8th ATF2 Project Meeting
from Monday 08 June 2009 (13:00)
to Friday 12 June 2009 (20:00)
Asia/Tokyo
at KEK (Seminar Hall, 4-Go-Kan)

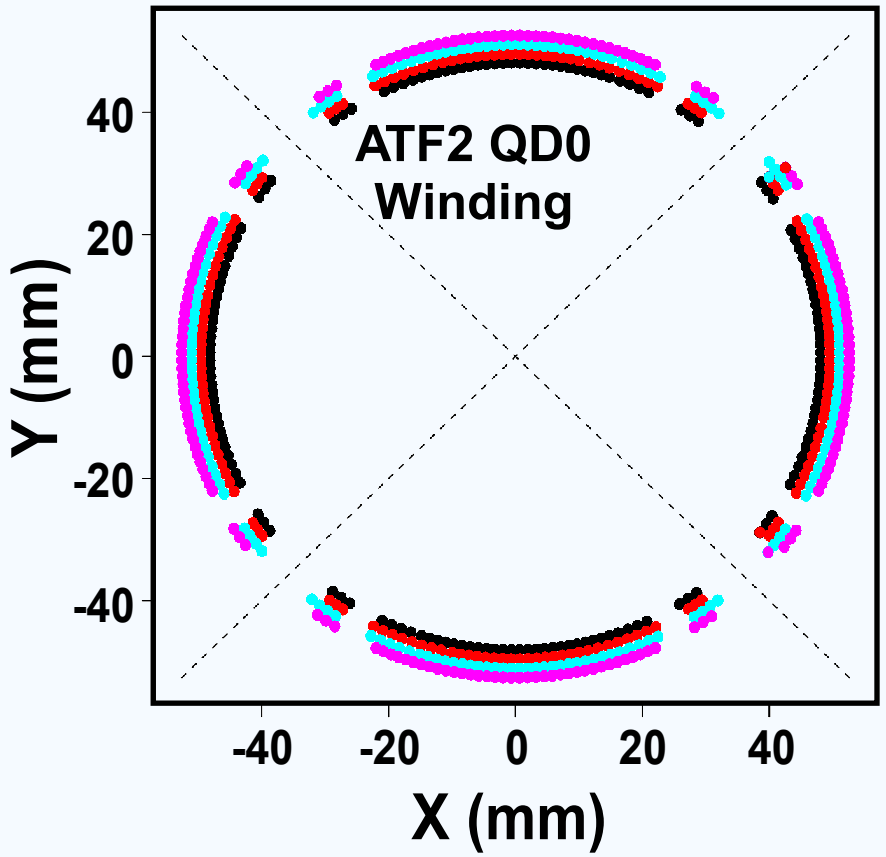
Superconducting Magnet Upgrade Status

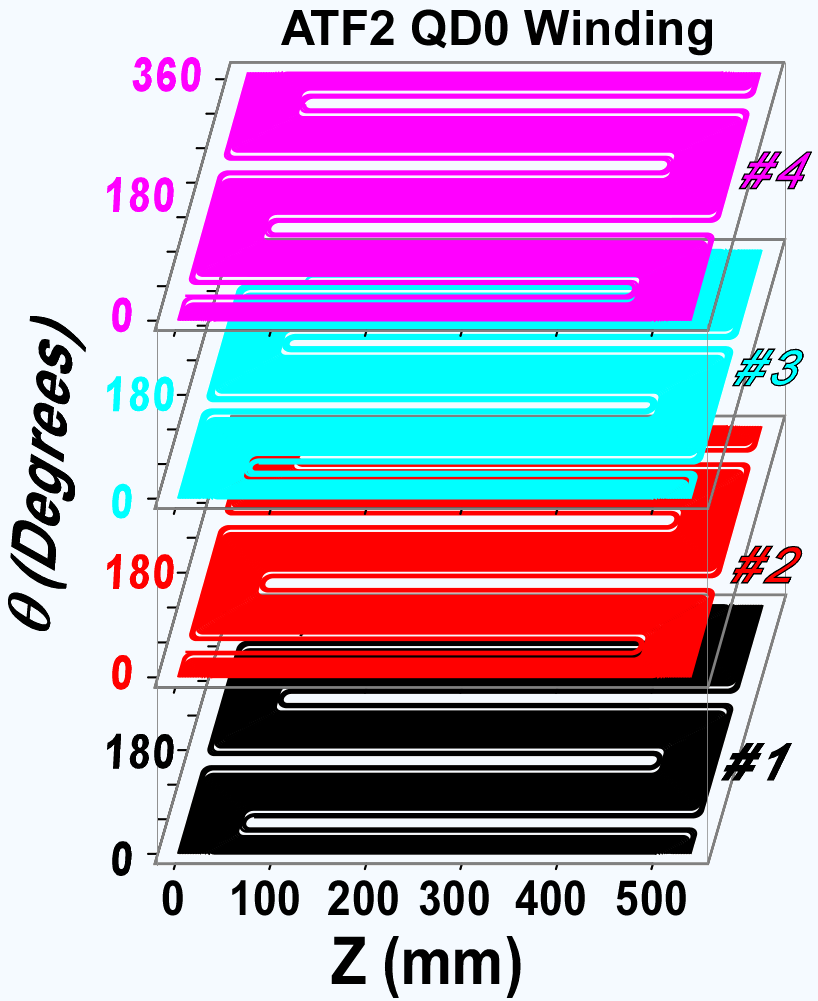
Presented by: Brett Parker (BNL-SMD)

Outline:

- Review the baseline upgrade design.
- Progress on CAD work and simulations.
- Offer suggestions for the next steps.

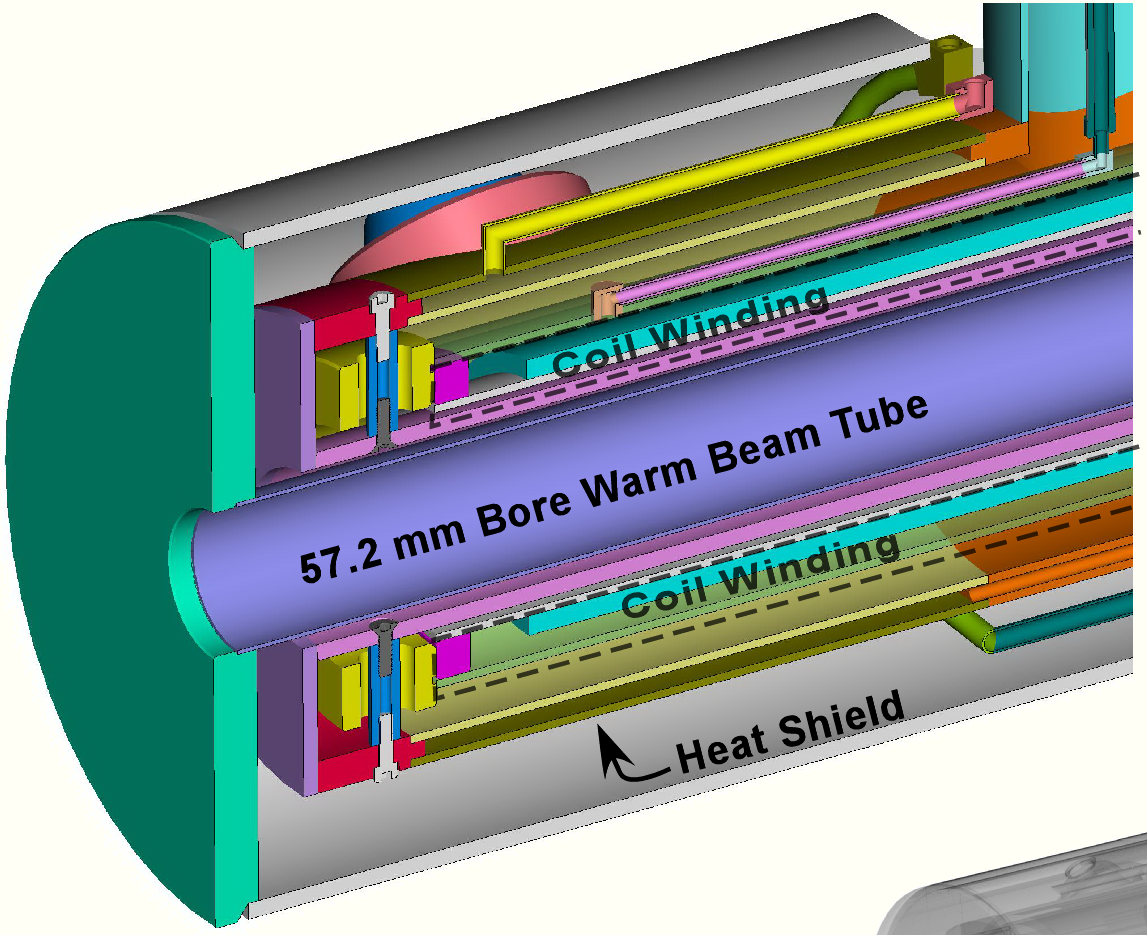
ATF2 Upgrade Superconducting Coil Design.



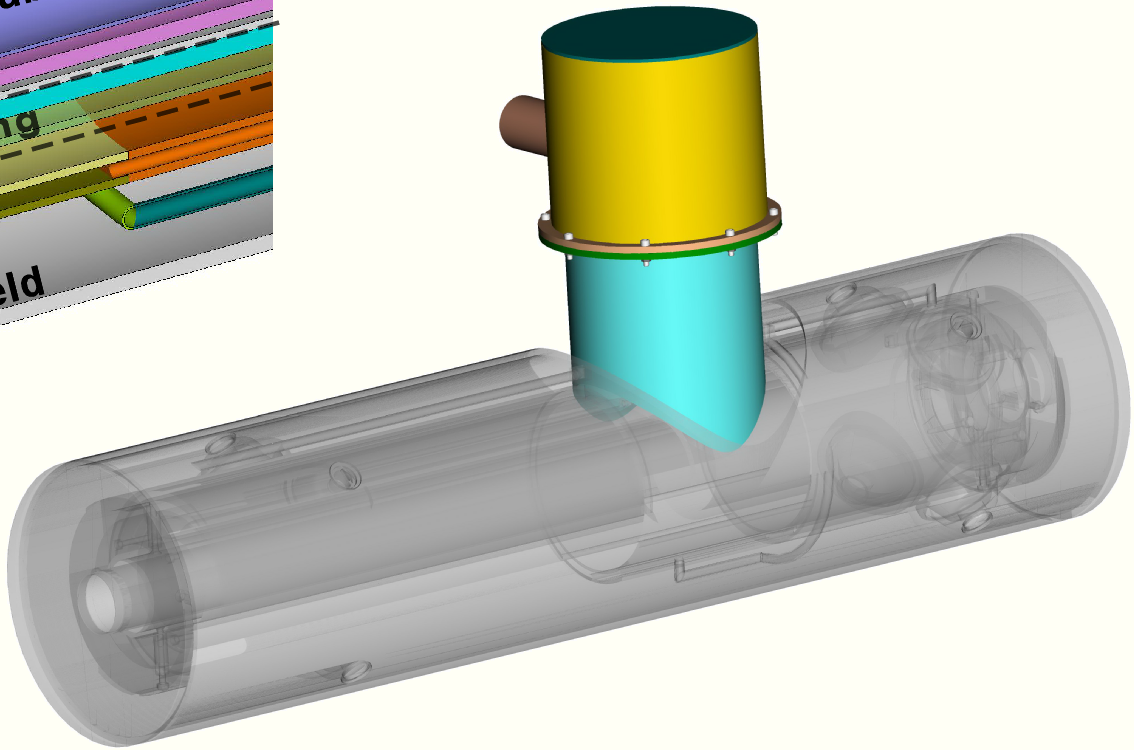


Wind two quadrupole coil sets (four layers) with a 536 mm pattern length and one 284 mm sextupole coil set (two layers, not shown).

ATF2 Upgrade Superconducting Coil Design.

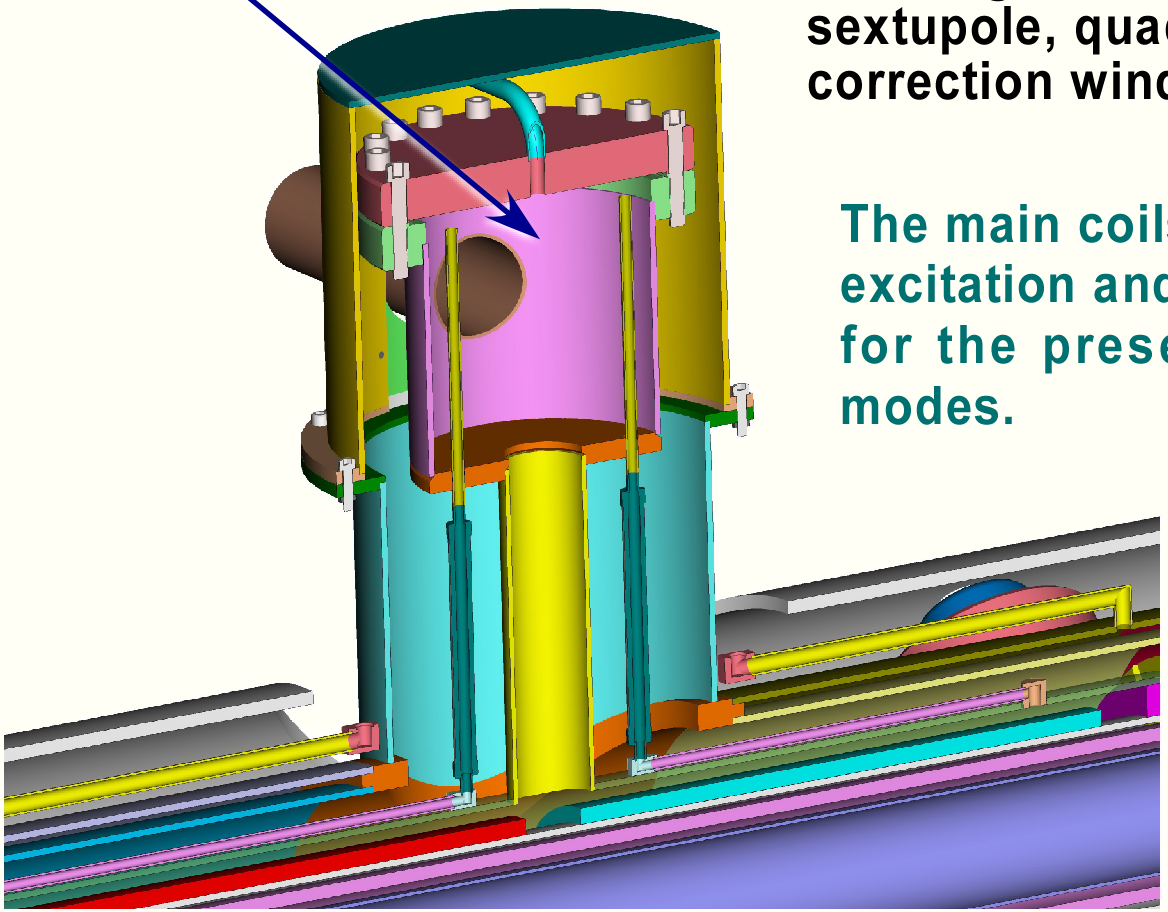


Coil diameters are sized so as to provide a warm beam tube a bit larger than in present magnets.



Accommodate both 1.9k (superfluid) and 4.2k He operation modes.

ATF2 Upgrade Superconducting Coil Design.

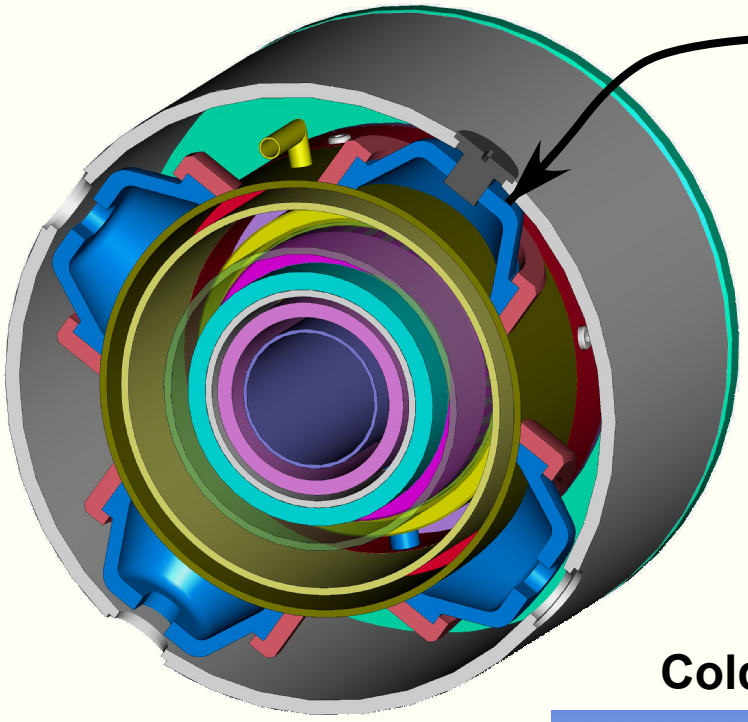


The quadupole coil winding is planned to have both dipole and skew-dipole correction windings; the sextupole coil gets skew-sextupole, quadrupole and skew-quadrupole correction windings.

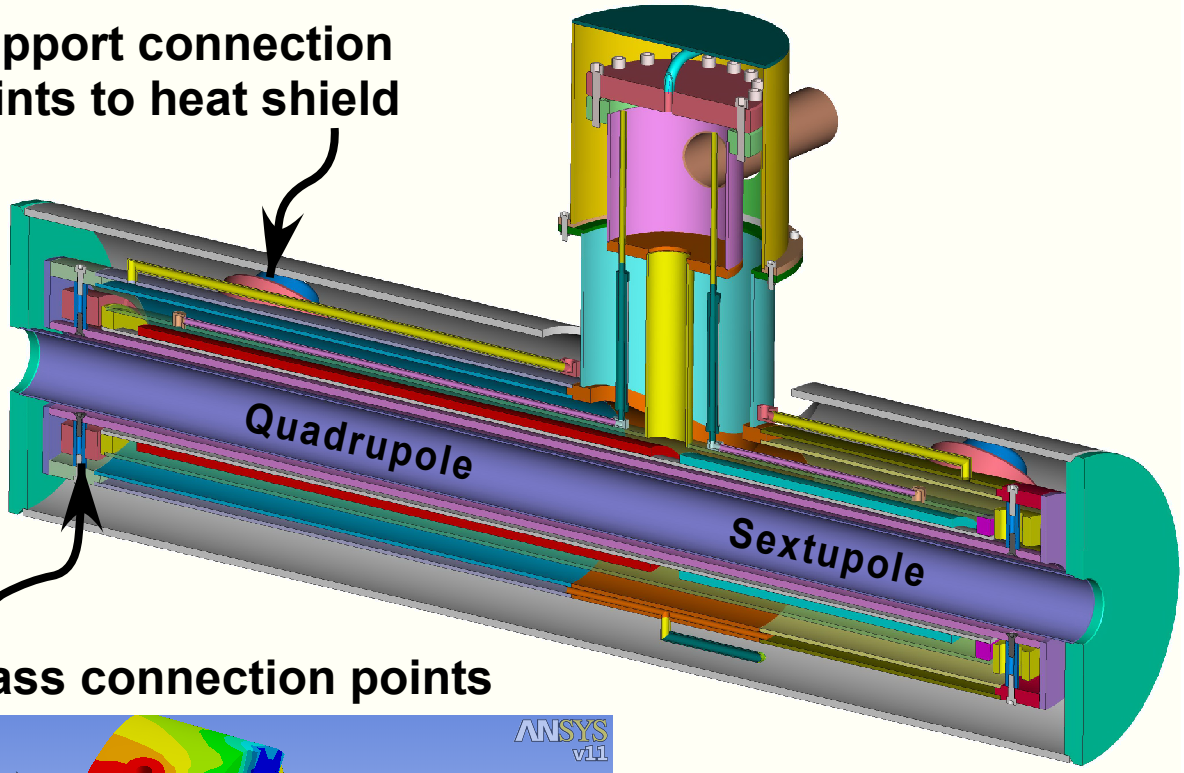
The main coils could be energized to 800 A excitation and the correction coils to 100 A for the presently anticipated operation modes.

So we need four 800A and ten 100A current leads plus a number of instrumentation leads.

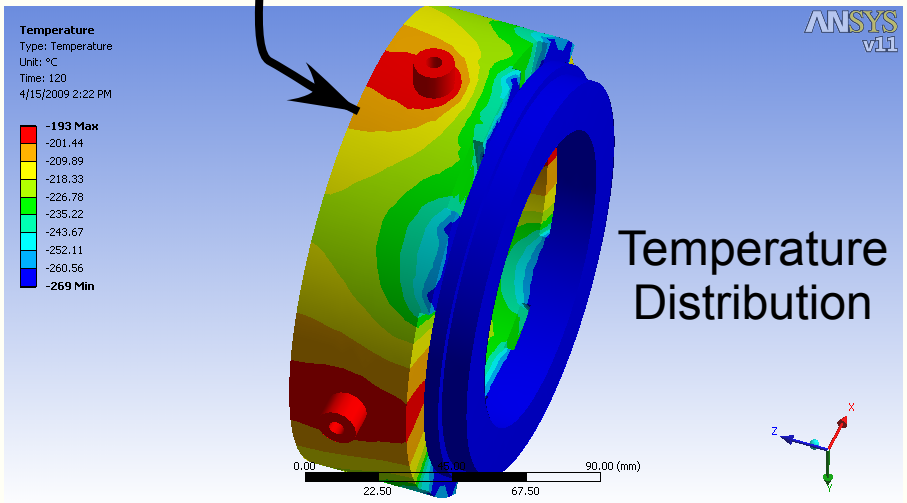
ATF2 Upgrade Cryostat Design Parameters.



Support connection points to heat shield



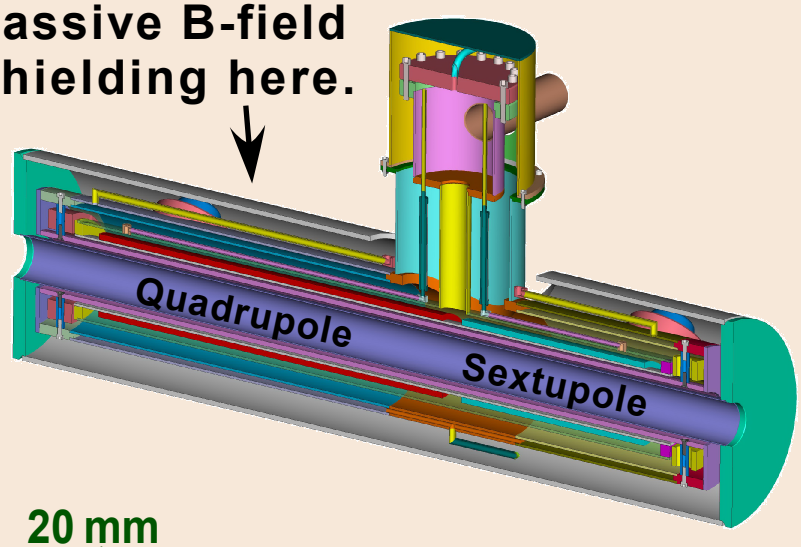
Cold mass connection points

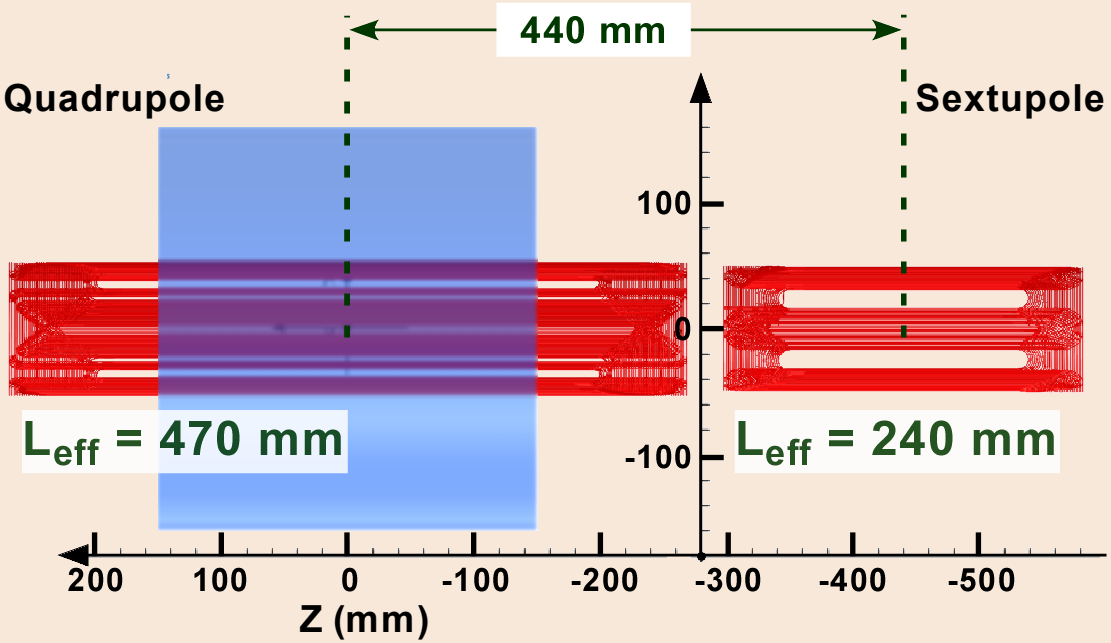


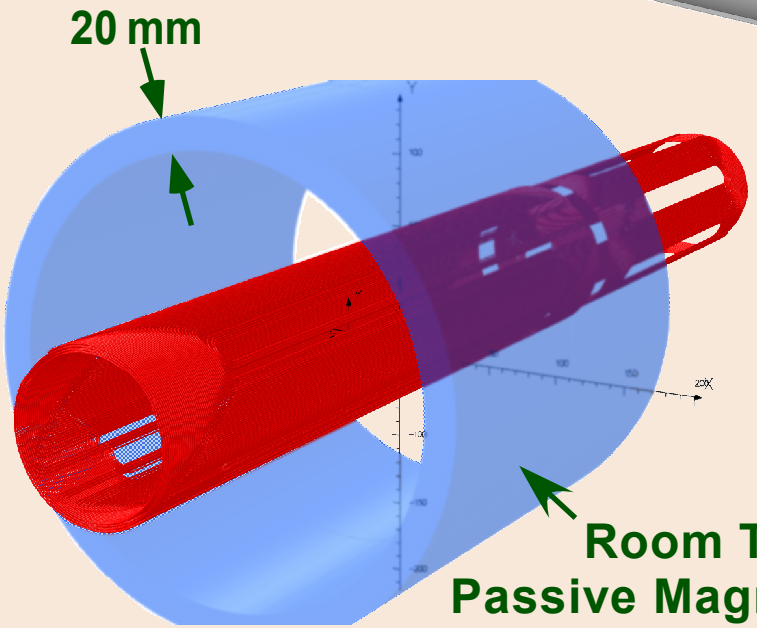
Heat leak to cold mass via the inner support structure is now quite low.

ATF2 Upgrade Superconducting Coil Design.

For the geophones we can provide passive B-field shielding here.



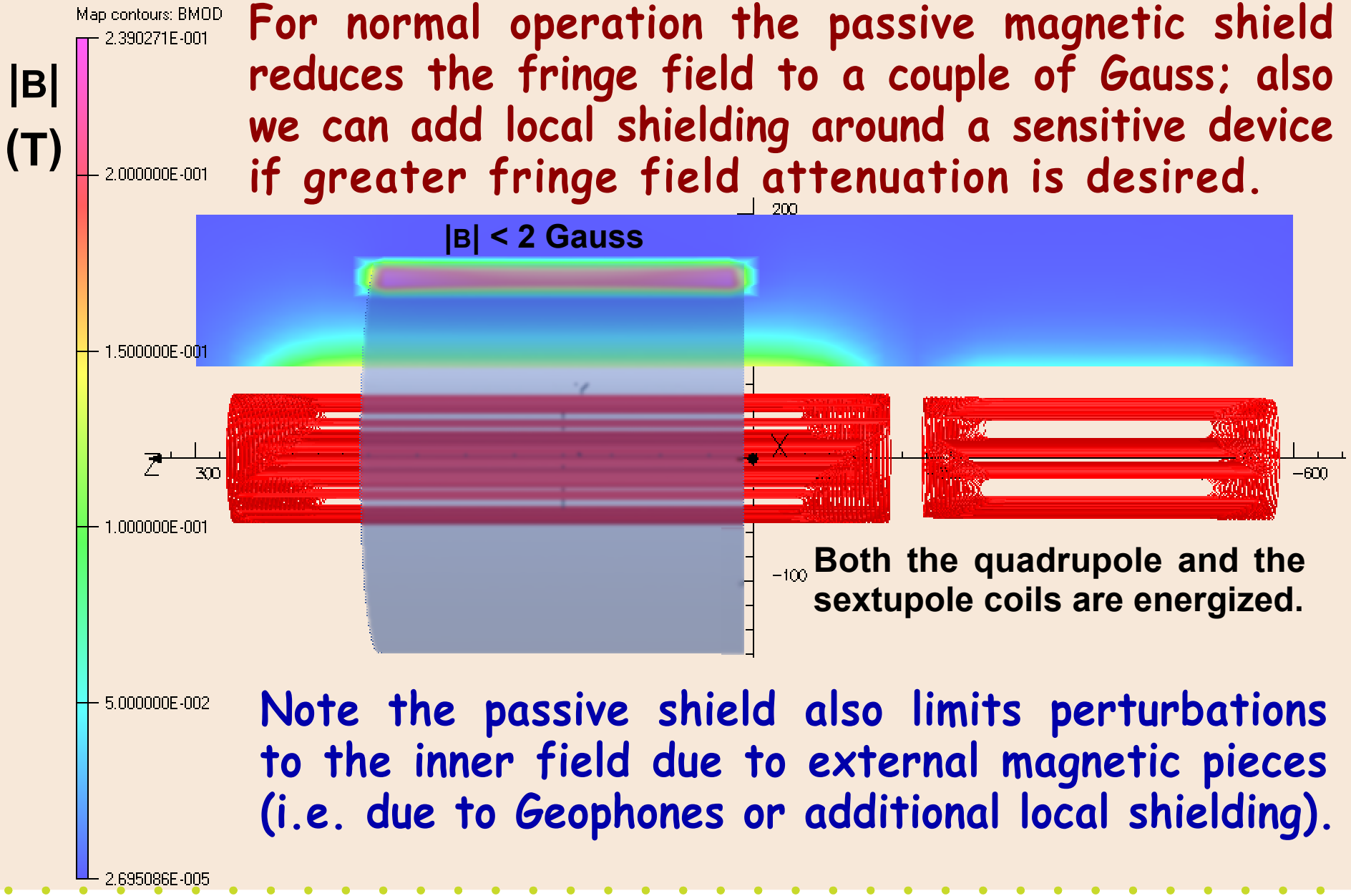




A thin, warm magnetic shell centered on the quadrupole coil, but located outside the cryostat, has minimal impact on the inner field and significantly reduces the external fringe field. Note the calculated magnetic lengths & field center separations are as shown above.

ATF2 Upgrade Superconducting Coil Design.

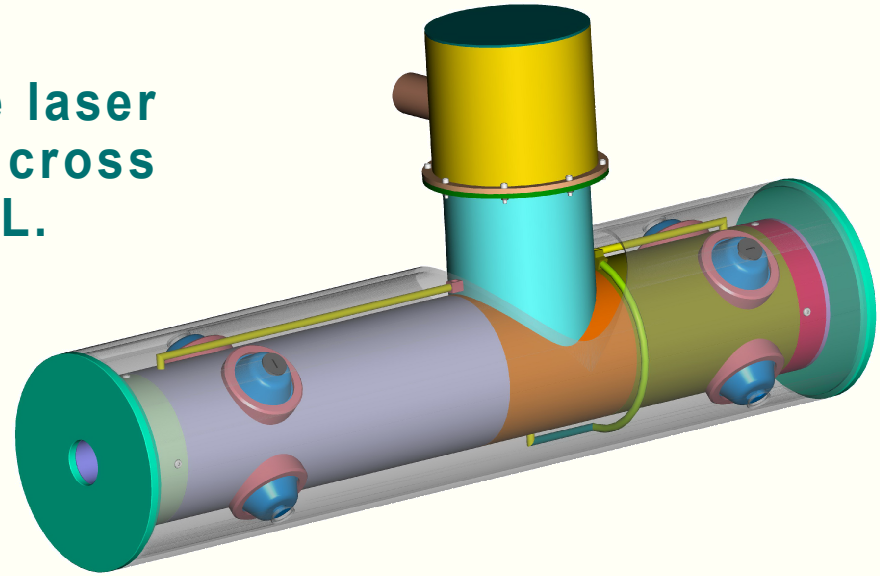
For normal operation the passive magnetic shield reduces the fringe field to a couple of Gauss; also we can add local shielding around a sensitive device if greater fringe field attenuation is desired.

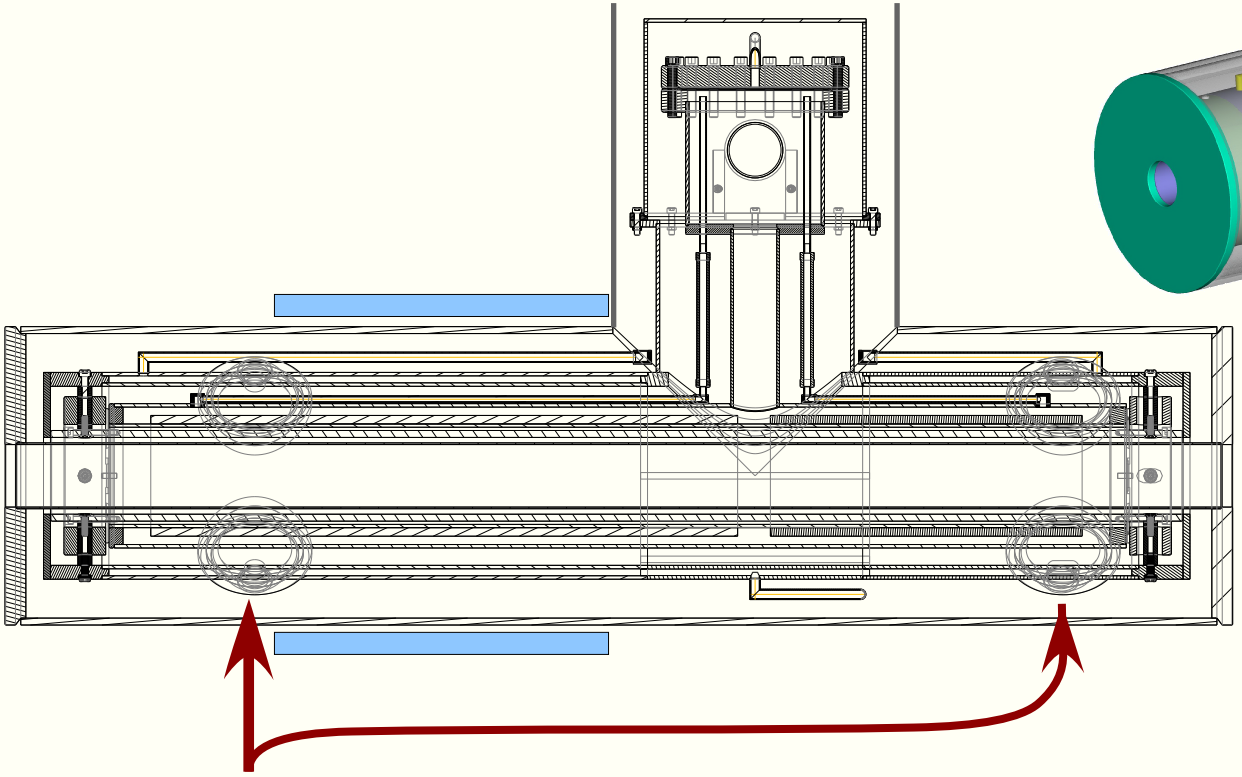


Note the passive shield also limits perturbations to the inner field due to external magnetic pieces (i.e. due to Geophones or additional local shielding).

ATF2 Upgrade Cryostat Design Parameters.

Make initial stability tests with the laser dopler vibrometer and geophone cross check during magnet testing at BNL.



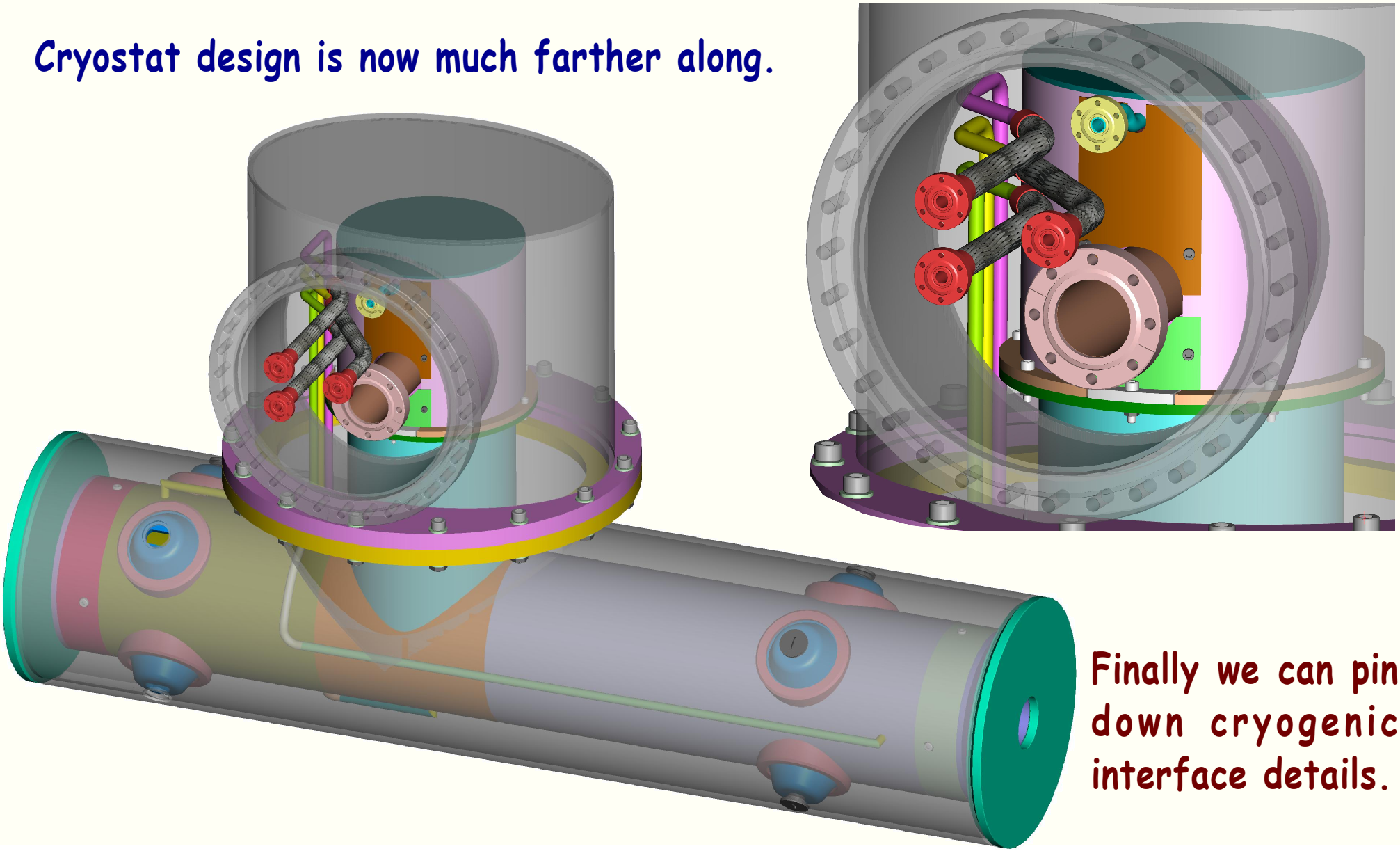


Observation of system performance with service cryostat at 1.9k will be done at BNL.

While it is not implemented yet, it should be possible to have laser access through to the cold mass from the bottom at the two locations (as requested by Oxford group).

ATF2 Upgrade Cryostat Design Parameters.

Cryostat design is now much farther along.



Finally we can pin down cryogenic interface details.

Proposal: Regular meetings in two topic areas.

It may finally be time to start meeting more regularly (via webex) with meetings (suggest monthly) focused around two topic areas:

- 1.9k measurements performed at BNL (using service cryostat).
  - Finalize scope of vibration/stability measurements.
  - Define access requirements for laser based systems.
  - Is there interest in active stabilization?
  - Direct measurements of field via stabilized pickup coil?
- 4.2k operation at ATF2 (using simplified interface that is TBD).
  - Firm up magnetic requirements (magnetic strengths needed for optics tests, field quality, operation time scenario, etc.).
  - Reach agreement on the "simplified interface."
  - Develop plan for obtaining cryogenic regulatory approval.
  - Work out time line for delivery, setup and ATF2 operation.