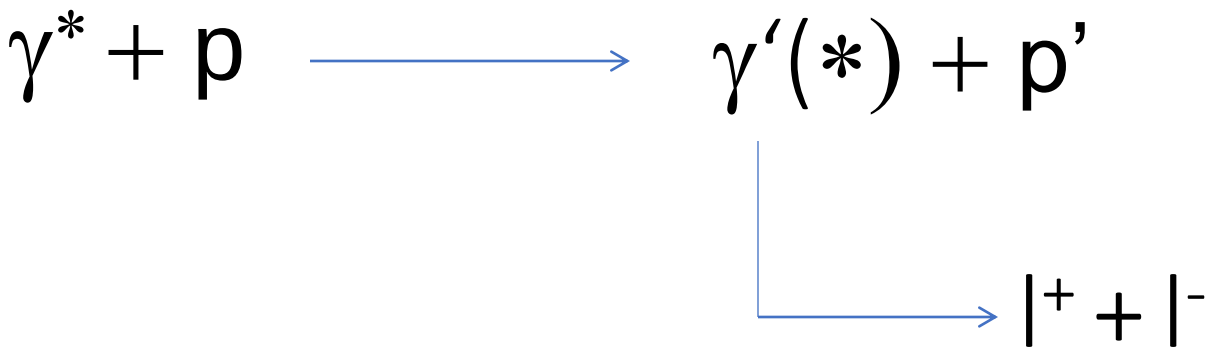
Double Deeply Virtual Compton Scattering with SoLID at JLab 12GeV

DVCS / Double DVCS



Guidal and Vanderhaegen : Double deeply virtual Compton scattering off the nucleon (arXiv:hep-ph/0208275v1 30 Aug 2002)
Belitsky Radyushkin : Unraveling hadron structure with generalized parton distributions (arXiv:hep-ph/0504030v3 27 Jun 2005)

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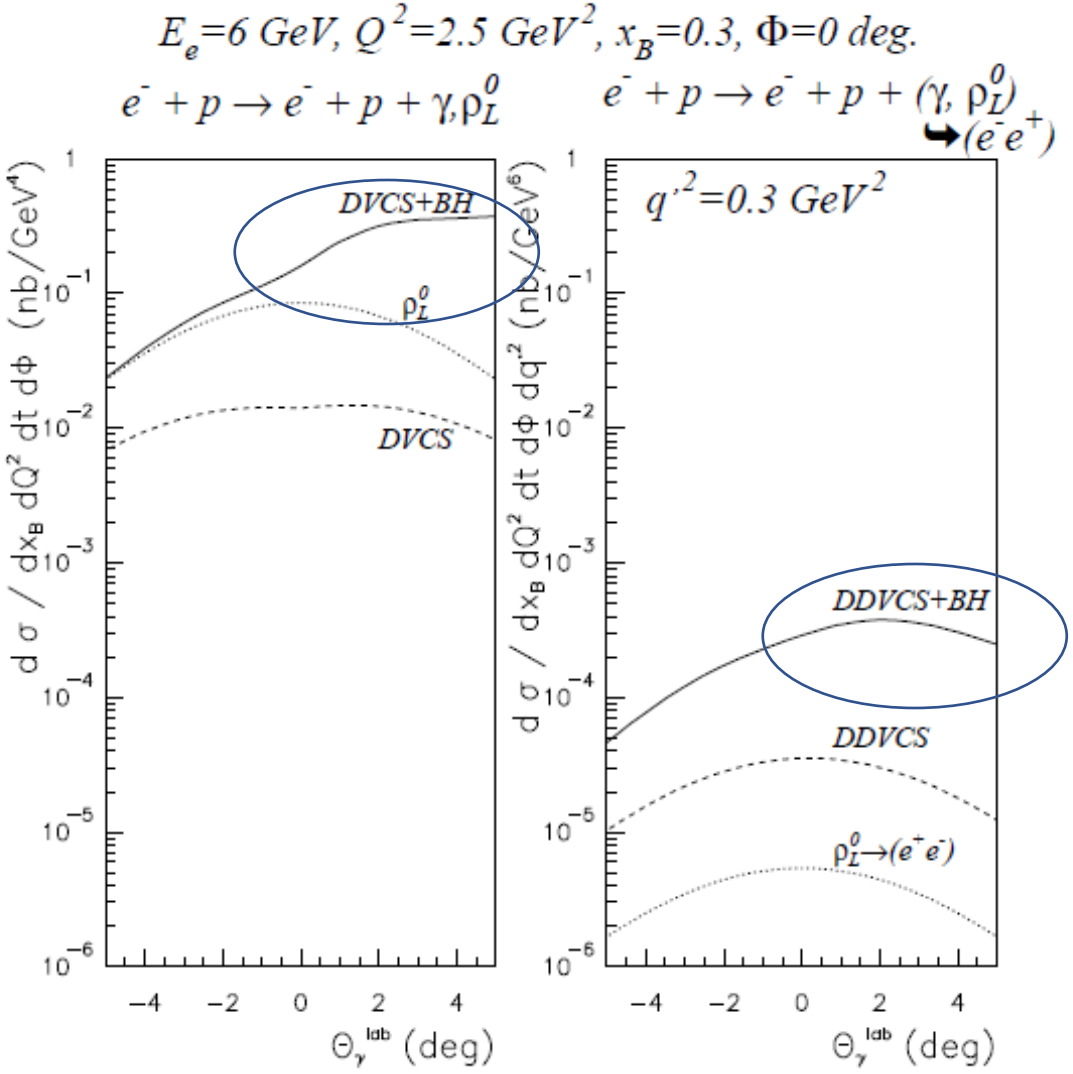
DDVCS cross section



- VGG model
- Order of ~0.1 pb = 10^{-36}cm^2
- About 100 to 1000 smaller than DVCS
- Virtual Beth and Heitler
- Interference term enhanced by BH
- Contributions from mesons small when far from meson mass

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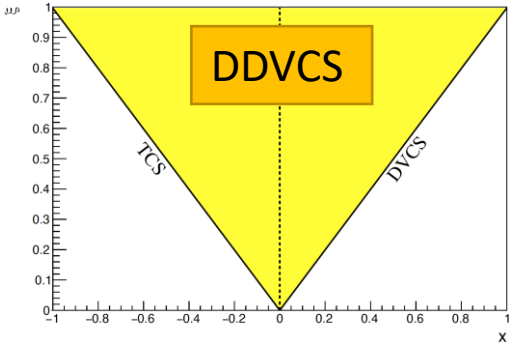
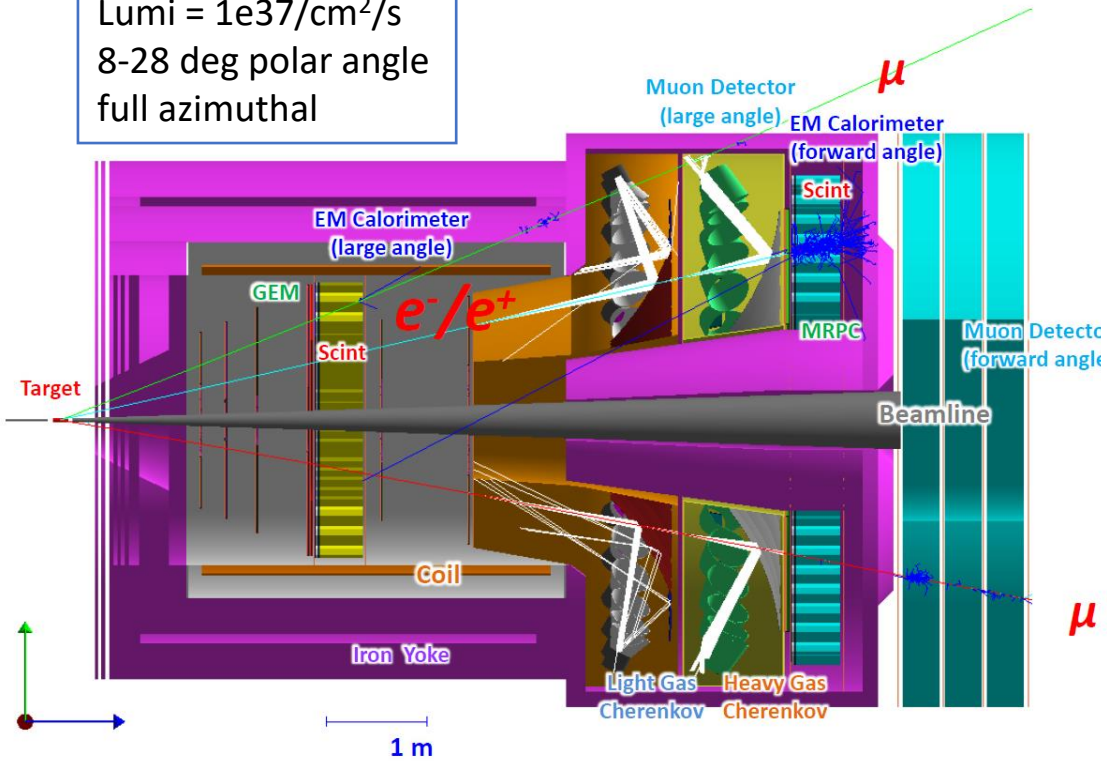
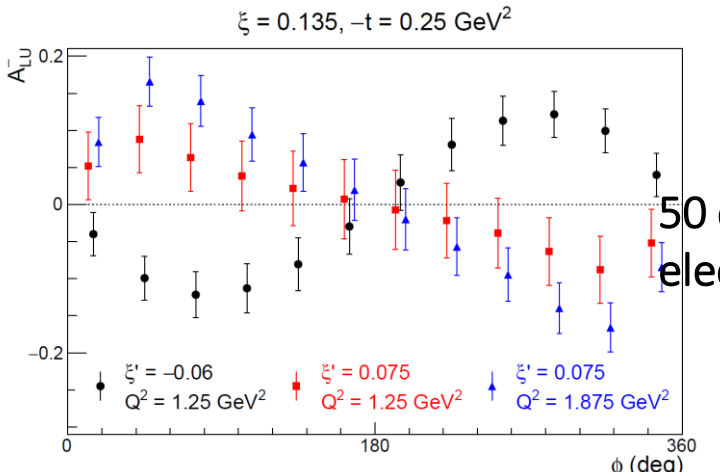
- DDVCS explores wide off-axis kinematic region of GPDs, beyond DVCS and TCS. The exclusive reaction has about 100 times smaller crosssection than DVCS and thus needs high luminosity and large acceptance.
- The SoLID apparatus completed with muon detectors at large and forward angles, enables DDVCS measurements with both polarized electron

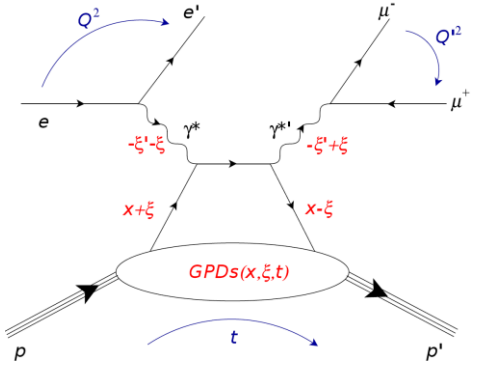


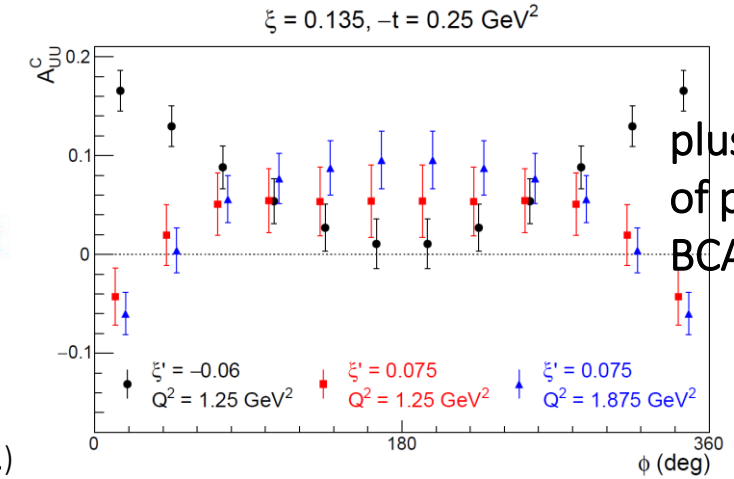
Lumi = 1e37/cm^2/s
8-28 deg polar angle
full azimuthal



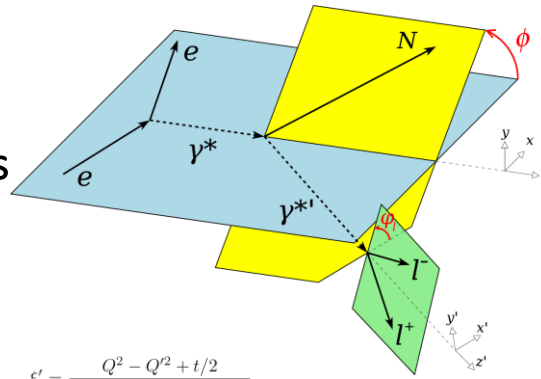


50 days of electron BSA





plus 50 days of positron BCA



$$\xi' = \frac{Q^2 - Q'^2 + t/2}{2Q^2/x_B - Q^2 - Q'^2 + t}$$

$$\xi = \frac{Q^2 + Q'^2}{2Q^2/x_B - Q^2 - Q'^2 + t}$$

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- Possible measurement during J/Psi experiment at 1e37/cm^2/s with additional muons detector
- Exploring complementary detectors to reach 1e38/cm^2/s
  - Luminosity already available in Hall A : 15 cm target x 30 uA = 1e38/cm^2/s typically run in Hall A already
  - Need detectors which can handle rates and radiation : on-going developements
    - MCP PMTs for shortened pulse width and improved timing resolution
    - Radiation hardened MAPS : pixel detector to complement GEMs tracking
    - Superconducting nanowires trackers : near target (possibly inside) for improved vertex resolution, recoil tagging
    - Superconducting nanowires single photon detector : fast detector response, radiation hardness and high quantum efficiency