

Existing CLAS $A(e,e')$ data and correlations

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SRC 2007 Workshop

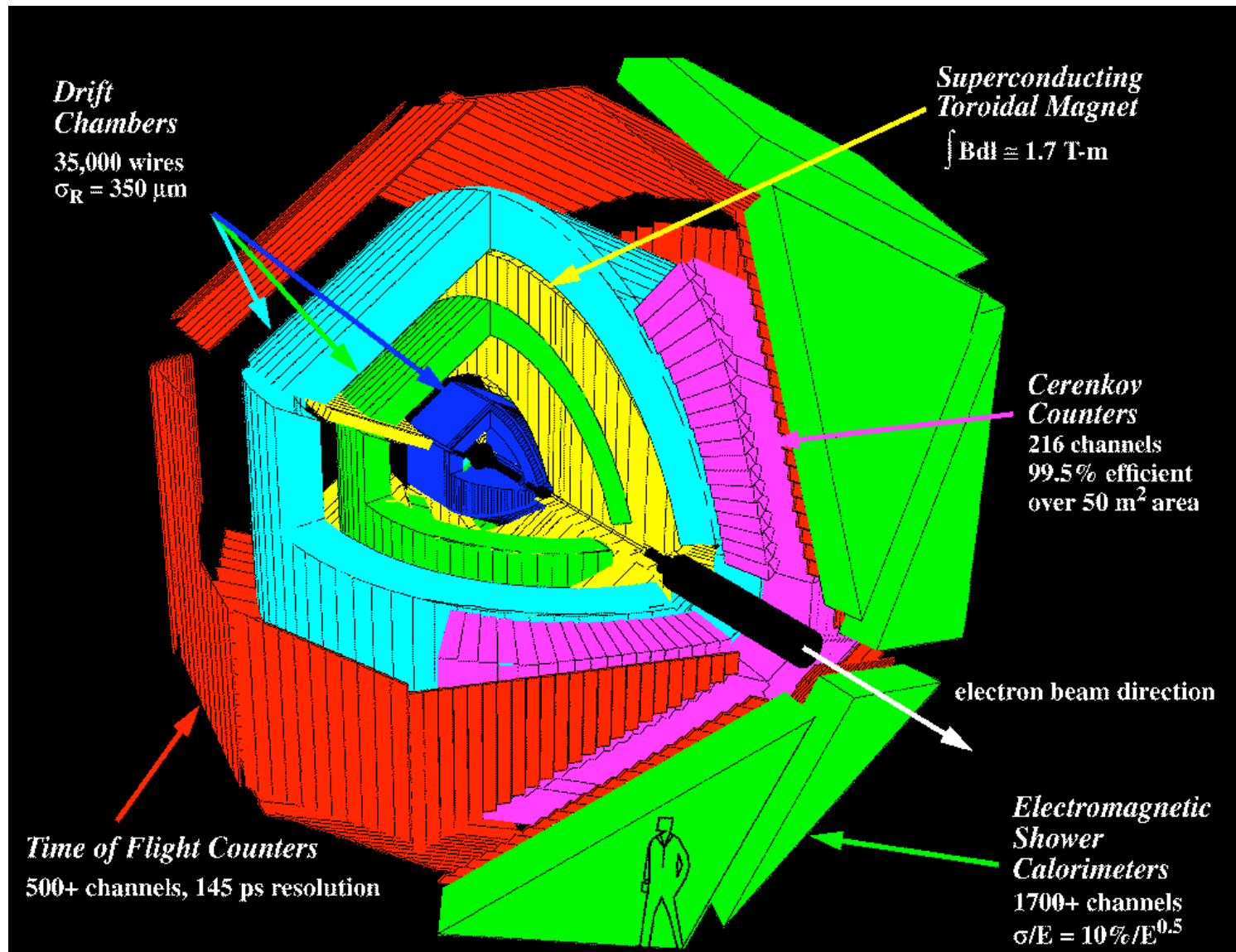
Existing Data (e2, eg2)

- Inclusive (e,e') trigger, 4 π (mostly) detector

Estimated # of (e,e') and (e,e'pp) events within fiducial cuts

#e ⁻ (10 ⁶)	1.1 GeV	2.2 GeV	4-5 GeV
d			A lot
³ He	500 / 3	50 / 0.3	100 / 0.5
⁴ He		80 / 0.5	25 / 0.1
¹² C	15 / 0.1	50 / 0.3	25 / 0.1
⁵⁶ Fe		5 / 0.03	200 / 1.0
Pb			25 / 0.1

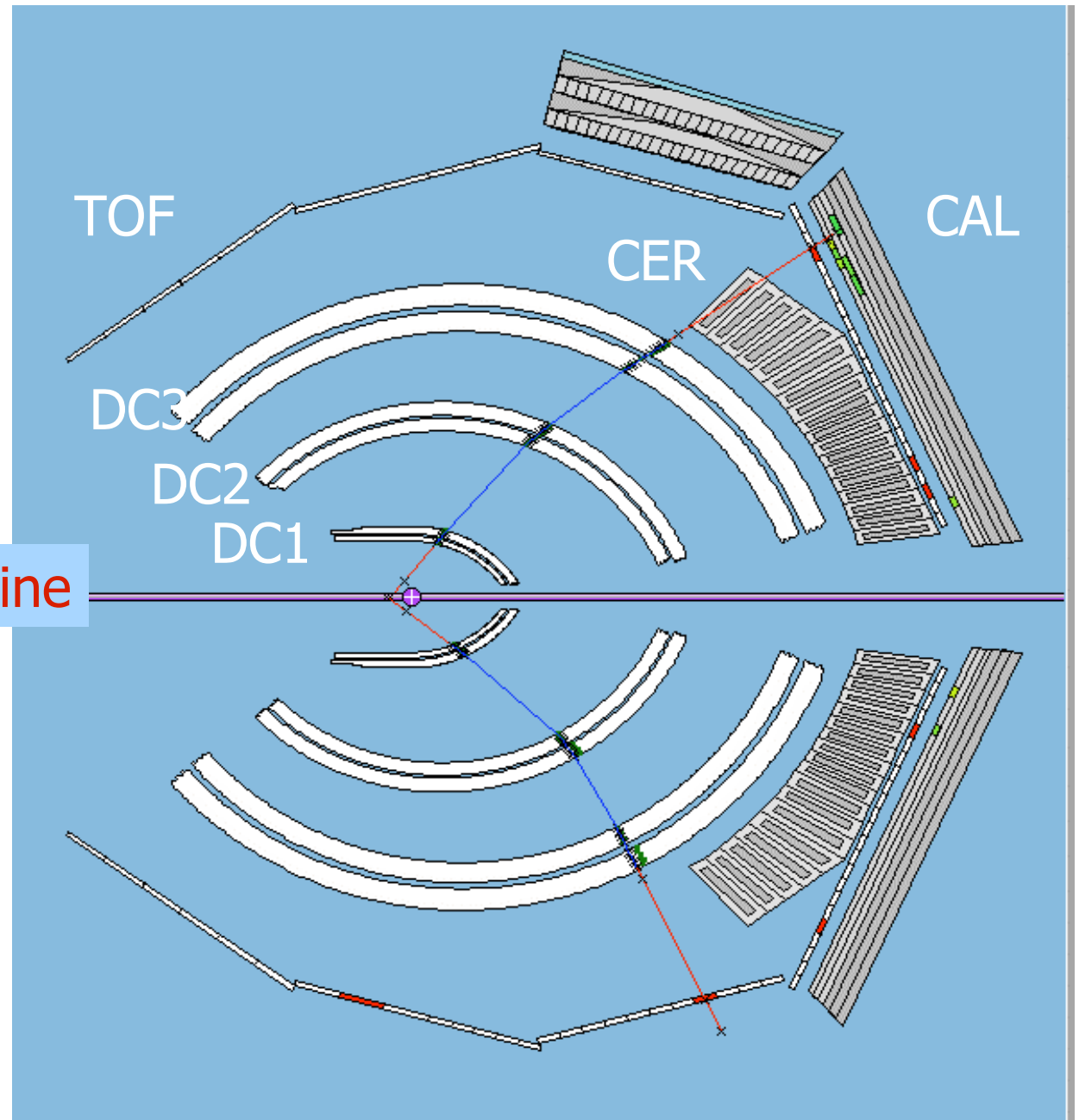
CLAS 3-D View



Sectors 1 and 4

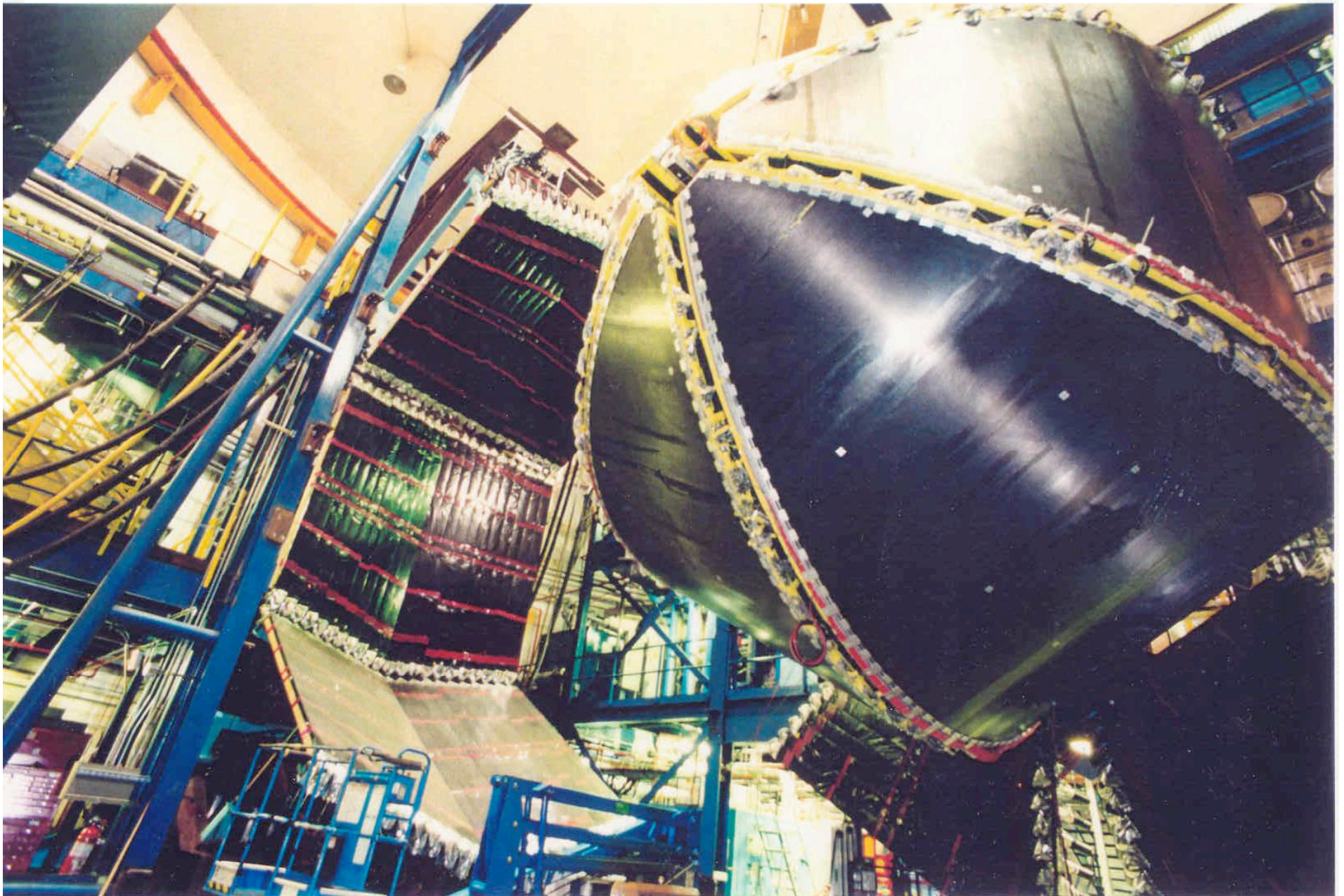
CLAS Event Display

Beamline

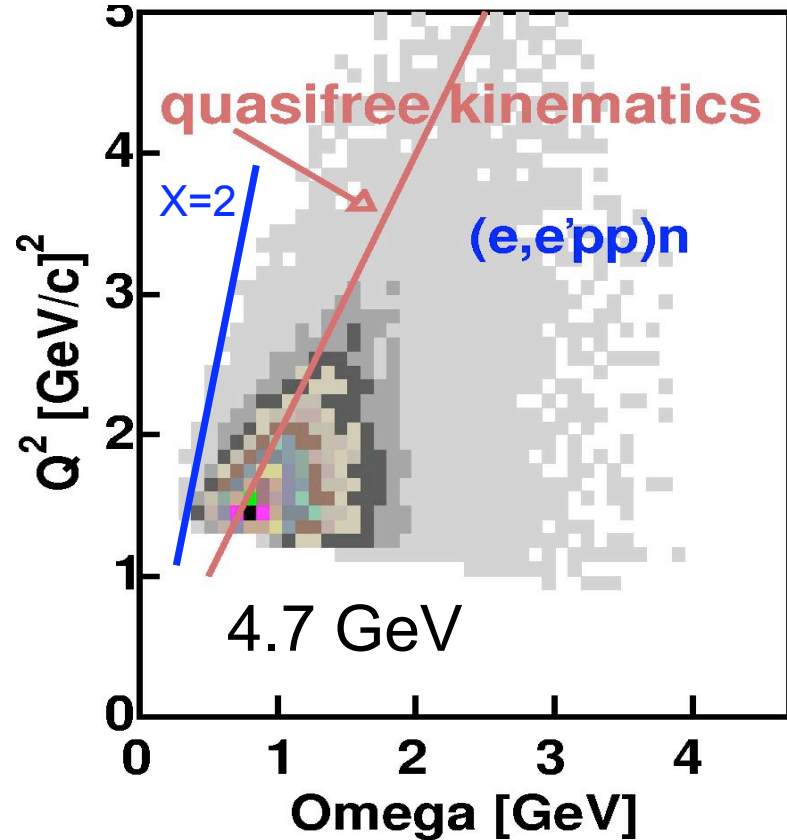
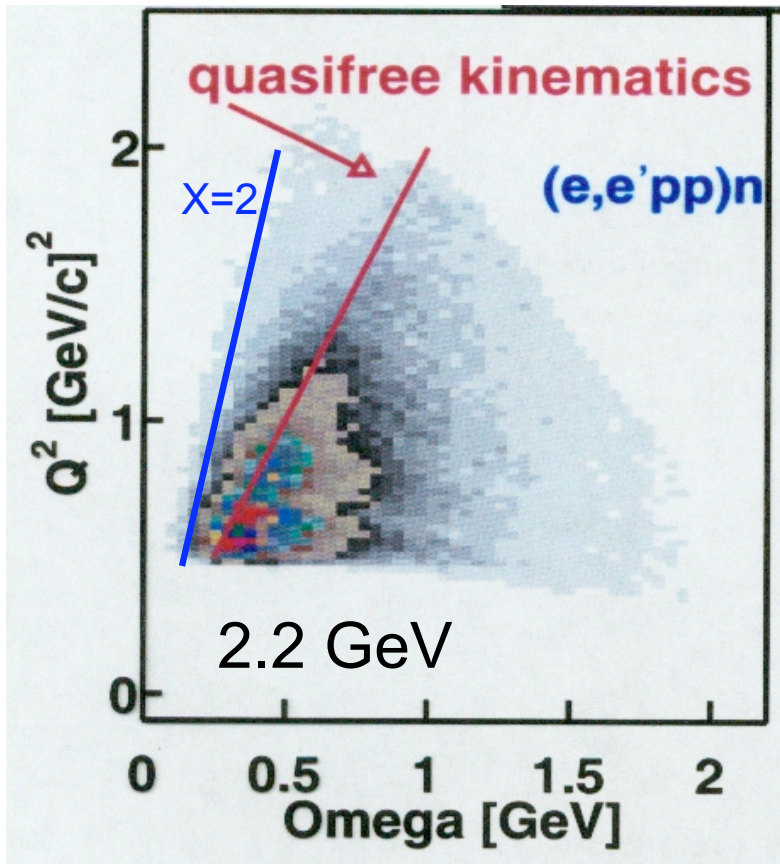


Note charged particle
acceptance holes at
forward and backward
angles
Neutral particle
detection only at
forward angles

CLAS in Maintenance Position



Electron acceptance (for pp KO from ${}^3\text{He}$)



Huge acceptance, almost all at $x \approx 1$ and $x < 1$

No holes in Q^2 - ω space

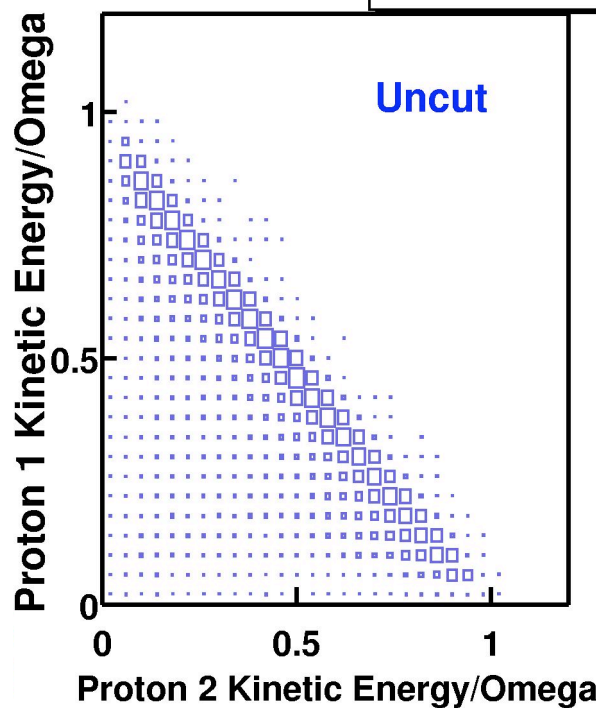
Typically lose factor of 10 statistics for each extra proton

$^3\text{He}(e,e'pp)n$ nucleon energy balance:

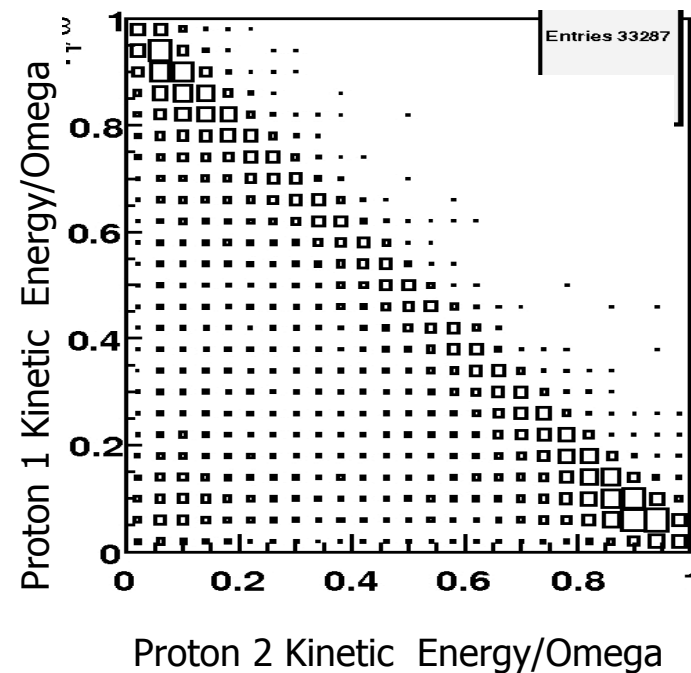
Lab frame Dalitz plots

Proton threshold 250 MeV/c

2.2 GeV (10^5 events)



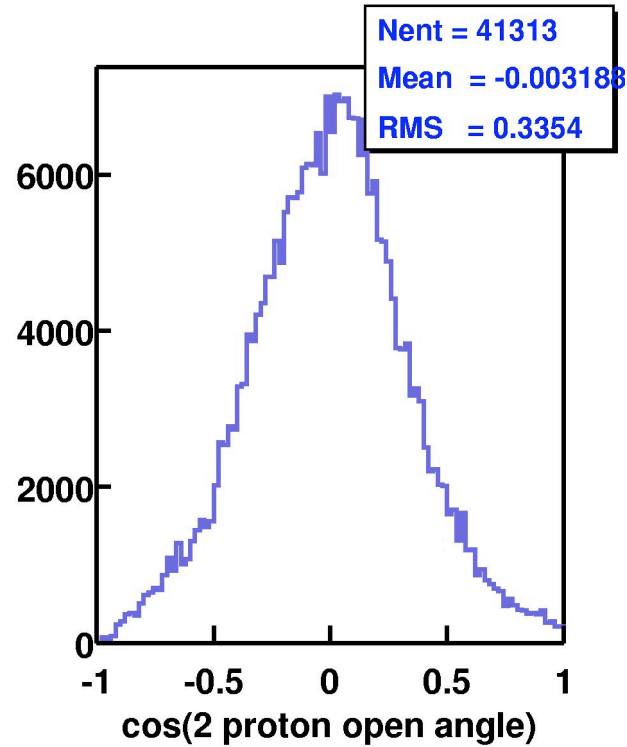
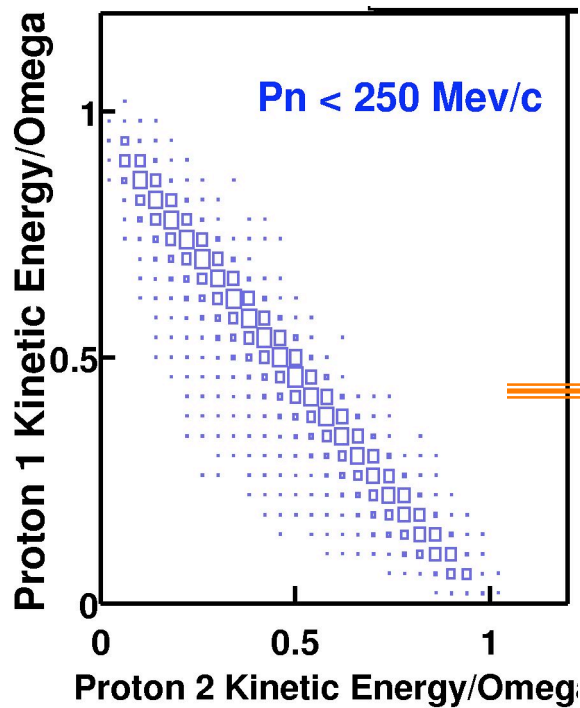
4.7 GeV ($3 \cdot 10^4$ events)



Mostly pp knockout with a low energy neutron

Similar to pp KO from heavy nucleus with A-2 spectator

pp knockout dominated by rescattering

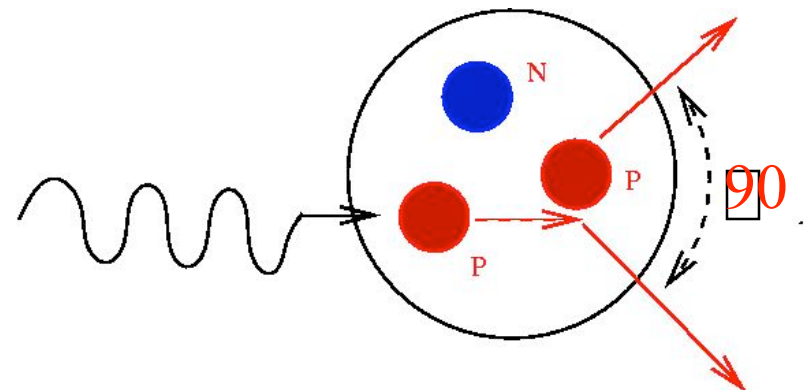


90 degree
pp opening angle

Rescattering!

Energy balance (Dalitz plot):
 ${}^3\text{He}(e, e'pp)n$ events
with spectator neutron

But let's look more closely ...



pp knockout: a closer look

Two active nucleons:

$$p_{\text{neutron}} < 200 \text{ MeV}/c$$

Try to escape FSI:

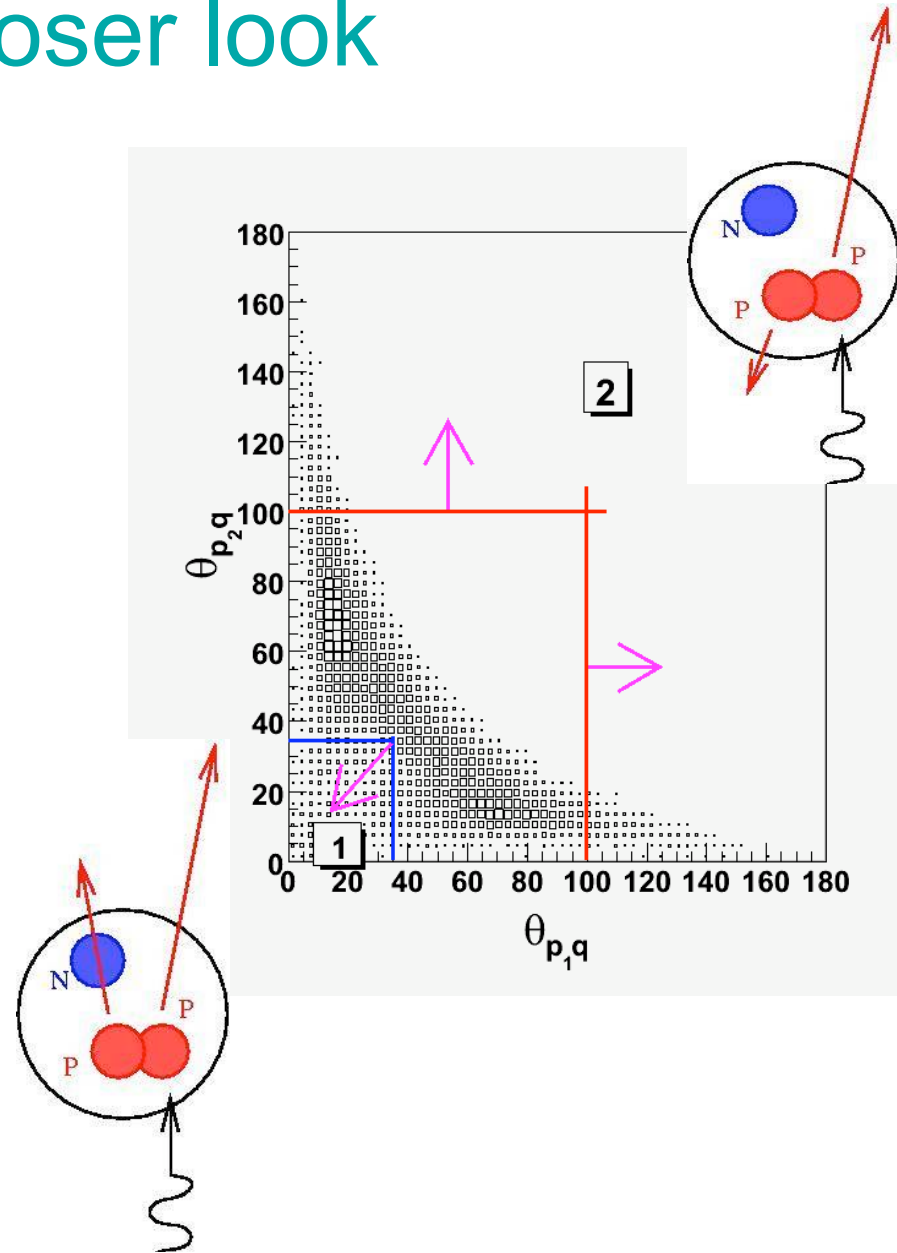
1. Forward protons $X_B > 1$
 $\theta(pq) < 35^\circ$
2. Slow backward proton
 $X_B < 1$, $\theta(p_{\text{slow}}q) > 100^\circ$

Plot vs $P_{\text{rel}} = (P_{\text{fast}} - q - P_{\text{slow}}) / 2$

Try to characterize FSI:

1. $250 < P_{\text{slow}} < 350 \text{ MeV}/c$
2. $400 < P_{\text{slow}} < 600 \text{ MeV}/c$

Plot vs $\theta(p_{\text{slow}}q)$



pp knockout

Avoiding FSI:

- $x < 1$ and $x > 1$ data completely disagree
 - Laget calc does not describe data
1. Laget 1-body=Full (little FSI or MEC)

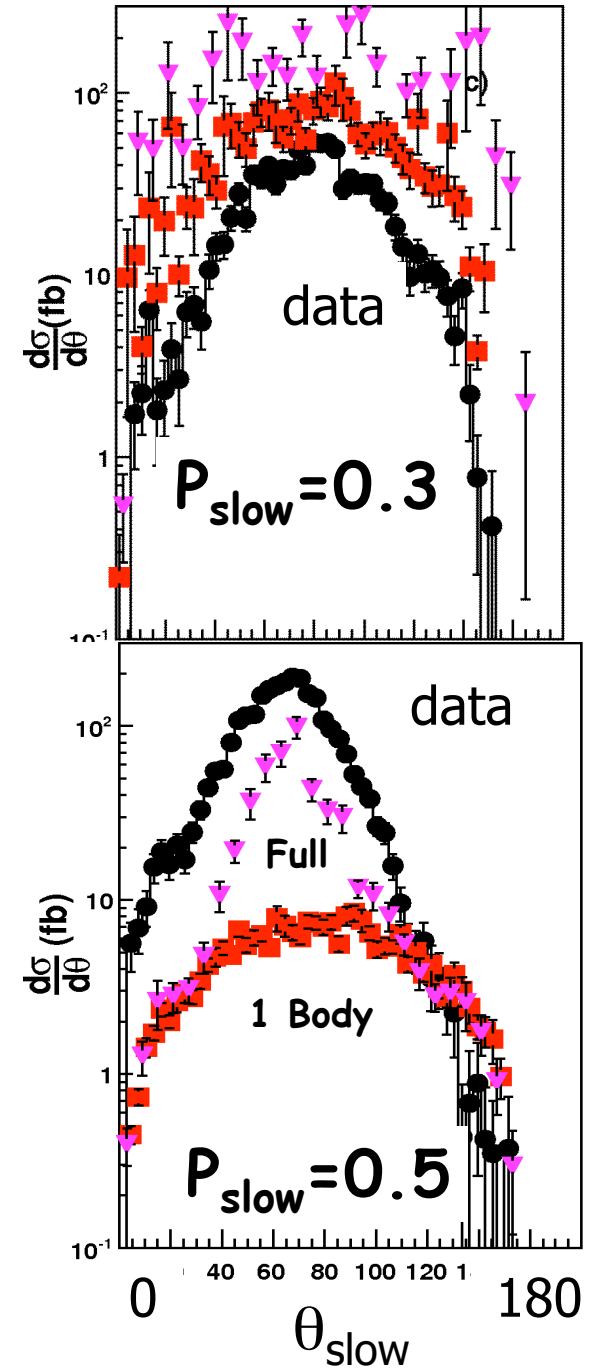
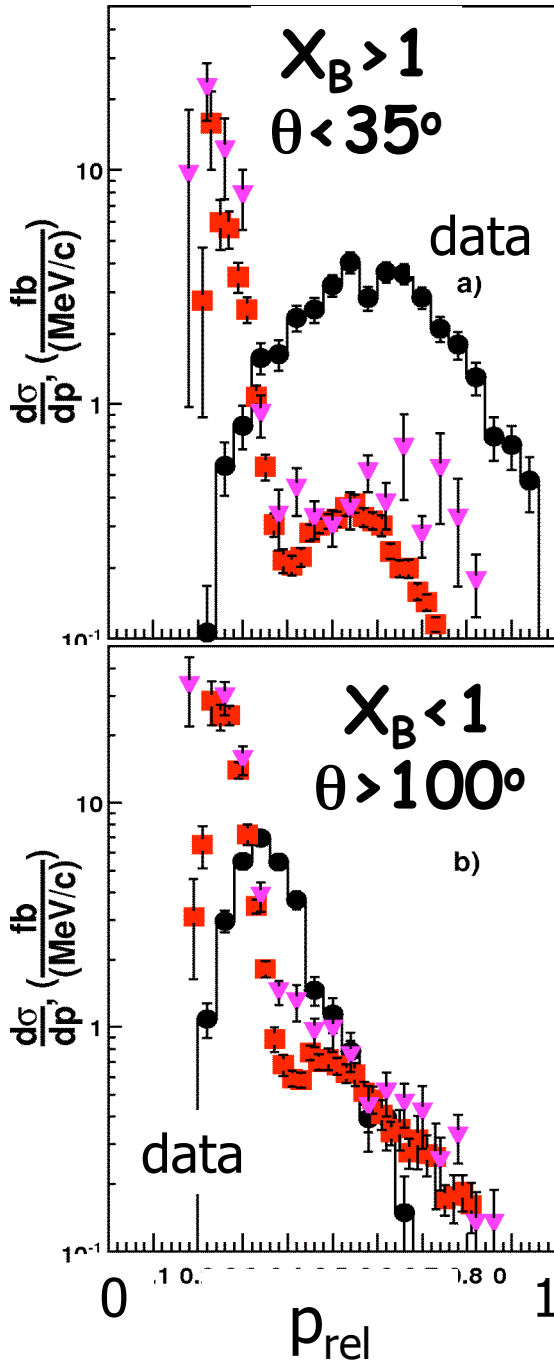
Studying FSI:

1. Large FSI peak for $p_{\text{slow}} = 0.5$ GeV/c
2. Little FSI for $p_{\text{slow}} = 0.3$ GeV/c
3. Qualitative data-theory agreement

No obvious

correlations here

But x is too small!



CLAS Analysis Status

Analyses done (or in progress):

- (e,e') ratios
- ${}^3\text{He}(e,e'pp)$
- hadronization

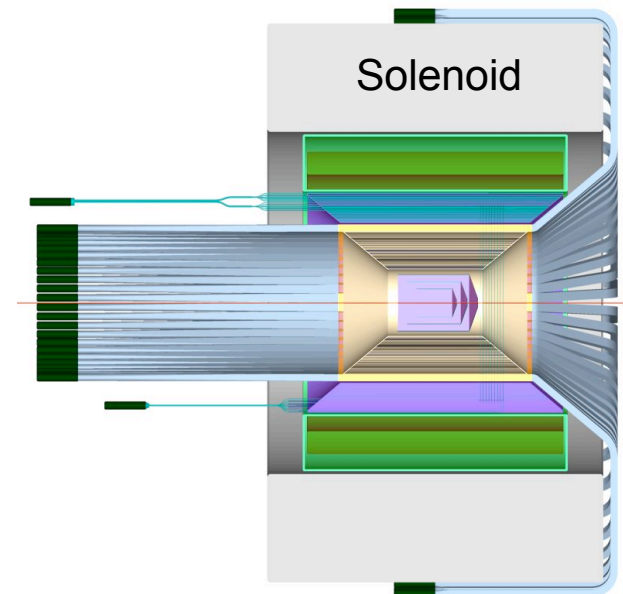
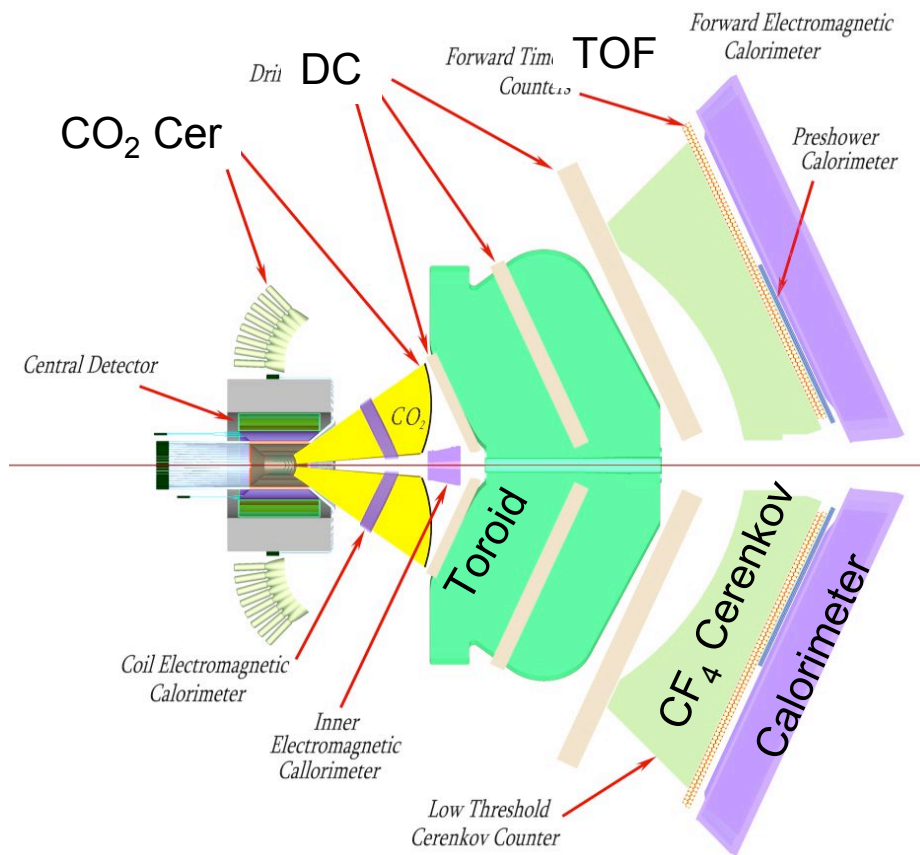
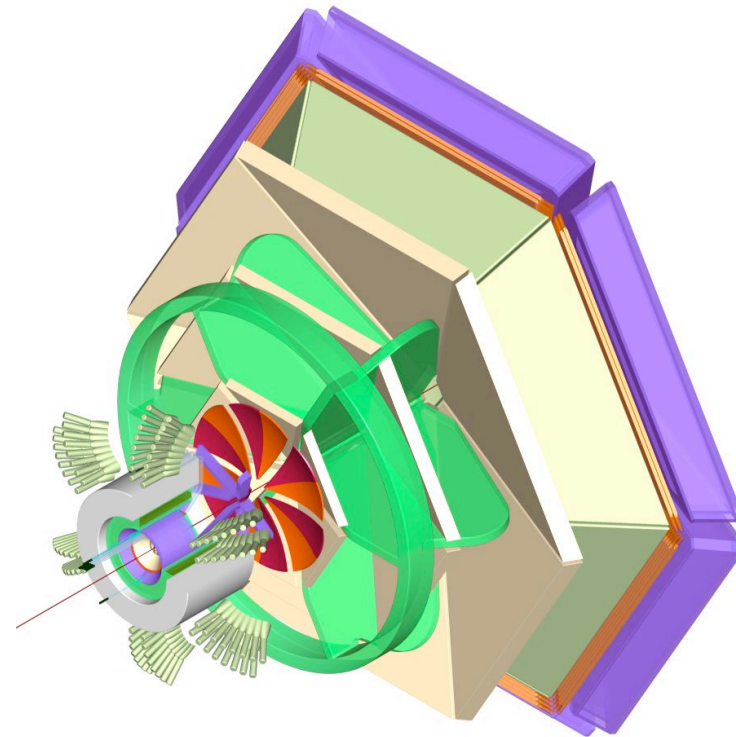
Analyses not done (volunteers, anyone??)

- (e,e'p)
 - Transparency
 - Look for SRC ridge at $E_{\text{miss}} = p_{\text{miss}}^2/2m$
- backward deltas
- your idea here

CLAS12

Toroidal field $\theta < 45^\circ$

Solenoidal field $45 < \theta < 135^\circ$



Summary

- There is a lot of CLAS data
 - mostly iron and helium
- Analyses so far:
 - ${}^3\text{He}(e, e'p)$
 - $A(e, e') x > 1$ ratios
 - Hadronization
- Analyses that can be done:
 - Inclusive $A(e, e'p)$ looking for the SRC ridge
 - Backward deltas
- But mostly $x \leq 1$
 - wrong place for SRC?