

Status of MICE Solenoids

**MAP 2013 Collaboration Meeting
Fermi National Accelerator Lab**

June 22, 2013

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Topics

- First magnet training results
- Field mapping progress
- Control system/power supplies
- Second magnet progress
- Schedule

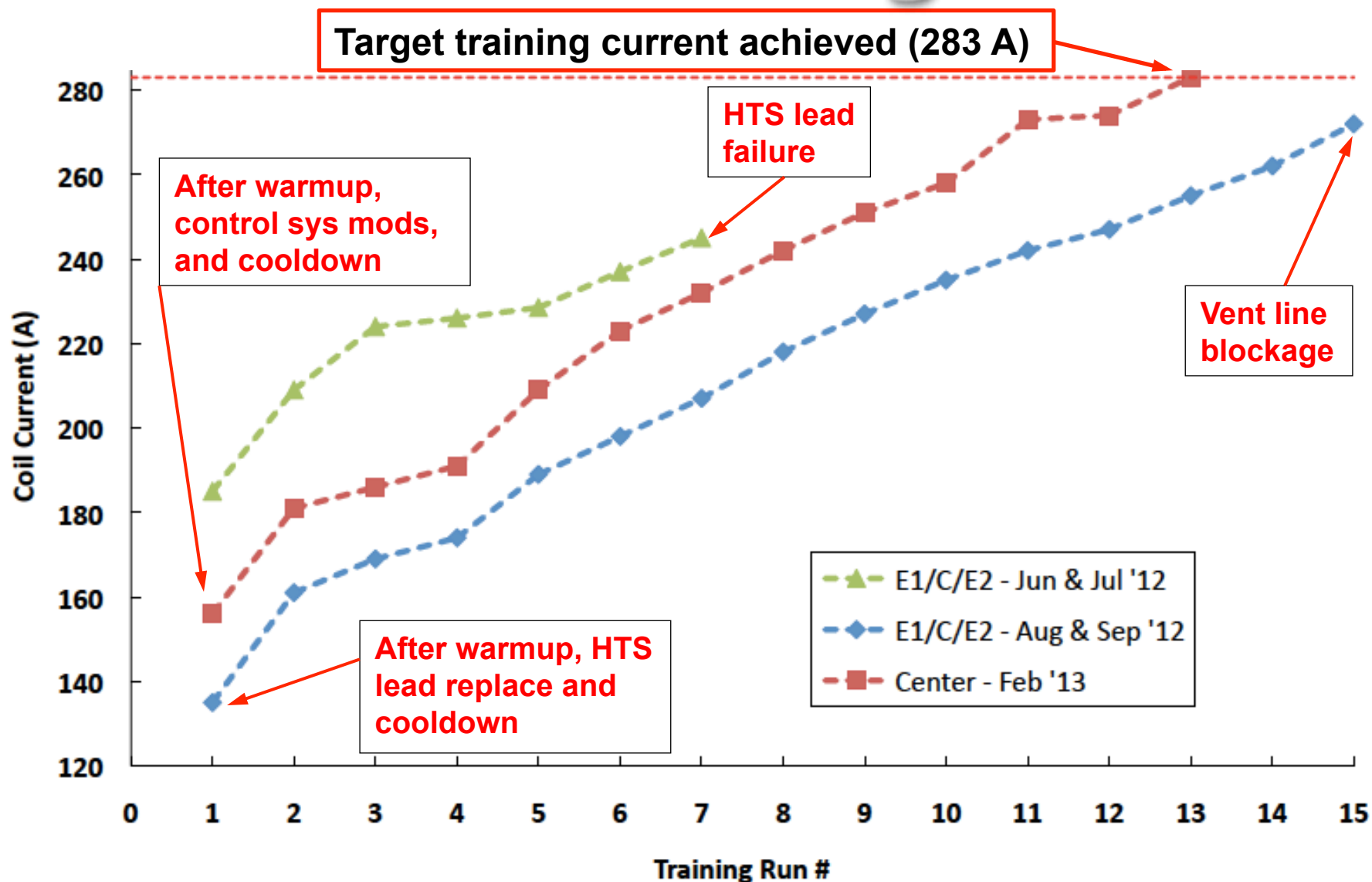


Training Progress

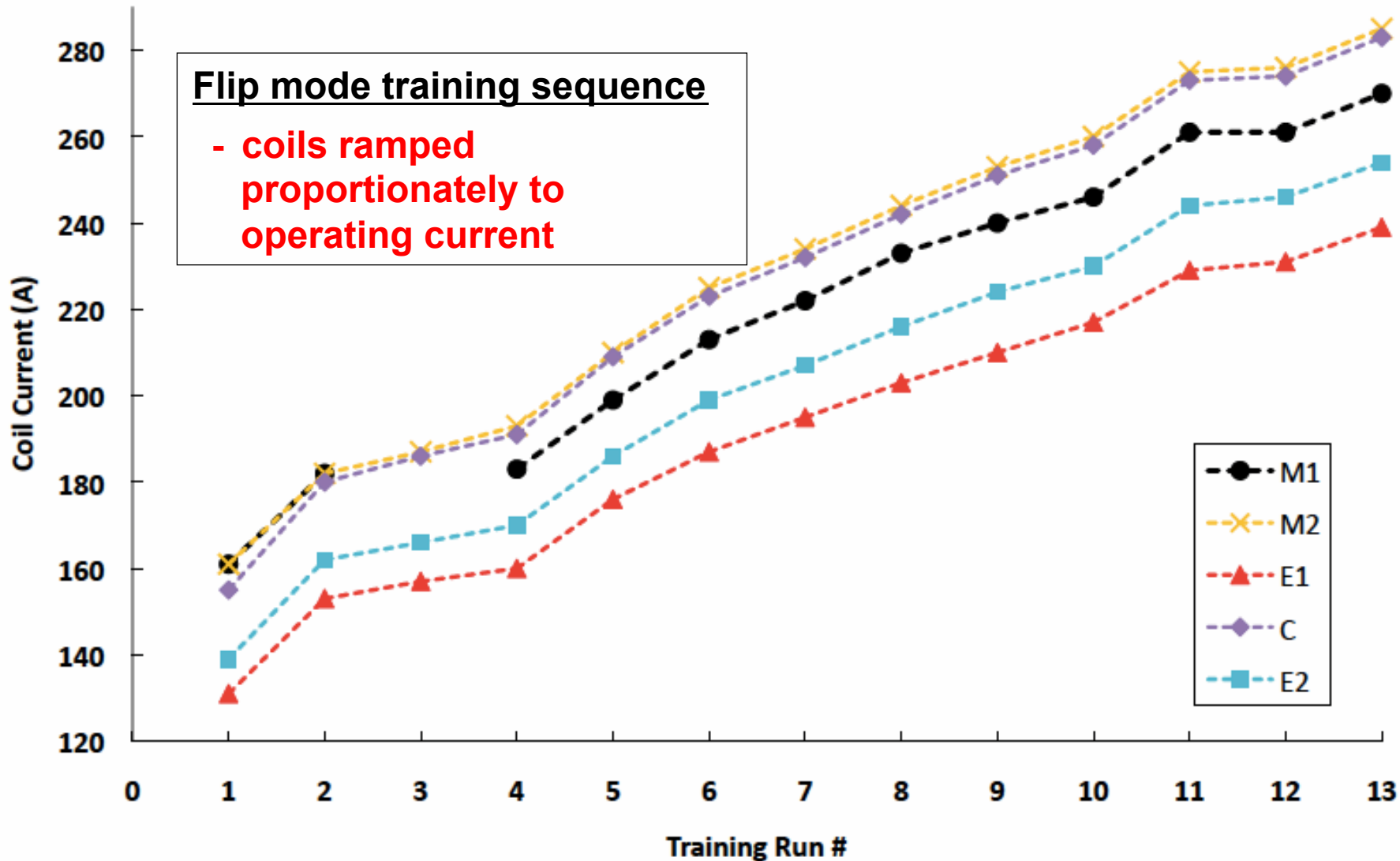
- The first magnet (designated SS#2) was successfully trained to full flip and solenoid mode currents at the end of February 2013
- Current was maintained at full flip mode for a period of 24 hours with no quench followed by direct ramp to solenoid mode
- All five power supplies were used at various ramp rates and under computer control
- All vendor acceptance tests for SS#2 are complete
- Cold mass was held at 4K and full of LHe for a period of 3 months prior to start of 3D magnetic mapping



Recent Training Runs



Final Training Progression



Magnet Field Mapping

- CERN mapping equipment arrived at the end of May
- Mapper installed by CERN crew and aligned to magnet by LBNL laser tracker group
- Preliminary mapping runs carried out without iron shield in place
- Iron shield successfully installed on magnet without removing mapping system
- Minimal effect on magnet training by addition of iron shield (quenched at ~98% of solenoid mode full current on first try, reached full current on 2nd run)



Magnet Field Mapping (cont'd)

- Full 3D mapping runs completed w/shield in place and at both flip and solenoid modes (full current)
- With iron shield removed, additional full current, full 3D mapping runs completed for both modes
- Additional mapping (80% current) and calibration runs (w/NMR probe) have been carried out
- Zero current mapping runs were generally carried out during every day of running
- All necessary mapping has been carried out



Current Activity

- All mapping work completed last Thursday
- LHe removed from the cold mass yesterday and the cryocoolers were turned off
- The system is now gradually warming up
- Preparations for shipping are under way
 - Preliminary quotes obtained from LBNL shipping agent
 - Shipping pallet design nearly complete
 - Shock isolators to mount magnet to pallet on order
- Cooler compressors to be shipped in crate originally made for mapping system

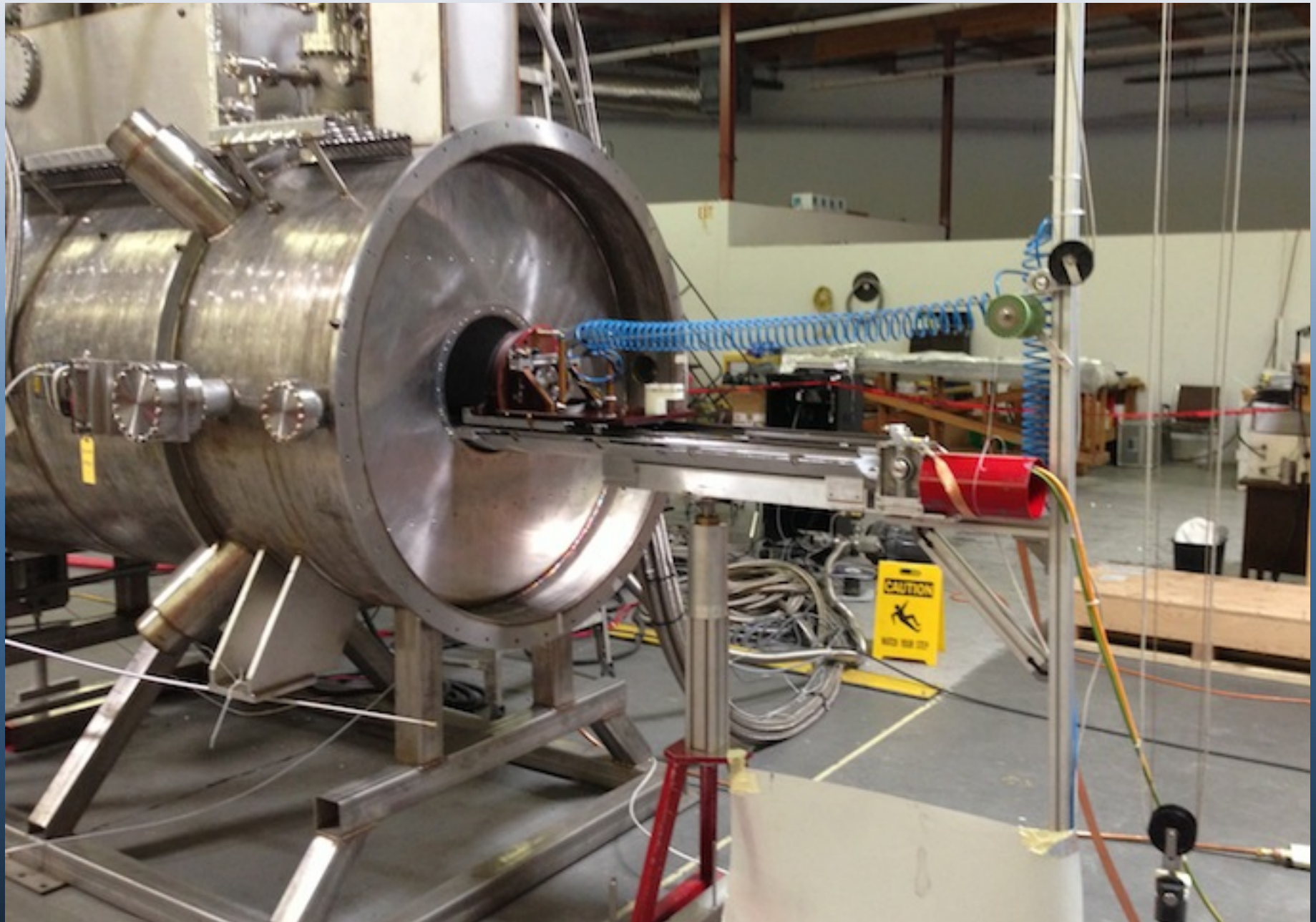


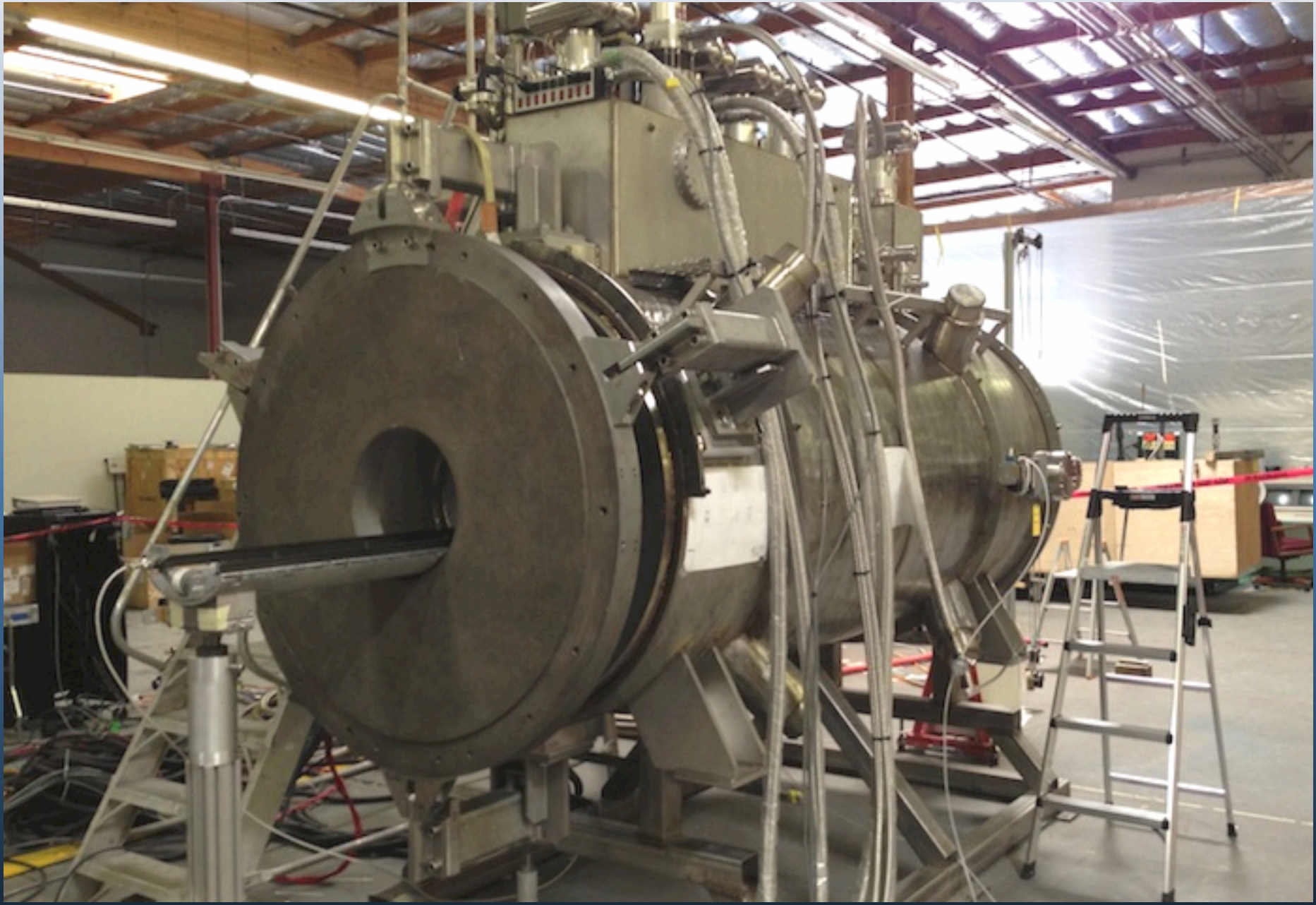
Recent on Site Effort at Wang

Many people have come to Wang NMR in the last two months to assist. Thanks to:

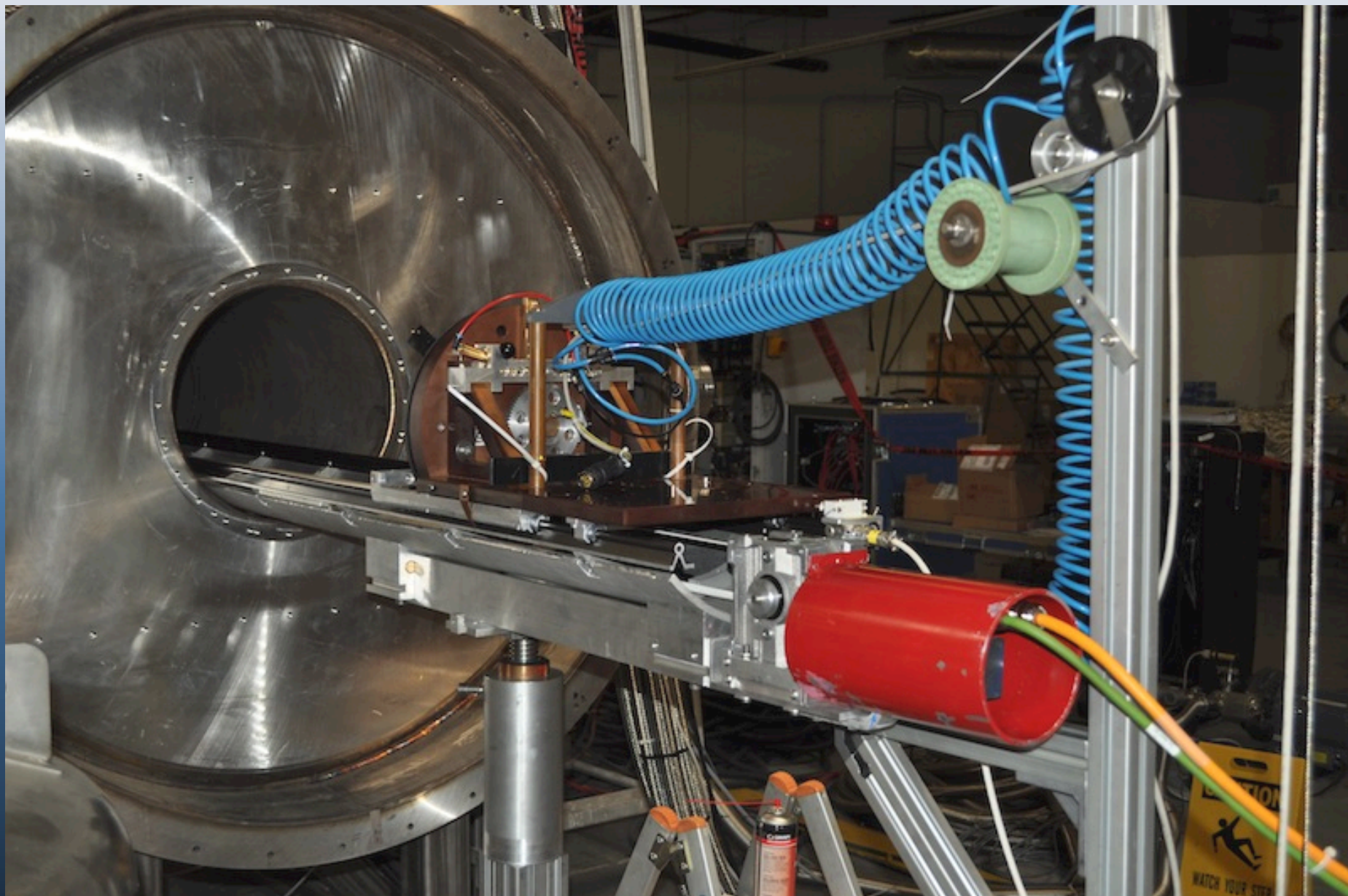
- Pierrick Hanlet (controls, etc.)
- Maria Leonova, David Adey (operation for mapping)
- Pierre-Ange Giudici, Felix Bergsma, Francois Garnier (magnet mapping system)
- Roy Preece (iron shield installation)
- Kyle McCombs and Adrian Williams (mech techs)
- Heng Pan (QD system) and Roman Pilipenko (phone)
- John Joseph (power supplies)
- Dave Humphries and crew (laser tracker system)
- And numerous others helping behind the scenes

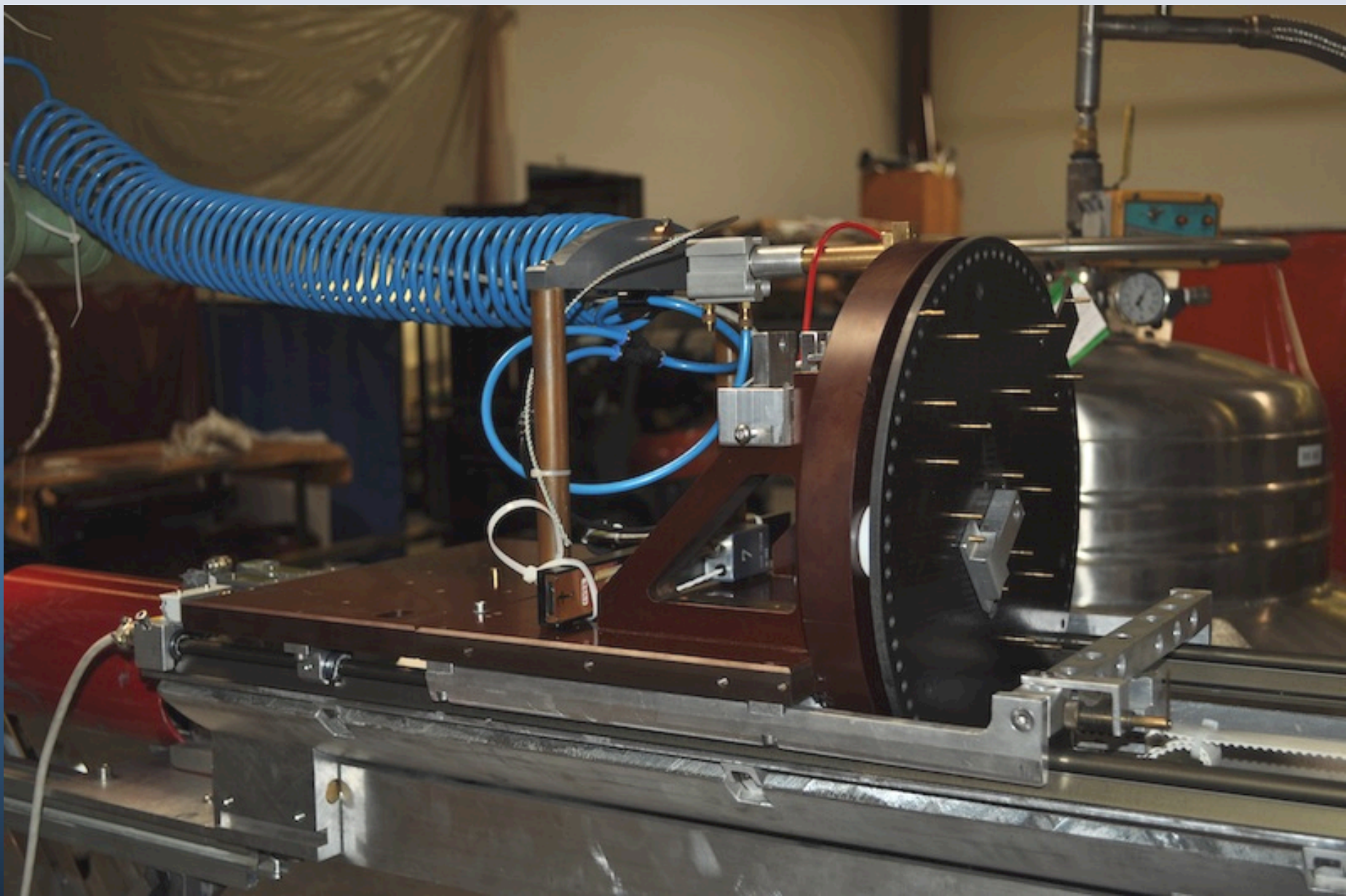






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Control System Update

- Stand alone PID controller for the cold mass heater circuit has worked well
- Gas bottle backup system to prevent negative cold mass pressures remains in place
- Current shunts to directly measure the coil currents have been useful
- No issues with the charge/discharge circuits since all four units were rebuilt
- Improvements to the control system and its GUI have continued to be incorporated



Control System Update

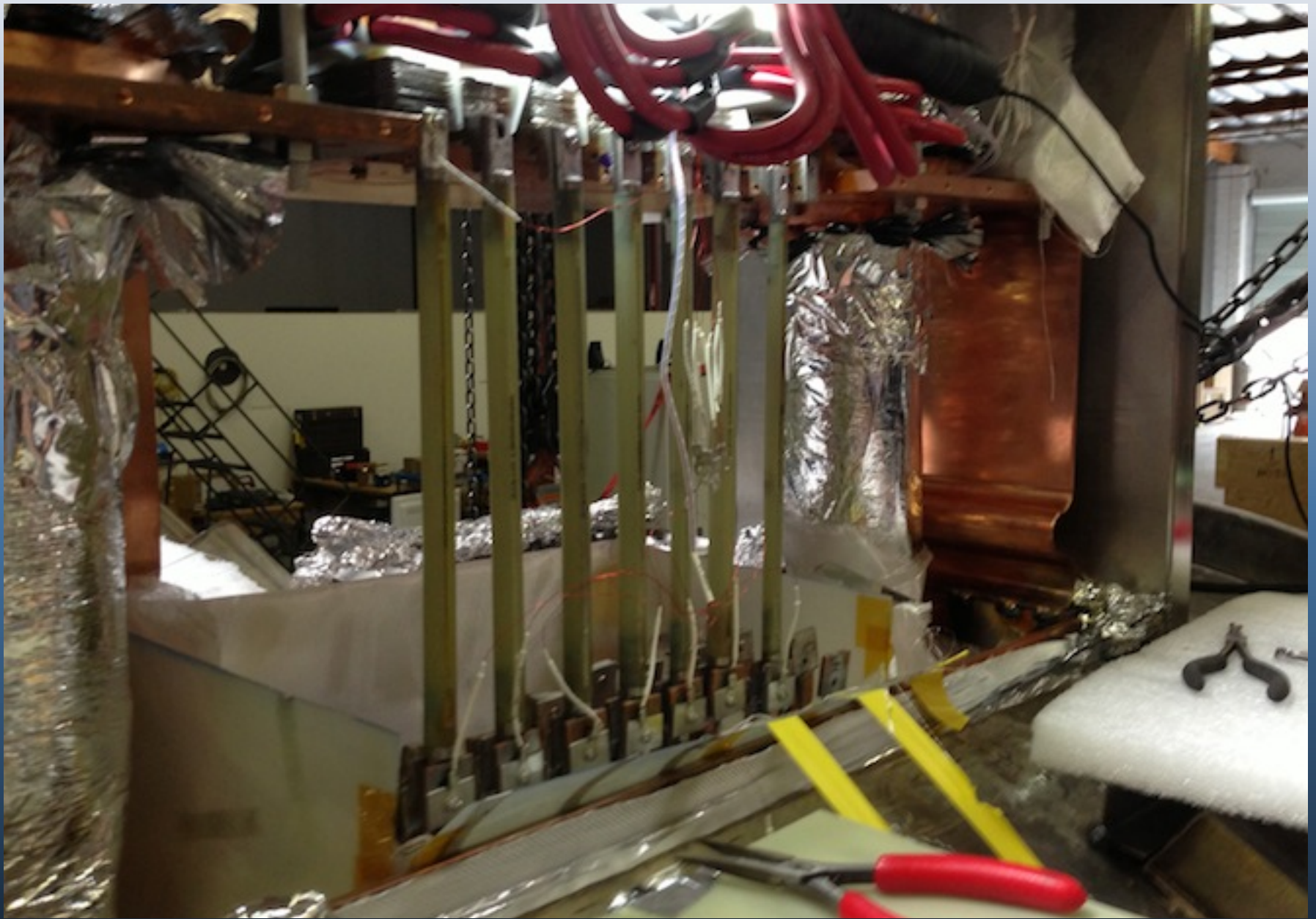
- An issue with the voltage taps on the M2 coil has appeared during the mapping runs
 - The problem results in inductive type voltages across the HTS and LTS leads during ramping, resulting in PS instability and at least one quench
 - Operation has continued by desensitizing the QD system to the spurious voltages and adjusting the power supply stability control
 - Issue with taps will be investigated when magnet is warm
- Continued problems with loss of PS control parameters, mainly w/the Lakeshore trim supplies
 - Have a workaround, problem is being investigated at Daresbury



2nd Magnet Progress

- All vacuum vessel assembly and welding has been completed including cryocooler tower
 - Cryocoolers have been installed
- Leak check of the vacuum vessel completed last week (no leaks after one weld joint repair)
 - Under vacuum more than a week now
- Upcoming tasks: instrumentation feedthrough wiring, connection of exterior warm leads, installation/welding of iron shield mount pads and support feet









Schedule

- First magnet complete and warming up
- Preparation for shipping under way
- Second unit expected to be in place and ready for cool down week of July 8th
- Training (with shield in place) expected to run through July, followed by mapping
- Shipping of commissioned magnets to RAL still tentatively planned for July and Sept.