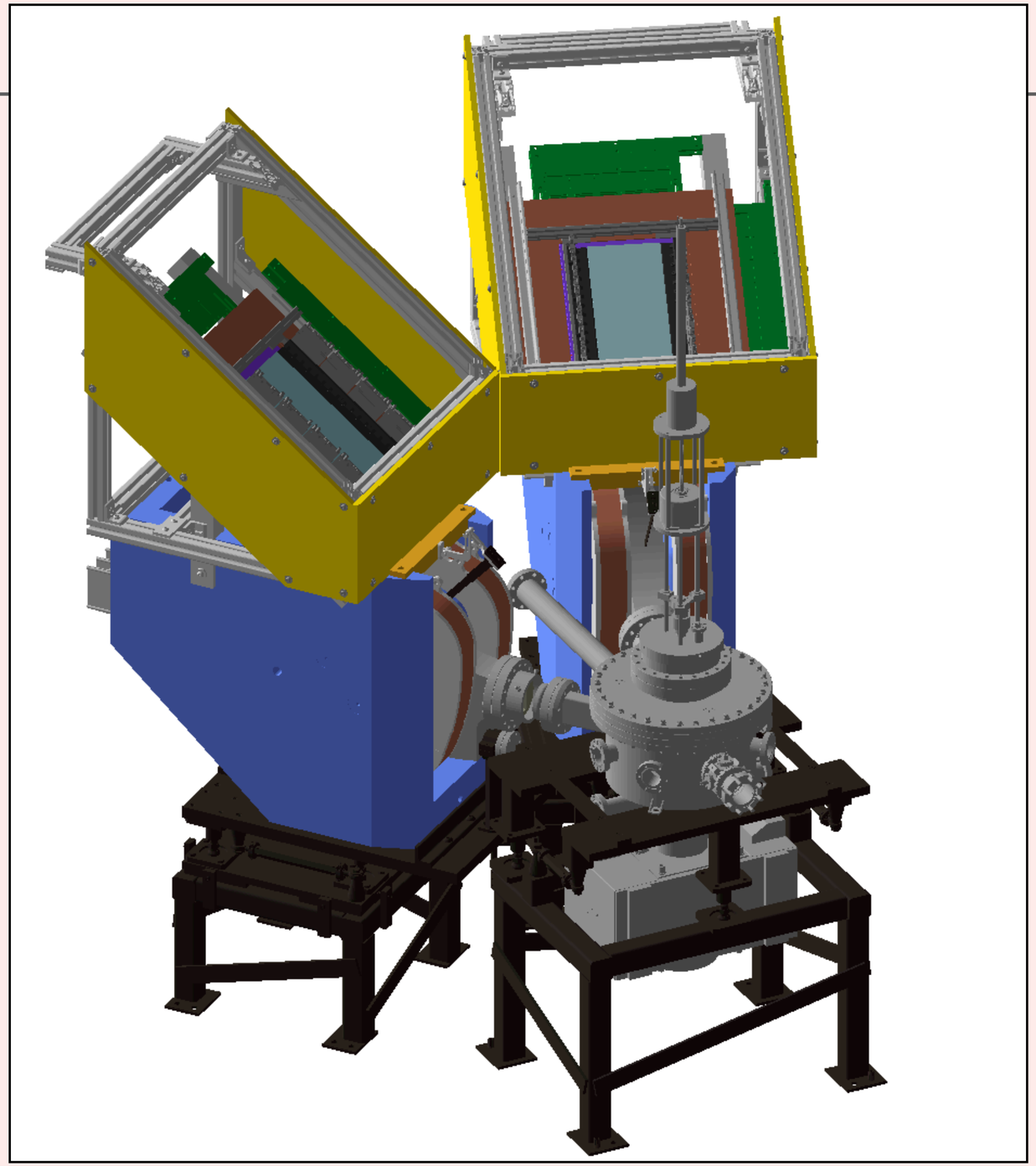
Simulation geometry update

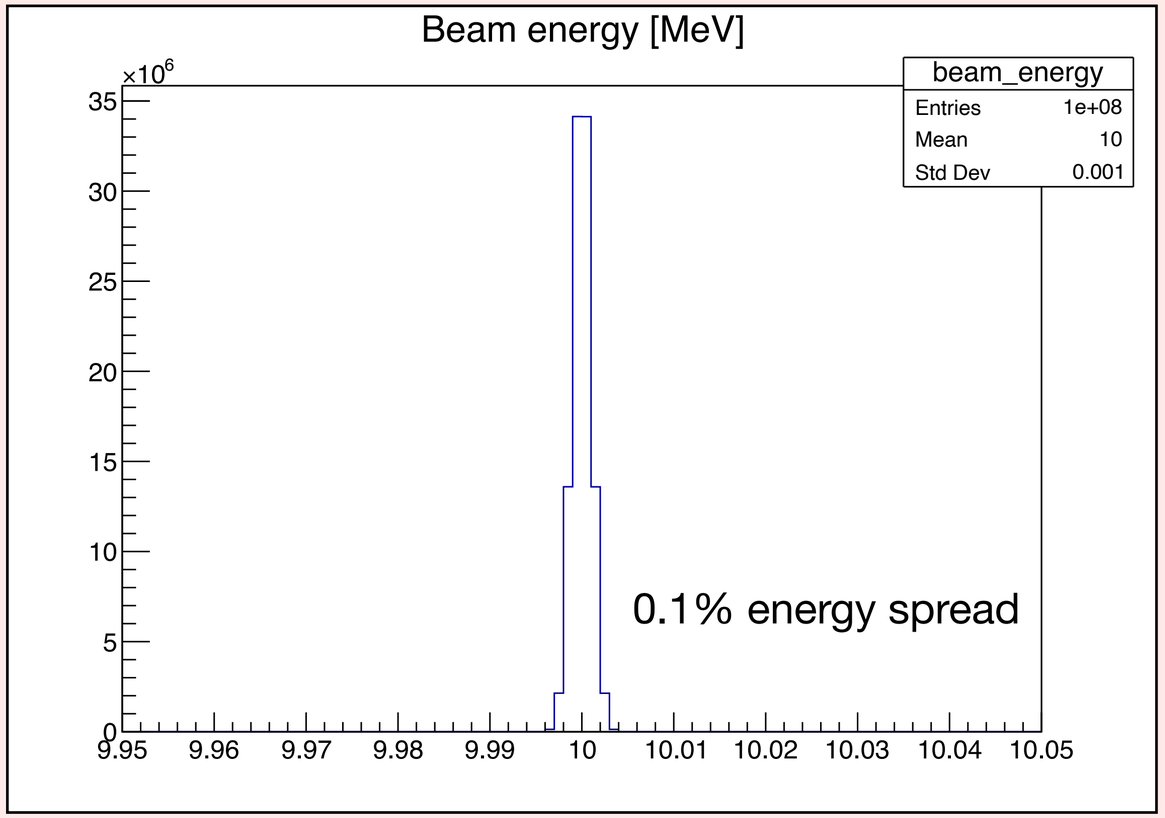
- Confirmed with Doug that north is beam right, south is beam left
- Pull request with survey information for the chambers are merged
- Would be good to add target chamber lead shielding (not in current solid work model)

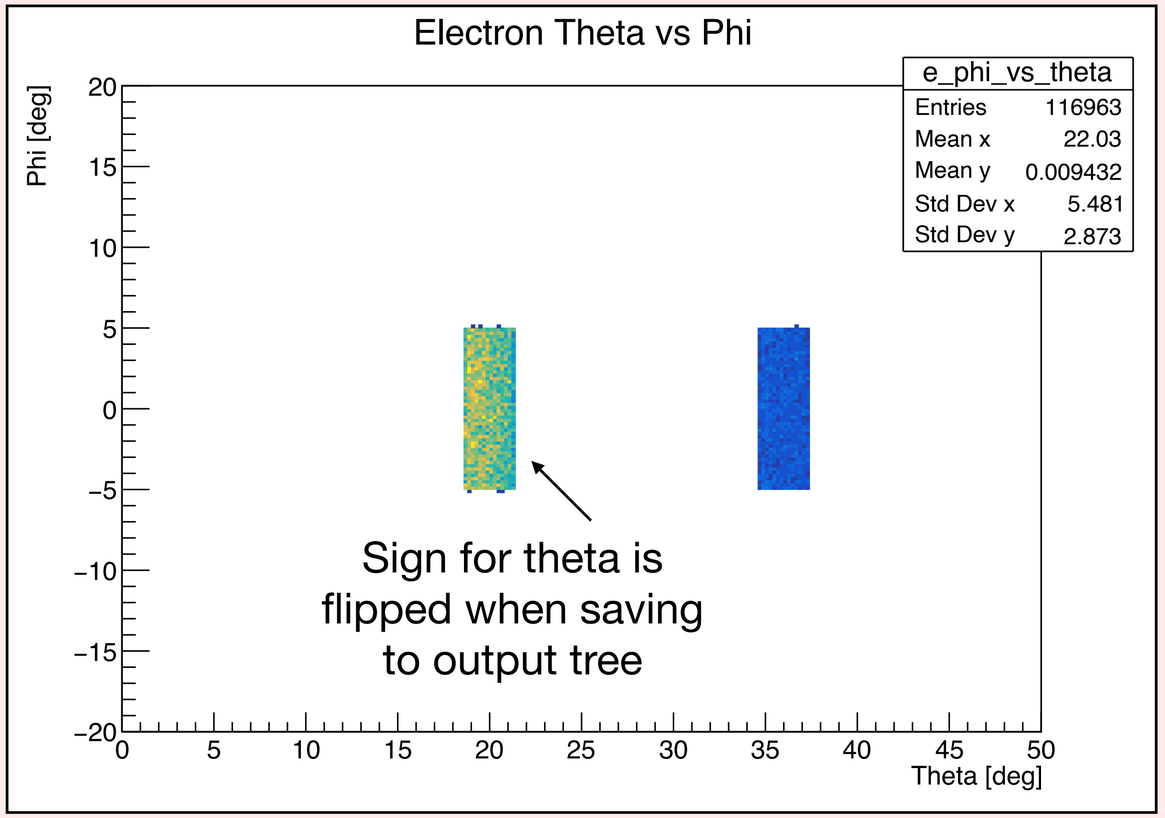
- Added messenger for enable/disable structures
  - Default to only have detectors and target! (Fast loading for analysis)
  - Add necessary component for your simulation!!!
  - Command example can be found in vis.mac



eC scattering simulation

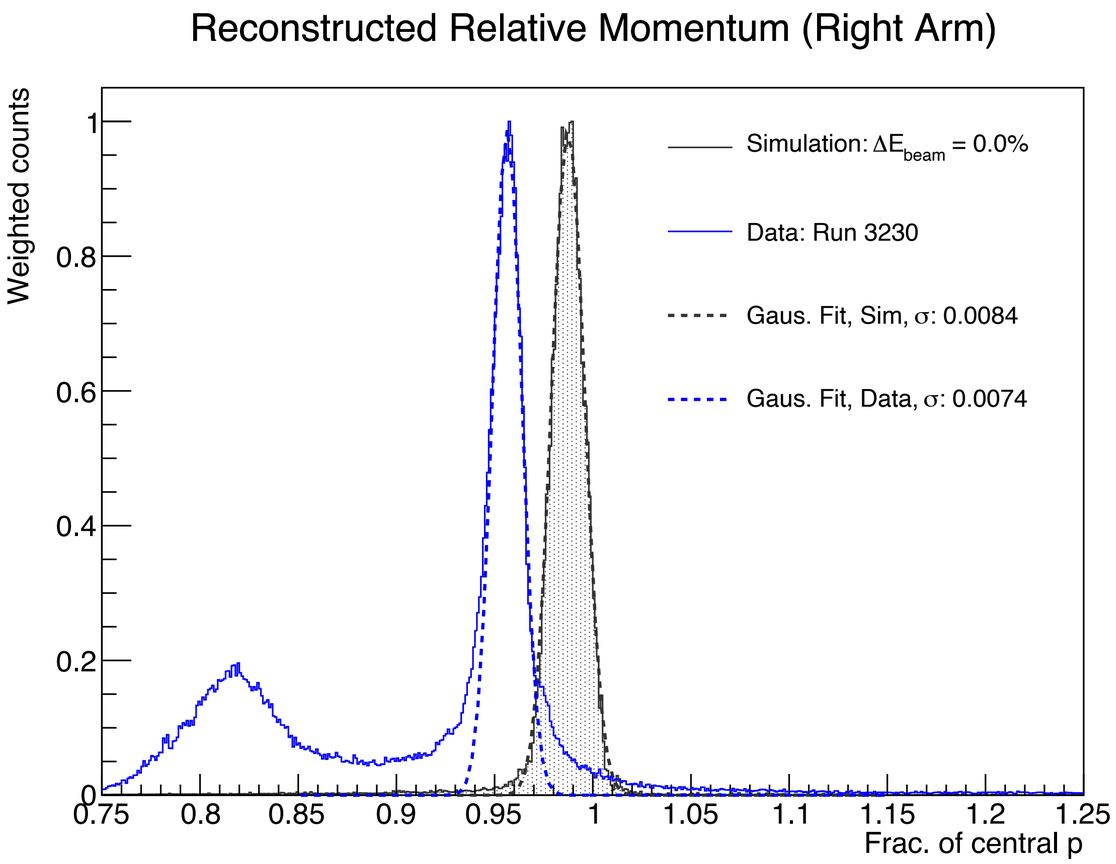
- New executable for running radgen eC and eAl simulation: darklight_scattering
- Can run left side (larger angle) and right side (smaller) at the same time
- Generate events with different energies

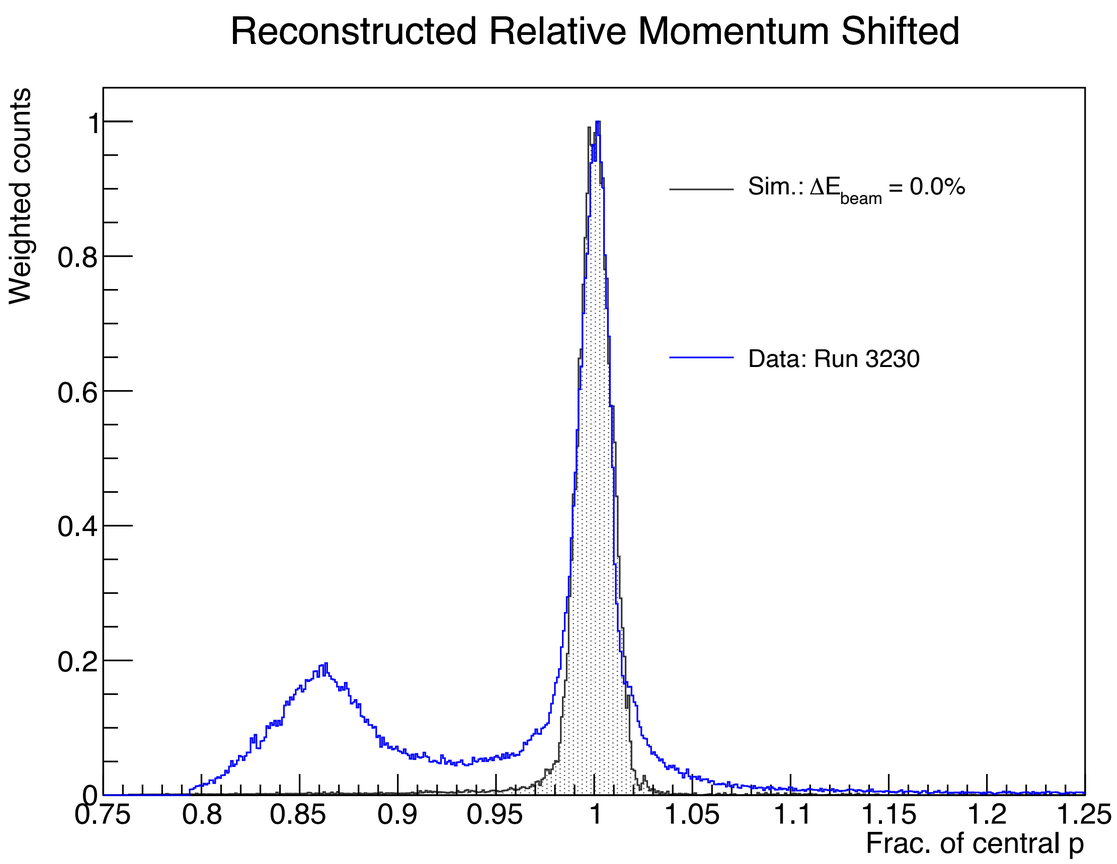




eC scattering simulation

- 10x wider beam spot (ie. 3 mm sigma in x, 6.5 mm sigma in y)

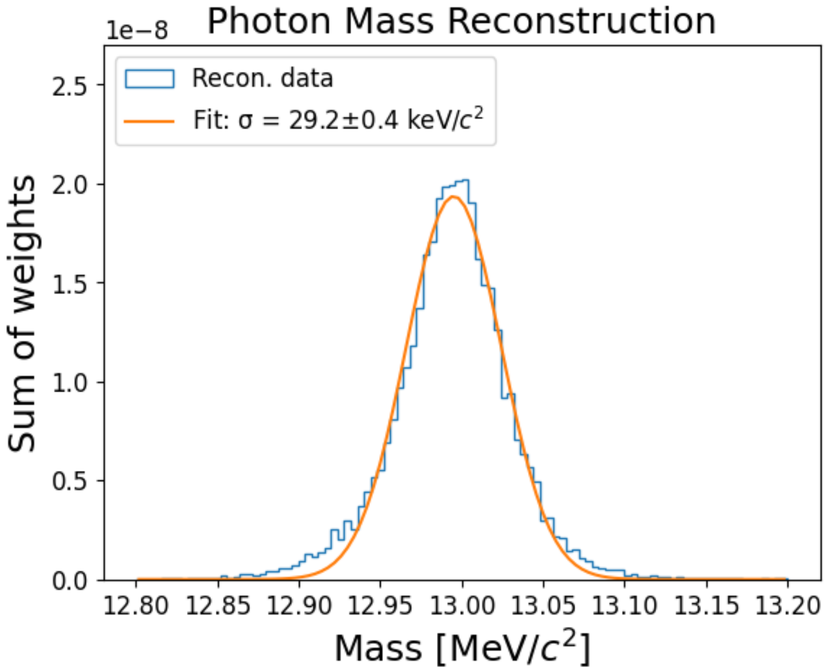




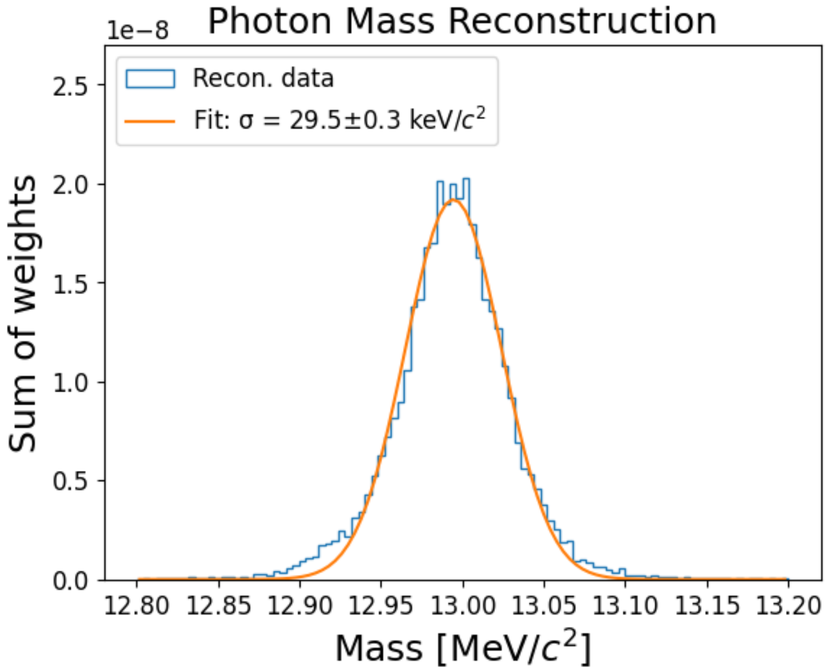
Previous study: Reconstructed mass resolution

- Beam spot size has little effect on the reconstructed mass resolution
- Resolution is better than experimental requirement

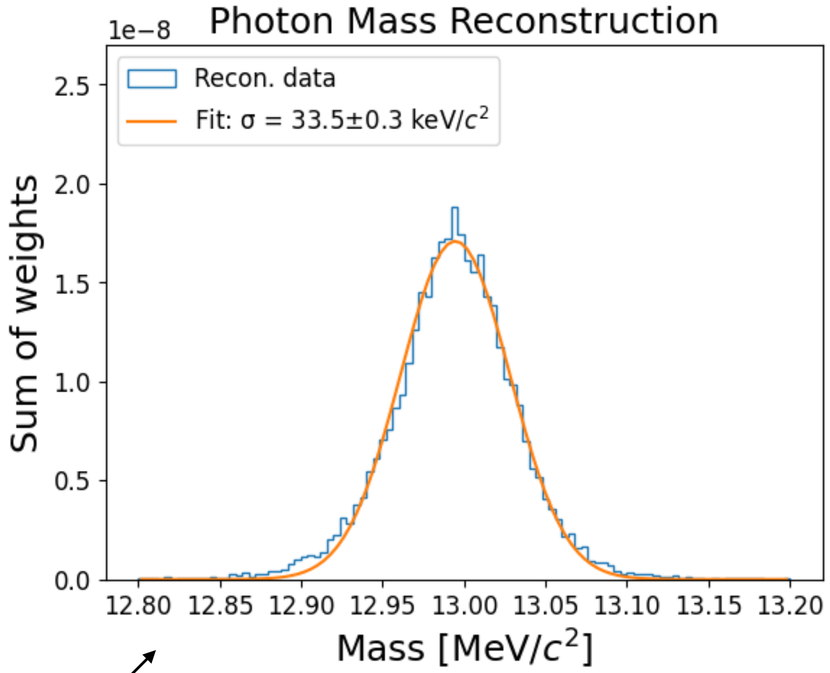
Nominal beam width (0.325, 0.650) mm



Beam width +0.4 mm in x

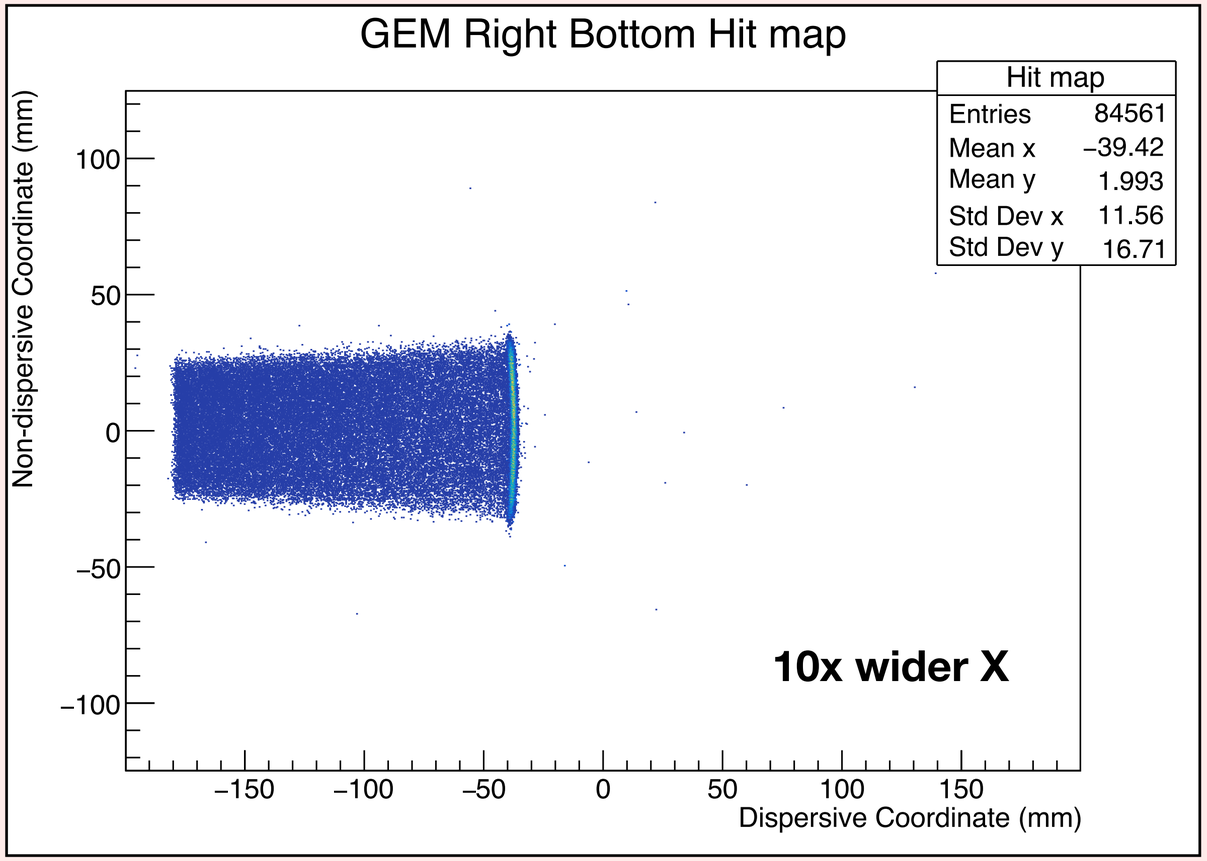


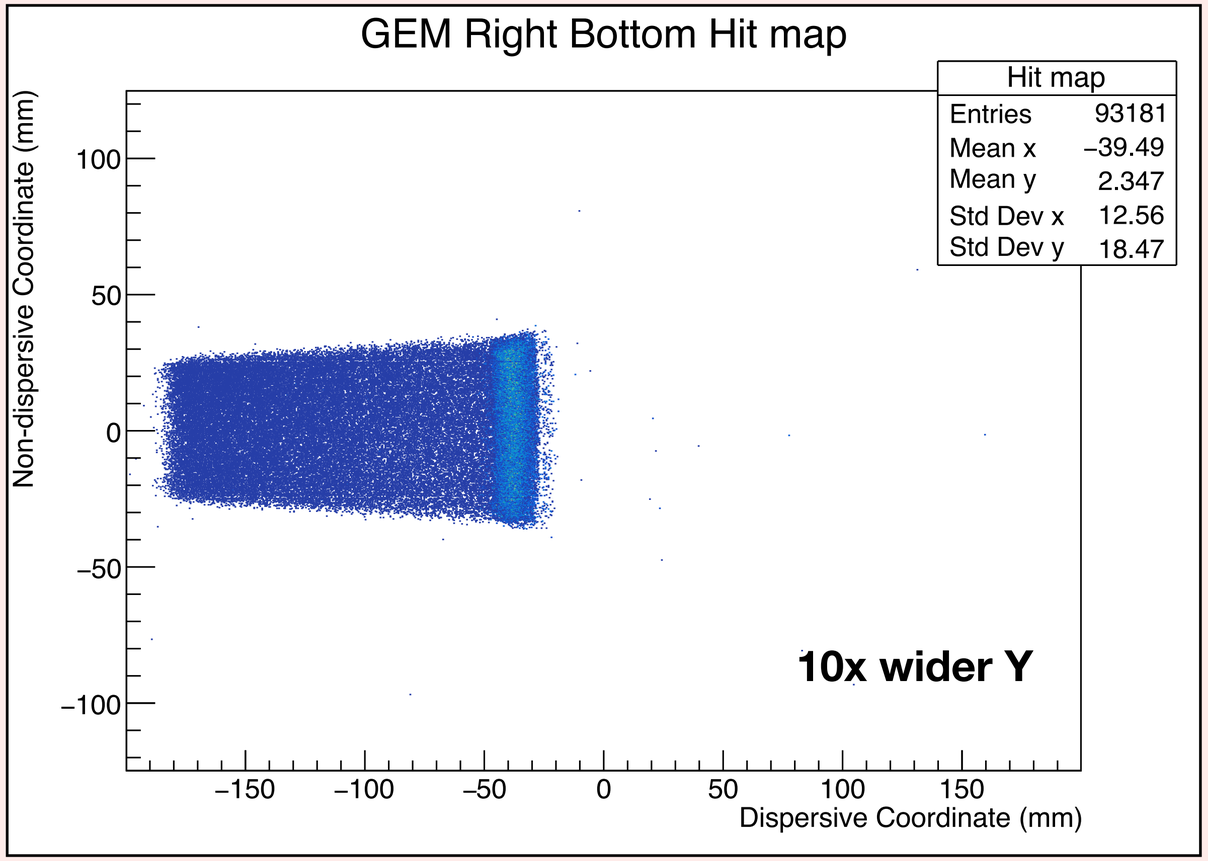
Beam width +0.4 mm in y



Effect in y is larger

eC scattering simulation

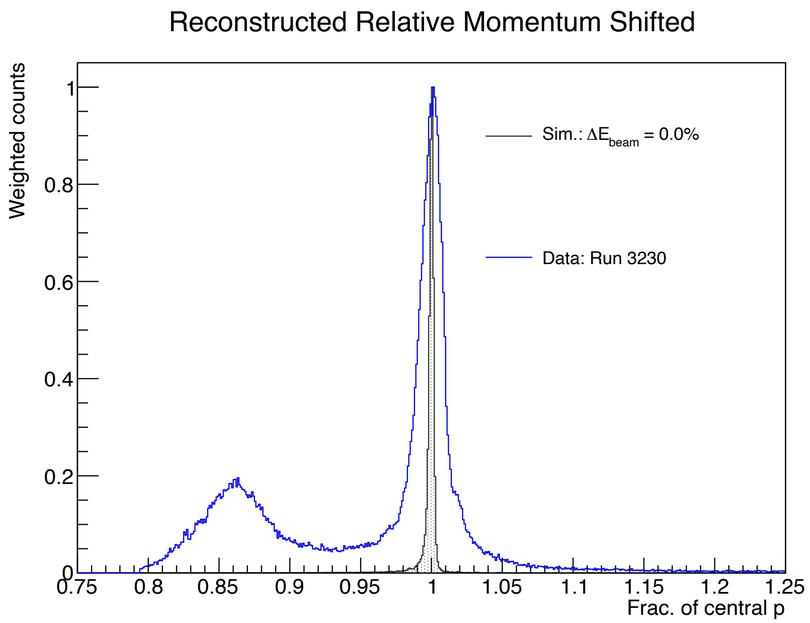


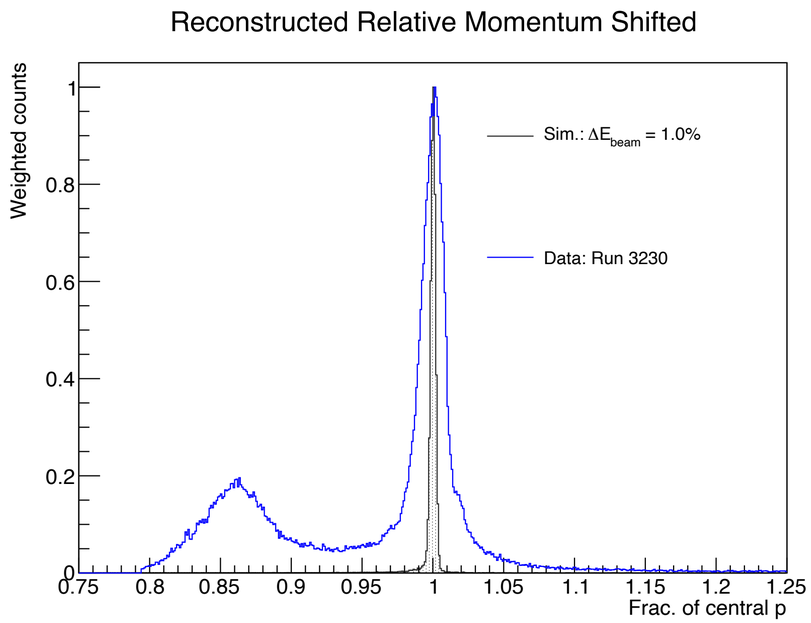


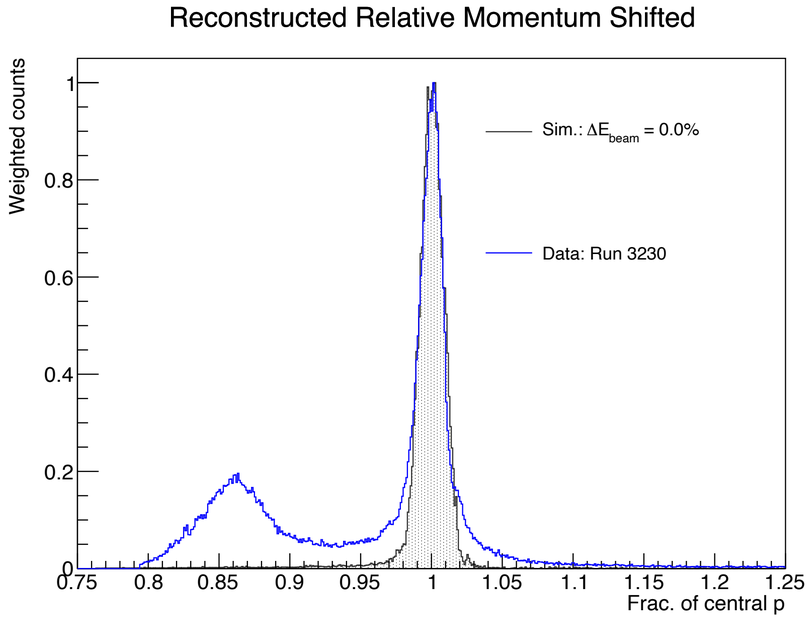
eC scattering simulation

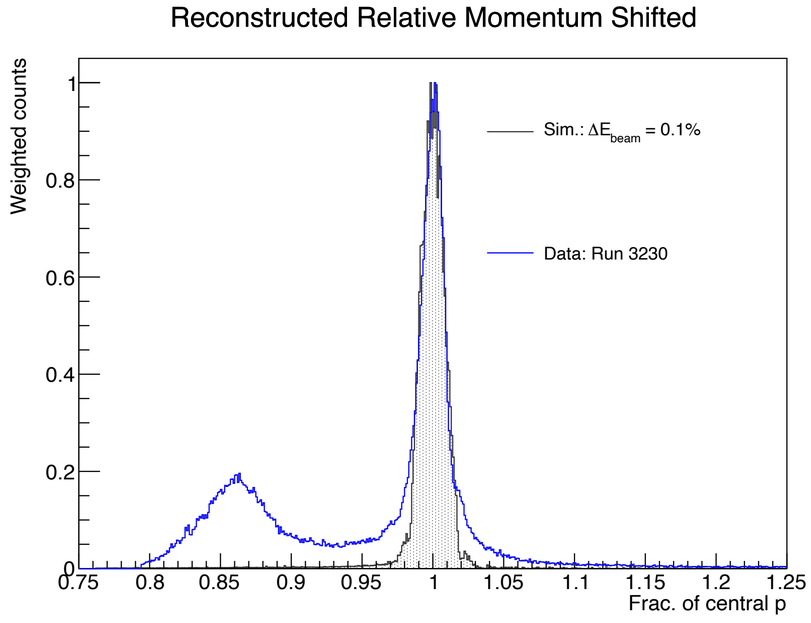
Original beam

Widen beam

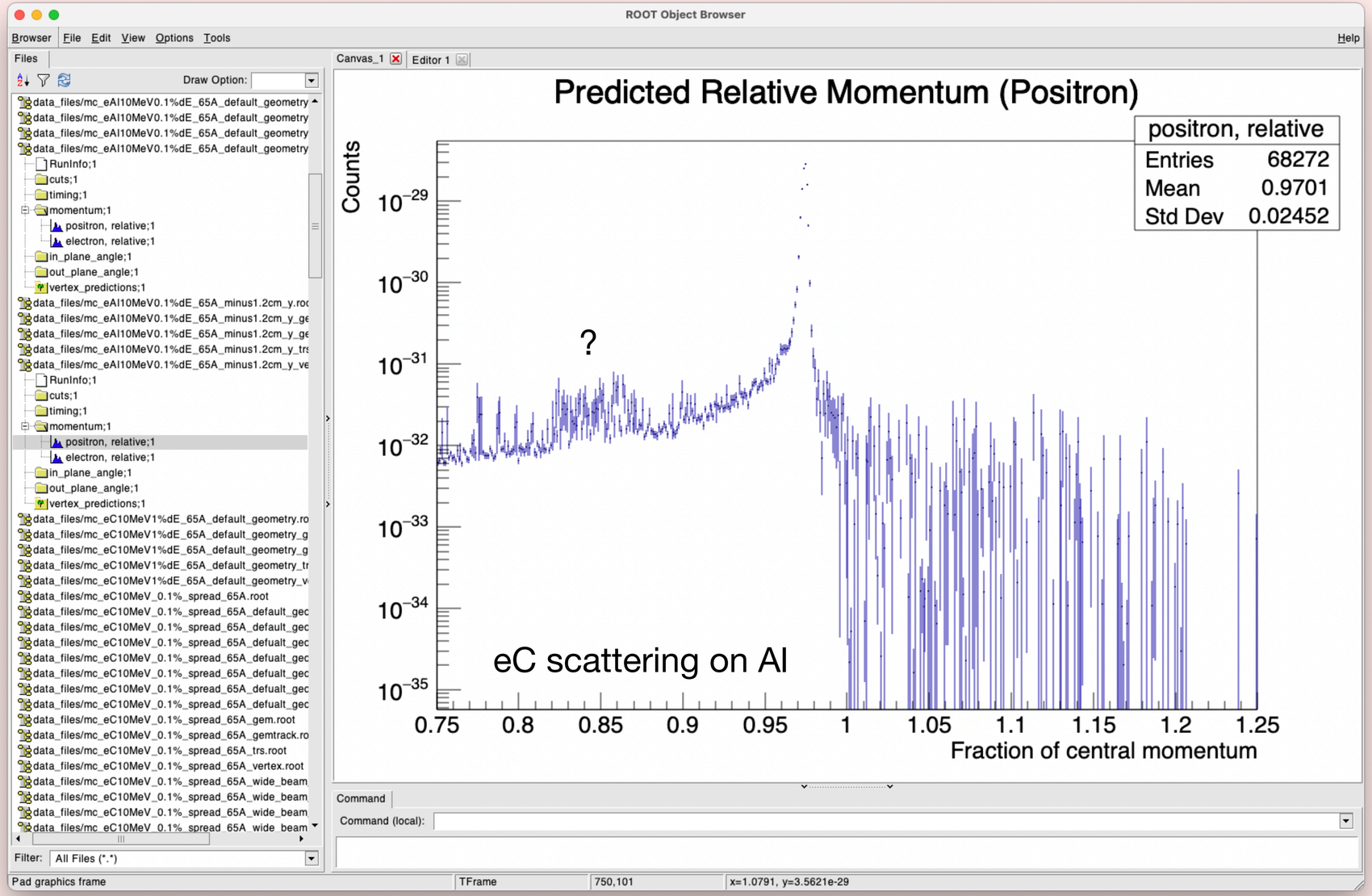








eC scattering simulation



Simulation paper

- Overleaf link

Currently plan to cover:

- Event generators
- Detector simulation and hit digitization
  - Trigger
  - GEM
- Vertex and Mass reconstruction
  - Traditional fitting approach
  - Machine learning algorithms
  - Projected mass resolution