

What I Am Doing

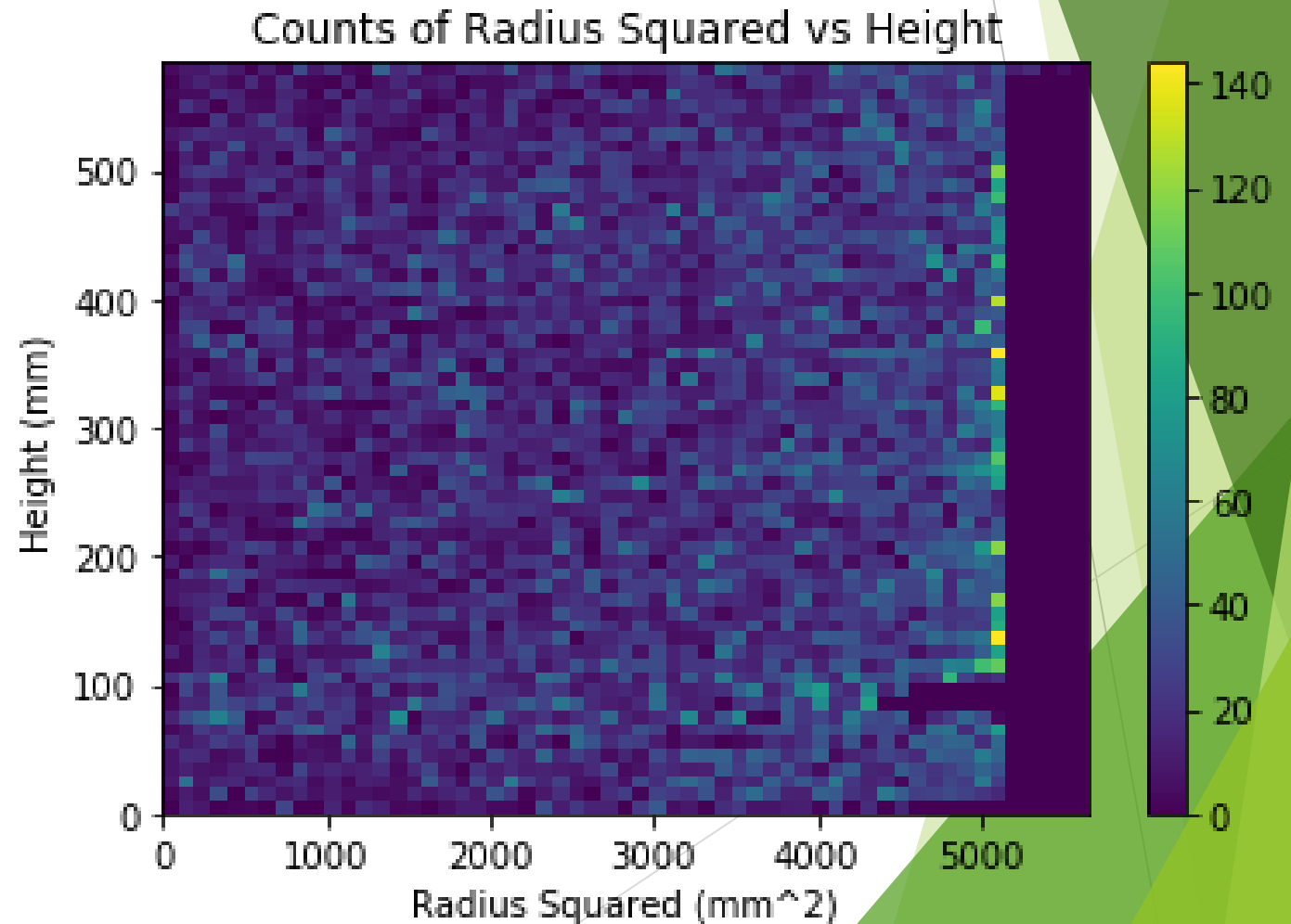
Simulating Decays of Elements in the Forward Field Region

Today's Slide is [Here](#)

Plots!

Concerns

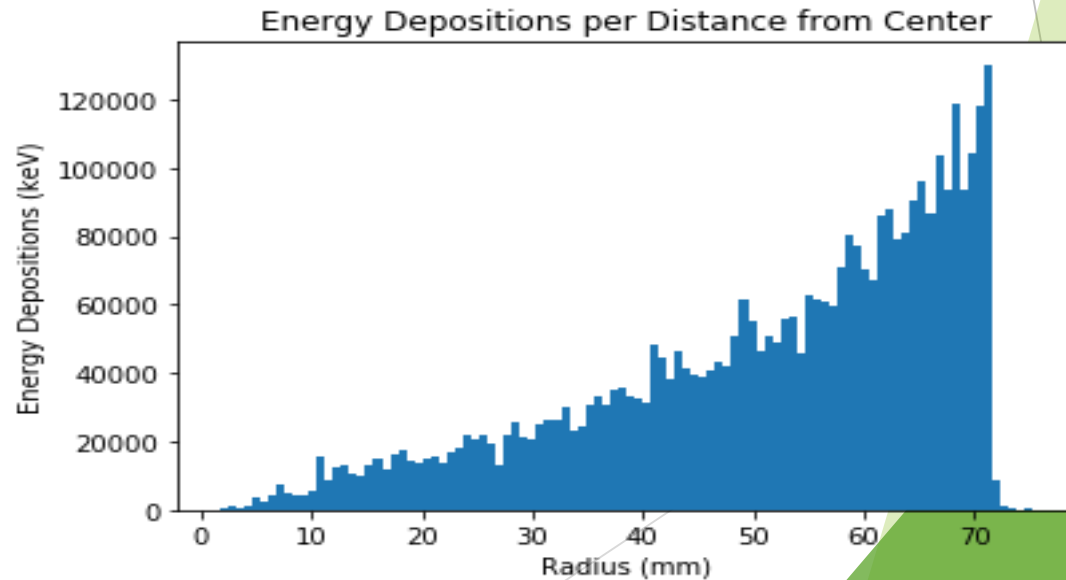
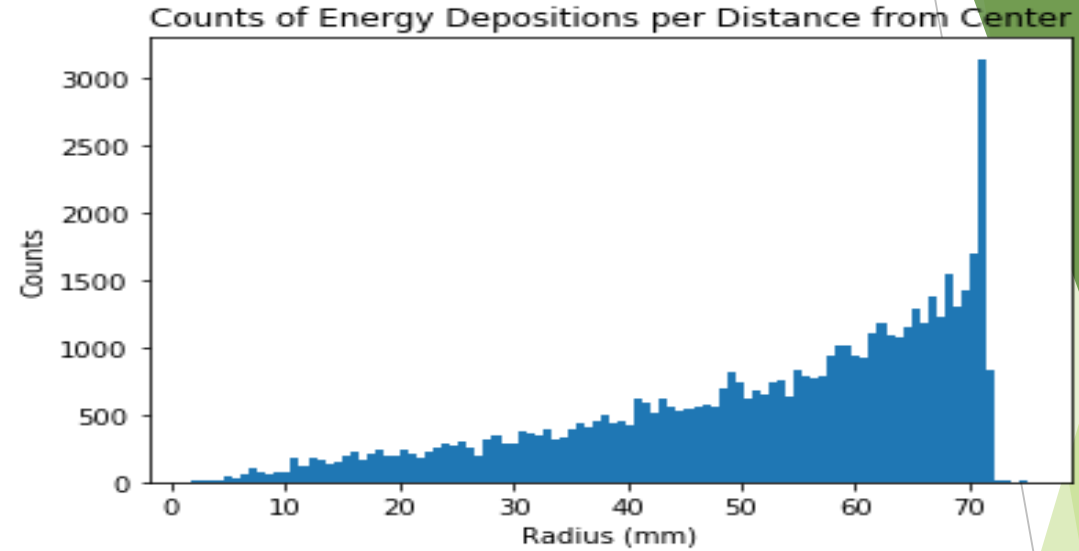
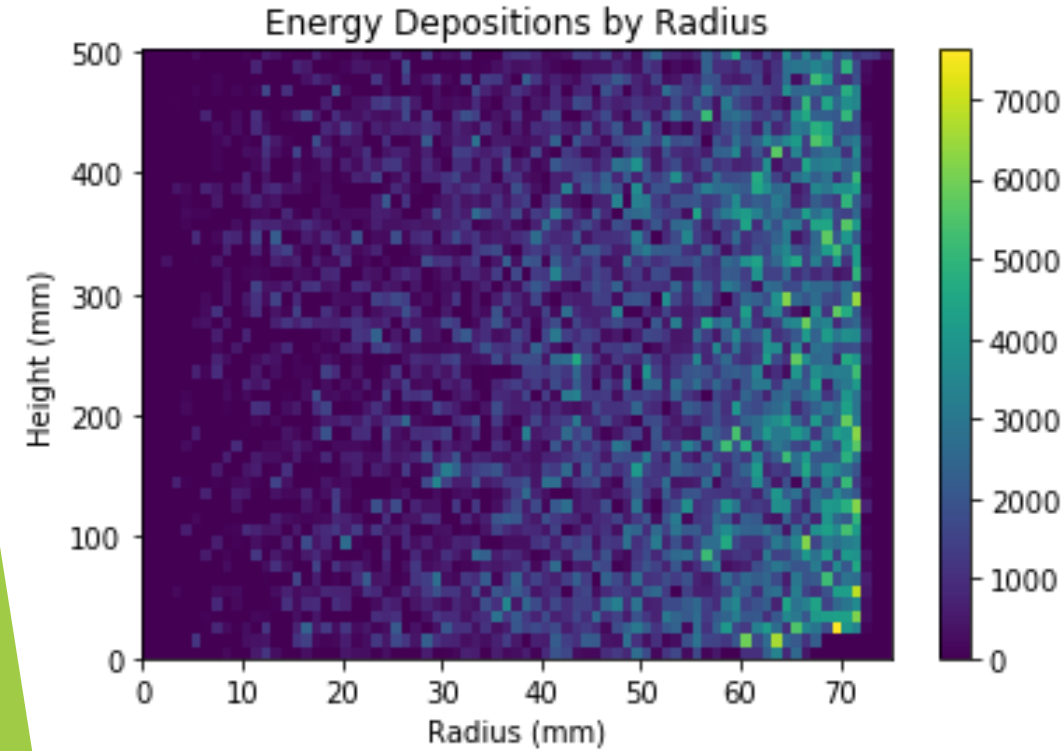
- ▶ Time threshold?
- ▶ Does not line up exactly with parameters (especially height)
- ▶ Gap at 100mm height



Still To Do

- ▶ Fix Current Issues
- ▶ Use Energy Values Instead of Counts
- ▶ Try Simulating Decays from Bottom
- ▶ Possibly other Materials?

Energy Depositions and Correct Dimensions



Still To Do

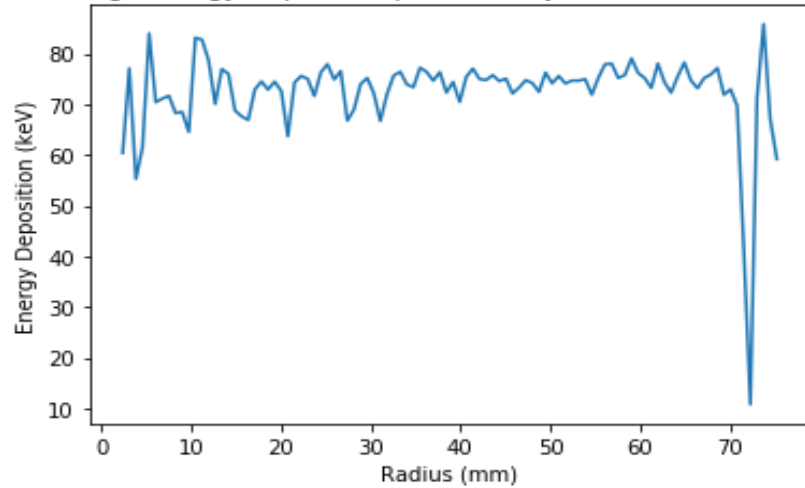
- ▶ Find decay rates in area
- ▶ Fix geometry problems
- ▶ Other materials?

Thermal Neutron Scattering

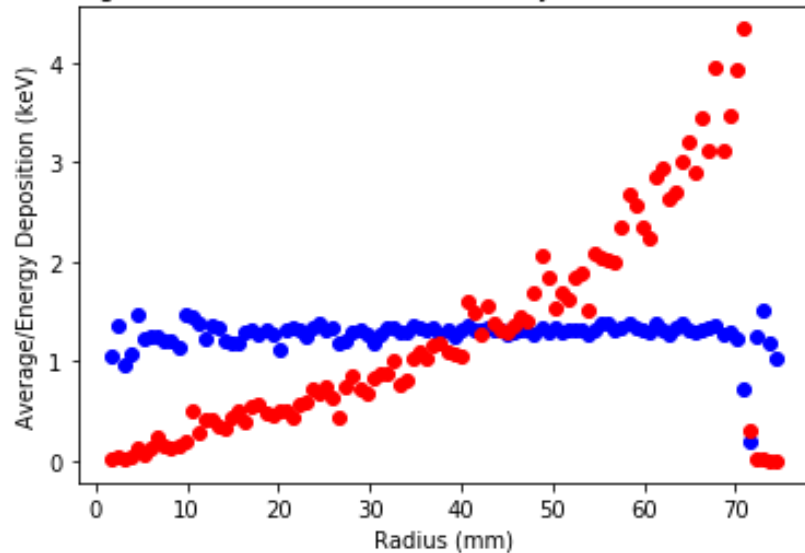
- ▶ https://indico.cern.ch/event/245281/contributions/1564676/attachments/420136/583408/thermal_physics_validation_argarcia.pdf
- ▶ <http://pubs.cnl.ca/doi/pdf/10.12943/CNR.2017.00002>

Average Energy Deposition

Average Energy Deposition per Event by Radius (Pre-Clustering)

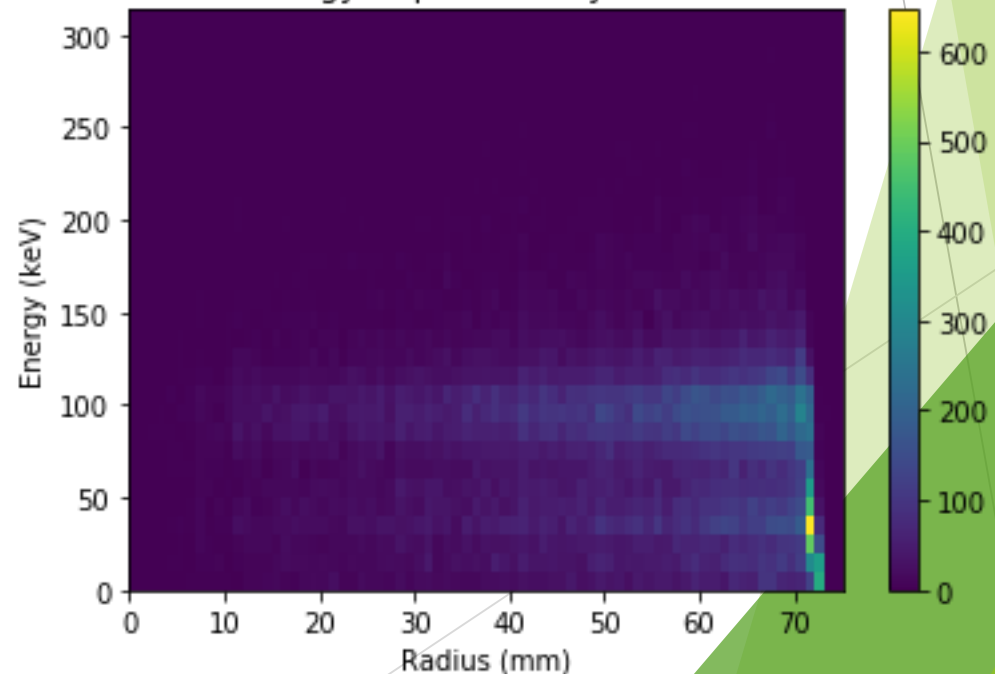


Average ED (Blue) and Total ED (Red) by Radius (Pre-Clustering)



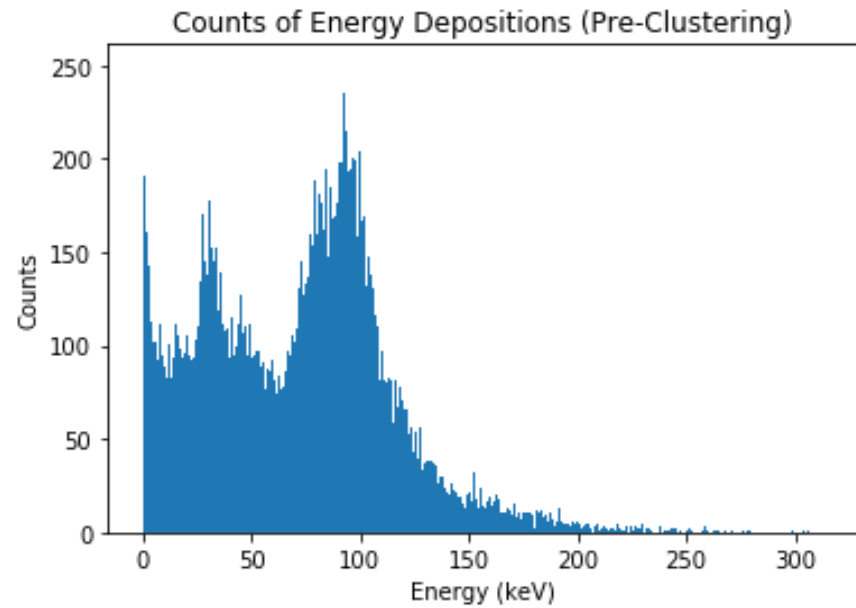
- Why is there so little energy degradation until it is close to the center?
- Why is there a sudden drop at the edge, but regular events past it?
- Why are there so many small-energy events at the edge, but fewer later on?

Energy Depositions by Radius

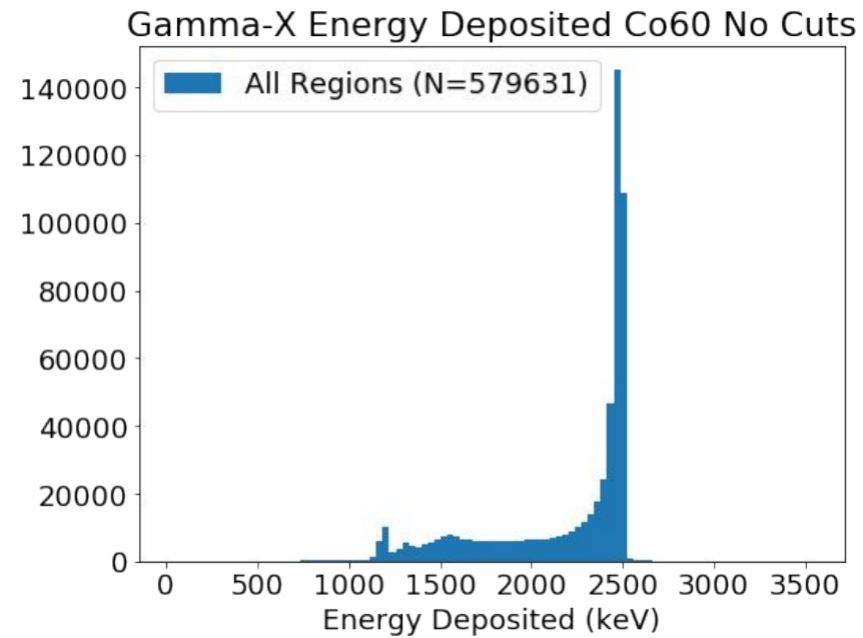


Energy Histogram Very Far Off

Mine



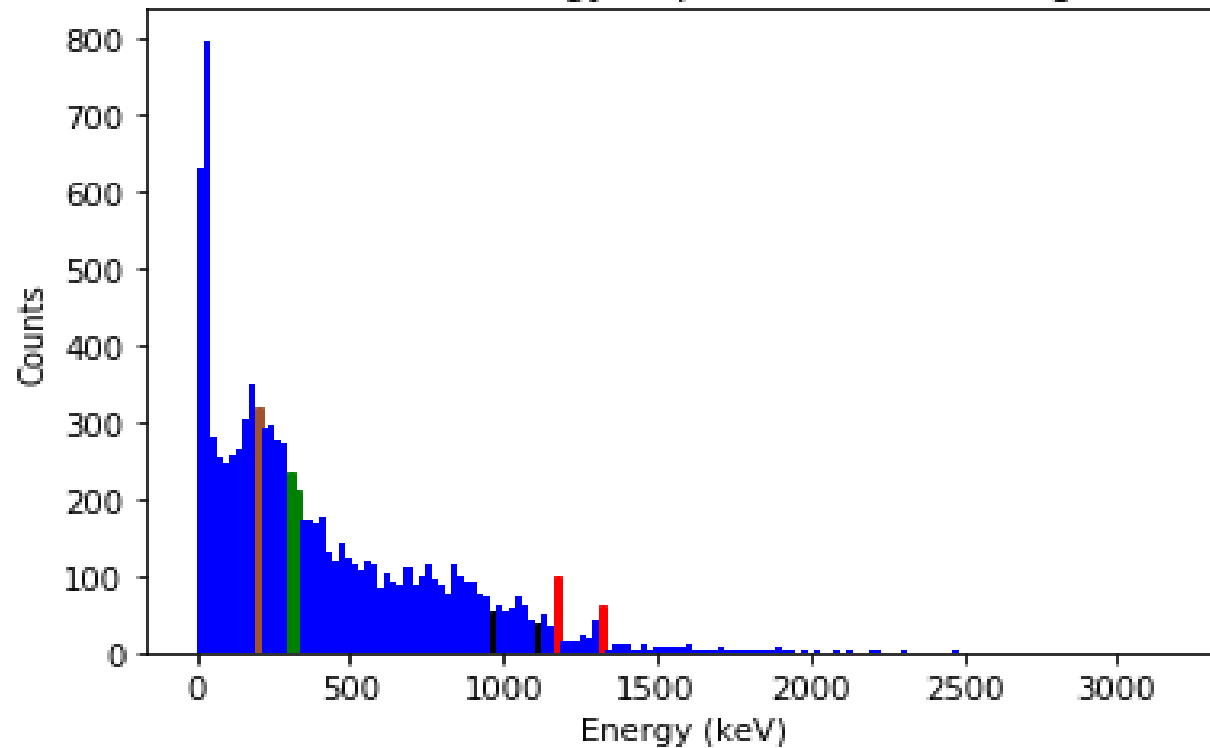
Jonathan's



Now With Clustering

Post-Clustering

Counts of Energy Depositions (Clustering)



Expected Values (keV)

- ▶ Brown= E' (204, 208)
- ▶ Green= β^- max (316)
- ▶ Black= E_e (966, 1112)
- ▶ Red=Photopeak (1173, 1333)

$^{60}_{27}\text{Co}$	5.271 y	β^-	0.316	100%	1.173	100%
					1.333	100%

Still to Do/Answer

Read

- ▶ *Why I am getting so many events well above 1333 keV?
- ▶ *What types of events are causing the very small, but numerous energy deposits?
- ▶ Why are there relatively few events at photopeak (compared to other measurements)?
- ▶ What other energy values do I want to look at?
- ▶ Understand equations that I am using

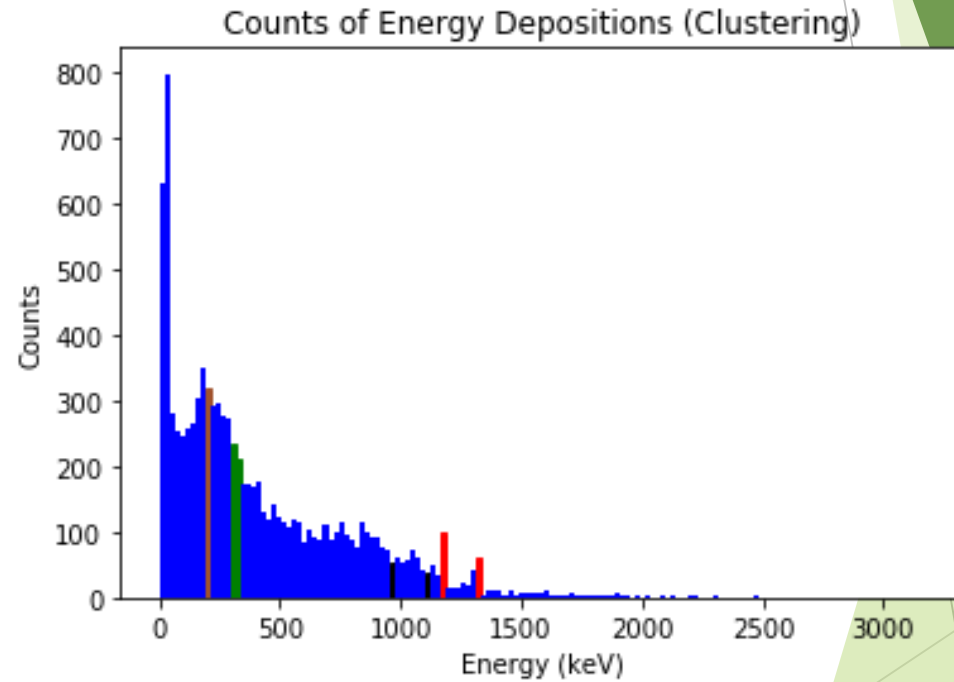
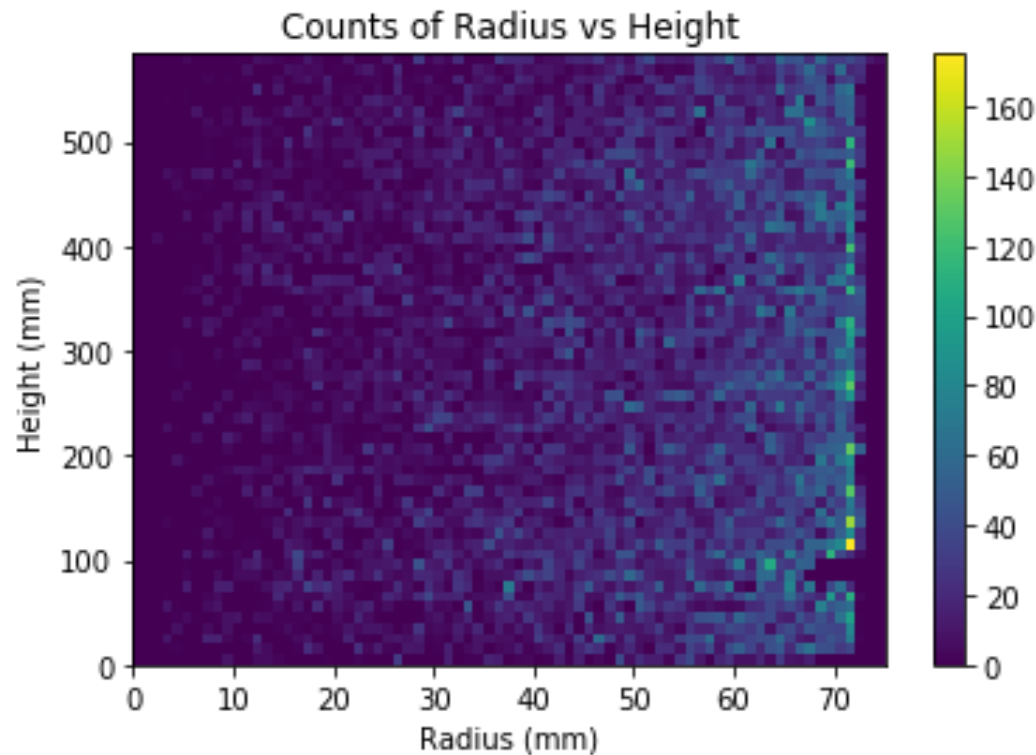
Do

- ▶ Find values of other energy factors (escape peaks, detector efficiency, etc.)
- ▶ Create rough model of what I should be seeing (ideally)
- ▶ Keep reading

Summer Overview

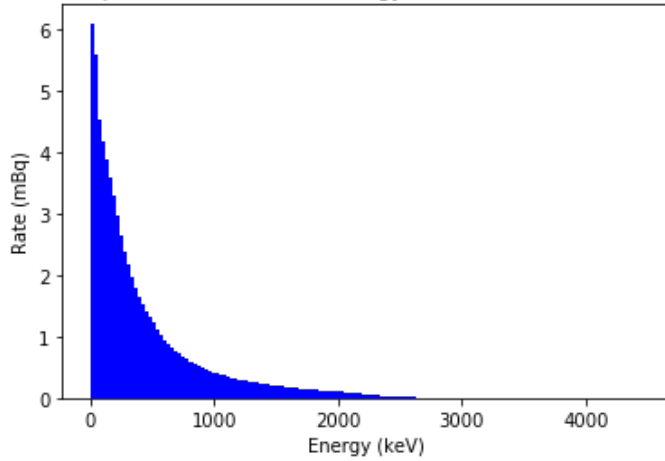
- ▶ Got Submission Script/Macro running
- ▶ Plotted by position
- ▶ Plotted by energy/histograms of energy
- ▶ Included Clustering
- ▶ Included Accurate Values
- ▶ Other elements
- ▶ Measured rate above energy threshold
- ▶ Cable Making (Minor)
- ▶ More components w/ More Decays (In Progress)

Plotting By Position/Energy/Clustering

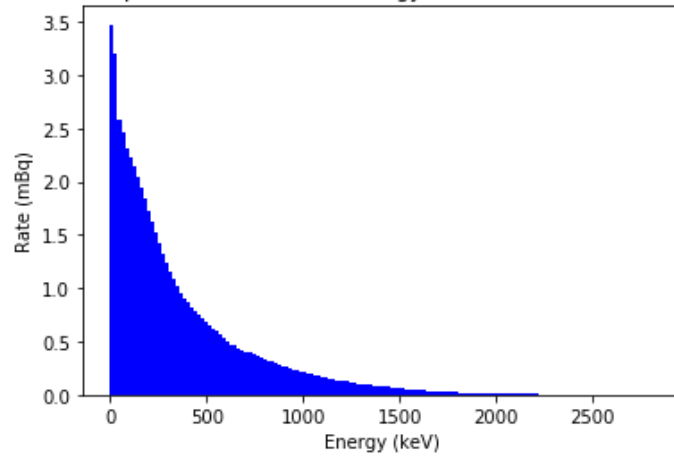


Accurate Values/Rate/More Elements

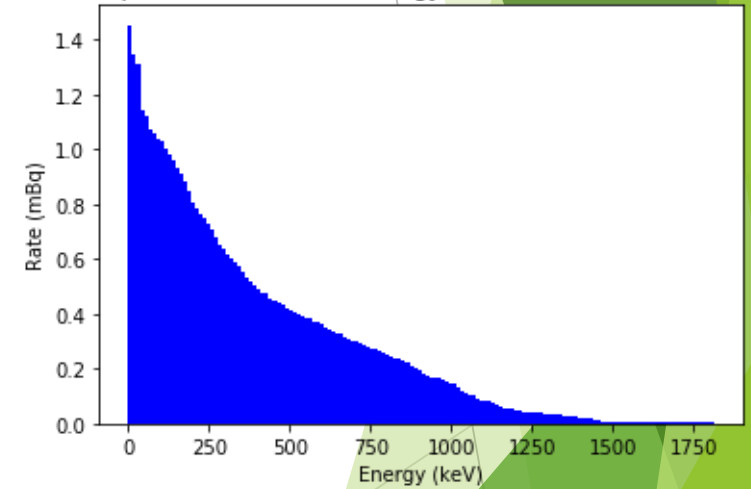
Th232 Deposition Rate Above Energy Threshold (Base = 5.52 mBq)



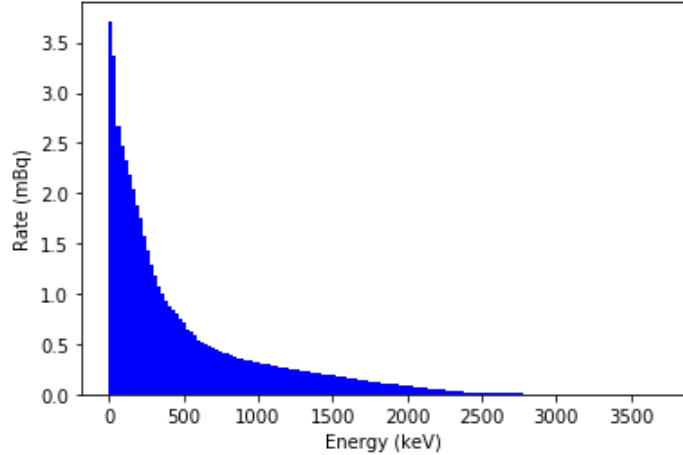
U238 Deposition Rate Above Energy Threshold (Base=3.68 mBq)



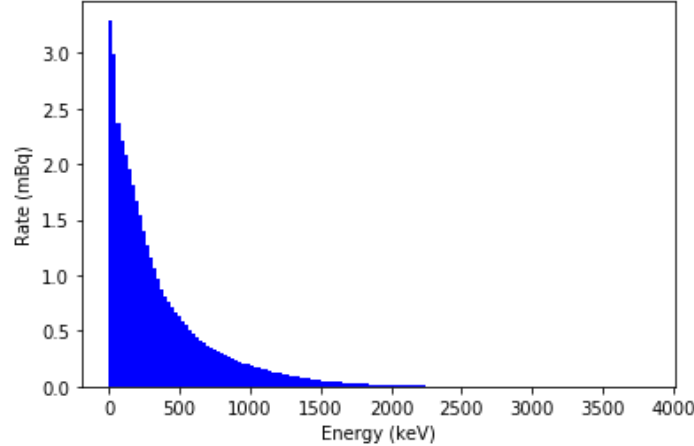
K40 Deposition Rate Above Energy Threshold (Base = 22.08 mBq)



Th228 Deposition Rate Above Energy Threshold (Base = 5.52 mBq)



U234 Deposition Rate Above Energy Threshold (Base = 3.68 mBq)



Goals For Fall 2017 Semester

- ▶ Research Tasks
 - ▶ More Components
 - ▶ Give LZ-value estimate range
 - ▶ Errors (And More Events)
 - ▶ Thorium Alpha Energies
- ▶ Conceptual Knowledge
 - ▶ What Specific Impact Do Decays Have on Experiment
- ▶ Technical Knowledge
 - ▶ Learn More C++; be able to write code in C++ instead of Python
 - ▶ Getting Better at ROOT