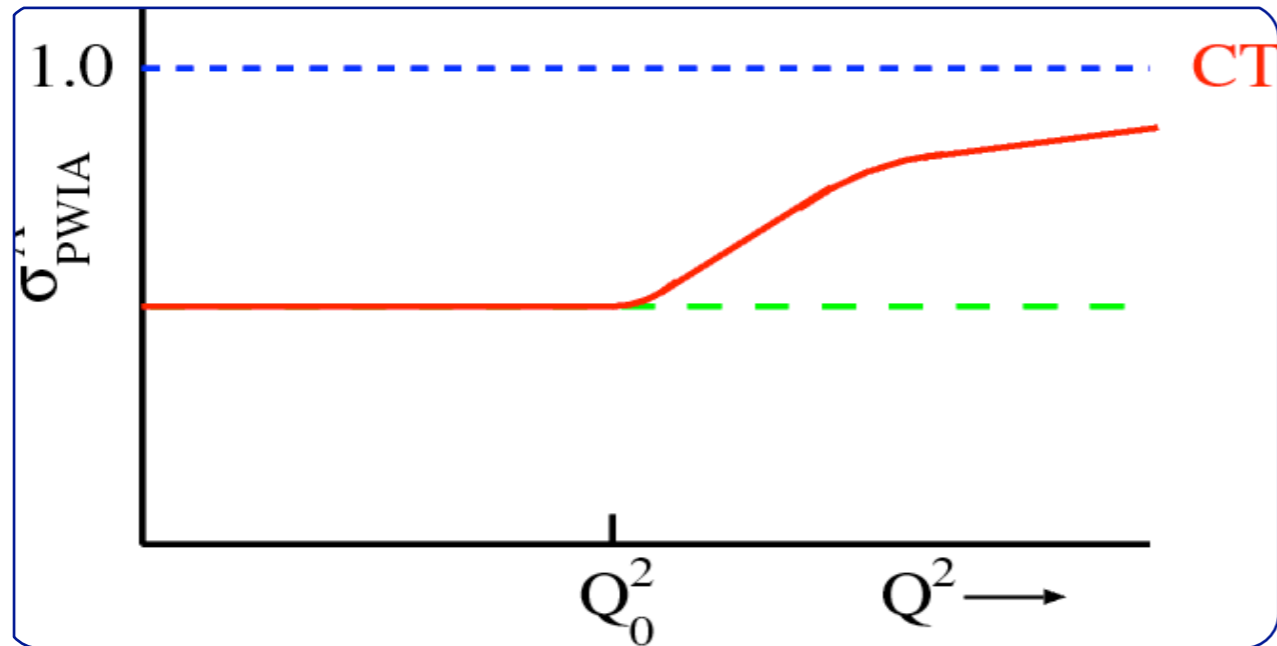


# Hadron Propagation and Color Transparency at 12 GeV

**Experiment E12-06-107: Spokespersons - D. Dutta & R. Ent**

Running only  $A(e,e'p)$  portion of experiment — 3.5 days @ 8.8 GeV & 6.5 days @ 11 GeV (total 10 days)

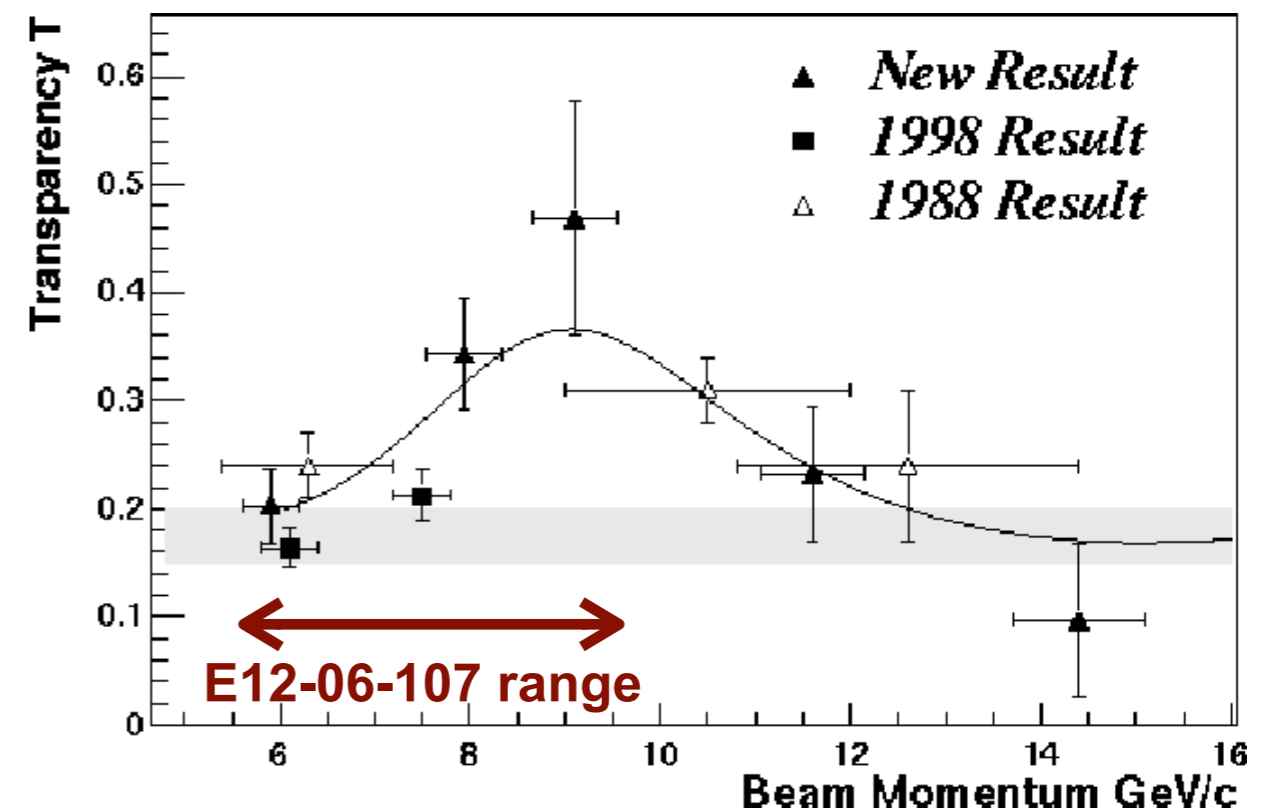


JLab Experiments have conclusively found the onset of CT in mesons, but so far there is no conclusive evidence for CT in baryons up to  $Q^2 \sim 8 \text{ GeV}^2$

CT searches at **BNL using  $A(p,2p)$**  reaction have observed a bump in the transparency. This experiment covers an energy range which overlaps with the BNL bump and will help interpret it.

CT leads to vanishing of the hadron-nucleon interaction for hadrons produced at high momentum transfers

CT is unexpected in a strongly interacting hadronic picture. But it is natural in a quark-gluon framework.



# A(e,e'p) at 12 GeV JLab

**Goal:** measure the A(e,e'p) proton knockout cross sections to extract the proton nuclear transparency up to the highest Q<sup>2</sup> at the 12-GeV JLab

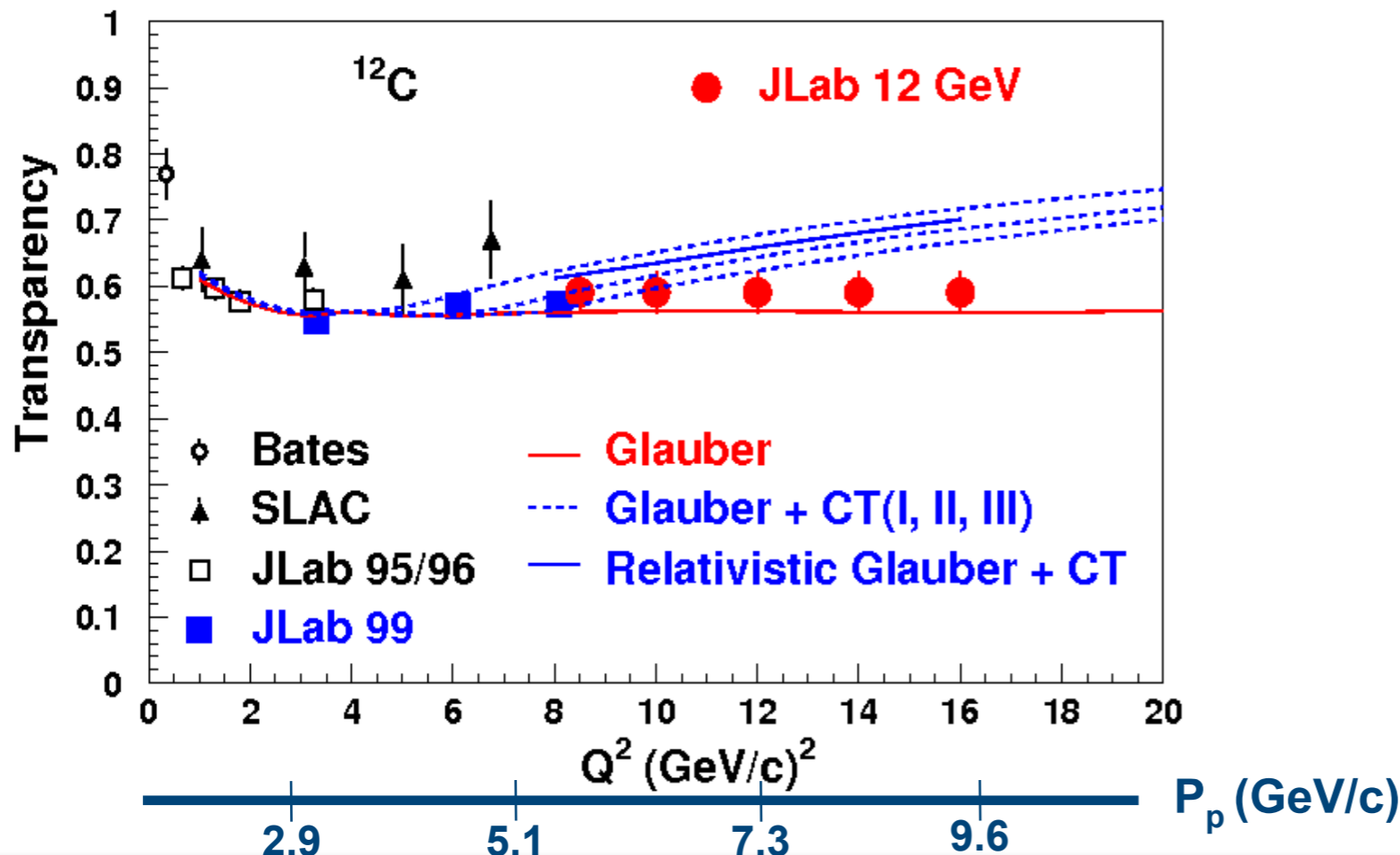
Can only be performed in Hall C with HMS+ SHMS

A(e,e'p) cross-section on <sup>1</sup>H and <sup>12</sup>C with 70uA of 8.8 & 11.0 GeV beam.

5 different Q<sup>2</sup> points (8, 10, 12, 14 & 16.4 GeV<sup>2</sup>)

HMS: electron arm  
SHMS: hadron arm

PID: Base detector package  
aerogel in SHMS (not required but can be inserted to commission)



Spectrometer and target requirements are middle of the road.

SHMS: p = 5.12 - 9.64 GeV/c  
θ = 10 - 22.7 deg

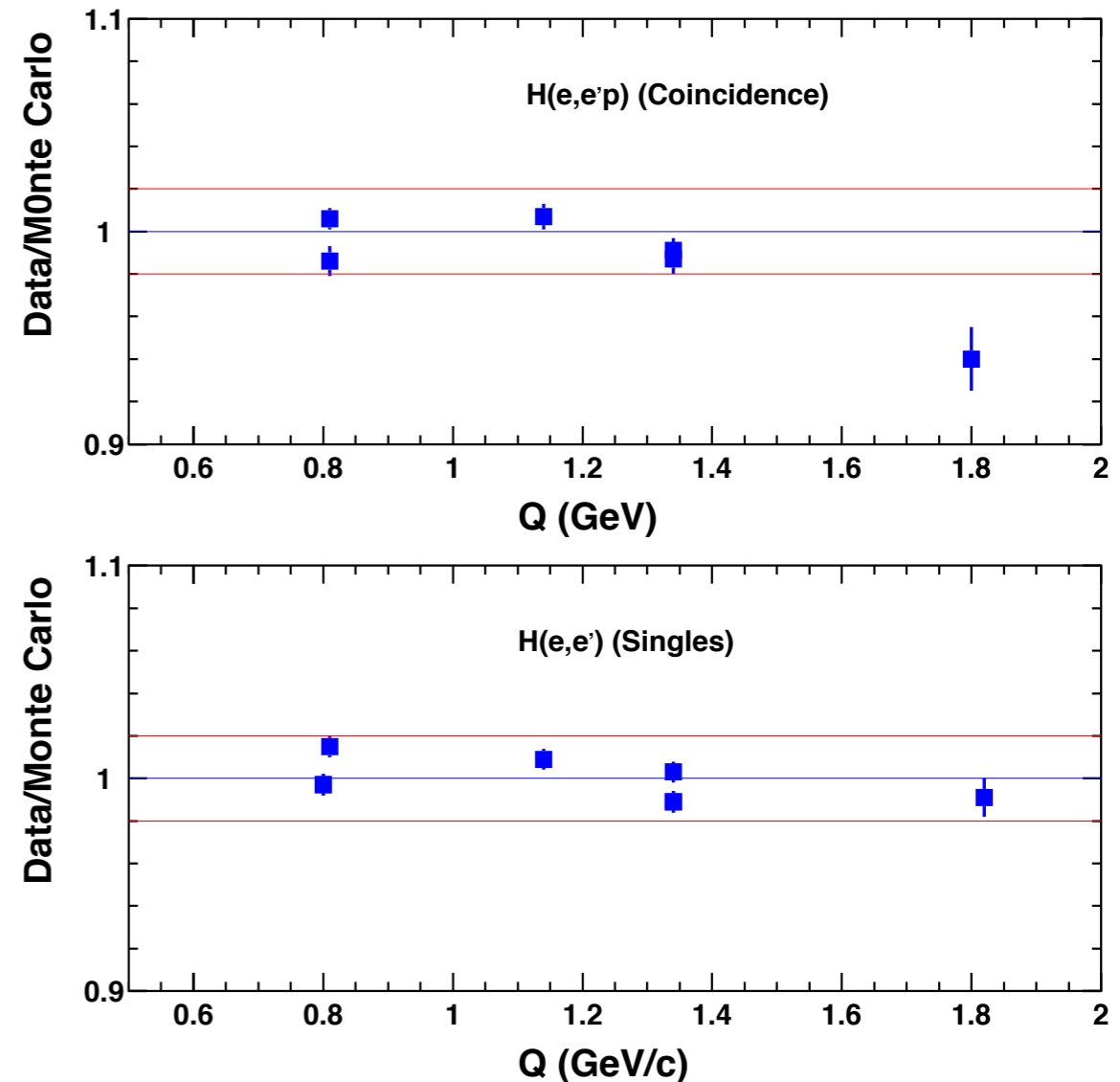
HMS: p = 2.25 - 4.53 GeV/c  
θ = 25.9 - 48.1 deg

Targets: 10 cm LH<sub>2</sub> & empty thick and thin Carbon

# $A(e,e'p)$ is an ideal commissioning experiment.

- $H(e,e'p)$  process critical for SHMS commissioning is part of the experiment.
- The Hall C Monte Carlo simulation SIMC was built for the  $A(e,e'p)$  process.
- Analysis framework and simulation is tested and ready, online results can be used for diagnostics.

$H(e,e'p)$  results from Hall-C commissioning experiment E91-013



The 1994-95 version of simulations and analysis package was able to monitor rates online at the 10% level. We should be able to do much better now and provide a great diagnostic tool for commissioning.

# E12-06-107 Collaboration

**ANSL/Yerevan, Argonne, Catholic, Duke, Hampton, JLab, Mississippi State, Regina**

collaborators have built several of the SHMS detectors including the GEM based active collimator to be used to commission the SHMS.

subset of collaboration commissioned Hall-C in 1994

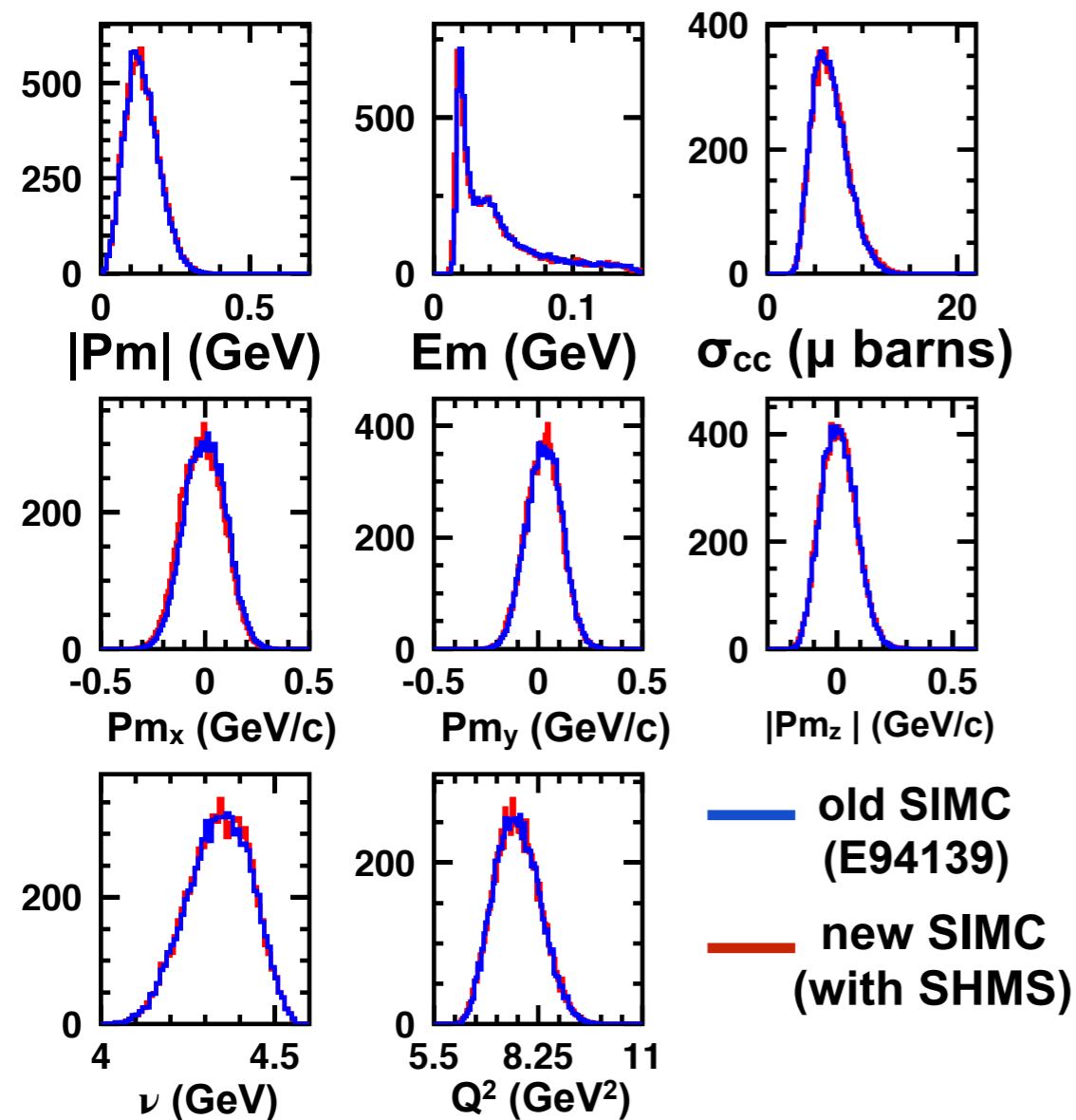
Collaboration also carried out several nuclear transparency experiments E91-013 (1994-1995), E94-139 (1999) and E01-107 (2004) with strong publications record from these experiments (2 PRLs, 6 PRCs (1 as rapid comm)).  
373 citations, 5 articles with over 50 citations each

Scheduled for 10 PAC days or ~ 60 shifts  
over 25 collaborators => expect less than 5 shifts/person

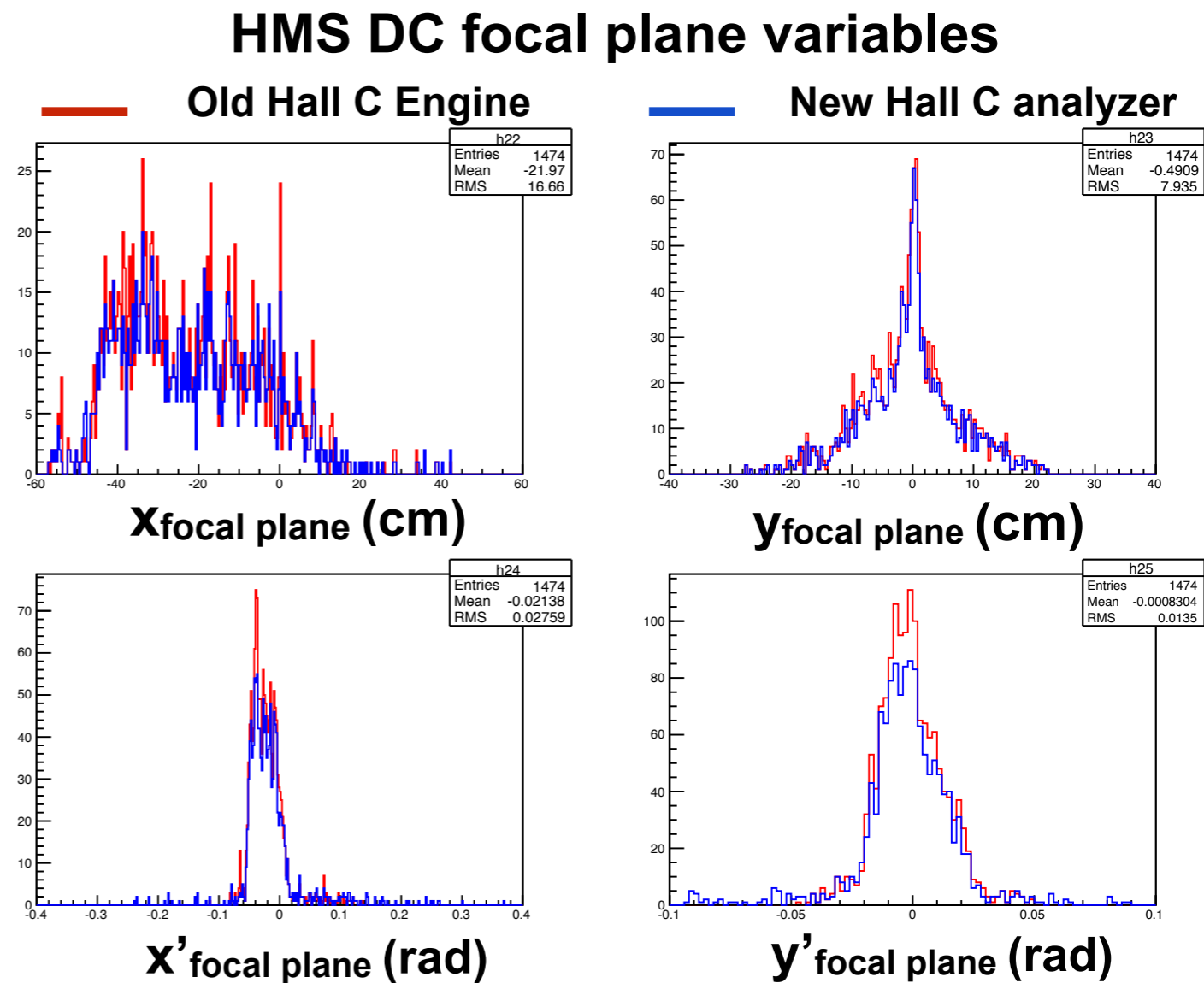
1 thesis student - Deepak Bhetuwal (MSU)  
1/2 post-doc (MSU) dedicated to this experiment  
extensive support from JLab staff and post-docs in commissioning spectrometer.

# Analysis Readiness

**E94-139 measured  $C(e,e'p)$  at  $Q^2 = 8.1 \text{ GeV}^2$   
 this is same as the lowest  $Q^2$  point for E12-06-107  
 We have used the data and simulation (SIMC) ntuples from E94-139  
 to test the new Hall-C analyzer and the new SIMC.**



SIMC is ready



Analyzer is ready