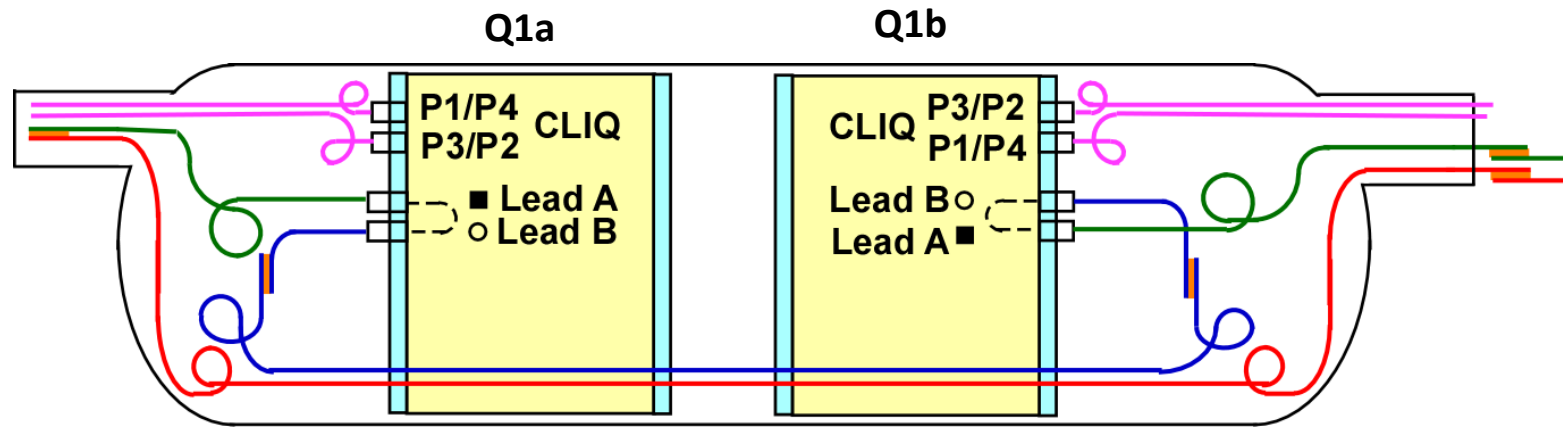
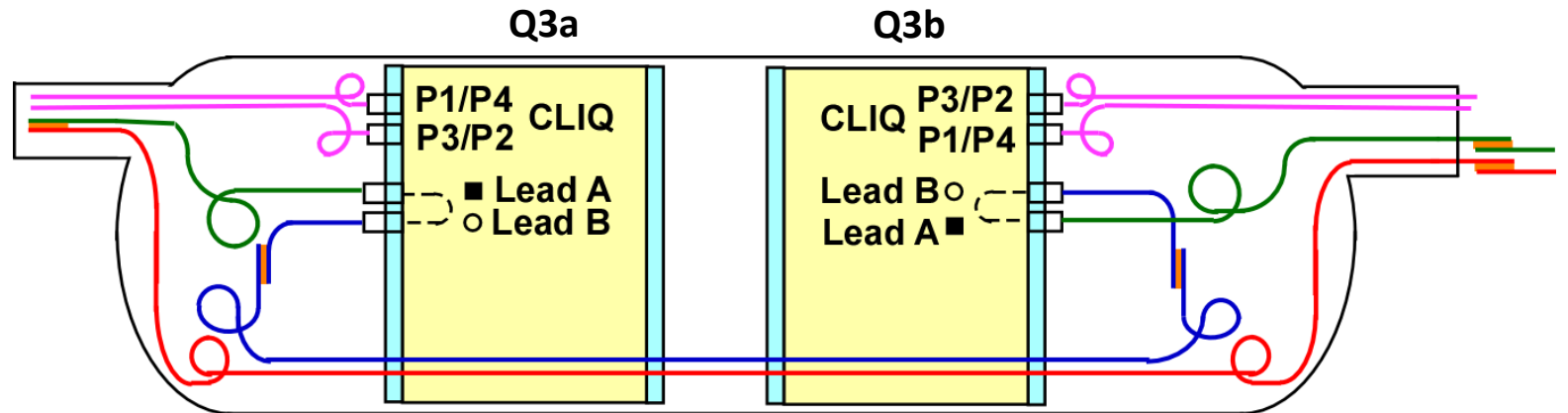
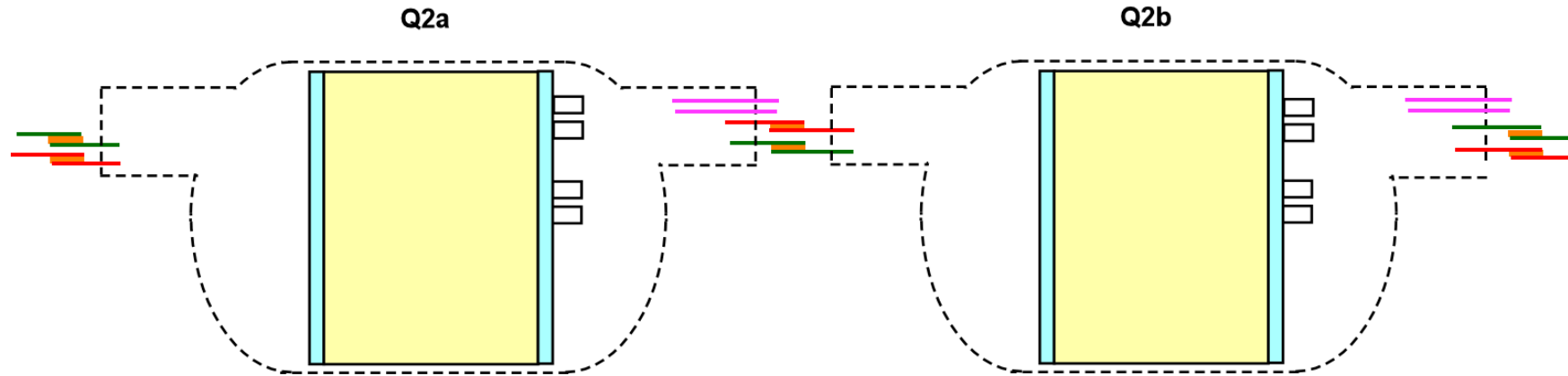


Status of Expansion Loop and Bus Design

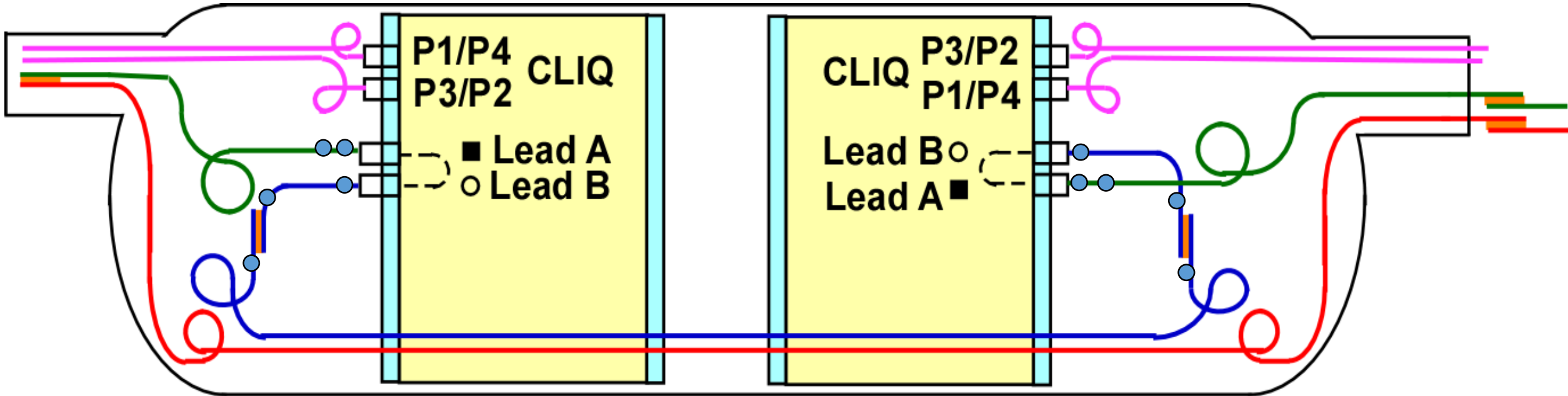
R. Bossert January 26, 2018



General Buss loop configuration –



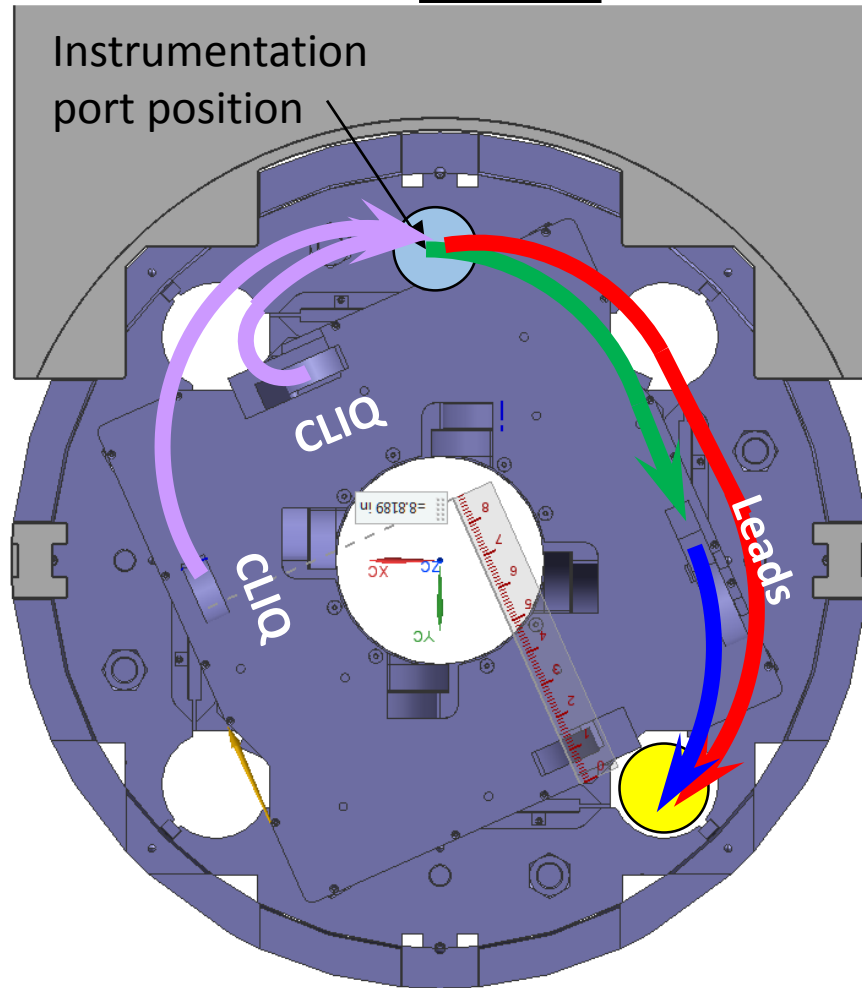
Q1 Configuration (same as Q3) *with voltage taps shown*



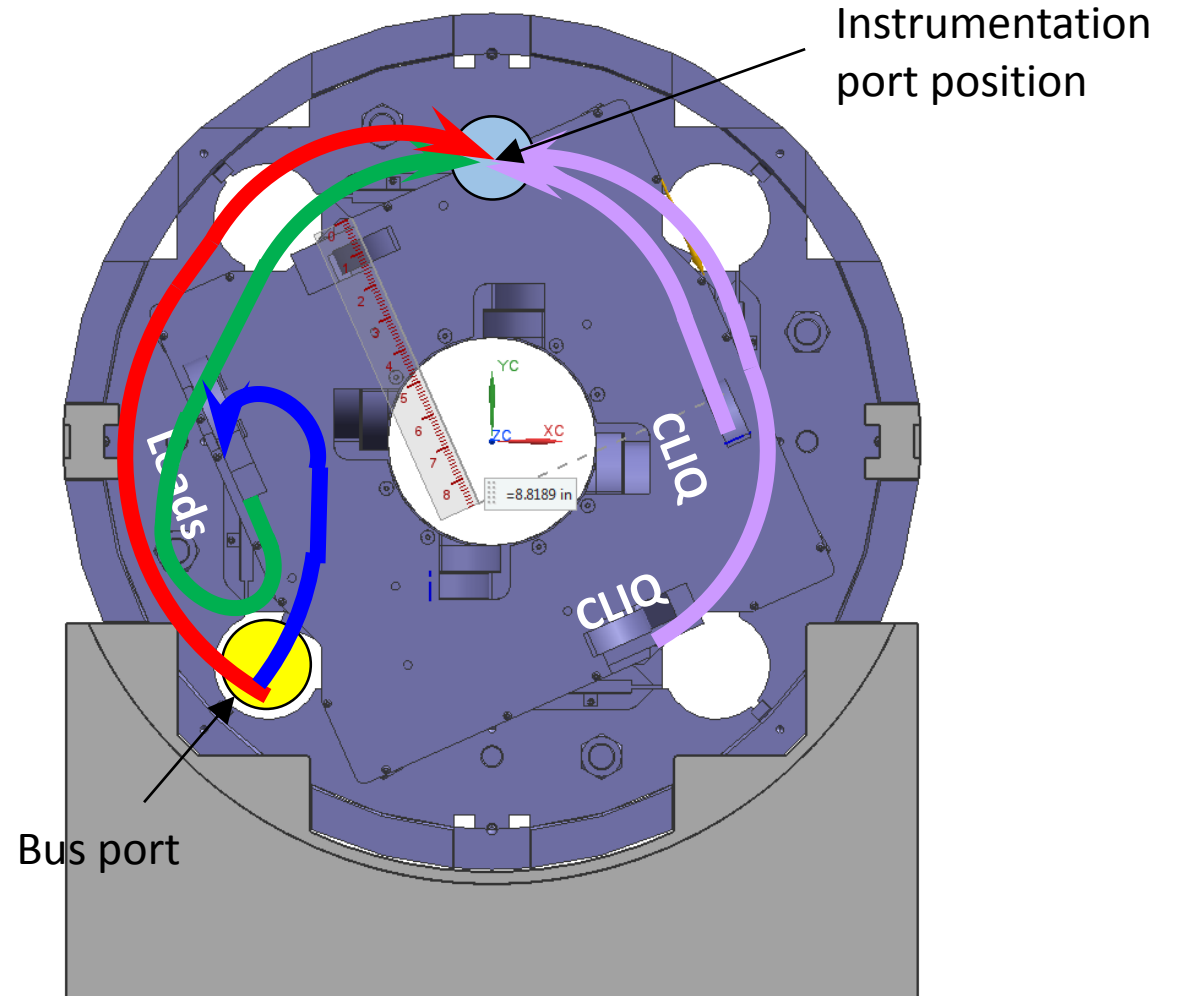
● = *Position of Voltage Tap*

End views of Expansion loops looking into the Lead End of both Magnets





Q1a/Q3a



Q1b/Q3b

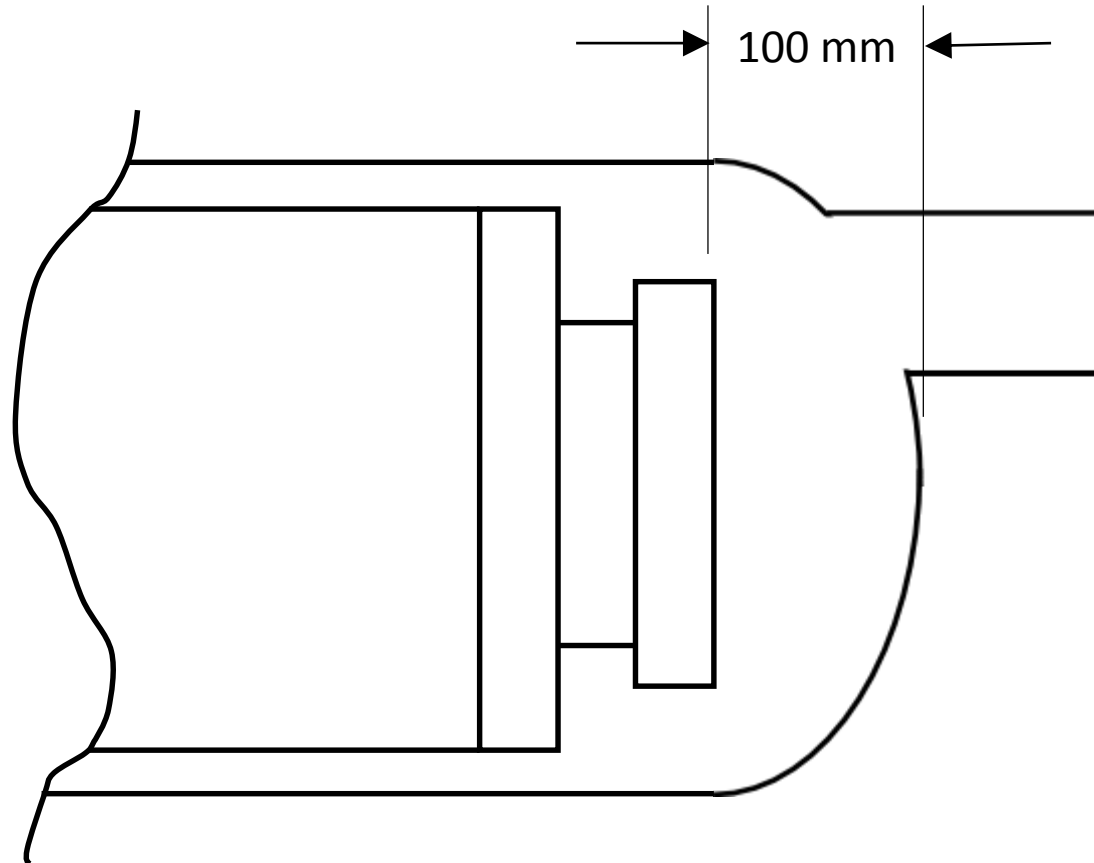


Key

- Green line power leads** 
- Blue line local bus** 
- Red line through bus** 
- Purple line CLIQ leads** 

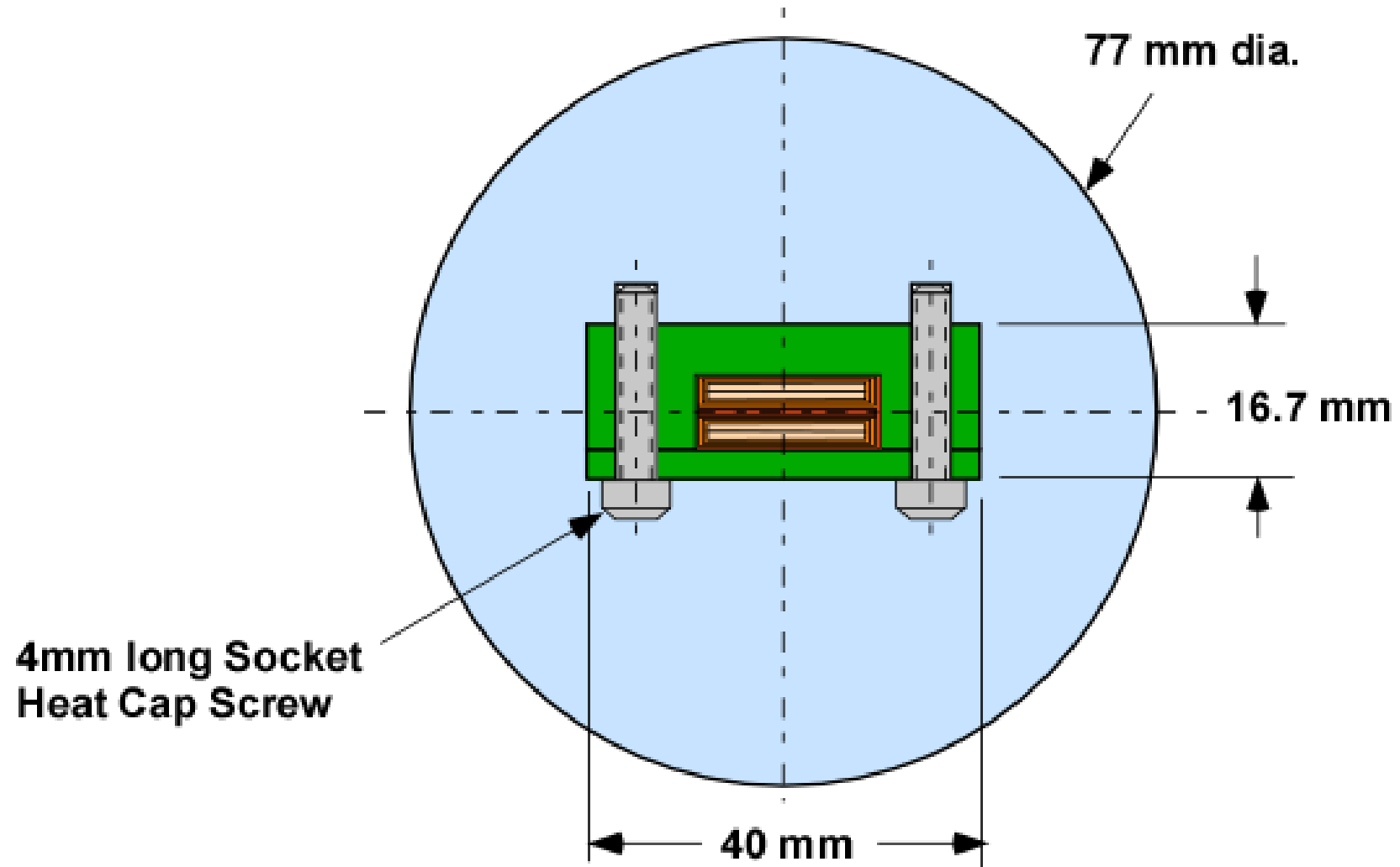
Q1b/Q3b is flipped vertically with respect to Q1a/Q3a

Space in End Dome



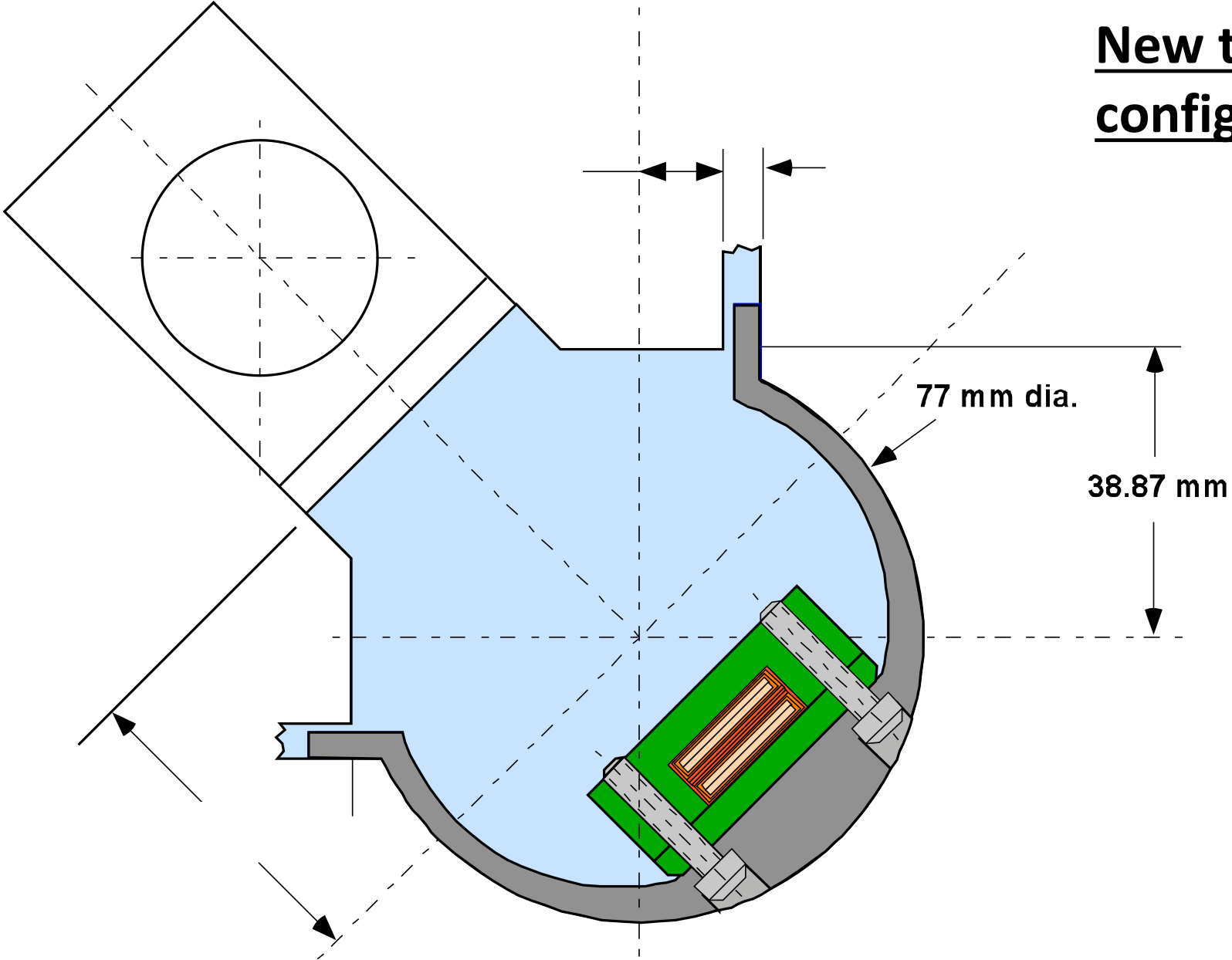
There is approximately 100 mm of space inside the dome between the “pizza box” and the dome cover. This should provide enough space for the loops to be able to move axially by 50mm. Precise shape of inside of end dome still needs to be received at Fermilab.

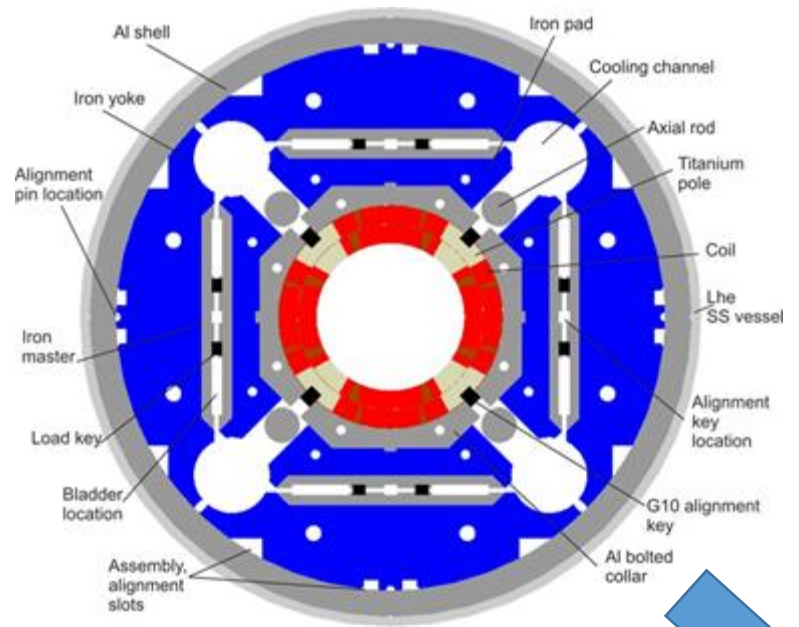
Through Bus original configuration



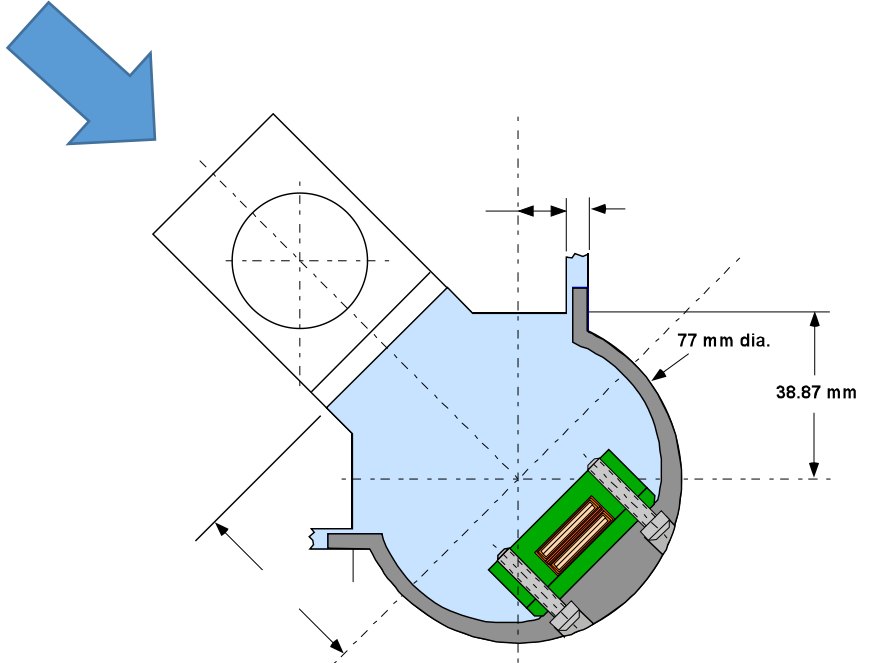
Original Concept – bus centered in bus port

New through bus configuration

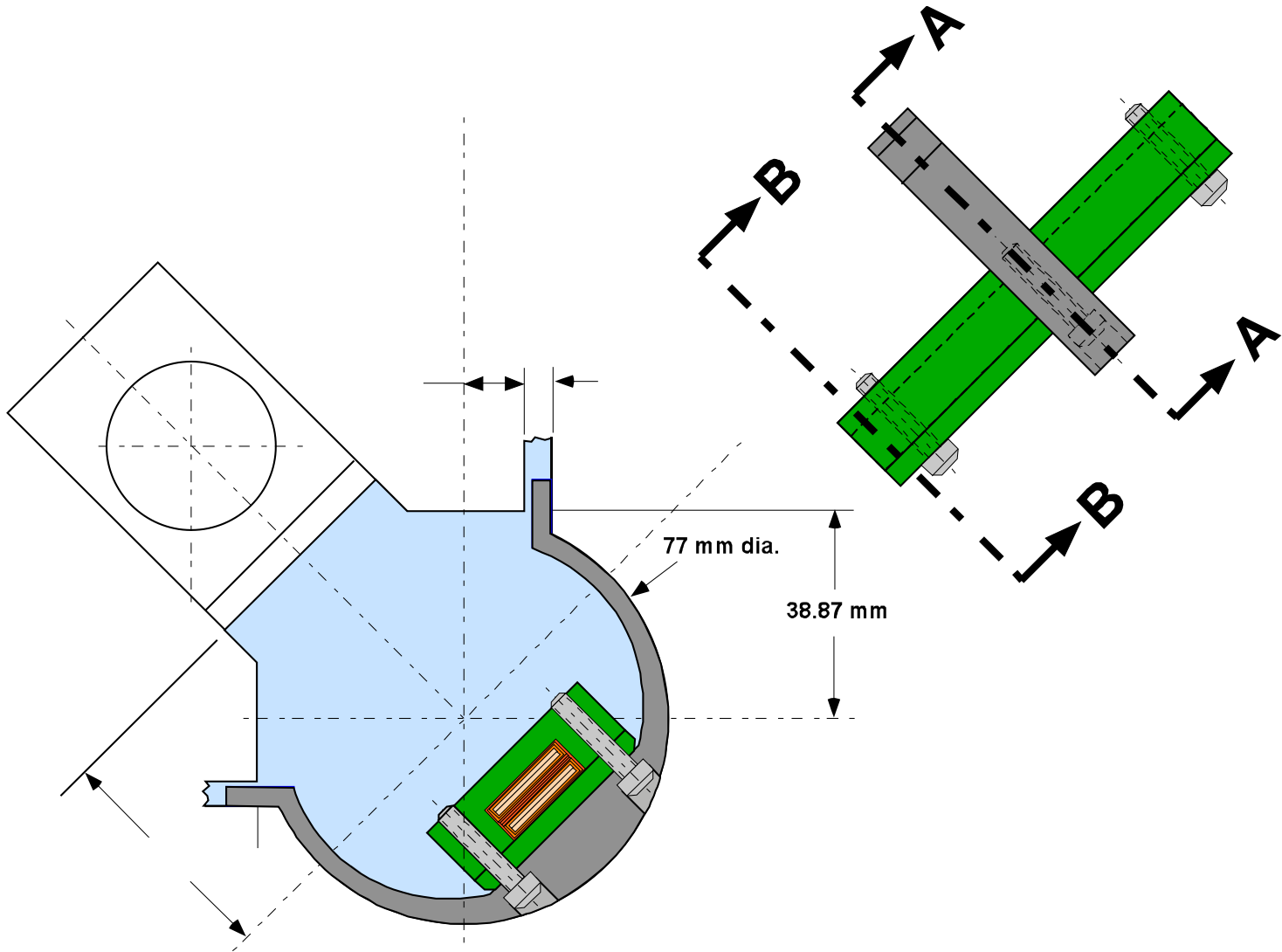




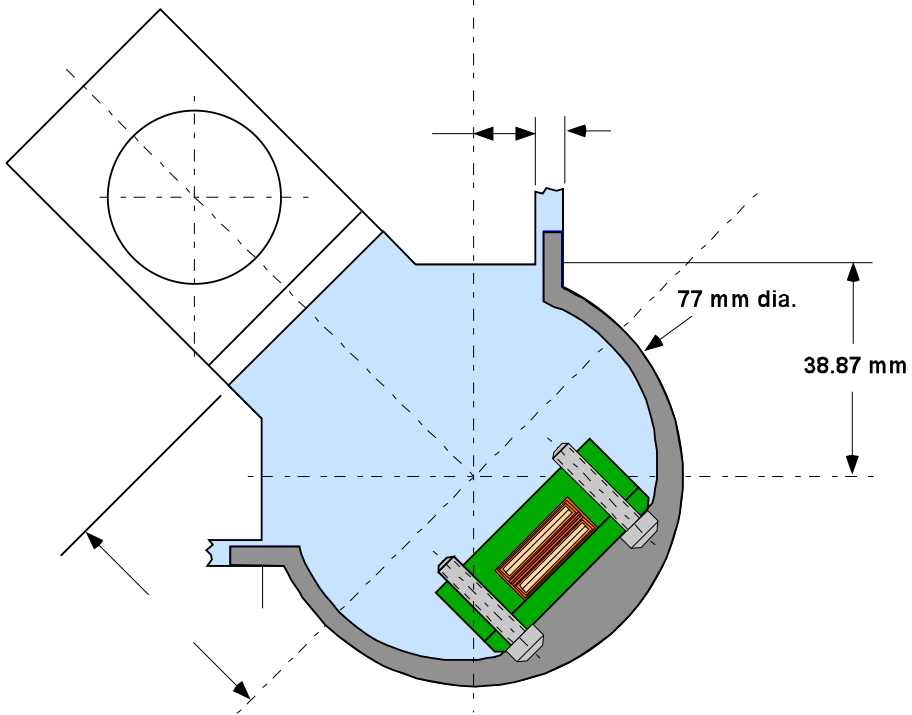
Bus in bus port with "Spider"



More Detailed view

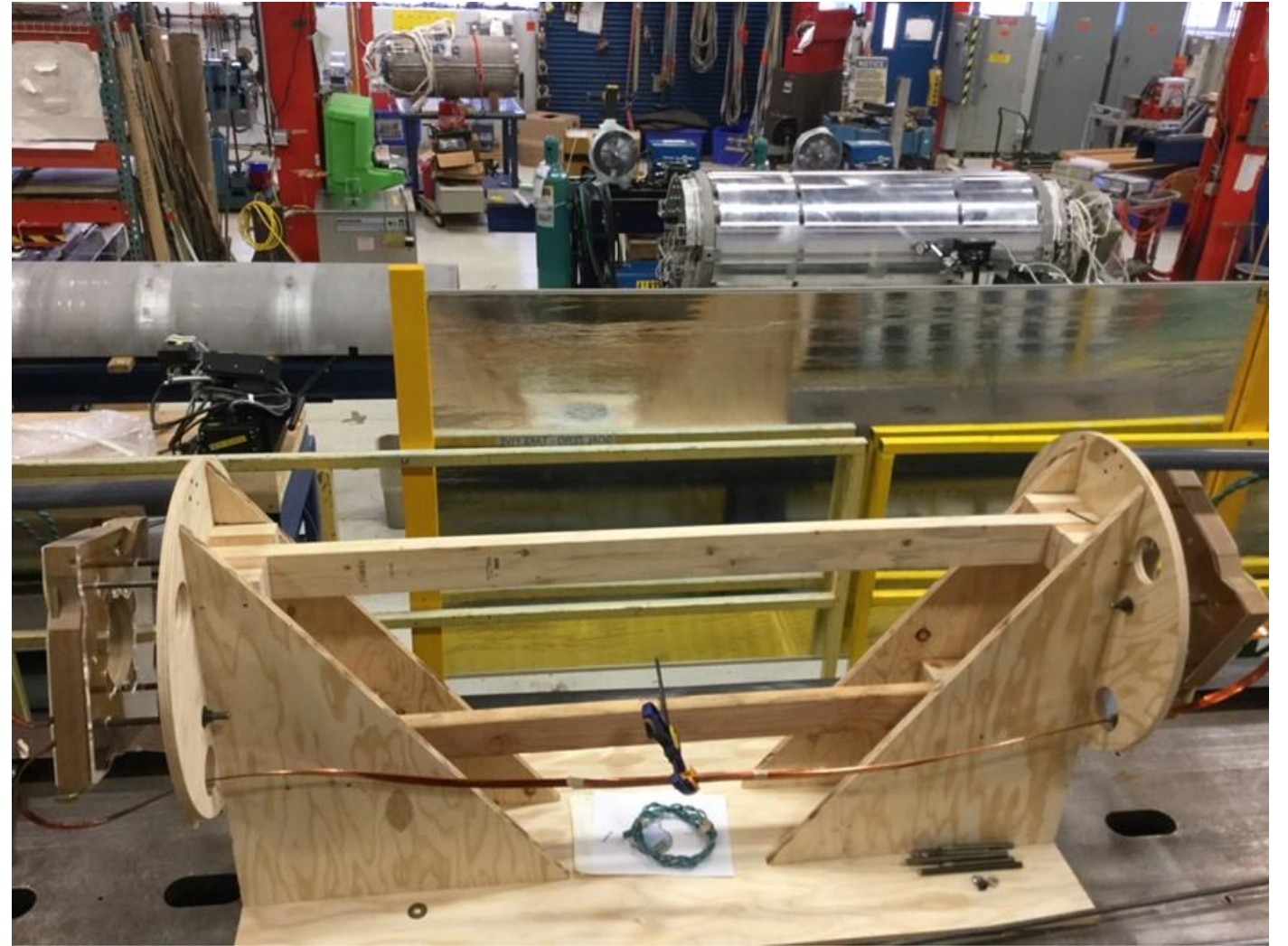


Section A - A

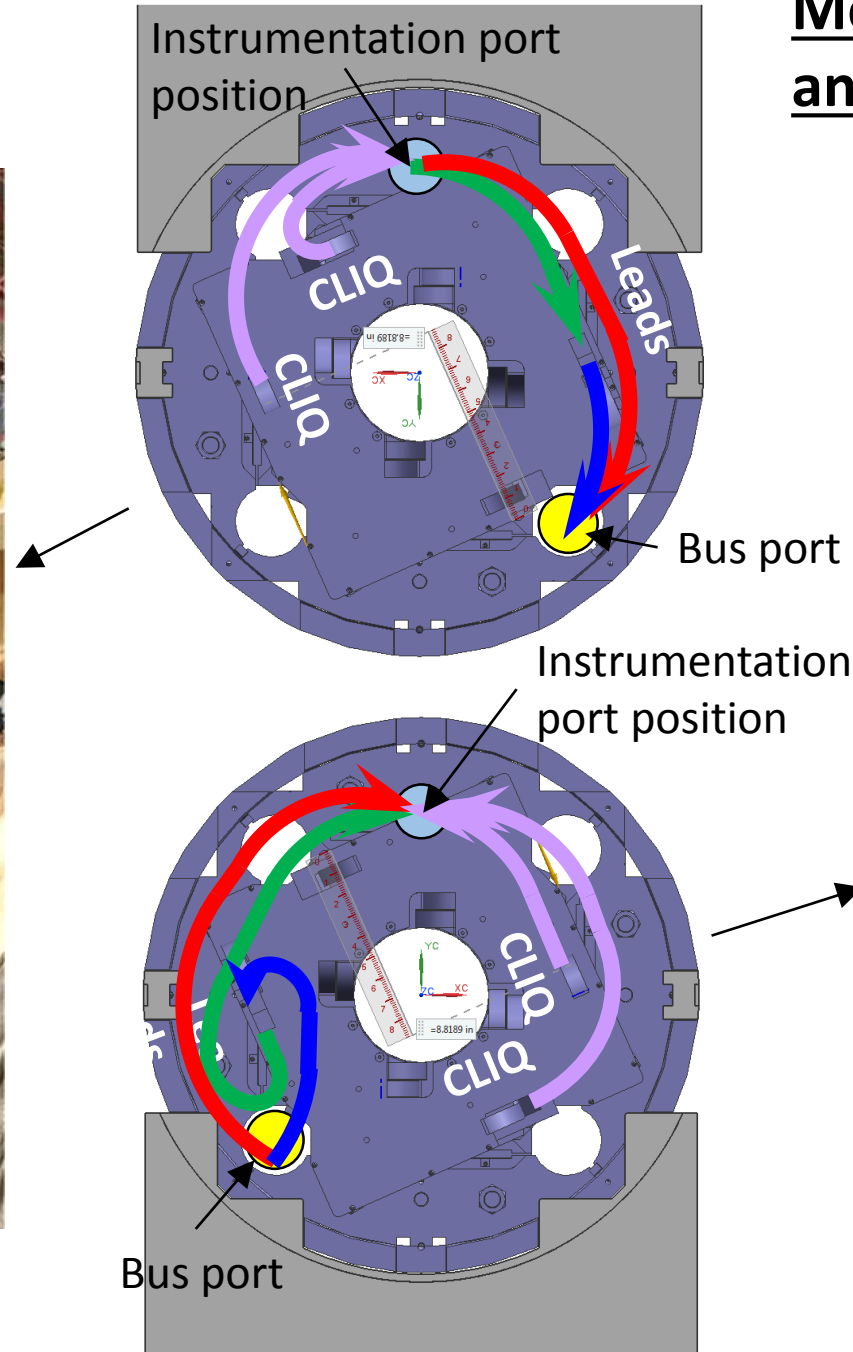


Section B-B

Overall views of mockup

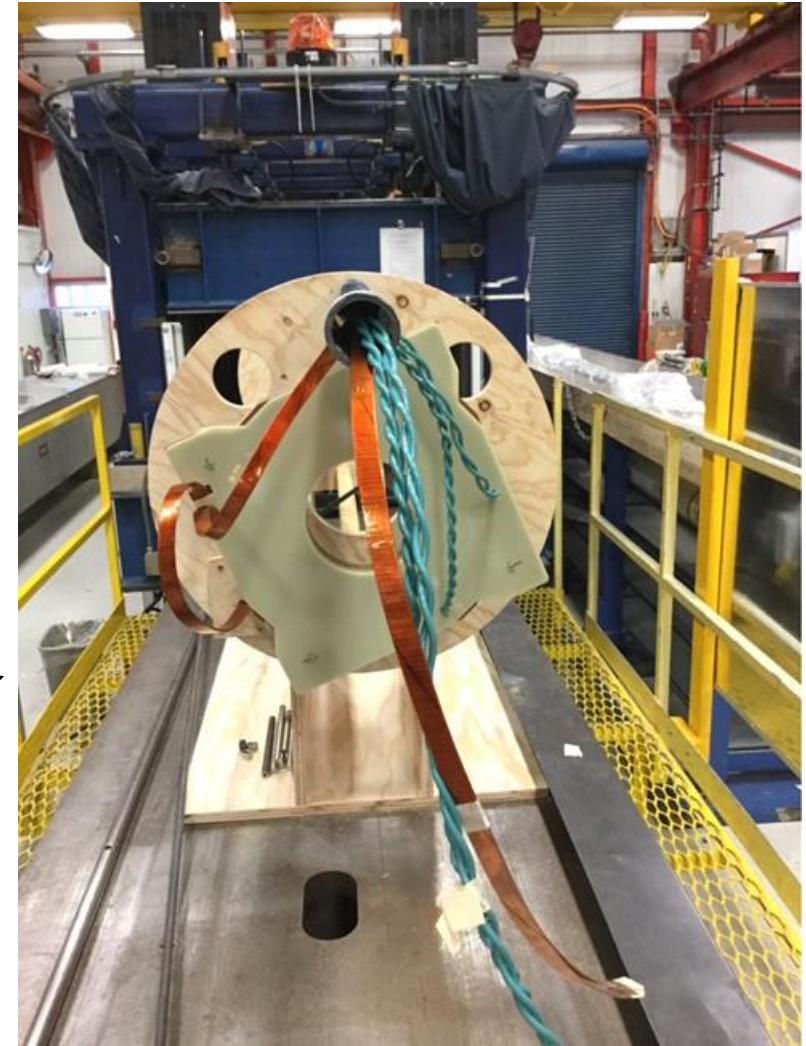


Q1a/Q3a



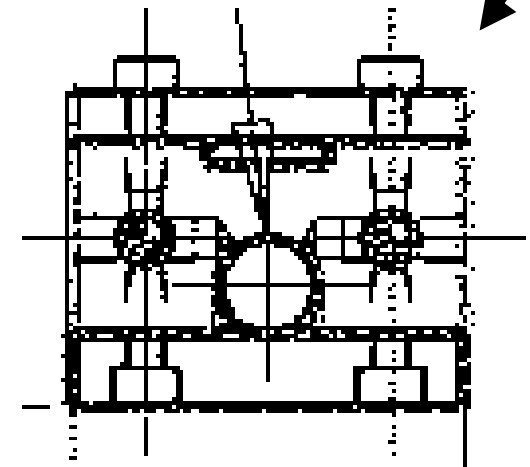
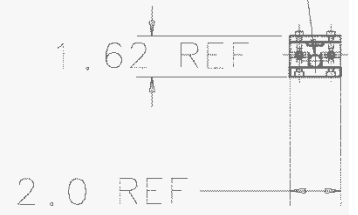
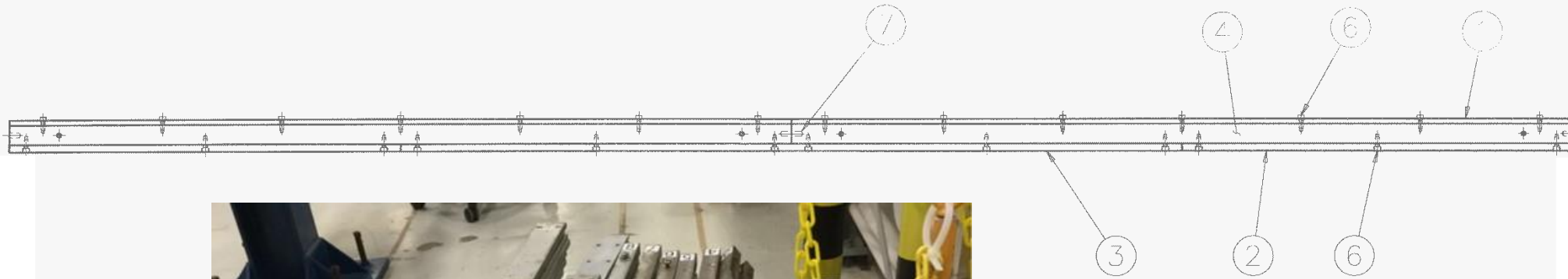
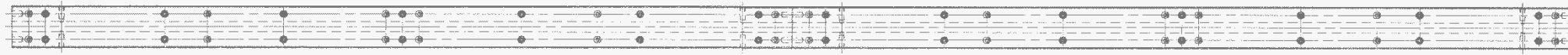
Mockup of Expansion Loops and Through Bus

Q1b/Q3b

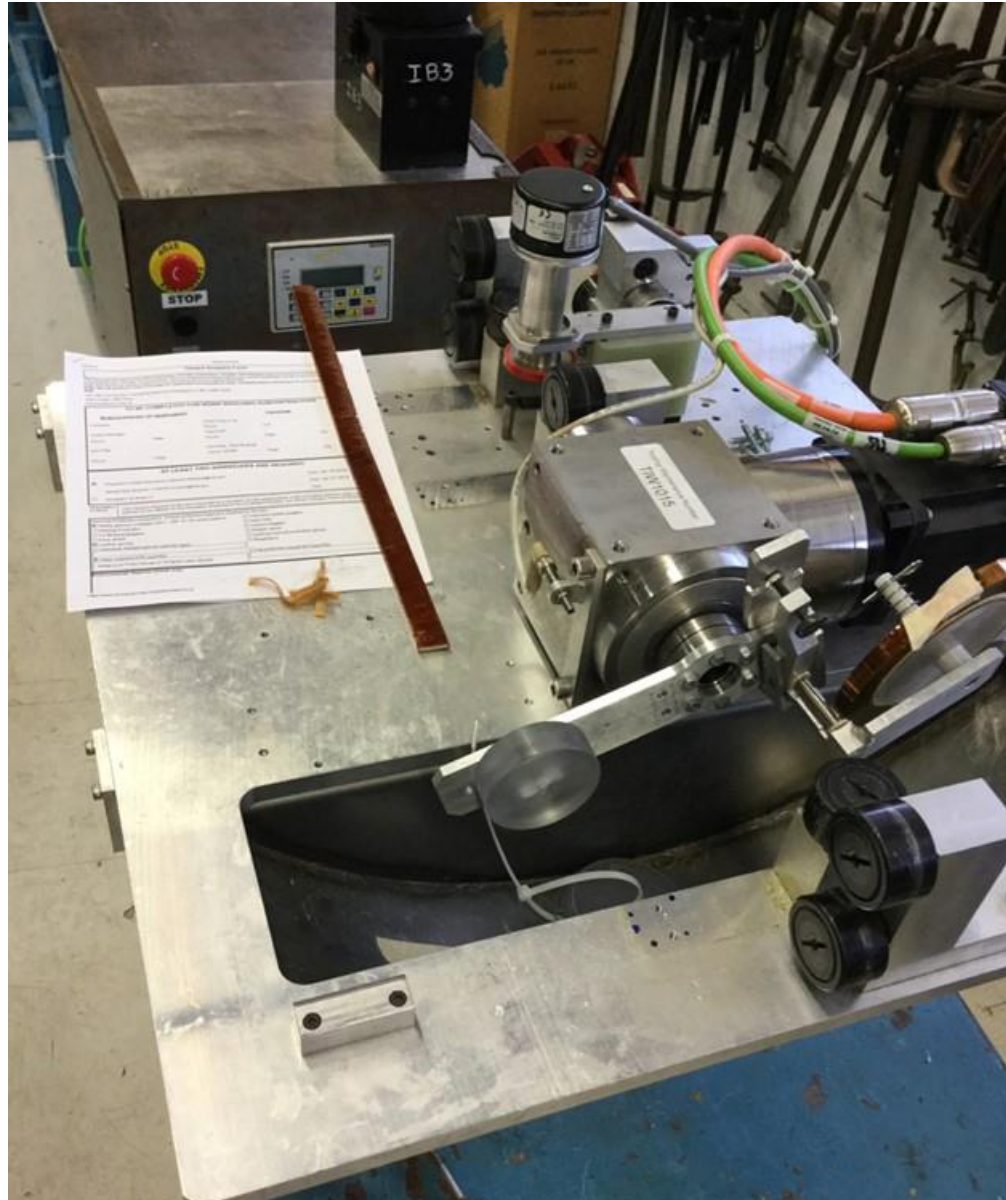


Note: Through bus not yet installed.

Bus Soldering Fixture



Bus Wrapping Fixture



Next Steps:

- Finish rework of bus soldering fixture
- Solder short bus for mockup
- Manufacture bus housing, “spiders” and bus housing port for mockup.
- Install bus into mockup
- Manufacture gauge to duplicate dome inside surface.
- Calculate amount of expansion needed for each loop.
- Finish routing leads, expansion loops and CLIQ leads.
- Understand splice configuration and design fixtures for completing splices.
- Duplicate mockup for Q2.
- Troubleshoot bus wrapping fixture.
- Extend bus soldering fixture to 10 meters
- Manufacture full length prototype bus, including wrapping, and mount into a prototype housing.
- Test full length bus configuration in a long model?

Items still needed from LBNL/CERN to complete mockup and design:

- Verification that bus configuration and position is acceptable (from magnetic analysis).
- Configuration of inside of end dome.
- Sample of CLIQ lead (to verify that our model is close to the correct size and stiffness).
- Parameters needed for Q2.

Summary

- Mockup of Q1/Q3 expansion loops is underway.
- Plan for bus wrapping as well as bus soldering exists. Fixtures for both are available from previous projects but will need rework (or rebuild).
- Bus and bus housing conceptual design exists, needs to be verified.
- Not yet started on Q2 mockup.
- Still need to design and complete splices and splice tooling.
- Will also attempt to make a “test bus” for a future iteration of the short model.