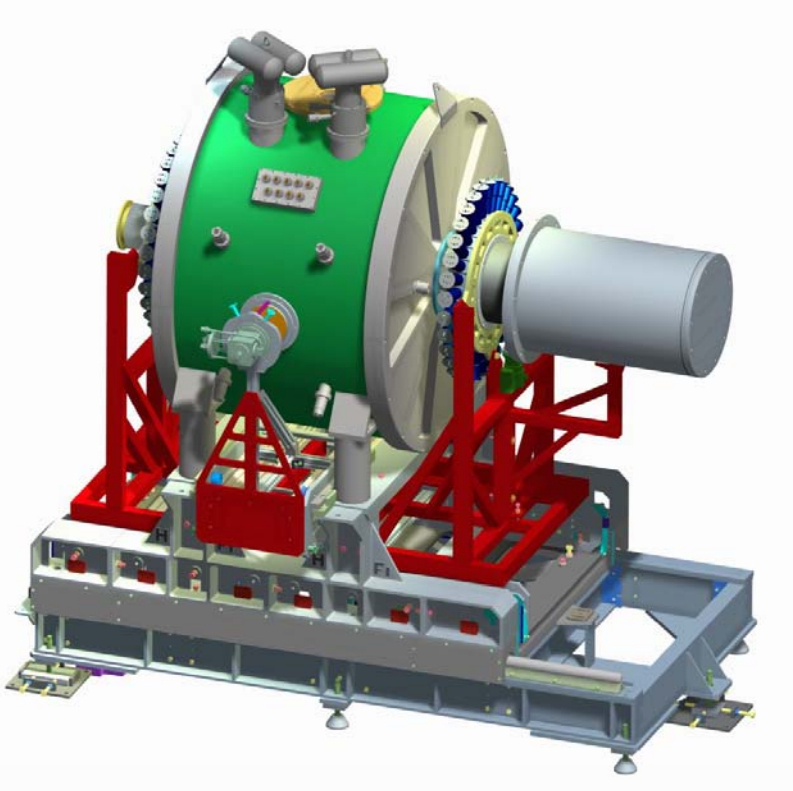
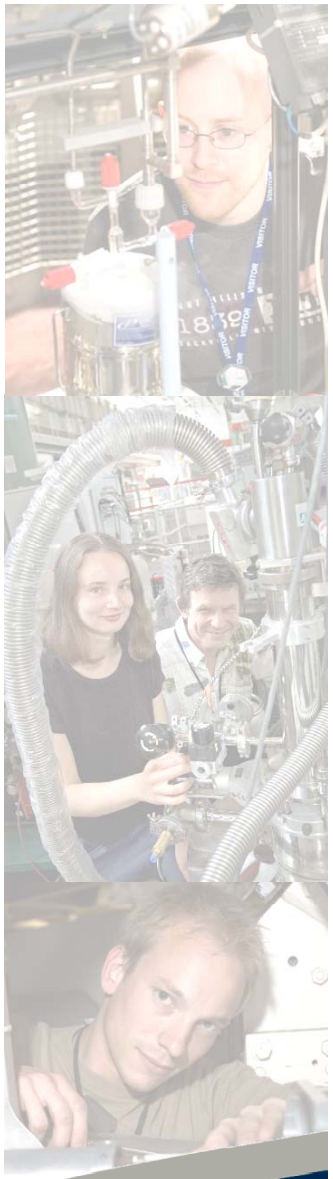
FP7 Muon JRA Meeting
30 March 2009, PSI

HiFi – the new ISIS high field spectrometer

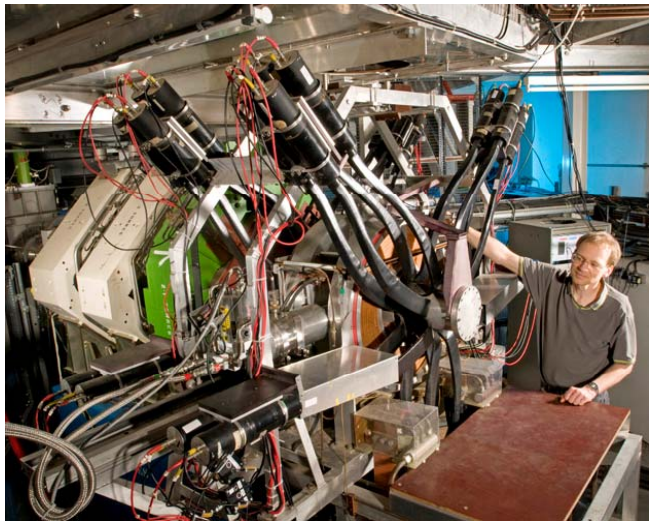
(but first, a brief update on other ISIS developments)

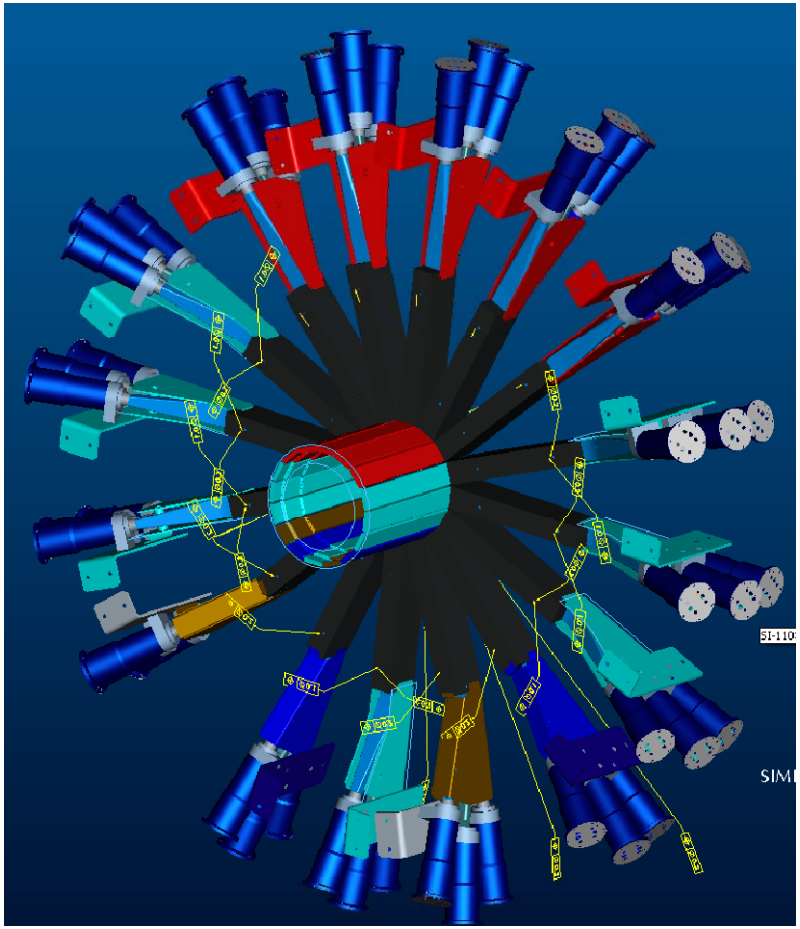


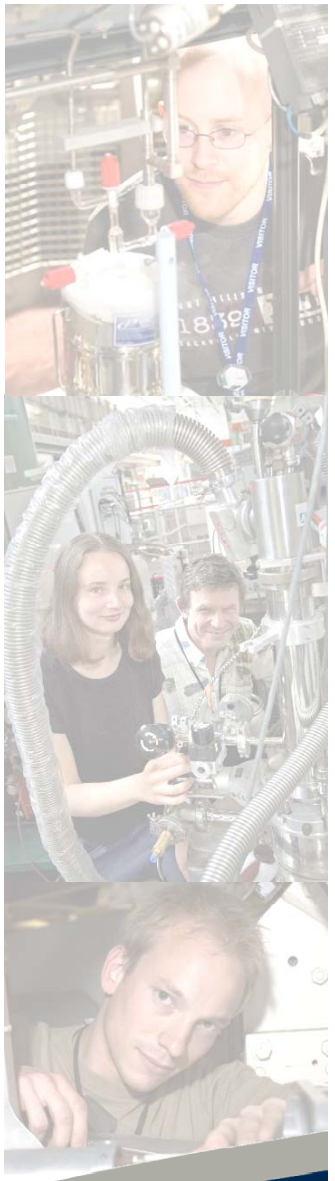


Science & Technology Facilities Council
ISIS

Developments: EMU



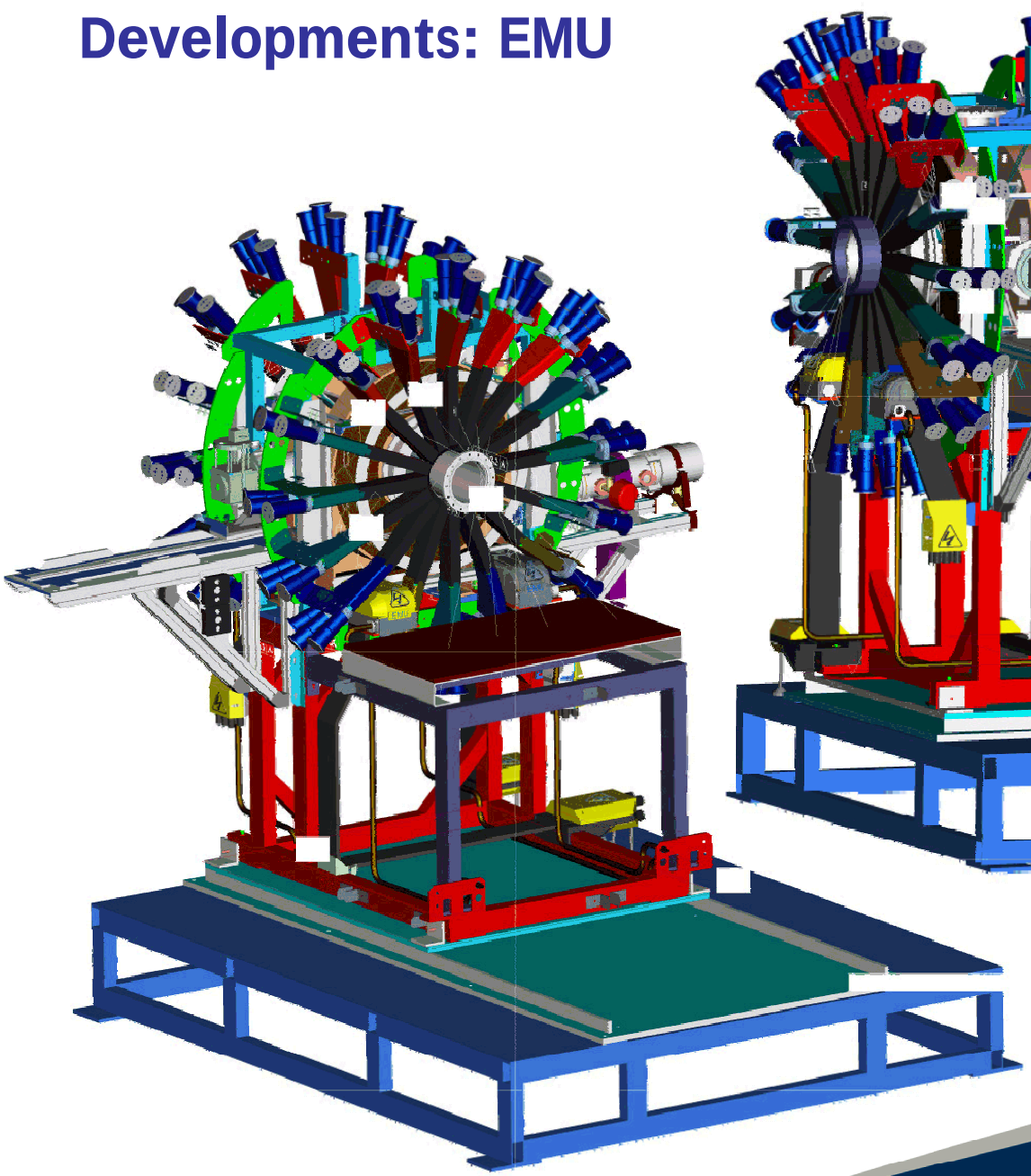


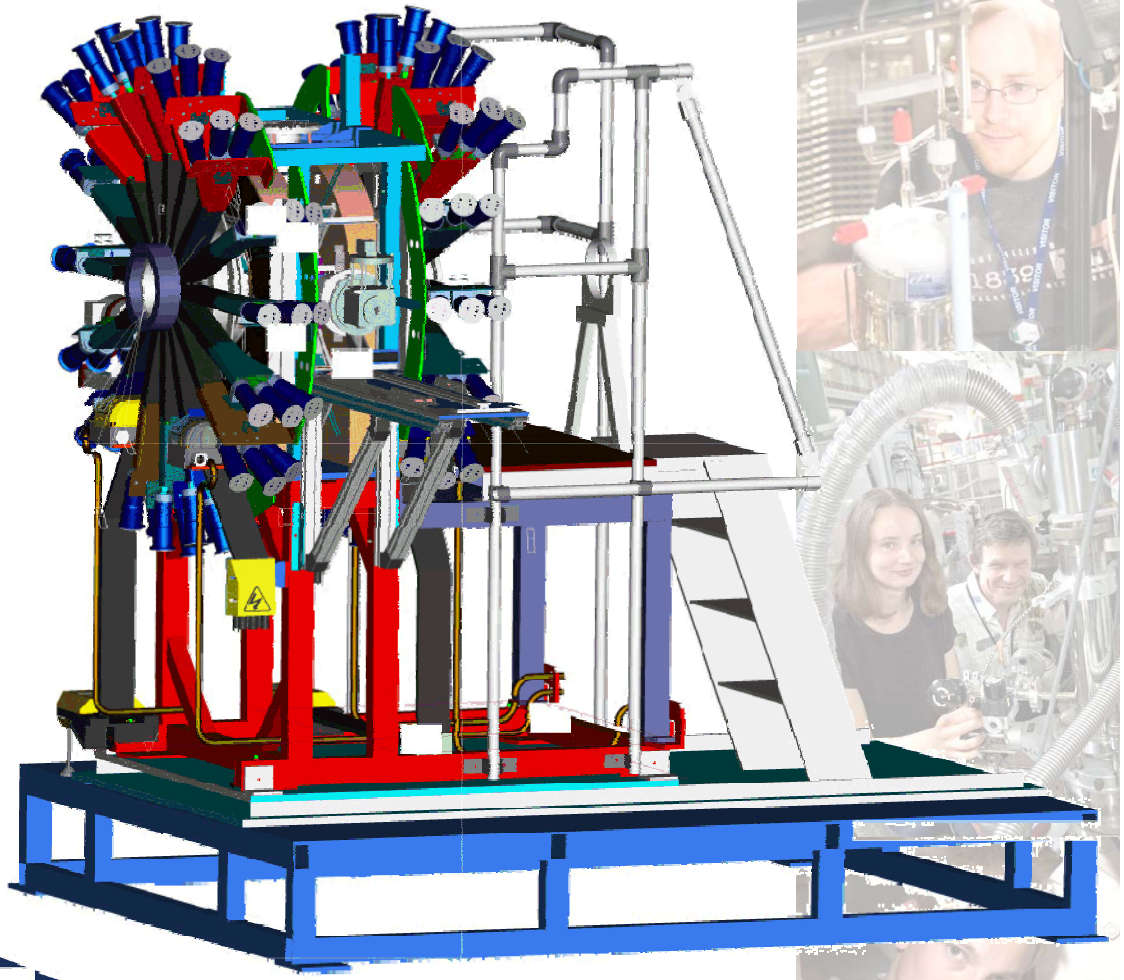


Aims:

- To increase data rate, up to 70MeV/hr
- To improve ‘fly-past’
- To extend SE access
- To allow laser access

Developments: EMU



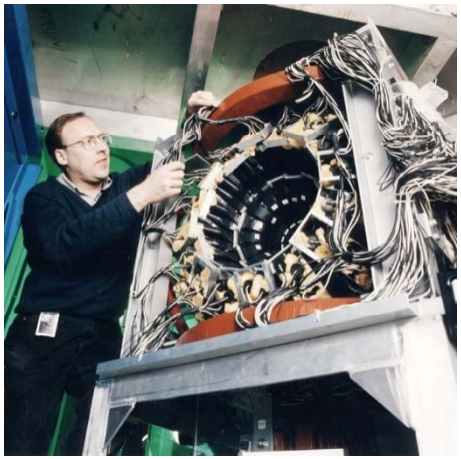


Installation:
late 2009

Science & Technology Facilities Council
ISIS

Developments: RIKEN-RAL

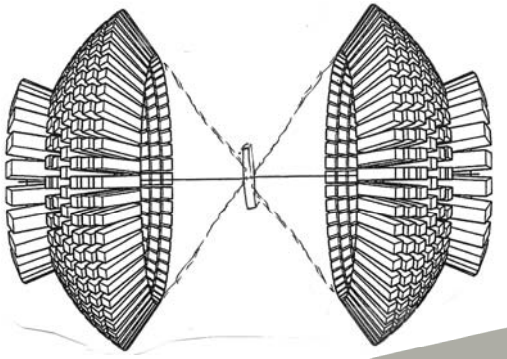
ARGUS (Port 2)

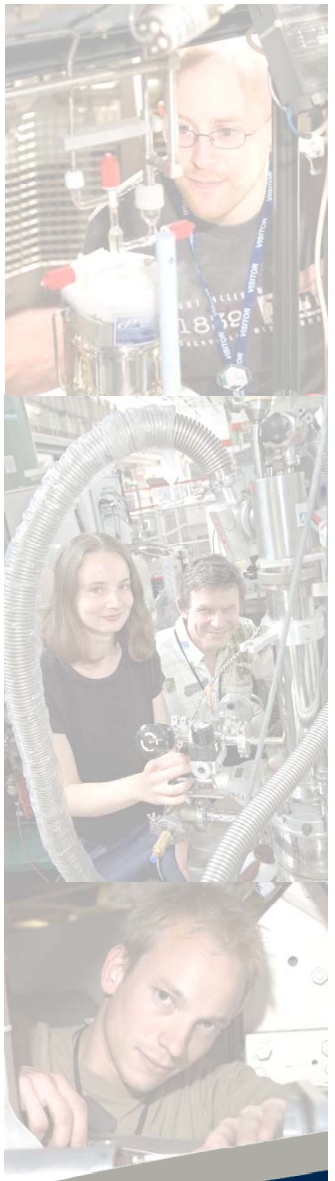


Laser stimulation

6kbar pressure cell

New spectrometer (Port 4)





Science & Technology Facilities Council

ISIS

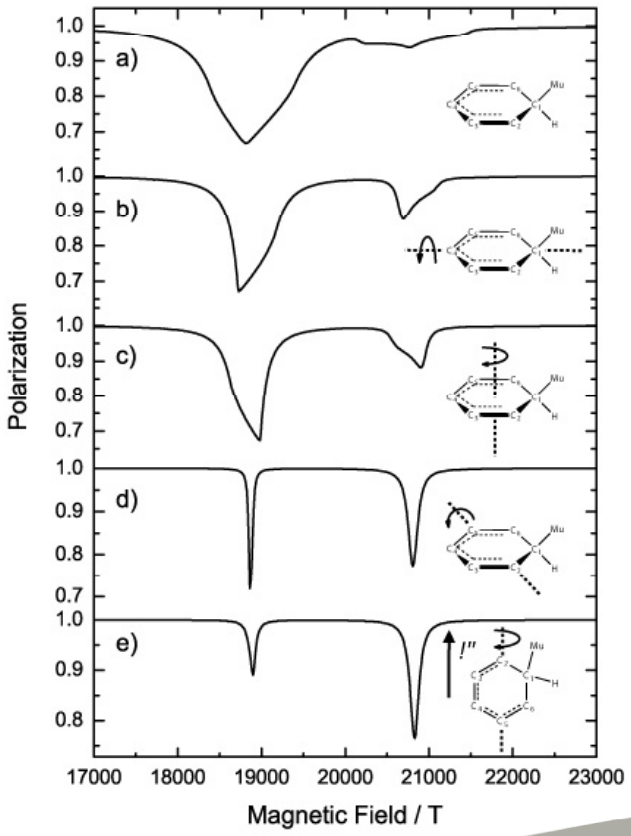
HiFi

Aims:

To provide a spectrometer with ~5T applied LF for:

- dynamics studies
  - good ramp rate
  - large / rapid field steps
  - fields as high as possible
- ALC
  - good homogeneity and stability
  - small field steps needed
  - switched fields needed
  - fields > 3T
- state preparation
  - changing field polarity may be needed
- RF-μSR (e.g. decoupling)
  - good homogeneity and stability
  - small field steps needed
  - high rates needed
  - fields >2 T

c/o Iain McKenzie

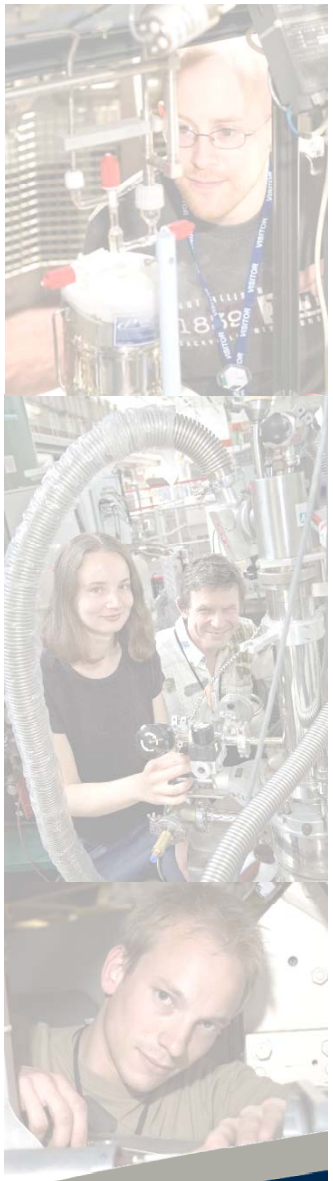


Science & Technology Facilities Council
ISIS

HiFi

Magnet specs:

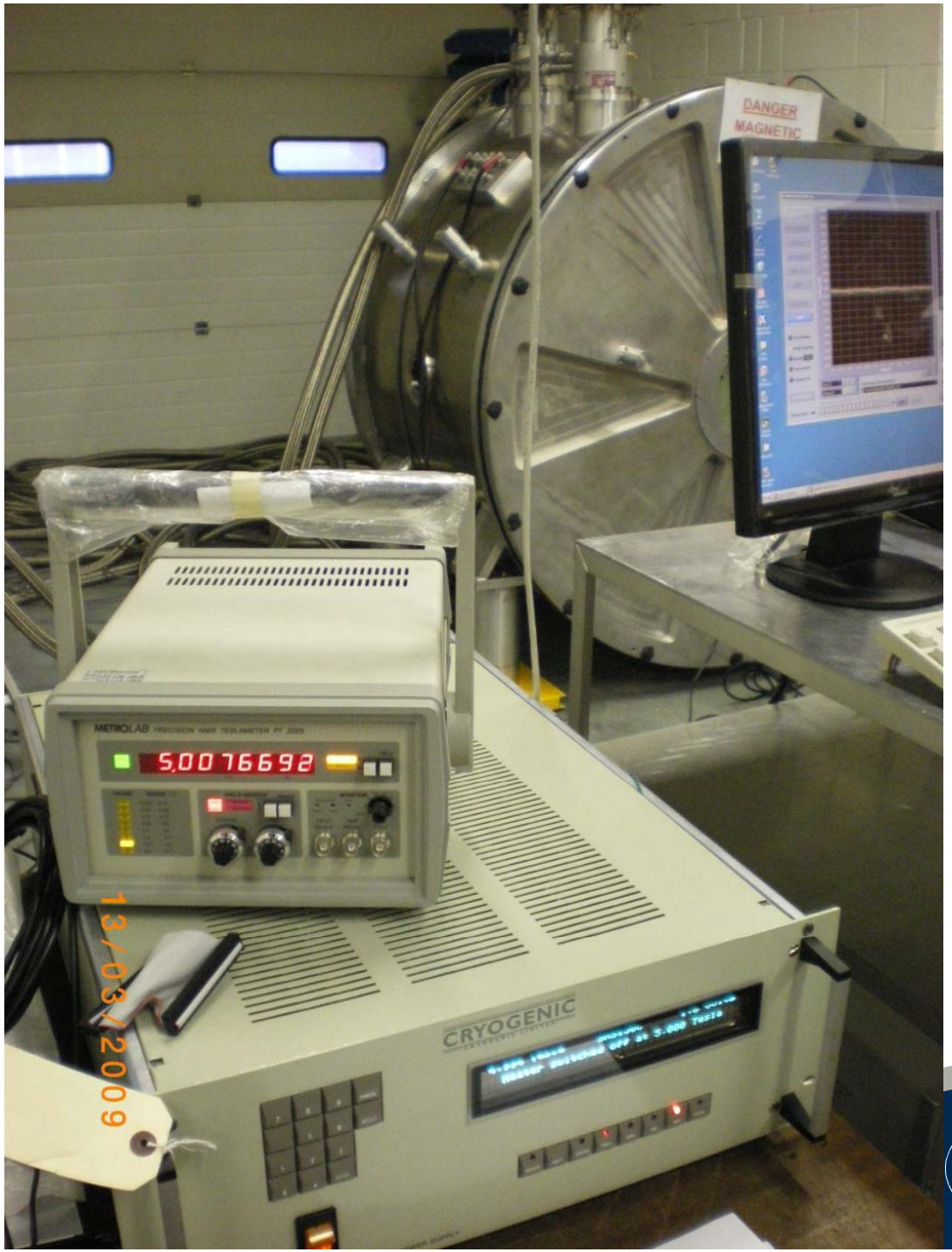
- 5 T main field, longitudinal
- + 400 G auxiliary field (for field switching, e.g. ALC)
- + 2 x 200 G transverse fields
- Stray field: 2 G at 3 m
- Cool-down for system: ~4 days (cryogen-free)
- Stability: 50ppm over 12 hours (persistent mode)
- Ramp rate: 1T in 10 mins
- Homogeneity: 20 ppm over normal sample volume
- Split pair to allow flexible SE access
- Good alignment of geometric and field axes
- Labview control

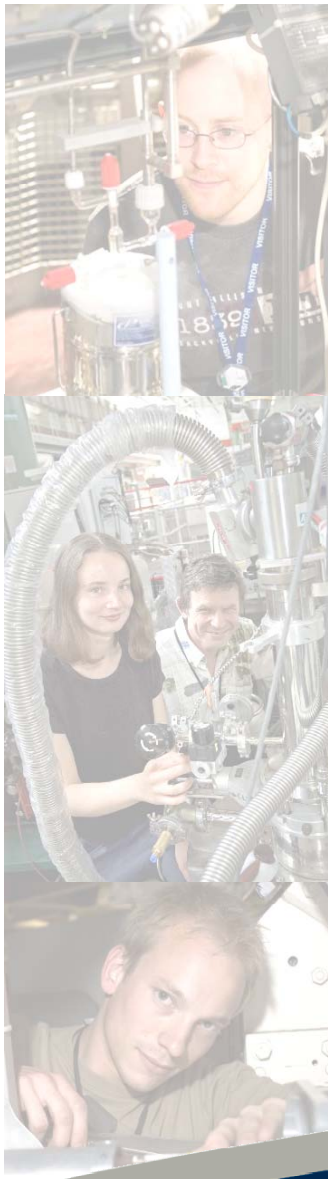


HiFi

Science & Technology Facilities Council
ISIS

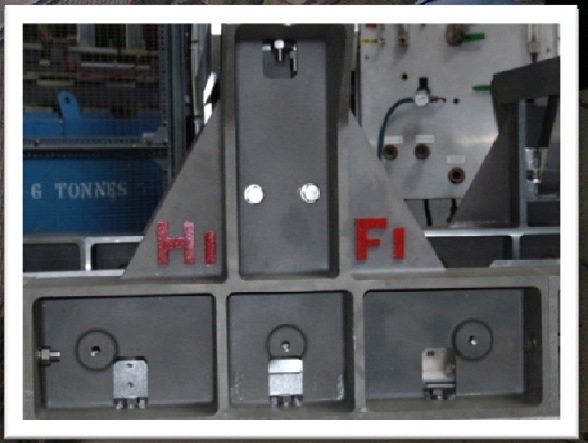
HiFi

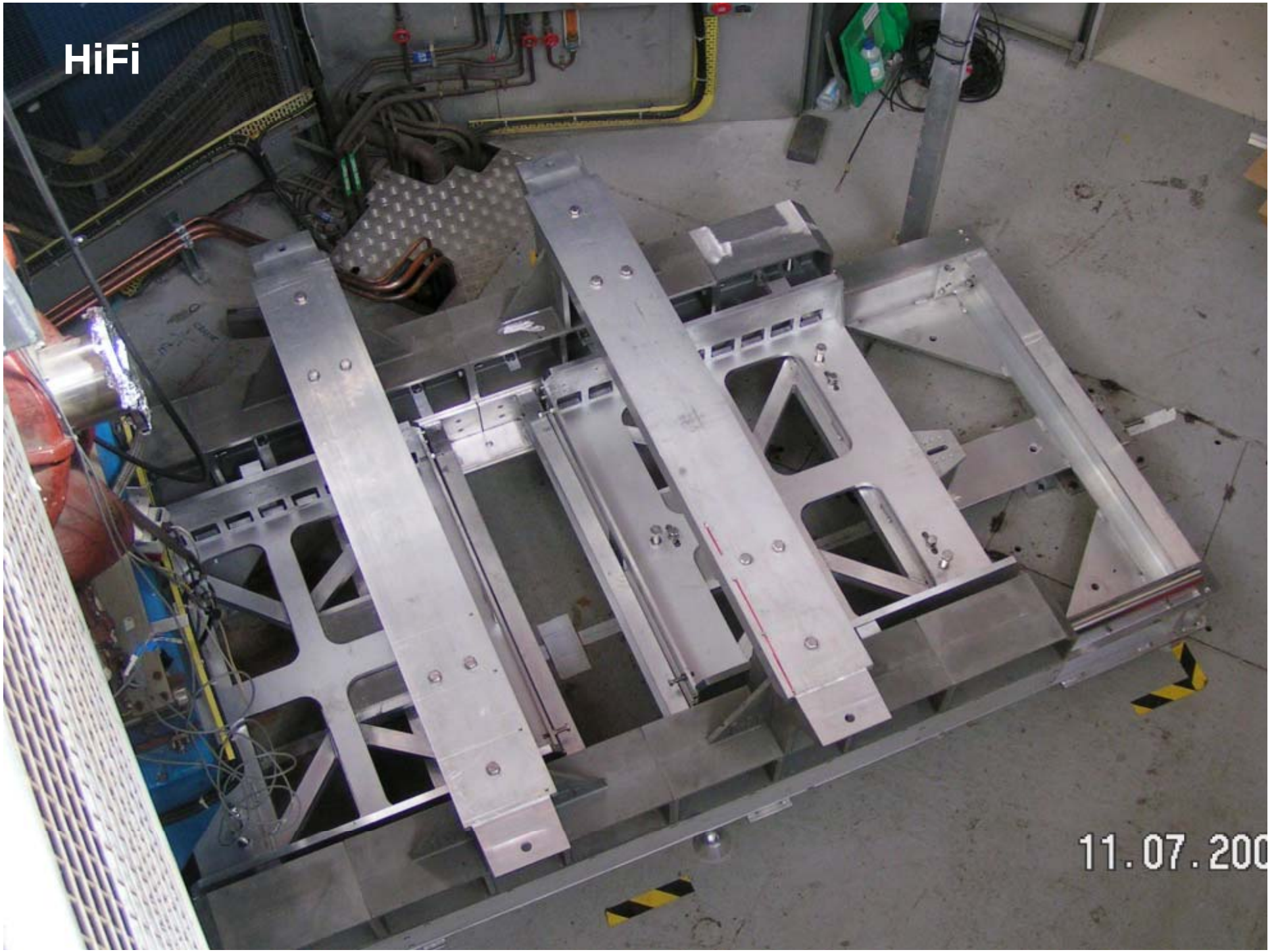




Science & Technology Facilities Council
ISIS

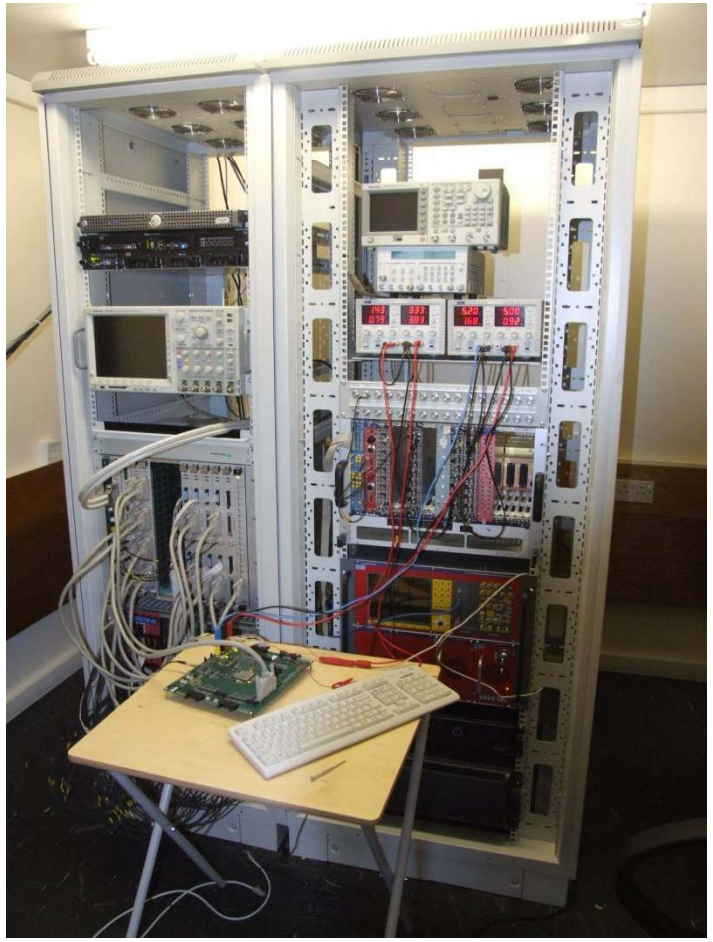
HiFi

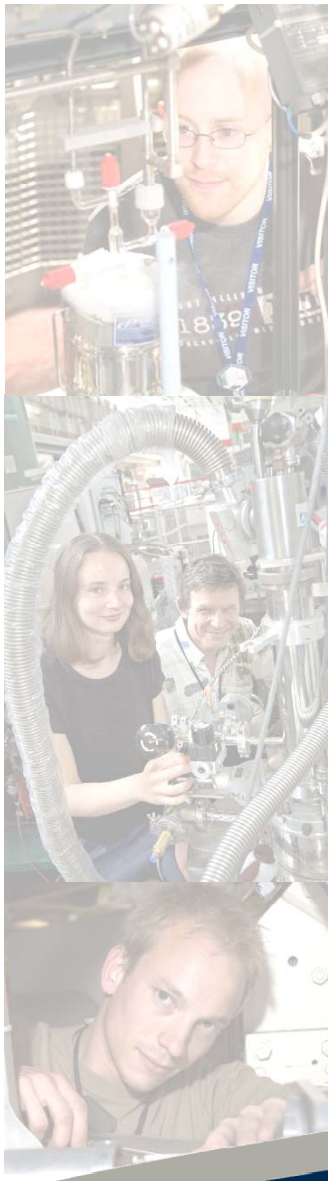



HiFi
11.07.200

HiFi

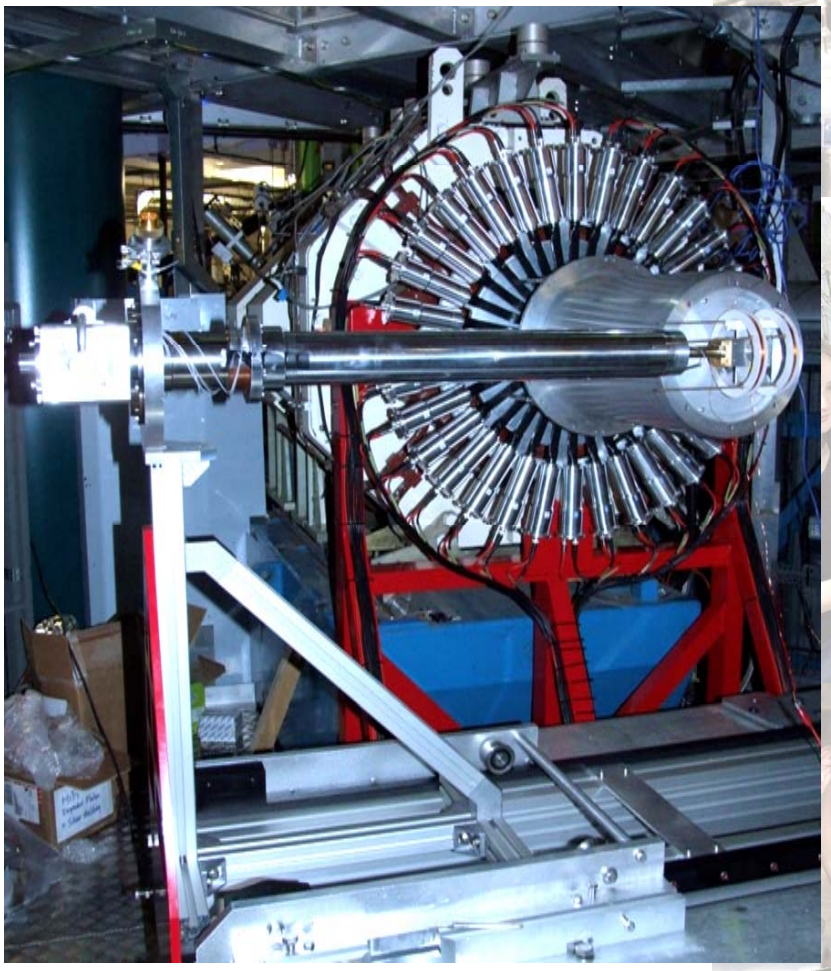
HiFi

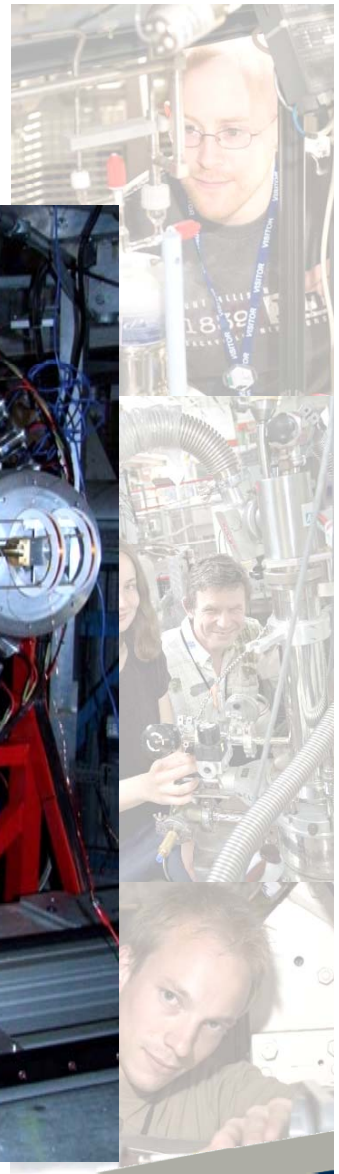




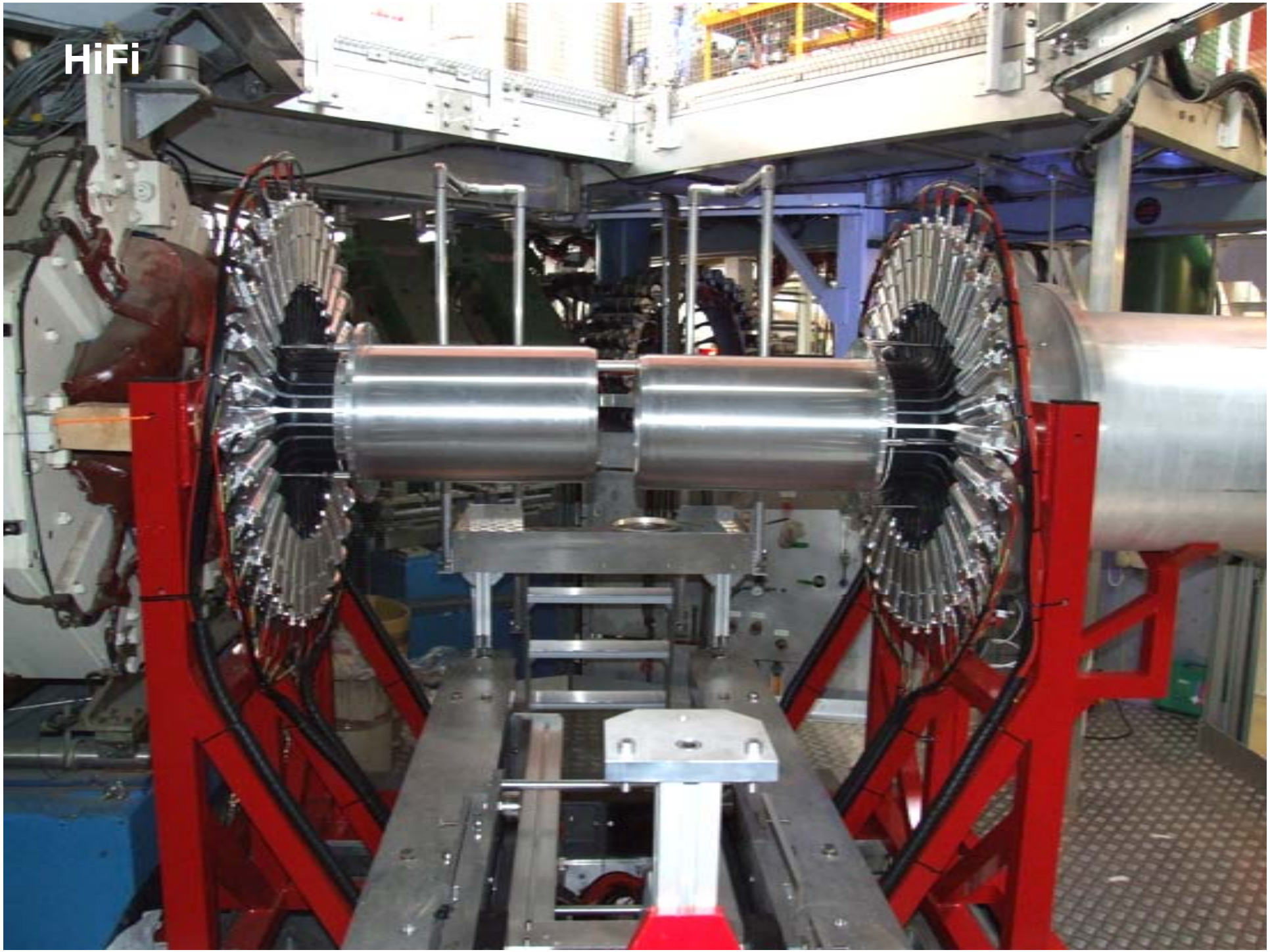
Science & Technology Facilities Council
ISIS

HiFi



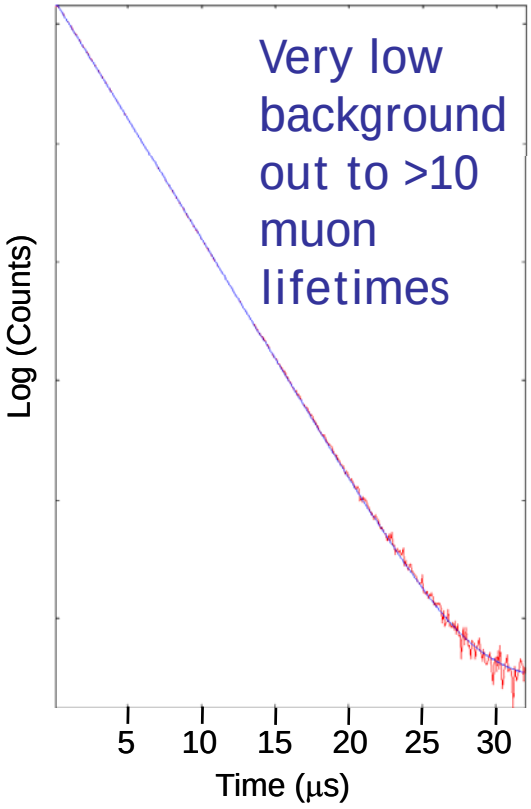


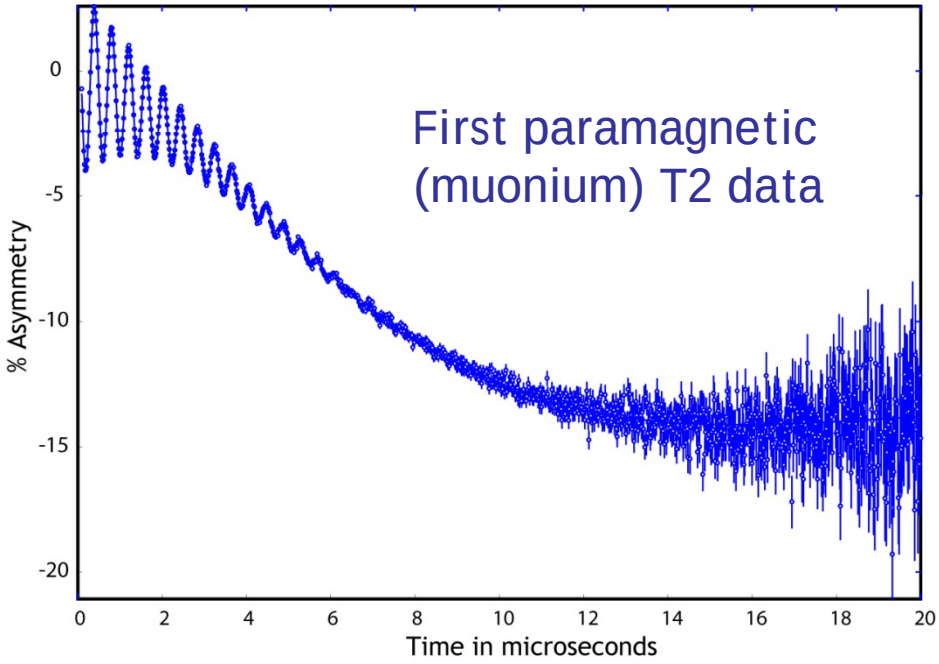
Science & Technology Facilities Council
ISIS

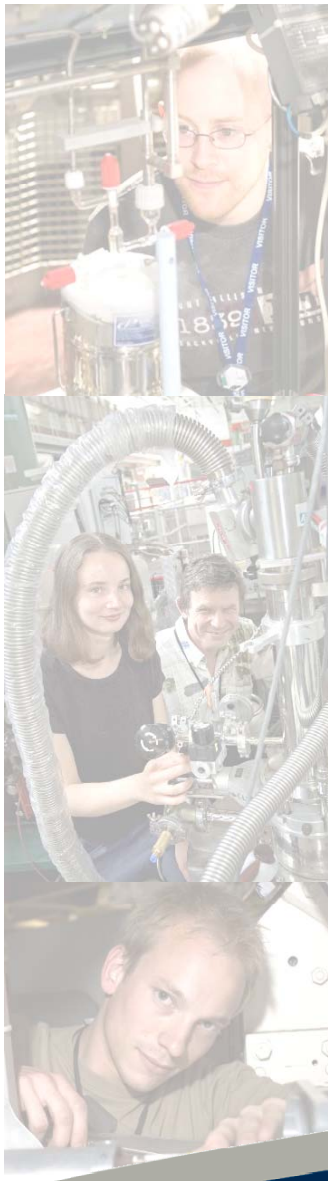

HiFi

HiFi

ZF, T2 and T20 data taken so far
Data rates ~50 MeV/hr

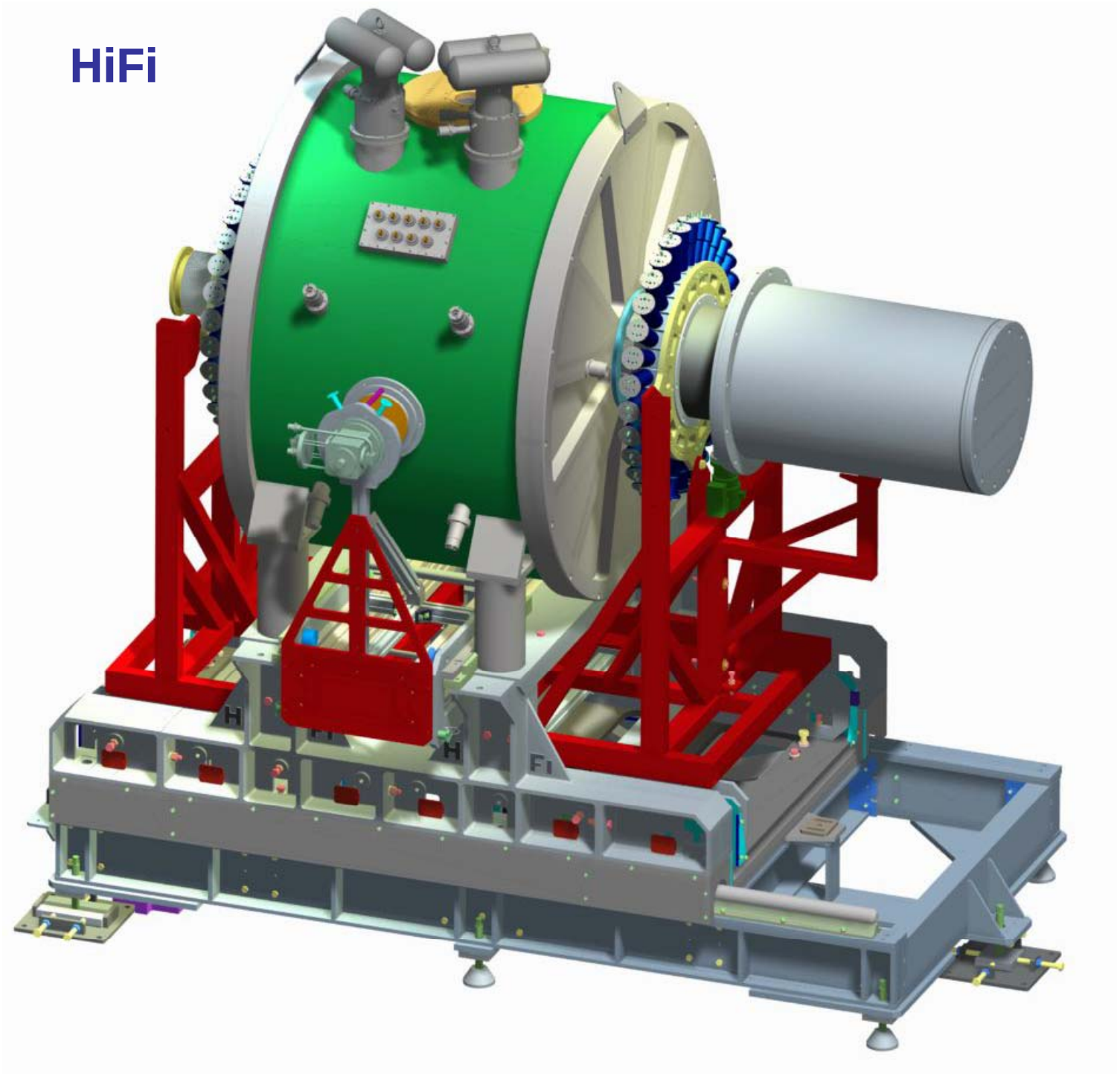


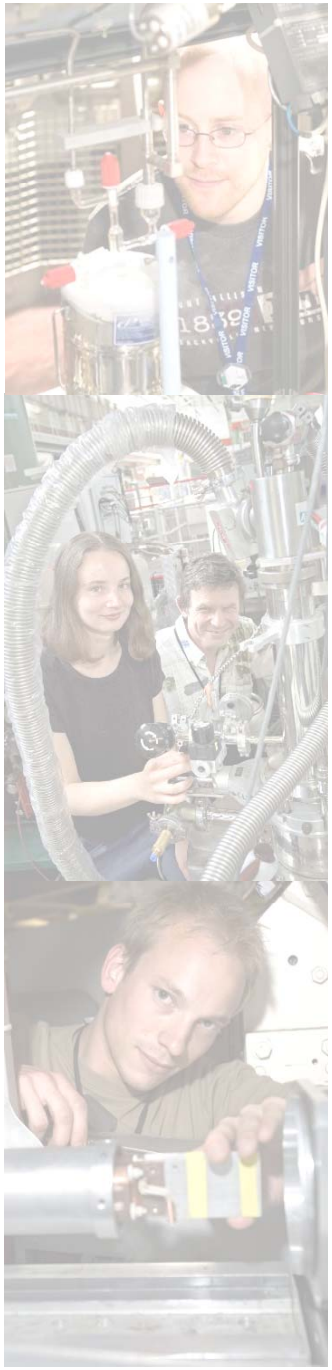




Science & Technology Facilities Council
ISIS

HiFi

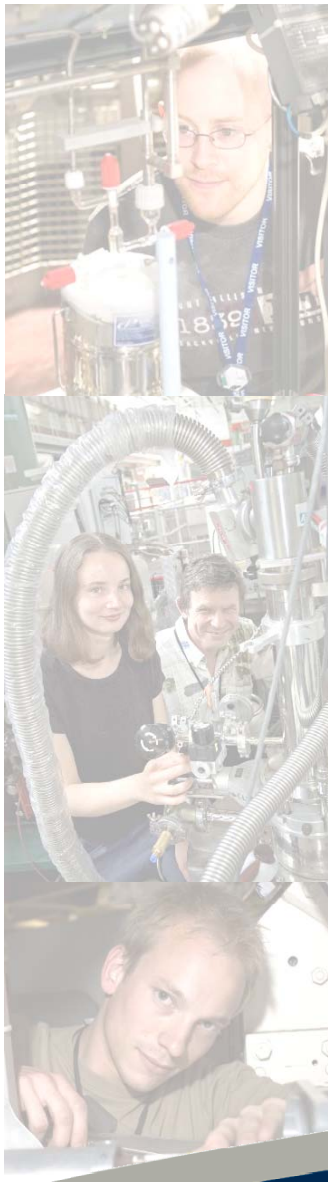




HiFi

Sample environment:

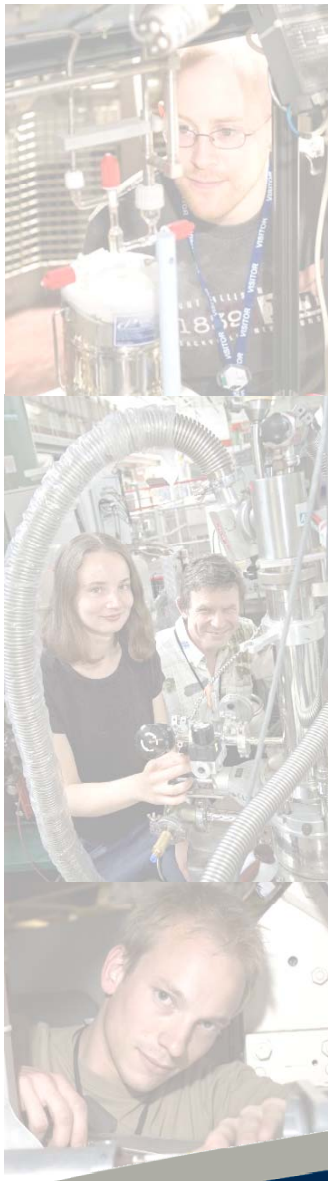
- Dilution fridge (25mk – 300K): delivered from Oxford Instruments, tested and accepted
- ^{4}He cryostat (1.5K – 400K): in manufacture at Cryogenic
- Flow cryostat (4K – 300K): on order from Oxford Instruments
- CCR (10K – 600K): manufactured in-house, being tested
- Reflector furnace (300K – 1500K) manufactured in-house, to be tested



HiFi

The next steps:

- Magnet acceptance tests at Cryogenic Ltd: March
- Magnet delivery and on-site commissioning: April
- Open for proposals: 16 April deadline
- Beam / spectrometer commissioning: May – June
- Commissioning experiments and SE commissioning: July – August
- Proposals being run: October onwards



JRA

JRA Task 20.2: Technologies for high field instruments

Development of detector technologies and array designs, supporting the ongoing programme at both STFC and PSI to develop new muon instruments operating at magnetic fields of up to 10T.

D 20.2.1.1	Demonstration of fast timing detector (PSI)	20
D 20.2.1.2	Report summarising detector performance (PSI)	35
D 20.2.2.1	Design document for a 10 T transverse field instrument detector array (PSI)	28
D 20.2.3.1	Document describing the performance of the 5 T longitudinal field spectrometer at currently in development (ISIS)	22
D 20.2.3.2	Publication of instrument performance and test results in scientific journal (ISIS)	26