Diamond Light Source
A Facility Update

Jim Kay

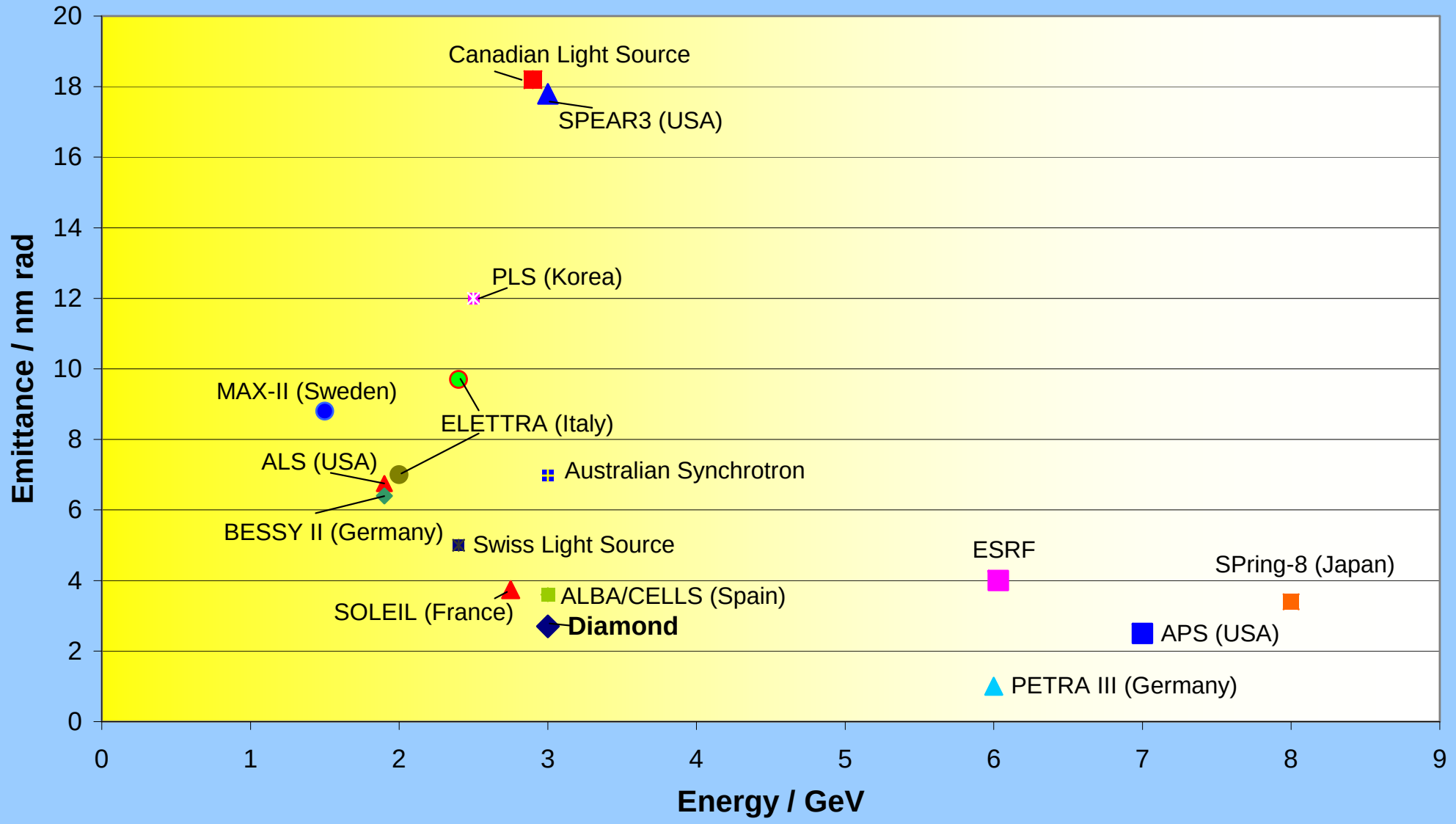
MEDSI 2008

Diamond Project Summary

- Diamond Light Source Ltd formed March 2002
- UK Gov (STFC)86%, Wellcome Trust 14%
- 24 cell, 3GeV,300 -500mA
- 7 Phase 1 beamlines
- At £260m, biggest UK science project for 40 years
- Linac at 100MeV in Sept05
- SR at 700MeV May06, 3GeV Sept 06
- January 07 on time and to budget opened for business and hailed a success!

Official Opening by Her Majesty the Queen 19th October 2007

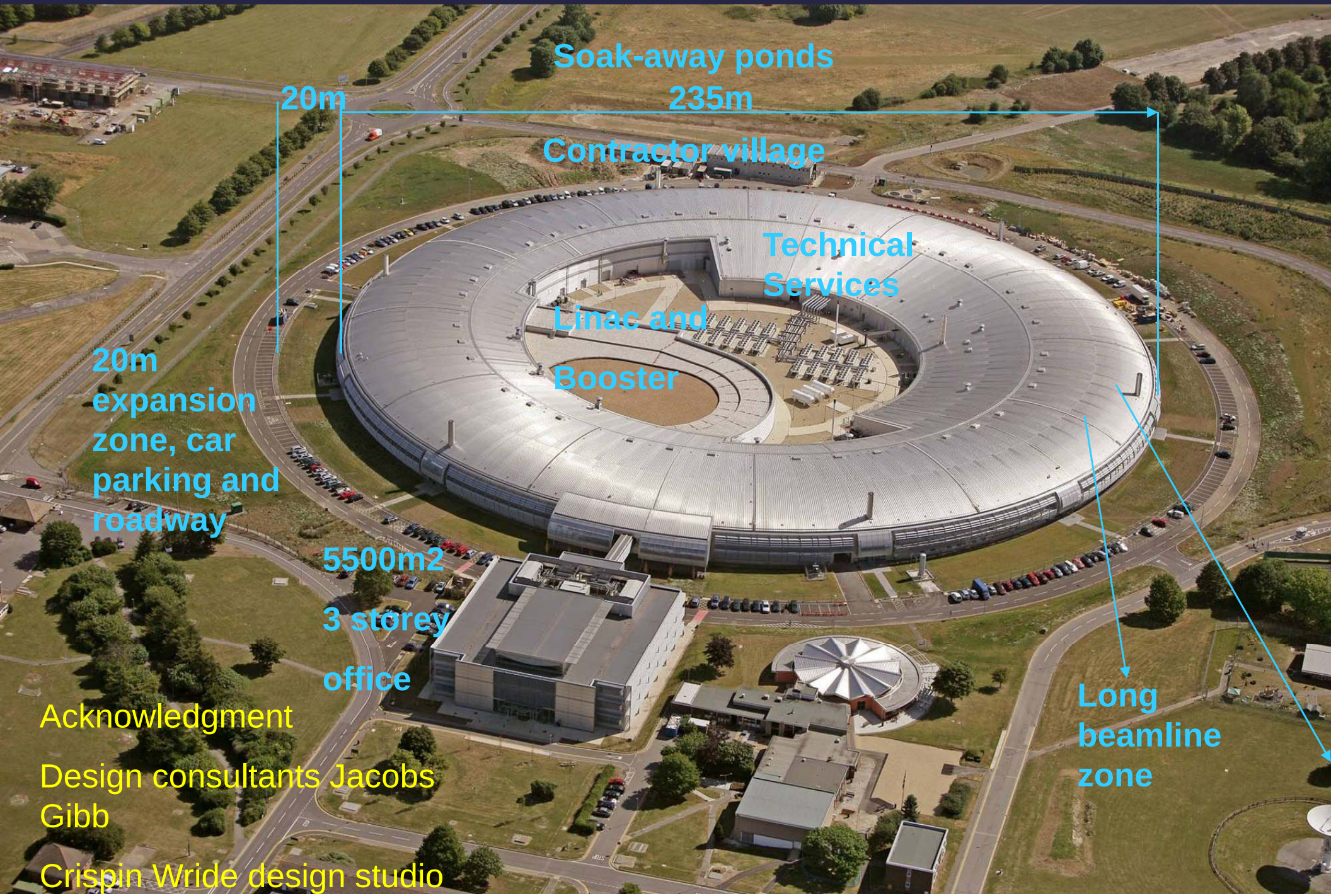
Comparison of 3rd Generation Synchrotrons



Foundations – Sept 2003

October 2004

Diamond Light Source July 2006



Acknowledgment

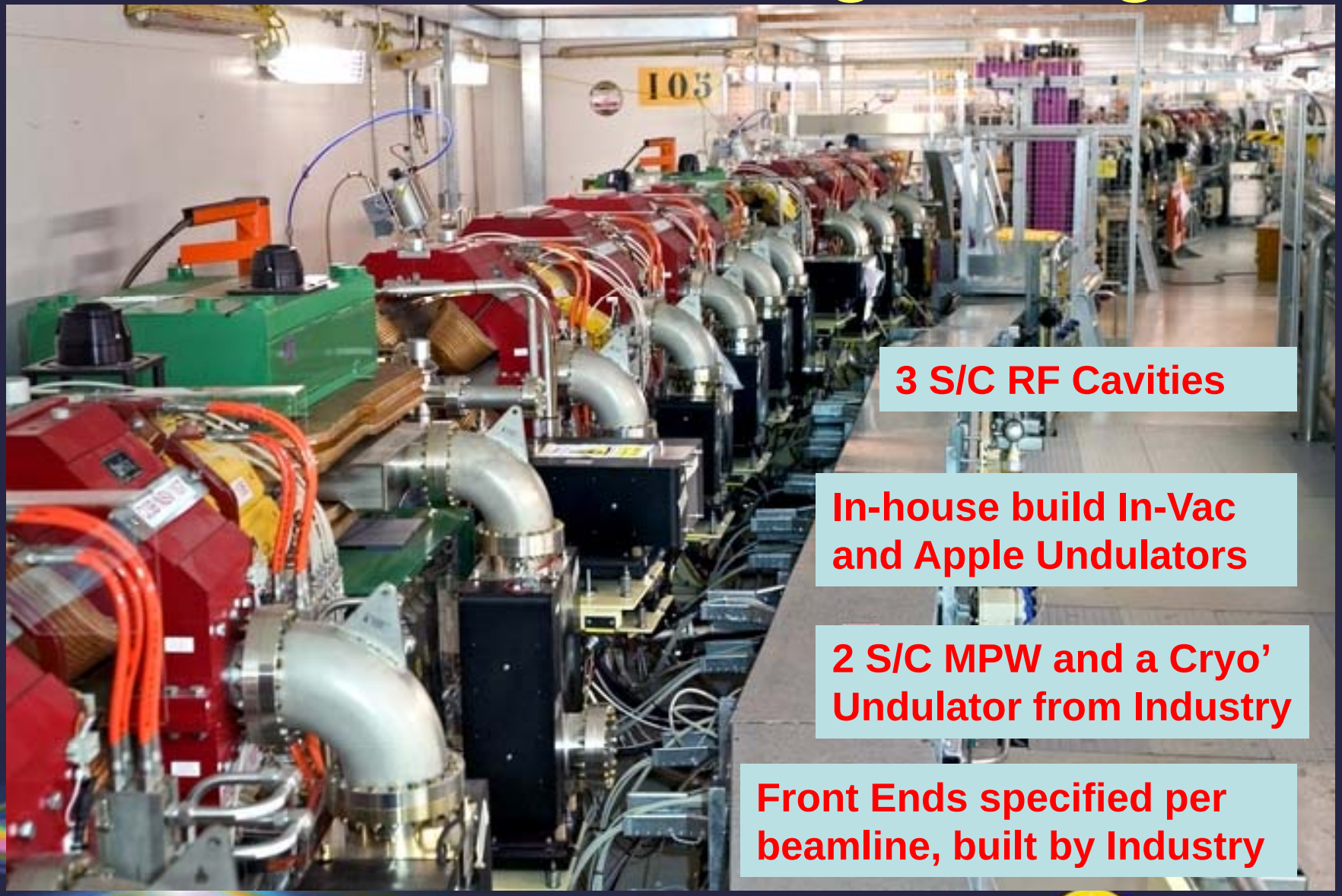
Design consultants Jacobs Gibb

Crispin Wride design studio

The Storage Ring…..Machine installation

1st girder April 05, 72nd girder March 06.

Diamond Storage Ring



3 S/C RF Cavities

In-house build In-Vac and Apple Undulators

2 S/C MPW and a Cryo' Undulator from Industry

Front Ends specified per beamline, built by Industry

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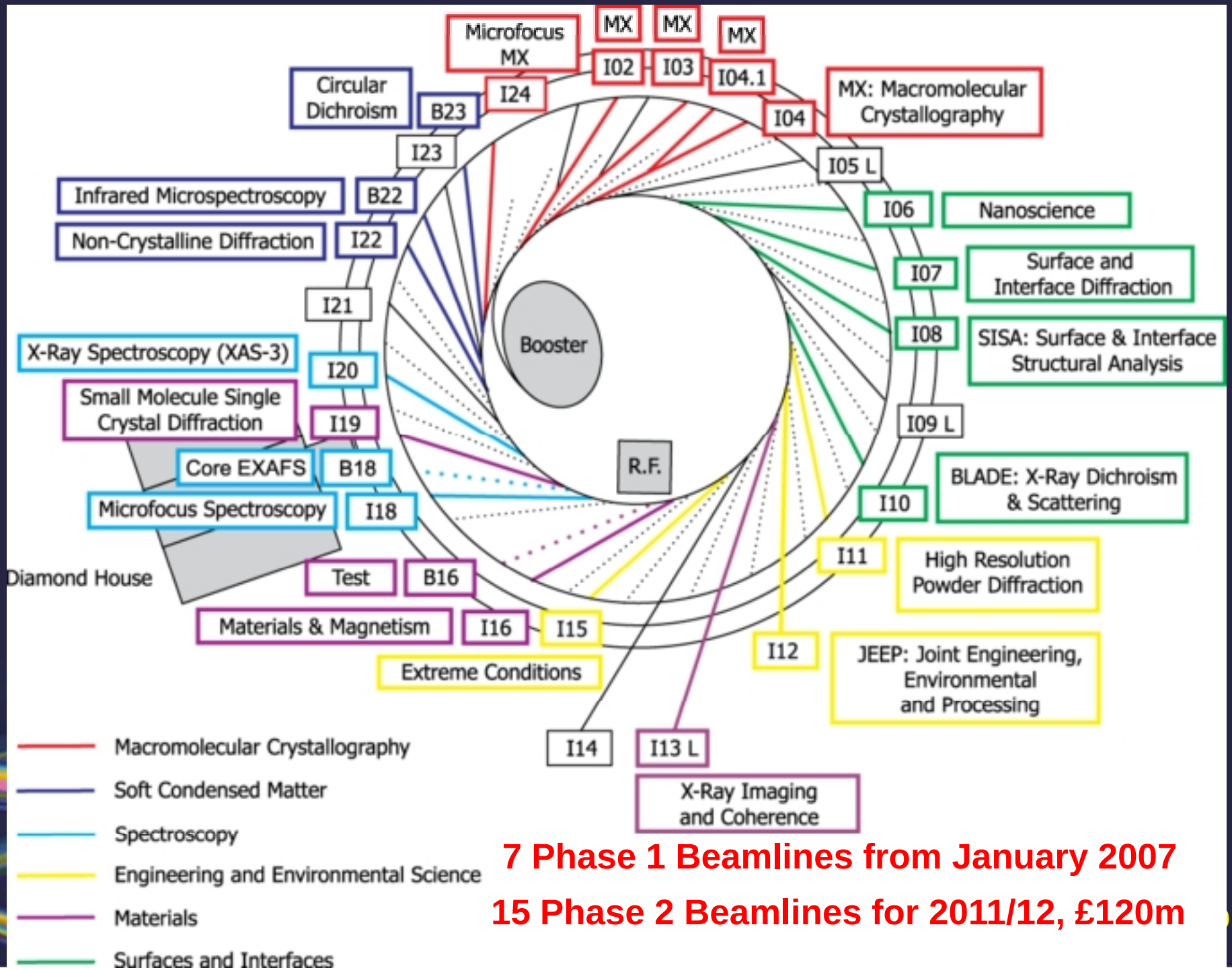
Diamond Straw Plan



7 Phase 1 Beamlines from January 2007

15 Phase 2 Beamlines for 2011/12, £120m

The Experimental Hall – May 2005

Building originally due Aug 05

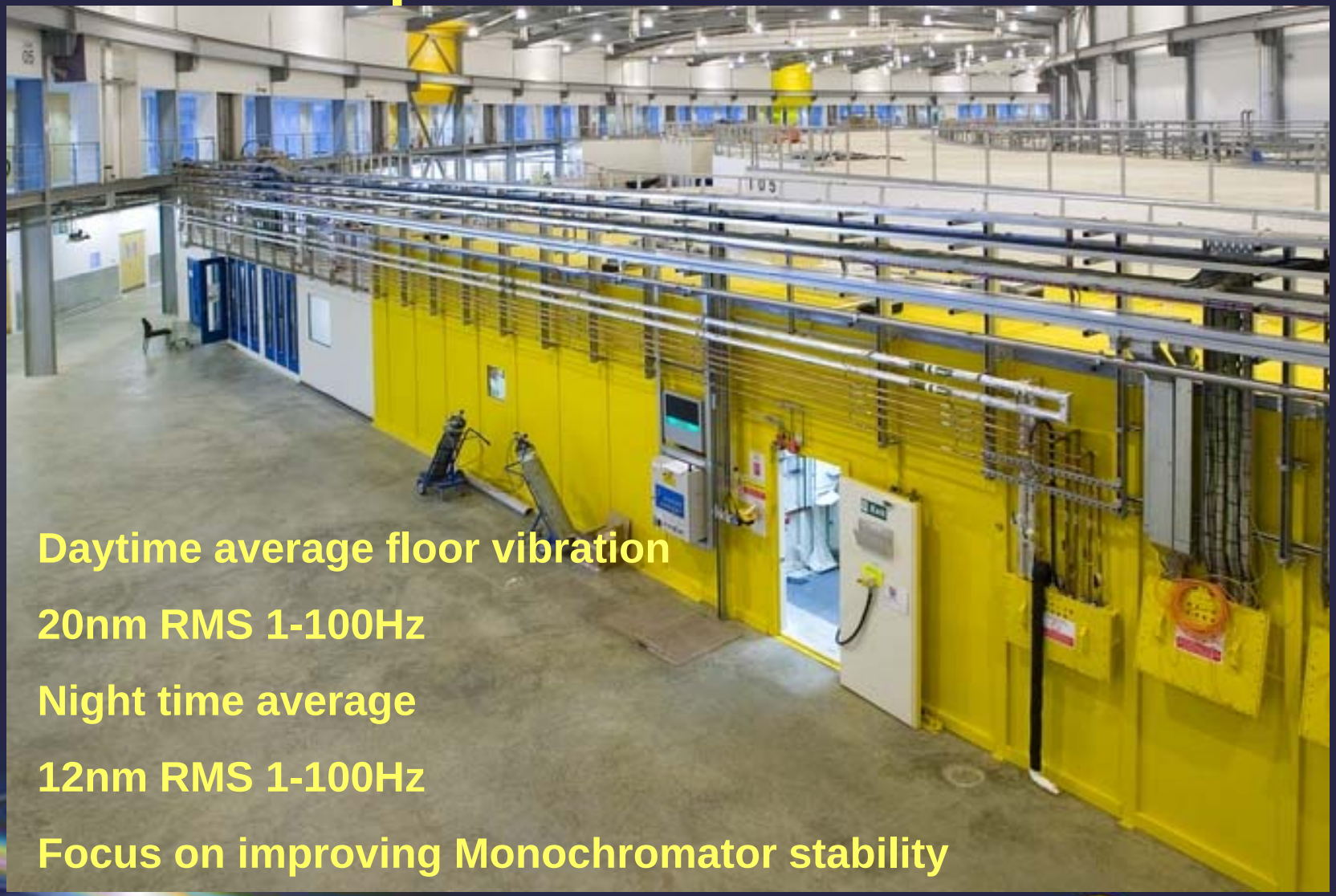
Finally handed over Aug 06 due to delays in services.

Linac, Booster and SR RF commissioned on temporary cooling supplies and SR to 700MeV with NO magnet cooling.

Full energy in Sept 06, only 3 months before Operations deadline

7 beamlines under construction

Completed Beamline



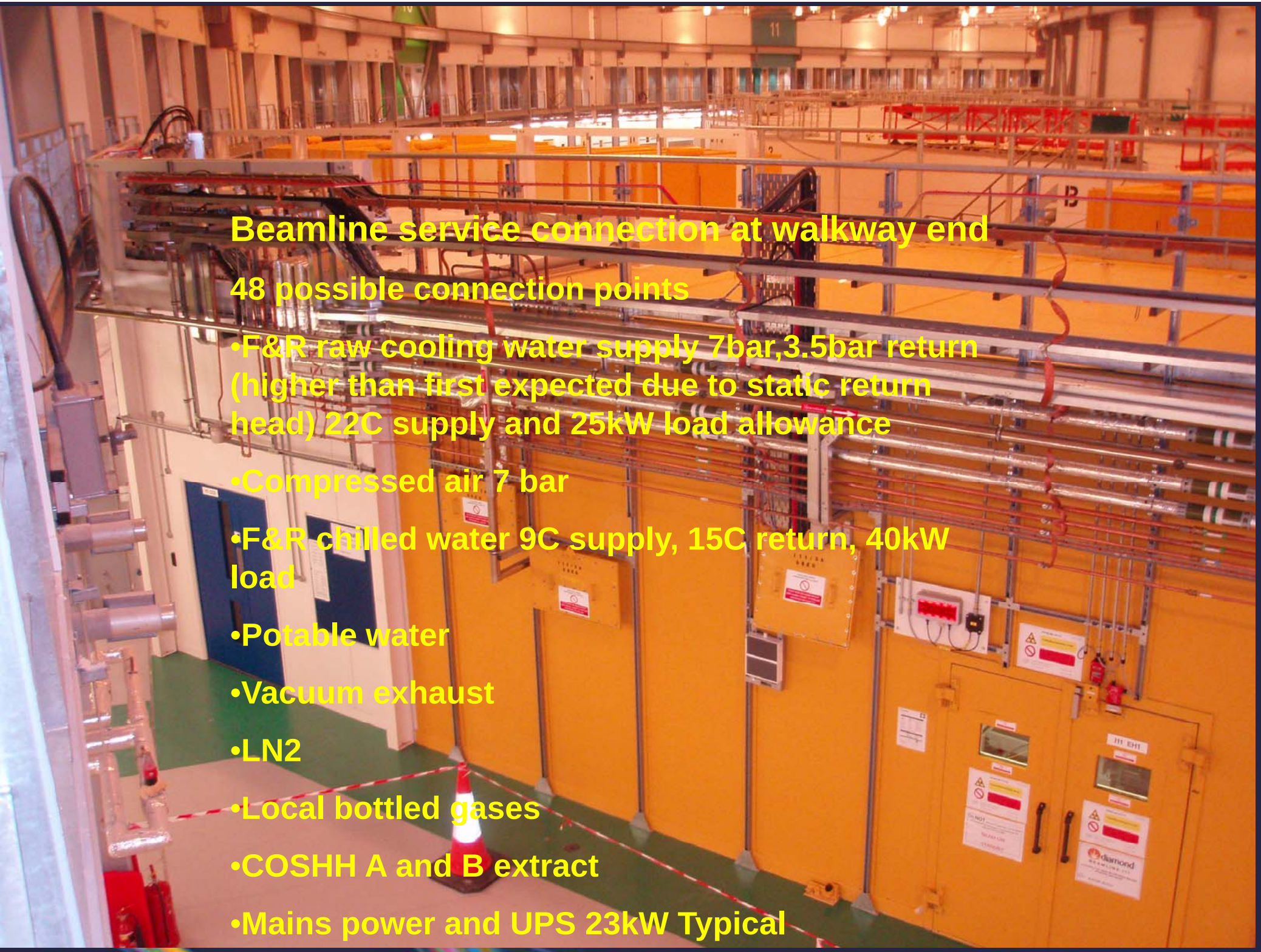
Daytime average floor vibration

20nm RMS 1-100Hz

Night time average

12nm RMS 1-100Hz

Focus on improving Monochromator stability



Beamline service connection at walkway end

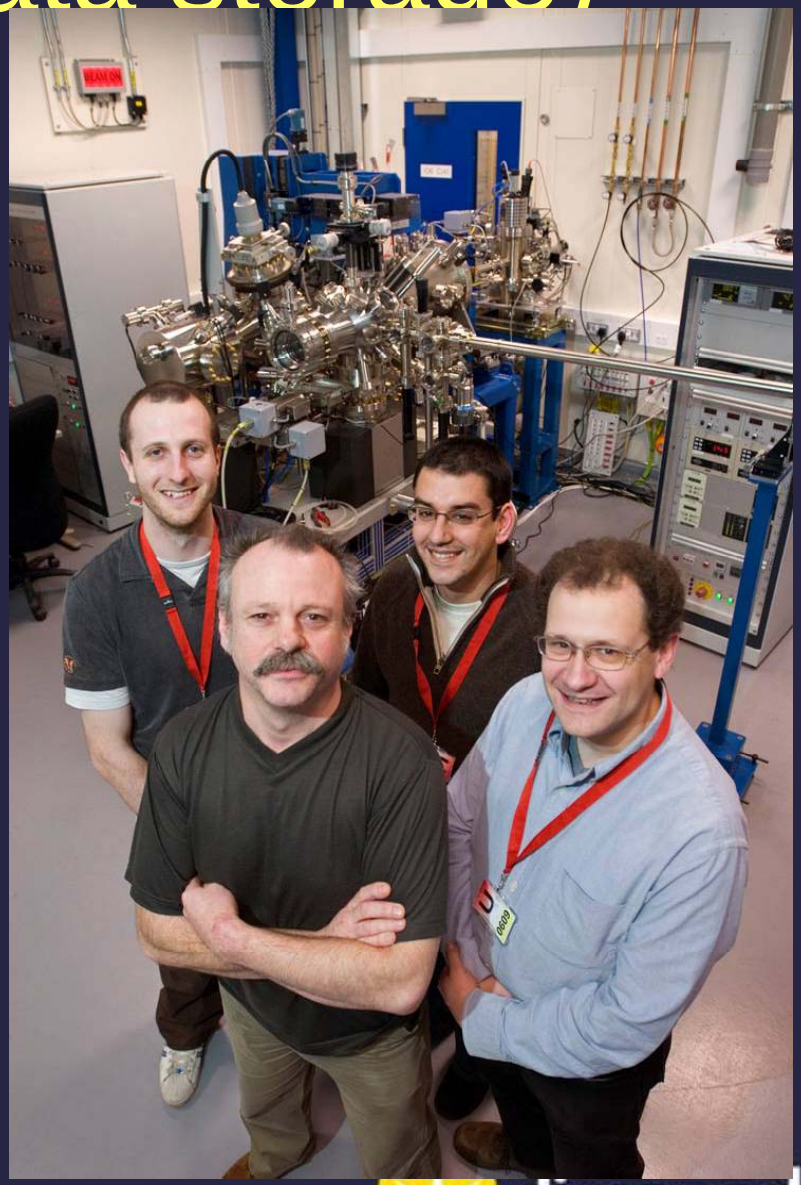
48 possible connection points

- F&R raw cooling water supply 7bar,3.5bar return (higher than first expected due to static return head) 22C supply and 25kW load allowance
- Compressed air 7 bar
- F&R chilled water 9C supply, 15C return, 40kW load
- Potable water
- Vacuum exhaust
- LN2
- Local bottled gases
- COSHH A and B extract
- Mains power and UPS 23kW Typical

Diamond First Users I06 (Computing & data storage)

- **Chris Binns** & team – **Univ. of Leicester**

- Studying the properties of magnetic materials for use in applications such as electronic data storage.



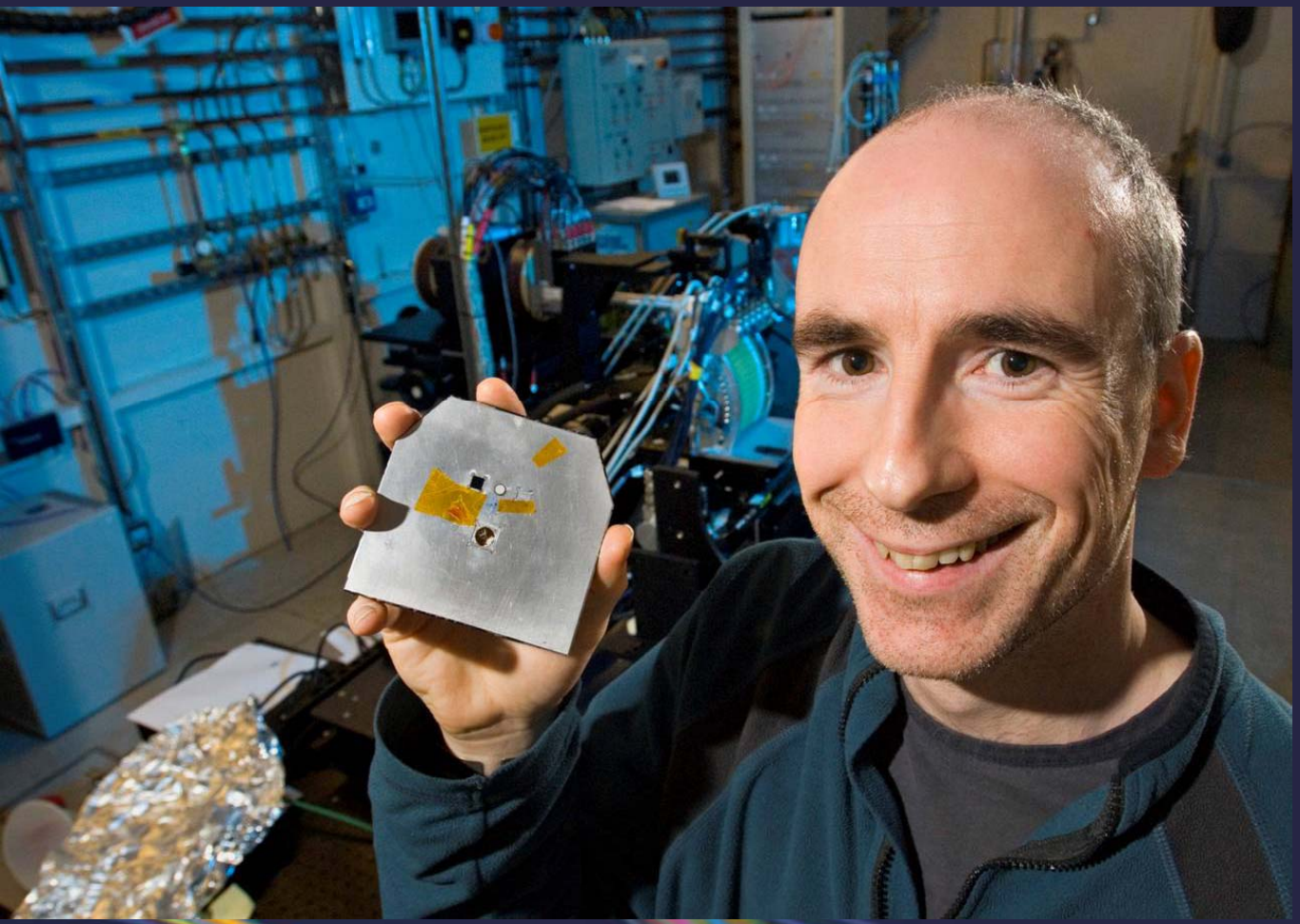
Diamond First Users I16 (Sensors & data storage)

Brian Tanner & David Eastwood, University of Durham

- Examinations of new sensors to be used in computer components that ‘read’ the magnetic information stored.

Diamond First Users I18 (Understanding the Universe)

Dr Paul Schofield, Natural History Museum -
with samples of the Santa Catharine meteorite



- Examining the composition and structure of a meteorite

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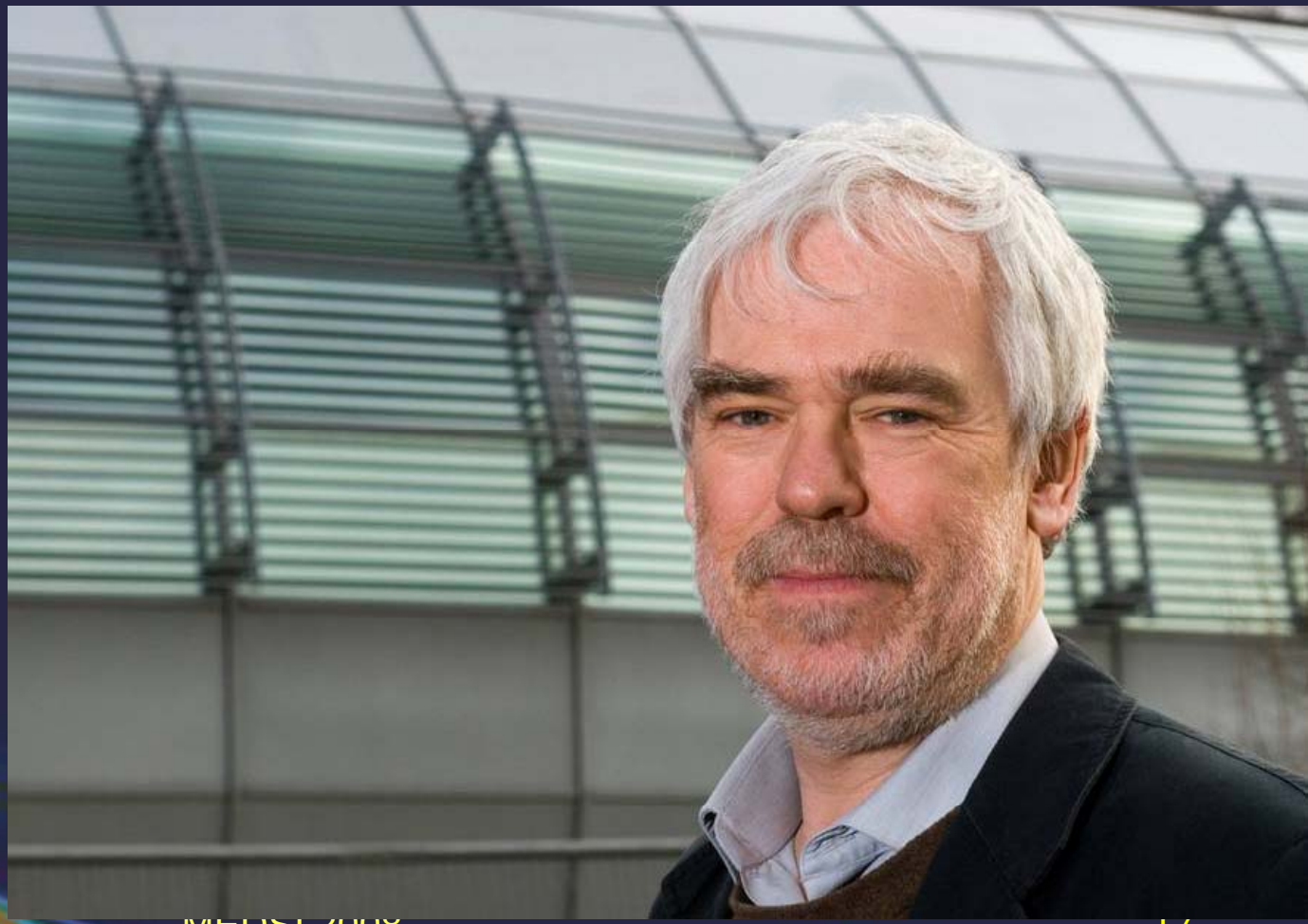
First Users – I03 (Medical applications)

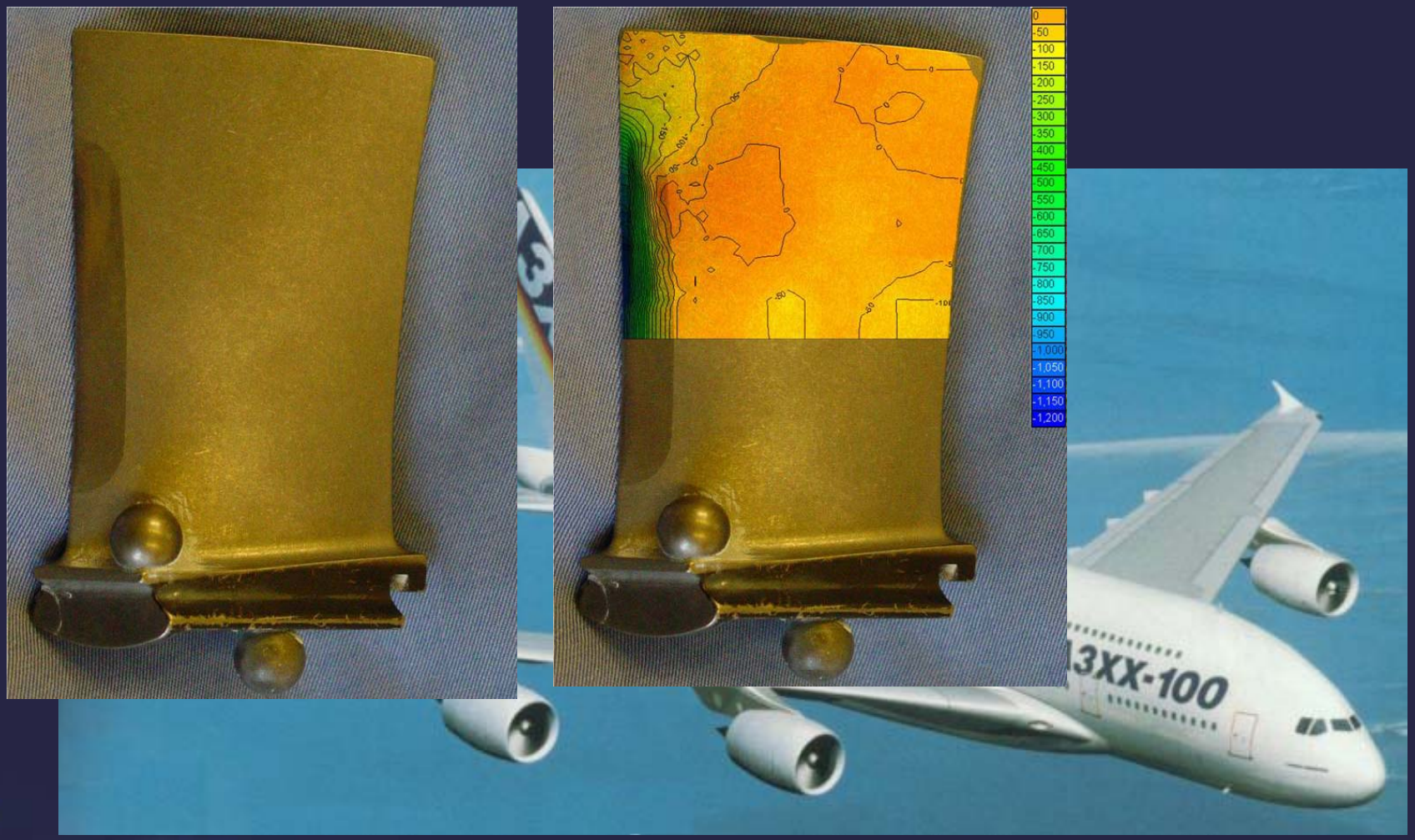
Dave Stuart, University of Oxford

- Using X-rays to understand the structure of a protein molecule (Ephrin) that is found in our cells & linked to the development of cancer.

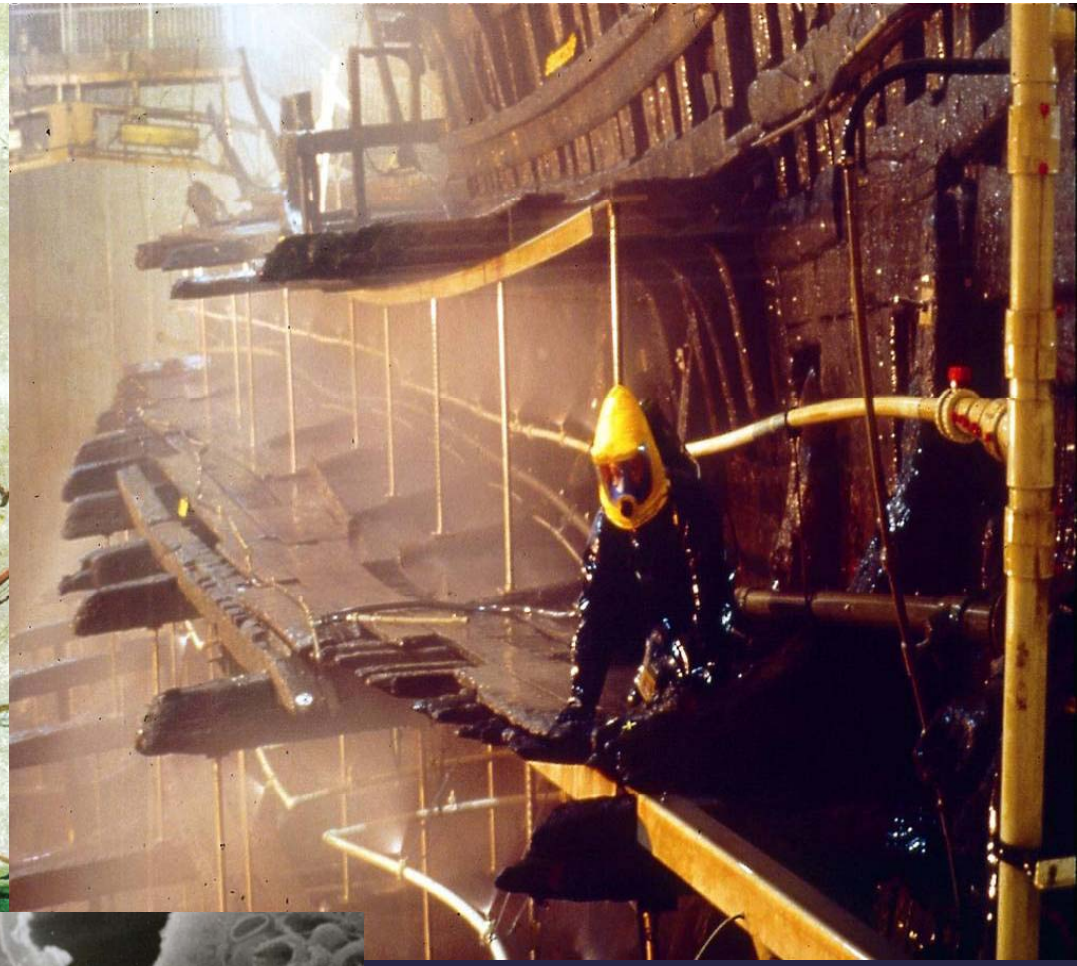


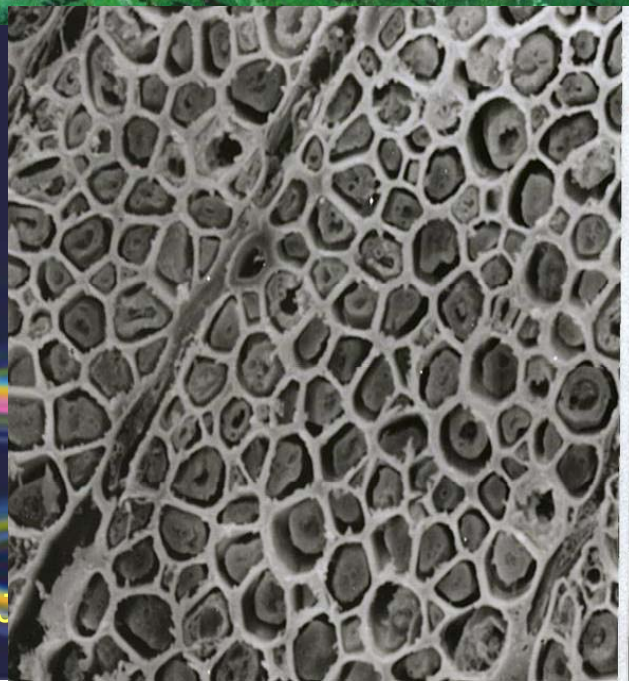
Project funded by Cancer Research UK & MRC

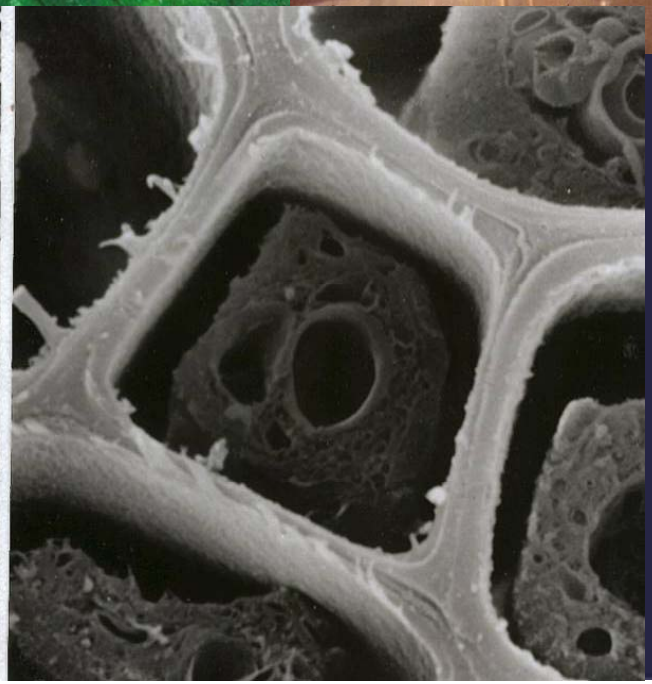
Strain mapping on I12



In collaboration with Rolls Royce







Courtesy of
Dr Mark Jones,
Mary Rose Trust

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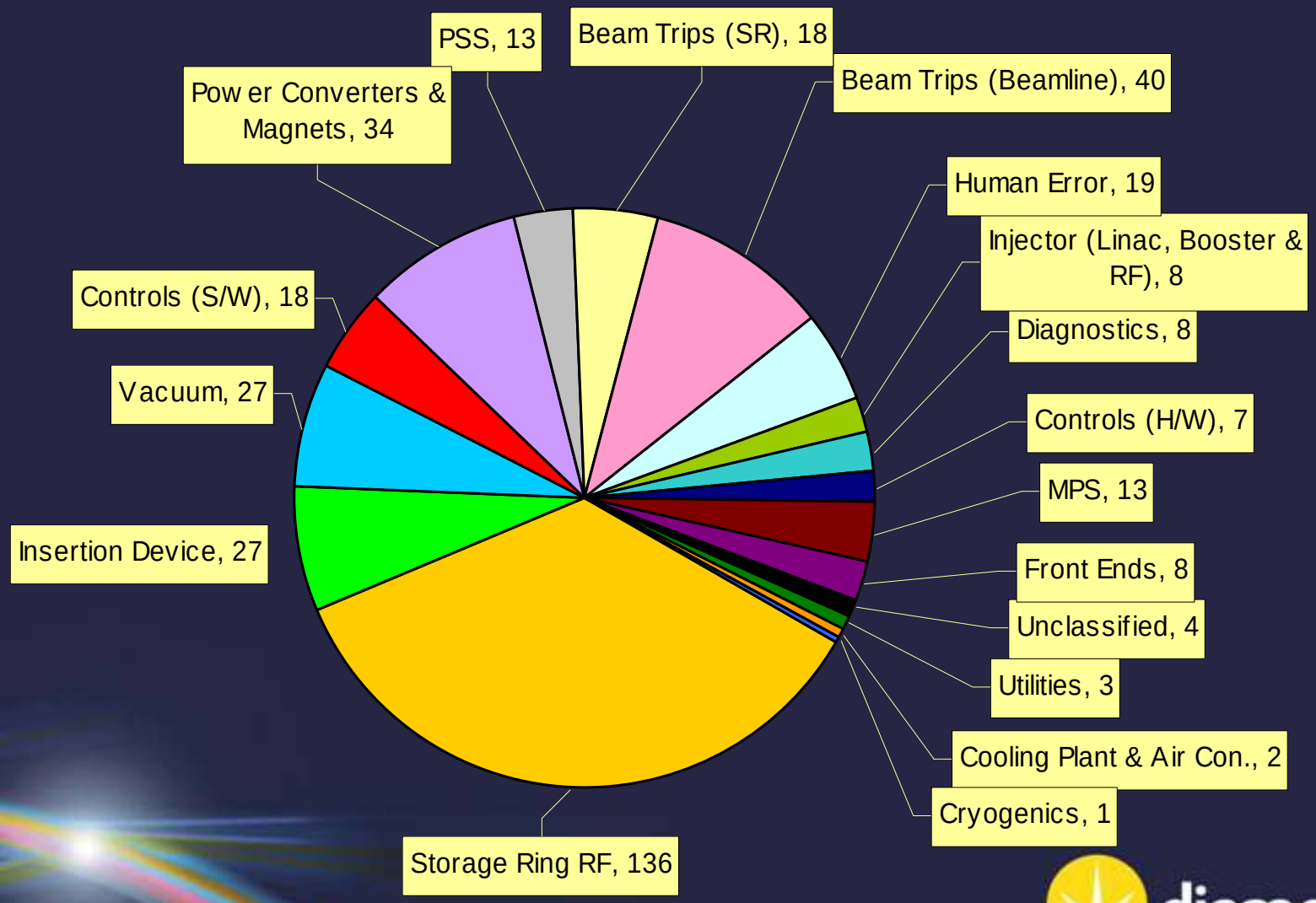
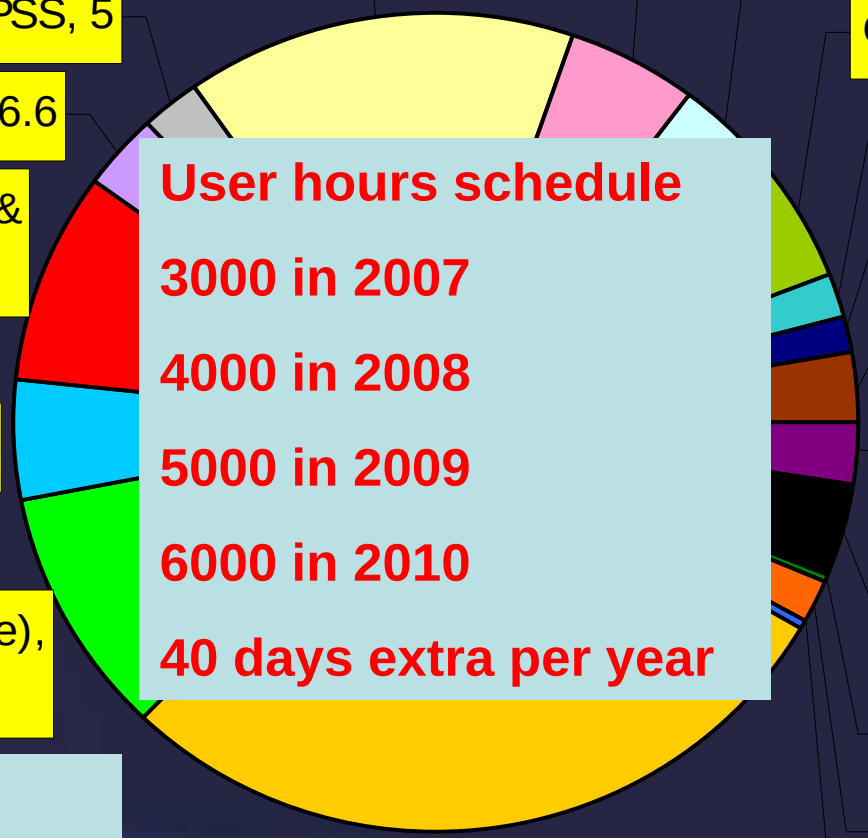
Diamond 2007 User Beam trip faults



Diamond 2007 User Beam trip hours



User hours schedule

3000 in 2007

4000 in 2008

5000 in 2009

6000 in 2010

40 days extra per year

MTBF 8 Hours

MTTR 0.5 Hours

Conclusion

- Diamond Facility Update
- The Future?
- 11 beamlines now, 4 more in October
- Top-up later in 2008
- 300mA for 2009, no plans for 500mA
- 10 Phase 3 Beamlines for 2013/14
- Next Light Source for the UK
- Any questions?

Diamond Light Source

Looks forward to welcoming you at MEDSI 2010

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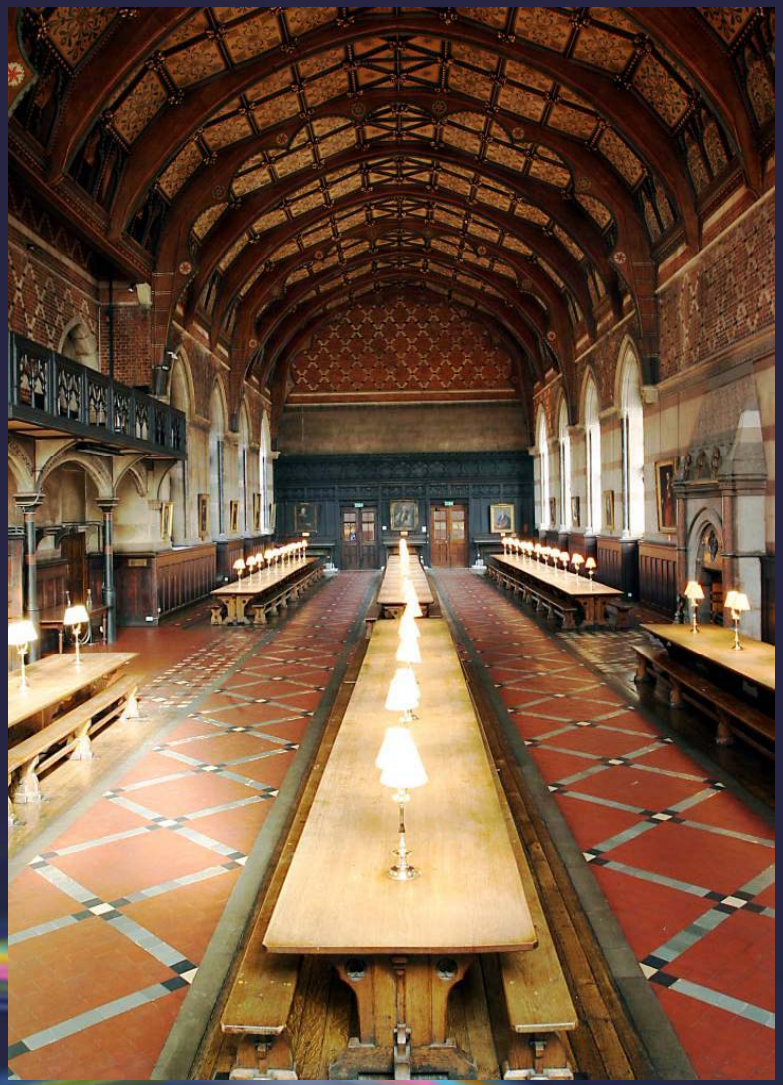
Keble College, Oxford



- College of Oxford University, founded in 1870

- In the heart of Oxford, one of the most beautiful cities in the UK and an hour from London

- Accommodation and facilities all within the college

Keble College Oxford

MEDSI 2010 in Oxford

- A conference in the beautiful surroundings of Keble College
- Access to historic Oxford and beyond
- Close to Diamond Light Source
- See you then!