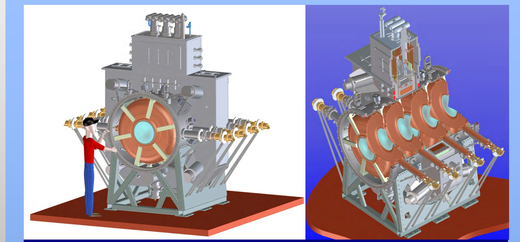
LBNL's Engineering Role in the Muon Ionization Cooling Experiment (MICE)

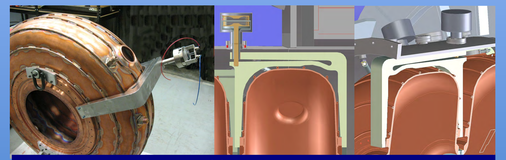
The Muon Ionization Cooling Experiment (MICE) is an international collaboration that will demonstrate ionization cooling in a short section of a realistic cooling channel using a muon beam. The experiment will be sited at Rutherford Appleton Laboratory (RAL) in the UK. LBNL has taken on one of the leading roles on the project and is responsible for designing and procuring the RFCC and Spectrometer Solenoid Modules, key components of the experiment.

RF and Coupling Coil (RFCC) Modules

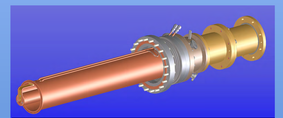


CAD model of the RFCC Modules, consisting of a superconducting coupling coil and four 201 MHz normal-conducting RF cavities

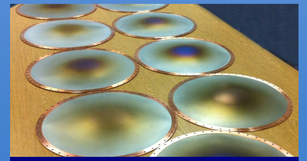
Low-level RF testing of a 201 MHz cavity at LBNL (10 cavities are complete)



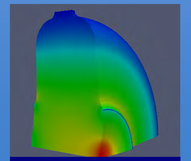
Flexure tuner designed by LBNL – 6 tuners per cavity provide a ±500 kHz range using a series of actuators



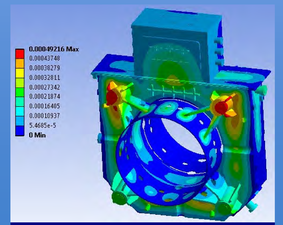
RF coupler designed by LBNL



Thin, curved Be cavity windows

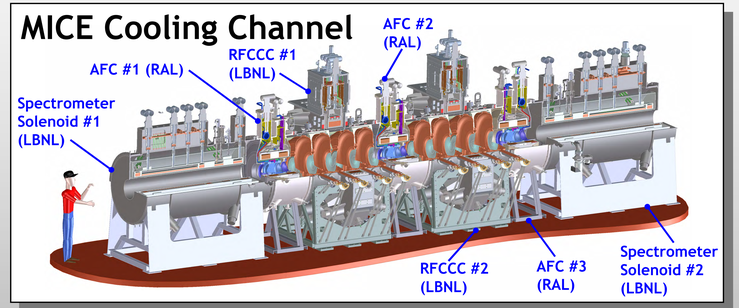


Cavity RF analysis



Structural FEA of integrated Coupling Coil/vacuum vessel

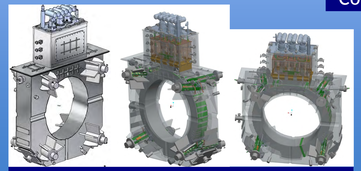
MICE Cooling Channel



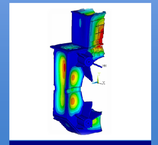
Superconducting Coupling Coil Magnets

1st coil cold mass at LBNL being prepared for testing at Fermilab

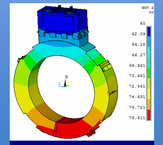
Components of the MICE Coupling Coils



CAD models of the MICE Coupling Coil

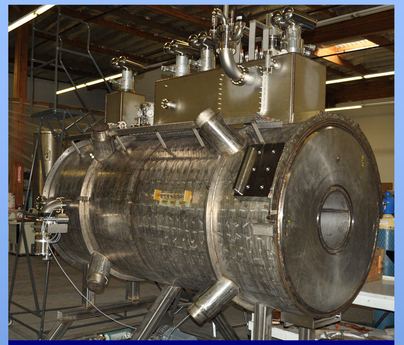


Cryostat FEA



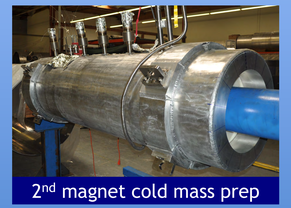
Shield temps.

Superconducting Spectrometer Solenoids



The five coil superconducting Spectrometer Solenoid magnets are being fabricated by a local vendor (Wang NMR) in Livermore, CA with assistance from the LBNL Engineering Division and MICE collaborators. The first rebuilt magnet is ready for testing.

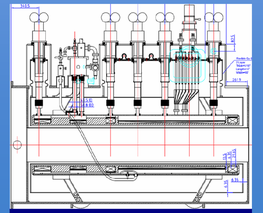
Magnet quench during previous training runs



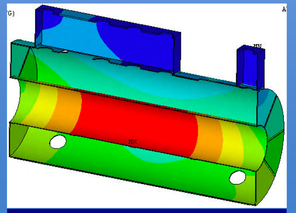
2nd magnet cold mass prep

2-stage cooler

Cold mass wrapped with MLI



Magnet 2-D cross section



Radiation shield temperatures