Mott Simulation Update

2015-02-13

What Does it Have?

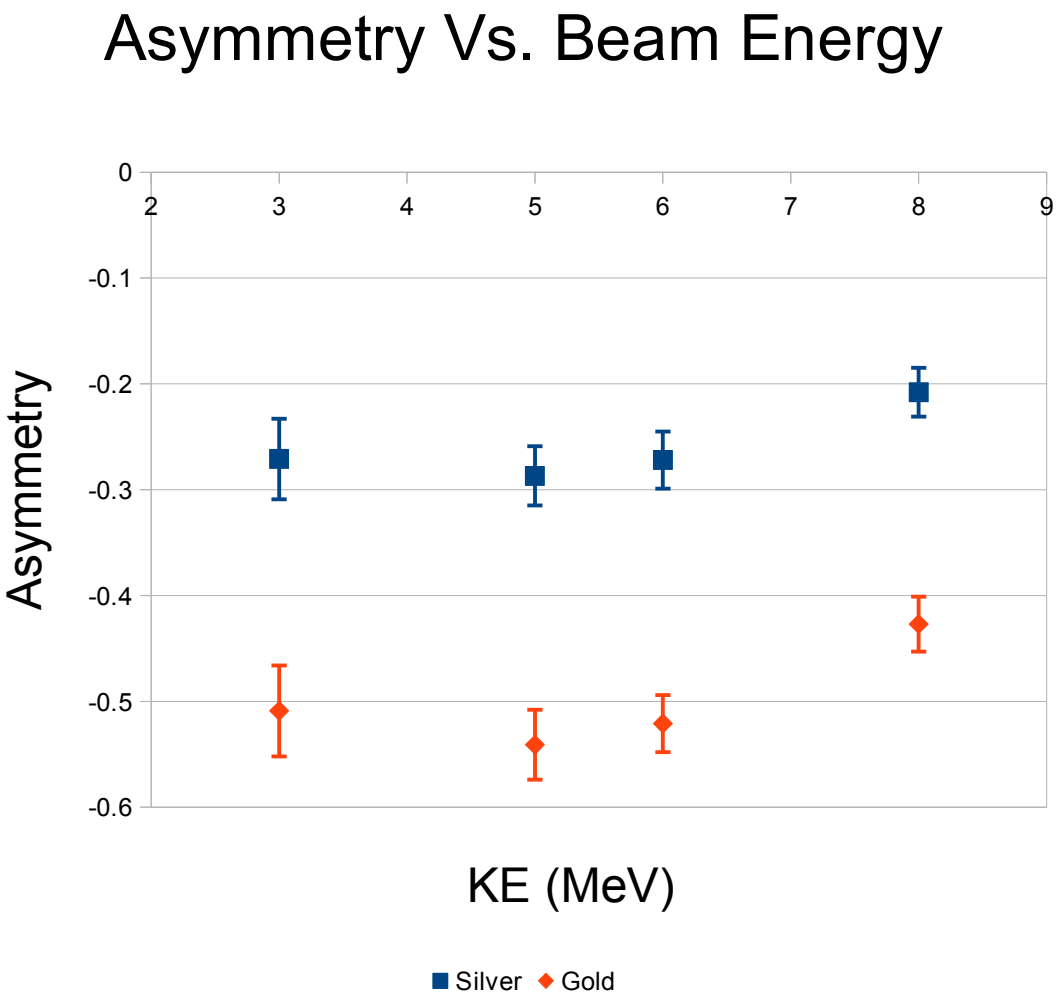
- Currently two modes of running:
  - Physics: Simulates single nucleus scattering based on Xavi's physics
  - Point Source: Used to test if things make it into the detector from a user specified place. Possible to test backgrounds (given **VERY** high statistics)
- Output (into .root files):
  - Detector responses (Energy deposited and PMT PE's for both dE and E detectors)
  - Primary Vertex Data (Scattering Angle, E' and Position) **NEW AND UNTESTED**

How Does It Work? (Physics Mode)

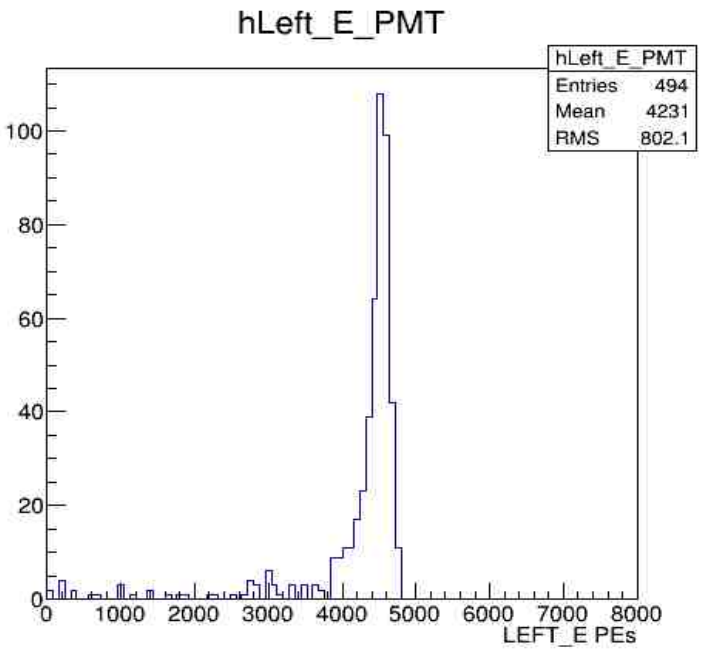
- User provides Beam Kinetic Energy and Target Material (Au, Ag).
- Assume all electrons have spin in the +y direction.
- Assumes a Gaussian beam profile and energy.
- Read in Xavier's data (I, S, T, U) as a 2D grid in energy and scattering angle.
- Use Rejection Method to sample the differential cross-section over the acceptance of the detectors.

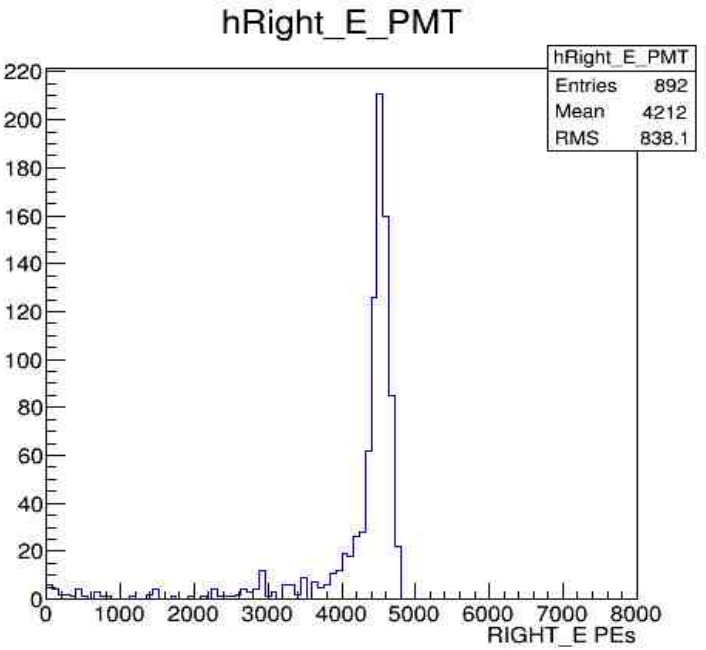
Does It Work?

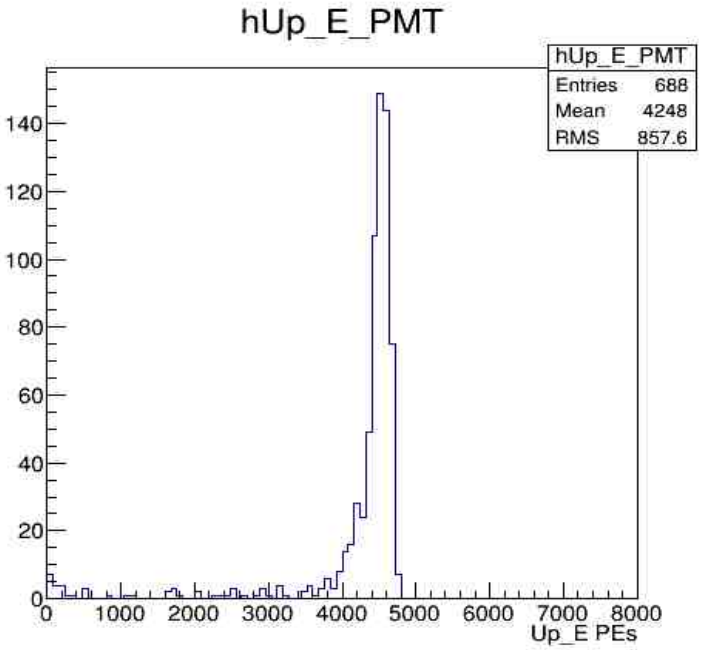
KE (MeV)	Target Z	Asym	dAsym
3	47	-0.271	0.038
5	47	-0.287	0.028
6	47	-0.272	0.027
8	47	-0.208	0.023
3	79	-0.509	0.043
5	79	-0.541	0.033
6	79	-0.521	0.027
8	79	-0.427	0.026

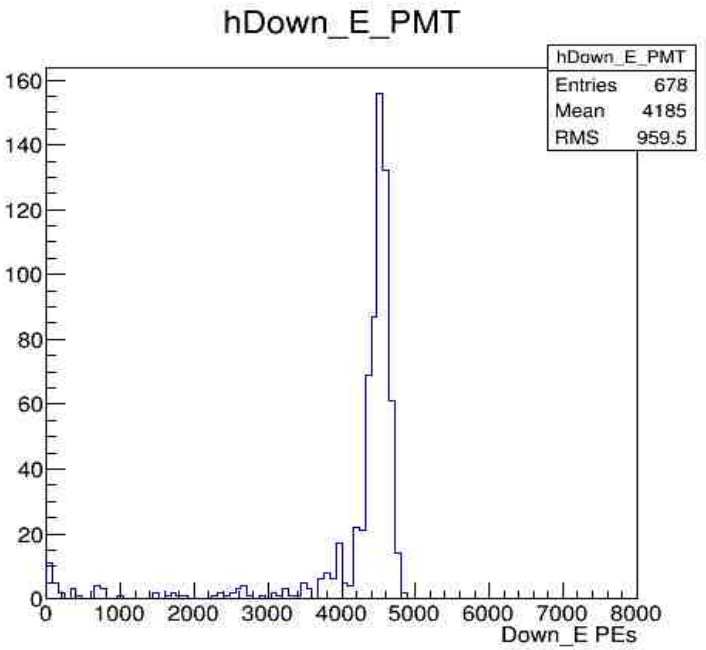


Spectra: 5 MeV Ag









What Else Have I Looked At?

- Used Point Source Mode to look at places on the foil other than the center. I have yet to see any event make it into our detectors from a point outside of 1mm of the center of the target out of 10^4 events.
- Still gathering statistics. I'll rule it out at the 10^7 level (~1 week simulating).

Coming Attractions!

- More Statistics
- User Provided Initial Polarization
- Second Scattering and foil thickness dependence! Multiple Methods available (and I'm open to more suggestions), will test to determine what is most computationally reasonable.
- Documentation