

FOCUS COIL STATUS

OXFORD

V. Blackmore

J. Cobb

W. Lau

RAL

V. Bayliss

T. Bradshaw

M. Courthold

R. Preece

S. Watson

DARESBURY

T. Hartnett

S. Griffiths

I. Mullacrane

P. Owens

C. White

Apologies if I have omitted anyone

FC Modules contain

- Two coils which can be operated in:
 - ‘Solenoid mode’ = same polarity
 - ‘Flip mode’ = opposite polarity
 - Much more demanding:
 - ~ 2 x higher currents
 - ~ 2 x higher fields at conductors
 - ~ 4 x higher forces
 - » 300 (+) tons
 - Coils repel
- Still responsibility of manufacturers

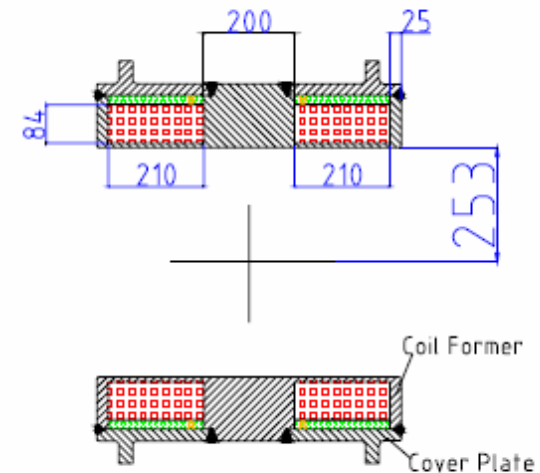


Figure 4 Solenoid cold mass with dimensions

Indirect cooling
Two cryocoolers



First FC arrived at RAL in November 2012

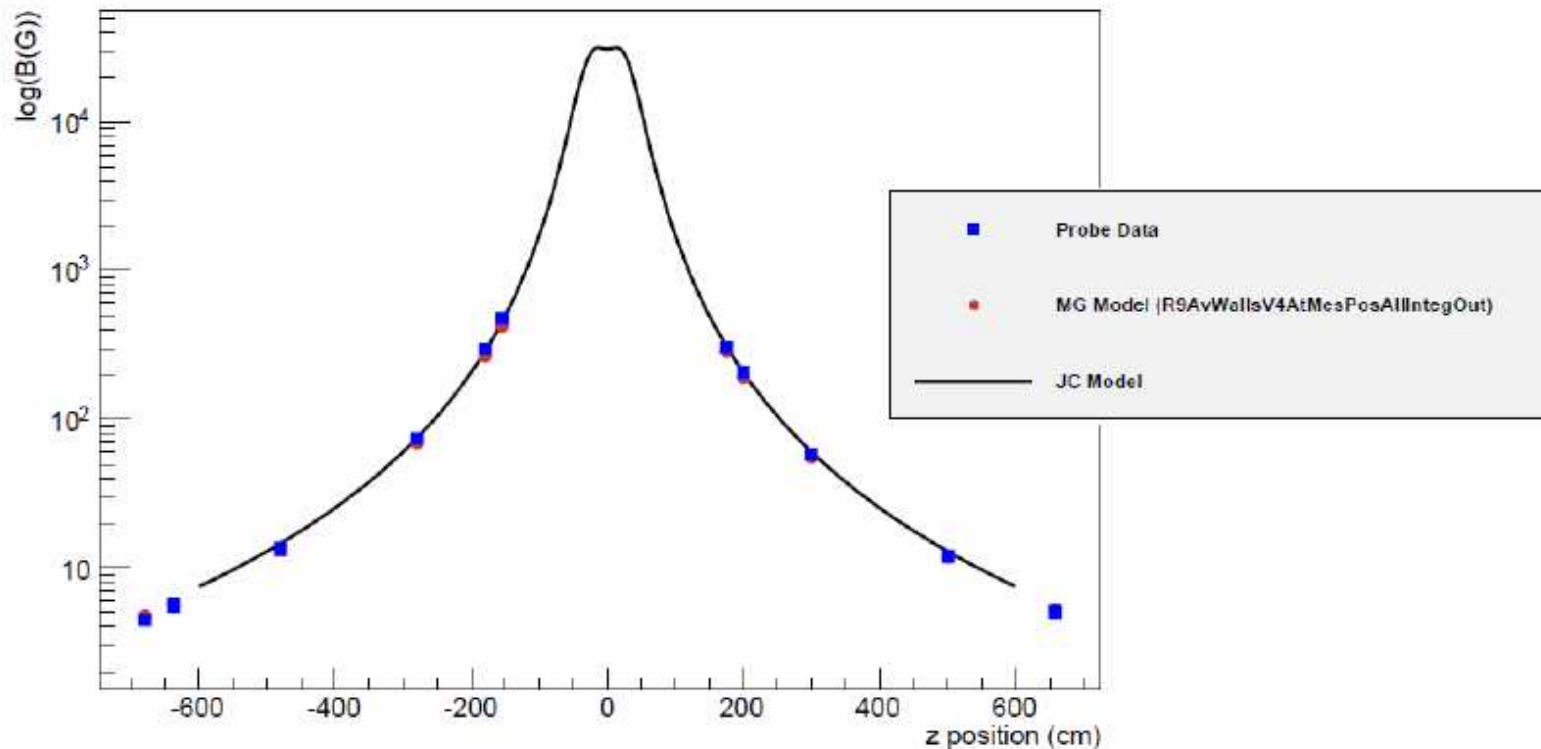
➔ full 'solenoid mode' current of 114 A after 3 quenches on 31 Jan 2013

MEASUREMENTS IN R9

I. Taylor, C. MacWaters *et al.*

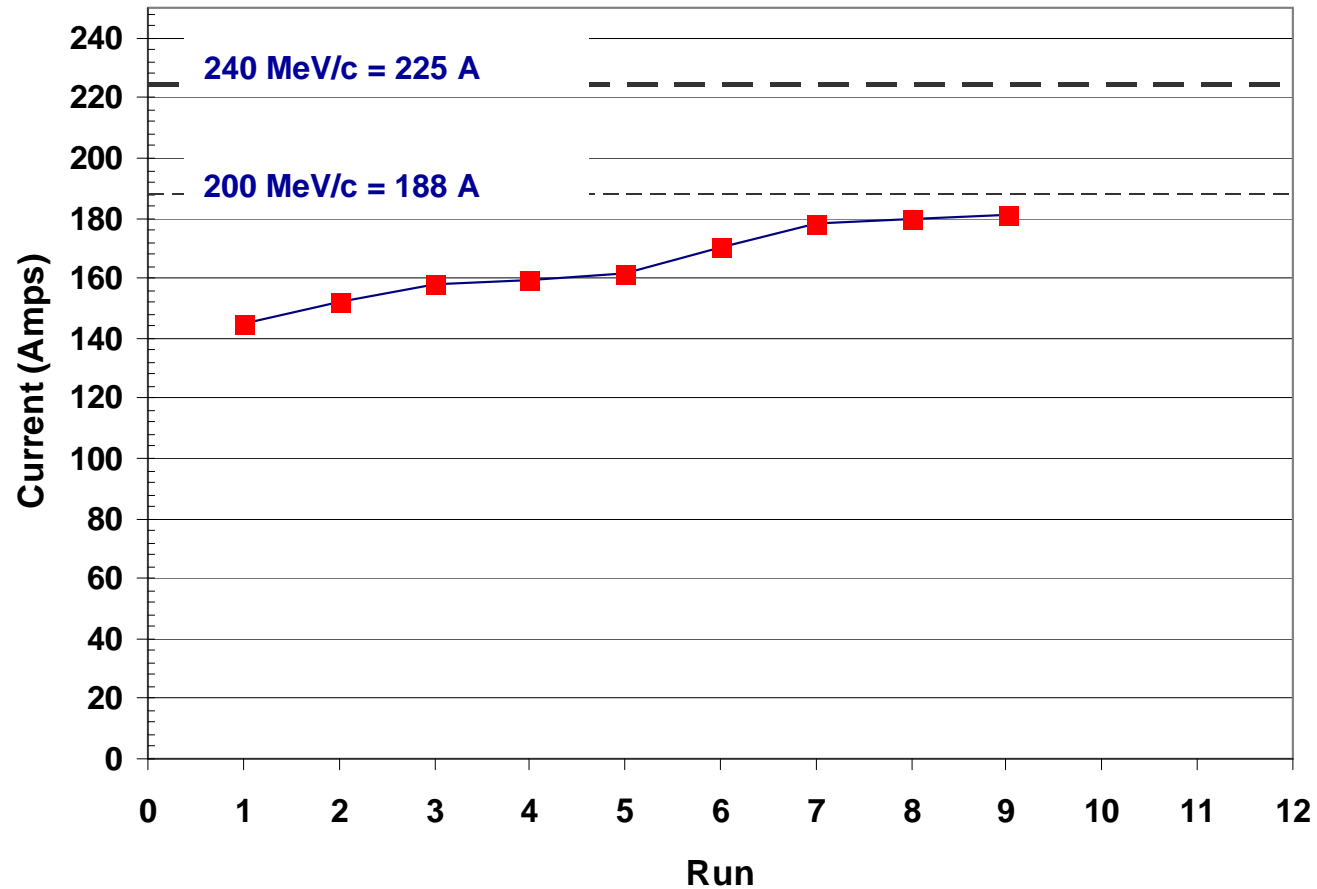
Field at bore height along z axis
(for model V4 using integral fields for all fields)

Comparing model data to probe data at $x=0, y=0$



Blue points are measurements, red points are from Opera model, black line is Biot-Savart prediction.

FC #1 Training Flip Mode



Started training in Flip Mode early February

Positive increments of 1 to 8.6 Amps / run until 14 May

6 June.....

Who leaked the story ??

oxfordtimes.co.uk

The Oxford Times

Now celebrating our 150th year Thursday, June 6, 2013 £1.30

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24 pages of arts and leisure in a pull-out section

HOMES

PROPERTY

144 pages of the old, the new and property to let

Magnet fails to attract

Number of influential bodies oppose £35m science centre next to Castle

By Reg Little
rlittle@oxfordtimes.co.uk

A £35M SCIENCE centre is being opposed by heritage groups who say it would block views of Castle Mound, one of Oxford's most historic sites.

The proposed visitor attraction has been designed by a leading architect to showcase science expertise in Oxfordshire.

But it is **strongly** opposed by English Heritage, Oxford Civic Society and Oxfordshire Architectural and Historical Society, while Oxfordshire County Council, which sold the site for £2.5m, says the centre is "too dominant" and called for "alternative solutions that reduce the effect on the ancient monument".

Most damagingly, the opposition is being led by Oxford Preservation Trust, which oversaw the transformation of the castle site, once home to a Victorian prison, into a successful heritage centre.

Science Oxford, the charity behind the scheme, wants to create in New Road the UK's first Discovery and Innovation Centre, with a world-class planetarium.

It would also be home to 50 local high-tech companies. Plans were submitted to Oxford City Council in April.

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Richmond Letcombe Regis Care Home

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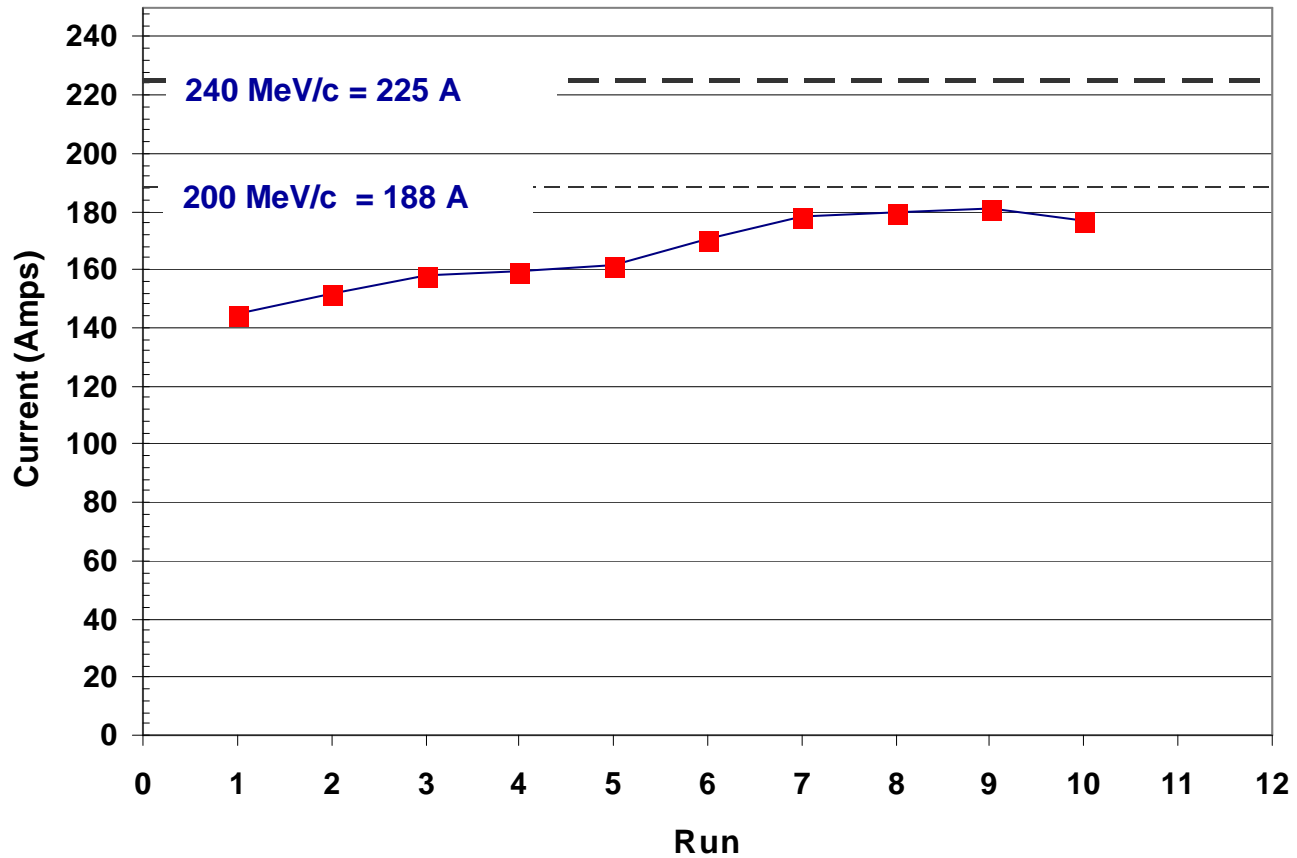
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South Street, Letcombe Regis,
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01235 313081
www.richmond-villages.com/letcombe

FC #1 Training Flip Mode



Last ramp up on 11 June: Negative (– 4 amps) increment

Not what we wished but – apparently – not unknown during training

One difference: no 50A overnight soak

COMMENTS (1)

- The ten training runs took a long time to achieve:
 - Cost of LHe (& availability of mfr's personnel)
 - £3.5k for 500 litres of LHe ~ 2 – 3 quenches
 - if we use LHe to cool down after a quench
 - most of the ~ 2MJ stored energy dumped in cold mass
 - Who pays was bone of contention
 - Can condense enough – 14 L – He from bottles in ~ 10 days
 - 'Free' – someone pays but 10 x cheaper than liquid
 - Last runs used that

COMMENTS (2)

- We know:
 - Same coil quenches first each time – not (e.g.) HTS leads
- We also know:
 1. Some insulation between stages of cryocoolers was omitted
 - for a good reason at the time
 - reduces cooling power $1.5 \text{ W} \rightarrow \sim 0.2 \text{ W}$
 - limits ramp rate, dI/dt , to 75 mA / sec
 ~ 10 hours to charge
 - but temperatures seem OK ($T(\text{bobbin}) = 4.45\text{K}$)
 - Should be plenty of margin
 2. Insufficient pre-tension on Cold Mass suspension to support maximum force expected in STEP VI from quench of one CC
- ***Neither of the above should affect performance now***
 - but must be fixed

IS IT SIMPLY TRAINING?

A.N. Expert: “Looks like training”

A.N. Otherexpert: “Judgment call”

M. Wilson’s book: “Solenoids > 50cm diameter hard to train”

American Magnetics (www.americanmagnetics.com/magnetp.php):

*“Premature quenching can also occur if the large forces between coil sections result in the motion of one coil with respect to another. **This is most likely to occur in magnets having coils that are wound in opposition. Such coils are used in bucking coil magnets...**”*

Nobody really understands training

Or there could be a problem with one (or both) coils

We want to test module #2 asap

MODULE #2 STATUS

- Cold mass aligned in OVC to better than 50 microns (7 June)
 - (lovely portable CMM machine)
 - Minimal pre-tension on supports
- Sensor wiring checked by DL team
 - Some (few) faults to correct
- **To do:**
 - **Increase pre-tensions whilst maintaining alignment**
 - **Will be tricky**
 - **Mount & connect components in turret**
 - **Leak checks**
 - **Complete radiation shields**
 - **Seal & final leak checks**
- **Delivery to RAL scheduled for end-July**
 - **Andy Nichols will know updated schedule this week**

PLANS

- **FC#1 does not yet meet the acceptance criterion in Flip Mode**
- **We are:**
 - negotiating the next steps with manufacturer
 - organising a meeting to review their QC documentation
- **We intend to:**
 - expedite the commissioning of FC#2
 - **carry out further training of FC#1 while waiting for FC#2**
- ***Subject to the development of a proper plan:***
 - **Training of module #2 should begin in October**
 - **Considerations include space in / use of R9**
- **The performance of FC#2 will inform negotiations**