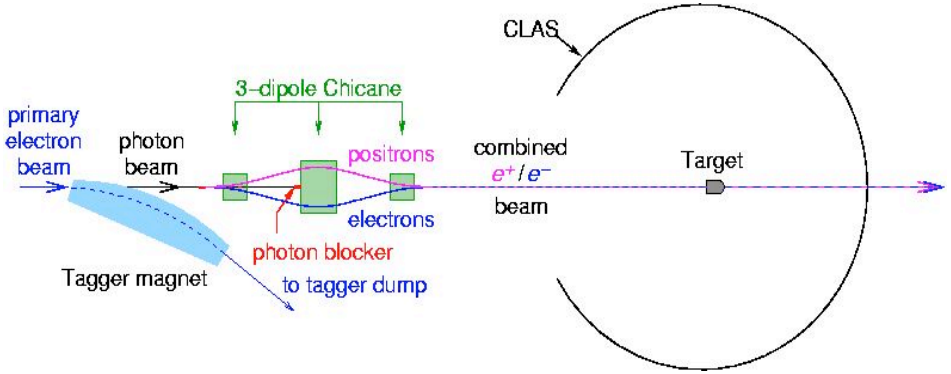
CLAS TPE – 2g effects in ep scattering

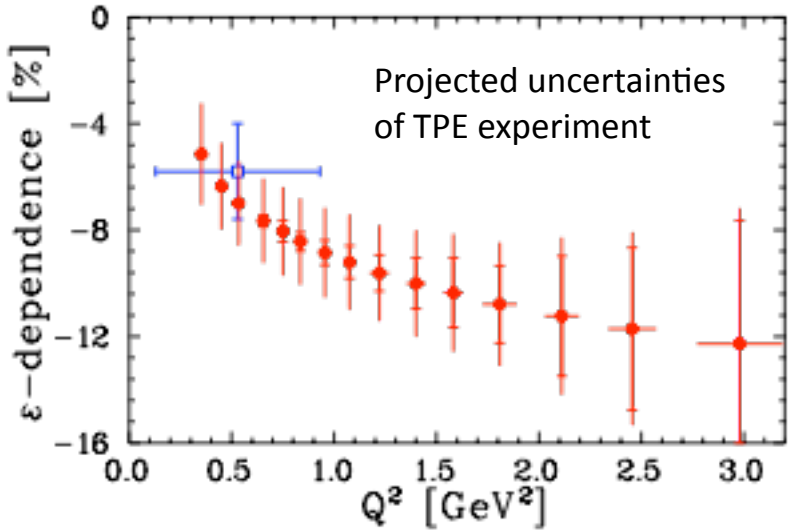
- There is a huge discrepancy in the ratio G_E^p/G_M^p observed between Rosenbluth and polarization transfer techniques.
- 2γ effects are expected to explain this discrepancy.
- The ratio of e^-p and e^+p elastic scattering cross sections measures the real part of the 2γ amplitude. The 2γ/1γ interference term $\delta_{2\gamma}$ has opposite sign for e+ and e-and should vary from 1 to 10%

$$R = \frac{\sigma(e^+)}{\sigma(e^-)} \approx 1 - 2\delta_{2\gamma}.$$

- Experiment is now taking data. It creates an intense photon beam and converts it to a simultaneous mixed identical e^+ and e^- beam directed onto a lH2 target. The scattered leptons and protons are detected in CLAS.

Schematic e^+/e^- beamline



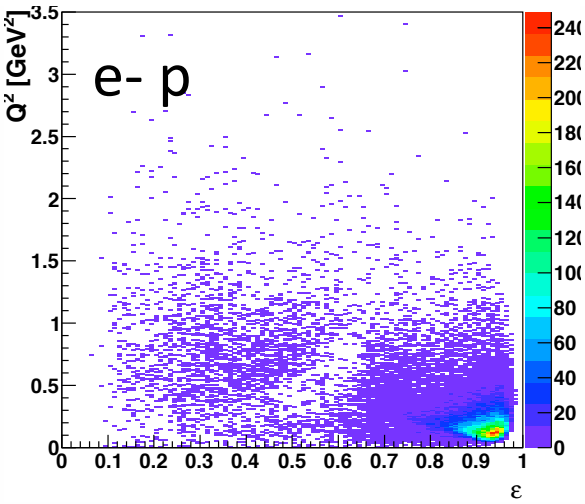


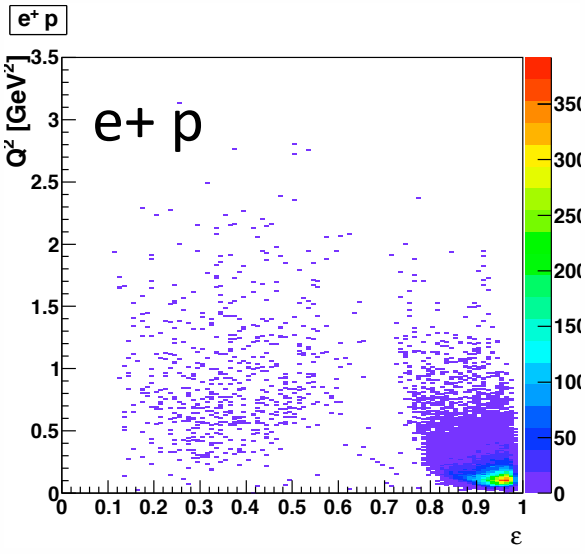
CLAS

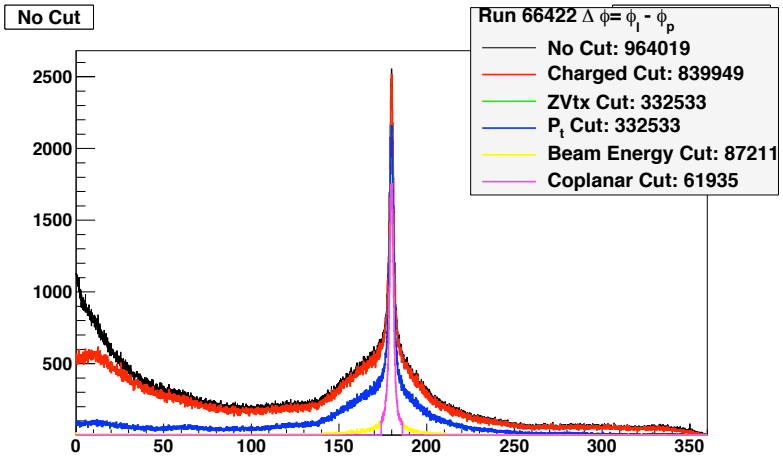
TPE - Experimental Progress

- e+/e- Chicane tuned
- Achieved luminosity within a factor of two of simulations
- 10^7 elastic events as of December.
- Identify elastic events by
  - coplanarity,
  - zero total transverse momentum,
  - beam energy matching (angle/mom)
- Reduce systematic errors by
  - Identical simultaneous beams
  - Reversing torus field
  - Reversing chicane field
  - Taking triple ratios

One hour of data …







coplanarity