Victoria Lagerquist
10-4-2017

Update on the Longitudinally Polarized Target for CLAS12 Run Group C

- Introduction
- Magnetic Fields
- NMR Systems
- Microwave Delivery
- Cryogenics
- Target Material
- Ongoing Work

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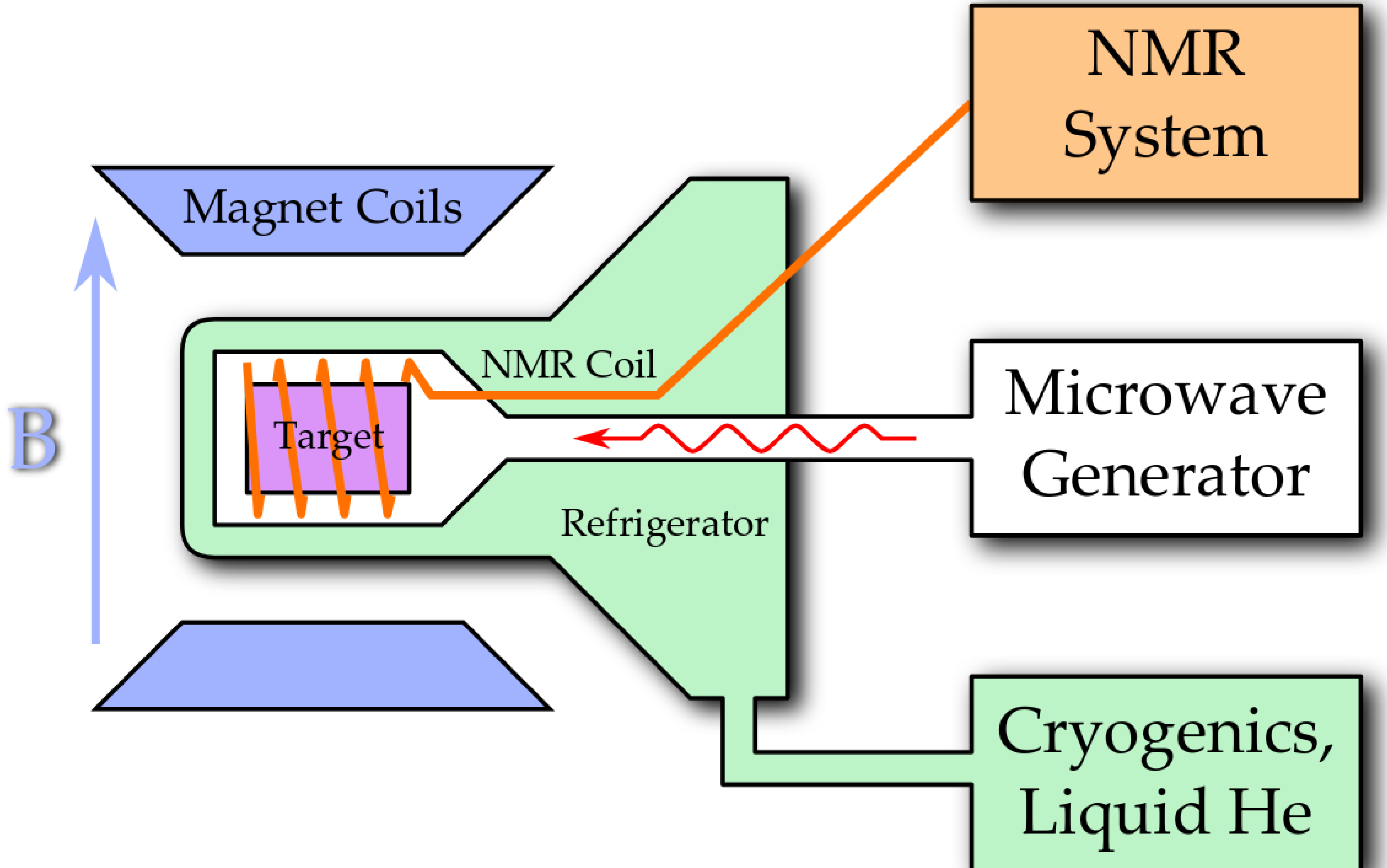
Target Requirements:



Credit: J. Maxwell

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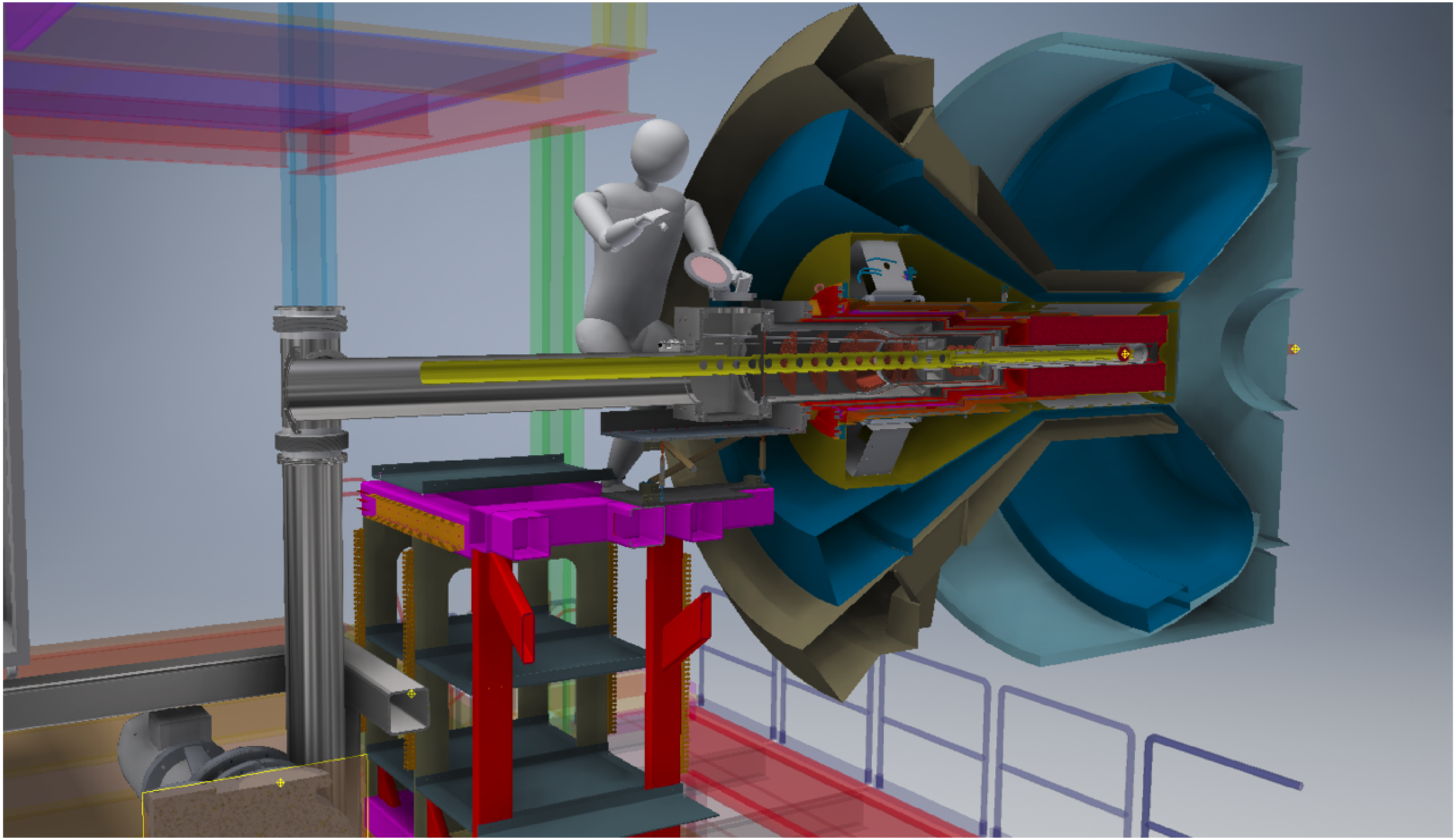
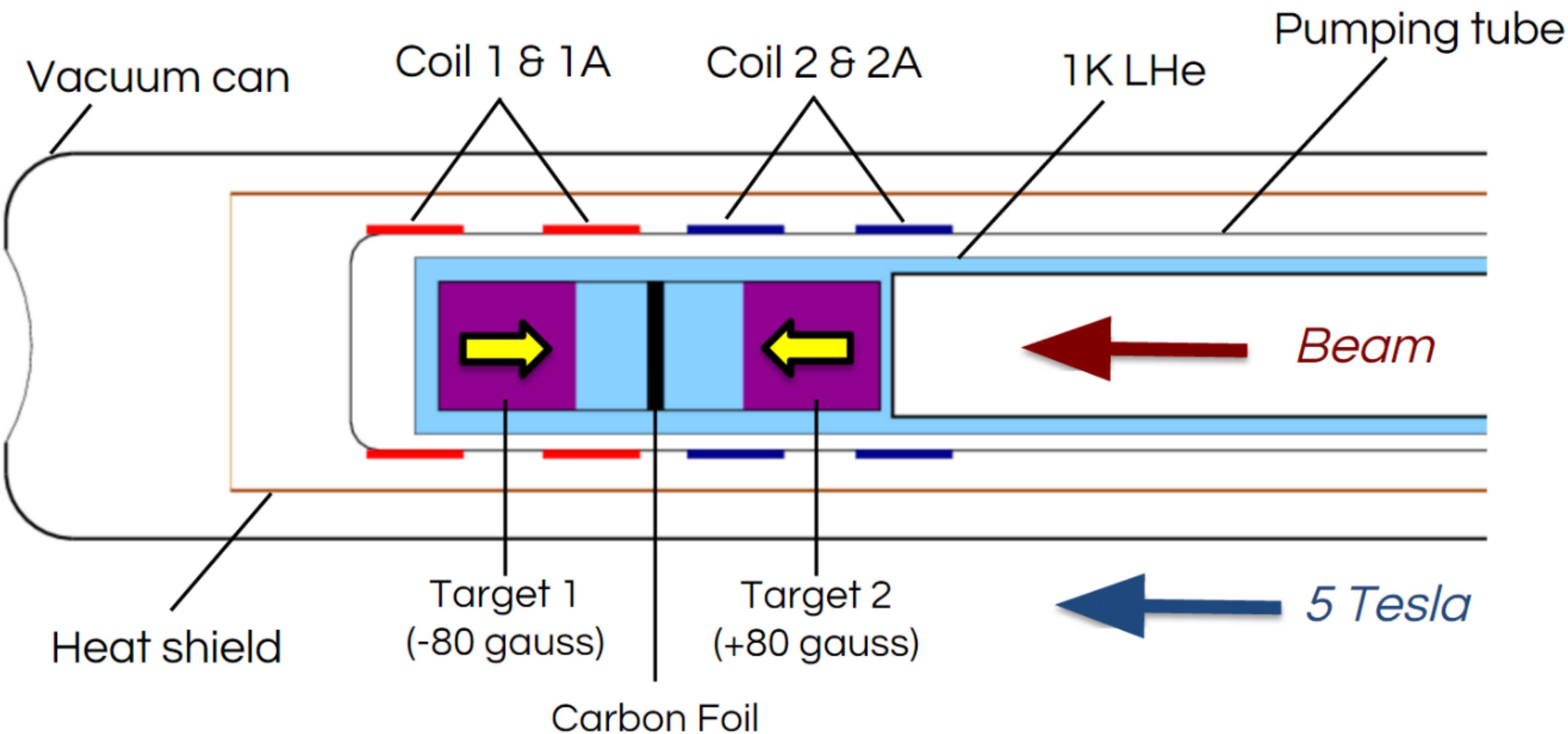
Current Design:



Dual Cell Design:



Credit: C. Keith

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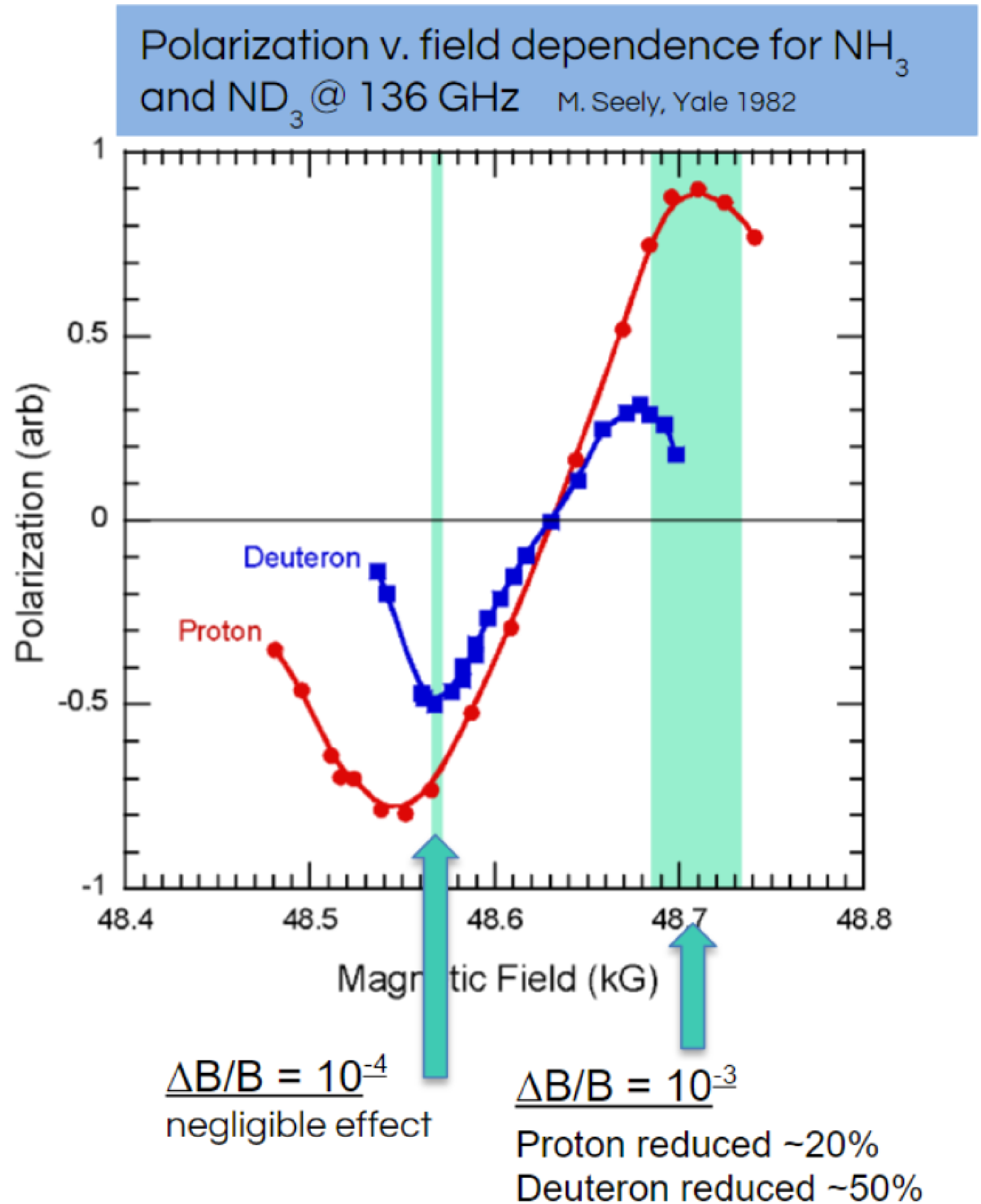
Two Cells Design:

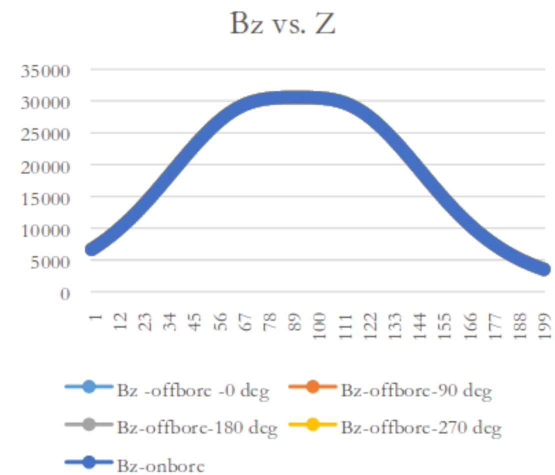


Credit: C. Keith

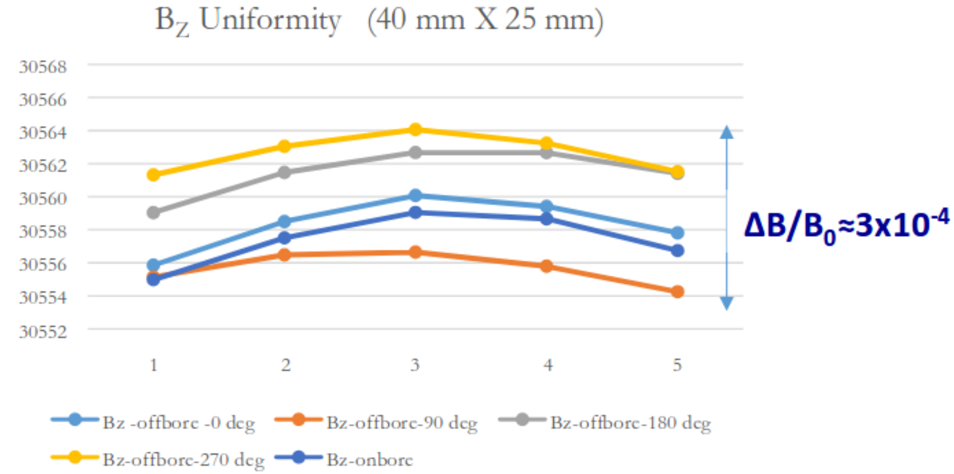
5T Solenoid:

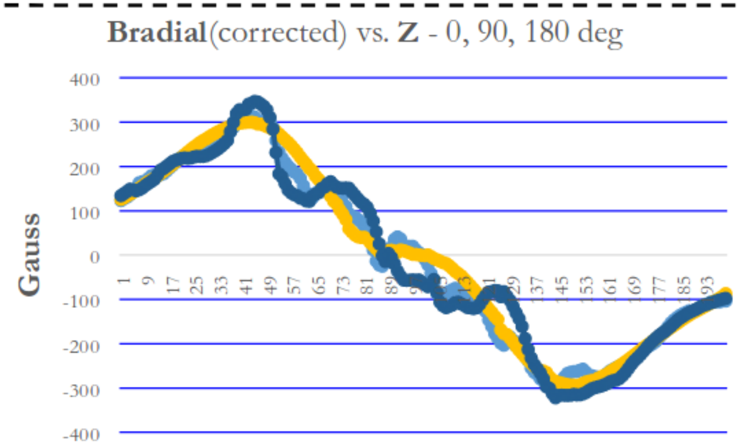
Credit: V. Burkert

Solenoid Magnetic Main Field



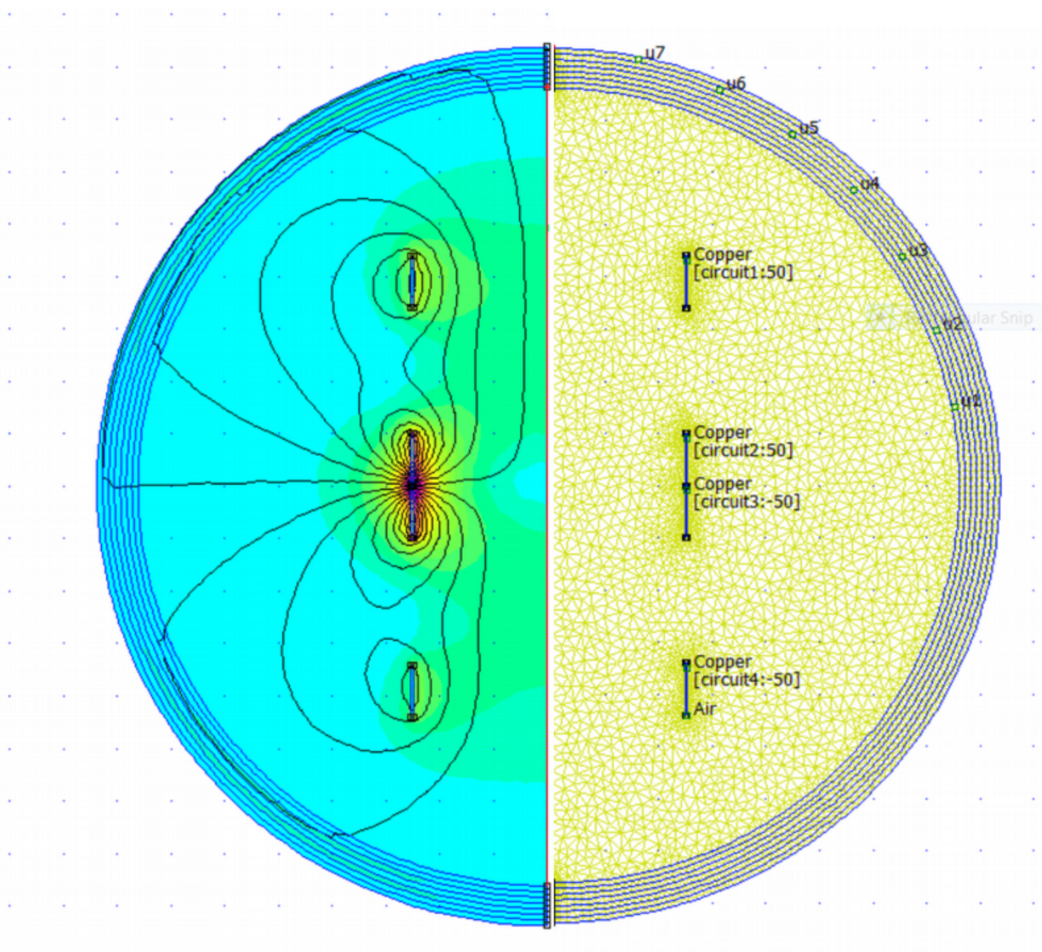
Azimuthal variation off-bore (12.5 mm)



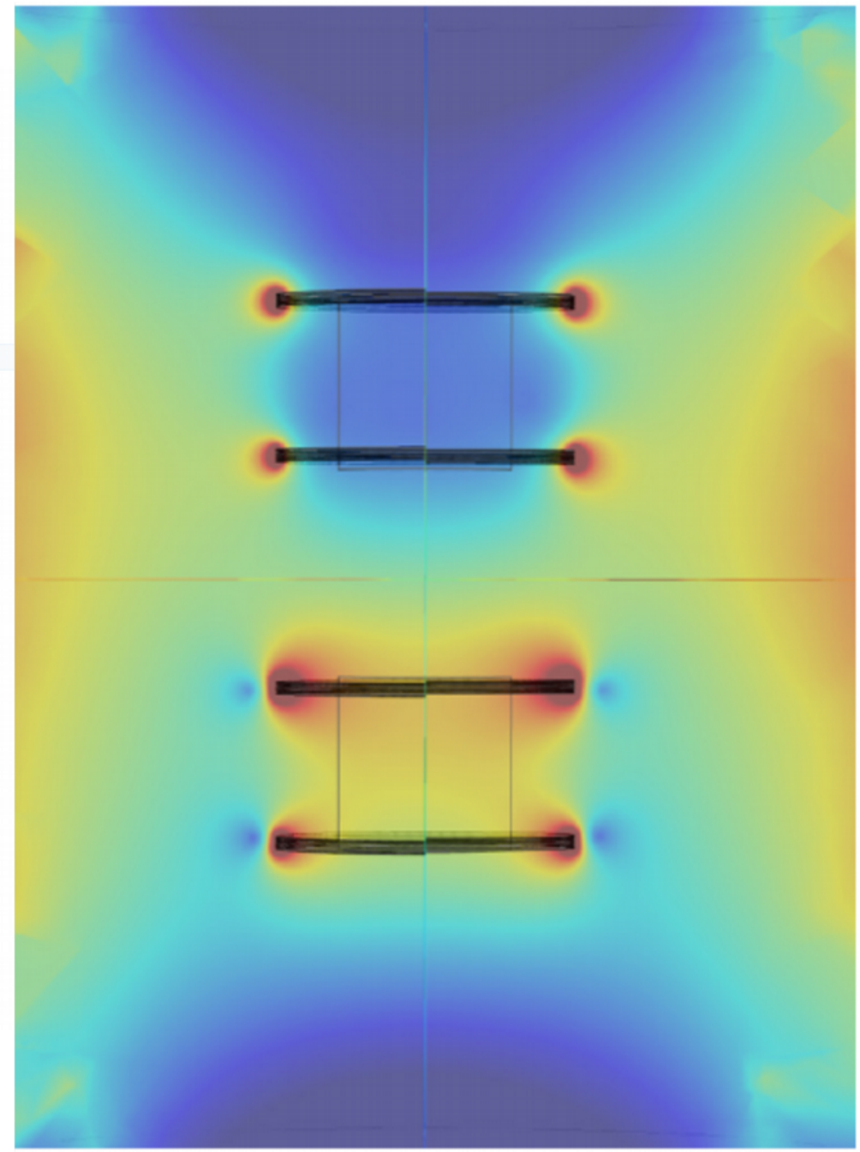


Equality of the off-axis radial components to +/- 30 Gauss
→ Survey axis agrees with magnetic axis within 2 mm (preliminary).

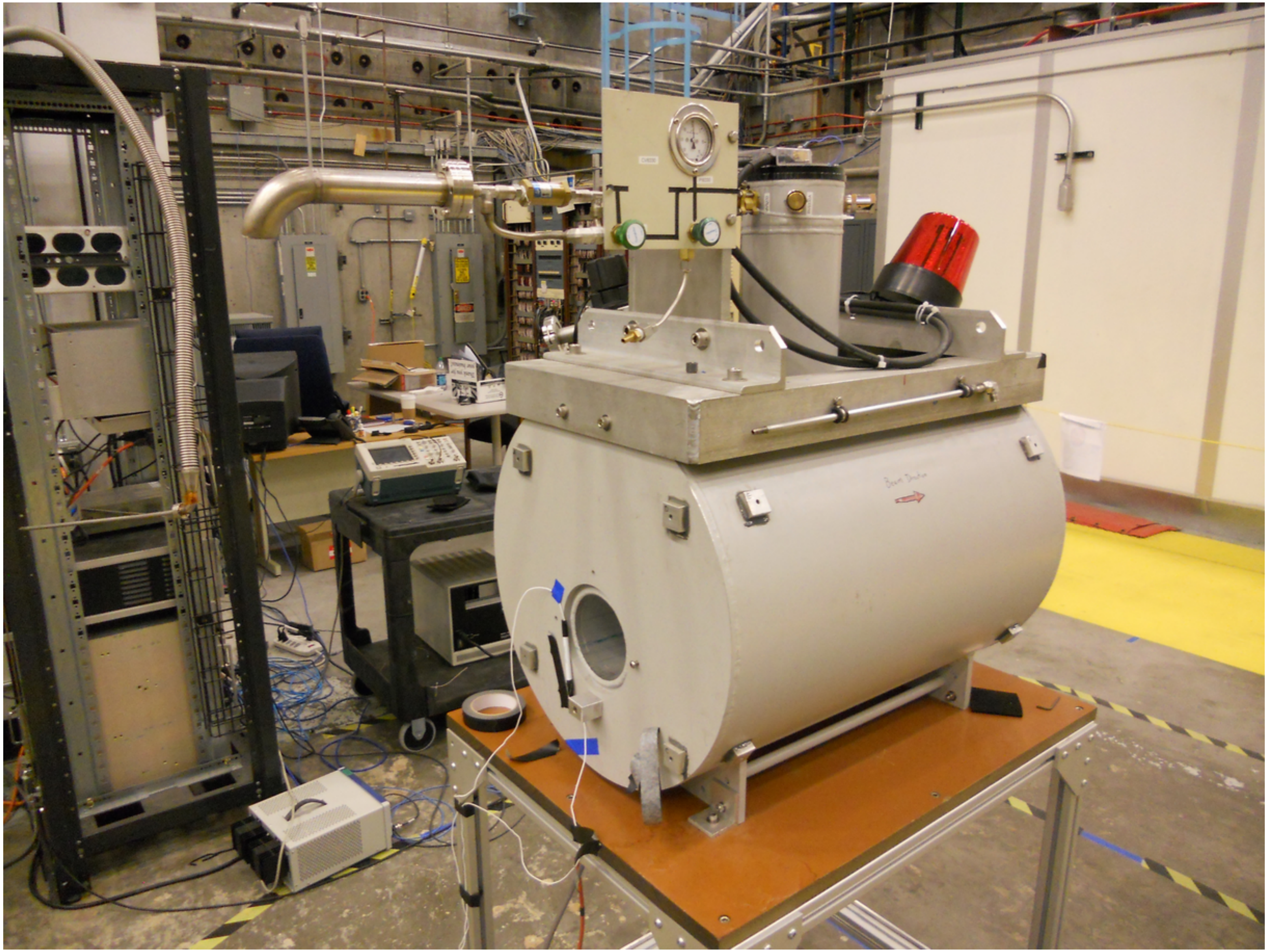
Shims:



u7
u6
u5
u4
u3
u2
u1
Copper
[circuit1:50]
Copper
[circuit2:50]
Copper
[circuit3:-50]
Copper
[circuit4:-50]
Air



Frost Magnet:



Polarized Target Update
NMR Development

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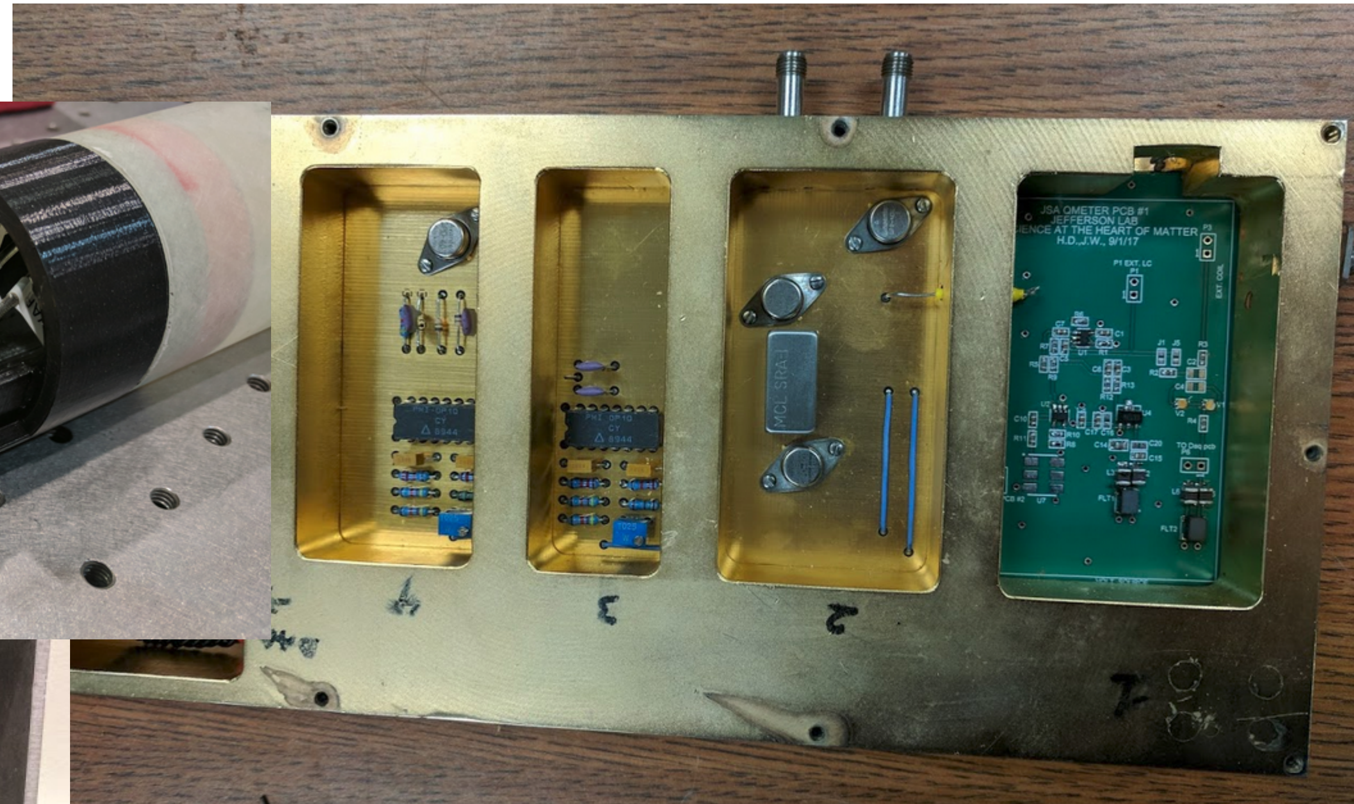
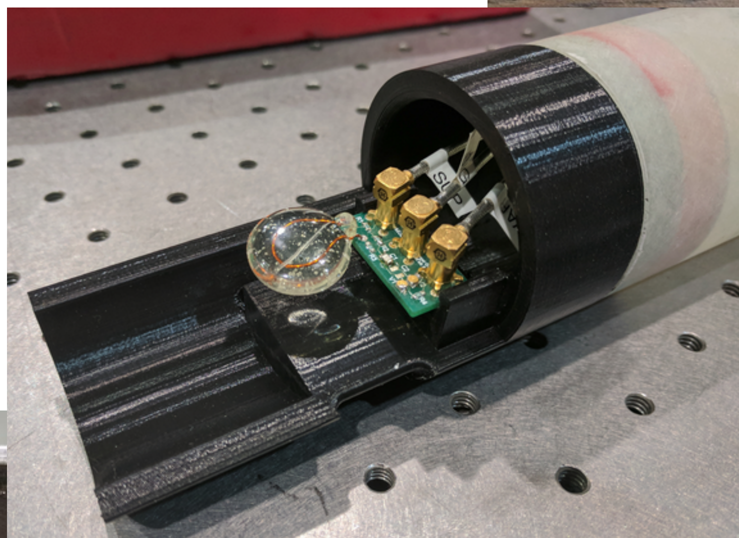
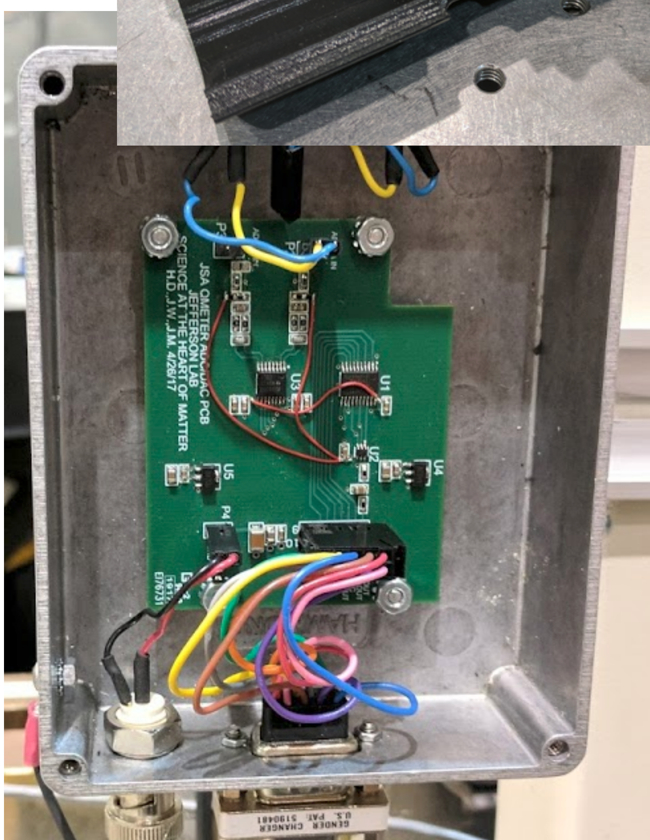
New NMR:





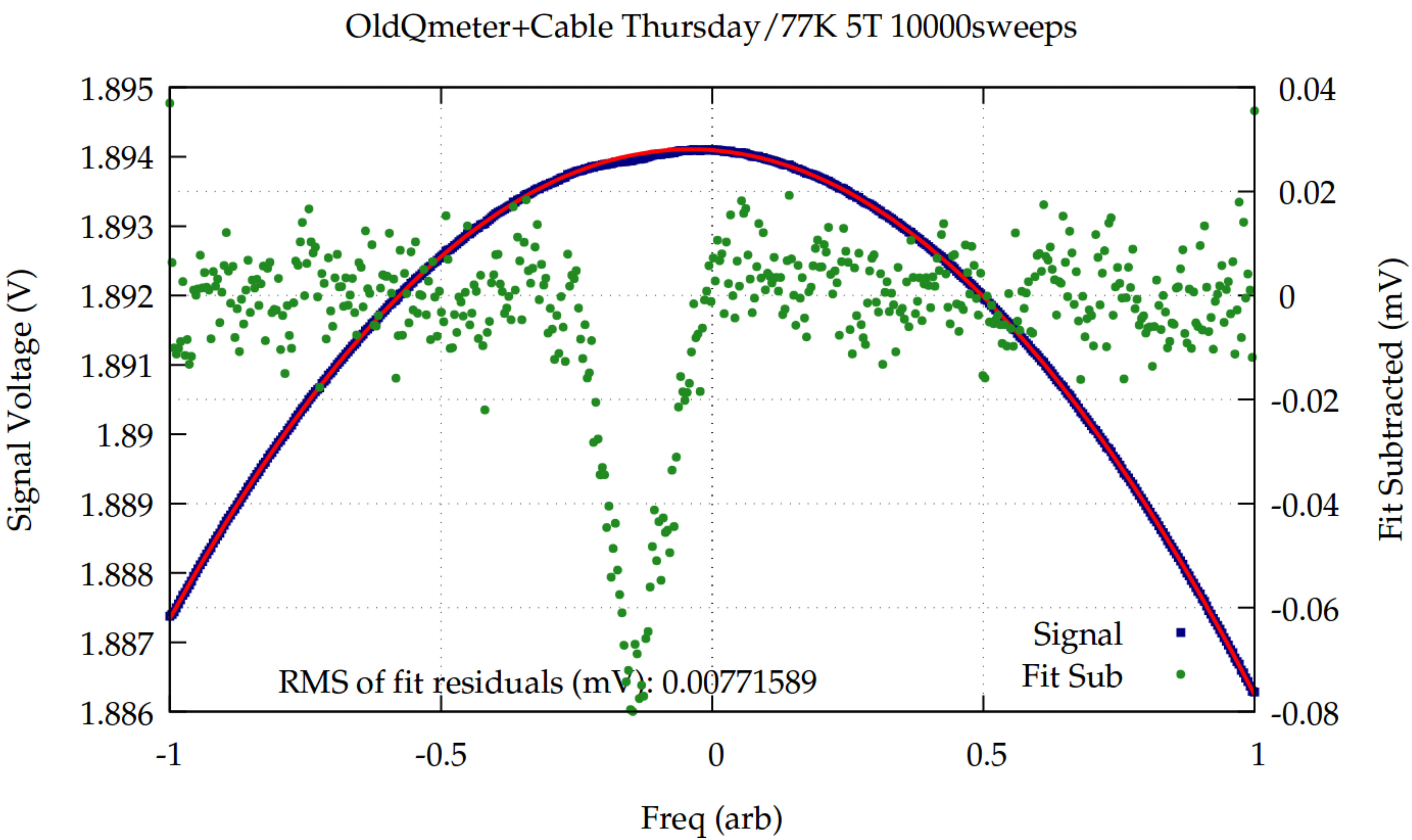


New Qmeter – Recreating the old Liverpool Model with modern component

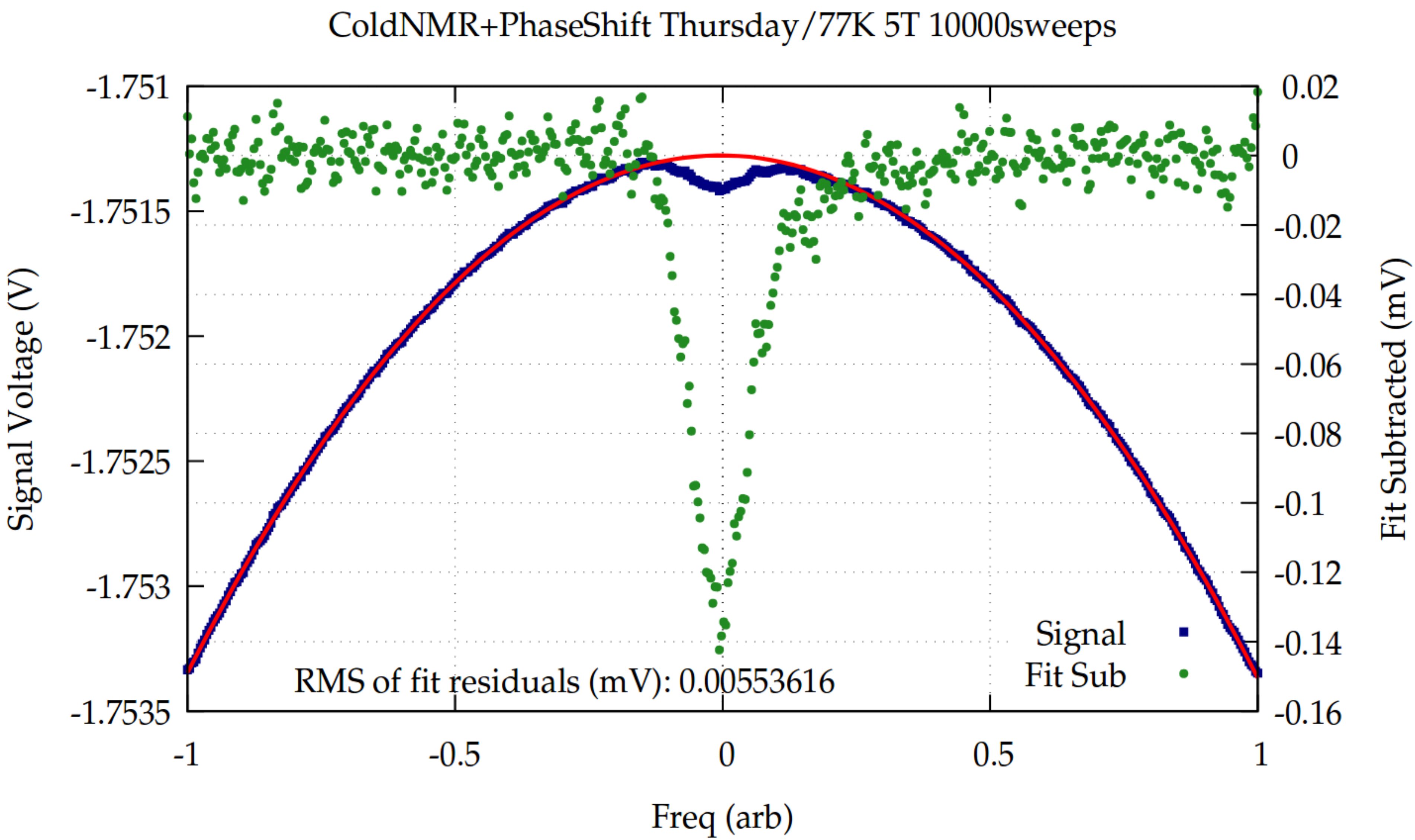
Added – Veractor diode, integrated ADC, phase shifter

In Development – All digital Qmeter (fast electronics)

"Old" QMeter Measurement:



Cold NMR Measurement:



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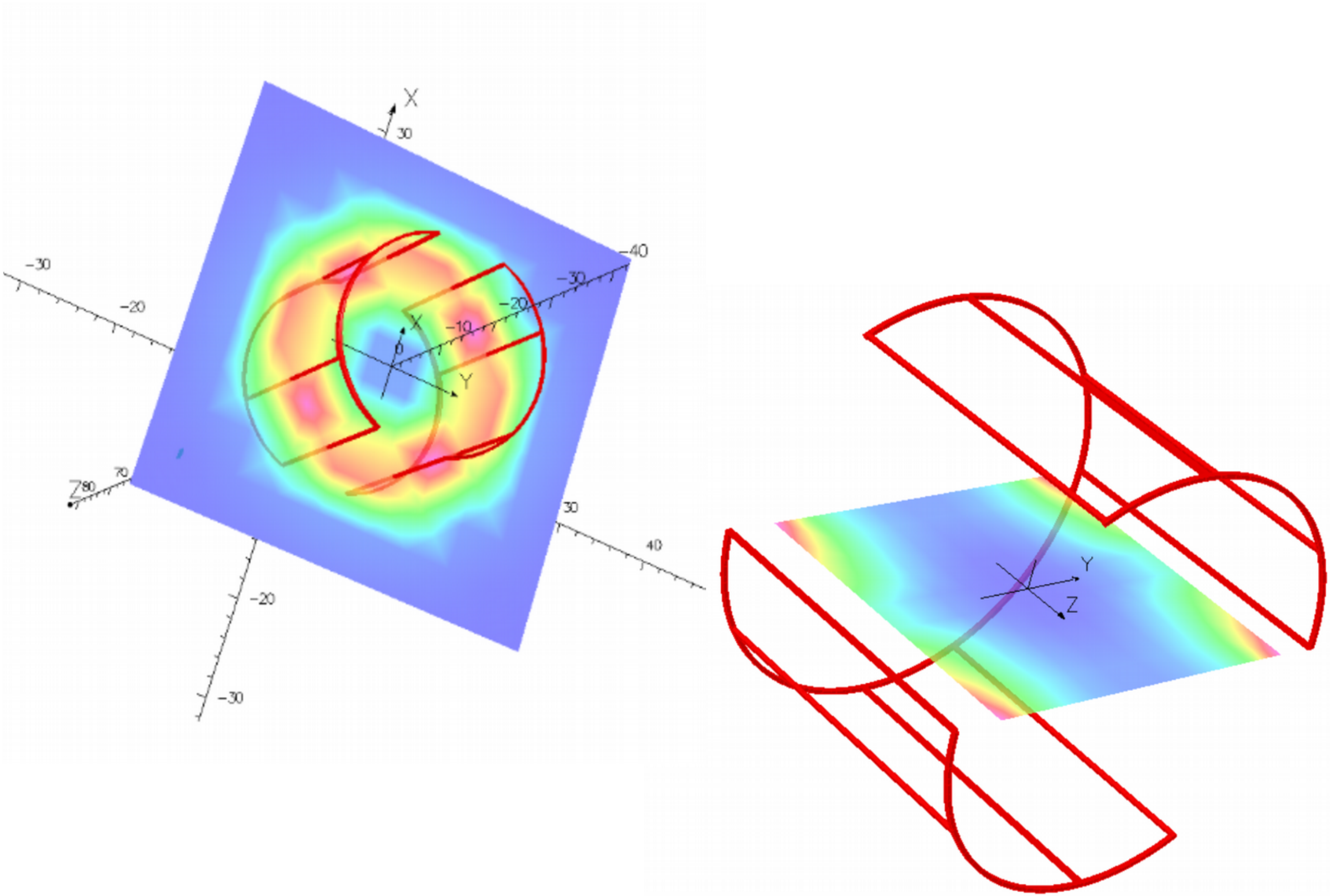
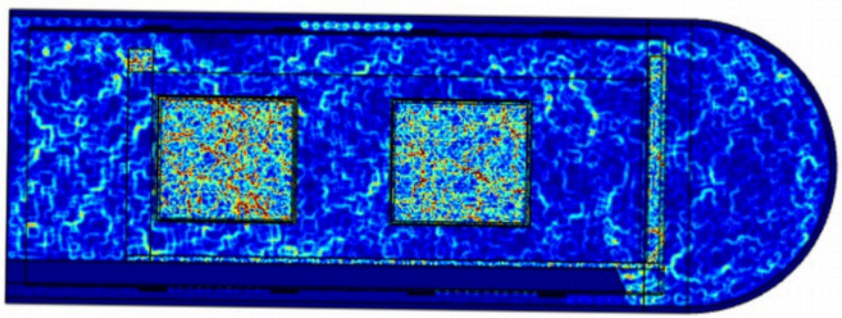
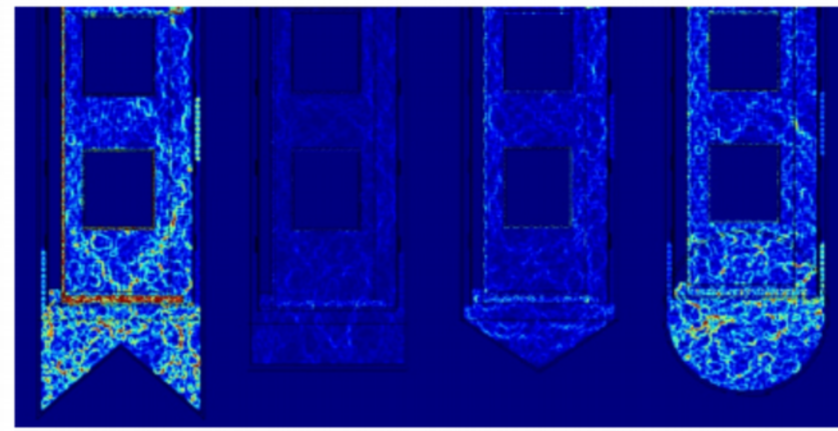
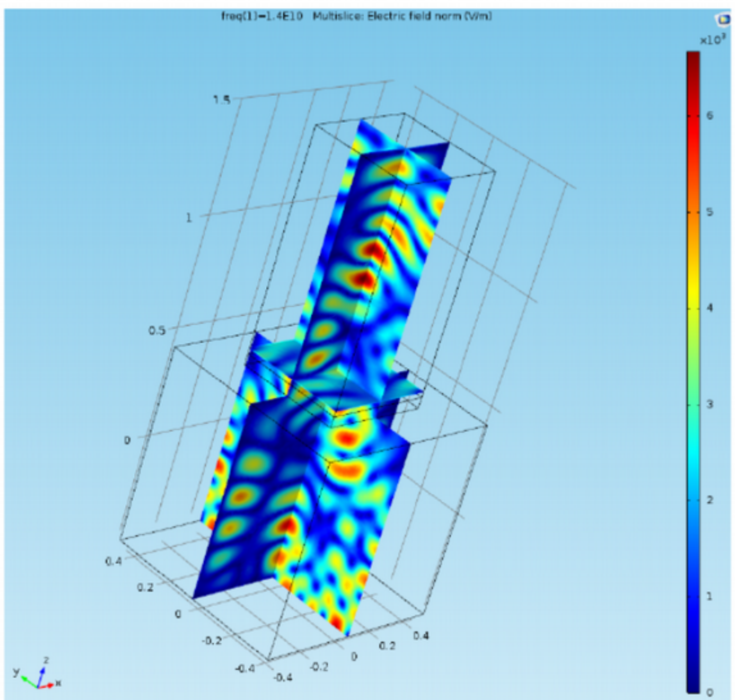
Coil Simulations:

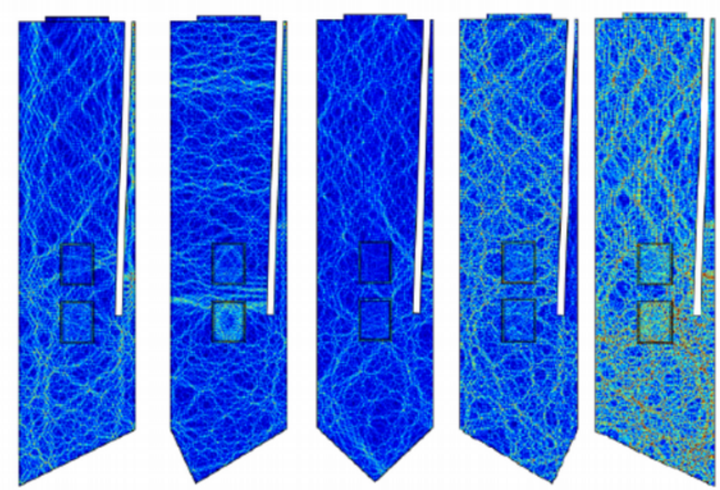


Simulations:









Credit: UVa Target Group

Polarized Target Update

Microwave Delivery

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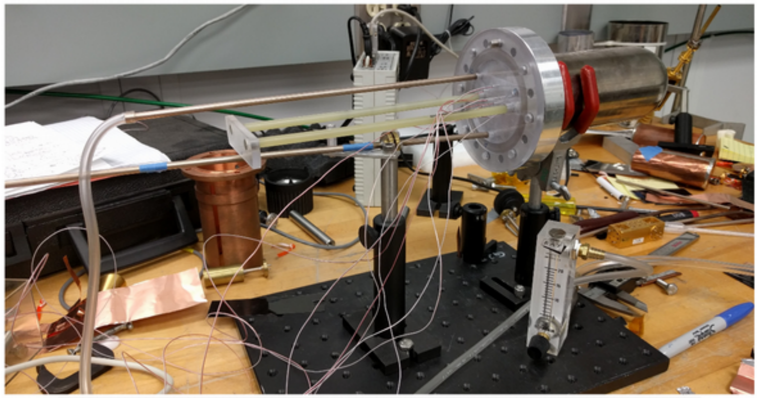
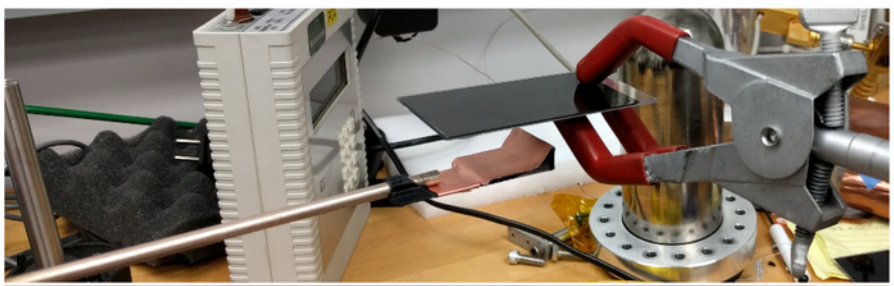
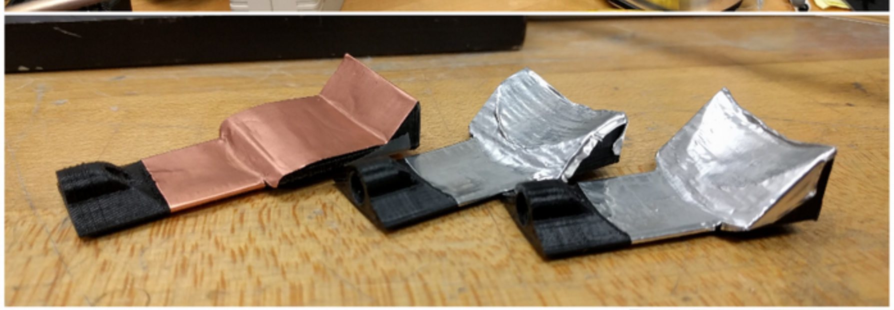
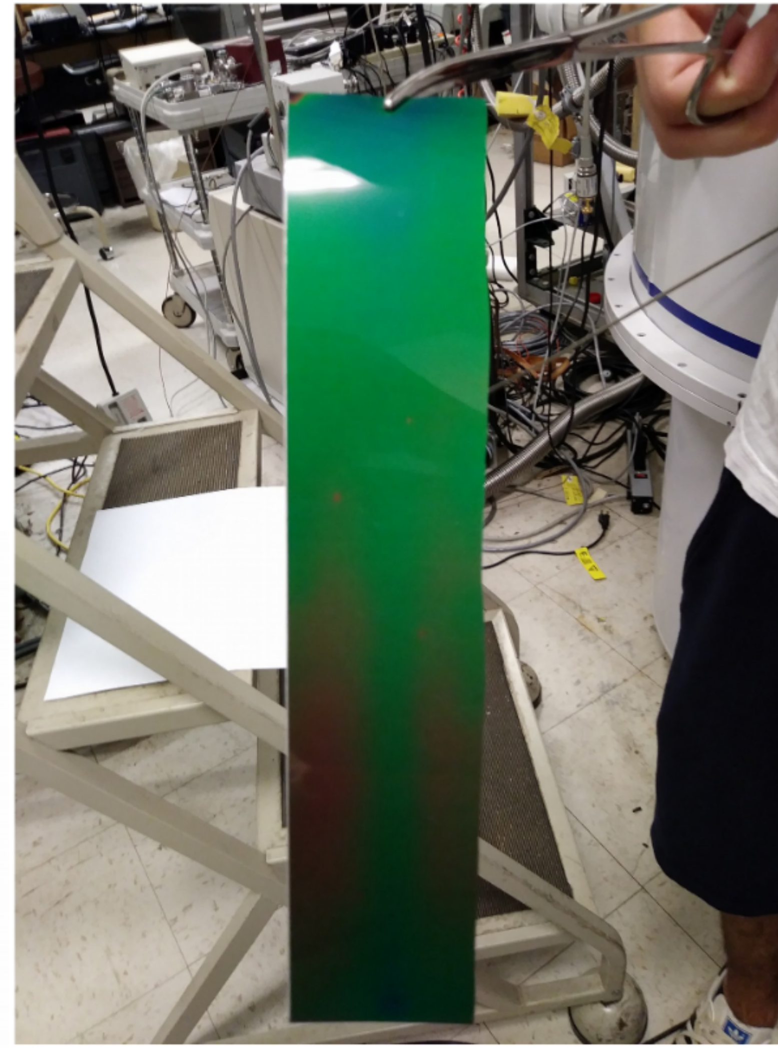
Measurements:









Liquid Crystal Films

Thermistors

Credit: UVa, CNU, Maxwell

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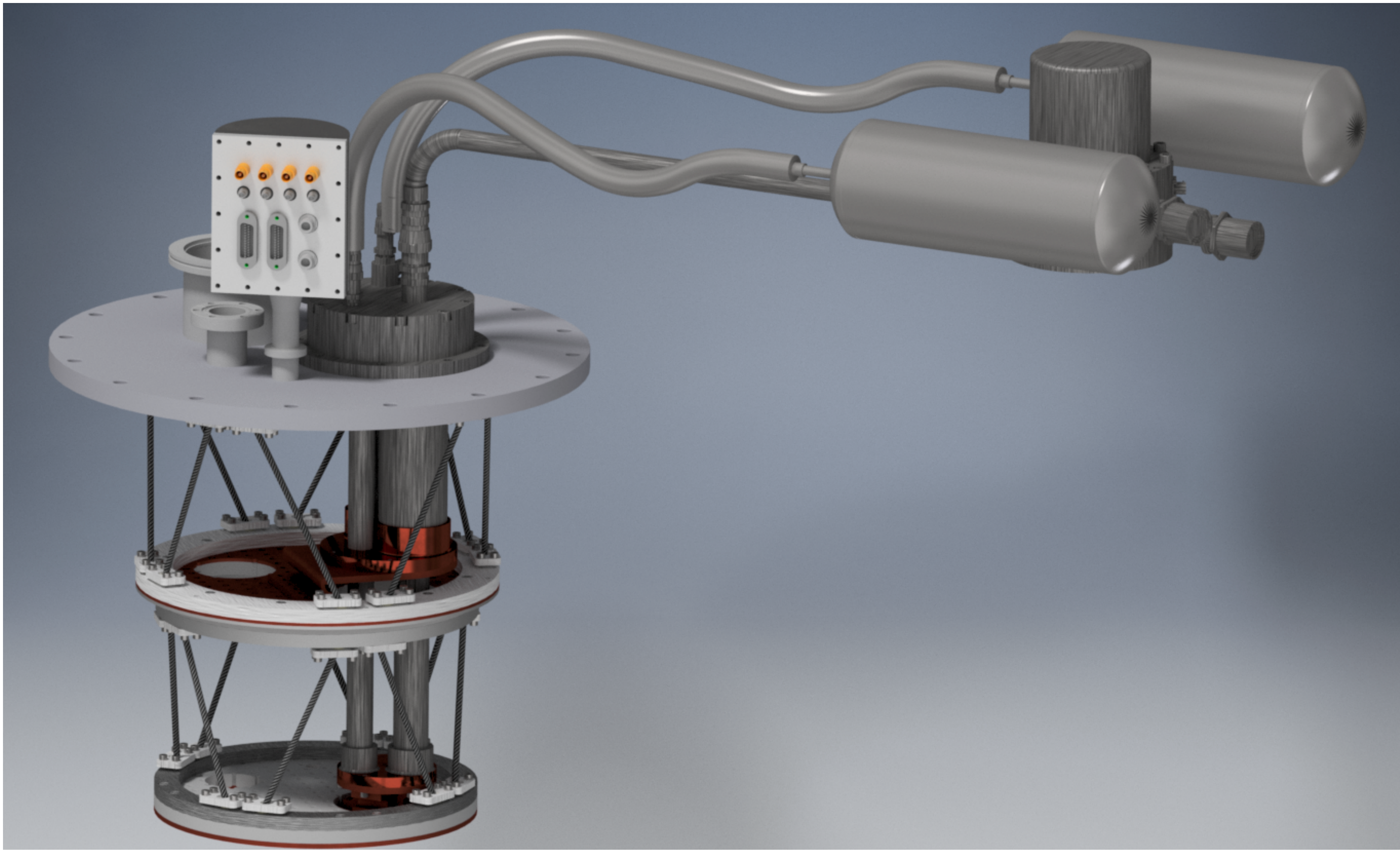
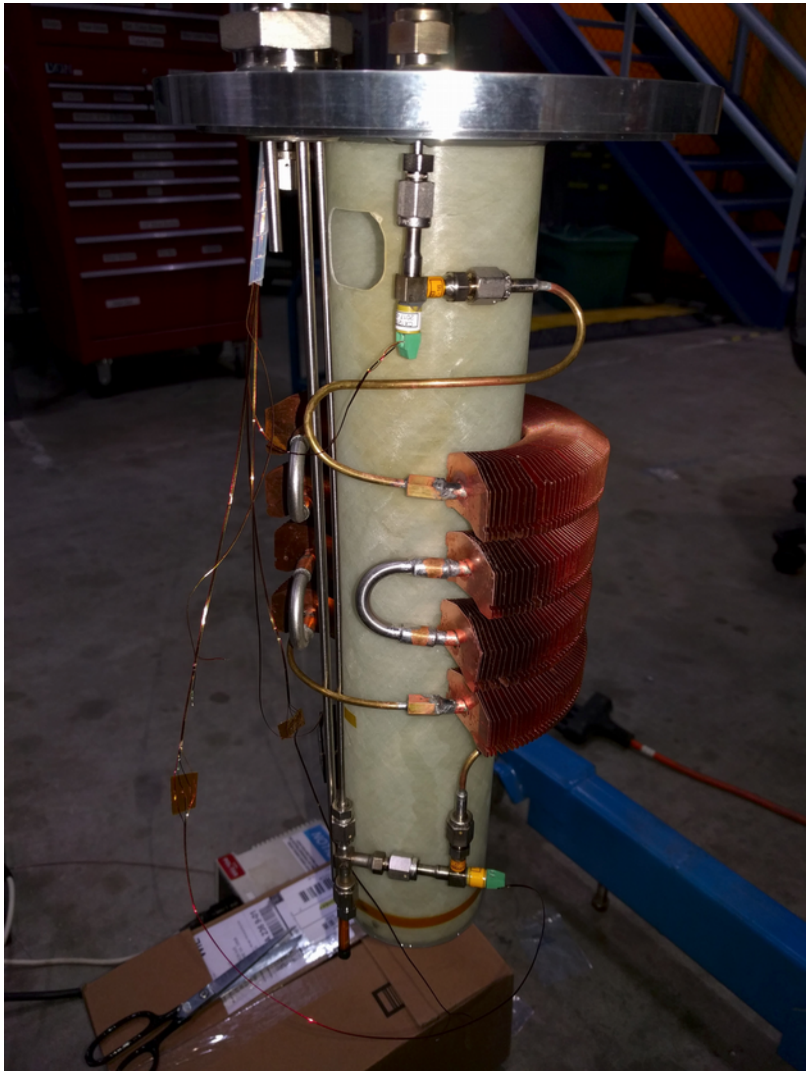
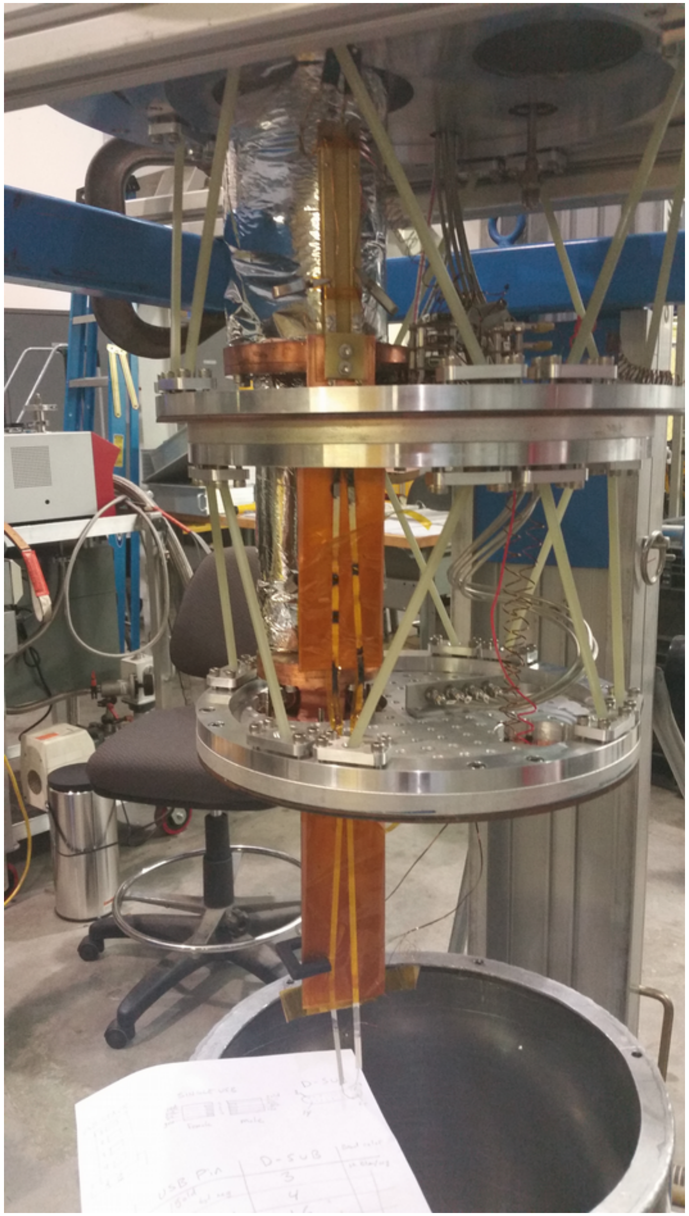
Test Stand:



Credit: J. Brock

Heat Exchanger – Test Leads:





Credit: J. Brock

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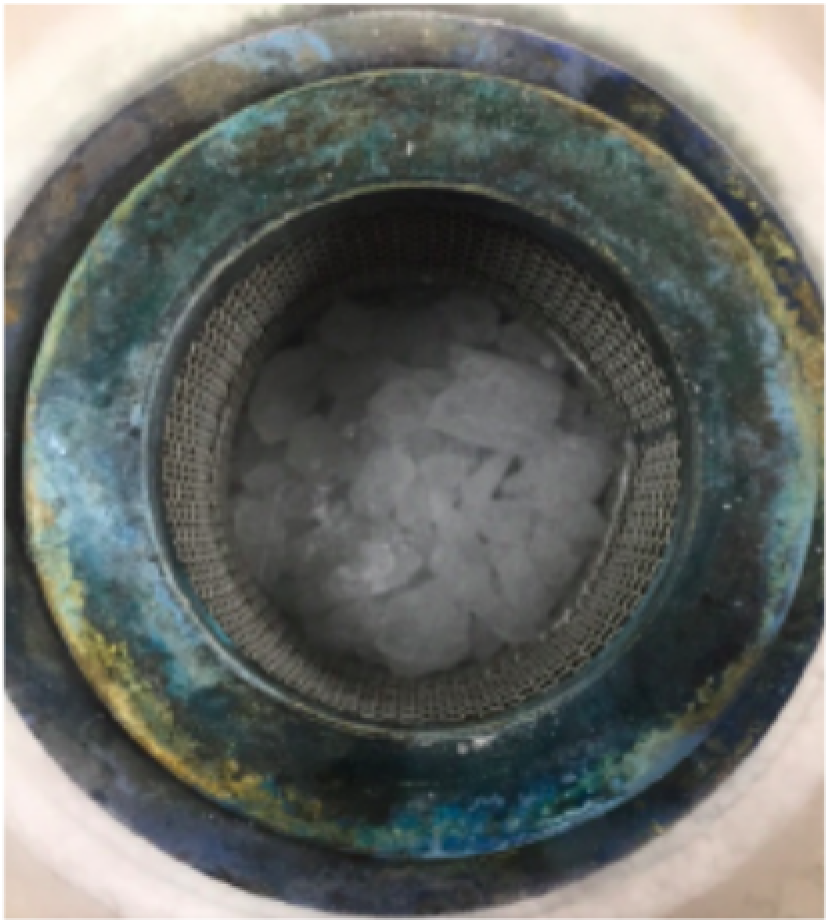
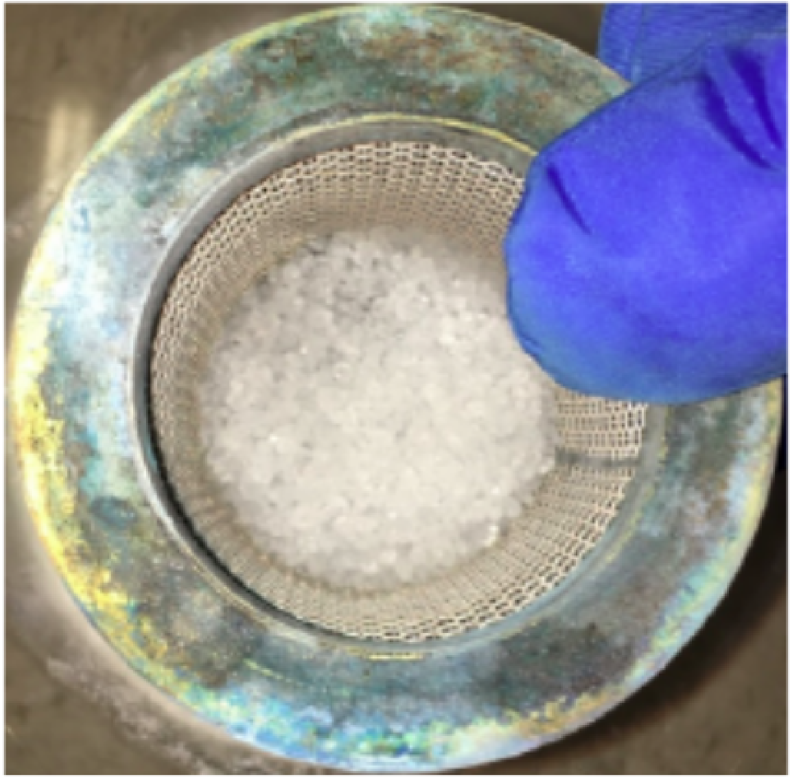
Chile - UVA

Crystallized Ammonia

Very Robust / Solid
High Density





Credit: UVa

- Build Prototype of Target Fridge
    - 77K Testing of Microwave System, NMR, …
- Continue NMR Work
    - Minimizing Noise, Auto Tune, …
- Complete Simulations with Updated Geometry
    - Updated as Prototyping Advances
- Improving Target Production
    - Wafers, Single Cartridge Cells, …

Thank You