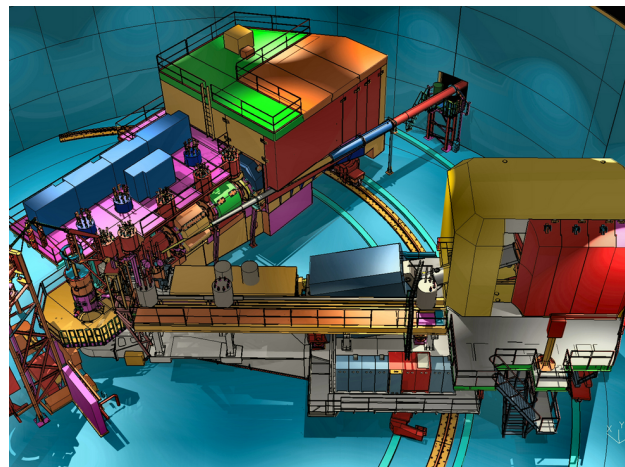
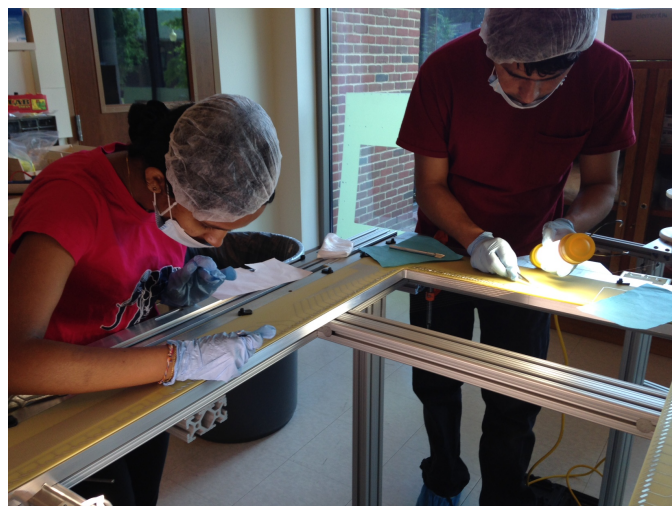
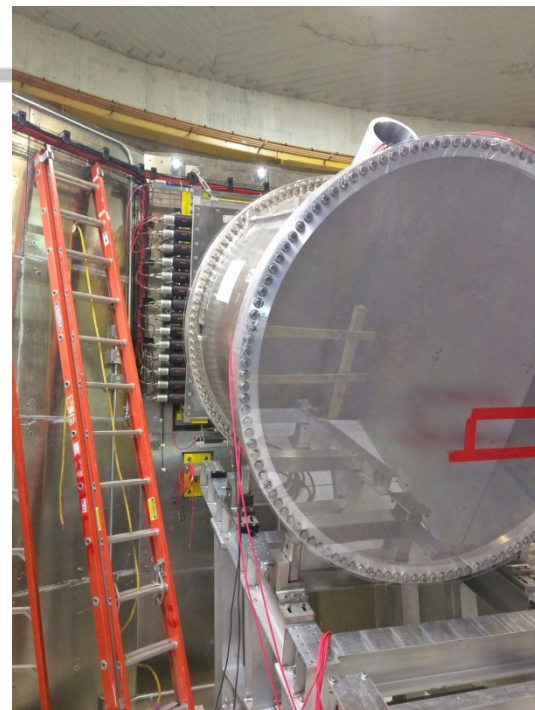




UGBOD
Meeting
June 21, 2016
Stephen Wood



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 5, 011013 \(2016\)](#)

High Resolution Spectroscopy of $^{10}_{\Lambda}\text{Be}$

[Phys. Rev. C 93, 034314 \(2016\)](#) (E05-115) ($^7_{\Lambda}\text{He}$ spectroscopy drafted)

Measurements of the Separated Longitudinal Structure Function F_L from Hydrogen and Deuterium Targets at low Q^2

[ArXiv:1606.02614](#) (E00-002)

[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

Hall A/C Staff Scientist position open

Qweak – Expect Analysis Completion in 2016

International Collaboration: 23 institutions, 95 Collaborators (23 grad students, 10 postdocs)

Parity-violating e-p analyzing power with high precision at $Q^2 \sim 0.025 \text{ (GeV/c)}^2$.

Determine: Q_W^p - proton's weak charge

Extract: C_{1u} , C_{1d} , $\sin^2 \theta_W$

Any deviation from SM prediction would be indication of new physics.

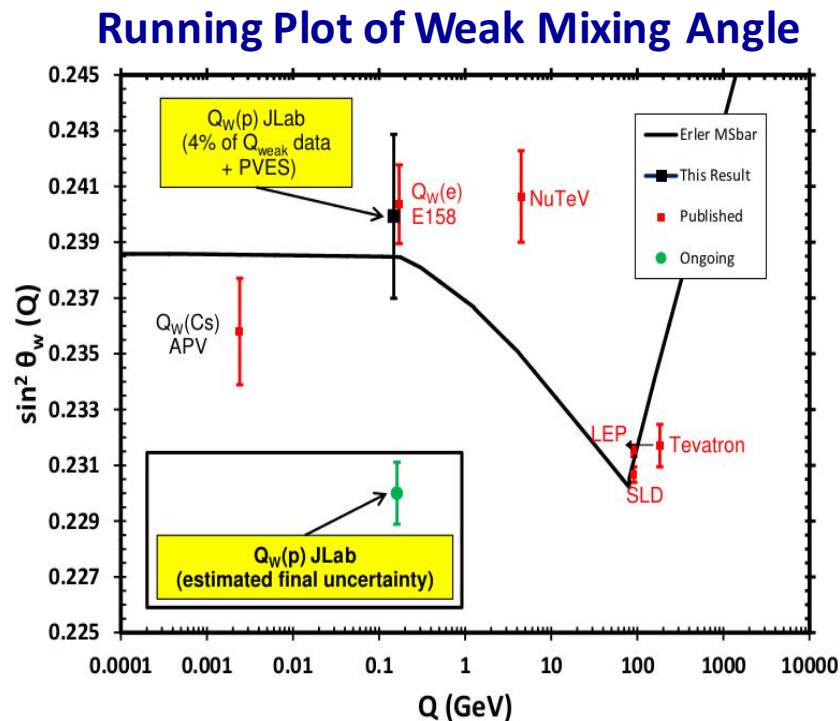
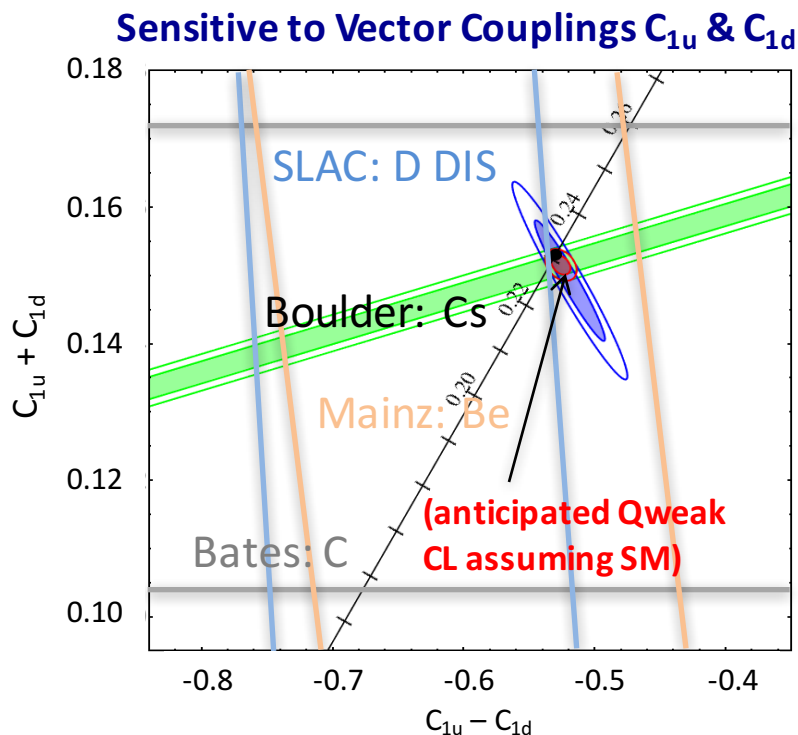
+ Numerous ancillary measurements to be published separately.

“Statistical analysis” of all data done.

The measurement has 25 systematic corrections with their associated uncertainties.

Finalizing the last significant correction.

Final result expected to yield most precise low energy weak mixing angle and significantly improved quark couplings.



Beam Test Results

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

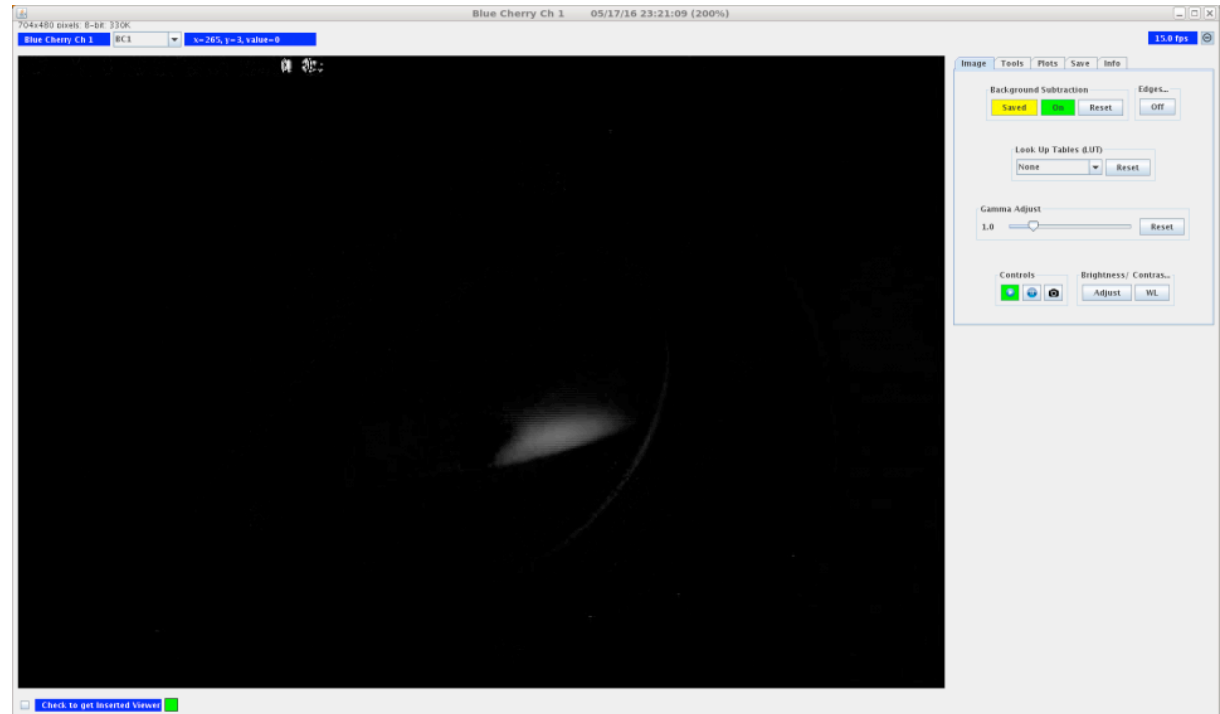
3H07 viewer

RadCon test executed
Wednesday afternoon

Checked out Hall C
fast raster

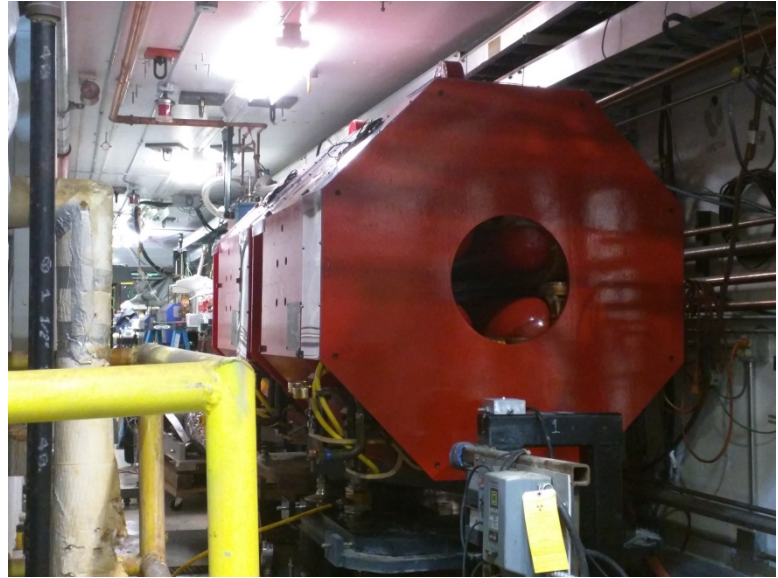
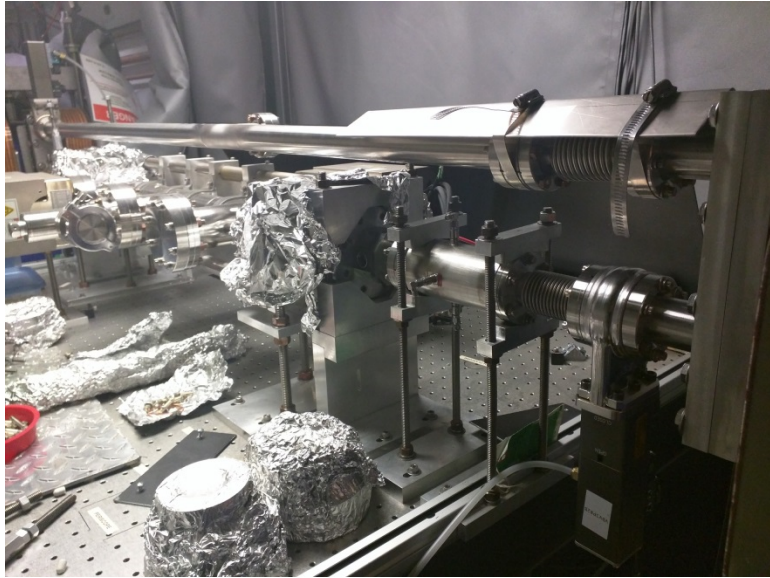
Quad polarity checks
Wednesday evening

No Physics equipment
tested.



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

Compton, Moller, Beamline upgrade



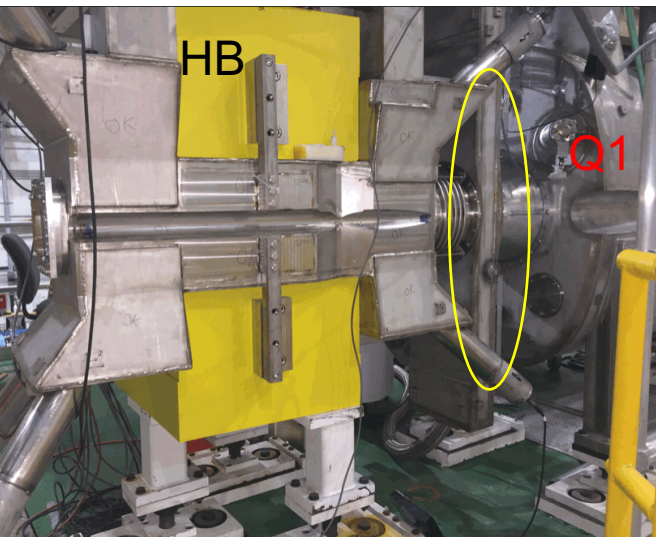
SHMS Magnets

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

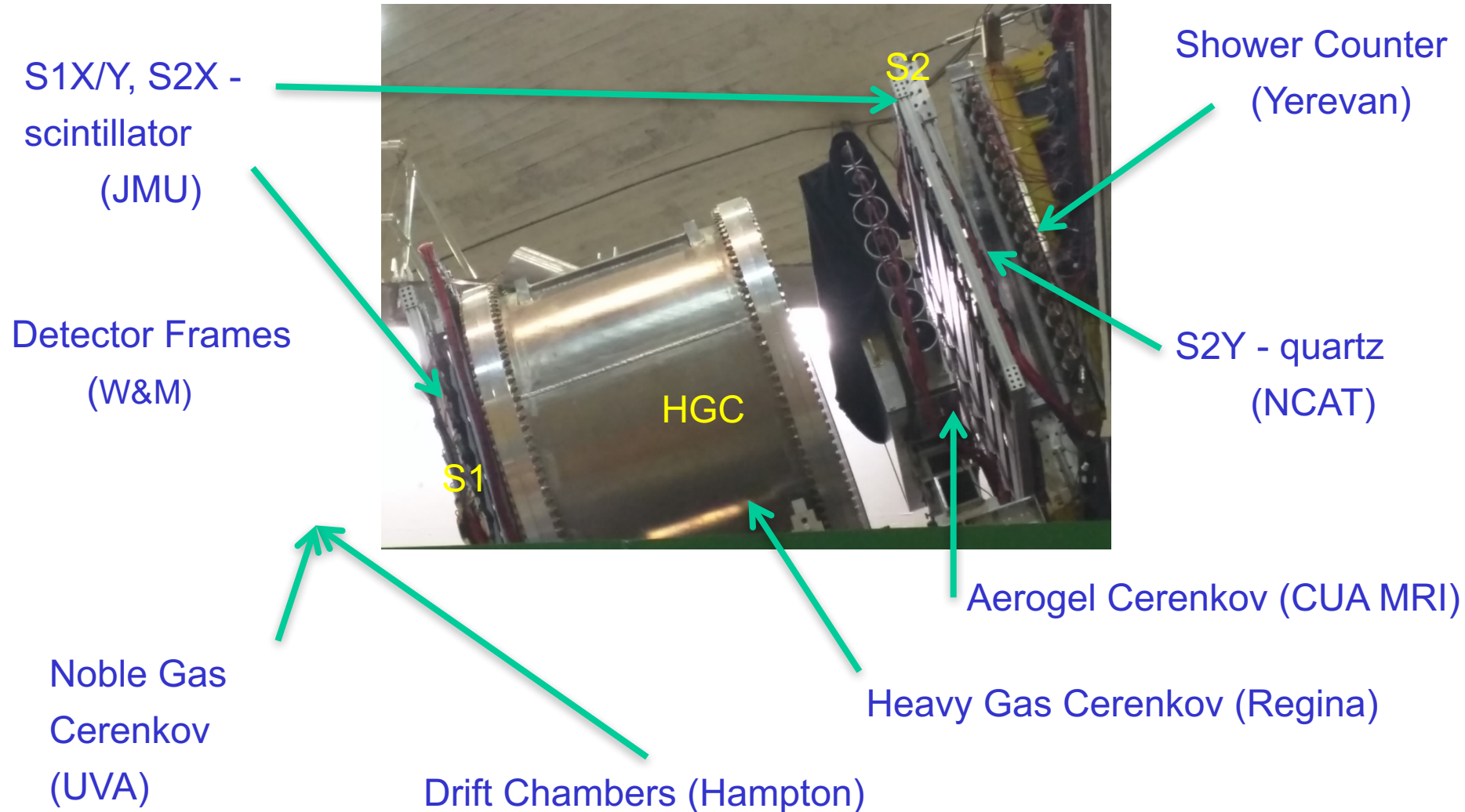
Q1/HB installation/testing complete, collimator box installed.

Cryocan for Dipole delivered, being leak checked

Dipole, Q2, Q3 delivery expected Sept/Oct



SHMS Detectors



SHMS Detectors

SHMS Preshower and Shower Counter installed

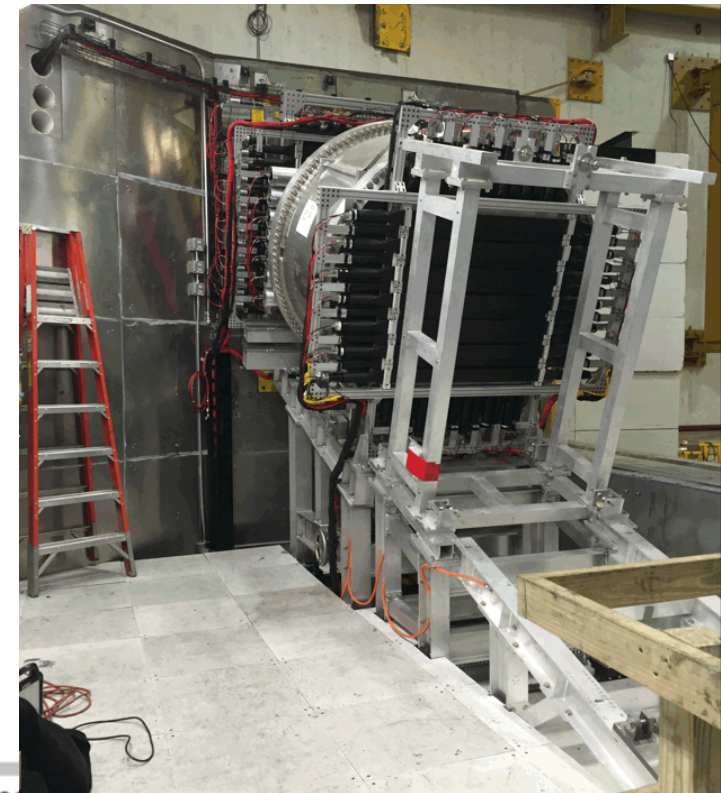
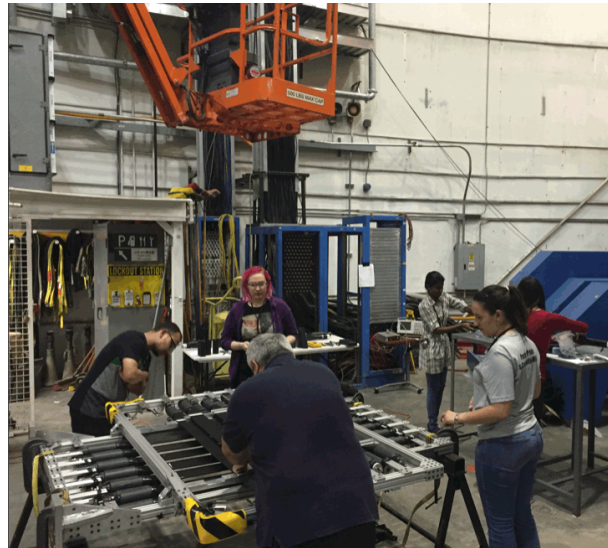
Instrumented with Flash ADC DAQ

Heavy Gas Cerenkov Installed

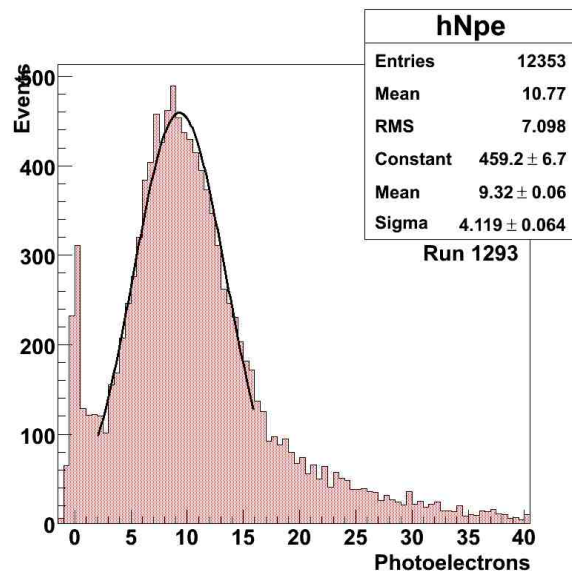
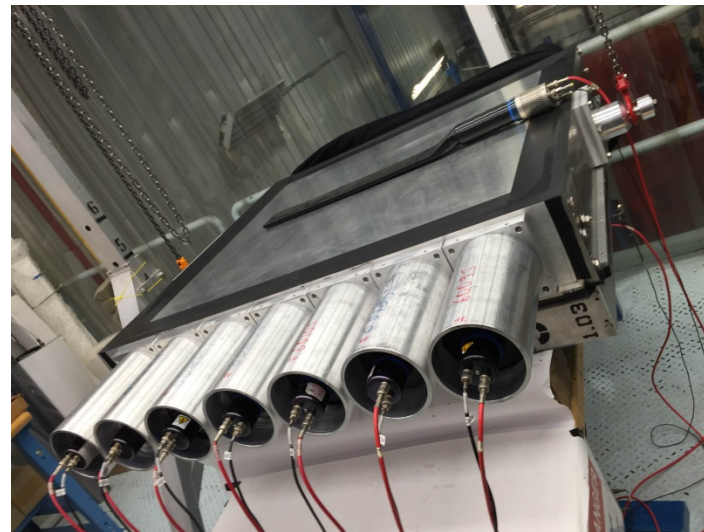
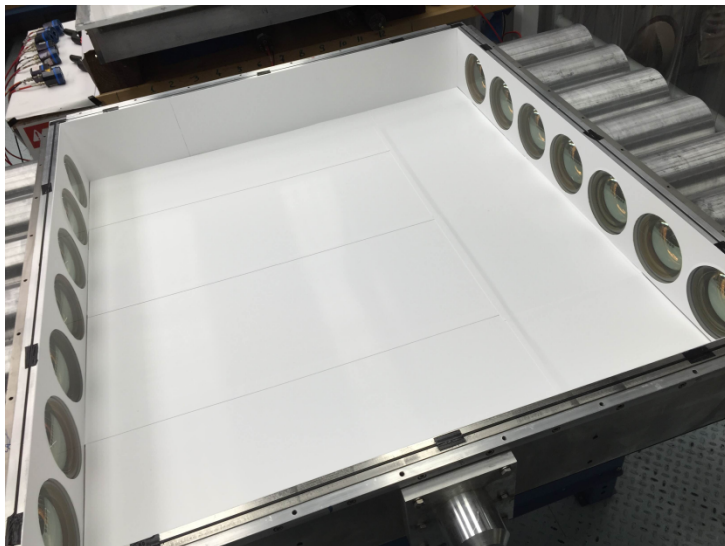
Aerogel installed

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.

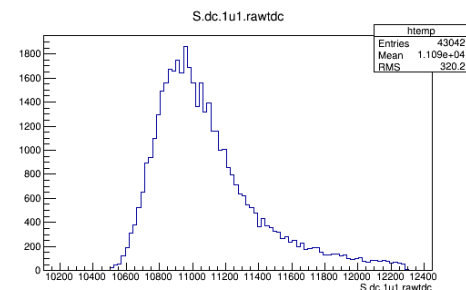
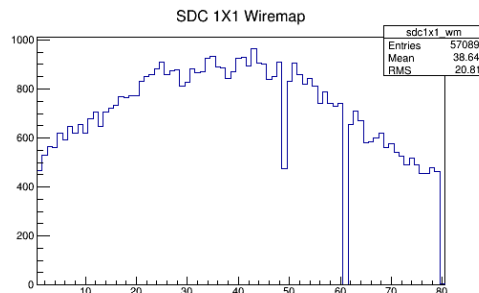
Exchangeable Aerogel trays:
 $n = 1.030, 1.020, 1.015, 1.011$

Now installed in SHMS

SHMS Detectors



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



Polarized ^3He

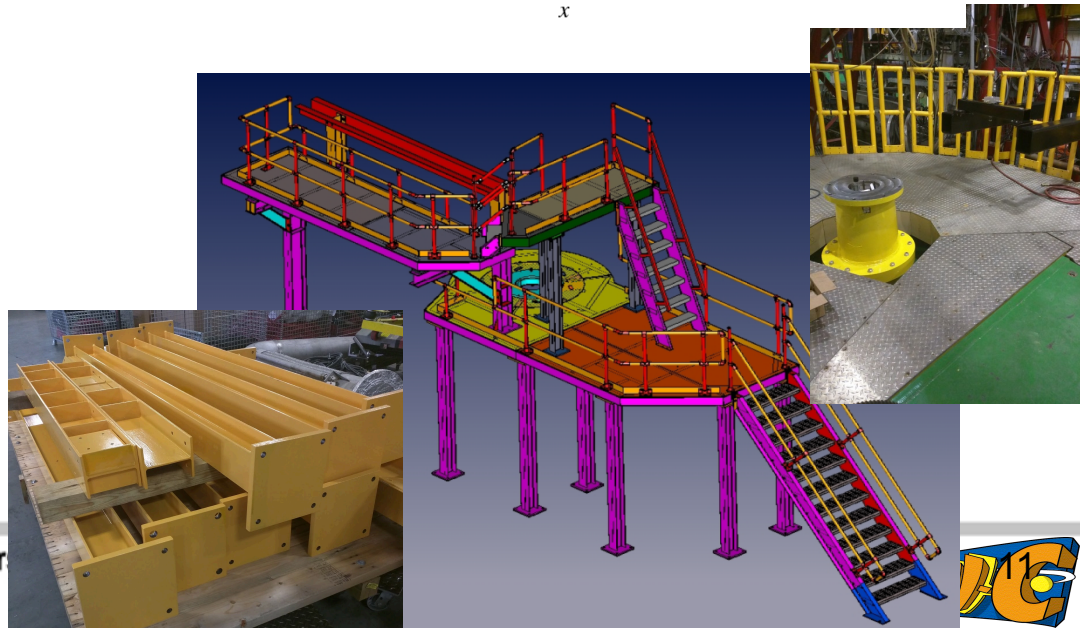
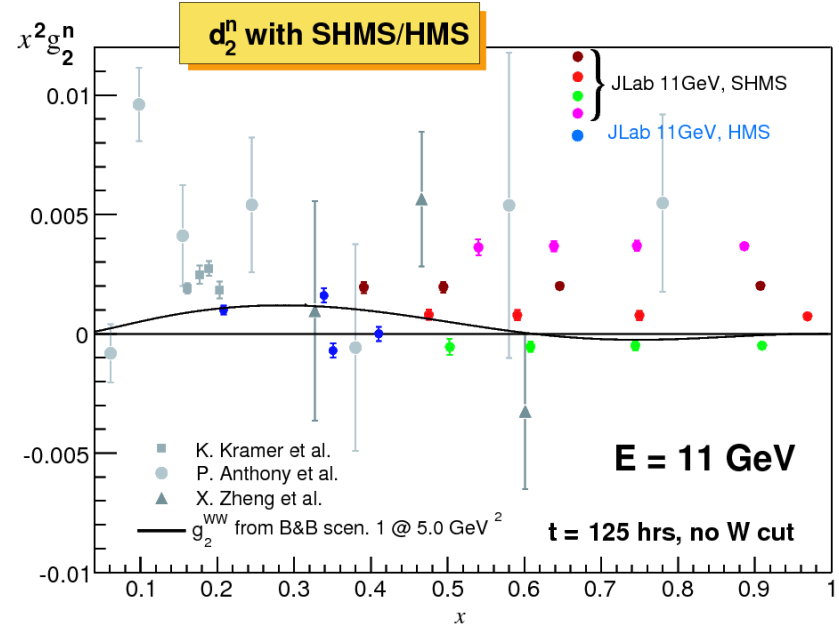
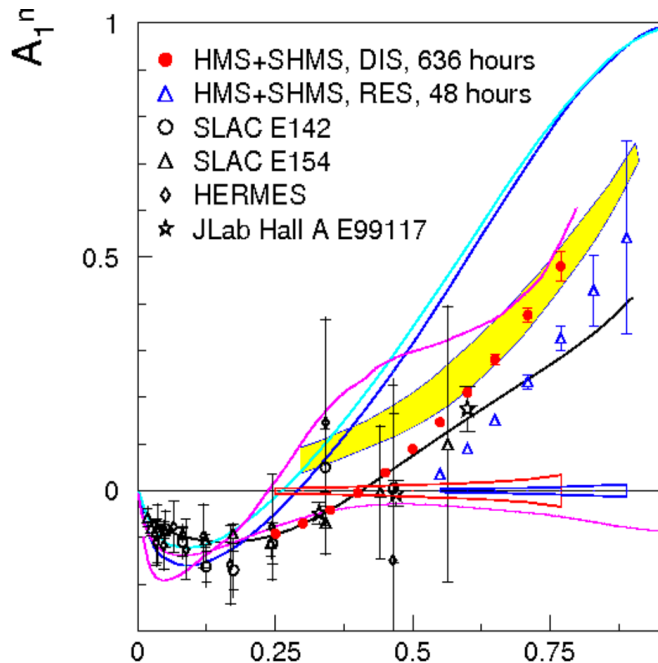
A_1^n (E12-06-110) and g_2^n/d_2^n (E12-06-121)

Preparations for polarized ^3He 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)

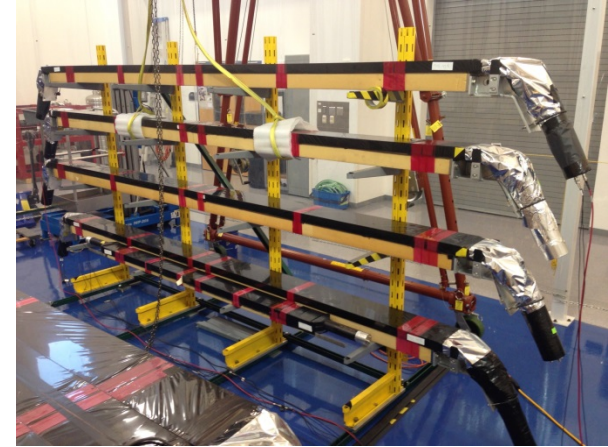
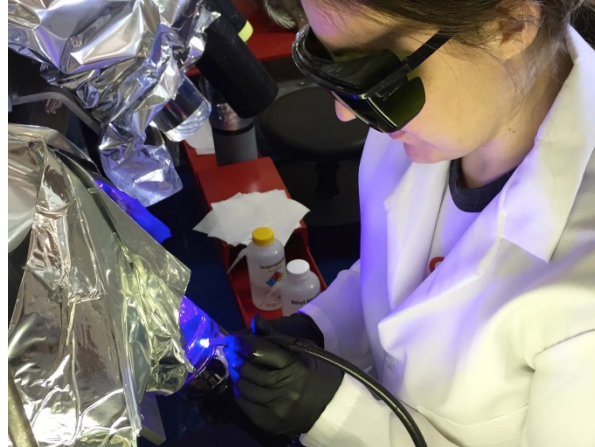
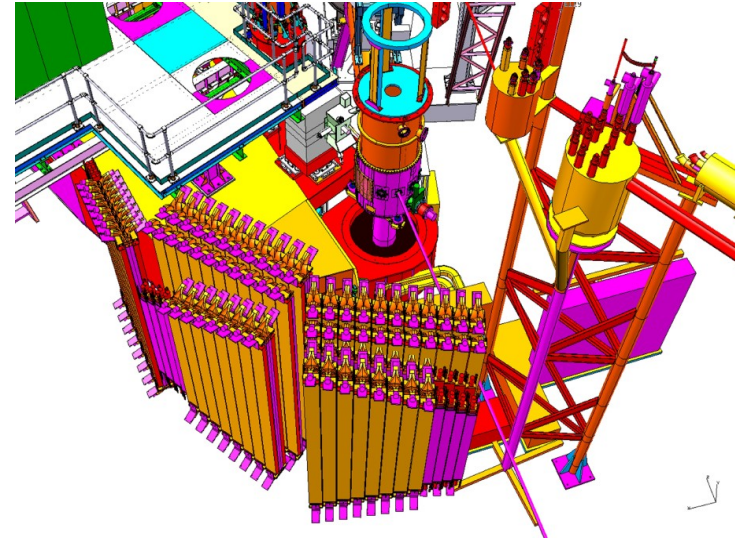
Very large solid angle for $L = 10^{36} \text{ cm}^{-2} \text{ s}^{-1}$ and $\theta > 90^\circ$

Optimized for medium momentum nucleons

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

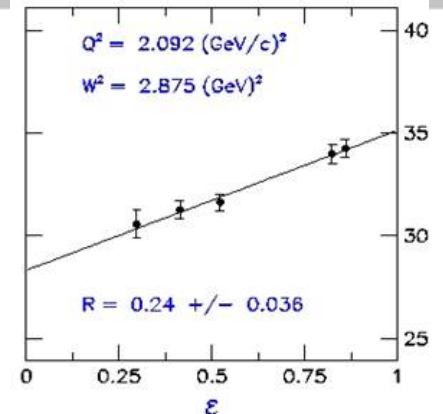
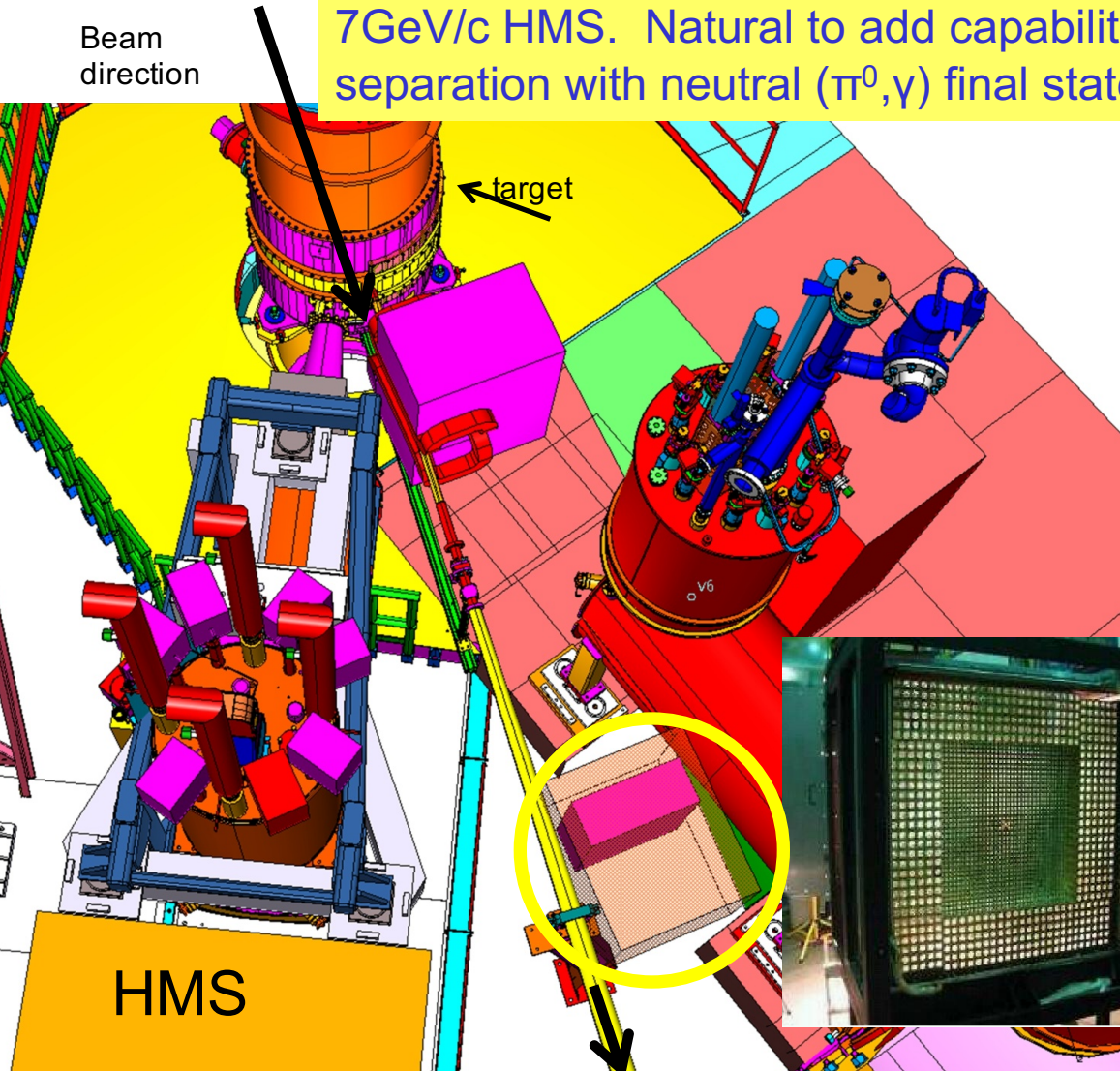
Built from old CLAS-6 TOF scintillators. Three planes refurbished @ODU by ODU, KSU, TAU, MIT, GWU. Fourth plane in progress.

Now only 5 planes needed [$d(e,e'n) \rightarrow \text{Hall B}$]



Neutral Particle Spectrometer (π^0/γ)

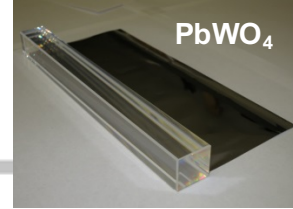
Hall C has unique L/T separation capability with 7GeV/c HMS. Natural to add capability for L/T separation with neutral (π^0, γ) final states.



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



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 PbWO₄ 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 π^0 cross sections

E12-14-003: WACS at 8 and 10 GeV

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)

Sweep magnet steel delivered

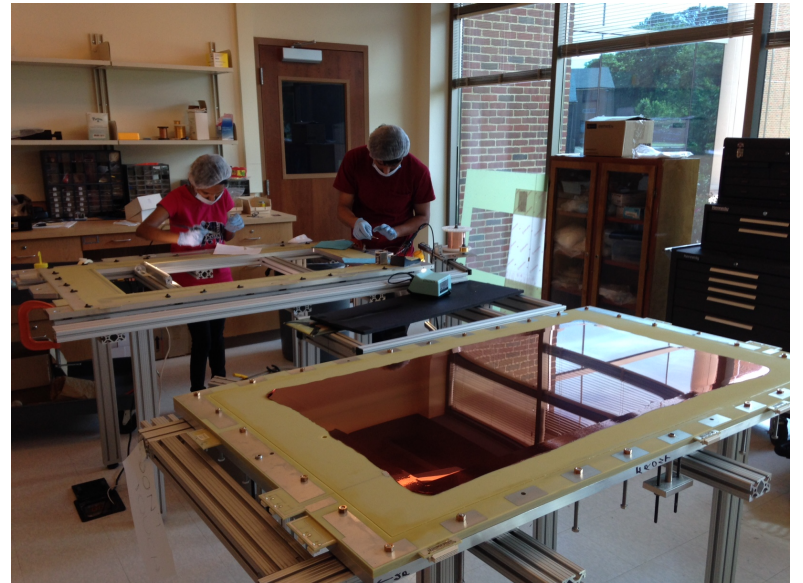
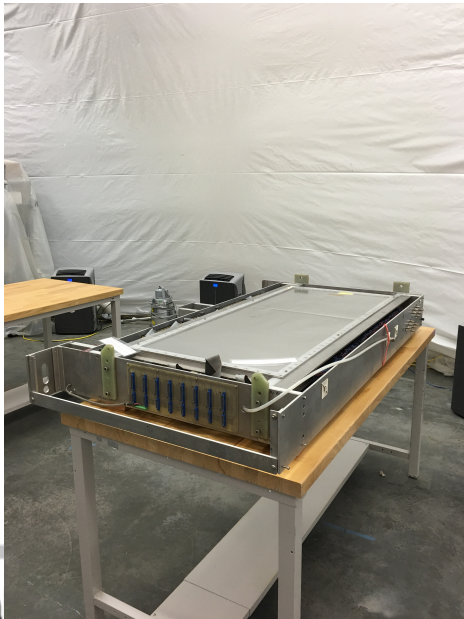
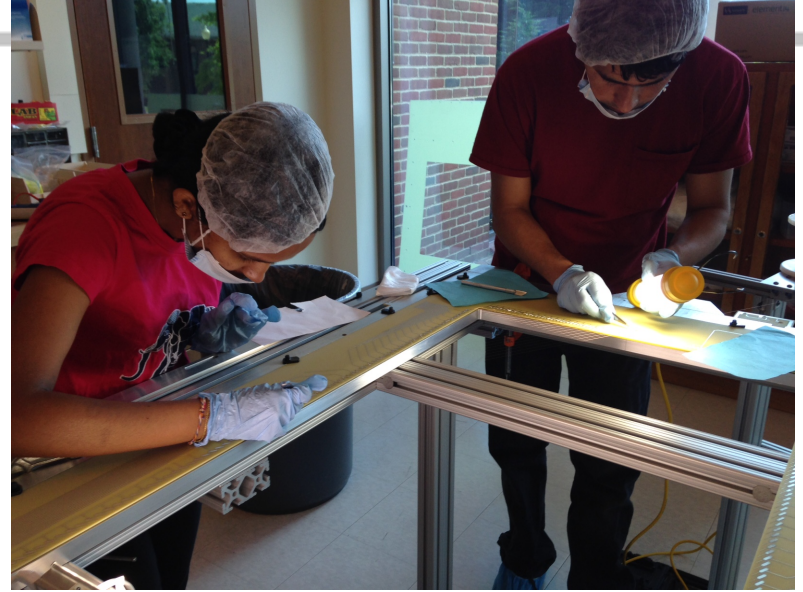
HMS Drift Chambers – repair and replacement

HMS Drift Chamber Chambers

One of two existing chambers has broken wires
Moved from HMS to TEDF for repair

Replacement Chambers Designed

Similar to SHMS design (XUV style)
Under construction at Hampton U
1+ planes strung



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

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

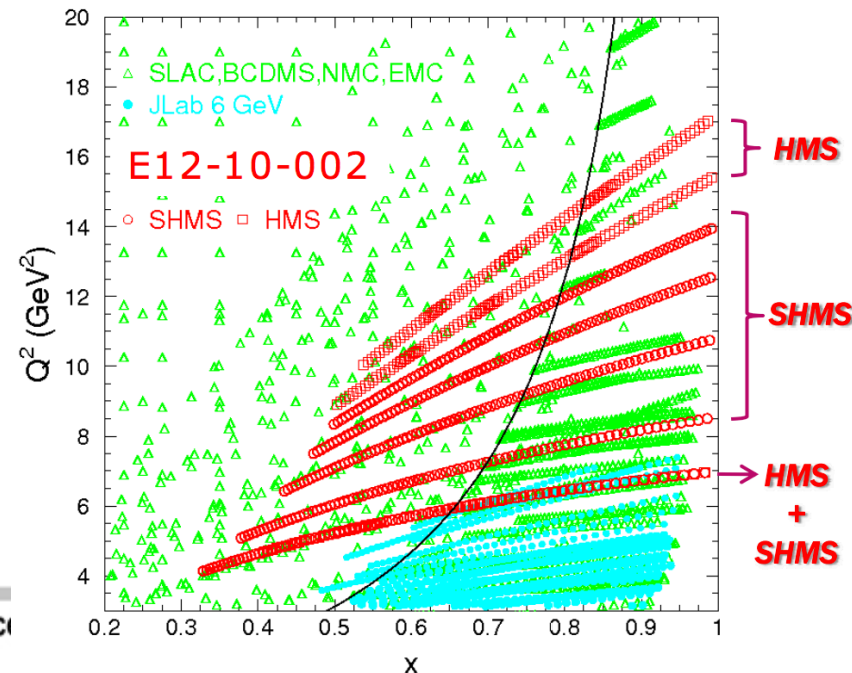
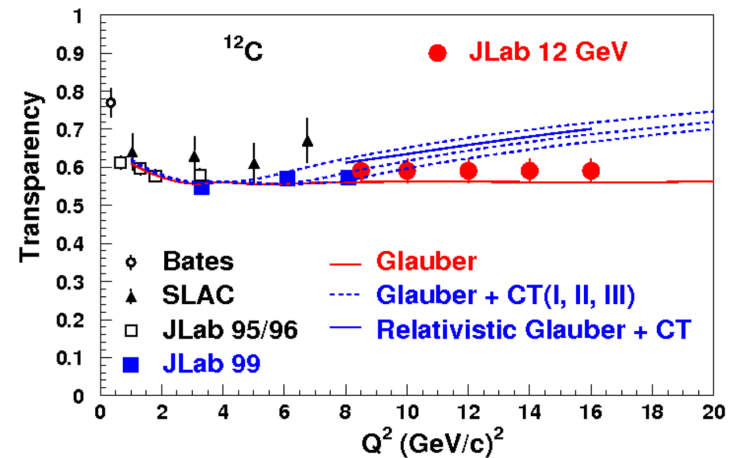
E12-09-002 Precise $\pi^+\pi^-$ ratios in SIDIS – Charge

Symmetry Detector efficiencies

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

Easiest L/T separation

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



Reviews

August 24, 25

Experimental Readiness Review

Review all experiments on schedule for 2017

“Commissioning”: $C12(e,e'p)$, $F2$, $x>1/EMC$, $d(e,e'p)$

“Early”: $SIDIS-Pt$, $SIDIS-CSV$, $p(e,e'K)$ factorization

Review all equipment, including HMS, Target, Beamline, Polarimeters

Reviewed equipment will become base equipment

September

Accelerator Readiness Review (for delivery of 11 GeV beam to Halls B&C)

November –

Software review

Show readiness for analyzing from modern DAQ

Show ready to provide online diagnostics, calibrations, optics

Hall C Approved Experiments - 1

Number	Experiment	Grade	App. Days	Cond. Days	Non-standard Equipment
06-101	Pion Form Factor	A	52		
06-104	SIDIS R	A-	40		
06-105	$x > 1$	A-	32		
06-121	He3 g_2	A-	29		Polarized He3 target
07-105	(e,e' π) Exclusive Factorization	A-	36		
09-011	(e,e'K) Exclusive Factorization	B+	40		
09-017	SIDIS P _t	A-	32		High Impact Experiments (PAC41)
09-002	Charge Symmetry Violation	A-	22		
10-002	F2 @ large x	B+	13		
10-003	d(e,e'p)	B+	21		
10-008	EMC	A-	23		
06-107	Color Transparency	B+	26		
06-110	He3 A1n	A	36		Polarized He3 target
11-002	He4(e,e'pol(p))	B+	37		FPP in HMS
11-009	Neutron Form Factor	B+	50		Magnet + Neutron polarimeter
11-107	EMC d(e,e' backward p)	B+	40		LAD (Hall B TOF bars)
13-007	SIDIS π^0	A-	26		Neutral Particle Spect.
13-010	DVCS + Exclusive π^0	A	53		Neutral Particle Spect.
13-011	Deuteron Tensor SF b1	A-		30	C1 - Polarized ND3

Hall C Approved Experiments - 2

Number	Experiment	Grade	App. Days	Cond. Days	Non-standard Equipment
C12-13-011	Deuteron Tensor SF b1	A-		30	Polarized ND3
E12-14-002	Nuclear Dep of R	B	22		
E12-14-003	WACS at 8 & 10 GeV	A-	18		Neutral Particle Spect.
E12-14-005	Wide Angle Pi0 photoprod	B	18		Neutral Particle Spect.
E12-14-006	Initial State Corr in WACS	B	15		NPS, Pol NH3
C12-15-001	Generalized Polarizabilities in VCS			15	C2
C12-15-005	Deuteron Tensor Asymmetries			44	C2
			681	30 + 59	
Total Days		711	8.1	Years @ 25 Weeks/year	