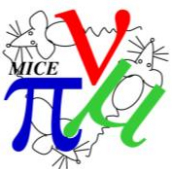




Magnet discussion



A few words from the MICE executive board(s).



Magnet discussion

The MICE magnets are all made following the same model, with the cold mass situated in a vacuum vessel and cooled to Liq. He temperature by cryo-coolers.

→ It is becoming clear that the technological choice of cooling these large magnets with cryocoolers (cheaper and less space-consuming than a large fridge) requires near perfection in both design and execution.

→ It is important for the other magnets that the spectrometer solenoids be sufficiently well understood.

BUT cant turn the MICE experiment into magnet R&D!

The spectrometer solenoid called “magnet 2” has nominal current of 270A. It reached 238A in July 2009 (burned HTS lead) and 257 A in March 2010 (open matching coil – cold leads?)

→ WE ARE CLOSE... BUT NOT THERE.

recall that spectrometer solenoid is additional resp. taken by LBNL in 2006.



The review of November 2009 (Pasquale Fabbricatore, Elwyn Baynham, Tom Bradshaw, Mike Courthold et al) recommended in particular

- *It is very important to improve [the] thermal model to take into account both the LN2 reservoir and the additional cryocooler and apply it to predict the results of cooling down and powering up of magnet 2.*
- That recommendation was not fully satisfied. The modeling of the magnet is not complete enough to allow reliable prediction of its behaviour after modifications.
- Instrumentation was considerably improved but e.g. data logger was lacking

It is evident that LBNL team has much on its plate and is lacking manpower (cryo calculations, daily fabrication oversight of magnet...)

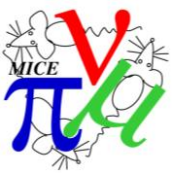
Design was upgraded with an additional one-stage cooler + instrumentation improved. Much improvement (20K!) was observed in region of the HTS leads and thermal shield.

Measurements were made to establish the heat loads and the Helium consumption see note 292 (M. Green)

- they are found higher than anticipated and difficult to understand.(worse than before? -- many hypotheses!).

The review committee was very surprised by these observations.

A team from Fermilab Cryo+Magnets experts visited LBNL and vendor 13-14May. Full report being finalized.



At present the default line of action is:

- continue work at Wang NMR
- increase staff in the direction indicated and improve MICE-wide collaboration
- do the thermal calculations to understand where to gain/guarantee additional margin and make sure crucial parameters are monitored
- increase cooling of the spectrometer solenoid (5 2-stage cryocoolers + 1 single stage?)
- take time to make sure things are understood as every failed iteration costs 8 months!

The magnet is now being disassembled to examine the area where the failure is assumed to be. When this is known (and taking into account the Fermilab team review) a more precise line of action (a will be devised.

Review panel will be informed, presented with proposed actions, and asked to comment.

Alternative lines of action have been envisaged:

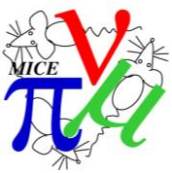
A: transport magnets from vendor to a strong laboratory who would take charge of them

- FNAL
- LBNL
- RAL

B: provide additional cooling (as risk management) at RAL with a He liquifier.

This is seen as more time consuming and highly non-trivial.

So far no precise plan exists in these directions.



Coupling coils

Much progress in the last months with the coupling coils
leading to the preparation of an addendum to the Harbin-Berkeley MOU

After discussion at the EB (+some suggested amendments) and with the project manager at RAL, the conclusion was the following:

There are important milestones coming reasonably soon (Q4 2010) (completion of first coil winding, completion of drawings, test of large test coil at HIST etc..) to verify that things are progressing appropriately.

It was therefore agreed to recommend that LBNL sign the MOU addendum.

However risk-mitigation measures should be taken:

- we have about 4-5 months to come up with an alternative plan should milestones be badly missed.**
- Again issue of manpower at LBNL. The concept should be investigated with high priority of a cryo-engineer (from UK if possible) delegated at LBNL to assist construction/tests of magnets and eventually support magnets operation in RAL once they are there. *(same person as for spectrometer solenoid).***