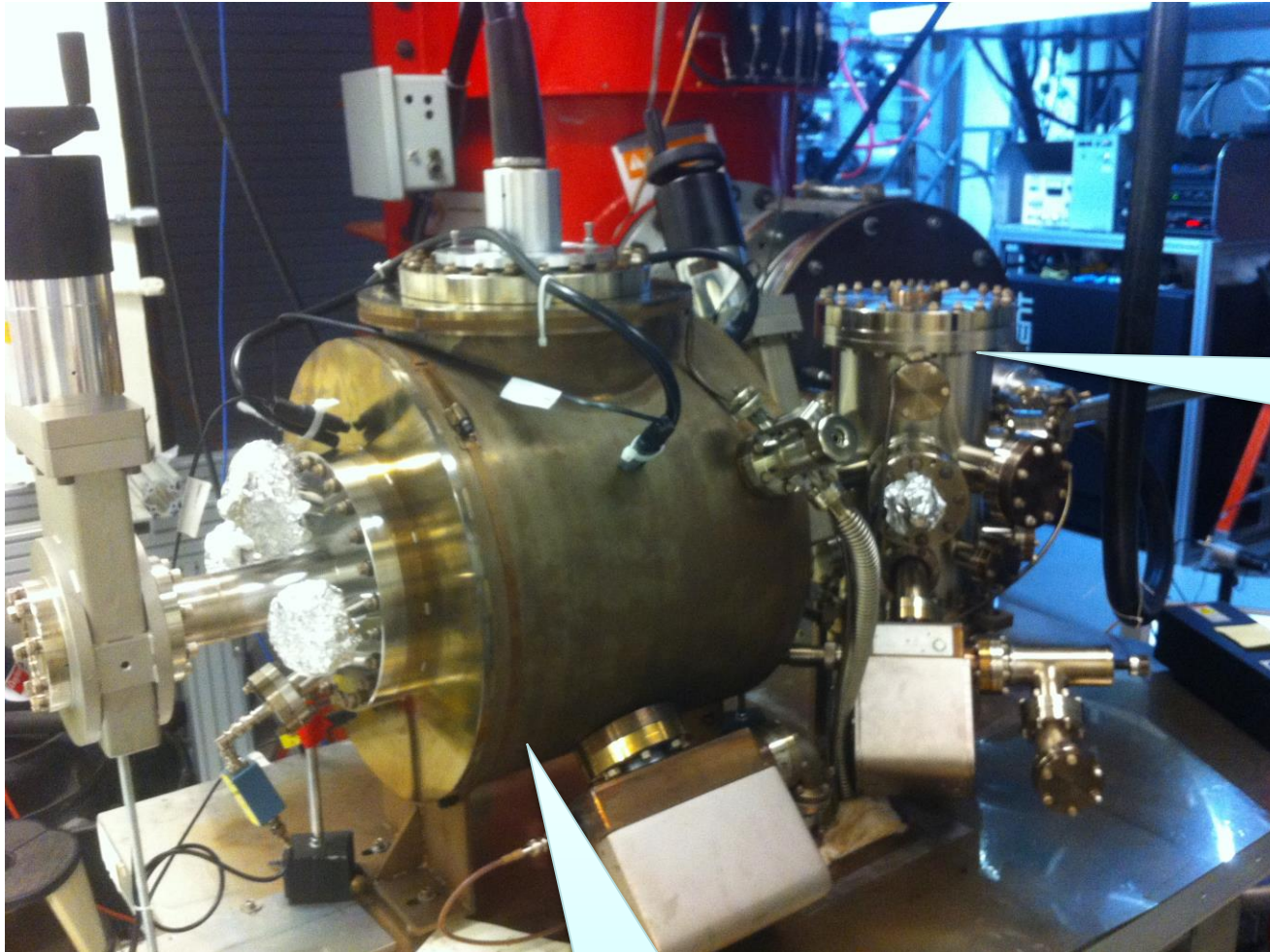


Update:
Puck and Gun Magnet

March 1, 2016

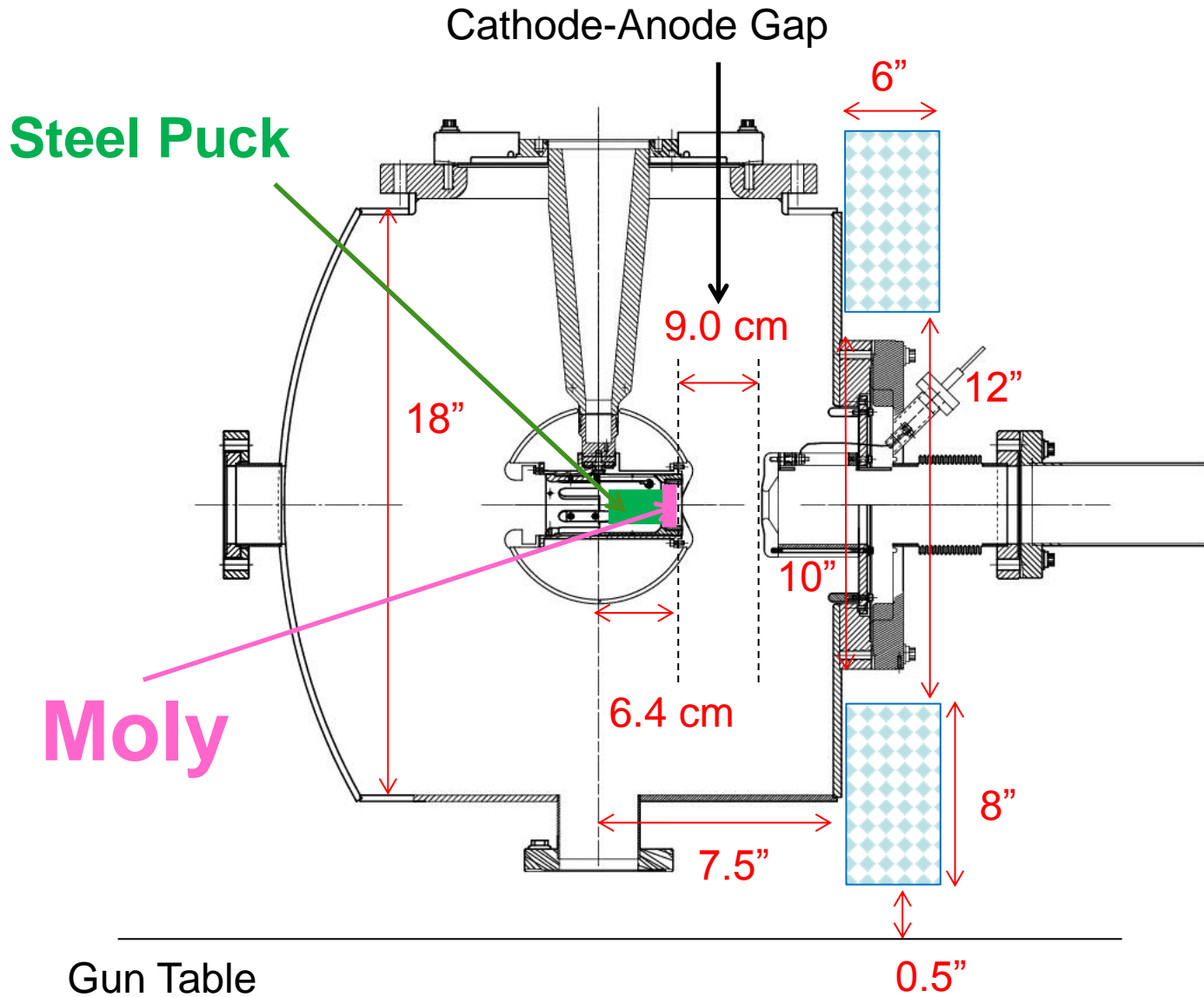
Magnetized Gun

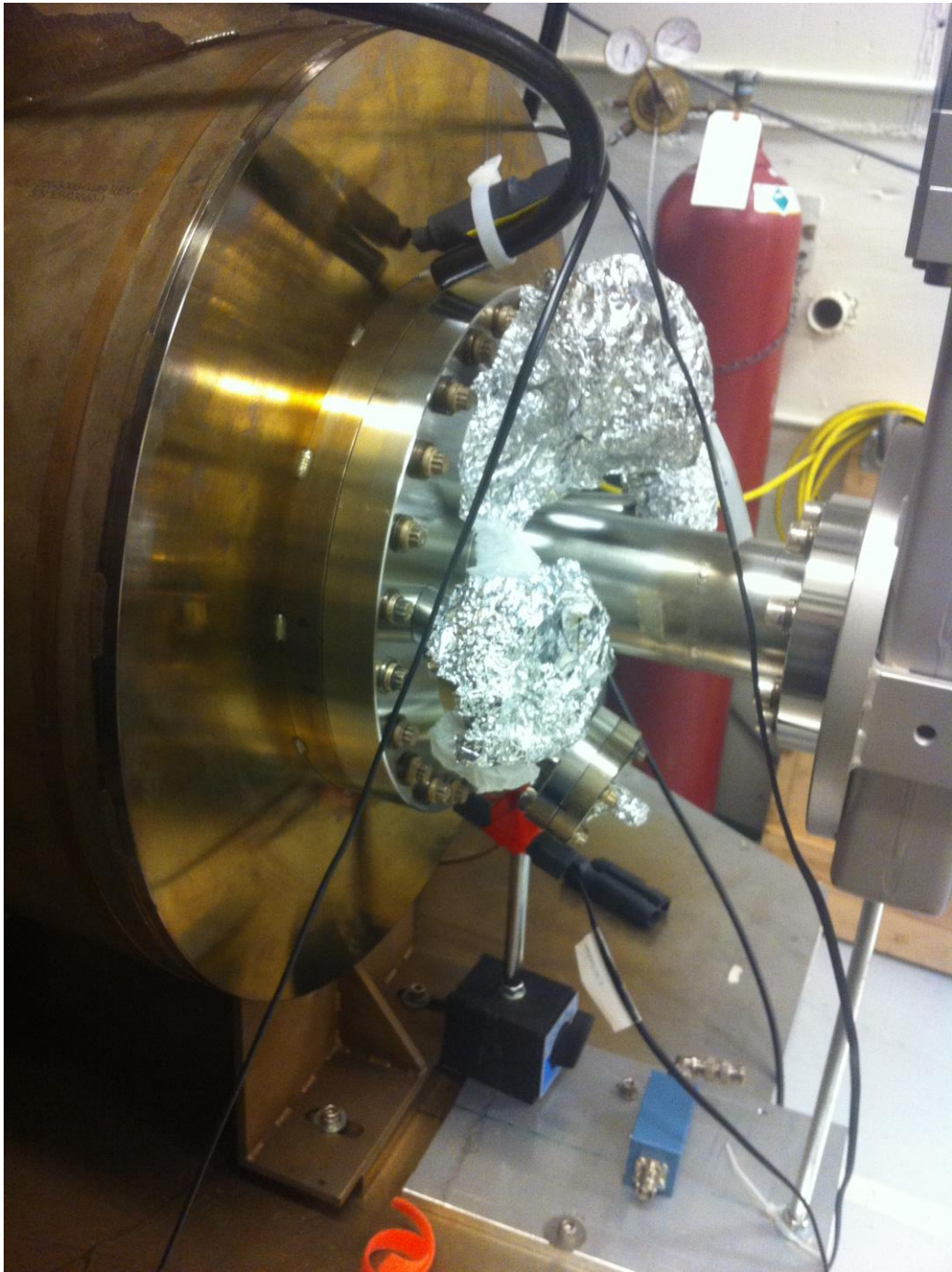


K₂CsSb
Preparation
Chamber

HV Chamber

Coil + Steel Puck

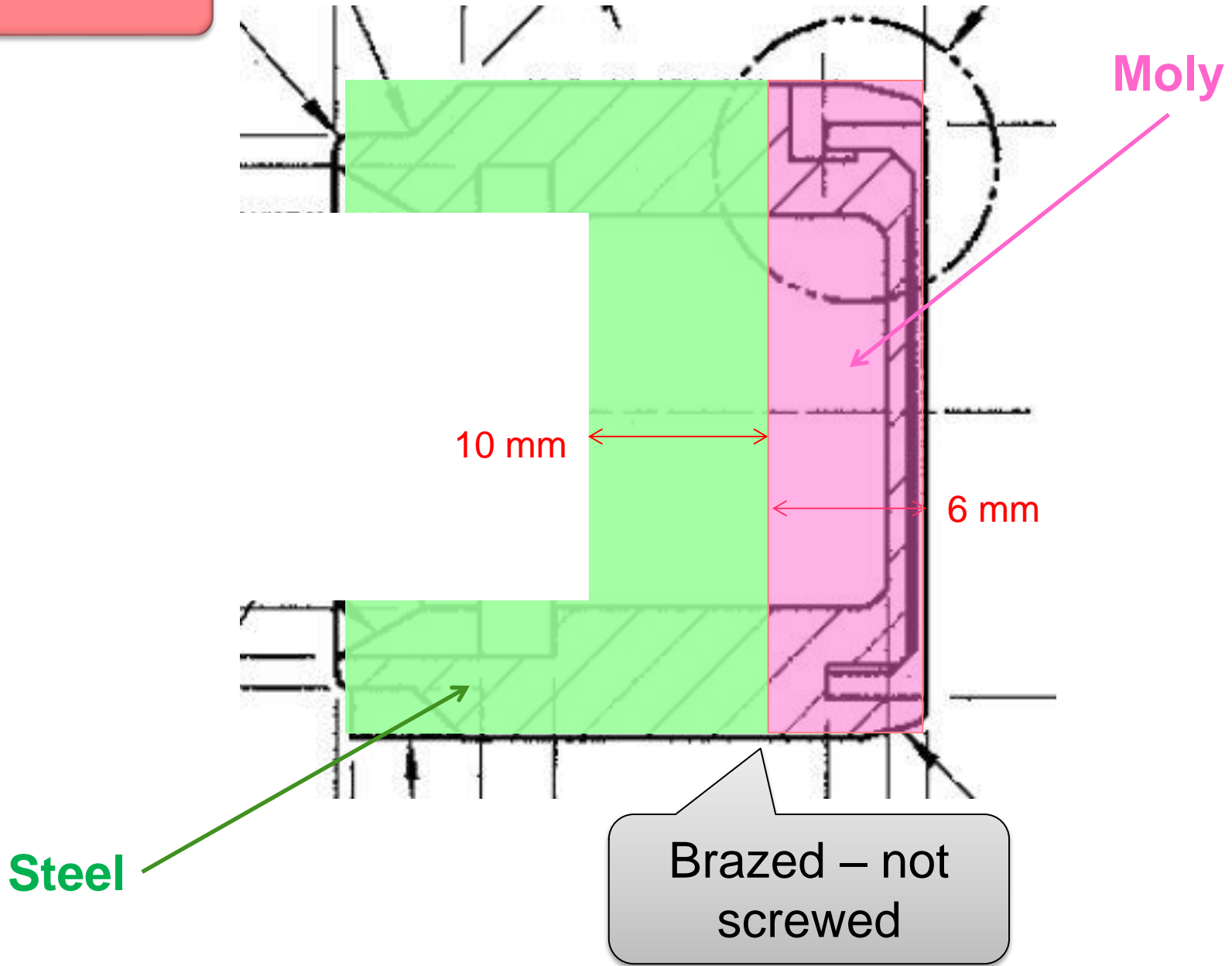




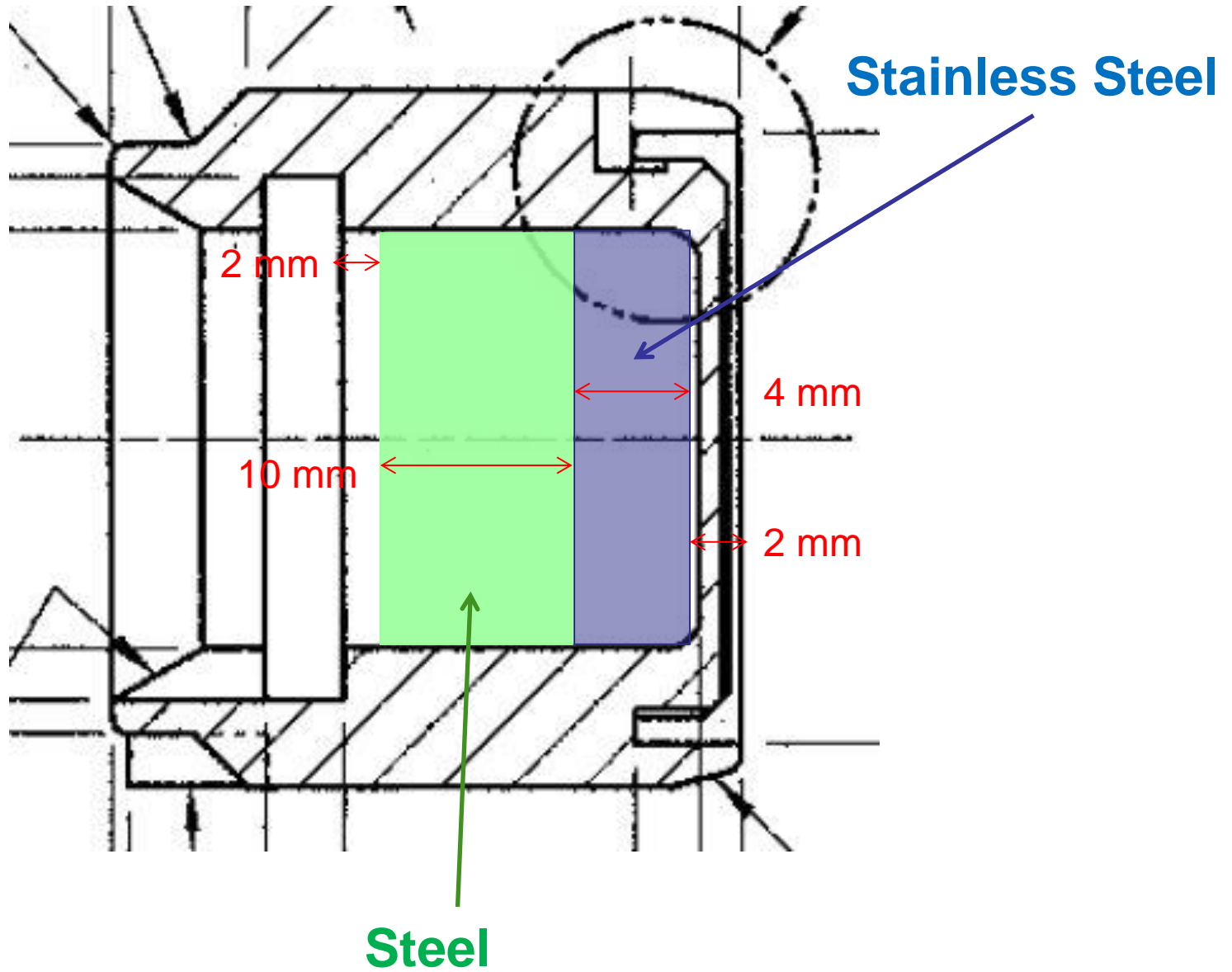
Steel Puck

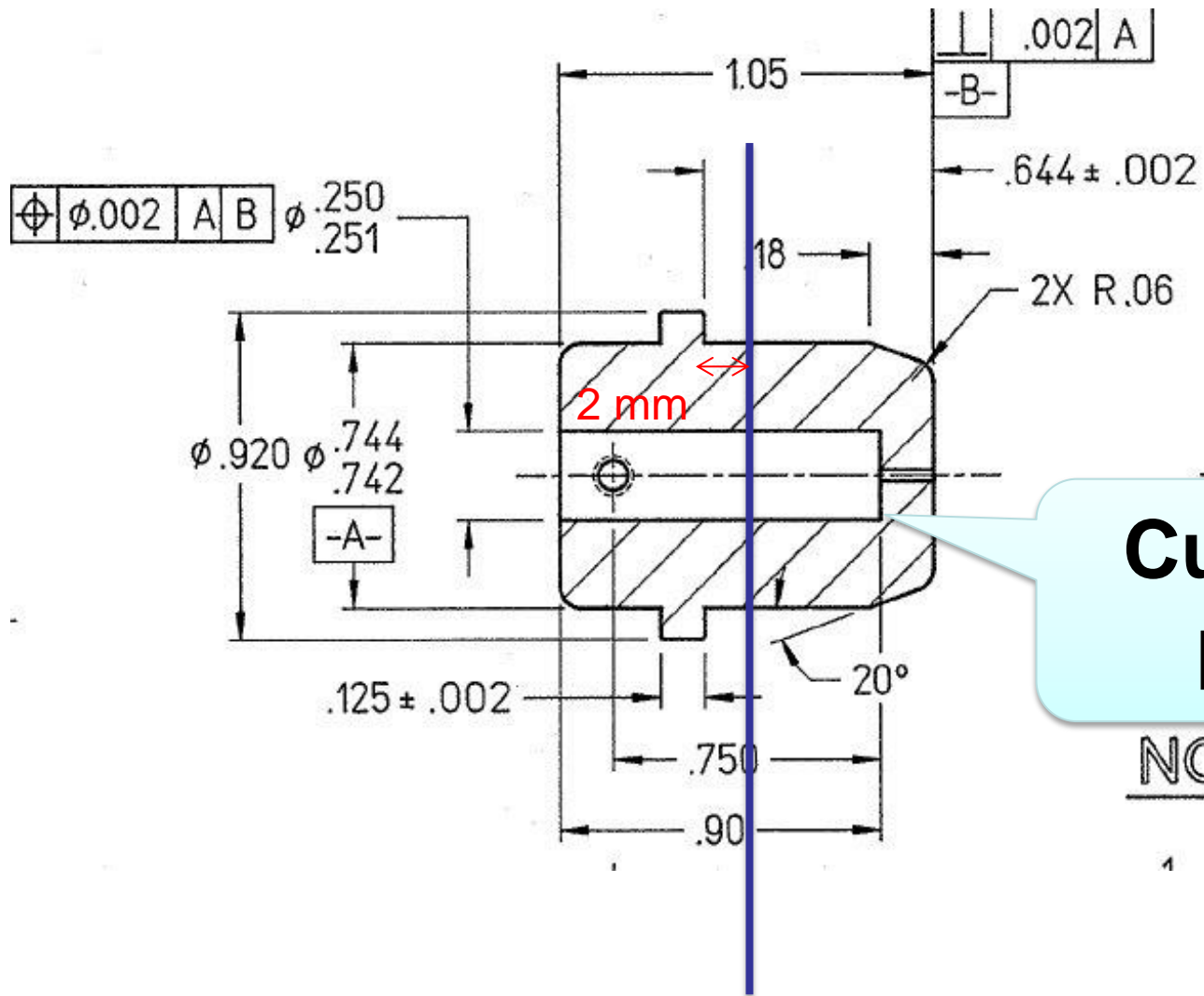
- Molybdenum and Steel hybrid puck
- Designed to enhance field to 2.0 kG at cathode
- Use 1010 carbon steel
- Re-design new Puck Manipulator End Adapter
- Order 4 pucks – map with Solenoid
- Heat Treatment:
 1. Un-heated
 2. 200°C (Sb) and 120°C (K – Cs) growth
 3. 550°C Heat Cleaning then 200°C and 120°C
 4. Multiple

Design I



Design II





Cut this part

NC

1

Power Supply

- Use new spare Dogleg power supply (500A, 80V)
- If needed at CEBAF, we can use an old Dogleg supply (250A, 50V) to keep going
- Need to add polarity switch to be able to degauss steel

Coil

- Not bakable – will be mounted on rails. Push downstream out of oven and run LCW through. Move gate valve after beamline solenoid (in place of BPM). Move HV Chamber front foot upstream
- Designed to give 1.4kG at cathode without steel puck
- Bare coil – no cylindrical steel shield/return
- Procurement:
 1. Everson Tesla
 2. Buckley Systems
 3. Alpha Magnetics (\$20.5k, 12 weeks)
 4. JLab Machine shop
- Designer: Gary Hays

Coil Specs

- One water cooled magnet coil
- Inside diameter 30 cm, round to 0.2 cm
- Outside diameter roundness: 0.5 cm
- Flatness, each side, 0.3 cm
- Double pancakes each of 8 by 20 turns using Luvata 6092 or equivalent copper conductor, 9 mm square with 6 mm round hole for water cooling. These may be soldered or bolted together as vendor prefers, see also potting options below. Vendor should propose input/output flags suitable for 450A.
- Eight parallel water cooling circuits, one per double pancake, with 37° flare JIC tube fittings. All eight water connections shall be located on the coil outer diameter within a 15 degree region of the assembly. Vendor shall provide a cooling water specification (flow rate and pressure) for each water circuit assuming 450A current and water inlet temperature of 35°C.
- Coil cross-section shall be less than 16 cm Z by 20 cm R.
- Vendor shall propose insulation system. Glass-epoxy with at least 110°C capability preferred. Potting may be done as a “bag job”. Tooling could also be built to pot four double pancakes as a coil half with four water circuits and two leads. Bolted jumper plate to electrically join the two halves shall be provided in this case. Or full depth tooling can be built.
- Power supply is 500A, 80V and we plan to operate at 450A and 72V.

Size	11.811" ID, 27.559" OD, 6.242" Z
Conductor Length	500 m
Coil Weight	200 kg
Resistance	0.2 Ω (65°C average T)
Field at Photocathode	1.4 kG
Voltage	72 V
Current	400 A

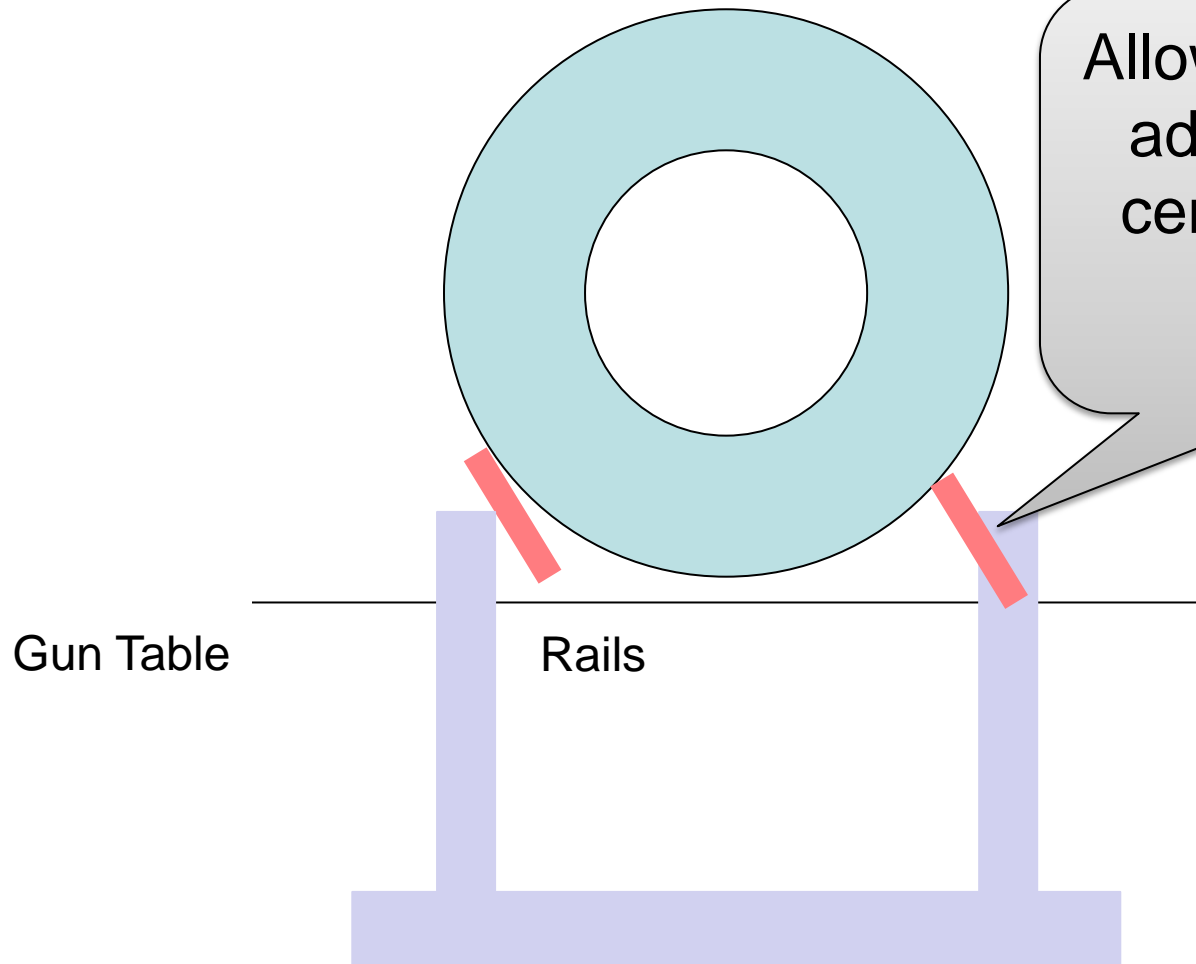
Resistivity Coefficient: $\rho(20^\circ\text{C}) = (1.72 + 0.00393 \Delta T) 10^{-6} \Omega \text{ cm}$

$$R = \rho L/A$$

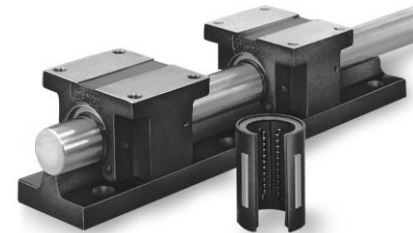
- Inlet LCW Temperature: 35°C
- GTS LCW pressure: 5 bar. Need a booster pump to raise to 15 bar
- Pressure drop:
- Measure 5G line and put magnetic field sings

Coil Mount

How much different geometric center from magnetic center?
How much uniform field for beam steering?



Allow for small (?)
adjustments to
center solenoid
on beam



Coil Timeline

1. Coil designed – by end of March
2. Coil procured – by end of April
3. Coil on site – by end of July
4. Coil mapped – in August
5. Coil installed – by end of August

Timeline

Power Supply (new spare Dogleg):

1. Being built at Magnet Lab: March
2. Test and add polarity switch: April
3. Move to GTS: May
4. Ready: July 1, 2016

All work has to be completed by September 30, 2016.

Coil:

1. Design: February and March
2. Procure: April
3. Map (with and w/o puck), check hysteresis and forces: August
4. Install: August, 2016