



Double Coincidence (e,e'p) in a Correlations Dominant Regime

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Short Range Correlations

An important task of nuclear physics is the study of the strong interaction between protons and neutrons within the nucleus.

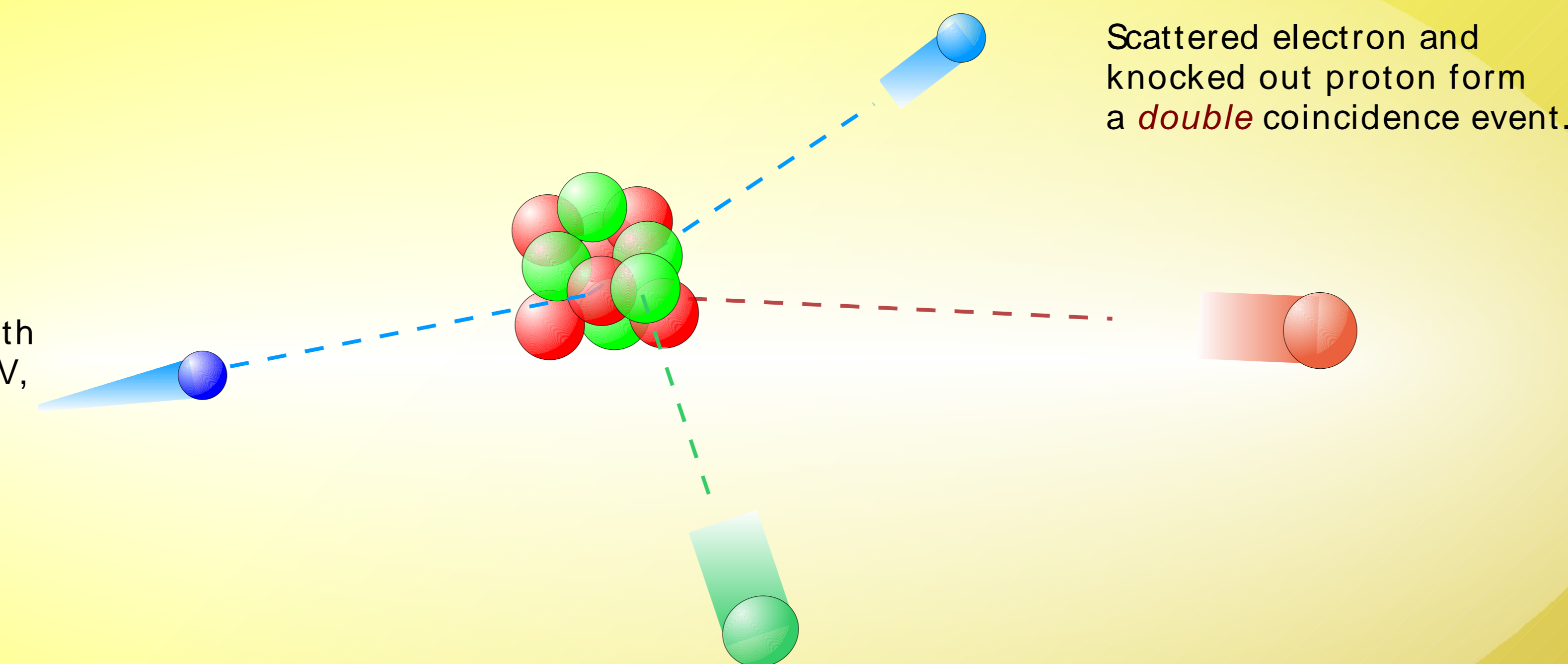
¹²C(e,e'pN) Experiment

Experiment E01-015 performed in Hall A at JLab to investigate *short range correlations* in carbon.

Kinematics chosen to produce a correlations dominant regime, while minimizing final state interactions, meson exchange currents and isobar configurations.

- ➔ $X_B > 1$
- ➔ $Q^2 = 2 \text{ (GeV/c)}^2$

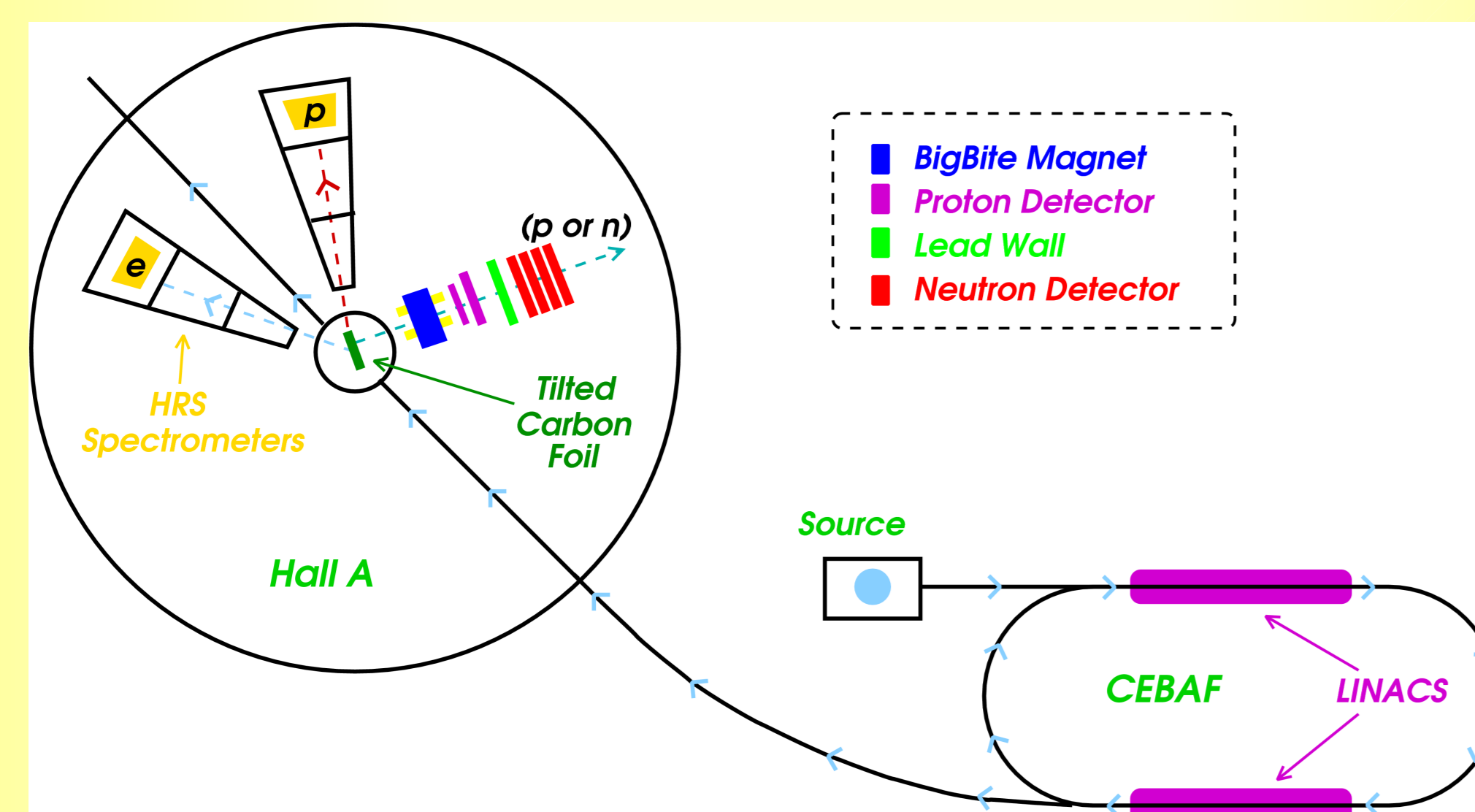
Incident electron with energy of 4.627 GeV, with $X_B \sim 1.2$ at $Q^2 = 2 \text{ (GeV/c)}^2$.



A *correlated partner* nucleon recoils; proton-proton, proton-neutron and neutron-neutron correlations possible.

JLab

The Thomas Jefferson National Accelerator Facility generates a continuous wave electron beam – an ideal probe for investigating the nucleus at extremely small distance scales.

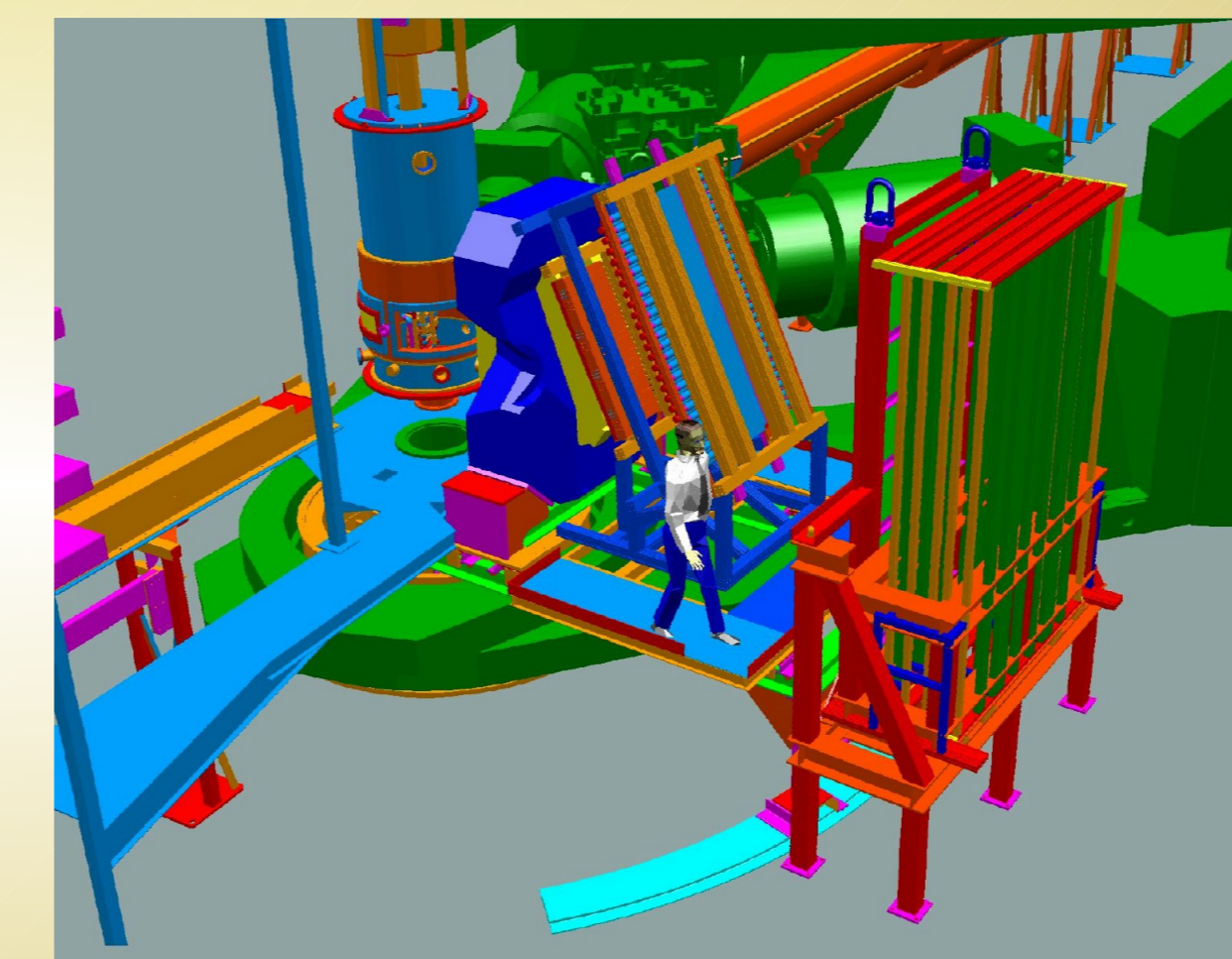


Note the carbon foil target was tilted to minimize the material being traversed by the ejected partner nucleon

BigBite

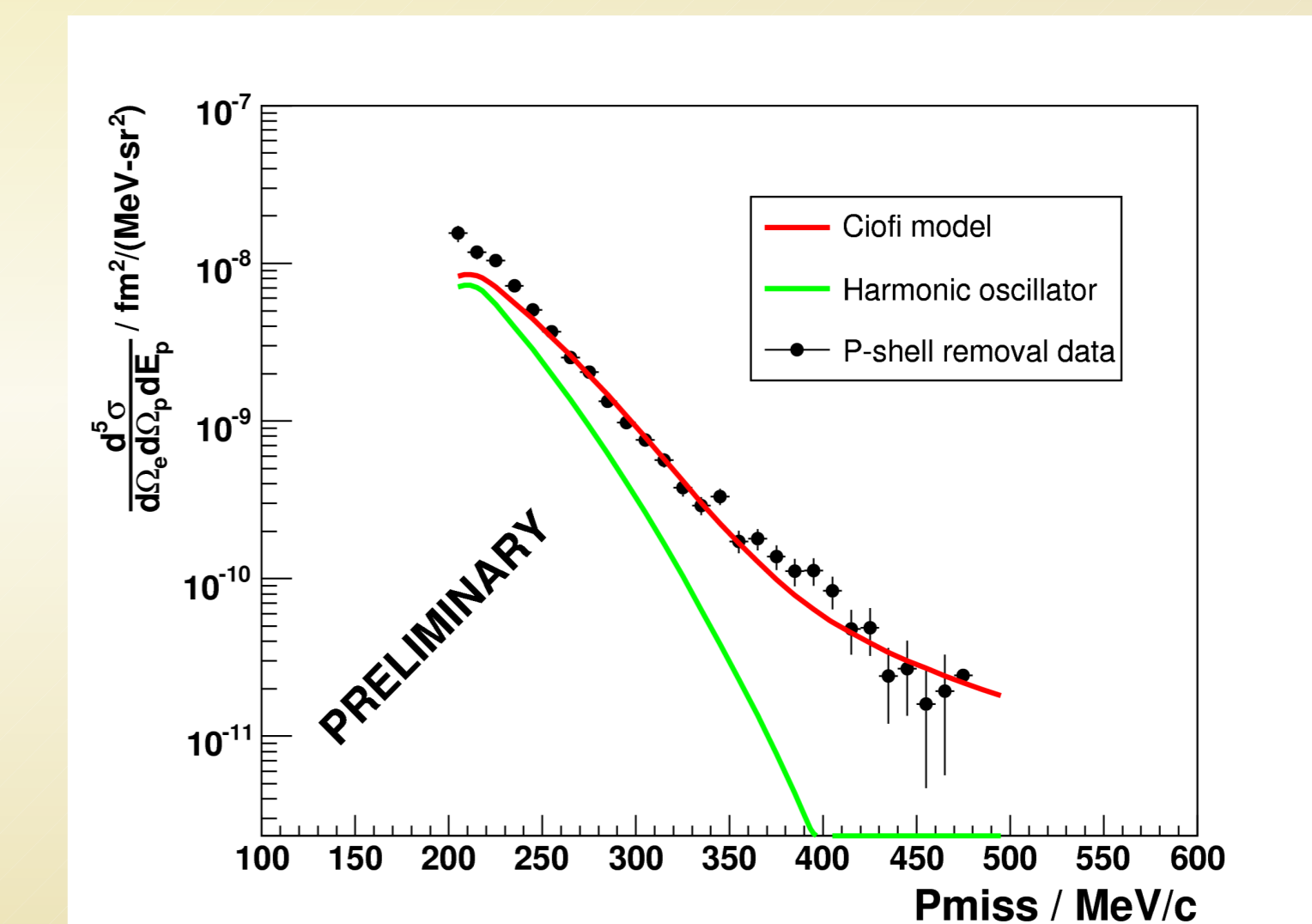
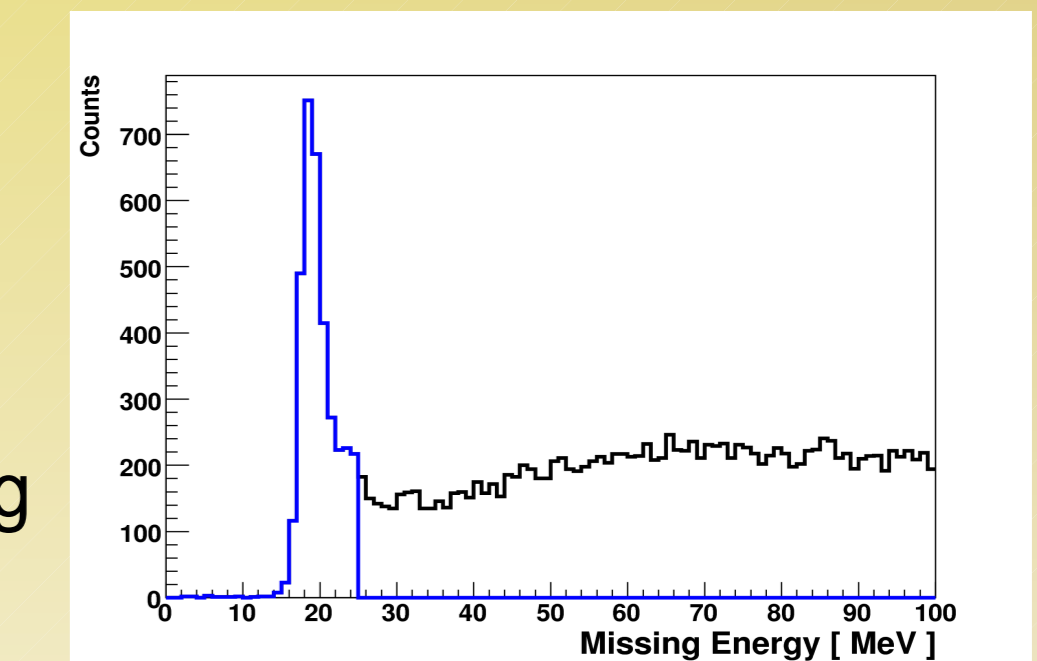
This experiment makes a *triple* coincident measurement, using both high resolution spectrometers in Hall A and a third, large acceptance spectrometer called *BigBite*.

- Non-focusing dipole magnet – 16x larger acceptance than HRS
- Charged particle detector – 3 scintillator planes.
- Neutron detector – 4 scintillator planes + veto layer.



¹²C(e,e'p)¹¹B Double Coincidence

¹²C(e,e'p) data taken for the first time at $X_B > 1$. Preliminary results are shown for the P-shell removal – cut on missing energy to select events.



P-shell cross-section data shown *renormalised* to the Ciofi model (red trace) and also compared to a harmonic oscillator model (green trace). The Ciofi model includes correlations *ad hoc*; further, more detailed calculations will be forthcoming soon.

Further data for S-shell removal and the continuum case is still being analyzed.

Further Information

BigBite website :
<http://hallaweb.jlab.org/equipment/bigbite/index.html>

Experiment website :
<http://hallaweb.jlab.org/experiment/E01-015/>