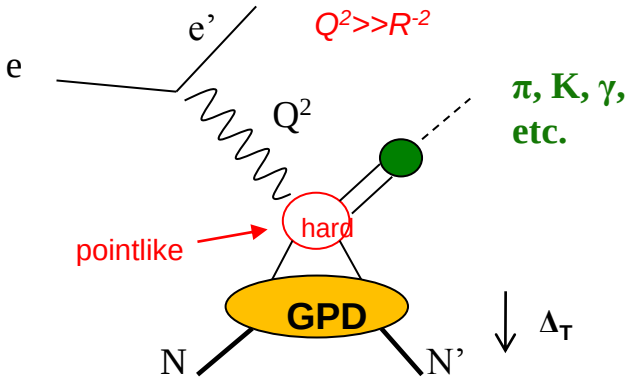
E12-07-105: Scaling Study of the L-T Separated p(e,e'$\pi^{\pm}$)n Cross Section at 11 GeV

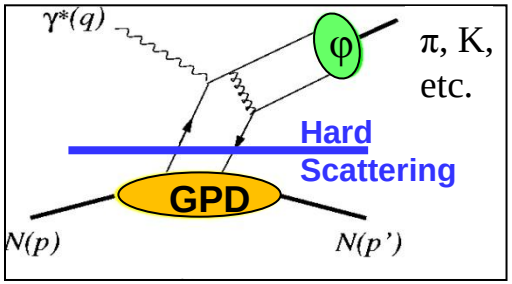
- E12-07-105 will provide high-quality set of separated $\pi^{\pm}$ cross section at three values of x_B
  - Separate the cross section components: L, T, LT, TT
  - The highest Q^2 for any L/T separation in charged pion production

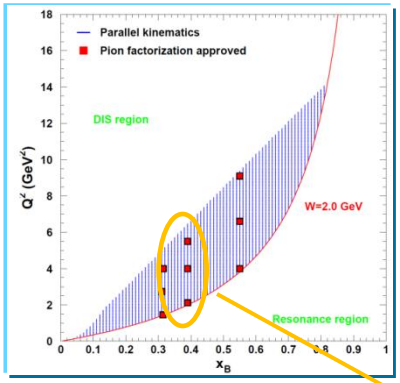


- The Q^2 dependence of the separated cross section at fixed x_B and t will make it possible to search for evidence of hard-soft factorization
  - TAC32 report: "…high quality separated L and T cross section data at higher energies are crucial to unraveling [the suitability of the GPD formalism in describing hard exclusive pion production] … and the theoretical understanding of hard exclusive reactions … benefit from the proposed data"
  - PAC32 report: "A detailed study to determine whether or not meson electroproduction can provide information on GPDs is important."
  - TAC38: "..the original strong theoretical motivation is reinforced by theoretical progress since the original 2007 submission, as well as by new BaBar data …".

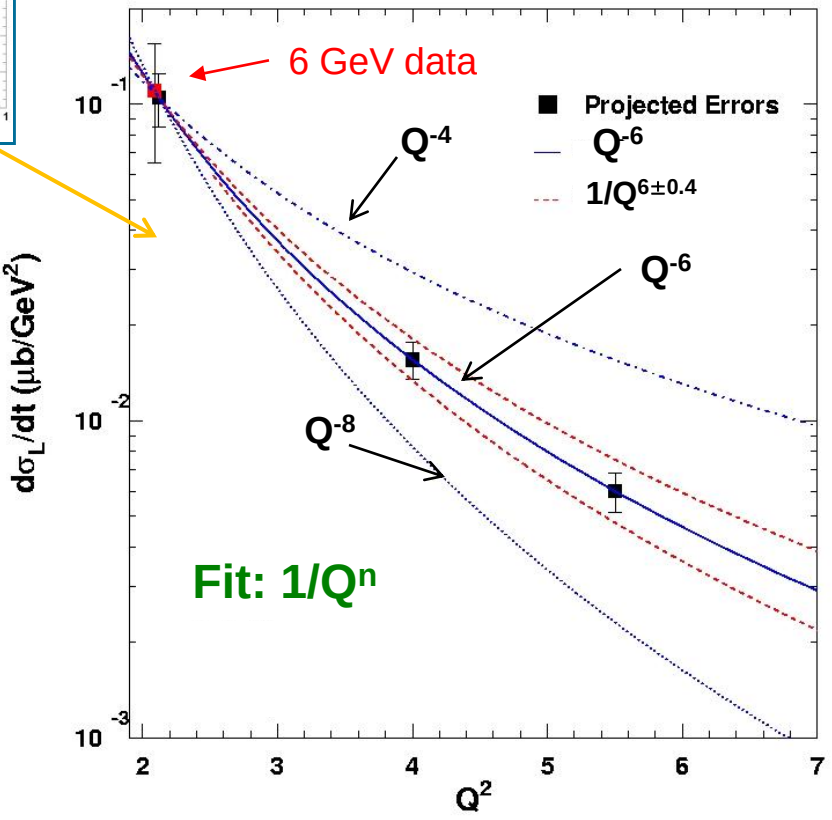
- Bonus: comparison of the L/T ratio for π^+ and π^- production allows for testing the possibility to determine σ_L without an explicit L/T separation

Factorization Tests in π^+ Electroproduction





E12-07-105 will search for the onset of factorization



- One of the most stringent tests of factorization is the Q^2 dependence of the π electroproduction cross section
  - σ_L scales to leading order as Q^{-6}
- Q^2 coverage is 2-3 times larger than at 6 GeV at smaller t
- Factorization essential for reliable interpretation of results from the JLab GPD program at both 6 GeV and 12 GeV

Is the partonic description applicable at JLab?

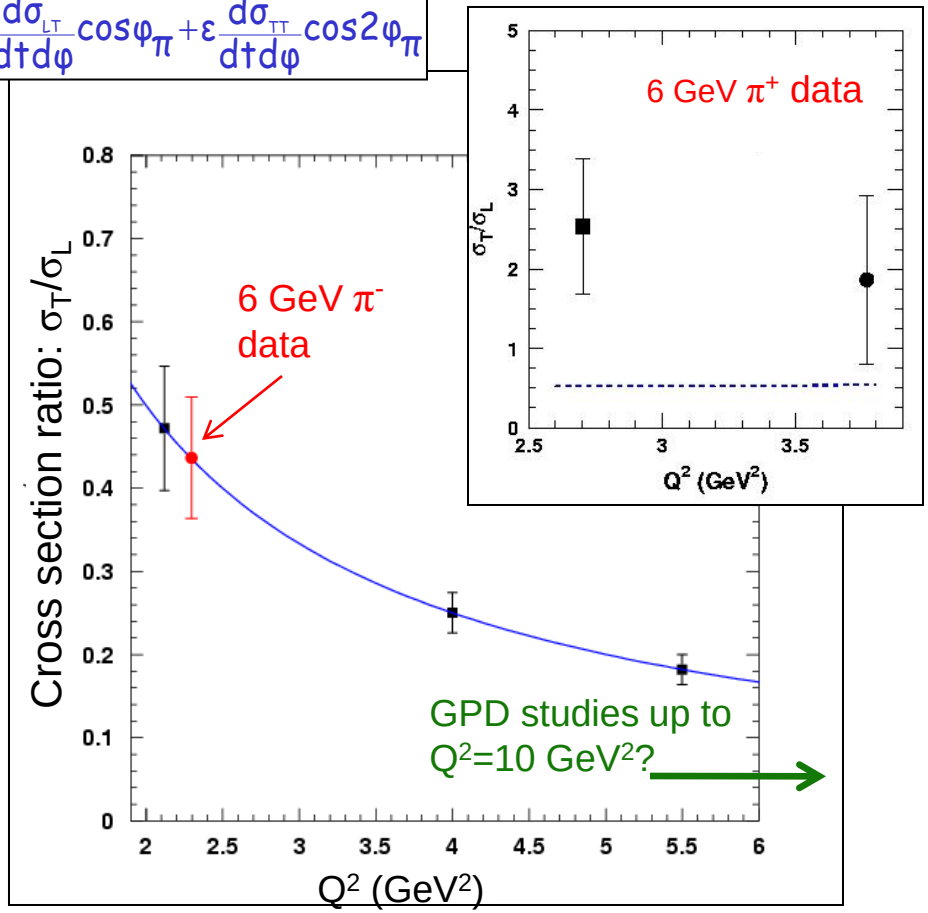
Can we extract GPDs from pion production?

Explore opportunities in π^- production

$$\frac{d^2\sigma}{dtd\varphi} = \varepsilon\frac{d\sigma_L}{dtd\varphi} + \frac{d\sigma_T}{dtd\varphi} + \sqrt{2\varepsilon(\varepsilon+1)}\frac{d\sigma_{LT}}{dtd\varphi}\cos\varphi_\pi + \varepsilon\frac{d\sigma_{TT}}{dtd\varphi}\cos 2\varphi_\pi$$

- The L/T ratios will provide valuable information for $\pi^{\pm}$ cross section measurements with large acceptance detectors

- Earlier data suggest that σ_L is larger for π^- than for π^+ production
  - If this holds, one can extract σ_L from unseparated cross sections
  - Could extend kinematic reach for GPD studies beyond Q^2=6 GeV^2



E12-07-105 will compare π^+ and π^- production to check possibilities of extracting GPDs without explicit L/T