Remarks on Color Transparency at JLab

- BNL sees it
- Parallel opportunity using $\gamma^{(*)}p \to \pi N$
- Related opportunity using isolated pions in $\gamma^{(*)}p \to \pi X$.

BNL measures pp elastic and quasielastic in carbon,

obtains transparency T at several momenta, near 90° in CM.

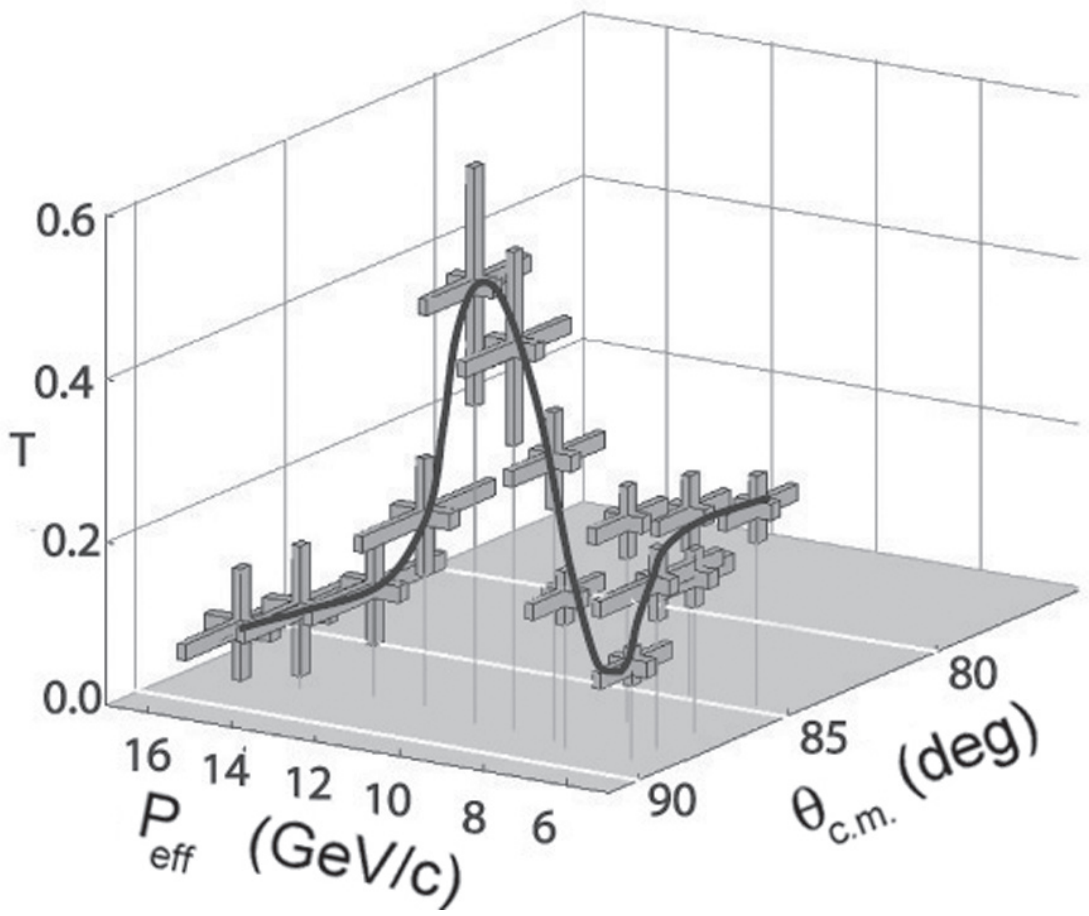


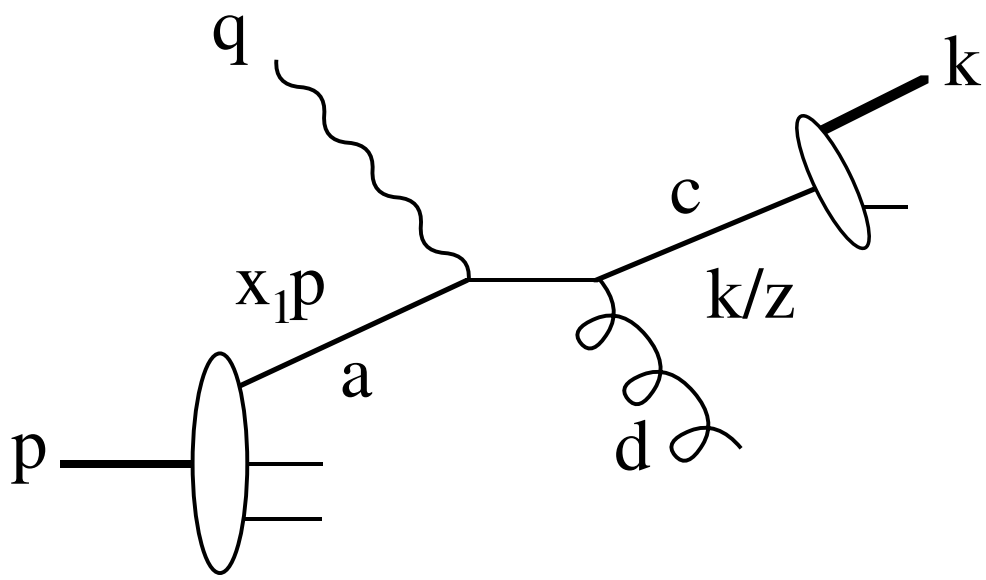
Figure from J. Aclander *et al.*, PRC **70**, 015208 (2004).

Comparable process at JLab is $\gamma^{(*)}p \to \pi N$ in and out of a nucleus.

Energy at 11 GeV is comparable to energies where BNL sees transparency effects.

Related: semiexclusive production of isolated pions, $\gamma^{(*)}p \to \pi N$.

Contrast: pion as part of jet from fragmentation,

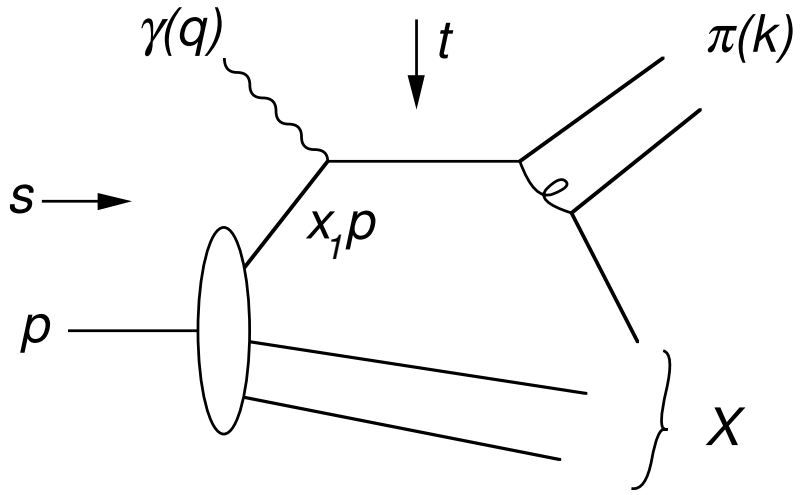


Quark c produced in primary process, fragments into $\pi(k)$ some distance away.

Pion is part of jet and not alone.

Alternative: pion produced by hard (high momentum transfer) process.

Part of primary reaction. Produces pion in spatially small configuration.



Experimental signature: pion kinematically isolated (not part of jet).

Momentum fraction of struck quark given by measured quantities,

$$x = -\frac{t + Q^2}{s + u} \ .$$

Same in nucleus.

- Pion escapes with minimal FSI if small enough and energetic enough.
- Flavor sensitive: π^+ mainly from u quarks, π^- mainly from d quarks.
- Measure flavor dependence of shadowing/antishadowing.

See:

Brodsky, Diehl, Hoyer, Peigne

Afanasev, Carlson, Wahlquist