





UGBOD Meeting January 14, 2016 Stephen Wood







Publications, Students, Postdocs

Separated Response Functions in Exclusive, Forward π^{\pm} Electroproduction on Deuterium Phys. Rev. C **91**, 015202 (2015) (from Fpi data)

The Q_weak Experimental Apparatus NIM A781, 105 (2015)

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

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

High Resolution Spectroscopy of Be-10-Lambda arXiv:1511.04801

SANE: Whitney Armstrong (Temple), Luwani Ndukum (MSU) Qweak: Scott MacEwan (Manitoba), Amrendra Narayan (MSU), Joshua Hoskins (W&M), Don Jones (UVA), Emmanouil Kargiantoulakis (UVA), Juan Carlos Cornejo (W&M) WACS: Cristiano Fanelli (U Rome)

Postdocs: Joint A/C/EIC - Kijun Park, Hall C postdocs, 1 filled, 1 open





SHMS Magnets

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

Q1 "accepted" and contract closed

HB undergoing detailed testing (Internal eddy current concerns) Tested to 3500A – 4000A goal

Dipole, Q2, Q3 delivery expected Starting in April









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





SHMS Detectors - Aerogel





Jefferson Lab



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

(In spectrometer, particles will pass through Aerogel before the diffusion box. In cosmic tests, Aerogel on bottom.)

Now installed in SHMS



SHMS Detectors





Noble gas Cerenkov and wire chambers in Experimental Staging Building





LAD – Large Acceptance Detector

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

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

Optimized for medium momentum nucleons $0.3 \le p_N \le 0.7 \text{ GeV/}c$

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

Now only 3 planes needed [d(e,e'n) -> Hall B]













Neutral Particle Spectrometer (π^0/γ)



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 Thomas Jefferson National Accelerator Facility

More info in the NPS Wiki: https://wiki.jlab.org/cuawiki/



NPS

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



PbWO₄

Hall C Beamline: 6 GeV → 11 GeV

Modify Compton polarimeter for operation at 11 GeV Raise chicane, replace vacuum chambers, replace dipole poles – map Beamline components, electron detector installed and under vacuum Laser table work remains

Repair Møller polarimeter

New coils for big quads, acid flush small quad, map all quads All quads refurbished, mapping complete, installed on beamline, new PS ordered

Make beamline downstream of Møller ready for 11 GeV

Fast raster, larger magnets for 17 mm vertical chicane

All girders (except for last superharp girder) installed. Final vacuum work, alignment and hookups needed.

On track for checkout with beam in March 2016





Compton, Moller, Beamline upgrade











Other Projects

HMS wire chamber replacement Very similar to SHMS chambers (XUV) Boards ordered

Counting house console replacement Old console removed New console assembly soon

Preparations for polarized 3He target Cut and reassemble pivot post Access platform design













Hall C Approved Experiments - 1

ber	Experiment	Grade	App. Days	Cond. Days	Non-standard Equipment
6-101	Pion Form Factor	А	52		
6-104	SIDIS R	A-	40		
6-105	x>1	A-	32		
6-121	He3 g_2	A-	29		Polarized He3 target
7-105	(e,e' π) Exclusive Factorizaton	A-	36		
9-011	(e,e'K) Exclusive Factorization	B+	40		
9-017	SIDIS P_t	A-	32	н	igh Impact Experiments (PAC41)
9-002	Charge Symmetry Violation	A-	22	_	
.0-002	F2 @ large x	B+	13		
.0-003	d(e,e'p)	B+	21		
.0-008	EMC	A-	23		
6-107	Color Transparency	B+	26		
6-110	He3 A1n	Α	36		Polarized He3 target
1-002	He4(e,e'pol(p))	B+	37		FPP in HMS
1-009	Neutron Form Factor	B+	50		Magnet + Neutron polarimeter
1-107	EMC d(e,e' backward p)	B+	40		LAD (Hall B TOF bars)
.3-007	SIDIS PiO	A-	26		Neutral Particle Spect.
.3-010	DVCS + Exclusive Pi0	Α	53		Neutral Particle Spect.
3-011	Deuteron Tensor SF b1	A-		30	C1 - Polarized ND3
			608		





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	В	22		
E12-14-003	WACS at 8 & 10 GeV	A-	18		Neutral Particle Spect.
E12-14-005	Wide Angle Pi0 photoprod	В	18		Neutral Particle Spect.
E12-14-006	Initial State Corr in WACS	В	15		NPS, Pol NH3
C12-15-001	Generalized Polarizabilities in VC	S		15	C2
C12-15-005	Deuteron Tensor Asymmetries			44	C2
			681	30 + <mark>59</mark>	
	Total Days	711	8.1	Years @ 25	Neeks/year





Early running plans – Year 1

2016: March: 6 GeV low current to checkout beamline2016: October-

Precommissioning – detector checkout ~25 PAC days – Commissioning "Experiment" 9 days of E12-06-107 search for color transparency A(e,e'p) only – "easy" coincidence measurement E12-10-002 F₂^{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 F₂ run,

Point target helps acceptance studies.

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

Push to lower cross sections





Early running plan – Years 2-3

2017:

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

(All Hall "Capabilities" tested with physics)

2018:

Choose a "High Impact Experiment"?

E12-06-101 Pion Form Factor (needs well understood SHMS)

E12-06-105 x>1

E12-06-110 A₁ⁿ (needs high Luminosity ³He)



