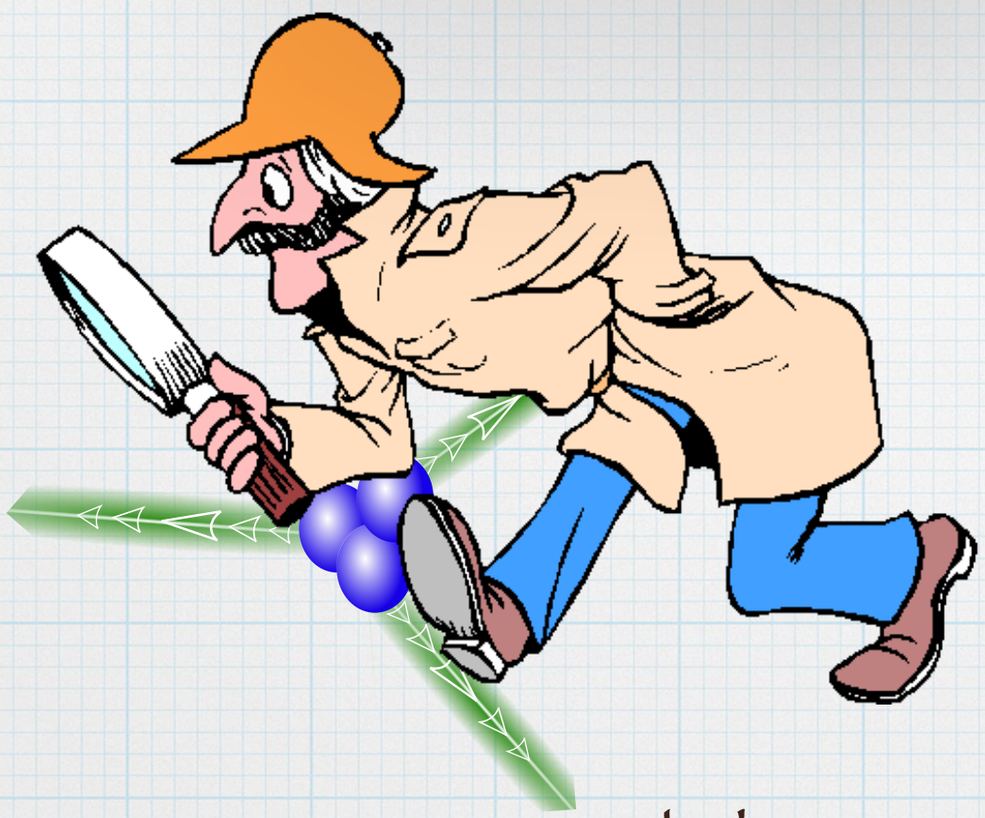
A Search for 3N-SRC in JLAB-CLAS data



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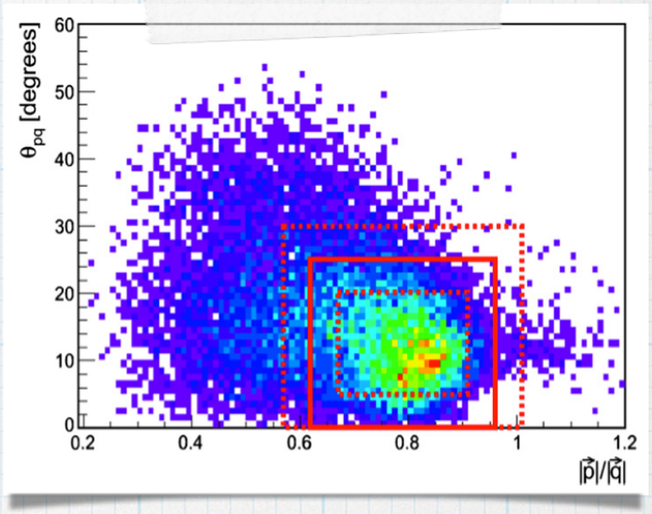
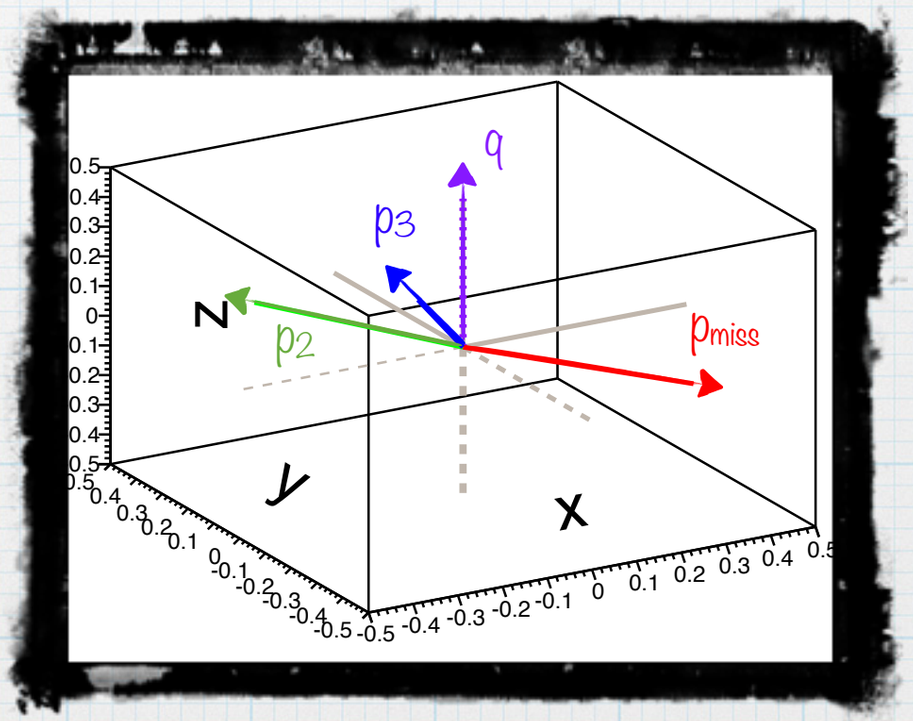
EMMI workshop: Cold dense nuclear matter:
from short range nuclear correlations to nucleon stars
October 2015, GSI Darmstadt

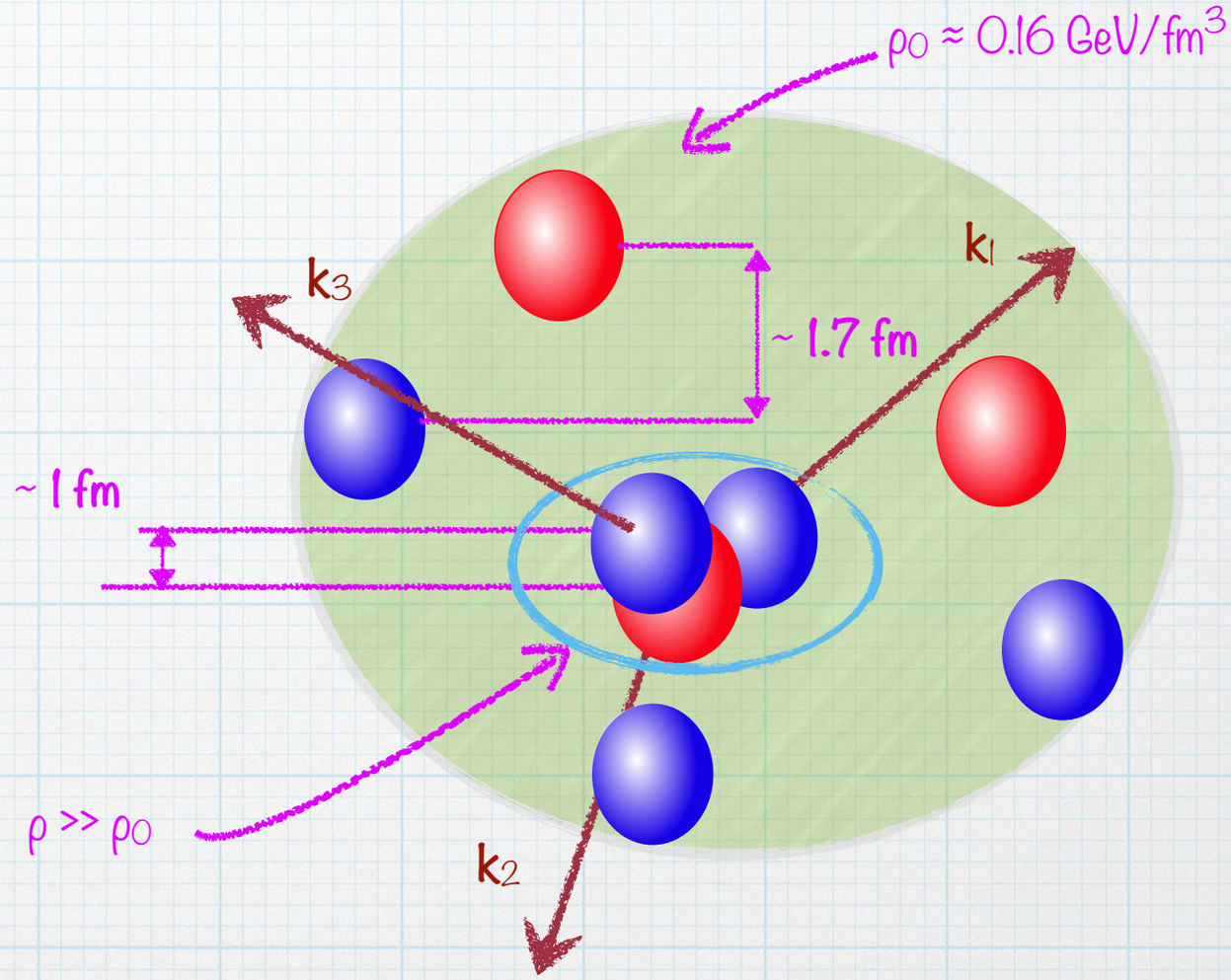
Outline

* What is 3N-SRC?
* Motivation
* Search strategy
* Event selection
* Results
* Consequences
* Future plans





What is 3N-SRC ?



* Large relative & small c.m. momentum (w.r.t Fermi)

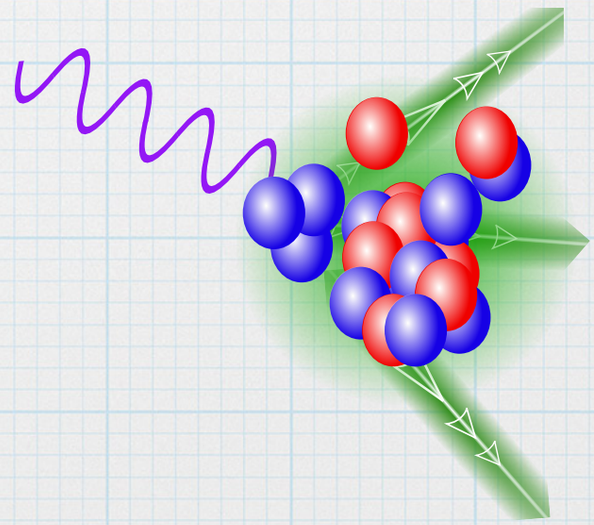
$$|\vec{k}_1 + \vec{k}_2 + \vec{k}_3| < k_F$$

$$|\vec{k}_1|, |\vec{k}_2|, |\vec{k}_3| > k_F$$

Motivation

* We know Isospin and topological structure of 2N-SRC.

* Practically nothing is known experimentally on 3N-SRC.



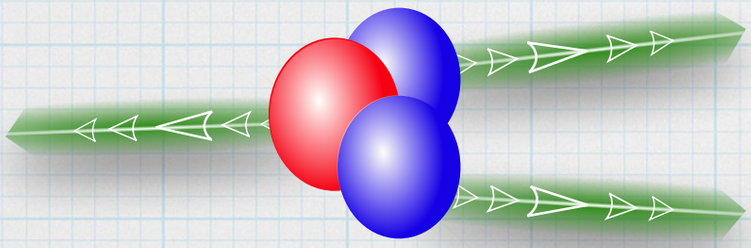
3N-SRC ?

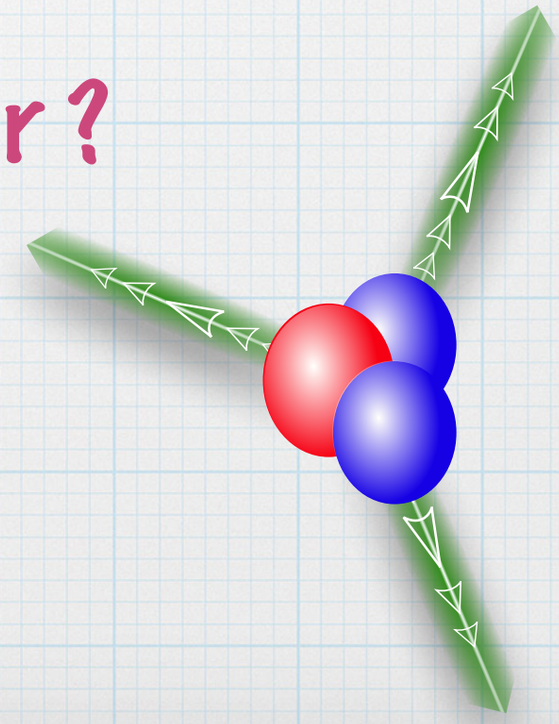
* Is there 3N-SRC? If so, how many?
* Isospin structure:

fraction of nnn / ppp / nnp / npp ?

* Geometry

Co-linear / Star ?

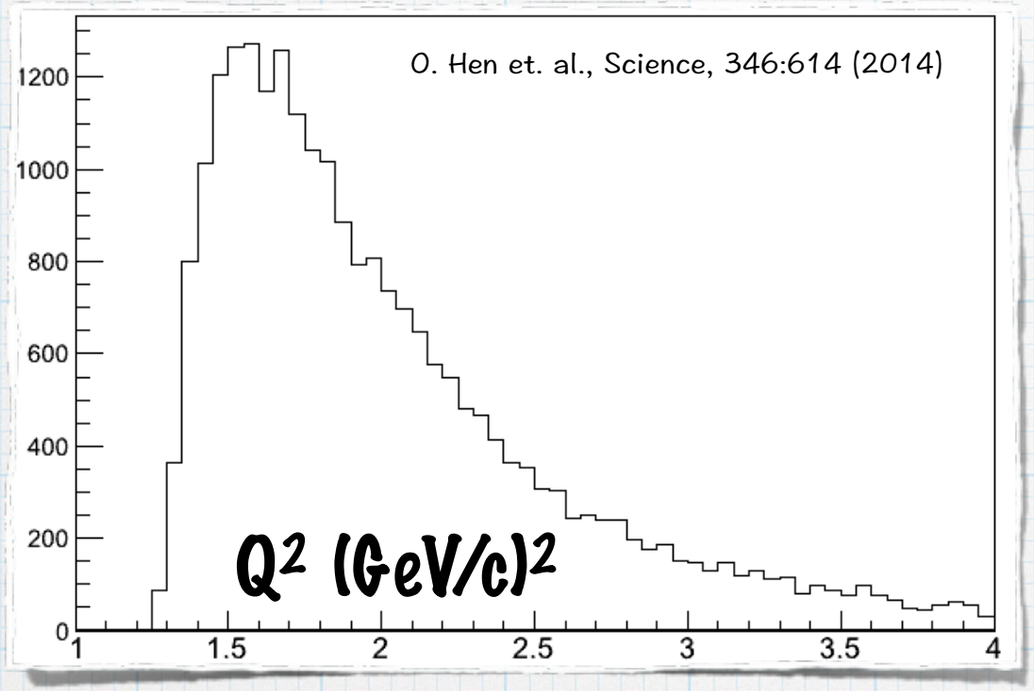




(e,e'p) SRC events selection

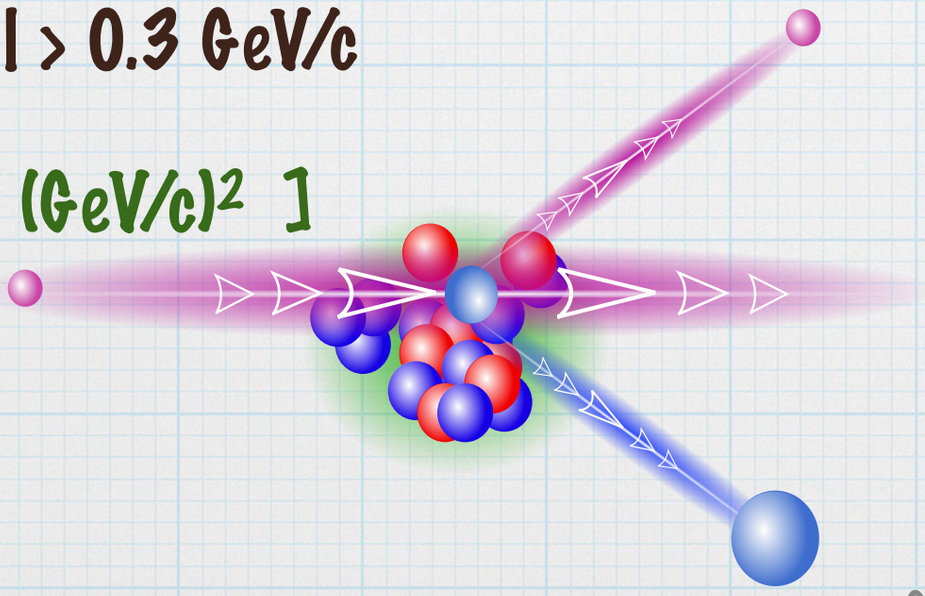
Kinematics

$x_B > 1.2$



$1 > |p_{miss}| > 0.3$ GeV/c

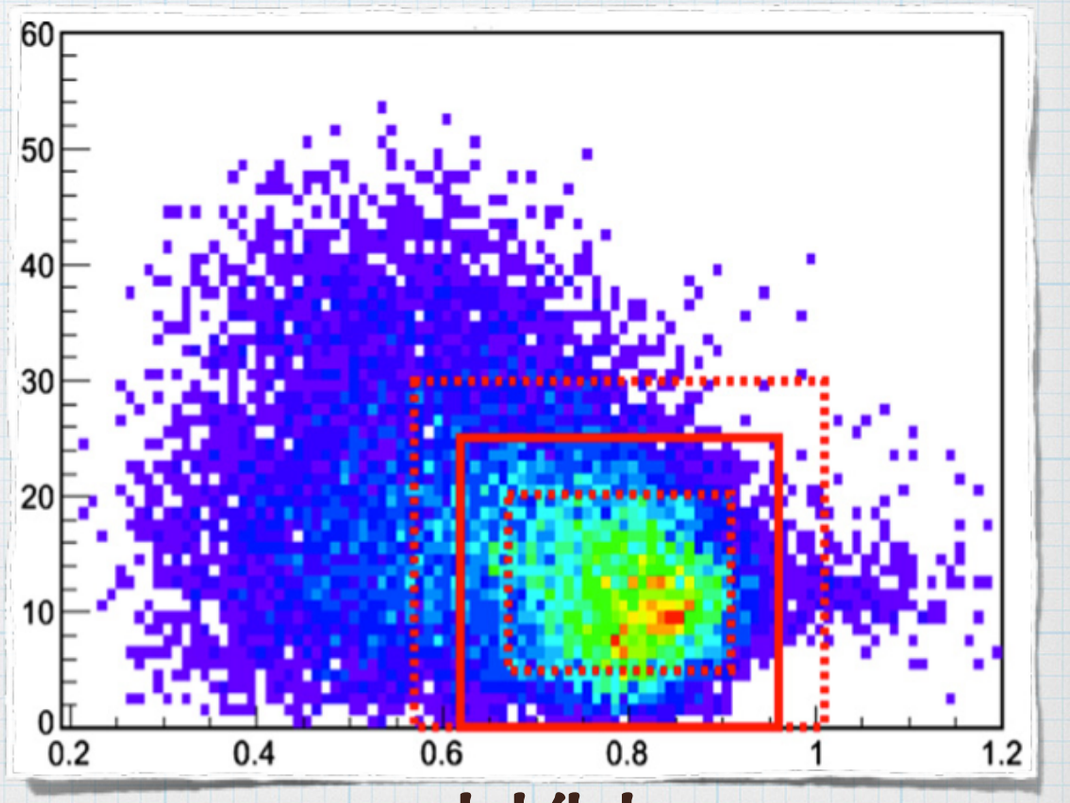
[$Q^2 > 1.5$ (GeV/c)^2]



Leading proton

$\theta_{pq} < 25^0$

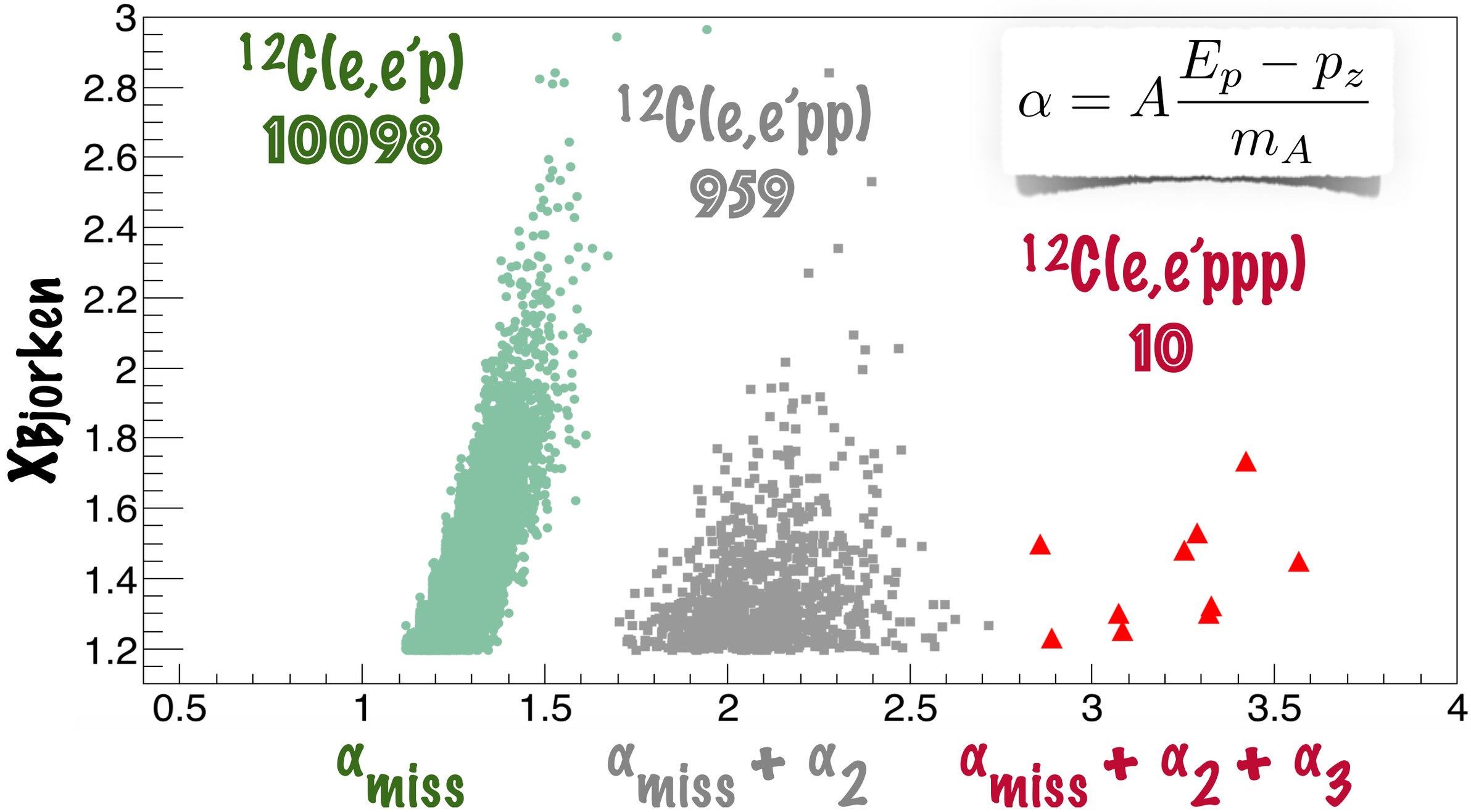
$0.62 < |p|/|q| < 0.96$



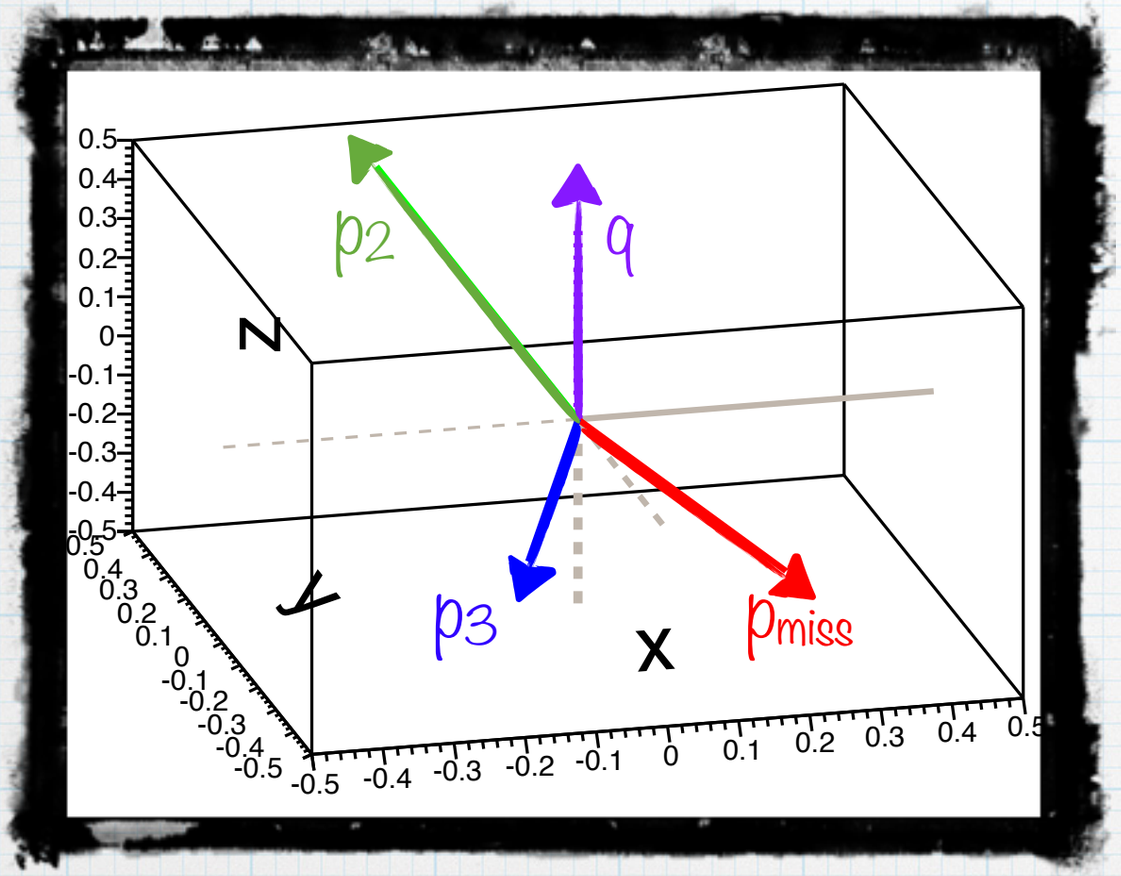
(e,e'ppp) events selection

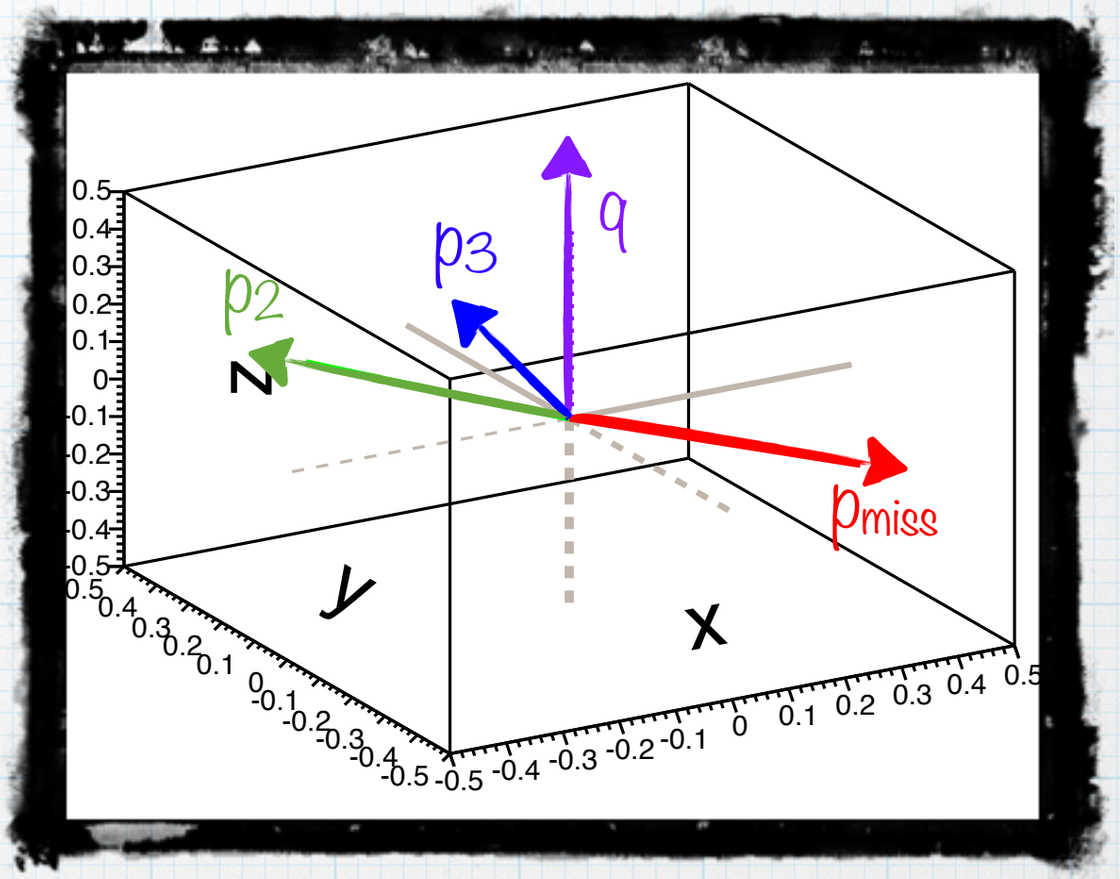
(e,e'p) events, in which two recoil protons are detected, with momenta > 0.3 GeV/c.

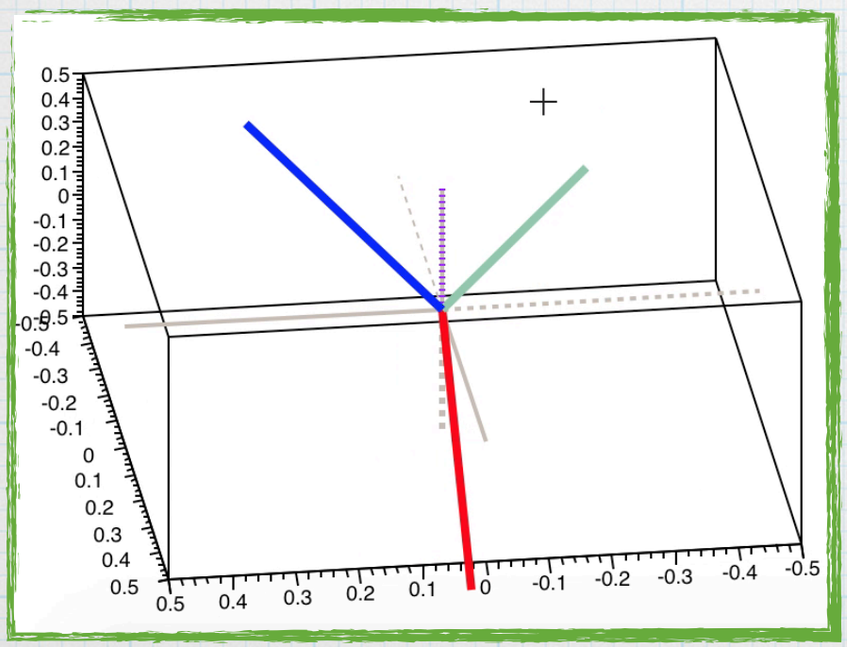
LC fraction for ^{12}C(e,e'p/pp/ppp) events in SRC kinematics

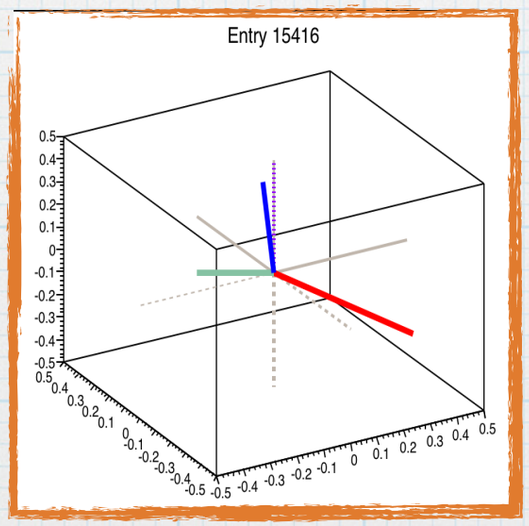


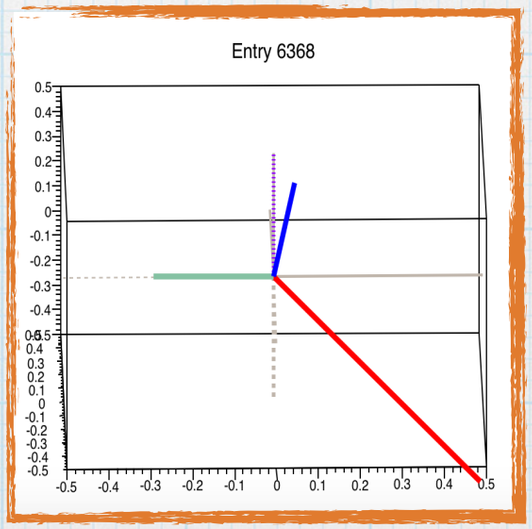
Characterize ppp-SRC candidates

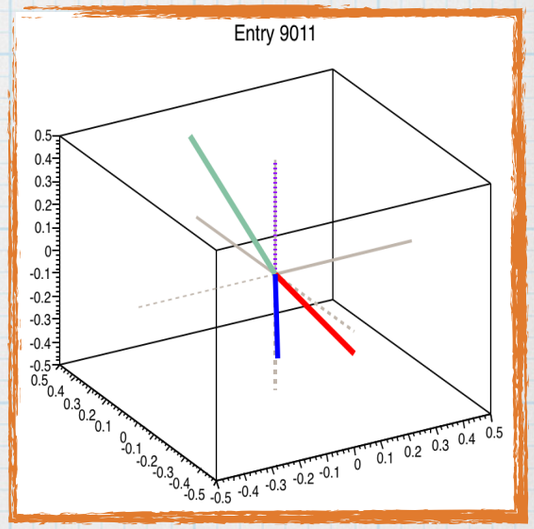








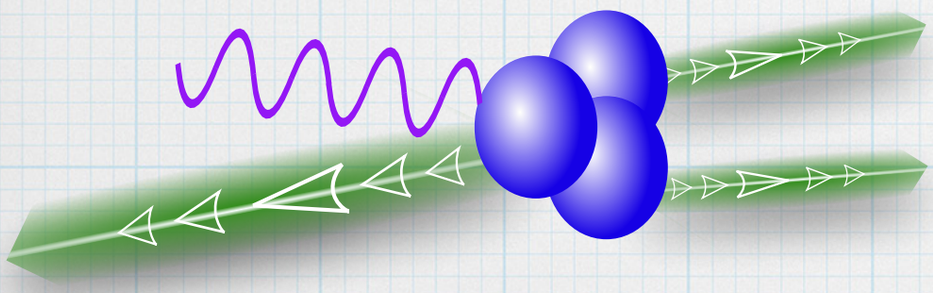




Where are the co-linear events ????

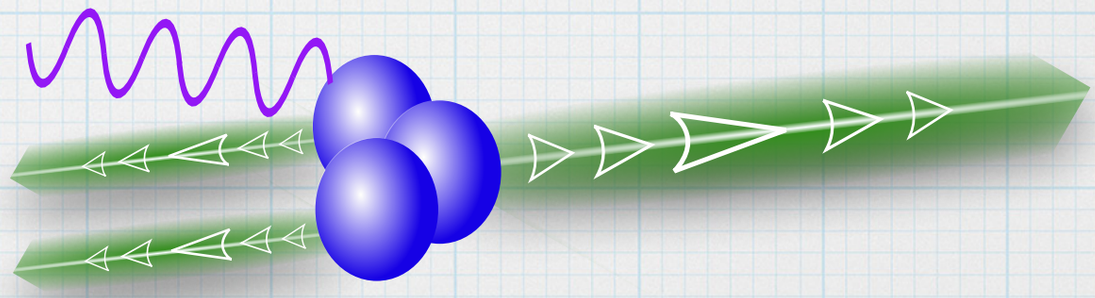
* Detector acceptance - **most probably NOT** (previously studied for CLAS).

* Physics?



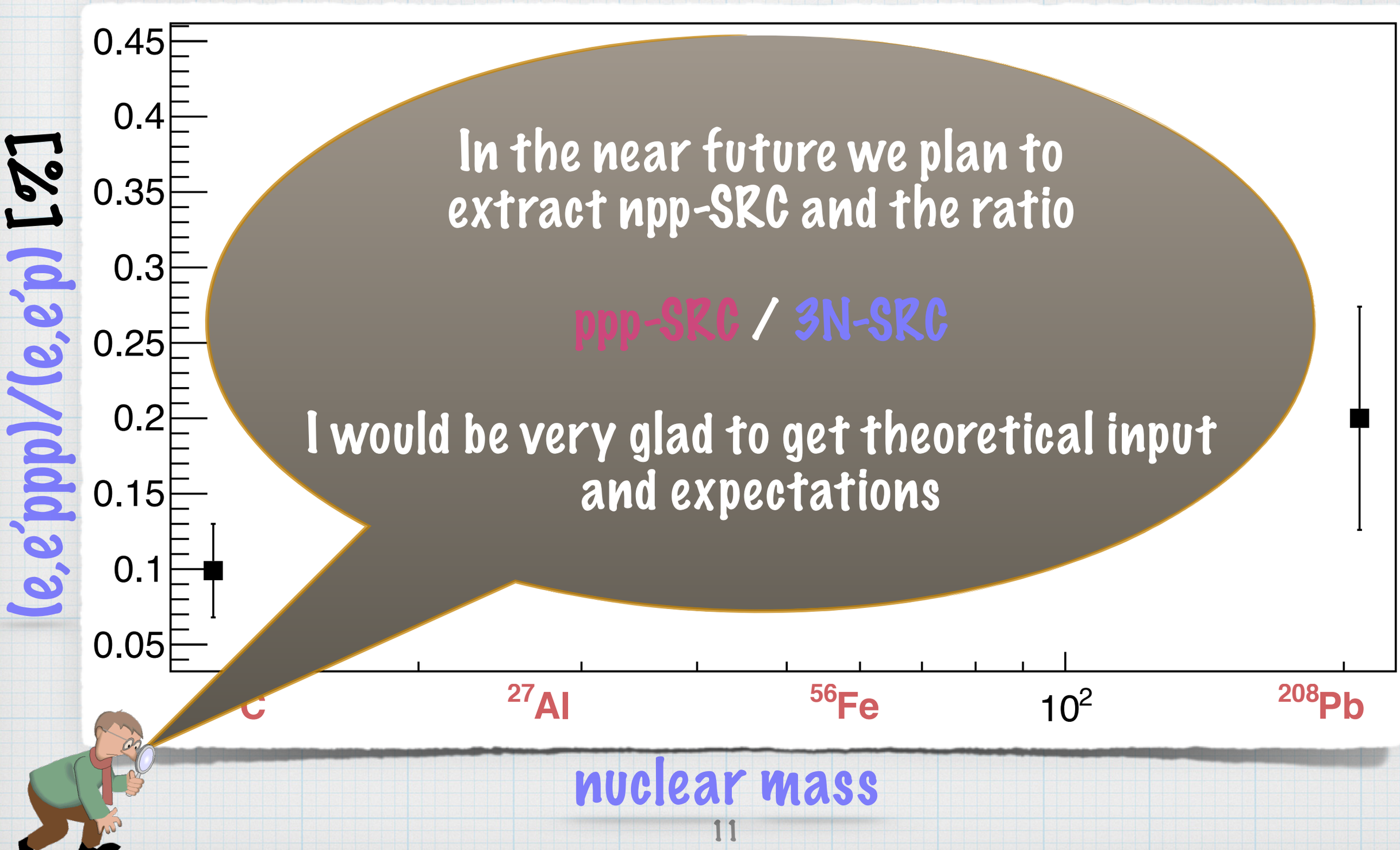
2N-SRC with large c.m.?

Close proximity tracks?

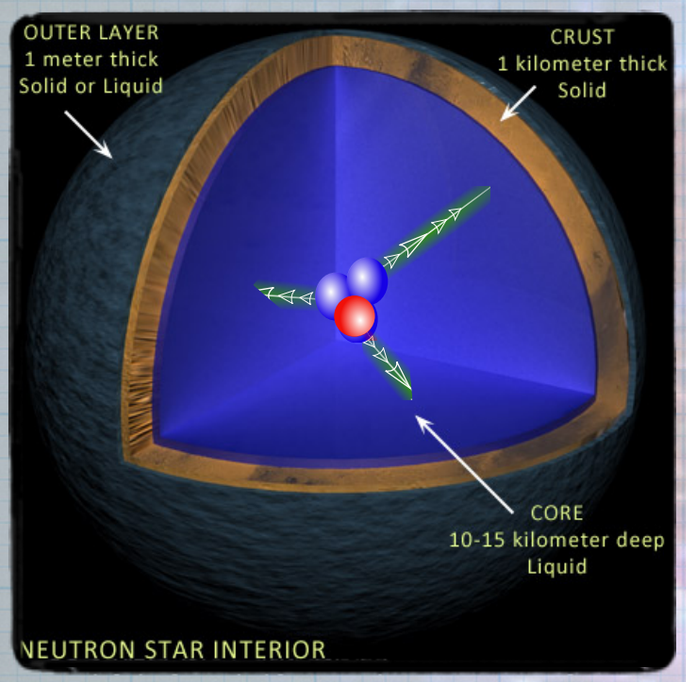


proton into inefficient area of CLAS ?

Scanning nuclear mass range



Implications: n-star



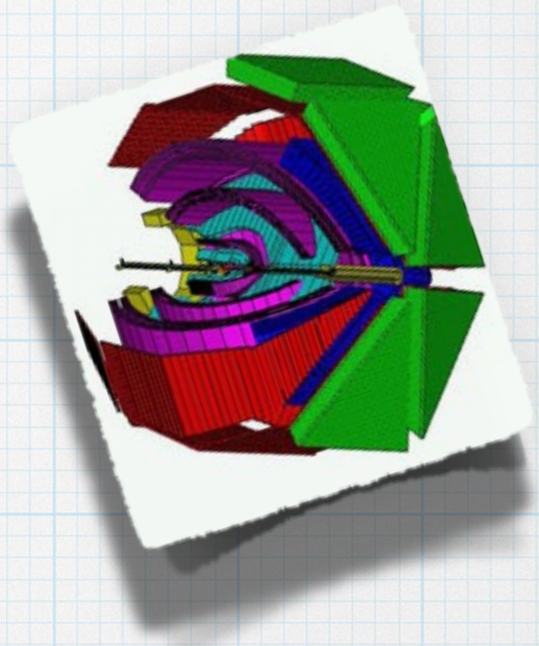
~ 90% n, ~ 5-10% p

$\rho_{\text{n-star}} > \rho_{\text{nucleus}}$

#nnn trios > #nnp trios

Measurements of ppp+npp would teach us Isospin structure of 3N-SRC & impact of nnp-SRC (?)

Future plan



* Apply Acceptance corrections.
* Characterize the ppp-SRC kinematics (angles, c.m. momentum etc.)
* Play the same game with A(e,e'npp) events.

Thank you for your time…

Comments/Suggestions/Questions:
cohen.erez7@gmail.com

Scanning nuclear mass range

Nucleus	^{12}C	^{27}Al	^{56}Fe	^{208}Pb
(e,e'p)	10098	3535	11650	3568
(e,e'ppp)	10	9	43	7
$\frac{(e,e'ppp)}{(e,e'p)}$	9.9×10^{-4}	2.5×10^{-3}	3.7×10^{-3}	2.0×10^{-3}
+/-	3.1×10^{-4}	8.4×10^{-4}	5.6×10^{-4}	7.4×10^{-4}