

Geant4 Compton Model Update

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Where are we at?

- Random Number Generation
- Full B-Field Implementation
- B-Field Visualization
- Running in batch
- Root Utilization
- Visualizing Asymmetry
- Future Tasks

Random Number Generation

- Currently, I am able to generate random numbers when not running in batch.

```
srand(time(NULL));
G4int randomint = rand() % 999999999999 + 1000000000000;
G4int randomint2 = rand() % 999999999999 + 1000000000000;

auto r1 = std::to_string(randomint);
auto r2 = std::to_string(randomint2);
G4cout << "\n-----"
<< "\n-----" << G4endl;
G4cout << "Random Seed Integers " << randomint << ", " << randomint2 << G4endl;
G4cout << "\n-----"
<< "\n-----" << G4endl;
```

```
/random/setSeeds 669701182 298778118
Idle> 
```

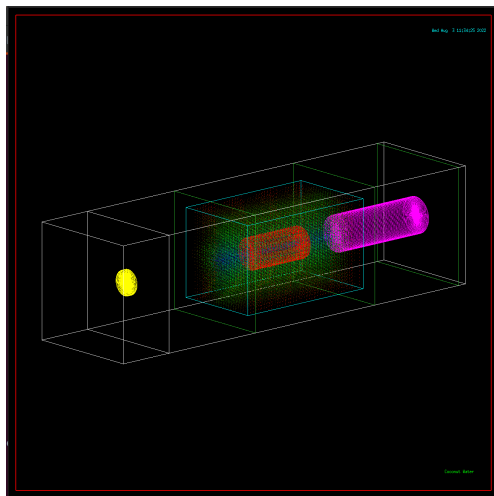
- If I run in batch I need to manually enter random numbers into the run file.
- Not terribly detrimental at the moment but future improvements could place the RNG in the run macro.

Full B-Field Implementation

- I have received the full region B-field from Probir and placed it in my code. All regions currently behave as expected.
- This is great because now my code is primed for receiving the field data for the actual magnet when received.
- Currently I have the steps in cm but the step size can be whatever is given to me.

B-Field Visualization

- I cannot run the code for information while the B-Field is shown, but it is useful to see the field.



Running in Batch

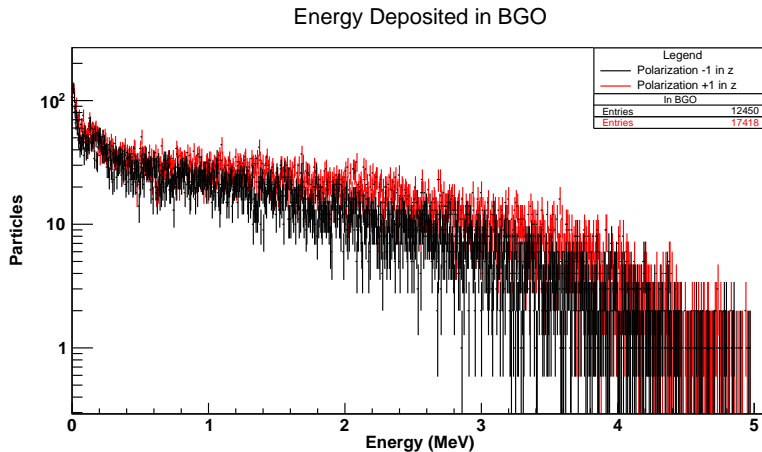
- As we all know the way to run the simulation quickly is without visualization. I believe the proper way to say this is running in batch.
- While I have been doing this via a run macro there are some recent improvements.
- The RNG for seeds is given directly in this file. This allows me to ensure new data each run.
- I am currently experimenting with running code in Idle without visualization which would allow me to implement my current RNG.
- The big improvement is running in batch multi-threaded. Previously, I was only able to do multi-threaded runs with visualization.

Root Utilization

- Unlike Geant I am finding root incredibly unintuitive.
- With heavy help from Sami I now understand how to use root and have begun development on a .C file.
- I have results from my first attempt regarding the asymmetry I will show in the next slide.
- However, the creation of this plot was full of trial and error, click and drag, and some hand waving.
- The data is useful but adding event trackers to the actual plot along with a legend proved tedious.

Visualizing Asymmetry

- So far I have only looked at the BGO in root.



Future Tasks

- Get the RNG into the run macro or figure out how to run in Idle. (Idle may be a local solution)
- Learn root. My .C file needs some love and doesn't do nearly as much as I need it to. The goal is to have all the analysis done in a singular .C file such that all it intakes is two root files.
- Revisit the math. I recall we need the asymmetry for getting the polarization but I would like to review how.
- Geometry Wise: I would like to correct the magnet core shape. Is polarization still "uniform" in an imperfect cylinder?