

# Compton Analysis Progress

for the  $d_2^n$  analysis meeting

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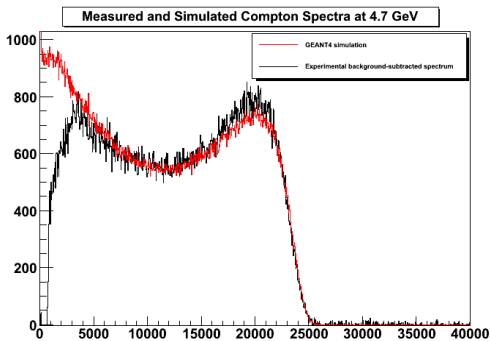
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July 21, 2009

- 1 Missing Compton Photons at Low Energies
- 2 Extracting Saclay-DAQ Compton Asymmetries
- 3 What's Next?

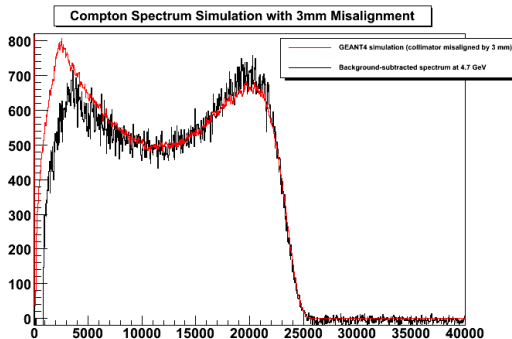
# Discrepancy between Experiment and Simulation

- Recall from the July 7 meeting that the simulated Compton spectrum (from GEANT4) differs from the experimental spectrum, especially at  $E_e = 4.7$  GeV
  - Underestimates number of photons at high energies
    - Possibly explained by PMT non-linearity
  - Overestimates number of photons at low energies
    - Misaligned (and very small) collimator and/or misaligned electron beam?



- By introducing a hard geometrical cut into our simulations, we can simulate the effect of a misaligned collimator

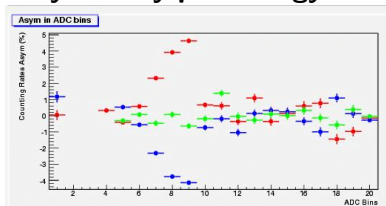
## 4.7 GeV beam; 3mm misalignment



# Which Asymmetry to Pull?

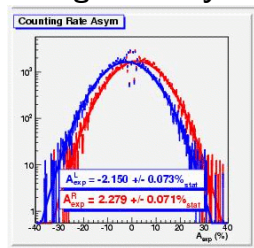
- We have been hampered by an imperfect understanding of the Saclay (original) analysis protocol
- The logbook reports two different types of counting-rate asymmetries:

## Asymmetry per Energy Bin



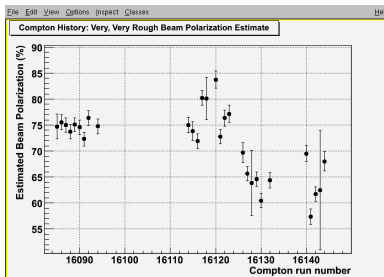
- Grab asymmetry at Compton edge (maximum value)
- Vulnerable to gain shifts

## Semi-Integrated Asymmetry



- Find mean, stdev for distribution
- Less vulnerable to gain shifts

# Getting the Semi-Integrated Asymmetry



- During  $d_2^n$ , we monitored polarization with the binwise asymmetry (at the estimated Compton edge)
- Could flaws in this method have resulted in problems like this specious asymmetry drop?
- Work in progress: extraction of Compton histories using semi-integrated asymmetry
  - Necessary histograms are not written to file (!?)
  - Makefile pulls from several different versions of analysis code ...

# What's Next?

- Compton
  - M. Oborski is working on finding a misalignment that reproduces the observed 4.7 GeV spectrum
  - Cutting through jungle of Saclay analysis code
  - Continued investigation of discrepancies between L, R Compton asymmetries
- BigBite Optics
  - Still working on getting all the right library paths set up ...