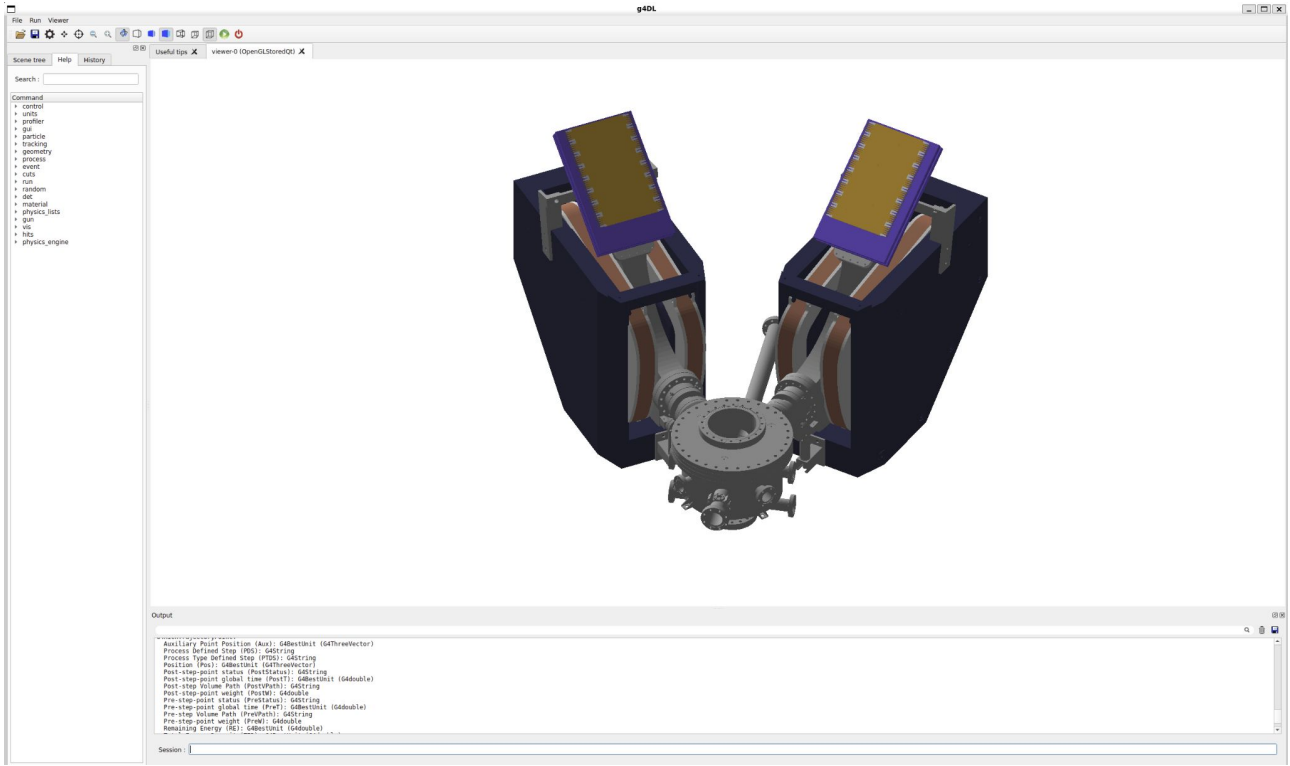
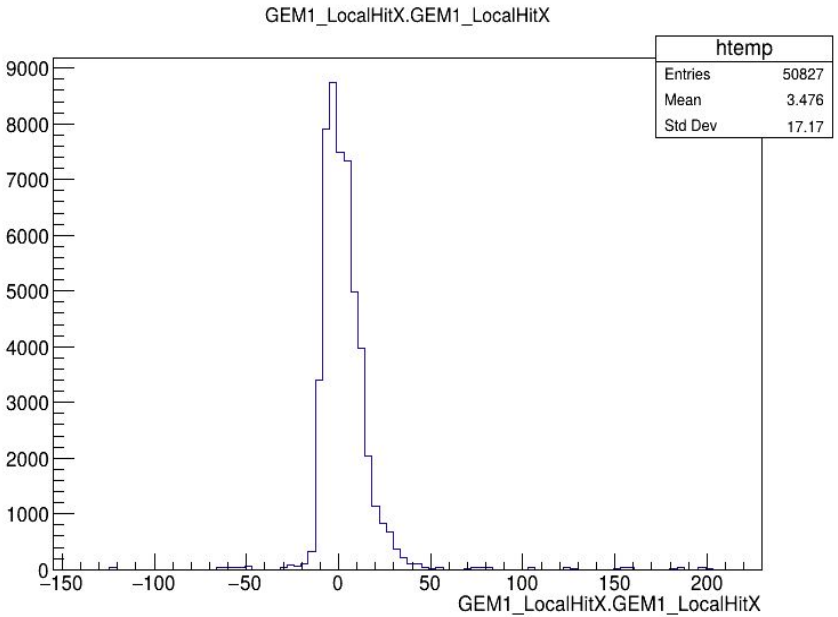
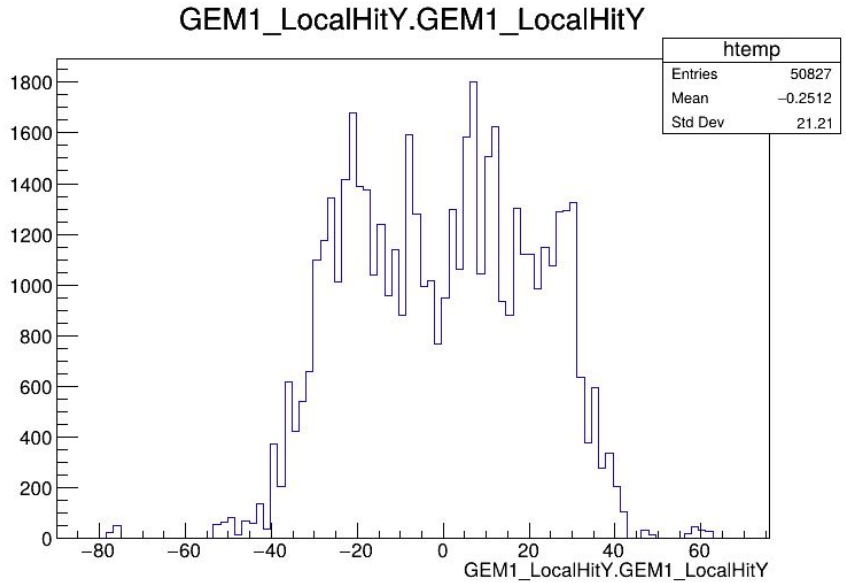
RGB lab updates

Xavier Braun



- Finally got g4DL simulation to work (thank you Win)





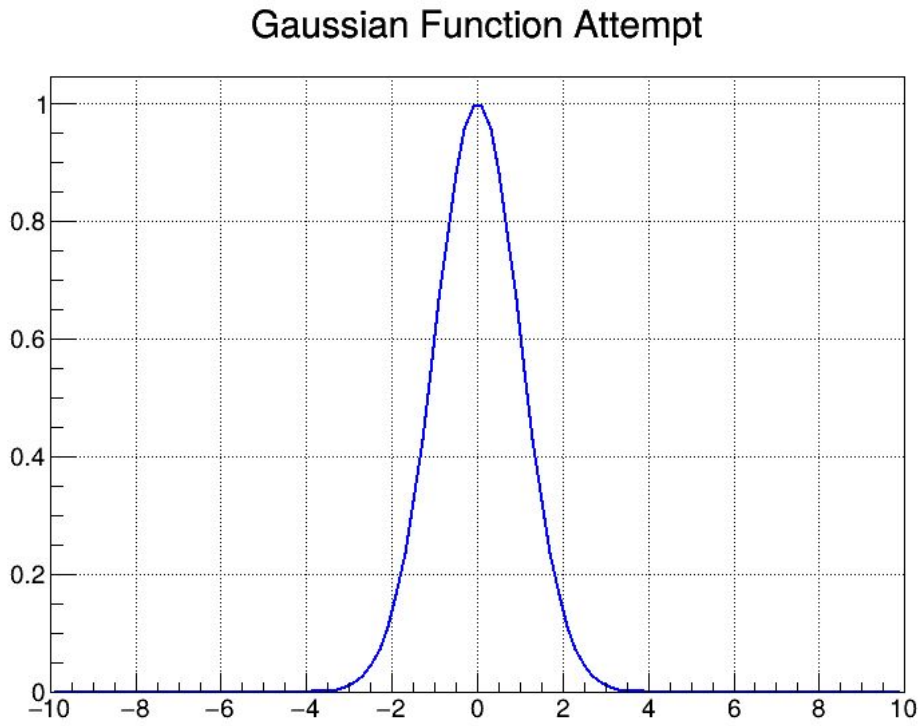
- First set of simulated data produced, changed the run2.mac file (and figured out how to use the root object browser)

Next steps

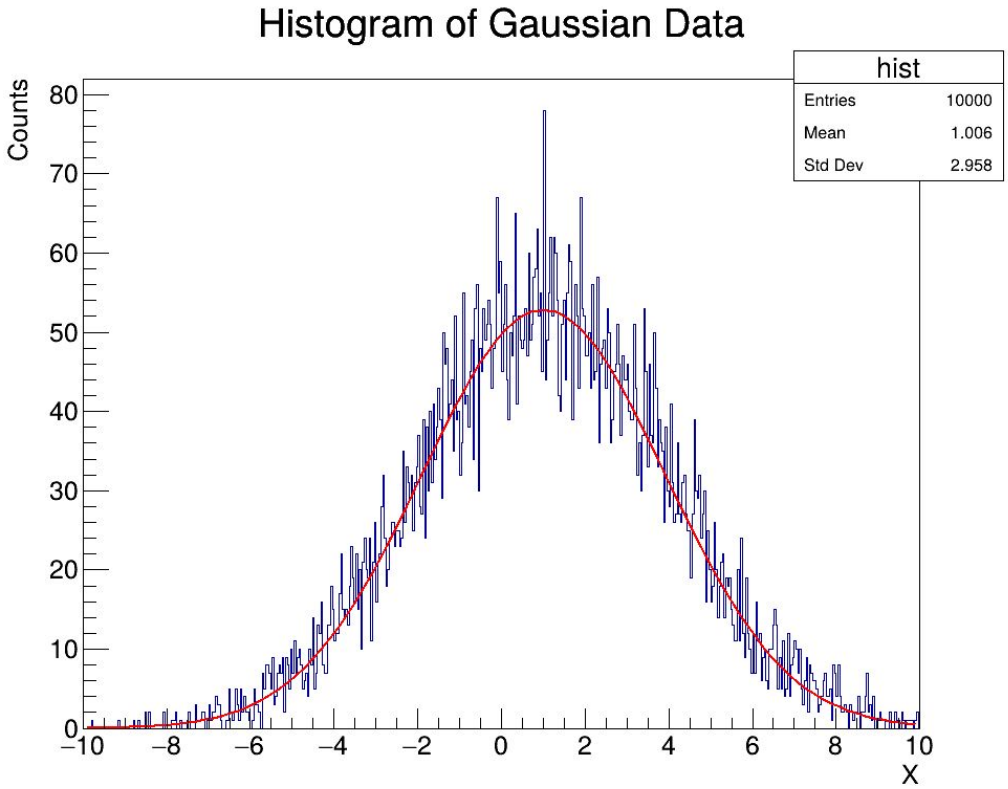
- Get used to root, generate data for a basic gaussian distribution and fit it in root
- Familiarize myself with C++
- Work on the “readout” material change to carbon fiber, read the “Construction, test and commissioning of the triple-gem tracking detector for compass” paper

RGB lab updates 11/1

Xavier Braun



First Gaussian distribution I made with root, with an amplitude of 1, a sigma of 1 and and mean value of 0, to see if I can use TCanvas and TF1 to create a basic gaussian



Created a random gaussian distribution, which was then fitted alongside a printed standard deviation and mean using root (the given values were 3 and 1 for stdv and mean respectively).
(also found a website called Learn C++ which has been helping tremendously).

Next steps

- Finished reading the Gem Construction paper
- Currently reading through the geant4 geometry page to get an idea of what to do
- Actually work on the gem construction code, requires overlapping copper strips and carbon fiber for the readout layer
- Still trying to decipher the current code

RGB lab updates 11/11

Xavier Braun

Working on the Copper Strip and Overlap layers

- After a brief discussion yesterday, I have changed the functions to space the strips out according to the size of the detector and width of the strips, not based on spacing between strips

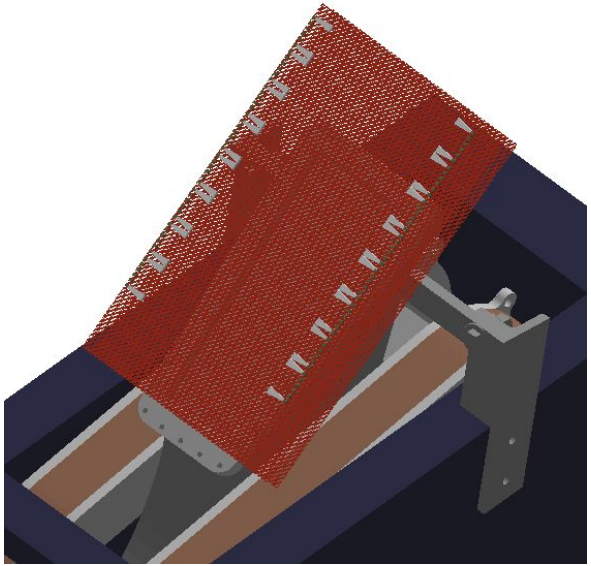
- Have also defined another gem layer for the overlapping regions between the two layers to create a plaid pattern

- I have a small issue related to the g4PSIGEM.hh file which needs to be adjusted due to the new functions being called (didn't know this until today), once that is done I can look at the resultant simulation!

RGB lab updates 11/21

Xavier Braun

Got the two layers of strips working!

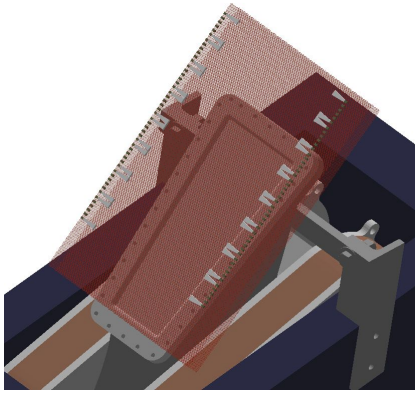


Still working on the overlap area in between the strip layers.

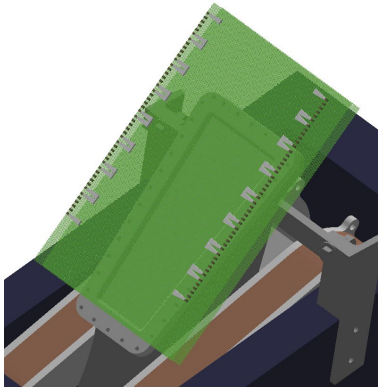
Next step(s) are to make individual sheets with strips removed, as opposed to making individual strips, but should be easier now with an idea of what to do.

RGB lab updates 12/1

Xavier Braun



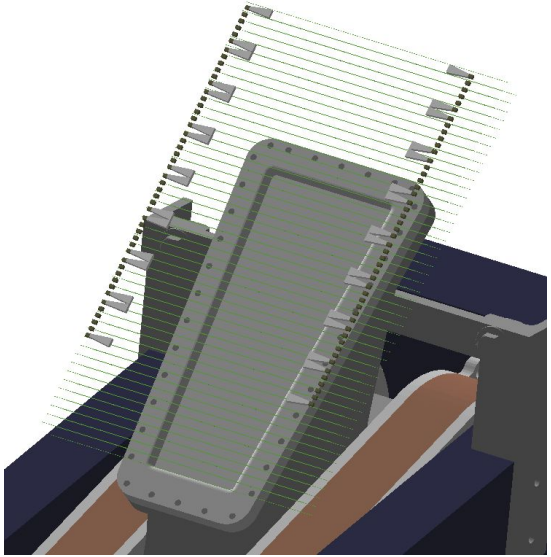
X Direction Strips

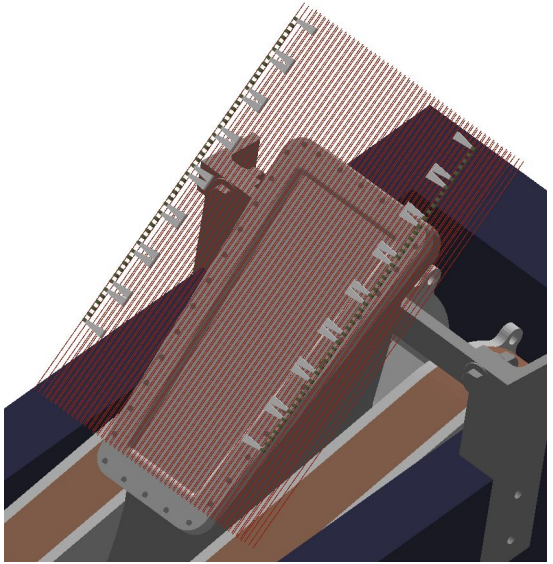


Y Direction Strips

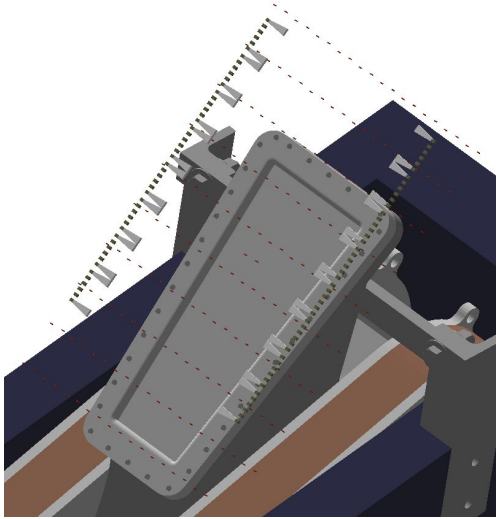
Visualization may look slightly off: This comes as a result of the thinness of the copper strips (80 and 340 micron) and the number of strips.

For Visibility





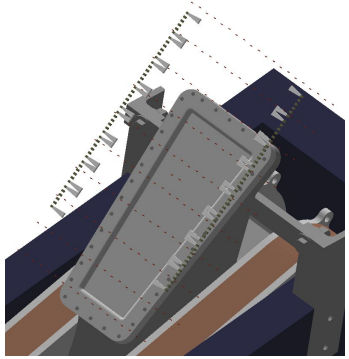
Kapton ridges

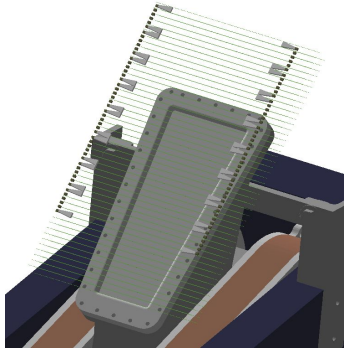


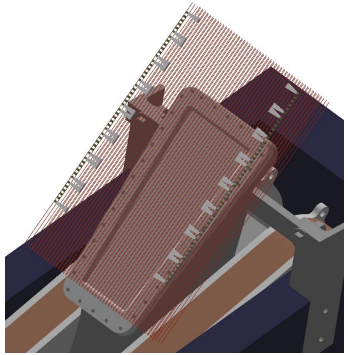
RGB lab updates 1/27

Xavier Braun

Previous semester work







I was working on translating the COMPASS gem readout board code to the darklight simulation.

These included the x and y direction copper strips and the kapton spacers in between each of these strips.

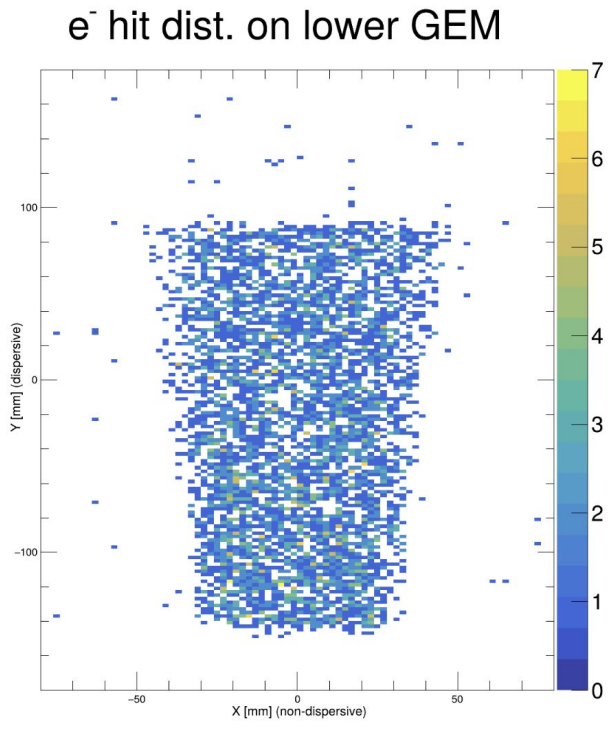
The individual strips/spacers slow the simulation down to a pitch drop experiment speed even when treated as a single volume

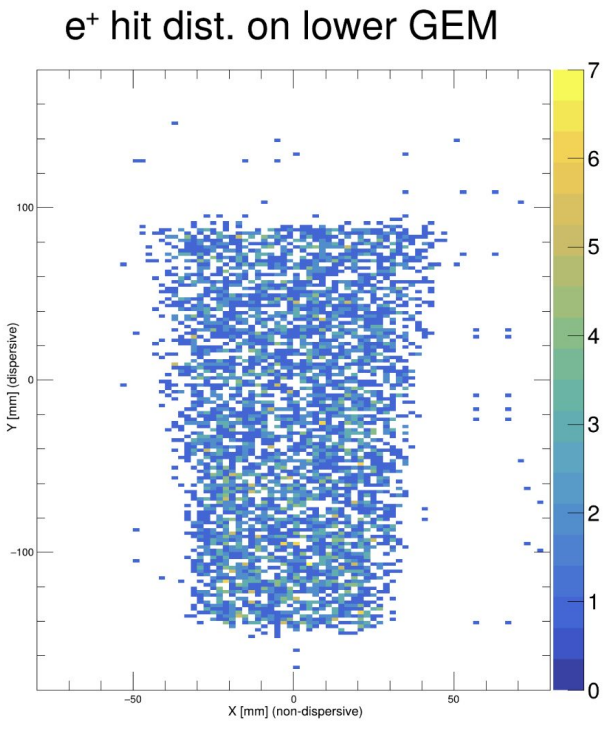
(Temporary) Solution

Treat each of the new layers the same as the gem layers (no individual copper strips/kapton ridges)
Layers are:
- Copper (0.2)
- Kapton(0.2)
- Copper(0.85)
- Fiberglass

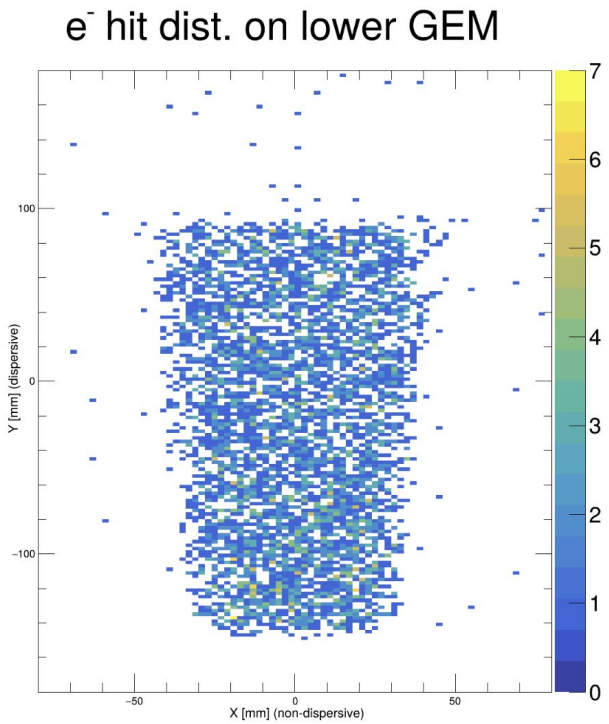
More permanent solution:
- Adjust the layer density as though it still has those gaps
- (Any other suggestions welcome)

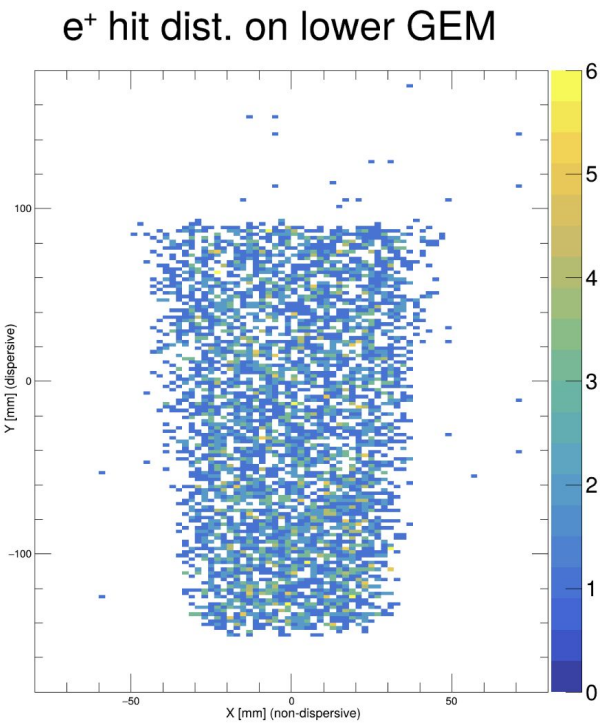
Hits with new readout board





Hits with old readout board





RGB lab updates 2/3

Xavier Braun

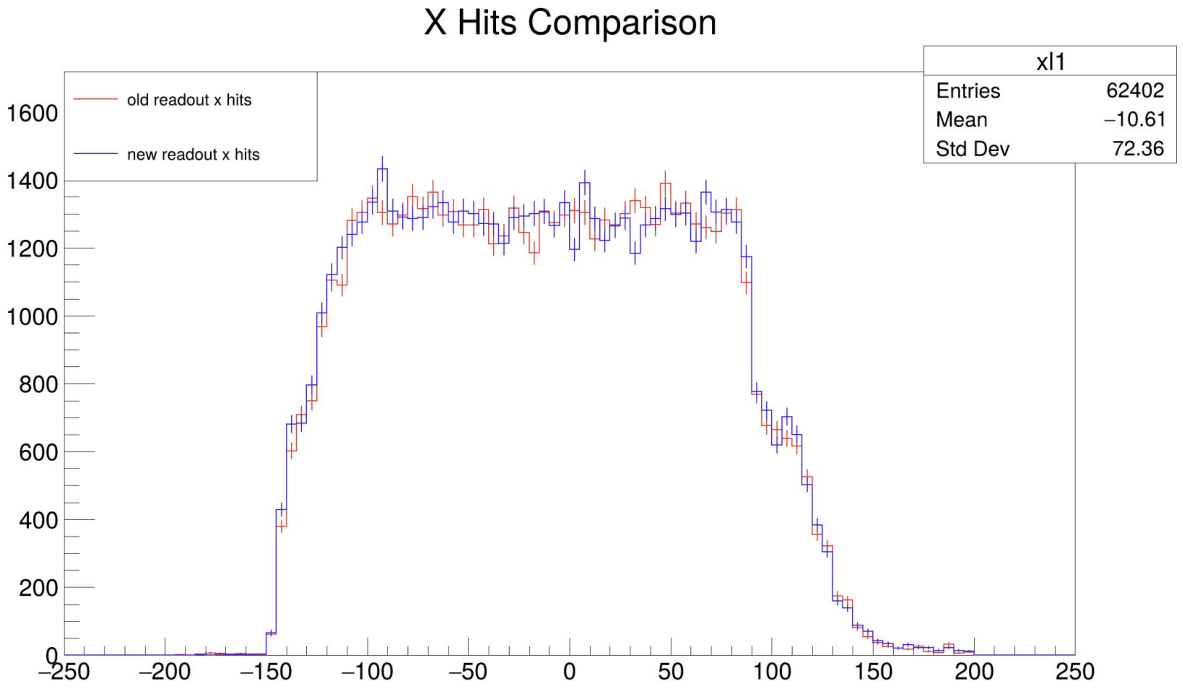
Context: New Readout Board

I am replacing the MUSE readout board with the version based on COMPASS design

Treat each of the new layers the same as the gem layers (no individual copper strips/kapton ridges)
Layers are:
- Copper (0.2)
- Kapton(0.2)
- Copper(0.85)
- Fiberglass

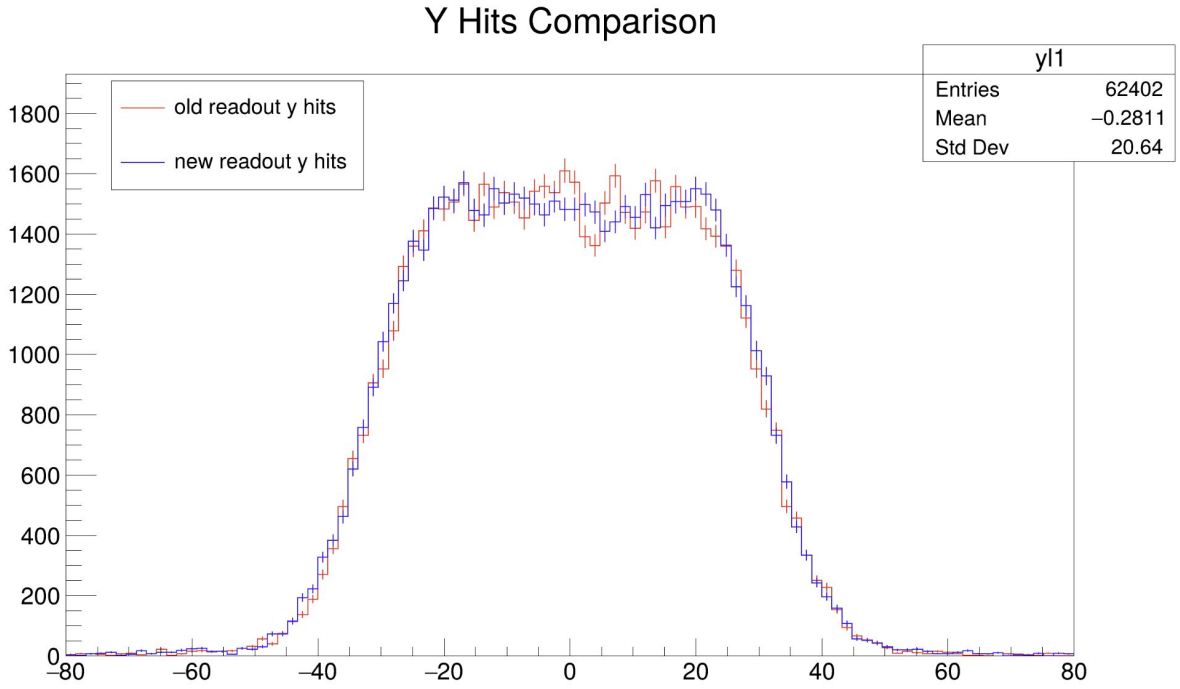
Previous semester attempted to have individual kapton spacers/copper strips but slowed the simulation down heavily

X Hits Comparison, 1D Plot, 15000 events



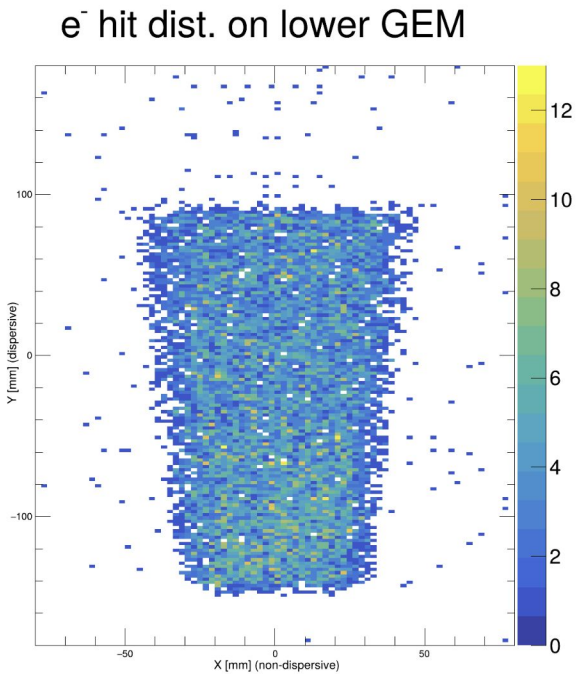
Run with random gun mode
error is sqrt(n)

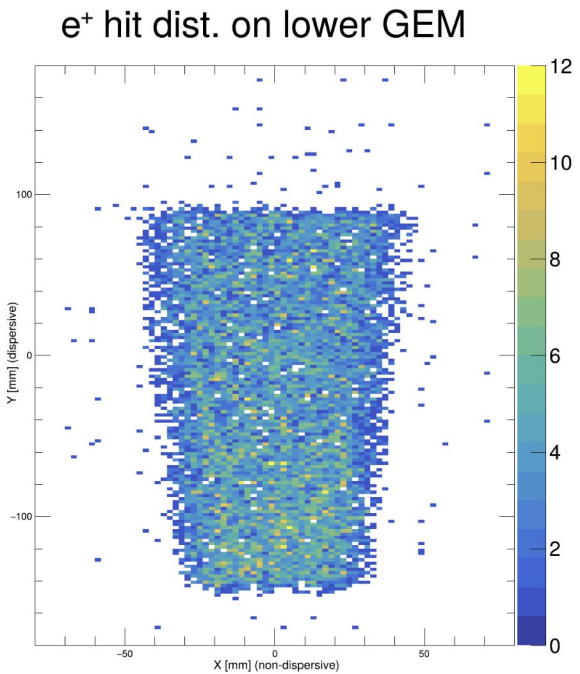
Y Hits Comparison , 1D Plot, 15000 events



Run with random gun mode
error is sqrt(n)

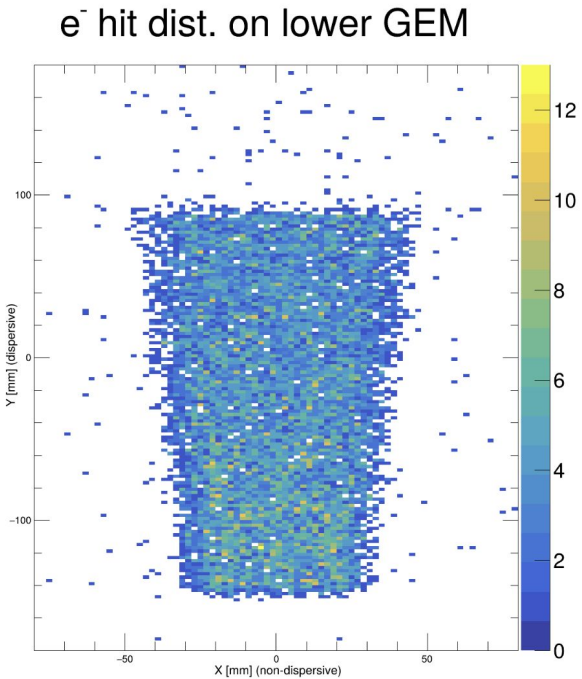
Hits with old readout board, 2D Plots, 15000 events

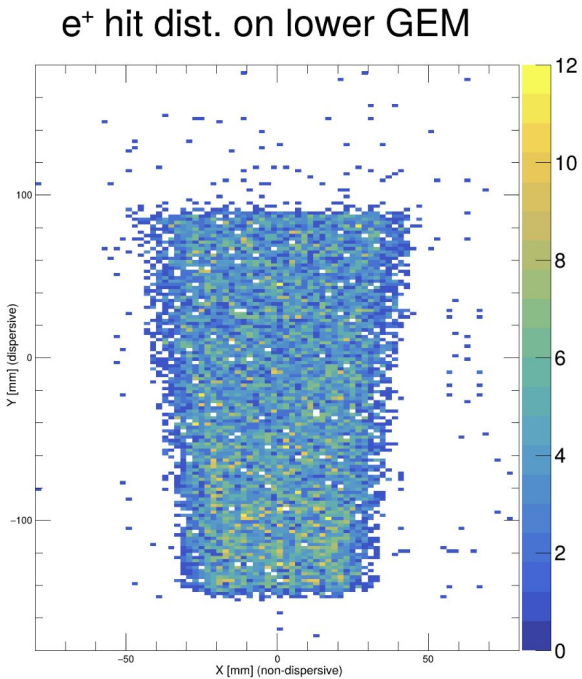




Run with random gun mode

Hits with new readout board, 2D Plots, 15000 events





Run with random gun mode

Next Steps

- Looking to retry the copper strip/kapton spacer layers in a way which doesn't slow down the event interactions
  - G4PVReplica/Division may be fruitful
- Rerun the tests to see how they affect the hits in 1D and 2D