# Gamma-X Event detection

Jonathan Nikoleyczik

I am attempting to understand a potential background in the LZ detector, called Gamma-X events by analyzing simulations of background events.

Todays update starts on slide 6

Running BACCARAT

- Ran test Sims in latest version of BACCARAT (1.0.0)
- Will modify scripts to look for Gamma-X events
- Currently using simple rootpy analysis
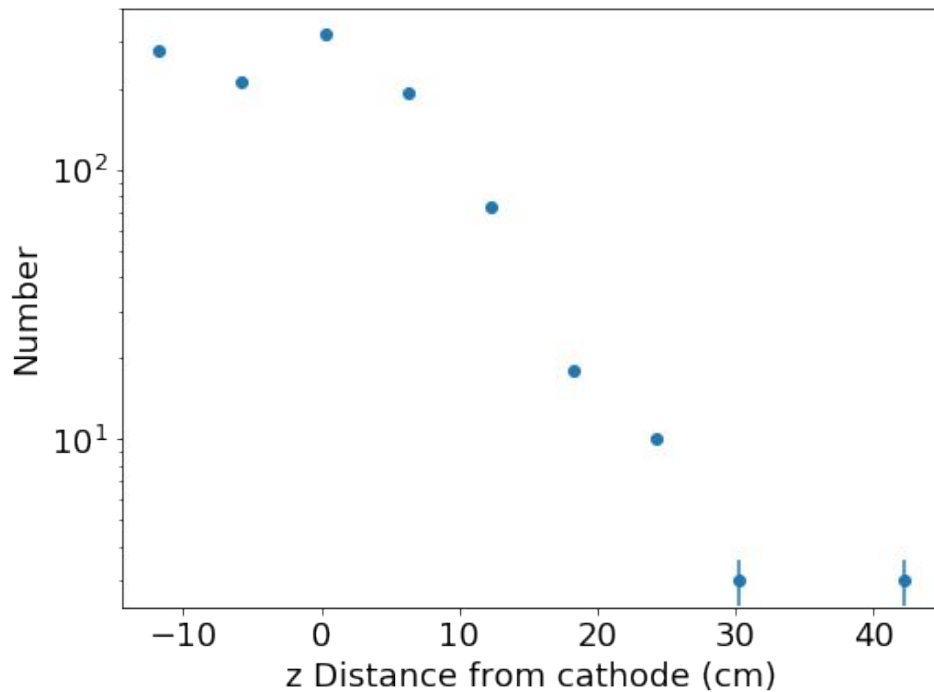- Plan to emulate Bhawna's Gamma-X study

S1 vs. S2 from the BACCARAT test macro
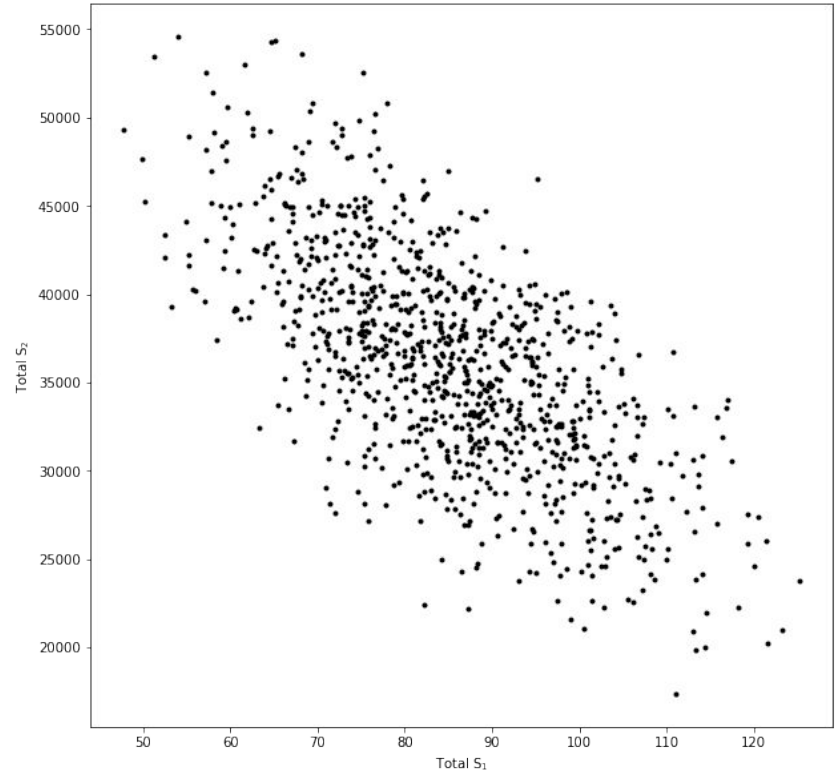
More Gamma-X results

- 100,000 Th 232 Decay Chain Events
- Expected an exponential drop off (I see one if I don't require energy deposited)
-

Events in both Forward and Reverse Field Regions

Gamma-X Update

- Same 100,000 Events as last week
- Producing 560 events in both regions
- Now I add together events in forward and reverse field regions, then do the energy weighted sum
- There is now one dot for each decay event
- Issues getting S1 and S2
  - Needs libNEST
    - Needs Boost

Energy weighted depositions combining both the forward and reverse field regions

4
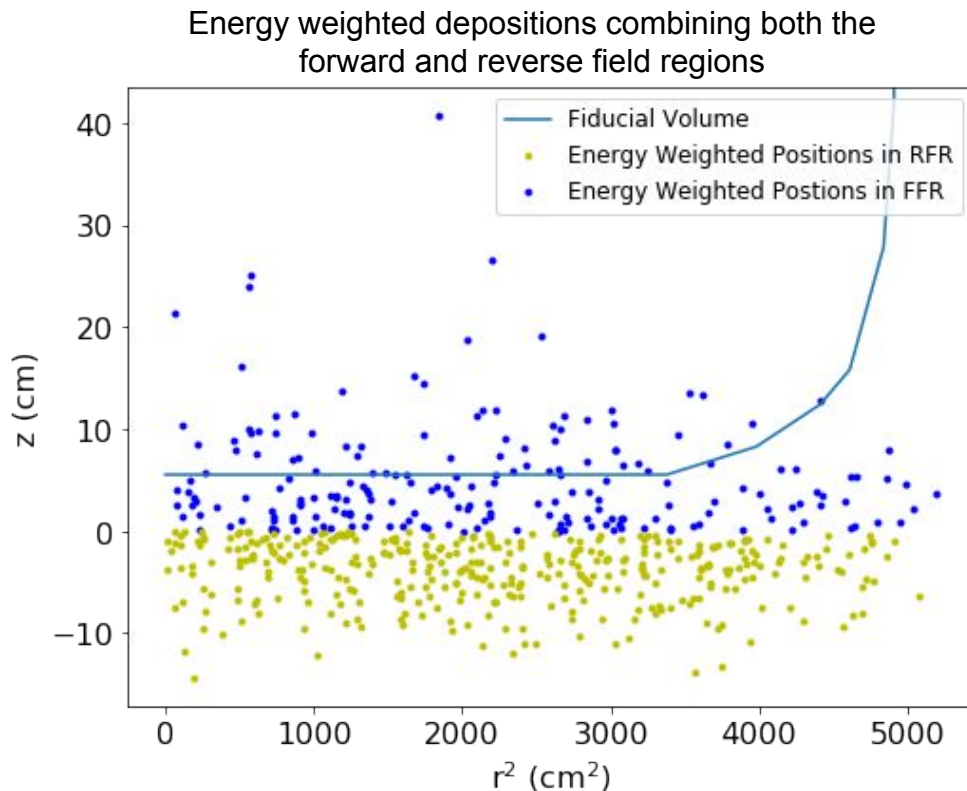
Fixed Histogram

- This is a histogram of the data on the last slide as a function of z
- The RFR looks almost linear and the FFR looks exponential

Energy weighted events in both forward and reverse field regions
For individual primary particles

Total number of events: 560
Mean:-0.69

z Distance from cathode (cm)
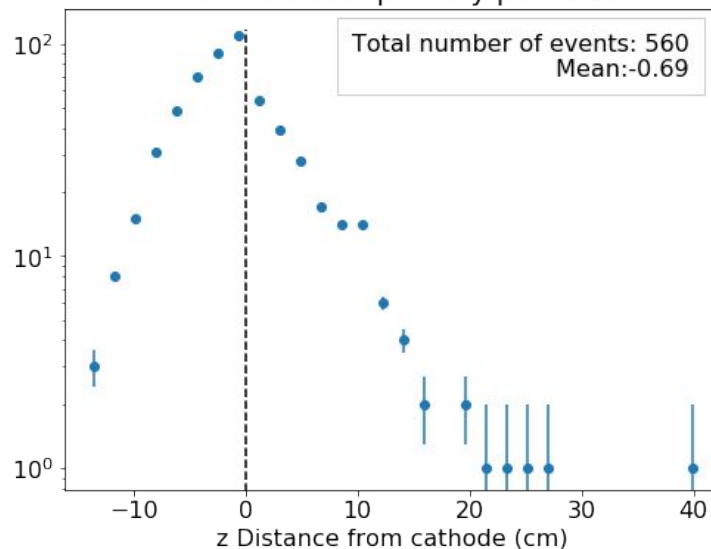
fastNEST is up and running

I'm able to get S1 and S2s

The plot on the right is just an example of S1 and S2 for Nuclear and Electronic events. They are for random energy depositions of 1 to 100 keV with no specification on location.

Simulated Energy deposits from 1 to 100 keV