Color Transparency at 12 GeV: Pions

E12-06-107

Spokespersons:

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Motivation

- Pion propagation in nuclear matter
- Map onset of CT through factorization regime

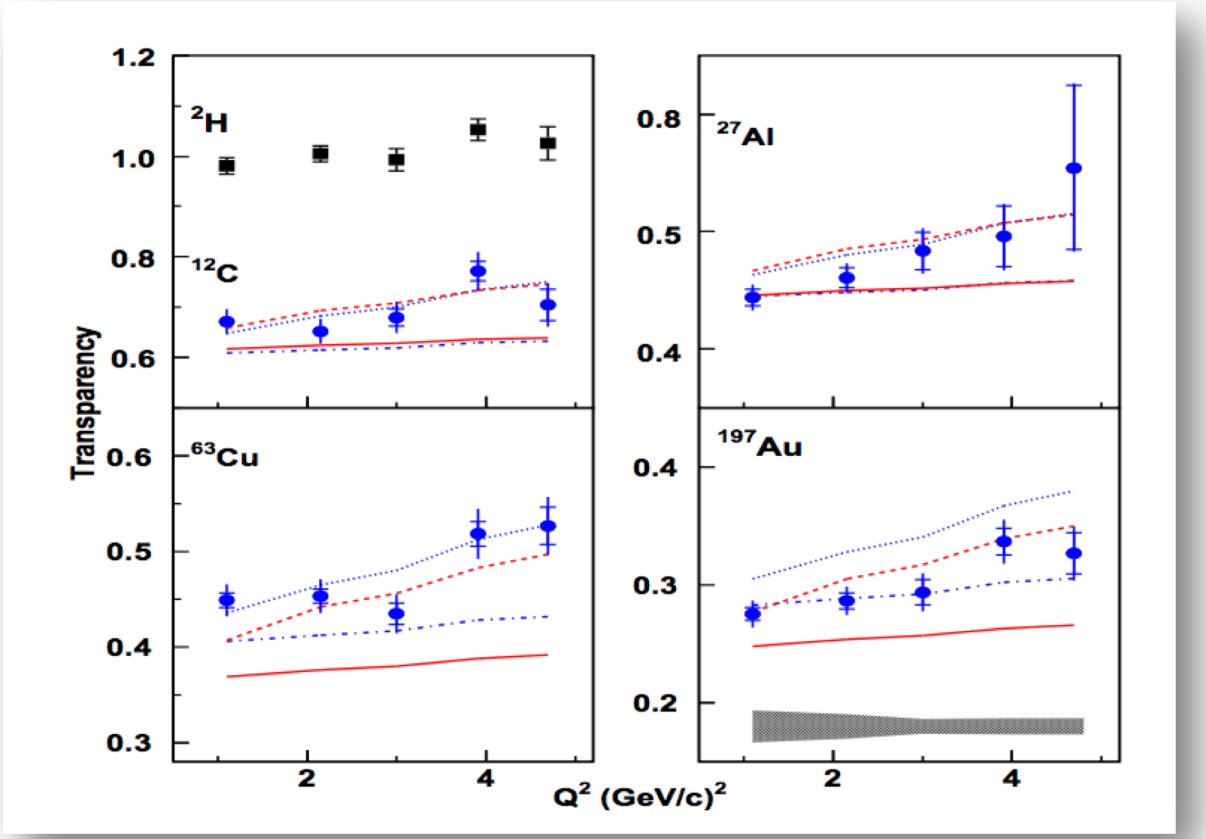
Meson CT:

- Earlier onset expected in 2q vs 3q systems
- Formation length larger (time dilated as E/m)
- Essential to measure Q^2 and A-dependence due to lesser known reaction mechanism!

Extension of very successful E01-107 experiment in 6 GeV era!

- ^{1}H, ^{2}H, ^{12}C, ^{26}Al, ^{63}Cu, ^{197}Au
- Q^2 from 1 - 5 GeV^2/c^2

A(e,e'π^+)



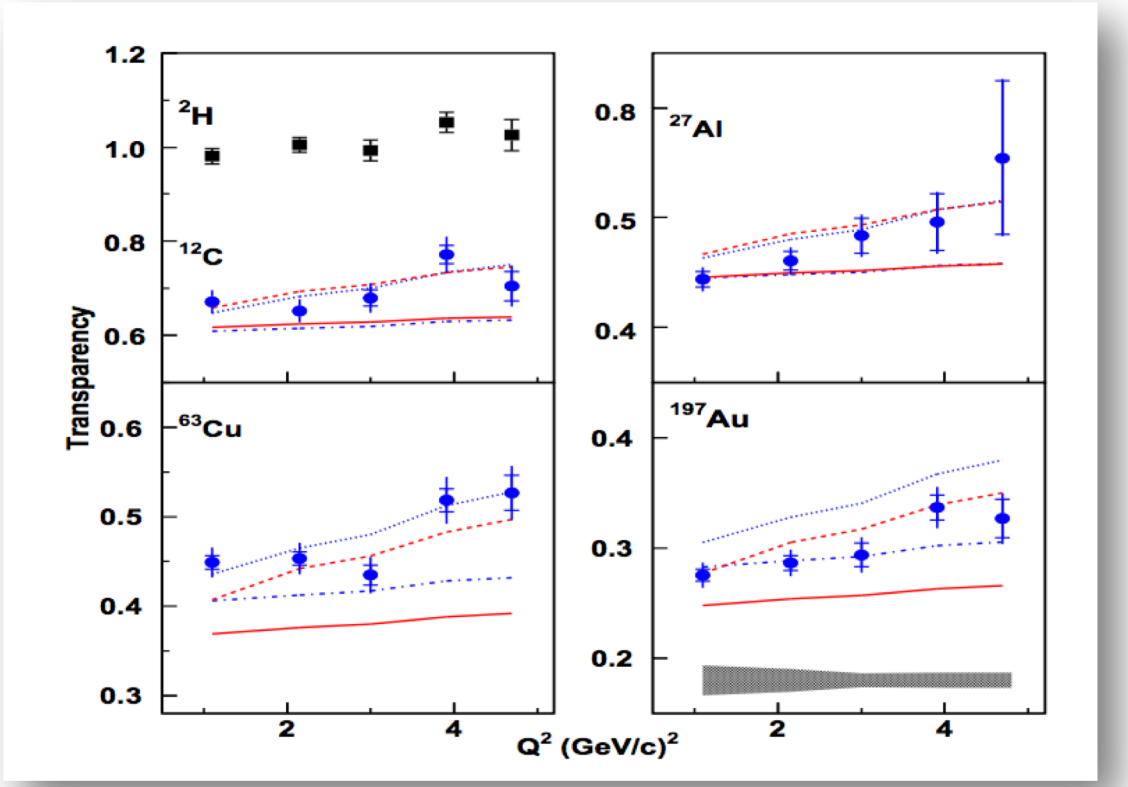
B.Clasie *et al.* PRL 99:242502 (2007)

X. Qian *et al.* PRC81:055209 (2010)

6 GeV era experiments observed enhancements consistent with CT: increasing with Q^2 and A

Hall C E01-107 pion electro-production

$A(e,e'\pi^+)$

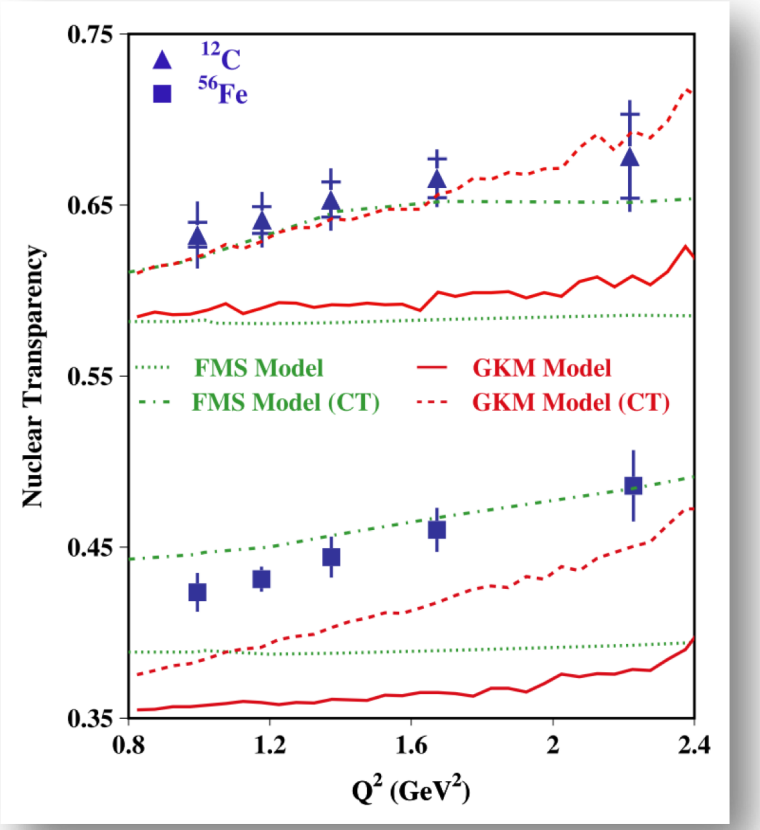


B.Clasie *et al.* PRL 99:242502 (2007)

X. Qian *et al.* PRC81:055209 (2010)

CLAS E02-110 rho electro-production

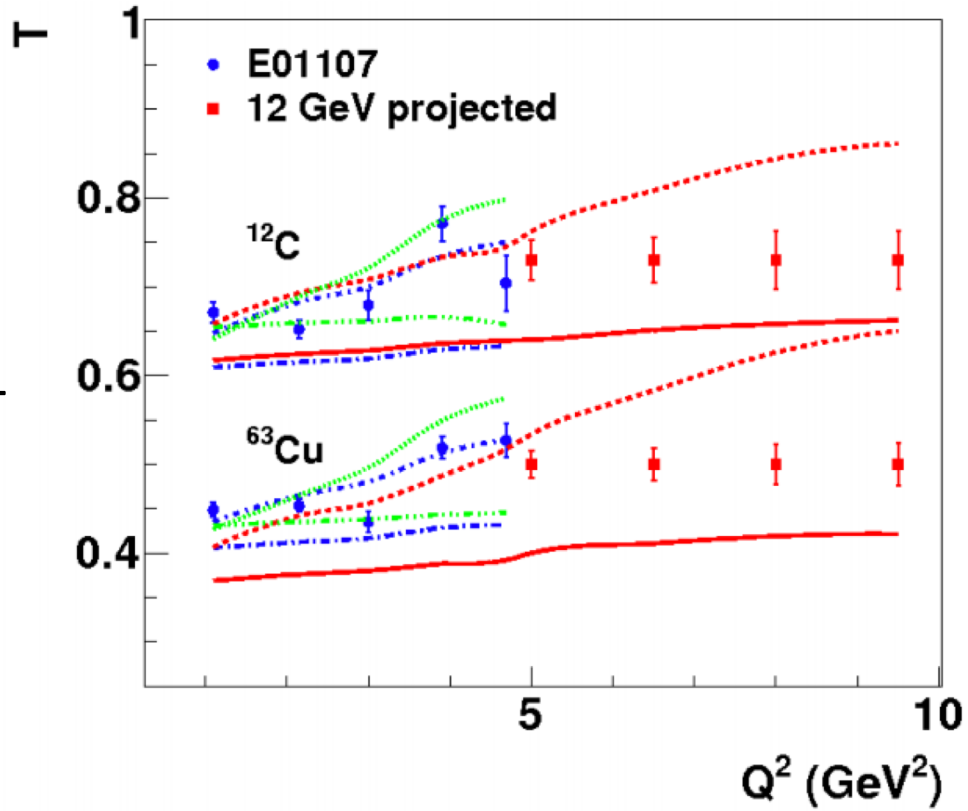
$A(e,e'\rho^0)$

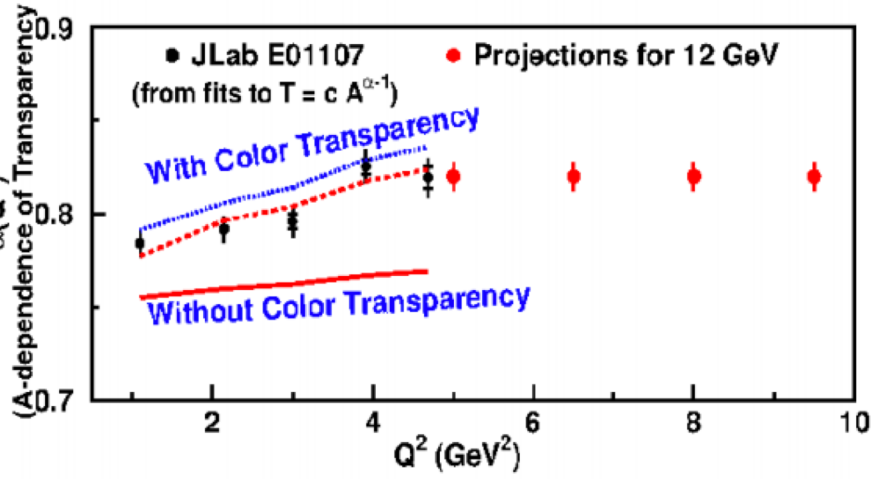


L. El Fassi *et al.* PLB 712,326 (2012)

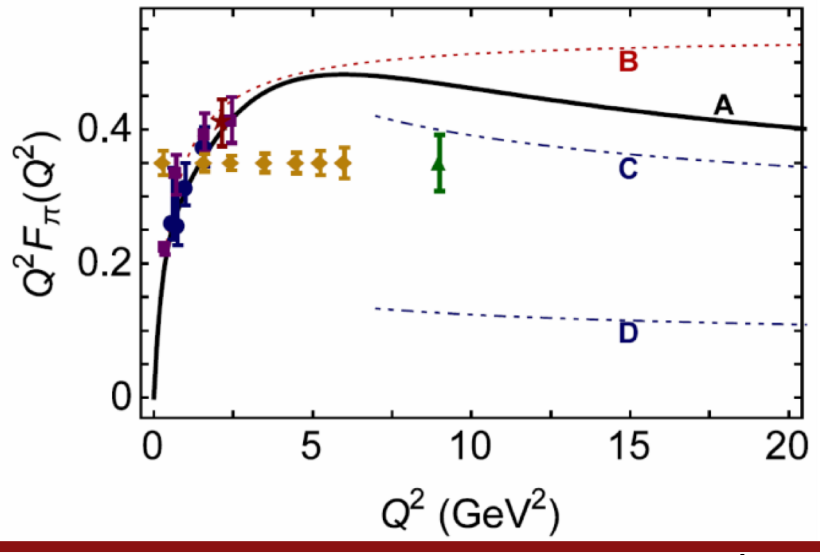
Q^2 $(GeV/c)^2$	Uncertainty %	^1H Run time (hours)	^2H Run time (hours)	^{12}C Run time (hours)	^{63}Cu Run time (hours)	Run time (total)
5.0	1	2x3	2	2.5+6	10	26.5
6.5	2	2.5x3	2.5	3+7	12.5	32.5
8.0	3	5x2	5	6	25	46.0
9.5	3	34x2	34	41	170.0	313.0
				Total		418

- 17.5 PAC days
- Measure pion electroproductio n cross sections
- Q^2 range from 5 - 9.5 GeV^2/c^2
- Mapping Q^2 and A-dependence





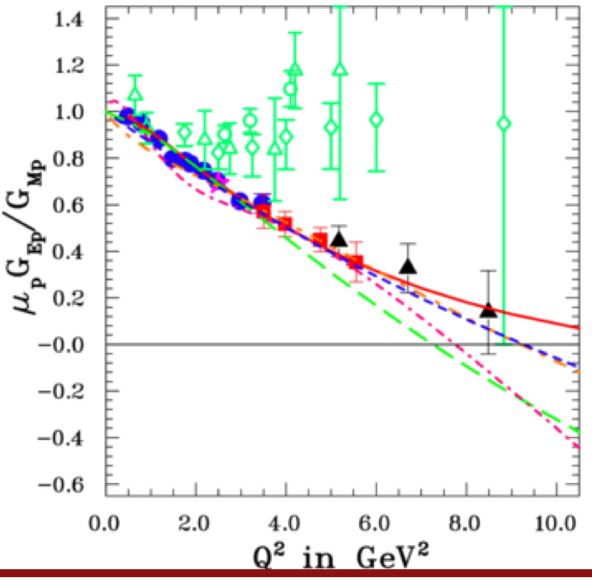
Pion insights for the proton?

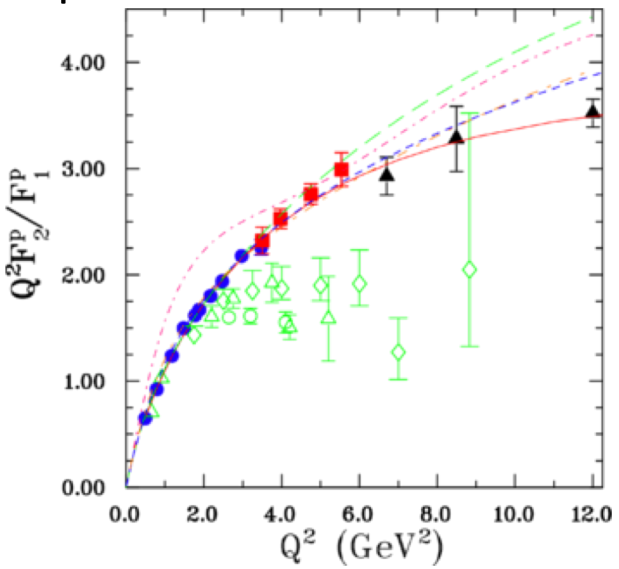


Pion:

- QCD scaling expected > 8 GeV^2
- Upcoming Hall C program (E12-06-101,E12-07-105)

Proton is complicated!

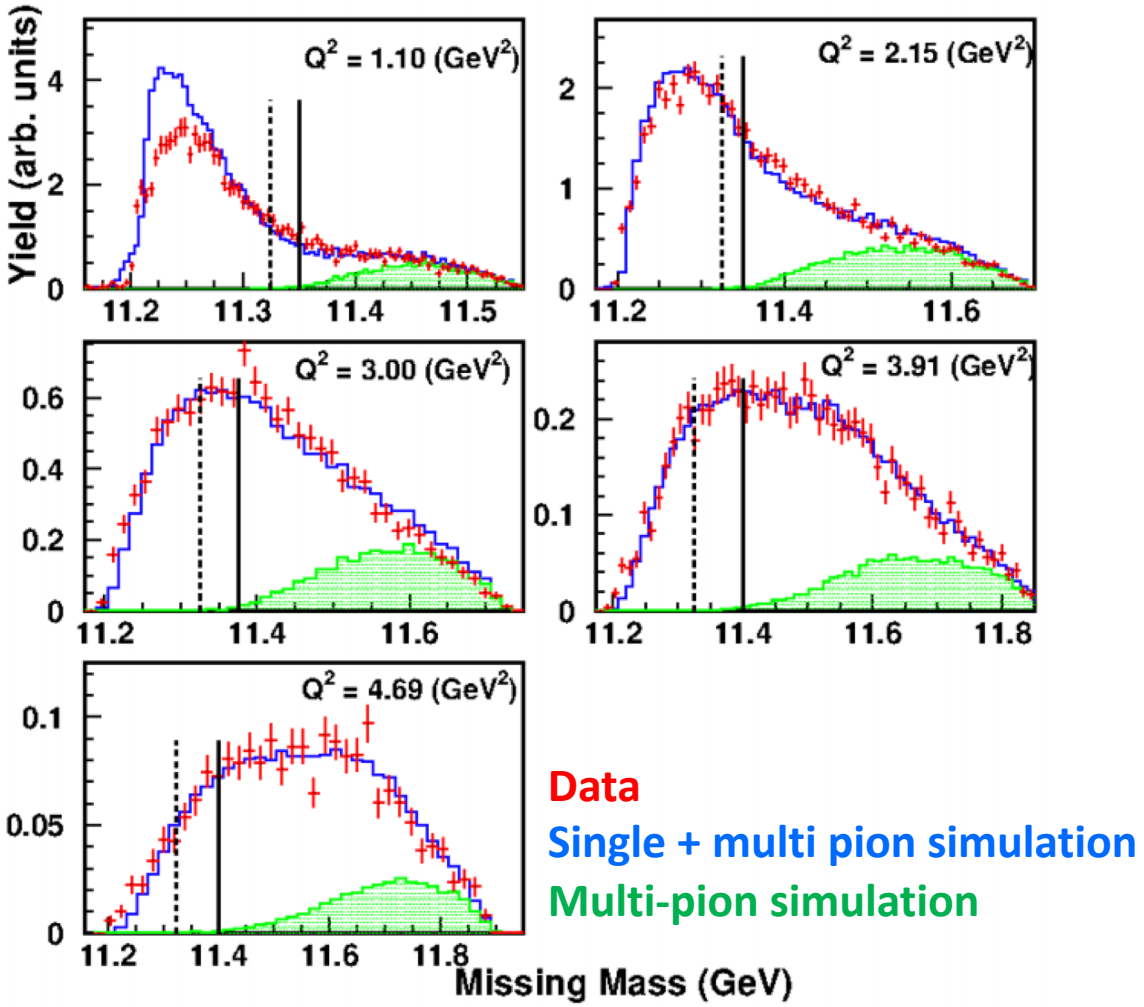




Not clear yet at what Q^2 asymptotic behavior!

Major goal of SBS

Kinematics



$\vec{p}$ // $\vec{q}$ to minimize elastic re-scattering

Small coherence length

$M_X = M_{A-1} + M$