The Two Photon Exchange Experiment

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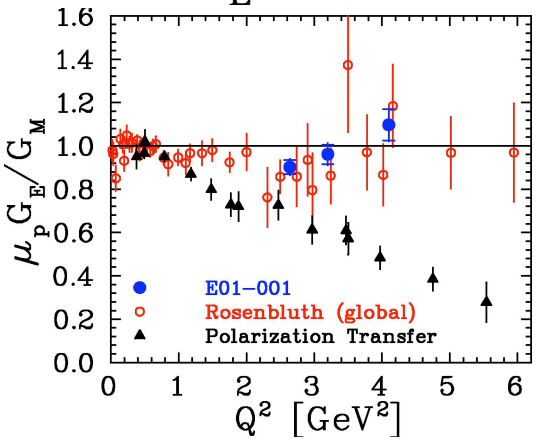
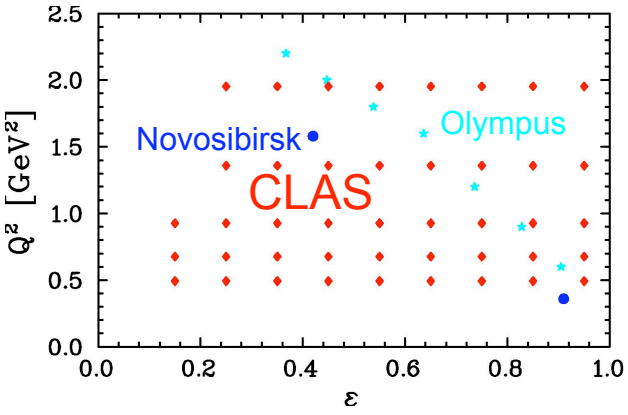
The Two Photon Exchange Experiment

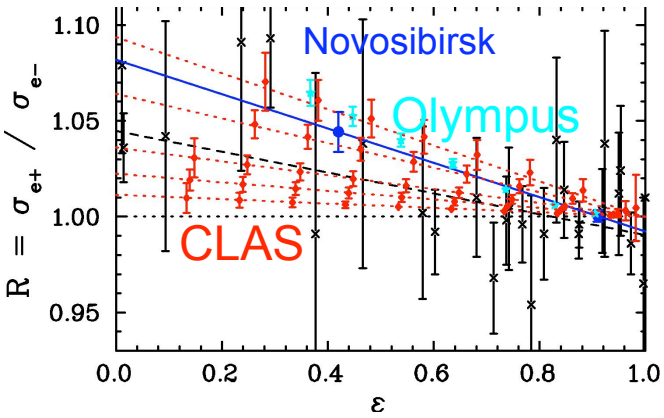
The G_E^p Problem



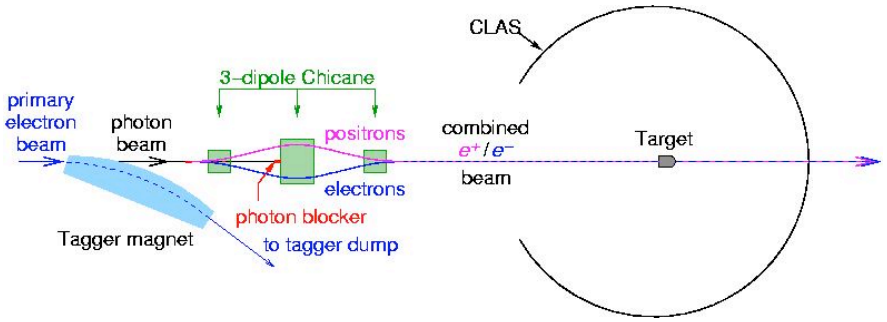
TPE Coverage



TPE Expected Results



Compare e+/e- scattering from the proton



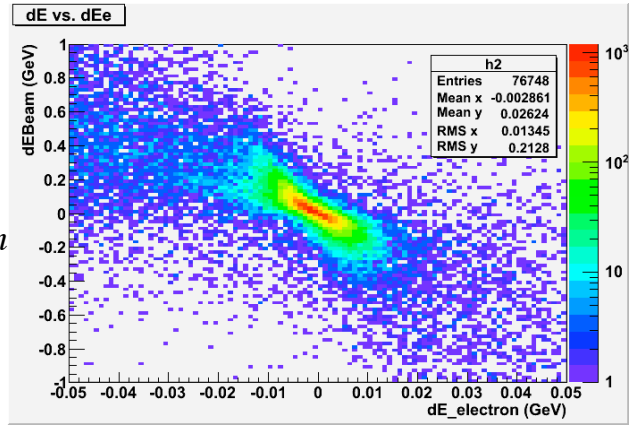
1. e^- beam hits radiator, makes photons
2. Photons hit converter, make e^+/e^- pairs
3. Chicane separates and recombines e^+/e^-, blocks photons
4. Beams hit hydrogen target in CLAS
5. Identify elastic scattering events

Control Systematics

1. Identical e^+/e^- beams
2. Simultaneous measurements
3. Reverse all B fields to cancel acceptance effects
4. Wide Q^2 and ε acceptance
5. Over-determined *ep* kinematics to reject background

Experimental Progress

- Took data from Nov 2010 to Feb 2011
  - Achieved luminosity within a factor of two of simulations
  - 12 Billion elastic events collected
- Over-determined *ep* kinematics to identify elastic events. Cut on
  - Coplanarity
  - $\Delta E_{beam} = E_{beam}(\theta_e, \theta_p) - E_{beam}(p_e^z + p_p^z)$
  - $\Delta E_e = E_e(\theta_e, \theta_p) - E_e^{meas}$



ΔE_{beam} ΔE_e

- Reduce systematic errors by
  - Acceptance matching cuts
  - Taking triple ratios
- Currently working on
  - Processing data
  - Energy loss/momentum corrections
  - Simulation

Results expected in a few months