

SBS Monte Carlo Update

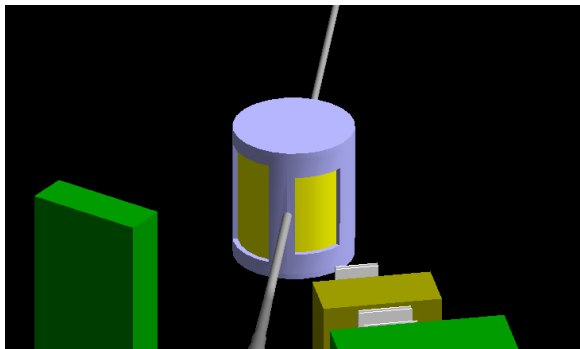
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All code available at
<http://solid.physics.umass.edu/g4sbs.html>

- Read access is openly available
- Read/write access - sent your public key to me (instructions on above page)
- Requested a-sbs group, SBS disk space, farm project

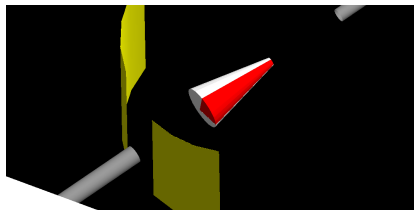
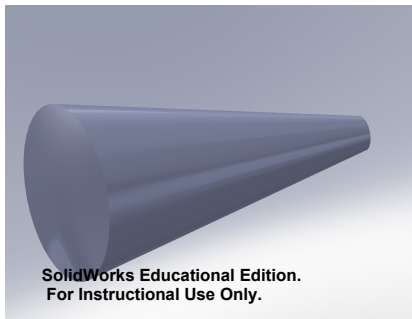
EVERYTHING HERE IS PRELIMINARY AND A WORK IN
PROGRESS



Scattering chamber specs:

- Windows designed to match acceptance of cryo-target experiments
- Inner diameter of 1.041 m, outer 1.143 m
- Window thickness 380 μm

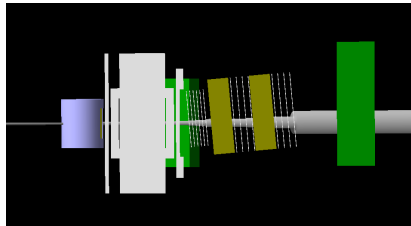
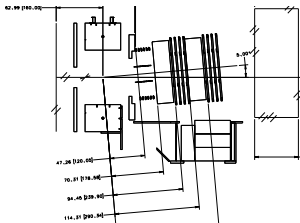
Target Cell



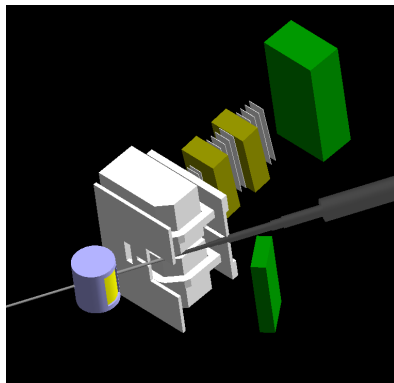
Target cell specs:

- Dimensions given by Silviu
- Upstream wall $100 \mu\text{m}$
- Downstream wall $125 \mu\text{m}$
- Outer wall thickness $635 \mu\text{m}$

Updated G_E^P Configuration

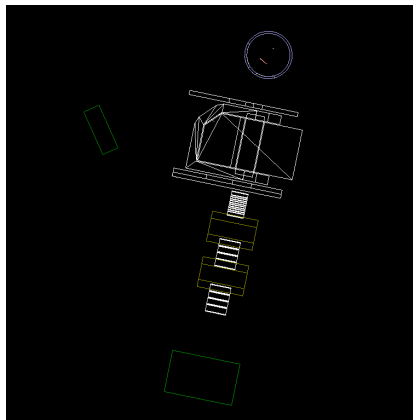


- Got new layout from AI
- Detector stack now at 5° pitch

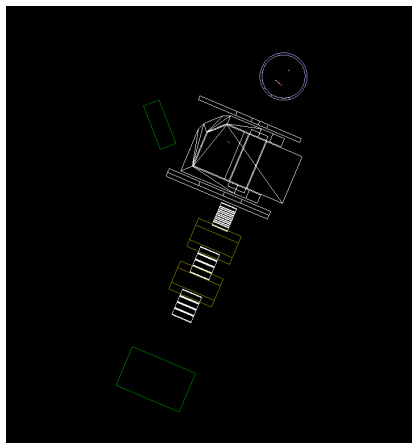


- Field clamps taken from model in TOSCA
- Windows for beampipe modified slightly to fit configurations
- Cuts in magnet taken from TOSCA, add in cut for Ecal acceptance

Field Clamps Interference



$$Q^2 = 5 \text{ GeV}^2$$



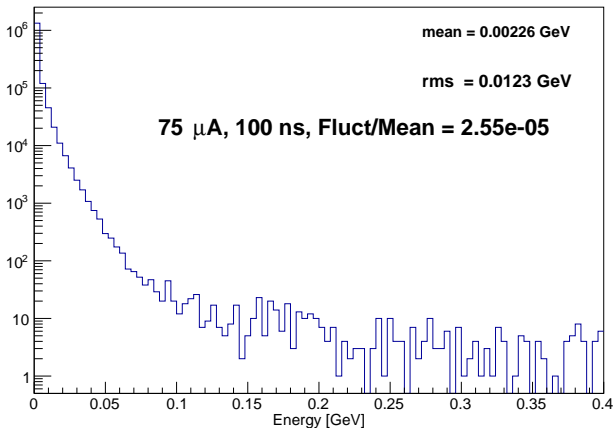
$$Q^2 = 12 \text{ GeV}^2$$

- Clamps may interfere with e^- path in G_E^p

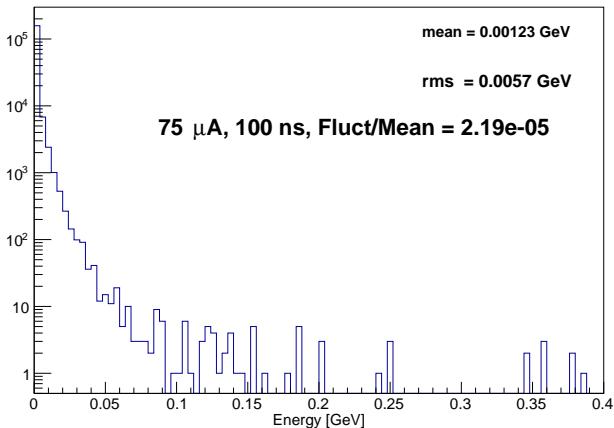
- Ran single electrons through full setup
- Recorded hits in calorimeters, but ignore showering
- From single events, integration over ADC gate given by:

$$\begin{aligned}\bar{E} &= N_e \mu \\ \Delta E &= \sqrt{N_e} \sqrt{\mu^2 + \sigma^2}\end{aligned}$$

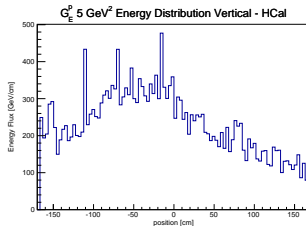
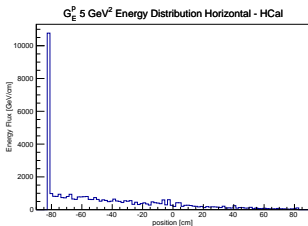
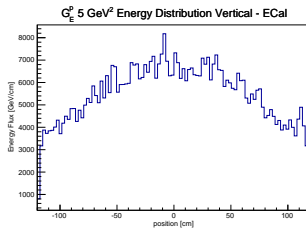
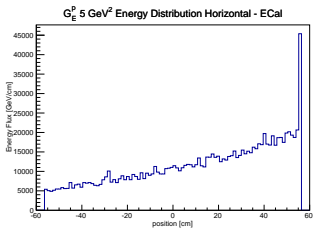
G_E^p 5 GeV² Energy Distribution - ECal



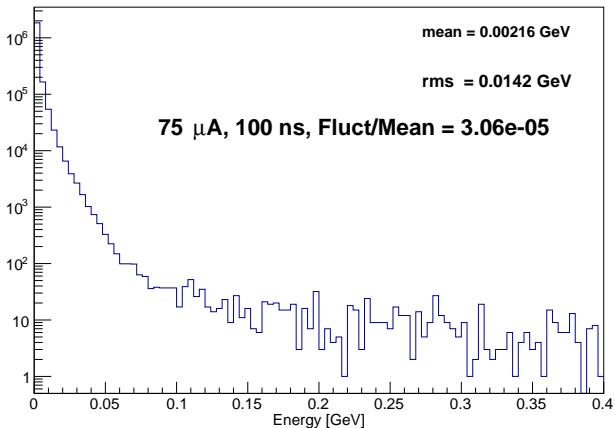
G_E^p 5 GeV^2 Energy Distribution - HCal



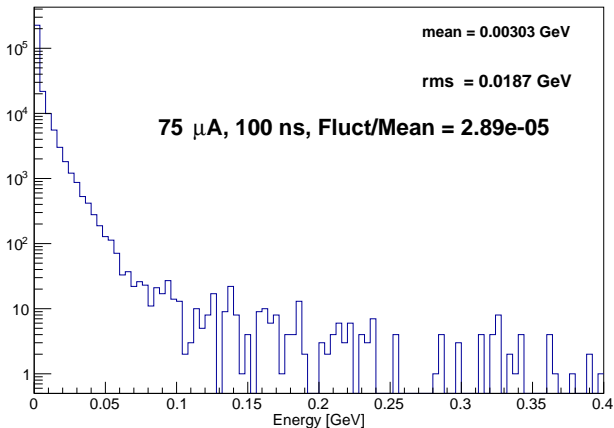
G_E^p Calorimeter Backgrounds, $Q^2 = 5 \text{ GeV}^2$



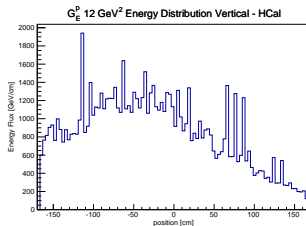
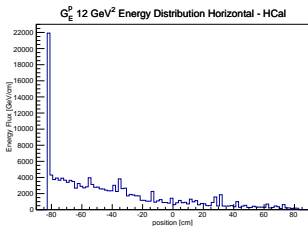
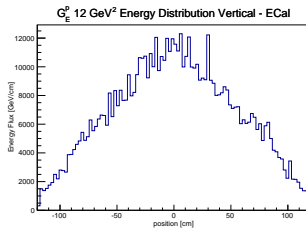
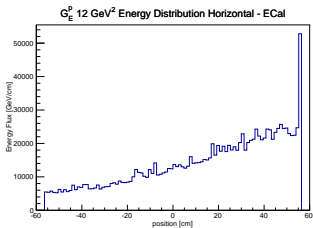
G_E^p 12 GeV^2 Energy Distribution - ECal



G_E^p 12 GeV^2 Energy Distribution - HCal

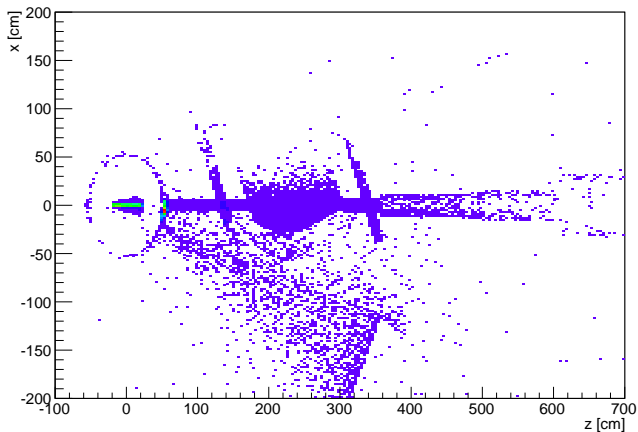


G_E^p Calorimeter Backgrounds, $Q^2 = 12 \text{ GeV}^2$

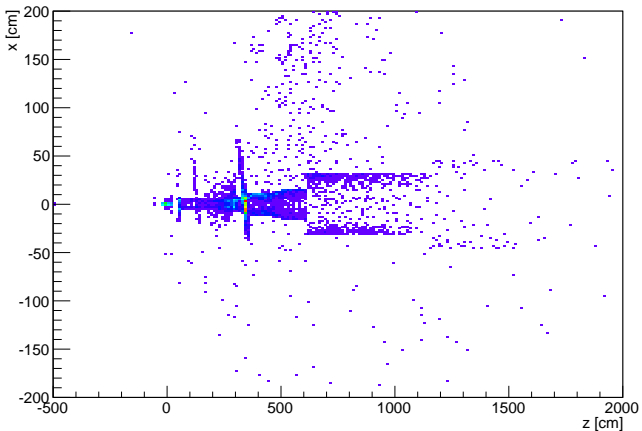


G_E^p Calorimeter Backgrounds, $Q^2 = 12 \text{ GeV}^2$

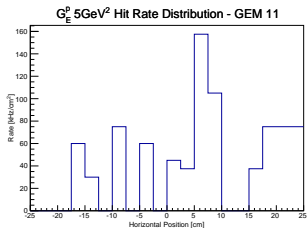
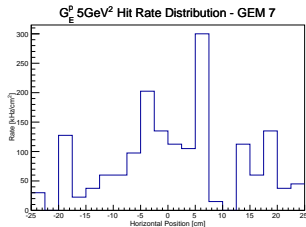
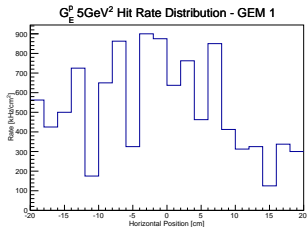
Ecal Background Origin, G_E^p , $Q^2 = 8 \text{ GeV}^2$



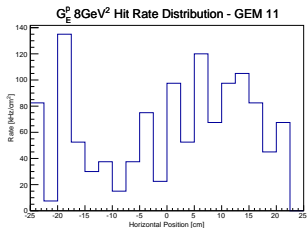
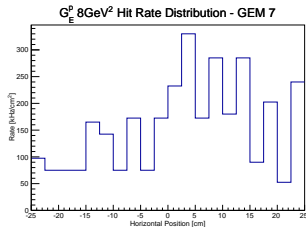
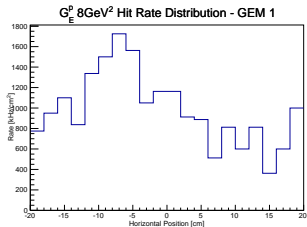
HCal Background Origin, G_E^p , $Q^2 = 8 \text{ GeV}^2$



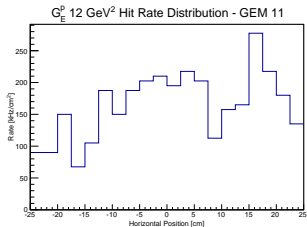
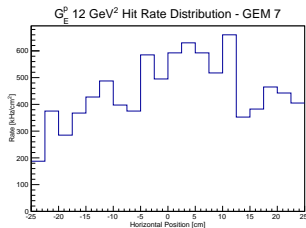
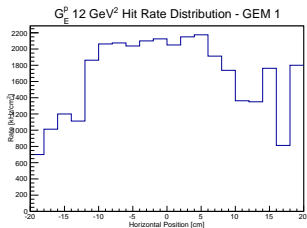
First GEM in each stack:



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First GEM in each stack:



- Continue to iterate geometries, analysis
 - Shielding
 - Clamps/48D48
 - Beamline/target chamber
 - GEM construction
- Look at acceptances with new configuration
- Ensure no overlapping geometries
- Maintain/improve codebase
 - Import remoll-style IO, generators
 - Pre-vertex radiative effects and multiple scattering missing
 - Adapt so has output trees compatible with SBS GEM response code?