Spectrometer Solenoid Update

MICE Collaboration Meeting #27
Rutherford Appleton Laboratory

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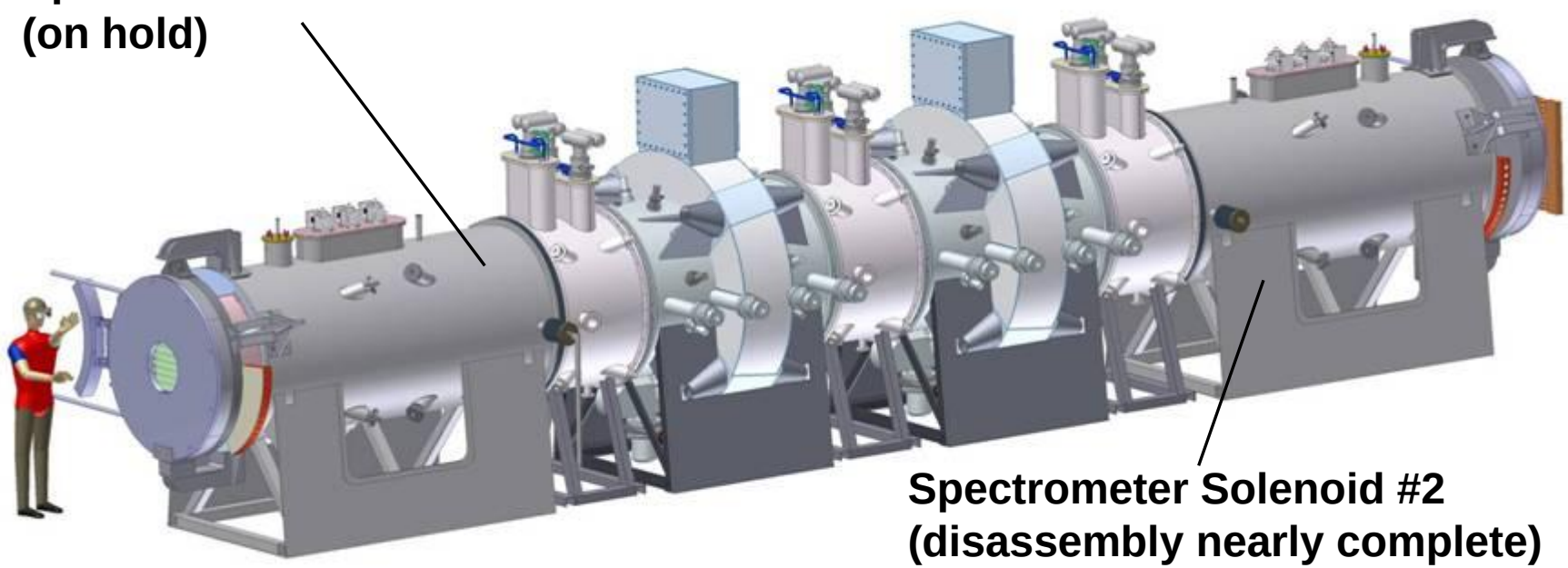
Topics

- FNAL technical review committee
- Magnet 2 testing results
- Magnet 2 disassembly
- Coil connection failure
- Manpower
- Moving forward

MICE Cooling Channel Layout



FNAL Technical Review Committee

- A technical committee was assembled to assist with the assessment of the magnet based on the design documents and the results of the recent Magnet #2 testing
- Review committee: Jim Kerby (chair), Bob Sanders and Vladimir Kashikhin (all from FNAL)
- The committee's charge included the following:
  - assess the thermal design of the magnet
  - review the thermal performance of the magnet
  - recommend design changes to reduce heat leaks
  - determine the number and type of cryocoolers required
- The disassembly of Magnet #2 and reassembly of Magnet #1 were put on hold pending the committee recommendations

Magnet 2 Training and Testing Results

- The magnet was successfully cooled down and numerous training runs were completed back in March ’10
- The addition of the single stage cooler had the desired effect on the HTS leads and the thermal shield
- A 257 A training current was reached (all 5 coils in series)
- A connection to the M2 coil was found to be open circuit
- Training runs on coils E1, C and E2 reached 270 and 251 A
- Analysis of the LHe boil-off rate indicates that ~1.5 watts of additional 4.2K cooling power is required to hold helium
- Refer to MICE Note 292 for details (M.A. Green)

Current Magnet Status

- Magnet 2 disassembly is now well under way
- M2 coil lead failure was not found external to the cold mass
- Preparations to open the Magnet 2 cold mass and locate the failed lead are under way @ vendor (complete by ~7/16)
- Depending on the nature of the failure, some modification to the Magnet 1 cold mass may be required
- Final quantity and configuration of magnet cryocoolers will be determined soon
- Vendor will generate a layout and the associated drawings for the modified design
- Likely will have to add as many as two pulse tube coolers

Vacuum Vessel End Plate Removal

View w/Vacuum Vessel End Plate Removed

Vent and Fill Line Area

View with Shield End Wall Removed

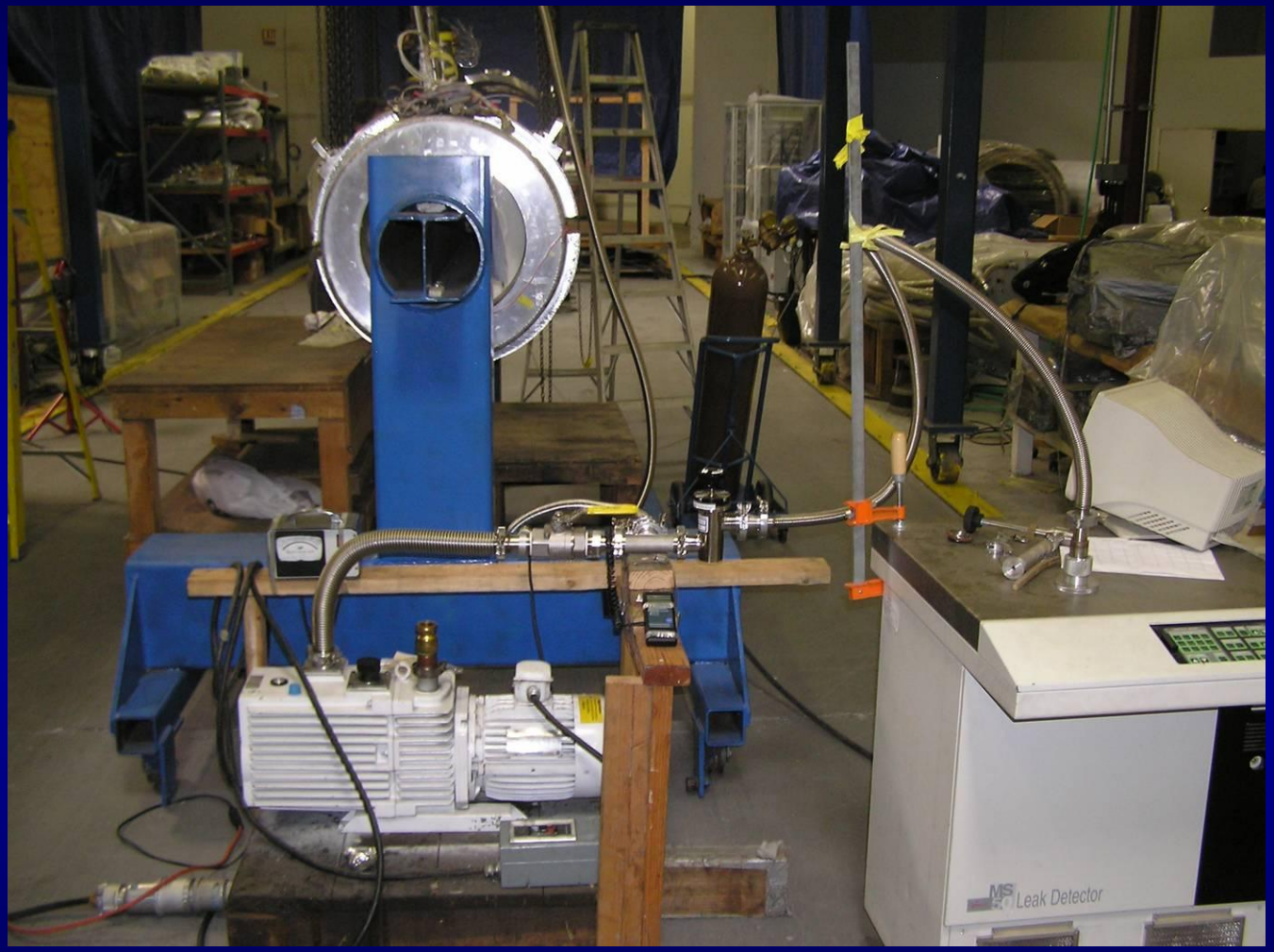
Preparation for Cold Mass Removal

Preparation for Cold Mass Removal

Cold Mass Removal

Disassembled Magnet #2

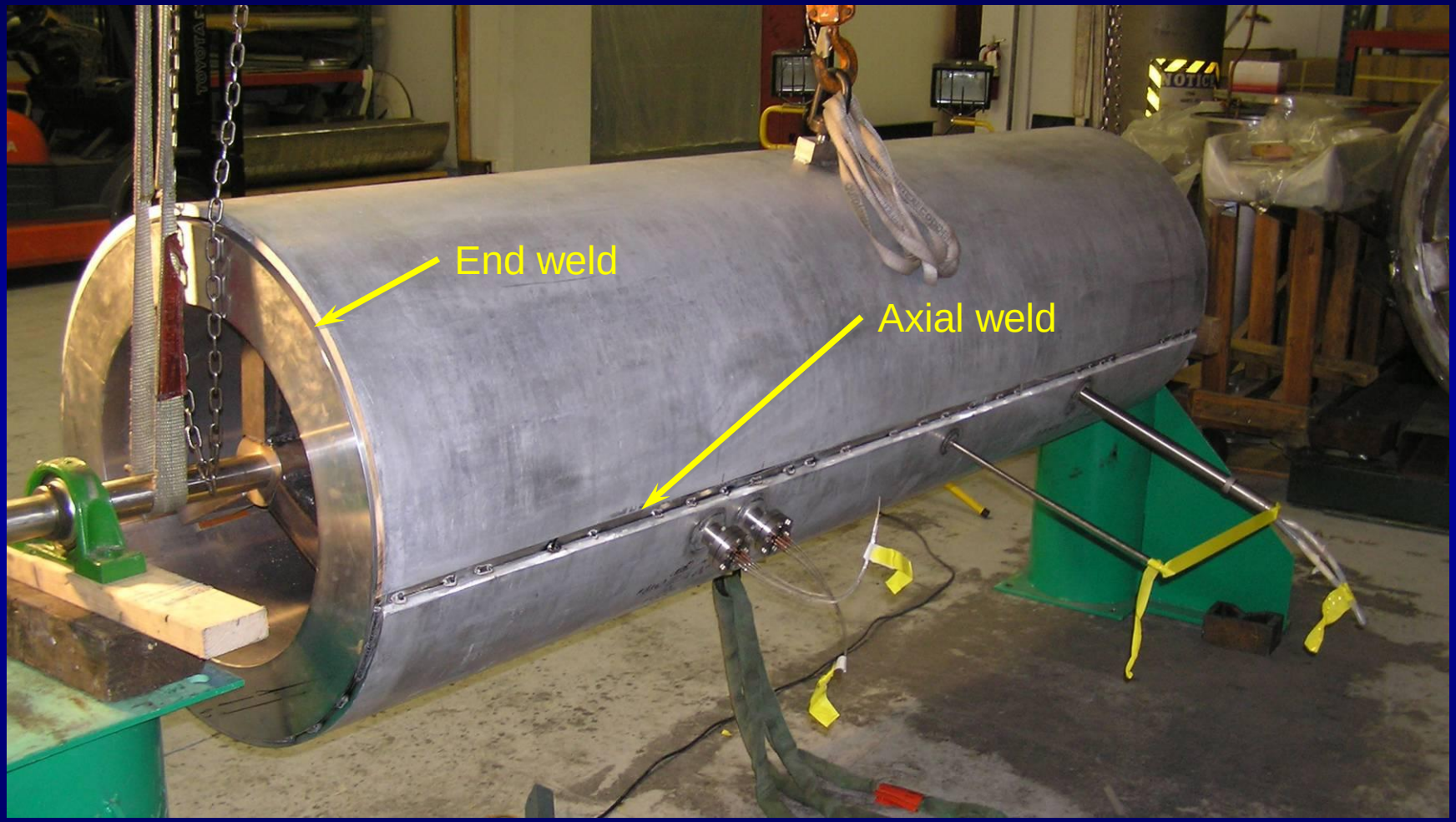
Leak Check of Magnet #2 Cold Mass



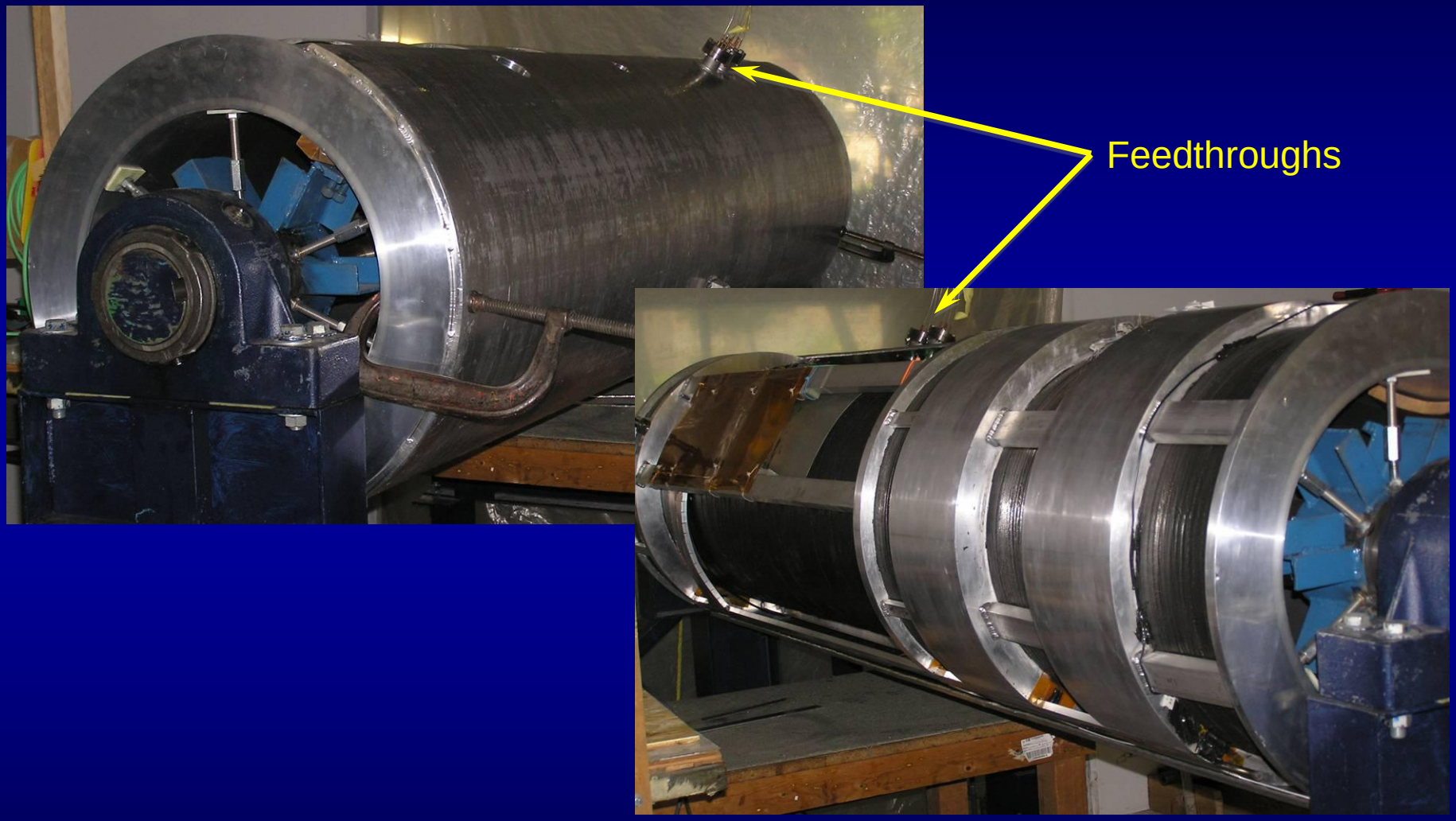
Cold Mass Cover Removal

- Vendor is now setting up fixturing to remove one of the two clamshell type cover plates on the cold mass
- Welds will be cut using a milling technique rather than grinding
- Two axial and two 180° end welds will need to be cut
- Cover to be removed does not contain the coil lead feedthroughs
- The feedthroughs are close to the edge of the other cover
- Leads will not be disturbed during cover removal so that the damaged area can be inspected and documented

Cold Mass with Covers in Place



Cold Mass Cover Plate Configuration



Manpower

- LBNL is actively pursuing technical expertise for analysis and fabrication oversight of the magnets through new LBNL hires (cryogenic engineers) and outside consulting help
- Vendor Wang NMR is receptive to analytical and fabrication oversight by an outside entity
- Mike Green is only peripherally involved with the project at this time and into the future
- Frederic Trillaud (who performed modeling tasks) is no longer employed by LBNL
- LBNL will provide Wang NMR with fabrication help (welding, machining, assembly tech) as deemed necessary

Moving Forward

- The next steps include:
  - determine the cause of the lead failure in Magnet 2
  - decide if Magnet 1 cold mass will require modification
  - develop a plan for lead repair and cooling configuration
  - obtain approval from MICE and FNAL review committees
  - work with vendor to develop a detailed schedule
- The above steps are expected to be complete by mid to late September
- May consider the options of performing magnetic measurements at Wang NMR or at RAL instead of shipping the magnets to FNAL