Week of 5/1/18 - Errors

```
/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/DetectorConstruction.cc: In m
ember function 'void DetectorConstruction::ConstructPit()':
/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/DetectorConstruction.cc:188:1
01: error: 'concrete_offset' was not declared in this scope
 btractionSolid("ChoozPit_ConcreteJacket",Jacket21Tube,Jacket2Tube,0,concrete_of
                                                                                ^
/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/DetectorConstruction.cc: In m
ember function 'void DetectorConstruction::ConstructPbSheilding(G4double, G4doub
le, G4double)':
/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/DetectorConstruction.cc:238:2
: error: 'fDRheight1' was not declared in this scope
  fDRheight1 = 1287*mm;
  ^
/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/DetectorConstruction.cc:239:7
8: error: 'fDRheight' was not declared in this scope
 ieldTube = new G4Tubs("Polyshield", zeroradius, outerRadius_shield, fDRheight/2
                                                                              ^
/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/DetectorConstruction.cc: At g
lobal scope:
/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/DetectorConstruction.cc:225:9
1: warning: unused parameter 'topthickness' [-Wunused-parameter]
 ion::ConstructPbSheilding(G4double innerR, G4double outerR,G4double topthicknes
                                                                             ^
/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/DetectorConstruction.cc: In m
ember function 'void DetectorConstruction::ConstructPolySheilding(G4double, G4do
uble, G4double)':
/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/DetectorConstruction.cc:266:2
: error: 'fDRheight' was not declared in this scope
  fDRheight= 1279*mm;
  ^
/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/DetectorConstruction.cc:267:2
: error: 'fDRheight1' was not declared in this scope
  fDRheight1 = 1289*mm;
  ^
/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/DetectorConstruction.cc: At g
lobal scope:
/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/DetectorConstruction.cc:254:9
3: warning: unused parameter 'topthickness' [-Wunused-parameter]
 n::ConstructPolySheilding(G4double innerR, G4double outerR,G4double topthicknes
```

```
/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/DetectorConstruction.cc:282:5
4: error: no 'void DetectorConstruction::ConstructSupportiveCasing()' member fun
ction declared in class 'DetectorConstruction'
 void DetectorConstruction::ConstructSupportiveCasing()
                                                       ^

/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/DetectorConstruction.cc: In m
ember function 'void DetectorConstruction::ConstructDespereaux()':
/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/DetectorConstruction.cc:302:2
5: warning: declaration of 'vec_fifty' shadows a member of 'DetectorConstructio
' [-Wshadow]
   G4ThreeVector vec_fifty(0*mm,0*mm,403.15*mm);
                 ^

In file included from /afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/Detecto
rConstruction.cc:2:0:
/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/include/DetectorConstruction.hh:1
01:37: note: shadowed declaration is here
             G4ThreeVector           vec_fifty;
                                     ^

/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/DetectorConstruction.cc:314:2
: error: expected ';' before 'innerRadius50KC'
   innerRadius50KC =167.5*mm
   ^
/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/DetectorConstruction.cc:320:8
: error: 'class DetectorConstruction' has no member named 'G4SubtractionSolid'
   this->G4SubtractionSolid*hollowCylinder50K = new G4SubtractionSolid("HollowCyl
         ^
/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/DetectorConstruction.cc:320:2
7: error: 'hollowCylinder50K' was not declared in this scope
   this->G4SubtractionSolid*hollowCylinder50K = new G4SubtractionSolid("HollowCyl
                            ^
/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/DetectorConstruction.cc:322:1
11: error: 'FLogicWorld' was not declared in this scope
 cement(0, vec_fiftyc, hollowCylinder50KLog, "Hollow 50 K Cylinder", FLogicWorld
                                                                      ^
/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/DetectorConstruction.cc:332:2
4: warning: declaration of 'vec_four' shadows a member of 'DetectorConstruction'
 [-Wshadow]
   G4ThreeVector vec_four(0*mm,0*mm,259.1*mm);
                 ^
```

```
In file included from /afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/Detecto
rConstruction.cc:2:0:
/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/include/DetectorConstruction.hh:1
03:37: note: shadowed declaration is here
             G4ThreeVector              vec_four;
                                         ^
/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/DetectorConstruction.cc:335:9
8: error: 'newG4LogicalVolume' was not declared in this scope
 newG4LogicalVolume(plateTube, fMaterialCu, "4 K Plate", fLogicWorld, false, 0);
                                                                              ^
/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/DetectorConstruction.cc:345:2
: error: expected ';' before 'innerRadius4KC'
  innerRadius4KC =149*mm
  ^
/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/DetectorConstruction.cc:350:8
8: error: 'hz4KCinner' was not declared in this scope
 beInner = new G4Tubs("4KCylinderinner", zeroradius, innerRadius4KC, hz4KCinner/
                                                                        ^
/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/DetectorConstruction.cc:351:8
: error: 'class DetectorConstruction' has no member named 'G4SubtractionSolid'
  this->G4SubtractionSolid*hollowCylinder4K = new G4SubtractionSolid("HollowCyli
         ^
/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/DetectorConstruction.cc:351:2
7: error: 'hollowCylinder4K' was not declared in this scope
  this->G4SubtractionSolid*hollowCylinder4K = new G4SubtractionSolid("HollowCyli
                            ^
/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/DetectorConstruction.cc:364:2
3: warning: declaration of 'vec_one' shadows a member of 'DetectorConstruction'
[-Wshadow]
  G4ThreeVector vec_one(0*mm,0*mm,128.1*mm);
                ^
In file included from /afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/Detecto
rConstruction.cc:2:0:
/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/include/DetectorConstruction.hh:1
05:37: note: shadowed declaration is here
             G4ThreeVector              vec_one;
                                         ^
/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/DetectorConstruction.cc:377:2
: error: expected ';' before 'innerRadius1KC'
  innerRadius1KC =129.5*mm
  ^
```

```
/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/DetectorConstruction.cc:383:8
: error: 'class DetectorConstruction' has no member named 'G4SubtractionSolid'
  this->G4SubtractionSolid*hollowCylinder1K = new G4SubtractionSolid("HollowCyli
        ^
/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/DetectorConstruction.cc:383:2
7: error: 'hollowCylinder1K' was not declared in this scope
  this->G4SubtractionSolid*hollowCylinder1K = new G4SubtractionSolid("HollowCyli
                           ^
/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/DetectorConstruction.cc:395:2
7: warning: declaration of 'vec_hundred' shadows a member of 'DetectorConstructi
on' [-Wshadow]
  G4ThreeVector vec_hundred(0*mm,0*mm,144.1*mm);
                ^
In file included from /afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/Detecto
rConstruction.cc:2:0:
/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/include/DetectorConstruction.hh:1
07:37: note: shadowed declaration is here
          G4ThreeVector              vec_hundred;
                                     ^
/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/DetectorConstruction.cc:410:2
7: warning: declaration of 'vec_fifteen' shadows a member of 'DetectorConstructi
on' [-Wshadow]
  G4ThreeVector vec_fifteen(0*mm,0*mm,72.9*mm);
                ^
In file included from /afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/src/Detecto
rConstruction.cc:2:0:
/afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/include/DetectorConstruction.hh:1
08:37: note: shadowed declaration is here
          G4ThreeVector              vec_fifteen;
                                     ^
make[2]: *** [CMakeFiles/RicochetChoozSim.dir/src/DetectorConstruction.cc.o] Err
or 1
make[1]: *** [CMakeFiles/RicochetChoozSim.dir/all] Error 2
make: *** [all] Error 2
```

Week of 4/24/18

- Spoken with Oliver about Geometry

```
/run/initialize

/gun/energy 15 GeV
/gun/particle neutron
/gun/position 0.0 0.0 .41 m
/gun/number 100
/gun/direction 0 1 0

#/gps/particle neutron
#/gps/ene/type Mono
#/gps/ene/mono 100 MeV
#/gps/pos/type Plane
#/gps/pos/shape Rectangle
#/gps/pos/rot1 0 0 1
#/gps/pos/rot2 1 0 0
#/gps/pos/halfx 1 m
#/gps/pos/halfy 1 m
#/gps/pos/centre 0.0 -.05 .41 m
#/gps/direction 0 1 0

/control/verbose 0
/run/verbose 0
/event/verbose 0
/tracking/verbose 0

/ricochetchoozsim/generator/SetNeutronSource true
/ricochetchoozsim/generator/setsourceradius 4.25 m
/ricochetchoozsim/generator/setsourceheight 8.4 m
/ricochetchoozsim/generator/setneutronsourcespectrum fast_neutron_spectrum.txt

/run/beamOn 100
```

Week of 4/17/18

- Following documentation from https://ecolephysique.sciencesconf.org/data/program/G4_LIO_w2_generator_physicslist.pdf

```
/run/initialize

/gun/energy 15 GeV
/gun/particle neutron
/gun/position 0 -.05 .41 m
/gun/number 100
/gun/direction 0 1 0

/gps/particle neutron
/gps/ene/type Mono
/gps/ene/mono 100 MeV
/gps/pos/type Plane
/gps/pos/shape Rectangle
/gps/pos/rot1 0 0 1
/gps/pos/rot2 1 0 0
/gps/pos/halfx 1 m
/gps/pos/halfy 1 m
/gps/pos/centre 0 -.05 .41 m
/gps/direction 0 1 0

/control/verbose 0
/run/verbose 0
/event/verbose 0
/tracking/verbose 0

/ricochetchoozsim/generator/SetNeutronSource true
/ricochetchoozsim/generator/setsourceradius 4.25 m
/ricochetchoozsim/generator/setsourceheight 8.4 m
/ricochetchoozsim/generator/setneutronsourcespectrum fast_neutron_spectrum.txt

/run/beamOn 100
```

GPSPrimaryGeneratorAction.cc

```cpp
#include "G4Event.hh"
#include "G4GeneralParticleSource.hh"

#include "GPSPrimaryGeneratorAction.hh"

GPSPrimaryGeneratorAction::GPSPrimaryGeneratorAction()
{
        m_particleGun = new G4GeneralParticleSource();
}


GPSPrimaryGeneratorAction::~GPSPrimaryGeneratorAction()
{
        delete m_particleGun;
}



void GPSPrimaryGeneratorAction::GeneratePrimaries(G4Event* anEvent)
{
        m_particleGun->GeneratePrimaryVertex(anEvent);
}
```

Error Received

```
[branson3@login04 ChoozSimulation]$ ./RicochetChoozSimulation_build/RicochetChoozSim /afs/hep.wisc.edu/ddm/Ricochet/ChoozSimulation/fast_neutrons_gun.mac

*************************************************************
  Geant4 version Name: geant4-10-01-patch-02 [MT]    (19-June-2015)
                    Copyright : Geant4 Collaboration
                    Reference : NIM A 506 (2003), 250-303
                         WWW : http://cern.ch/geant4
*************************************************************

***** COMMAND NOT FOUND </gps/particle neutron> *****

***** Batch is interrupted!! *****

 *** Break *** segmentation violation


===========================================================
There was a crash.
This is the entire stack trace of all threads:
===========================================================
#0  0x000000329aeac82e in waitpid () from /lib64/libc.so.6
#1  0x000000329ae3e479 in do_system () from /lib64/libc.so.6
#2  0x00007f7bab0271b9 in TUnixSystem::StackTrace() () from /afs/hep.wisc.edu/ddm/Ricochet/root_v6.06.08_build/root_v6.06.08/lib/root/libCore.so
#3  0x00007f7bab02920c in TUnixSystem::DispatchSignals(ESignals) () from /afs/hep.wisc.edu/ddm/Ricochet/root_v6.06.08_build/root_v6.06.08/lib/root/libCore.so
#4  <signal handler called>
#5  0x00007f7ba90ca8e0 in G4NeutronHPInelastic::~G4NeutronHPInelastic() () from /afs/hep.wisc.edu/ddm/Ricochet/geant4.10.01.p02/lib64/libG4processes.so
#6  0x00007f7ba90cb2d9 in G4NeutronHPInelastic::~G4NeutronHPInelastic() () from /afs/hep.wisc.edu/ddm/Ricochet/geant4.10.01.p02/lib64/libG4processes.so
#7  0x00007f7ba905fbf9 in G4HadronicInteractionRegistry::Clean() () from /afs/hep.wisc.edu/ddm/Ricochet/geant4.10.01.p02/lib64/libG4processes.so
#8  0x00007f7ba8d55e41 in G4HadronicProcessStore::~G4HadronicProcessStore() () from /afs/hep.wisc.edu/ddm/Ricochet/geant4.10.01.p02/lib64/libG4processes.so
#9  0x00007f7ba8d5748d in G4ThreadLocalSingleton<G4HadronicProcessStore>::~G4ThreadLocalSingleton() () from /afs/hep.wisc.edu/ddm/Ricochet/geant4.10.01.p02/lib64/libG4p
rocesses.so
#10 0x000000329ae35992 in exit () from /lib64/libc.so.6
#11 0x000000329aeled24 in __libc_start_main () from /lib64/libc.so.6
#12 0x00000000004229c9 in _start ()
===========================================================
```
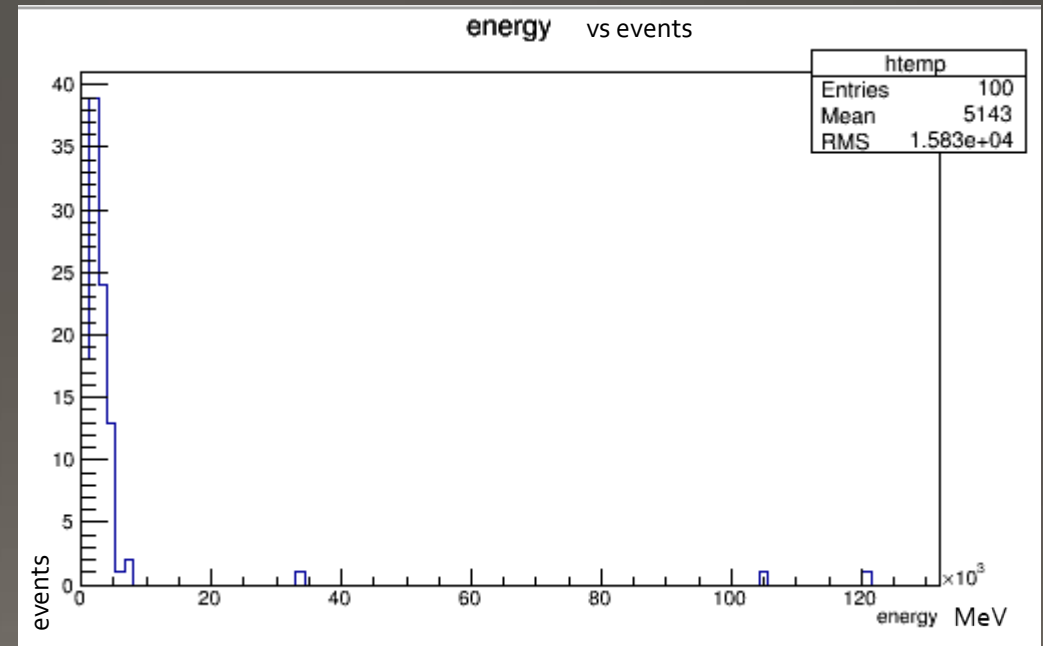
Week of 4/10/2018

- Working on getting interactions in the crystal
- Correct misunderstanding of Geant4 geometries
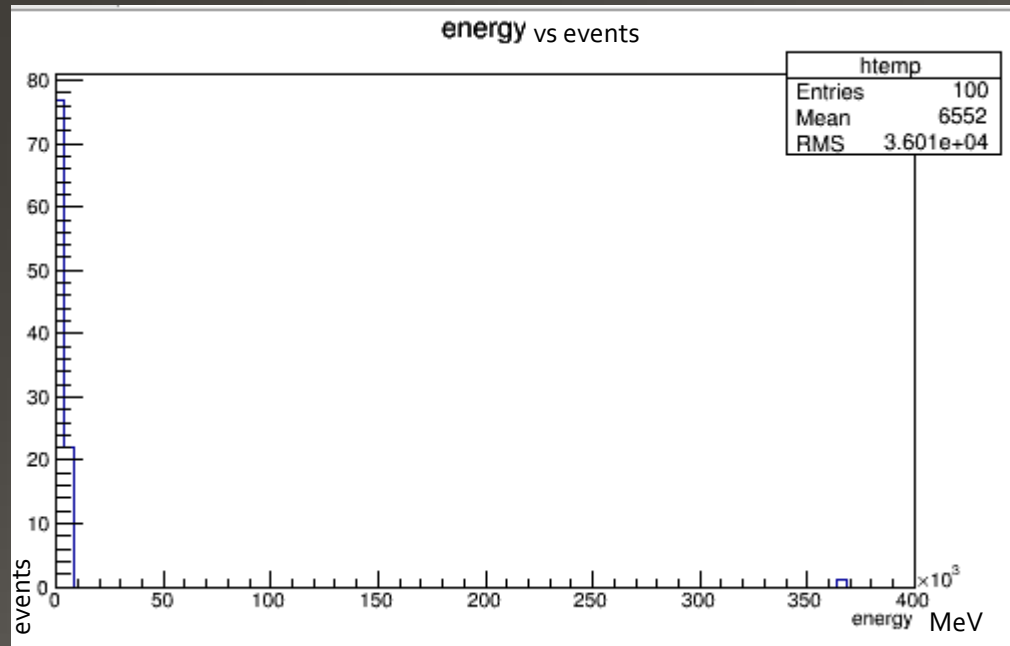
ChoozSimulation with Alex's geometry

ChoozSimulation with my geometry

Week of 3/13/18

- ChoozSimulation
  - Got it working
  - Using Xming, root crashes when using TBrowser()
  - Will download tool Carolyn uses

- Geometry
  - Finished the geometry file, sent off to Kim, Carolyn, Oliver to look over
 - Check using Oliver's visualization tools

Last Semester

- ADR -> Dilution Refrigerator
  - Created a proposal for a new geometry for a dilution refrigerator
- ChoozSimulation
  - Install geant, root, ChoozSimulation
- Poster
  - Presented at the Women in Physics conference at Iowa State over break

Week of 11/15/2017

- ChoozSimulation
  - Ran into problem with change in login while it was running
  - Was able to get past the problem
  - "Exceeded Disk Quota" at make install
  - We need more space before we can install more
  - Still need to install…. (once we have space)
    - Geant
    - ChoozSim?

ADR -> Dilution Refrigerator

- Relative Geometry is giving me trouble
- Meeting with Oliver to go through and better understand
- Sizes are very different it seems (ADR about 34 cm by 30 cm where Dilution refrigerator is 2.2615 m by 1.15 m)
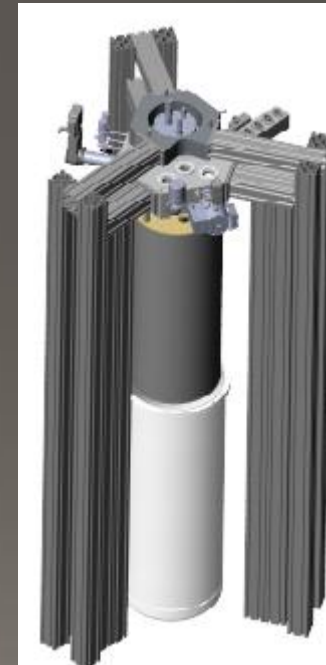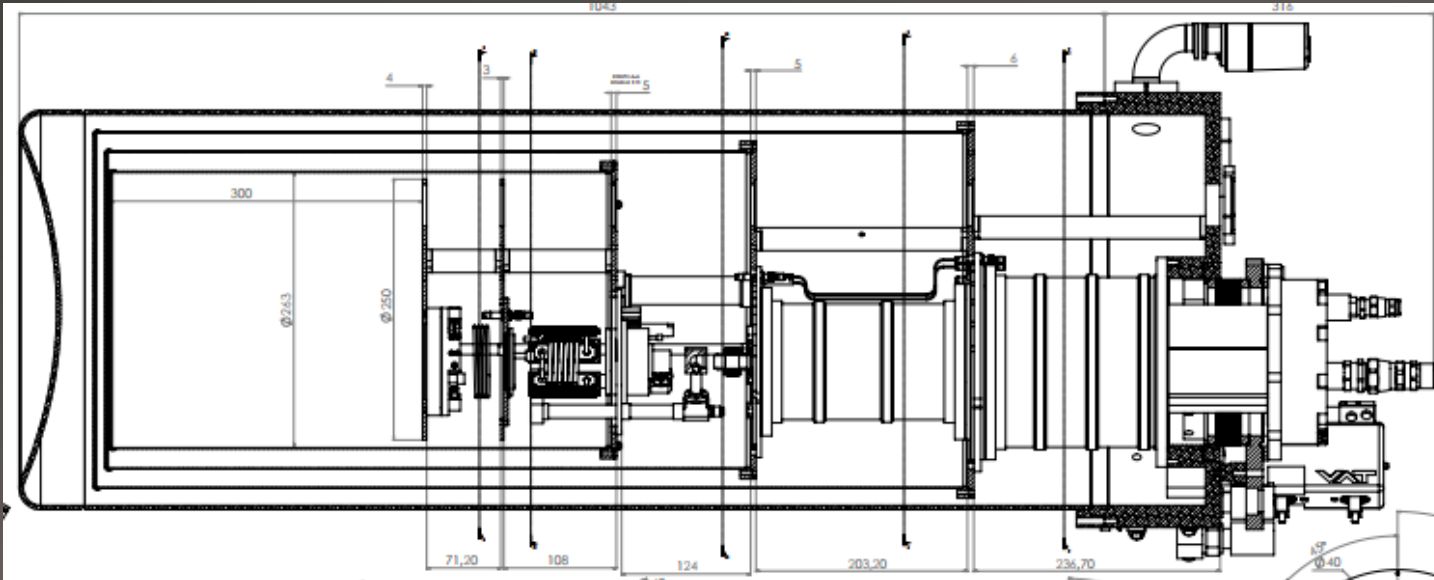
Week of 11/1/2017

- ChoozSimulation
  - After many meetings…
  - It works
  - There would be a histogram for proof if I could login in to the right place

Refrigerators

- ADR (Adiabatic Demagnetization Refrigerator)
  - Magnetic moment aligns with magnetic field
  - Strength of magnetic field ~ strength of alignment
  - Lowering the field slowly to cool
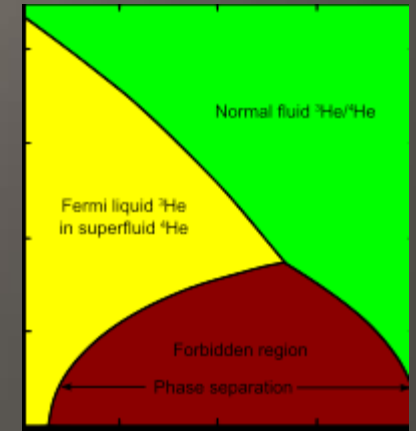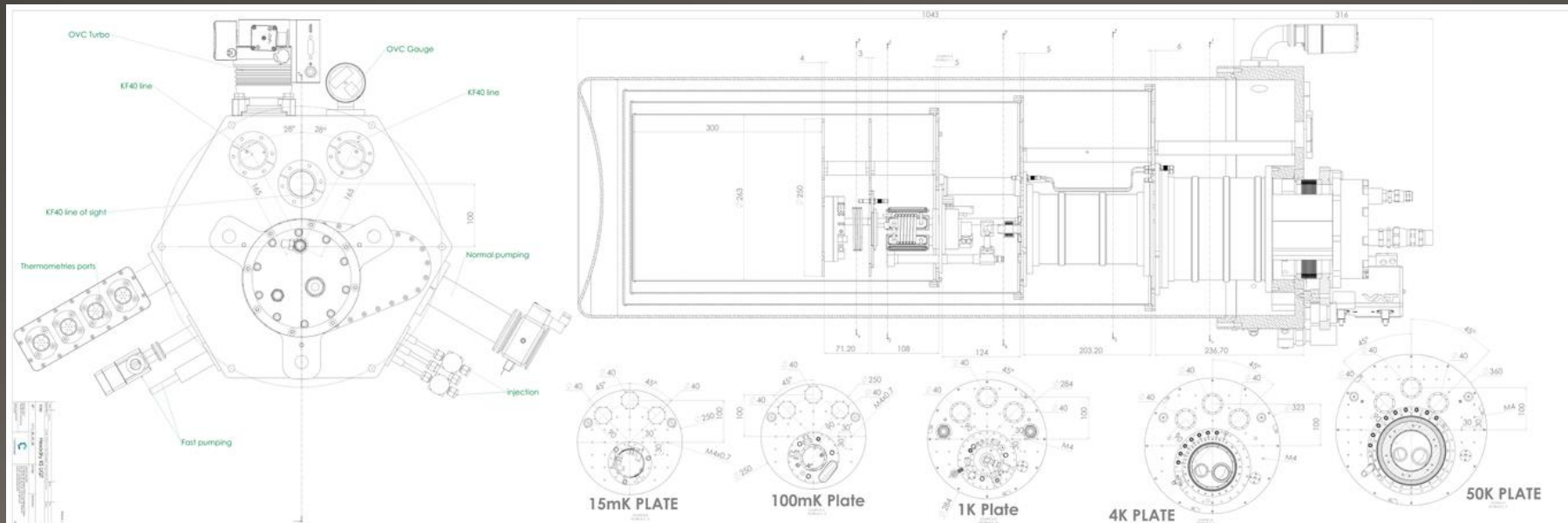 - Control temp using control of the magnetic field strength

Refrigerators

Temperature(K)

He3 concentration (%)
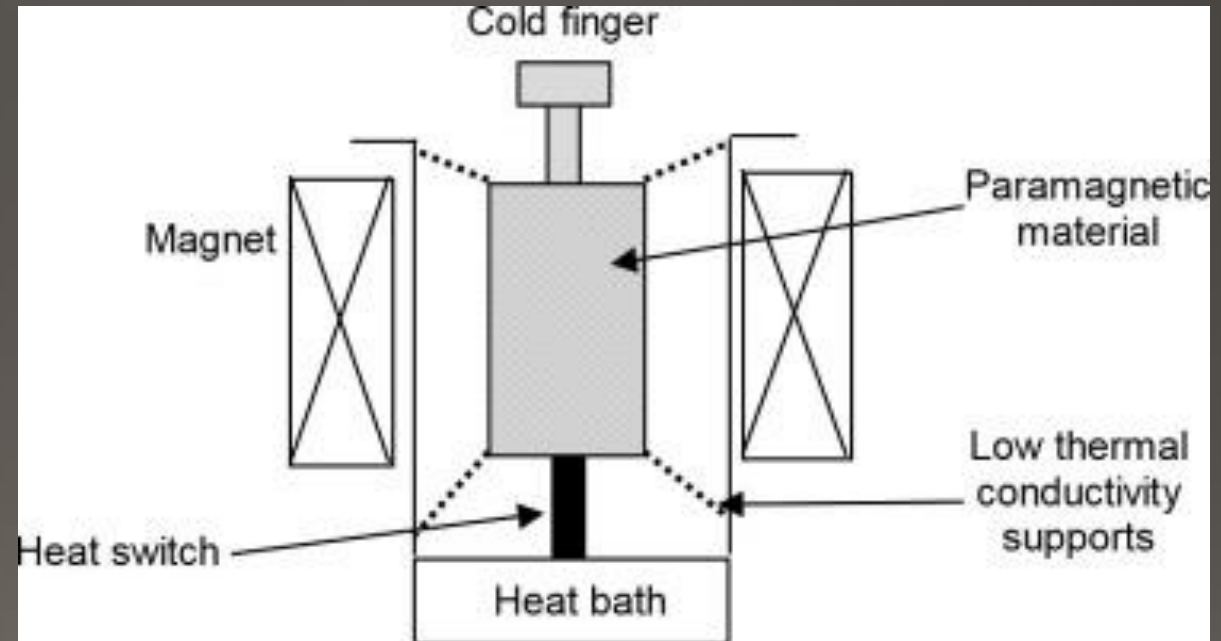
- Dilution Refrigerator
  - .87 Kelvin, He^4 goes to He^3
  - First gets sent through a cooling section surrounded by liquid nitrogen
  - Through each chamber, pressure goes down, lowering the temperature
  - Can go very low (.002 K usually)

Week of 10/18/2017

- ChoozSimulation
  - Meeting with Dan Bradley tomorrow
  - Recompile ChoozSim

- Geometry files
  - Learning about ADR and Dilution Refrigerators
  - Drawing the Geometry to better visualize a transition

Week of 10/3/17

- Gone last week

- RicochetChoozSim
  - Info from Carolyn
  - Get a segmentation fault
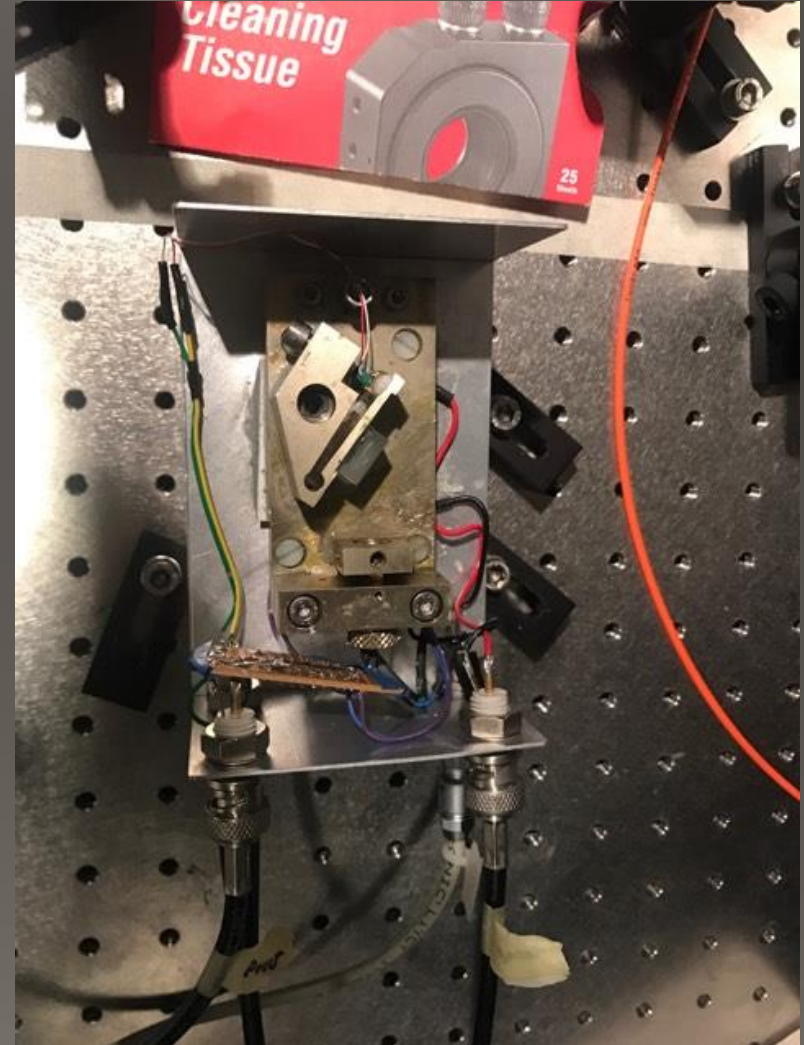 - Learn about debugging program

Semester Goals Fall 2017

- Get ChoozSimulation working on our computers

- Replace the ADR with a dilution refrigerator in the geometry

- Run the backgrounds with the new geometry

- Run backgrounds finding an exponential rise at the threshold

Summer in Denmark

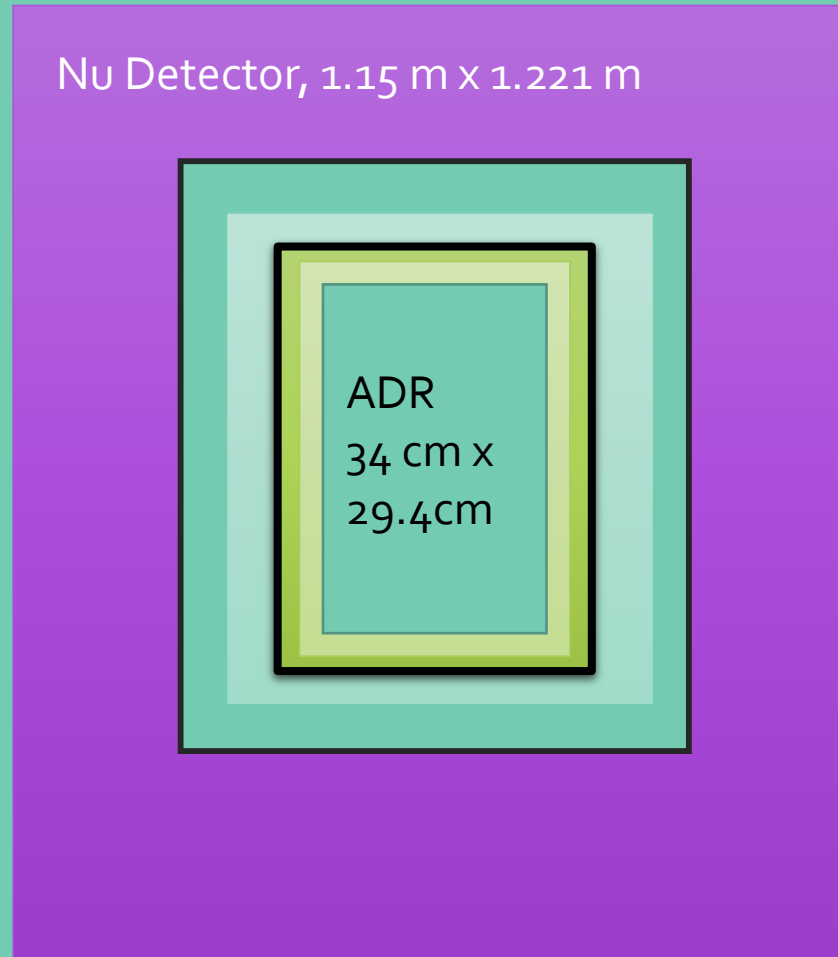- Aarhus University
- Ion trapping
- Lasers
- Calculations for MgH+

Replacing the ADR

Outer Detector, [1 m, 4.25 m] x [3.2 m, 4.2 m]

Pb and Polyethylene, 4 cm and 10cm

Nu Detector, 1.15 m x 1.221 m

ADR
34 cm x 29.4cm

Overall Project

I am working with Ricochet and will be doing simulations of the neutron background being received in the detector.

Week of 5/23

- Trouble with the unzipped ChoozSimulation
- Try to get git clone working with github.mit.edu to acquire the
- Getting help with our github.mit.edu problems
  - Talking to Alex and trying to figure out why it wasn't working
    - Lead to creating ssh keys that did not work
  - Call MIT help desk
    - So far they have been unable to help

    - Alex was able to get the github working on our computers, but through a vncserver, not through a ssh pipe

Spring Semester 2017

Started:

- We have moved closer to being able to do simulations in our new directories with our new code and the new information that comes with that.
- Over the summer Carolyn and Kim will move on, I will work with them for about 3 more weeks.

Learned:

- About linux and more about these simulations
- About Ricochet, what it is doing and some of the parts that go into building it.

Week of 5/2

Goals:

- Create an environment so that I can move forward with installing the ChoozSimulation code

- Get the installation finished off with hopefully no more problems.

Completed:

- Made an env.sh that seems to work and has brought me to the next part of the install of ChoozSimulation code.

- The testCfneutrons.mac works in the new (ratcage-040317) directory

Week of 4/25

Goals:

- Install the ChoozSimulation code into the new directory and build it
- Have the testCfneutrons.mac run in the old directory and new directory to make sure everything is working

Completed:

- The MATERIALS.ratdb is now as it should be and working
- Downloaded the ChoozSimulation after having trouble transferring it from github to the server

Week of 4/18

Goals:

- Install ChoozSimulation code into the new Ricochet directory and try and build it

- Fix typos in MATERIALS.ratdb

Completed:

- Transfer from old SPECTRUM.ratdb and adding additional elements to ELEMENTS.ratdb from old directory (ratcage) to new directory (ratcage-040317)

Week of 4/11

Goals:

- Transfer old spectrum, needed materials and elements over from old rat folder into the new rat folder, where the simulations will be done from now on.