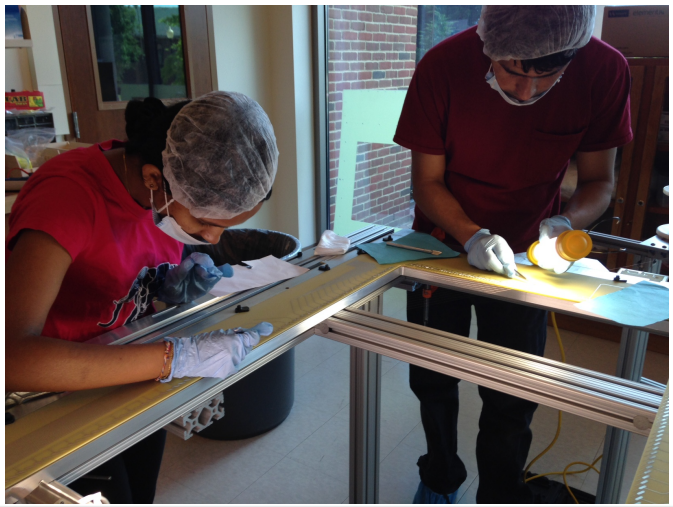
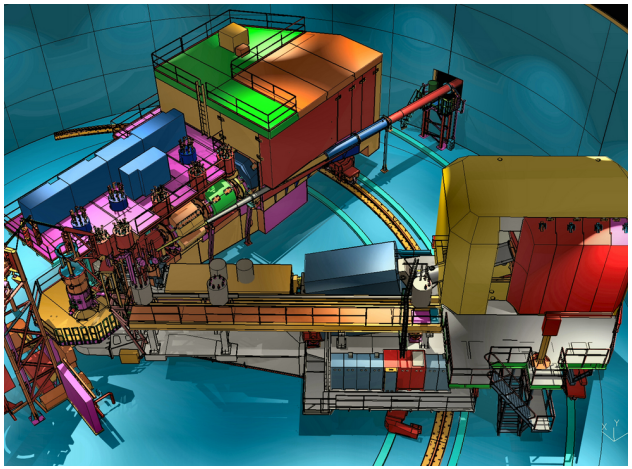
PAC44
July 25, 2016

Stephen Wood





Publications, Students, Postdocs

Polarization Transfer in Wide-Angle Compton Scattering and Single-Pion Photoproduction from the Proton
Phys. Rev. Lett. 115, 152001 (2015) (E07-002)

Precision Electron-Beam Polarimetry using Compton Scattering at 1 GeV
Phys Rev X - arXiv:1509:06642

High Resolution Spectroscopy of $^{10}_{\Lambda}$Be
Phys. Rev. C 93, 034314 (2016) (E05-115)

Measurements of the Separated Longitudinal Structure Function F_L from Hydrogen and Deuterium Targets at low Q^2
ArXiv:1606.02614 (E00-002)

Spectroscopy of neutron-rich hypernucleus, $^{7}_{\Lambda}$He by electron beam
ArXiv:1606.09157

Direct Measurements of the Lifetime of Heavy Hypernuclei (submitted)

The Aerogel Cherenkov Detector for the SHMS magnetic spectrometer in Hall C at Jefferson Lab
ArXiv:1607.05264

SANE: Luwani Ndukum (MSU)

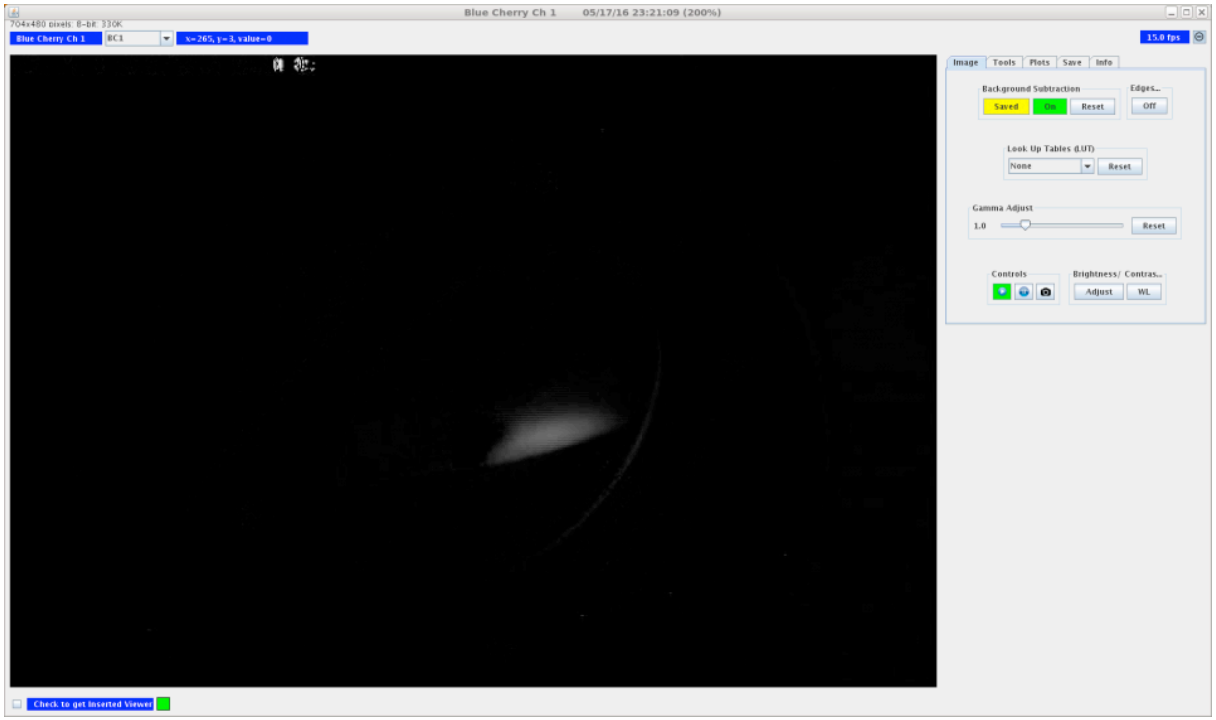
Qweak: Joshua Magee (W&M), Siyuan Yang (W&M), Joshua Hoskins (W&M), Don Jones (UVA), Emmanouil Kargiantoulakis (UVA), Juan Carlos Cornejo (W&M) (6 remaining)

Postdocs: Joint A/C/EIC: Kijun Park, Hall C postdocs: Jure Bericic, Eric Pooser

Beam in Hall

Beam delivered to Hall C dump swing shift, Tuesday, May 17

3H07 viewer



RadCon test executed Wednesday afternoon

Checked out Hall C fast raster

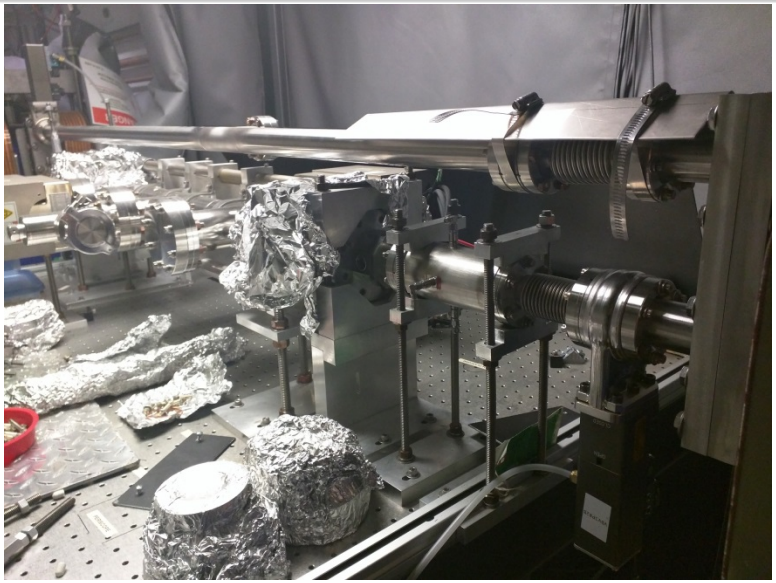
Quad polarity checks Wednesday evening

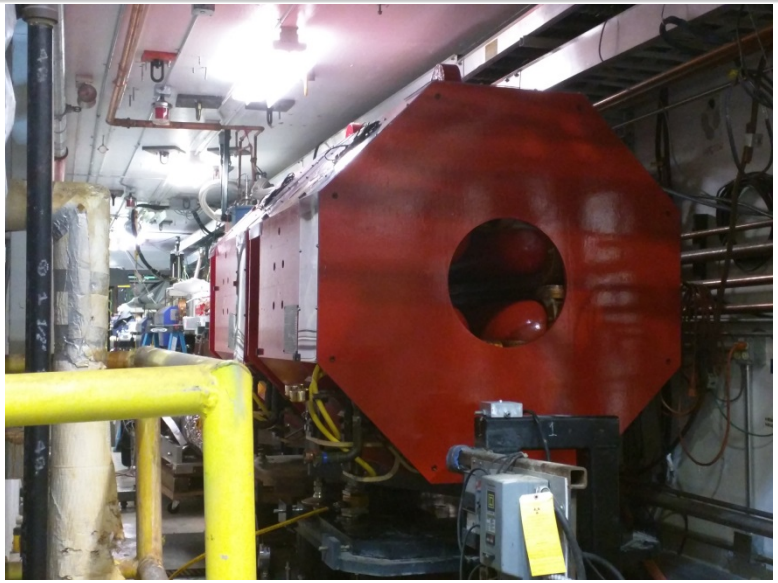
No Physics equipment tested.

https://logbooks.jlab.org/entry/3405141

Test generated punchlist of tasks to do before next beam

Compton, Moller, Beamline upgrade





SHMS Magnets

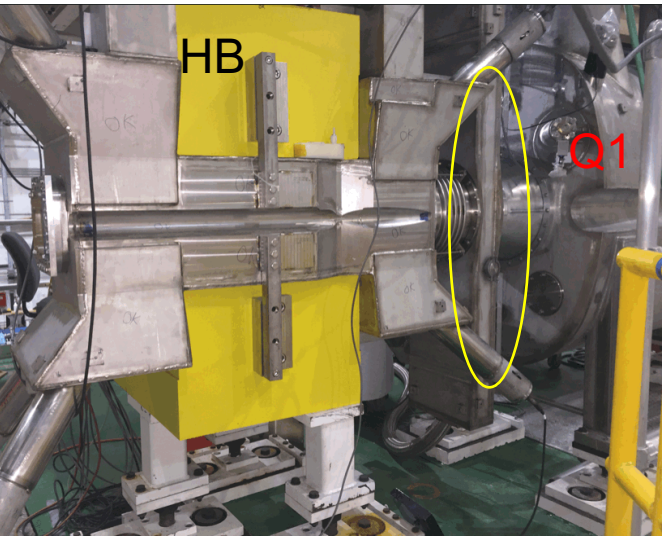
5 SC Magnets: HB, Q1, Q2, Q3, D

Q1/HB installation/testing complete, collimator box installed.

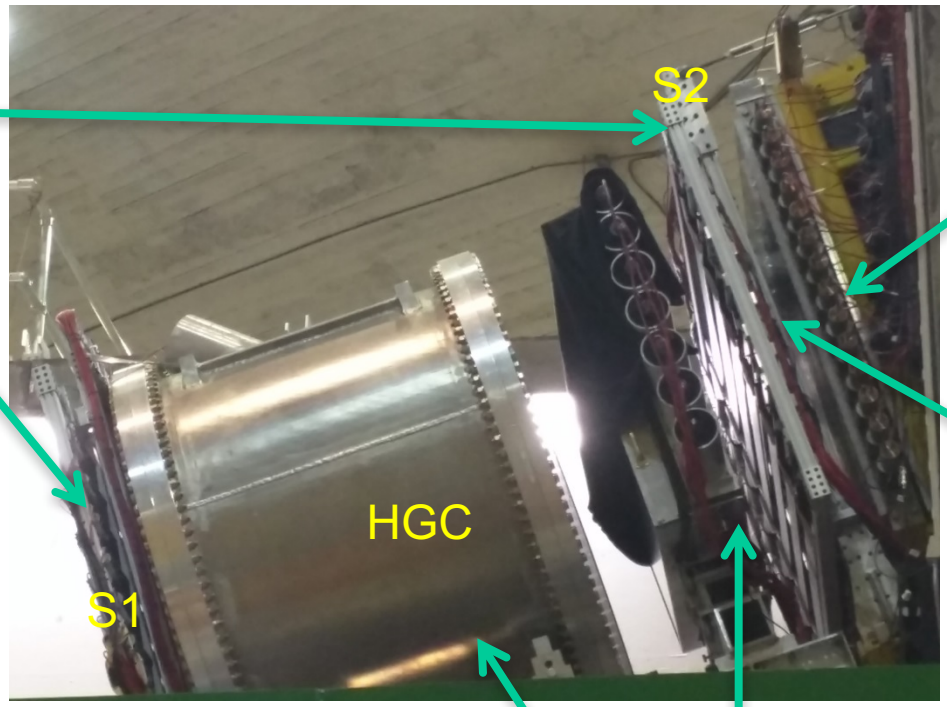
Cryocan for Dipole delivered.

Q2 done, shipping prep – Norfolk Sep 2

Dipole, Q3 ship in Sept/Oct



SHMS Detectors



S1X/Y, S2X - scintillator (JMU)

Shower Counter (Yerevan)

Detector Frames (W&M)

S2Y - quartz (NCAT)

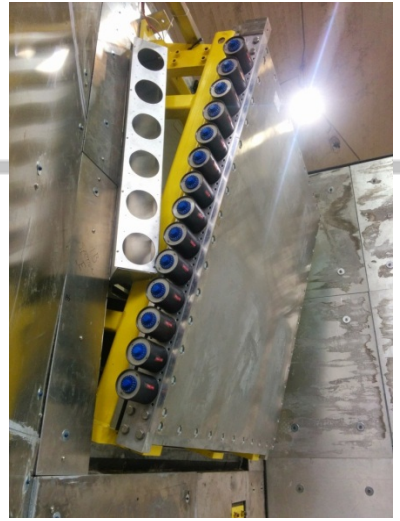
Aerogel Cerenkov (CUA MRI)

Noble Gas Cerenkov (UVA)

Heavy Gas Cerenkov (Regina)

Drift Chambers (Hampton)

SHMS Detectors



SHMS Preshower and Shower Counter installed

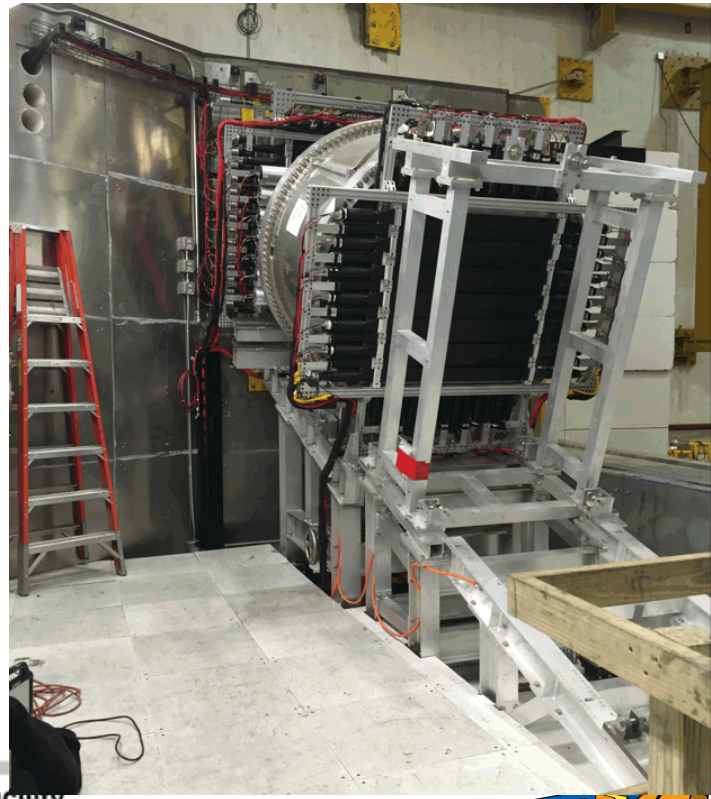
Instrumented with Flash ADC DAQ

Heavy Gas Cerenkov Installed

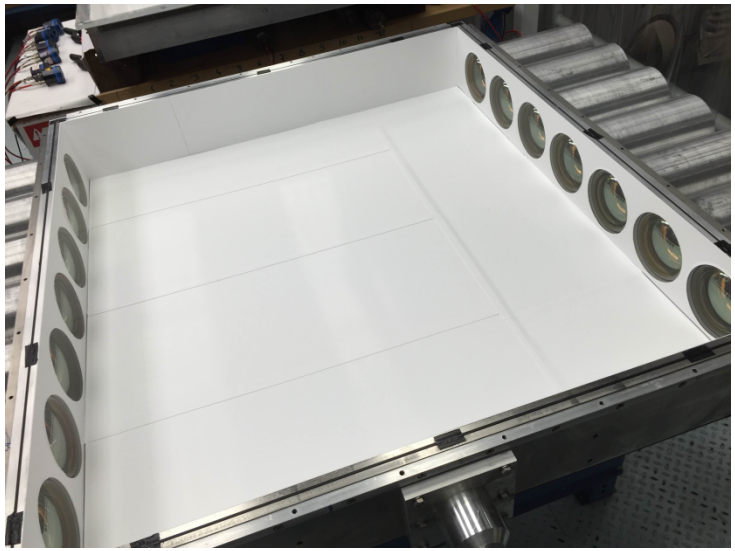
Aerogel installed

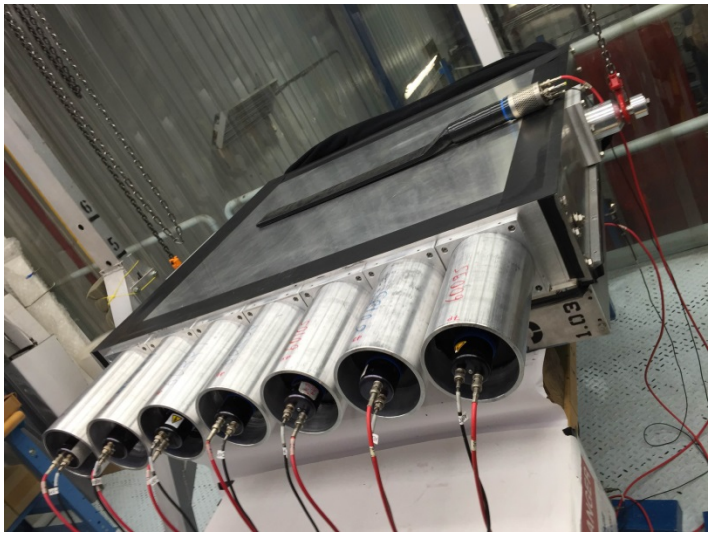
Hodoscope (scintillator and quartz) installed

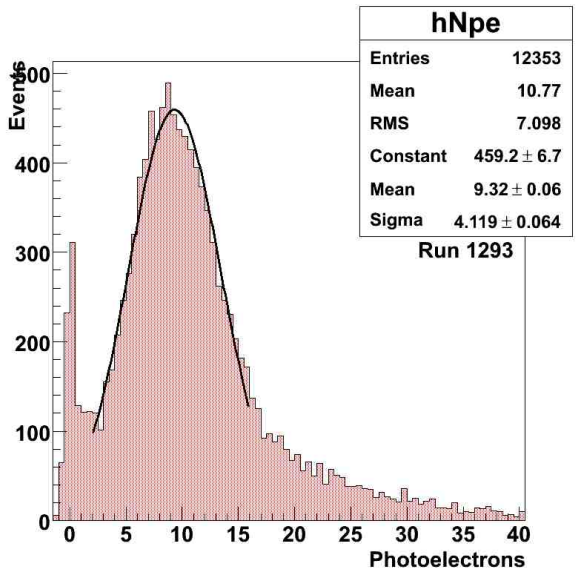
Checkout/gain matching in progress with sources and cosmics in progress.



SHMS Detectors - Aerogel







Good performance with cosmic ray tests with tray of n=1.03 Aerogel with “wrong way” muons.

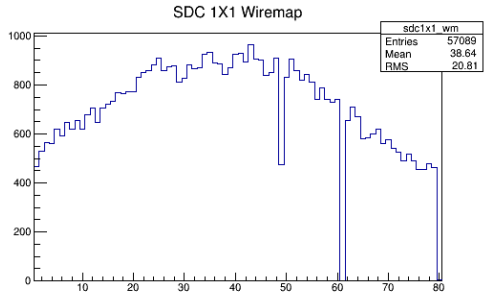
Exchangeable Aerogel trays:

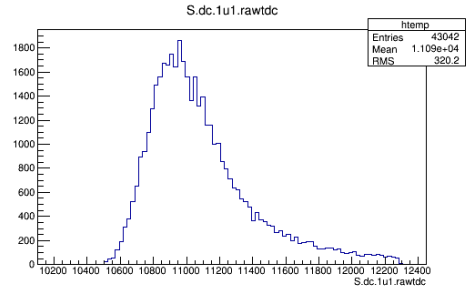
n = 1.030, 1.020, 1.015, 1.011

Now installed in SHMS

SHMS Detectors

Noble gas Cerenkov and wire chambers (2+spare) in Experimental Staging Building (Install after dipole installation?)





(Testing with 12 GeV electronics + software)

HMS Checkout and DAQ setup

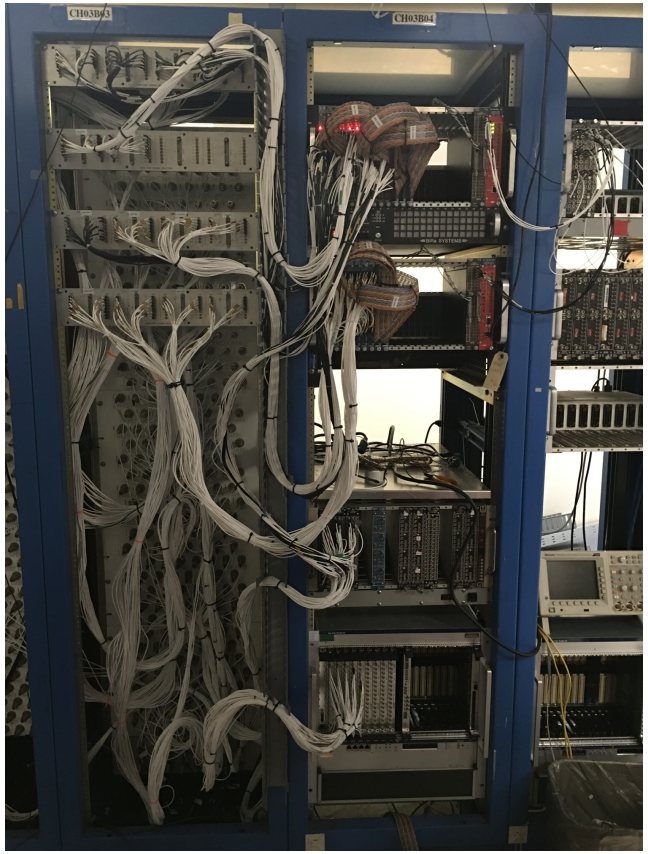
Exercising HMS magnets

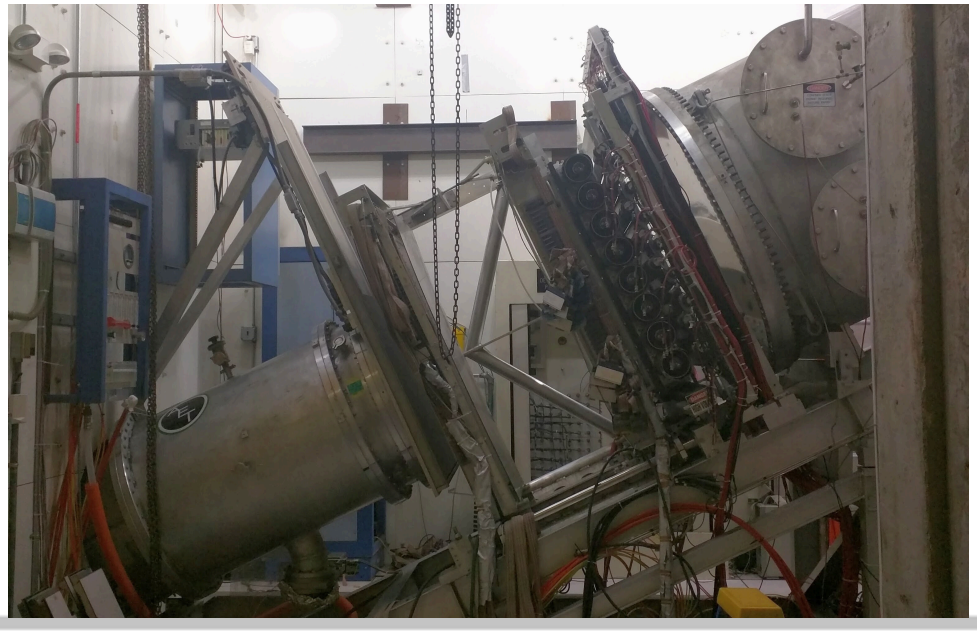
Will test to ~ 7 GeV/c

Checkout/recommission HMS detectors

Installing modern DAQ

All new front end electronics





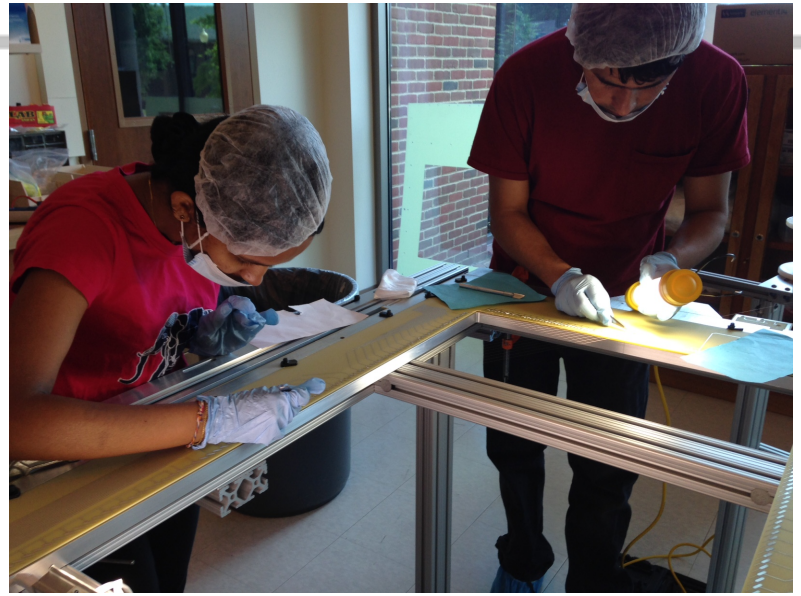
HMS Drift Chambers – repair and replacement

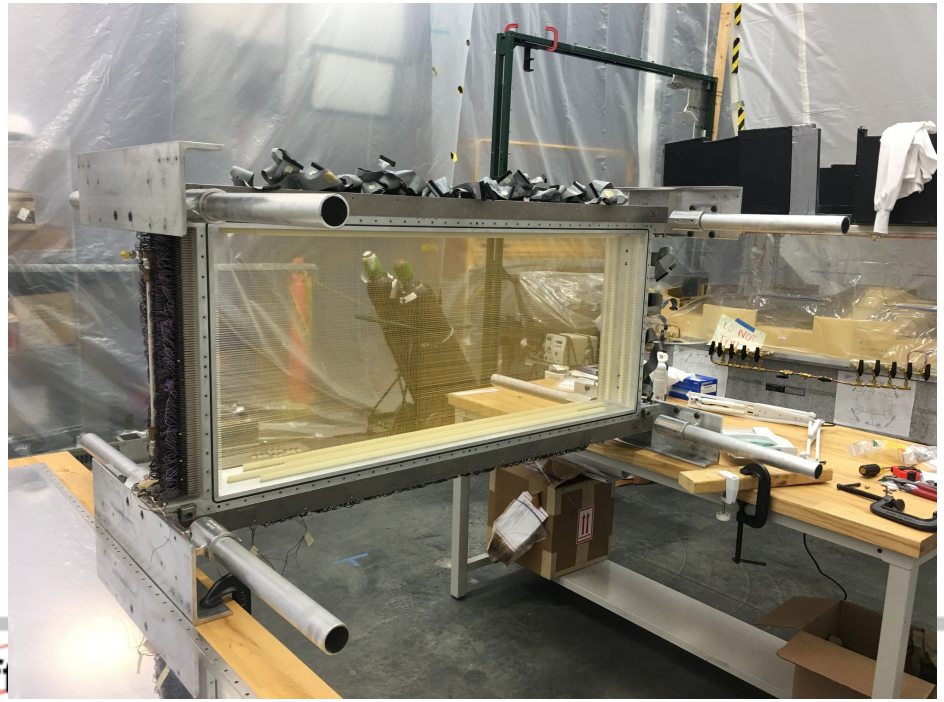
HMS Drift Chamber Chambers

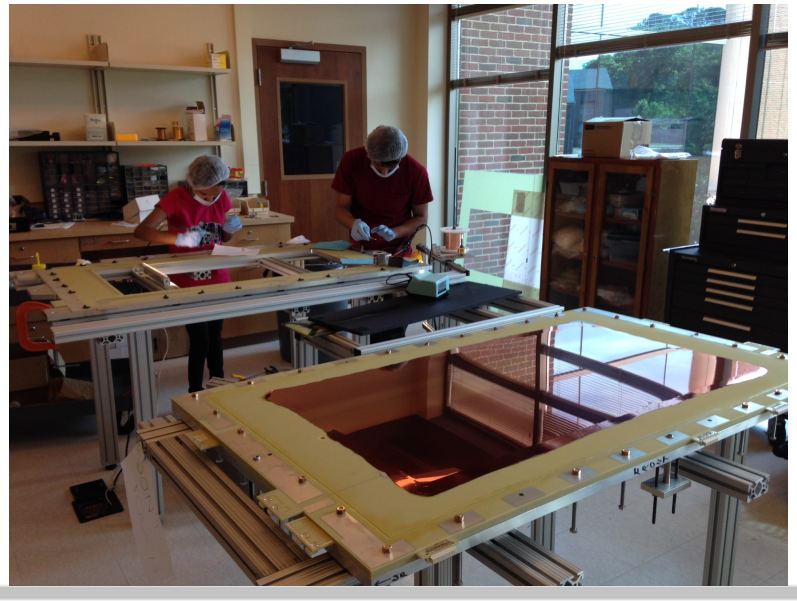
- One of two existing chambers has broken wires
- Undergoing repair

Replacement Chambers Designed

- Similar to SHMS design (XUV style)
- Under construction at Hampton U
- 1 chamber completed





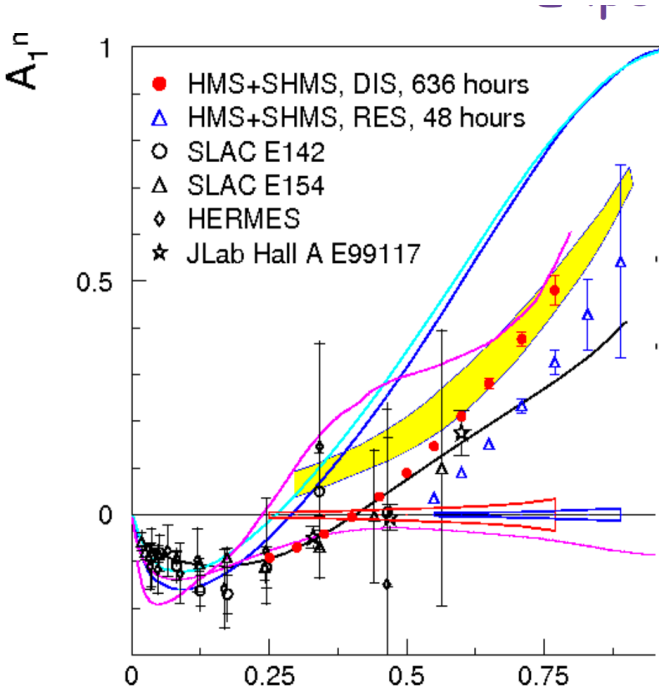


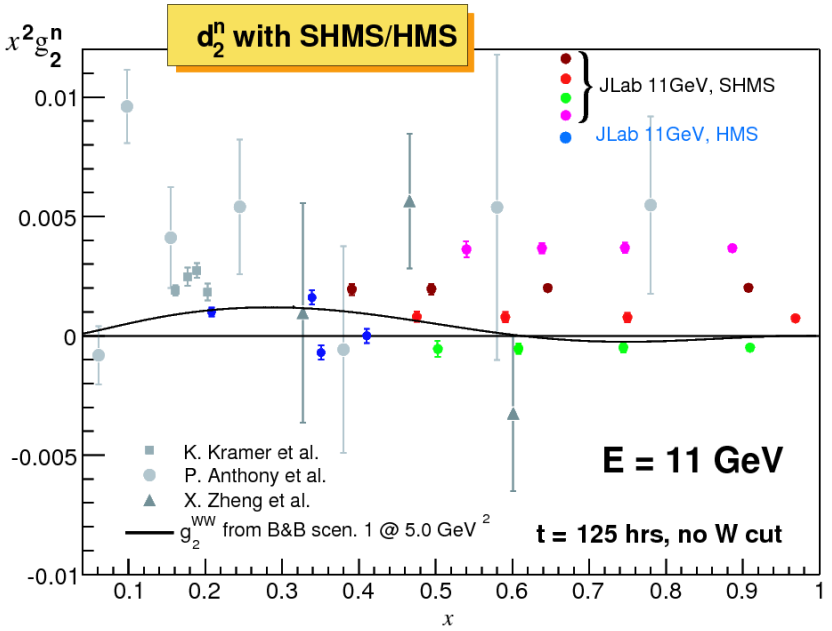
Polarized ^{3}He

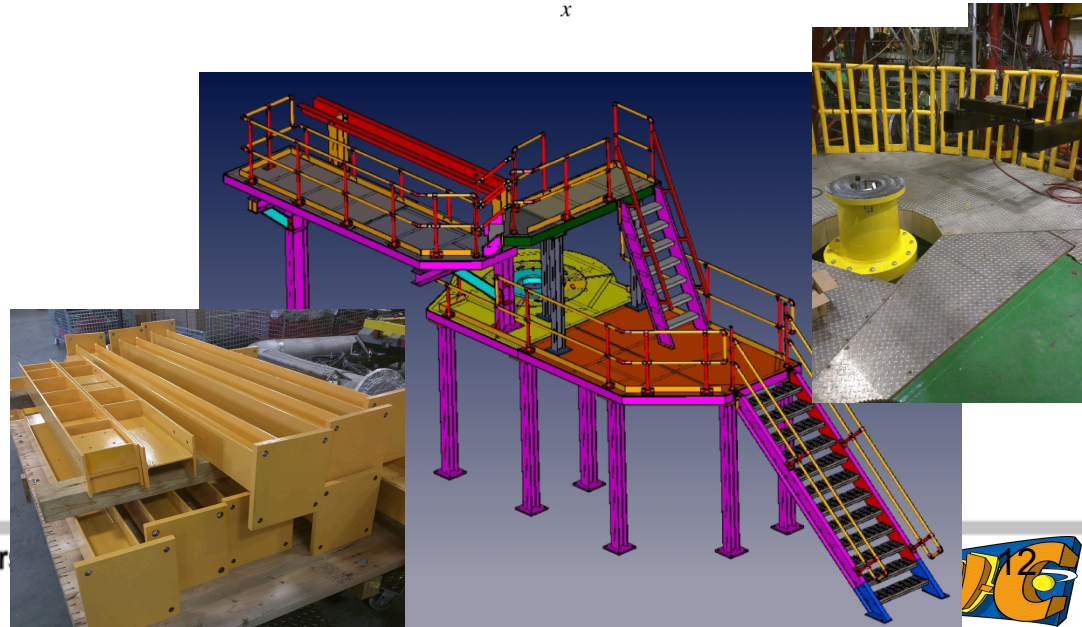
A_1^n (E12-06-110) and g_2^n/d_2^n (E12-06-121)

Preparations for polarized ^{3}He target in Hall C

- Cut and reassemble pivot post
- Access platform in fabrication
- Oven designed







LAD – Large Acceptance Detector

E12-11-007: Deuteron EMC – d(e,e' backward p)

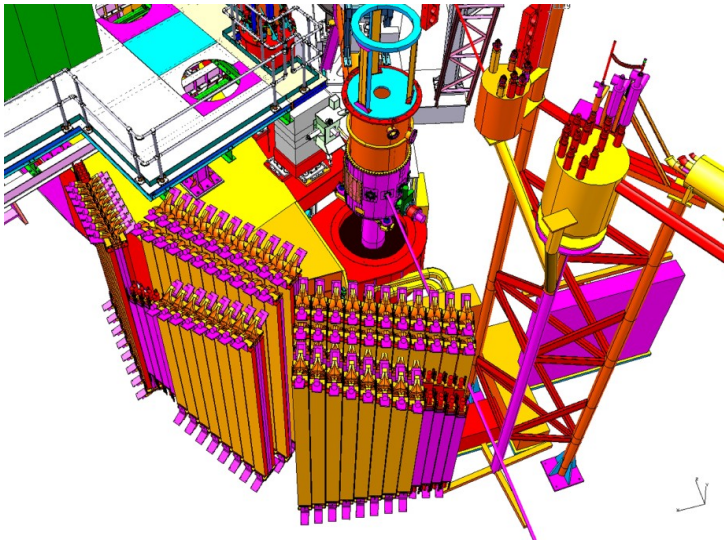
Very large solid angle for $L = 10^{36}\ \mathrm{cm}^{-2}\ \mathrm{s}^{-1}$ and $\theta > 90^{o}$

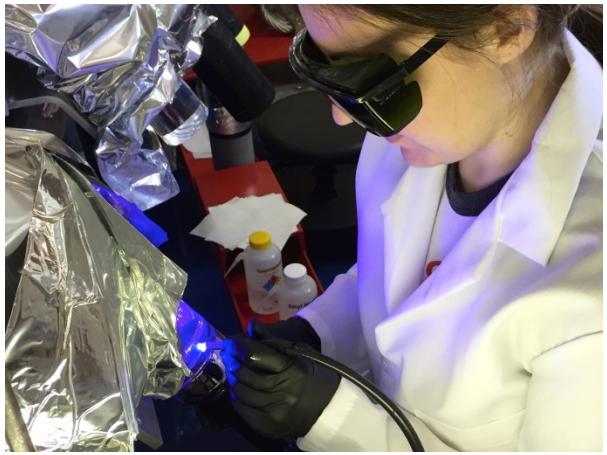
Optimized for medium momentum nucleons

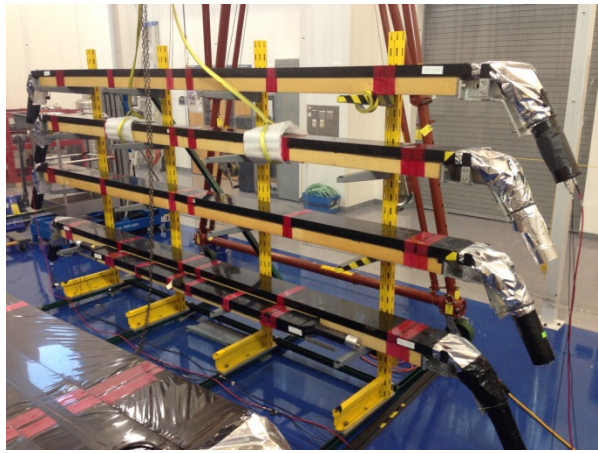
$$0.3 \leq p_N \leq 0.7\ \mathrm{GeV}/c$$

Built from old CLAS-6 TOF scintillators. Three planes refurbished @ODU by ODU, KSU, TAU, MIT, GWU. Fourth plane in progress.

Now only 5 planes needed [d(e,e'n) -> Hall B]

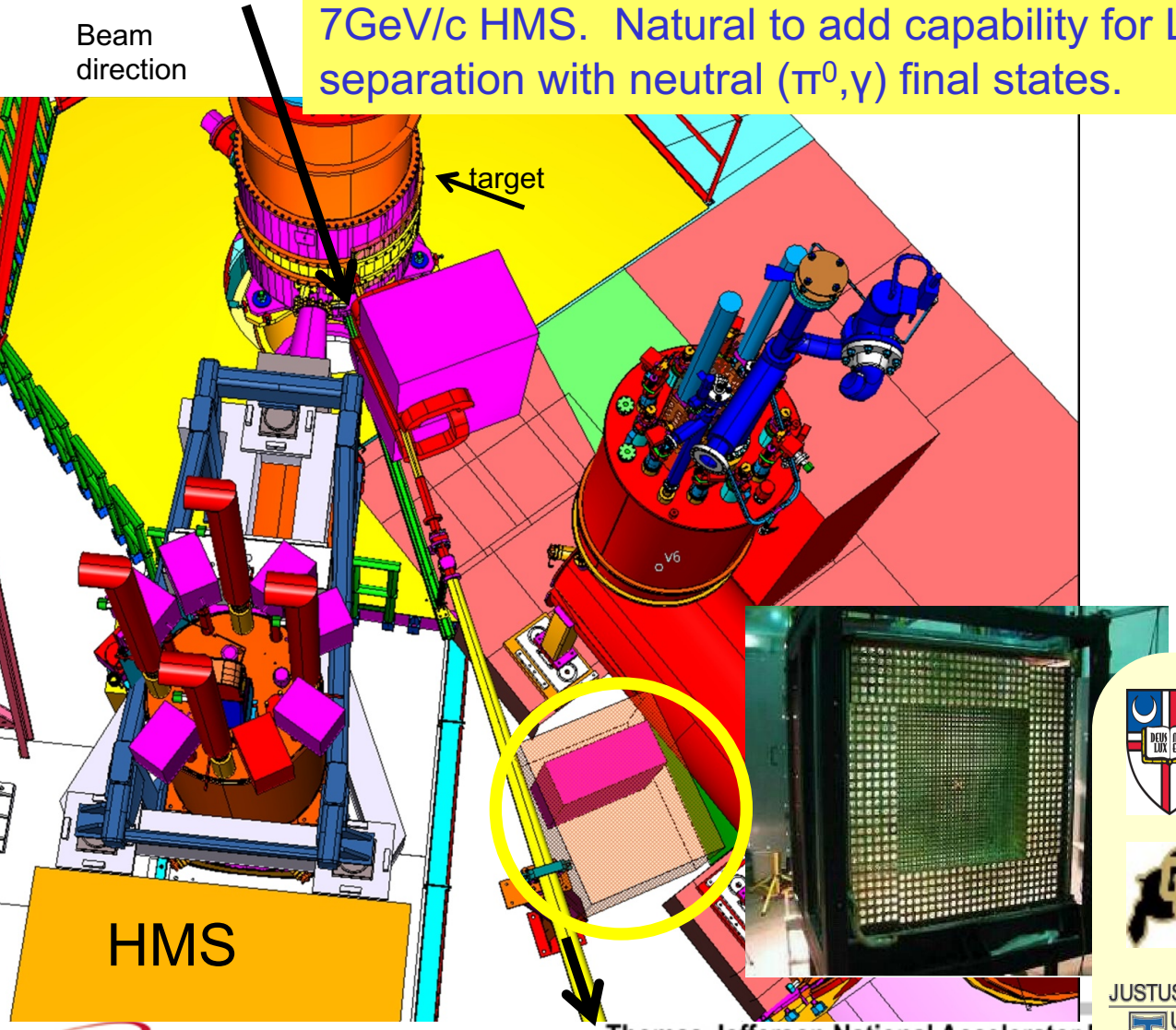


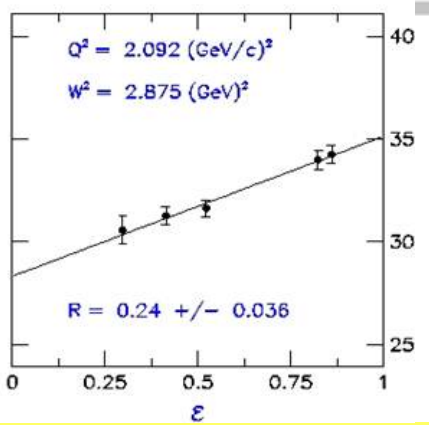




Neutral Particle Spectrometer (π^0/γ)

Hall C has unique L/T separation capability with 7GeV/c HMS. Natural to add capability for L/T separation with neutral (π^0,γ) final states.



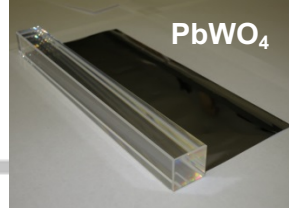


Concept: Place ~1000 block $PbWO_4$ detector on SHMS carriage with conventional sweeping magnet replacing SHMS horizontal bend.

Jefferson Lab

Thomas Jefferson National Accelerator

NPS Status



- Global design of a neutral-particle spectrometer between 5.5 and 60 degrees consists of a highly segmented EM calorimeter preceded by a sweeping magnet
- 2015 NSF/MRI funding proposal was selected for an award
  - Award will provide for NPS infrastructure, including the magnet, assuming existing crystals
  - In the ideal case the NPS would use new crystals
  - Application for UK grant with emphasis on additional equipment aimed at WACS requirements submitted
- Significant efforts of the NPS collaboration have recently been related to $PbWO_4$ crystals
  - 10+5 PbWO4 crystals produced by SICCAS have been tested for optical properties and radiation hardness; 30 more crystals on order
  - Infrastructure for crystal testing being developed at IPN-Orsay and CUA
  - Close collaboration with Giessen University on crystal evaluation, as well as Caltech and BNL

5 Experiments approved

E12-13-007: π^0 SIDIS
E12-13-010: DVCS and pi0 cross sections

E12-14-003: WACS at 8 and 10GeV
E12-14-005: Wide angle exclusive π^0

E12-14-006: Initial state helicity correlation in WACS

Hall/Collaboration developing cabling (HV/Signal, 1200@) scheme for NPS and other detectors (GeN, LAD)

Commissioning/Early Experiments

Published schedule: Feb 10-Apr 9, 2017

~25 PAC days – Commissioning "Experiment"

E12-06-107 search for color transparency

A(e,e'p) only – "easy" coincidence measurement

E12-10-002 $F_2^{p,d}$ structure functions at large x

Momentum scans help understand acceptance

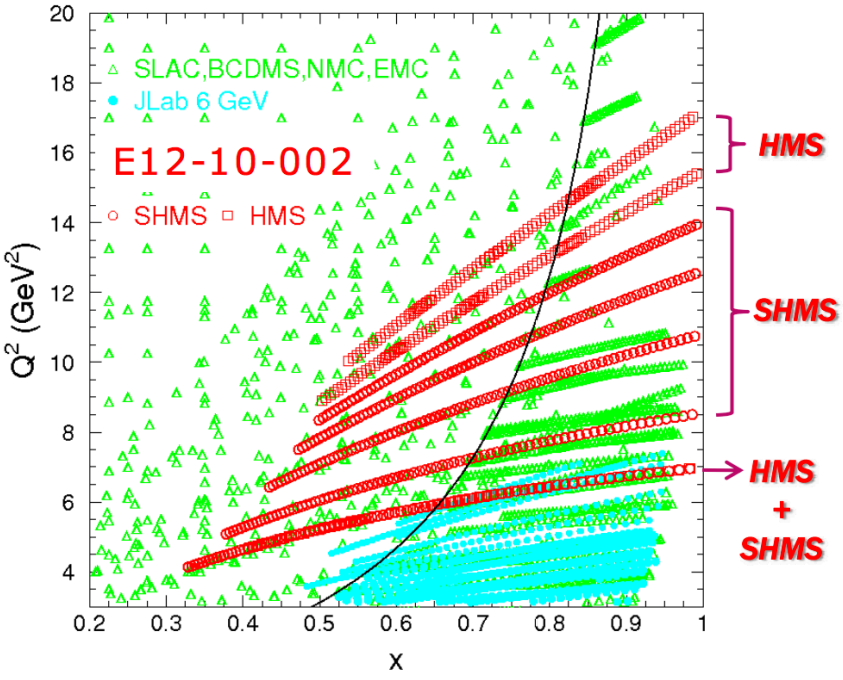
2 days E12-10-108/E12-06-105 EMC Effect, x>1

Integrate light nuclei with F_2 run,

Point target helps acceptance studies.

3 days of E12-10-003 d(e,e'p)

Push to lower cross sections



A(e,e'p) @ 11 GeV JLab

Published schedule: Apr 13 – Dec 20, 2017 (with breaks)

E12-09-017 P_t dependence of basic SIDIS cross sections

Push particle ID capabilities of SHMS

E12-09-002 Precise $\pi^+\pi^-$ ratios in SIDIS – Charge Symmetry Detector efficiencies

E12-09-011 L/T separated p(e,e'K$^+$) factorization test

Easiest L/T separation