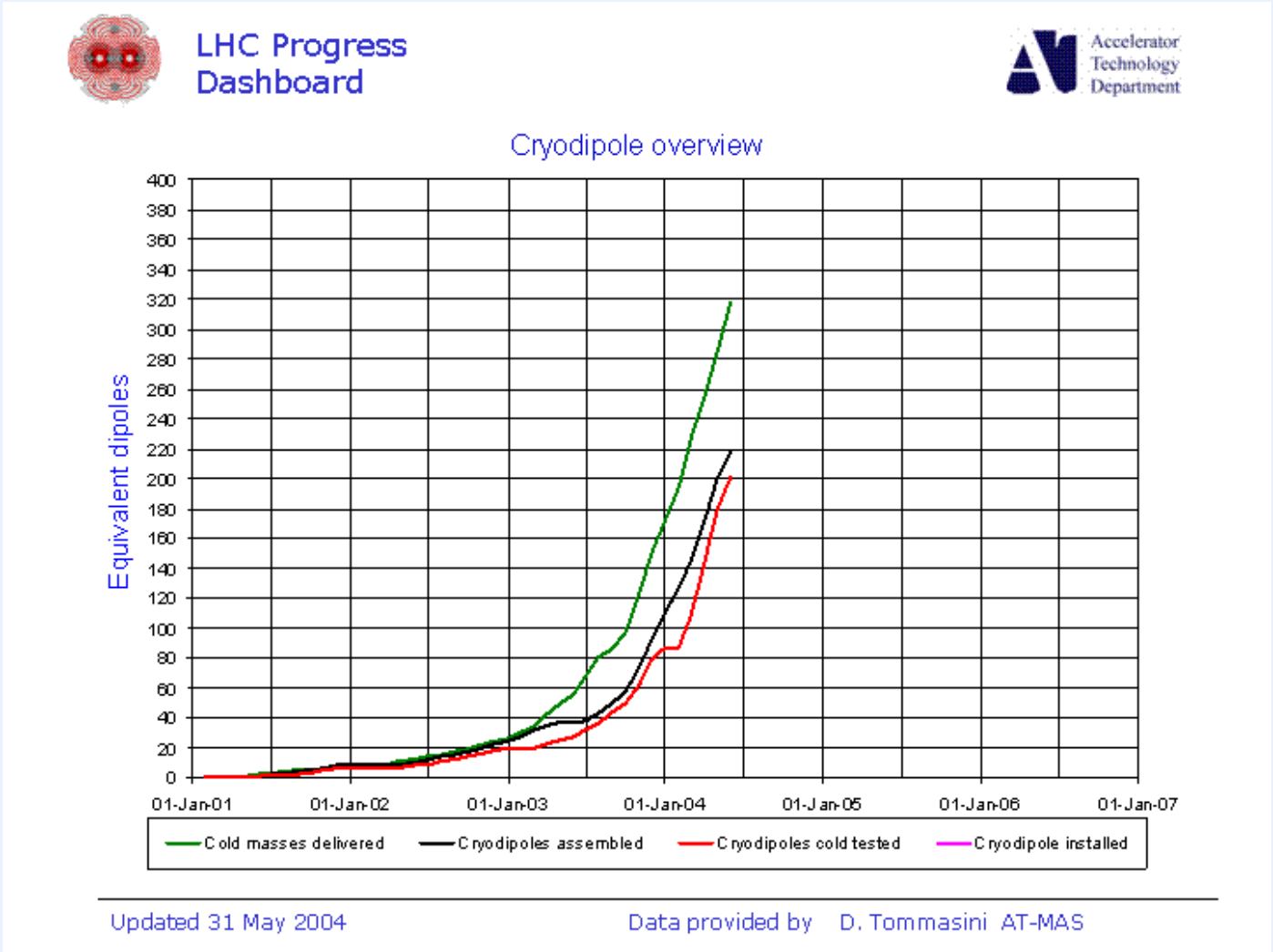
Cable 2


LHC Progress Dashboard
Accelerator Technology Department
Superconducting cable 2
Equivalent dipoles
1400
1200
1000
800
600
400
200
0
01-Jan-01
01-Jan-02
01-Jan-03
01-Jan-04
01-Jan-05
01-Jan-06
01-Jan-07
Contractual
Accepted strands
Delivered
Just in time
Updated 31 May 2004
Data provided by A. Verweij AT-MAS

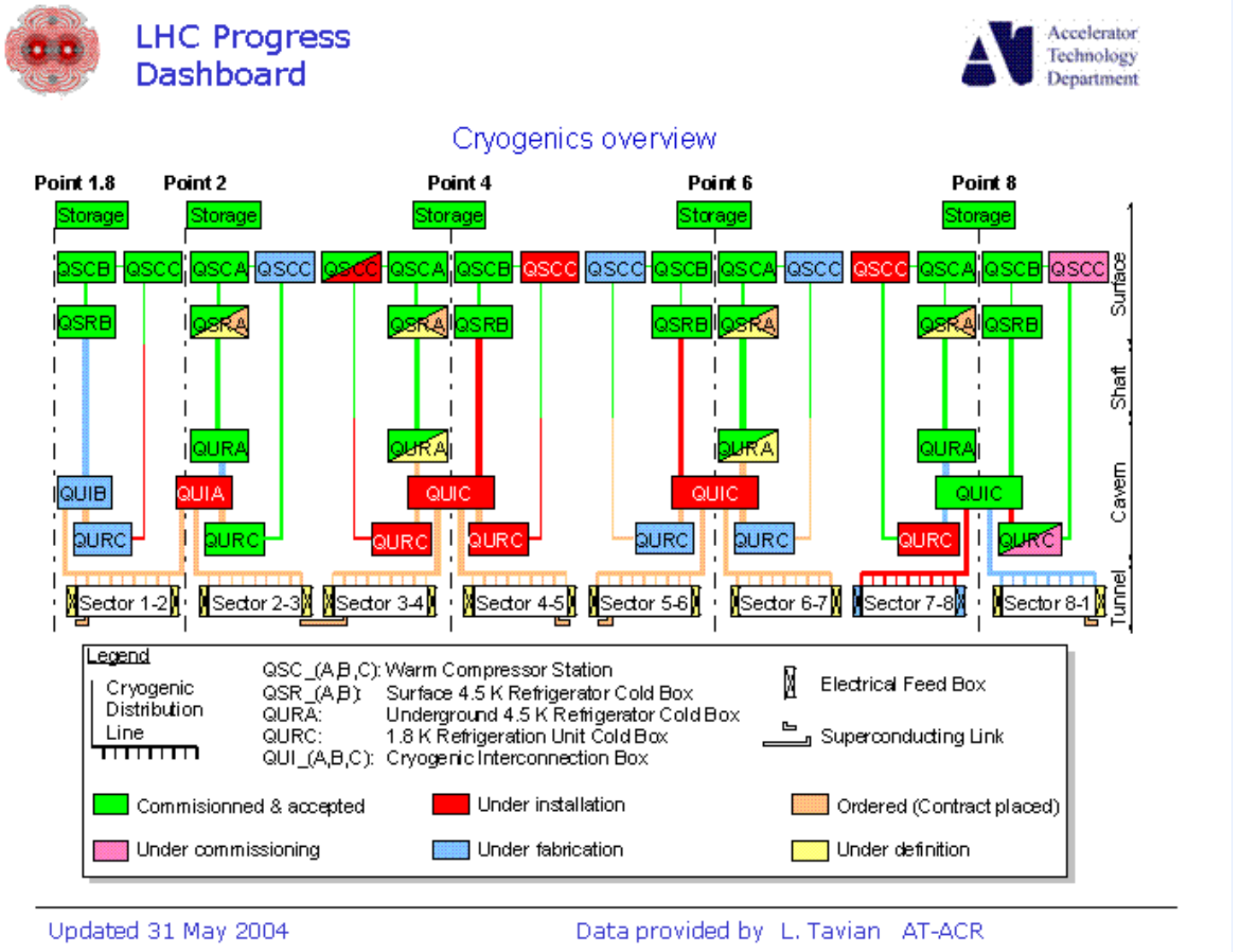
Dipoles


LHC Progress Dashboard
Accelerator Technology Department
Dipole cold masses
Equivalent dipoles
1400
1200
1000
800
600
400
200
0
01-Jan-01
01-Jan-02
01-Jan-03
01-Jan-04
01-Jan-05
01-Jan-06
01-Jan-07
Contractual
Collared coils
Delivered cold masses
Just in-time
Updated 31 May 2004
Data provided by P. Lienard AT-MAS

Cryodipoles

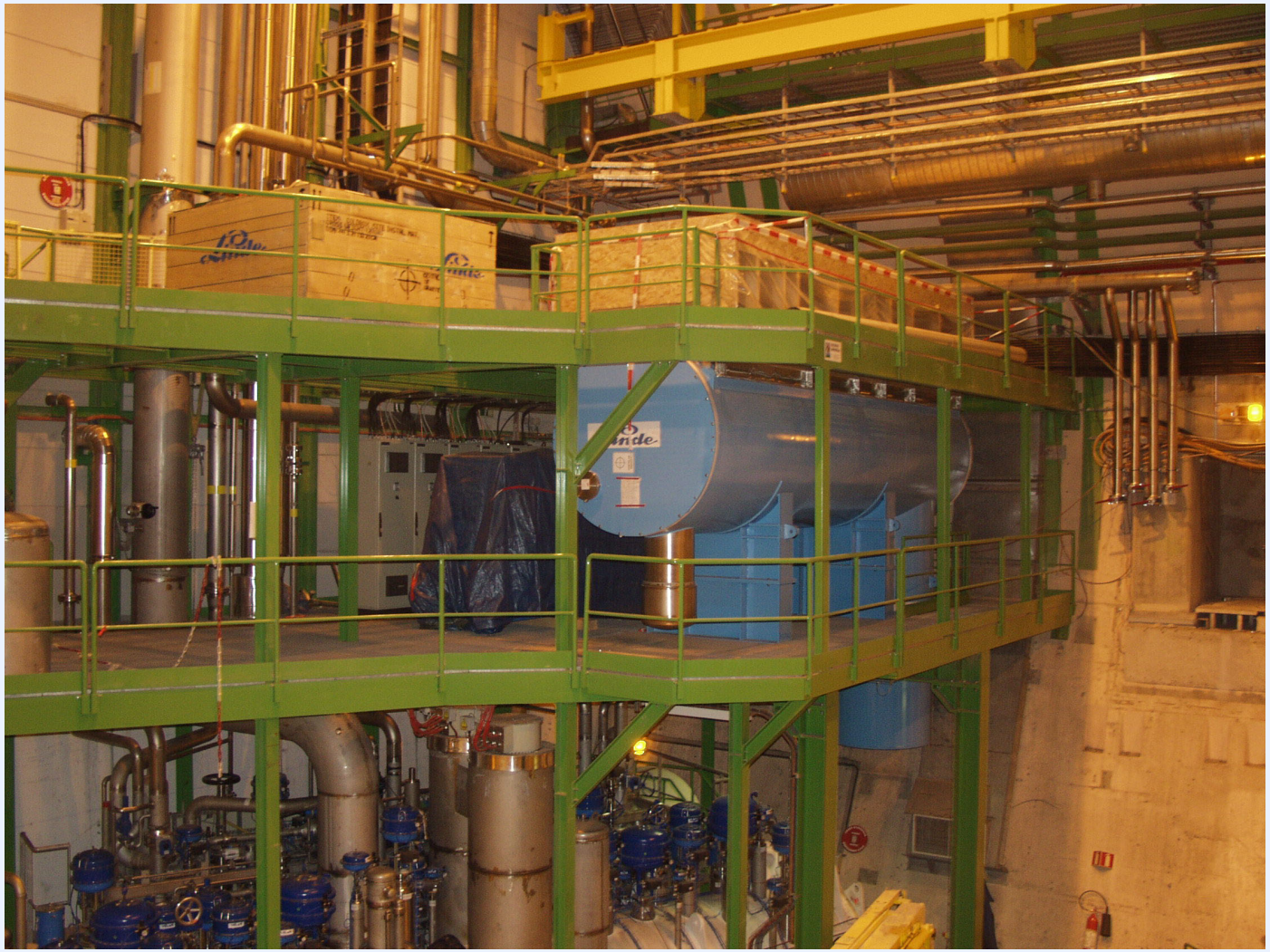


Cryogenics Overview

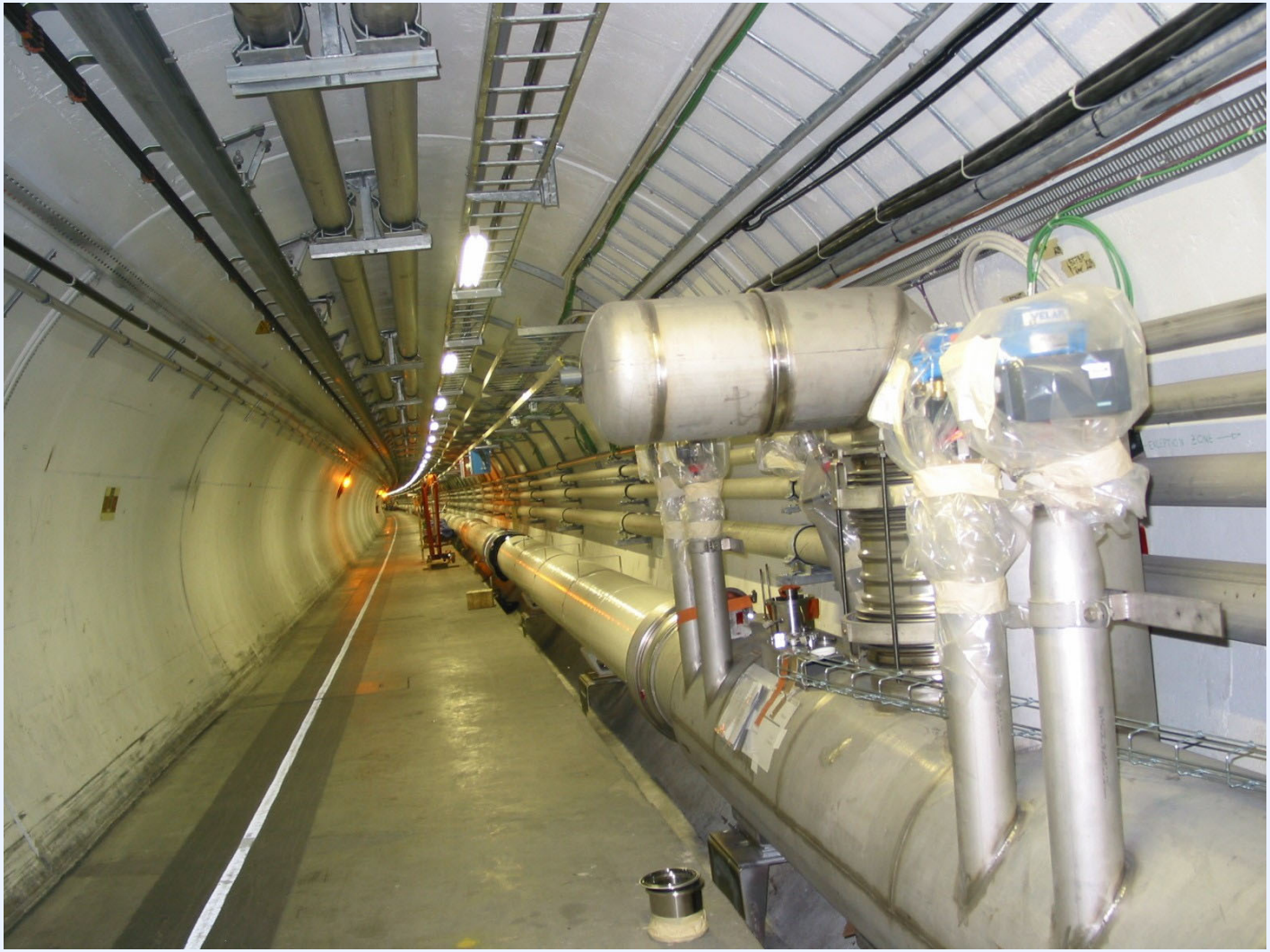


QUI

QURC



QRL



QRL Problems

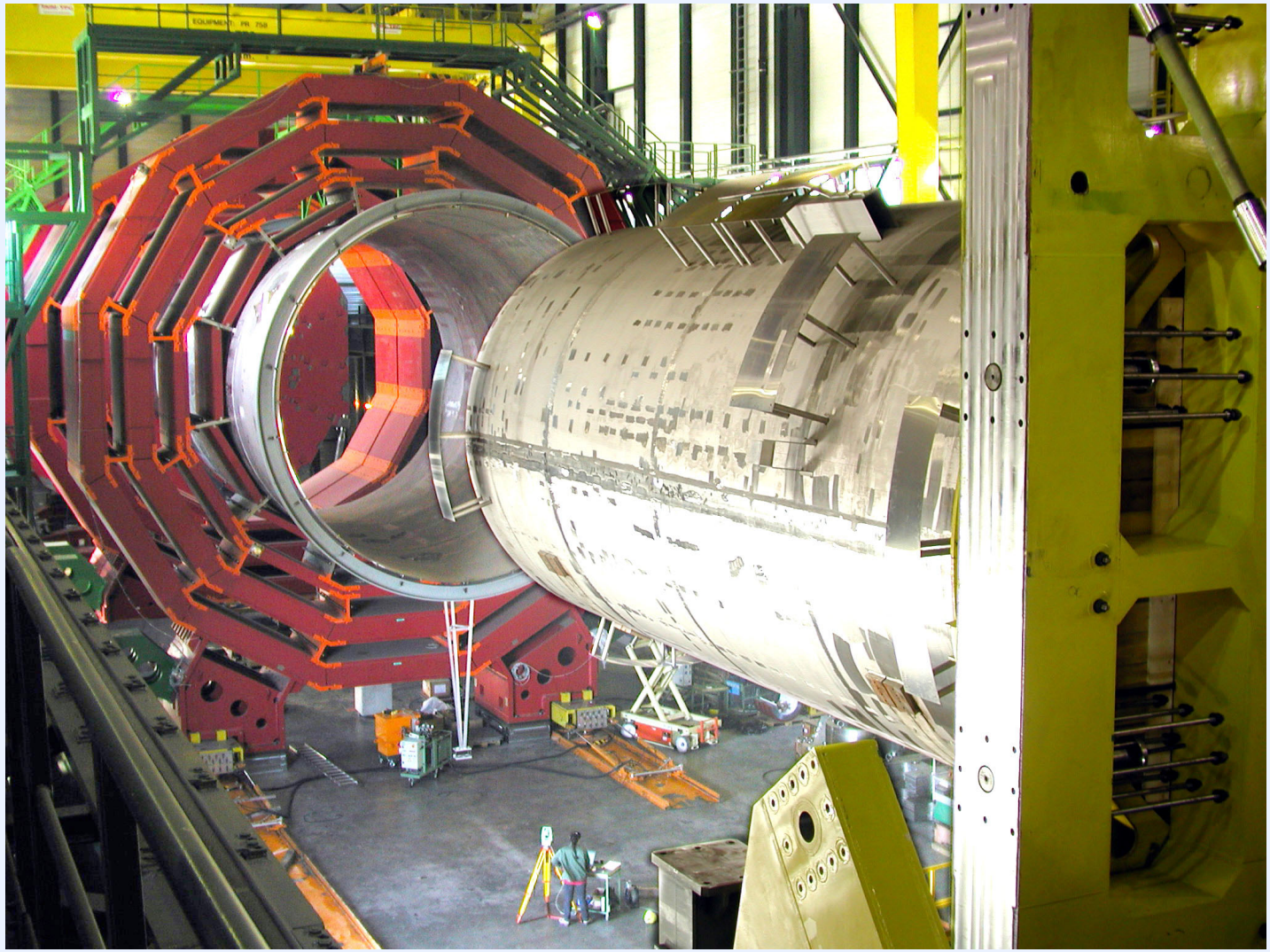
- Conflicts between main contractor and installation subcontractor have caused many delays and finally CERN was informed of a change of subcontractor in January. Overall delay is now 8 months.
- The contractor has produced a new planning to recover the delays but this compresses the time for installation and testing.
- A new installation planning is being optimised to recover the delays. This is based on installation of 3 octants simultaneously.

ATLAS Cavern

CMS Works

CMS Cavern

CMS detector assembly



LHC Operation

- Startup in spring 2007
- Clear objective is to get to 10^{33} cm^{-2} s^{-1} during 2007 operation.
- Increase luminosity to 10^{34} cm^{-2} s^{-1} in the next few years. The main problems will be the large stored energy in the beams (350 MJ) and the electron cloud effect.
- Luminosity upgrade.

Ions

- Pb ion operation at nominal 10^{27} cm^{-2} s^{-1}. Initial operation at much lower luminosity would be acceptable but minimum ion intensity is limited by the sensitivity of the BPM system.
- Ion storage ring (LEIR) is needed from the beginning. First physics run with Pb ion collisions in 2008.

Possible LHC upgrade

- The machine has the potential to go to about 2.5 * 10^{34} cm^{-2} s^{-1} without upgrade (beam-beam limit).
- The chromaticity correction system will allow a factor of two in beta squeeze but will require larger aperture insertion quadrupoles (yet to be developed).
- A final factor of two could be obtained by reducing bunch spacing but a lot of experience needed (stored energy, background, e-cloud).

Future possible Fixed-Target Programme

- CNGS will start in 2006.
- Possible continuation of NA48
- COMPASS wants to continue hadron spectroscopy
- Meeting of SPSC in September. Invitation to submit new proposals.
- SPL after 2010 could enhance FT programme.

Other Programmes

- Small p-bar programme.
- NTOF
- ISOLDE

Possible Future Programme at CERN

- LHC remains top priority. It will absorb the CERN budget until 2011.
- From 2007, some human resources could be liberated for studies in collaboration with other laboratories:
  - LHC upgrade
  - SPL front end of a multi-MW proton source
    - Neutrino factory
    - β-beams, EURISOL
- Request for extra resources and collaboration to prove feasibility of CLIC (Compact Linear Collider) by 2010.
- Generic R&D for LC in coordinated network of European laboratories.

Conclusions

- The LHC will absorb most of CERN's human resources until the end of 2007 and financial resources until 2011.
- LHC exploitation and upgrade will remain the top priority.
- Construction of a high intensity proton source after 2010 as a general purpose asset (LHC brightness, beta-beams, EURISOL etc.) may be proposed.
- A request has been made for some extra resources, including external collaborations, to validate or exclude CLIC technology for a multi-TeV LC by the end of 2010.