G_E^n Update & Field Mapping

Aidan M. Kelleher
The College of William & Mary
Williamsburg, VA 23185

September 13, 2004

G_E^n Update

Outline

1. Detectors

2. Software & Simulation

3. Oven Design

4. RF Design & Bucking Coils

5. Field Mapping

G_E^n Update

Detectors

- Neutron detectro structure should be ready by February. Should be assembled and ready to test by May.

- Big Bite. Structure to hold the detectors should be here by October 15.

- Veto. 176 built, need to replace about 20 PMT. Still need to build 25.

- Glasgow Detectors. To be installed starting in October.

G_E^n Update

Software & Simulation

Simulation.

- We have a complete GEANT 3 simulation for neutron detector
- We also have a physics event generator to test the simulation
- Eugene Chudakov has a GEANT 3 based simulation, but no one has used it.
- Glasgow is also working on a GEANT 4 based neutron arm simulation.

G_E^n Update

Software & Simulation (cont.)

Software:

- Seema wanted to look into neutron detector software, but hasn't yet.
- Bodo & Andrew Puckett have been working on a package for the drift chamber.
- There is a Carnegie-Mellon student looking into software development (CMU has experience with drift chambers in Hall B). They are working on interface between simulations and software.

G_E^n Update

Software & Simulation (cont.)

Other:

Bodo would like at one student on site to work on the Big Bite simulation.

G_E^n Update

Oven Design

Alan Gavalya has incorporated many of our design requests into his latest version. As of this meeting he still needs to know:

- The RF coil design. I am talking with John Musson about optimizing our RF coil design to reduce some of our frequency dependence (to help with frequency sweep NMR)

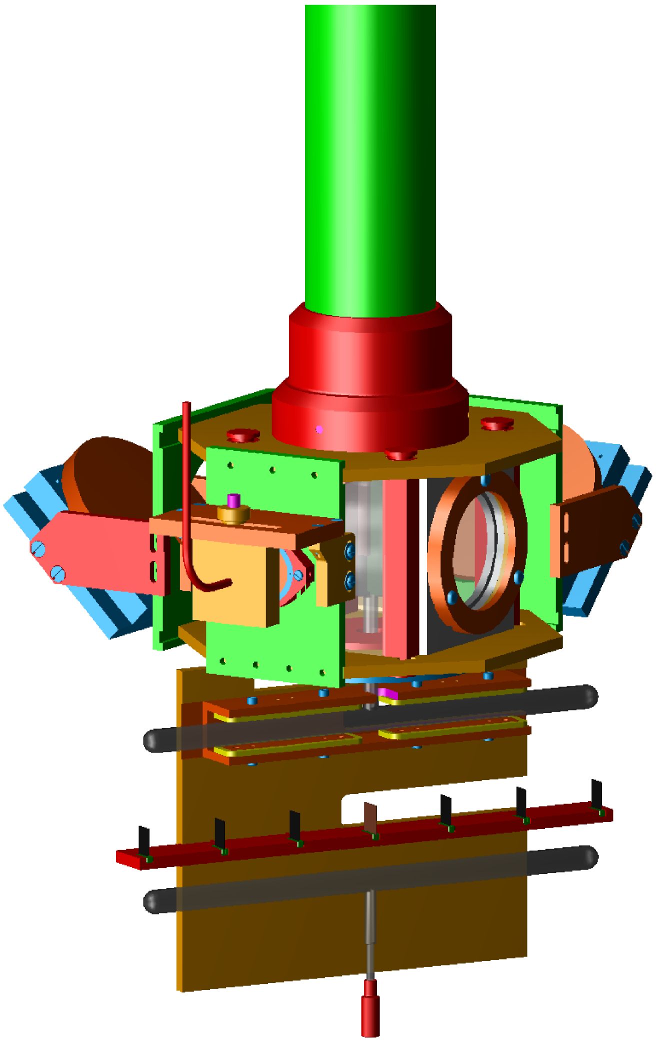
- The availability of suitable Alumina pipe.

- EPR coil specs. I need to give him these specifications.

And now...pictures!

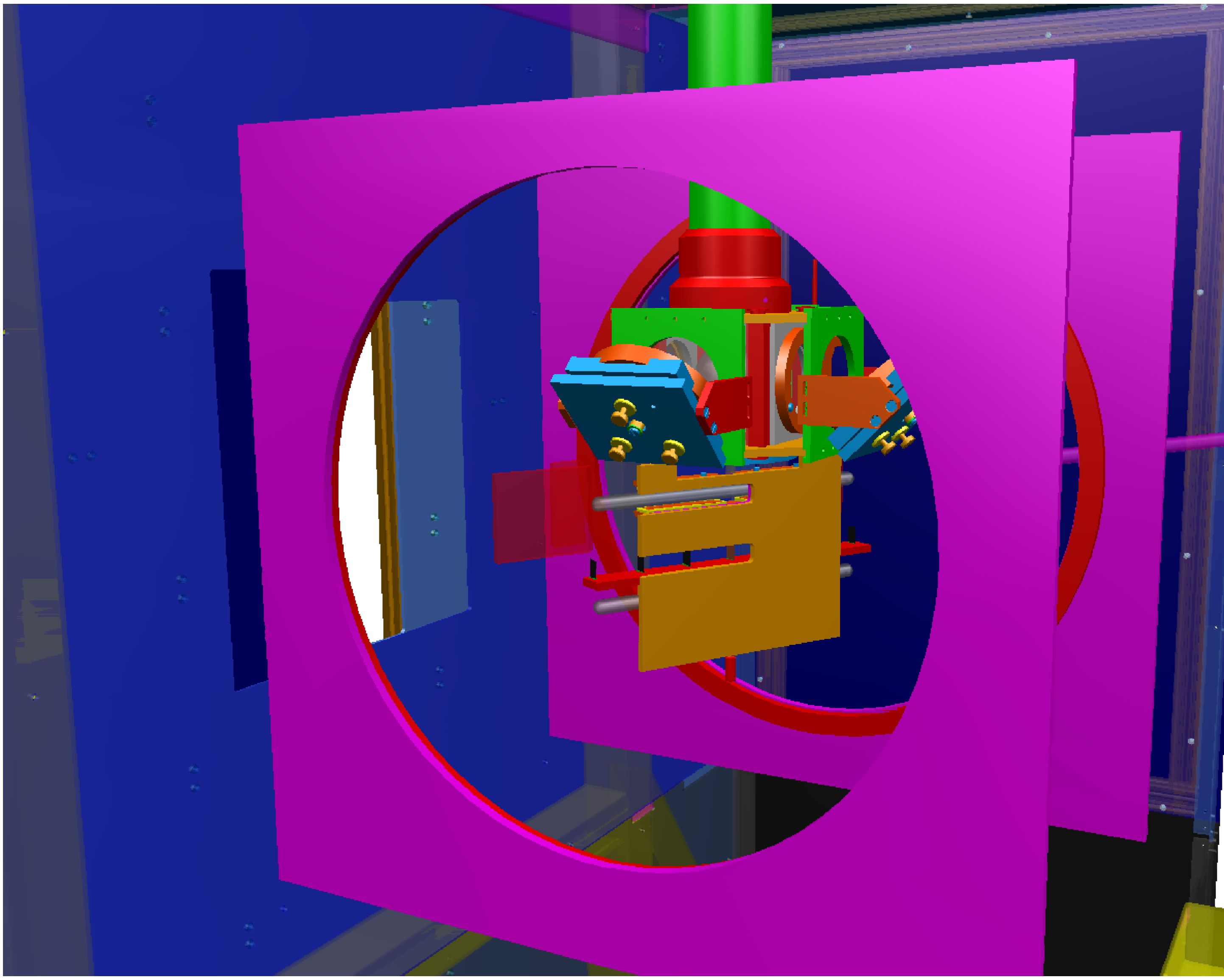
G_E^n Update

Oven Design



G_E^n Update

Oven Design



G_E^n Update

RF Design & Bucking Coils

- John Musson from the accelerator division has been sucked into the RF system for our target.
  - Working with Todd to reduce the frequency dependent background in the frequency sweep NMR.
  - Working with me to design RF coils for the target.
  - Working with me to create a bucking coils system for water calibration.
- Also will be working with William & Mary undergrad Mike Herbst on bucking coils.

G_E^n Update

Background Reduction

Basically, our NMR system is a giant, tuned, LRC cicuit. We would like to de-tune it so that the response of the system is less dependent on the frequency of the system so that we can perform measurements using frequency sweep.

- Todd contacted John Musson to try to find the right electronic solution to this problem.

- John Musson wants to try out a 5:1 transformer with a commercial antenna tuner.

- Will, in the near future, use these items to fine tune the W&M RF system.

G_E^n Update
RF Coil Design

- So far, we have worked on an existing system.

- Would like to work from the ground up.

- May be running out of time — possibly use current set-up.

G_E^n Update

Bucking Coil System

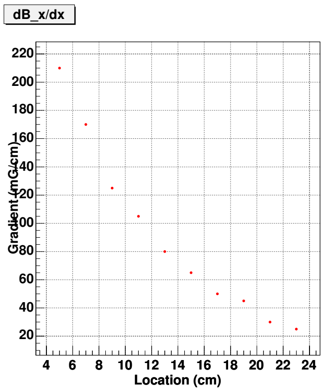
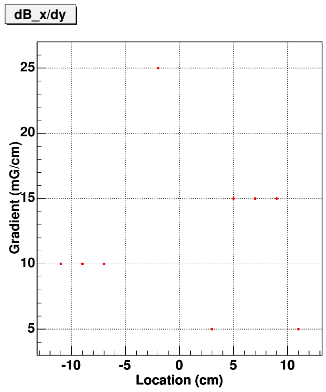
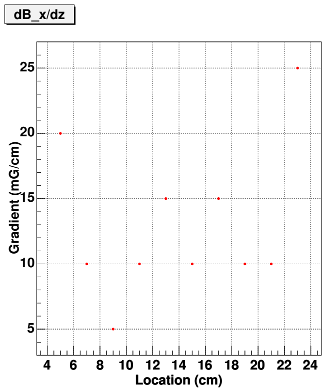
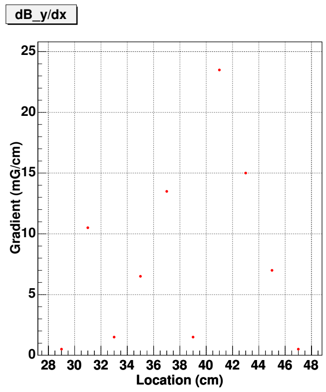
- Current design has no flexibility for NMR pick-up coils.

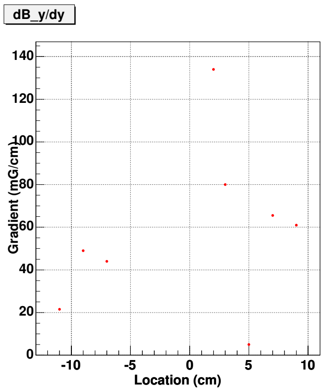
- Need to shape field to cancel RF pickup in coils

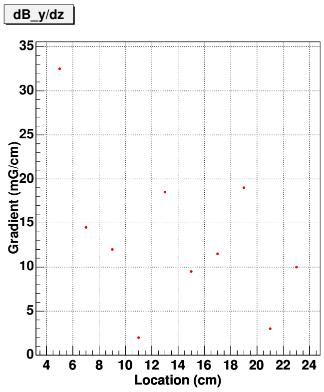
- Should cancel signal at all frequencies.

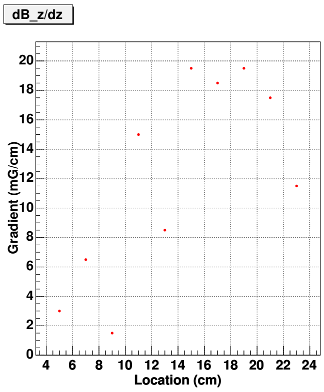
- Needs to keep the same relative phase at all frequencies.

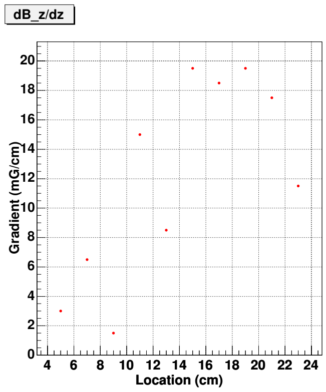
Currently, working at W&M to create this system.

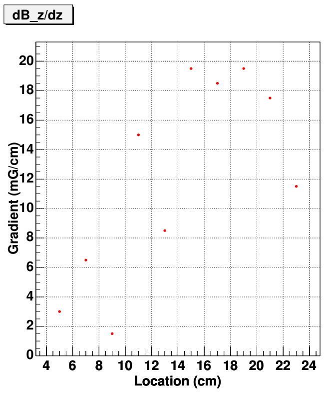

dB_x/dx
Gradient (mG/cm)
Location (cm)

dB_x/dy
Gradient (mG/cm)
Location (cm)

dB_x/dz
Gradient (mG/cm)
Location (cm)

dB_y/dx
Gradient (mG/cm)
Location (cm)


dB_y/dy
Gradient (mG/cm)
Location (cm)


dB_y/dz
Gradient (mG/cm)
Location (cm)


dB_z/dz
Gradient (mG/cm)
Location (cm)


dB_z/dz
Gradient (mG/cm)
Location (cm)


dB_z/dz
Gradient (mG/cm)
Location (cm)