UGBOD Meeting
January 13, 2015
Stephen Wood
Publications and Students

Separated Response Functions in Exclusive, Forward $\pi^\pm$ Electroproduction on Deuterium  

Primary Beam Steering Due to Field Leakage from Superconducting SHMS Magnets  
JINST 9, T11002 (2014)

The HKS Experiments at JLab Hall C and the New Spectroscopy of $^{12}_\Lambda$B Hypernuclei  

The Q_weak Experimental Apparatus  
NIM arXiV:1409.7100

In the pipeline: Qweak+ancilliary measurements, more hypernuclear, inclusive electron scattering, super-rosenbluth, RCS

Recent Ph.D.: Chunhua Chen (HKS), Adesh Subedi (Qweak), Amrendra Narayan (Qweak), Nuruzzaman (Qweak)
SHMS Structure complete
Services (Power, LCW, AC) installed
signal, HV install in progress
Magnet power supplies tested, DC cables ready for Q1 and HB
Cryogenic system ready for Q1 and HB
Steel for Q2, Q3, Dipole installed

Q1 delivery today
readiness review next week

HB delivery in spring
Q2, Q3, Dipole

Dipole coil #1 out of mold

Q2/Q3 Winding

Coils wound and vacuum impregnated.
Assembly into cold mass.

Q2 winding almost done
SHMS

SHMS Preshower and Shower Counter installed
Testing with Flash ADC DAQ
Detector mounts installed

Detector frames being assembled on site
Hall C Beamline: 6 GeV → 11 GeV

Modify Compton polarimeter for operation at 11 GeV
  Raise chicane
  Replace vacuum chambers
  Replace dipole poles - map

Repair Møller polarimeter
  New coils for big quads
  Acid flush small quad
  Map all quads

Make beabeamline downstream of Møller ready for 11 GeV
  Fast raster
  Larger magnets for 17 mm vertical chicaned

Mechanical installation by end of summer 2015 – still controls/software work
Updated 12 GeV Compton design

Project Manager: Dave Gaskell - Design: Paulo Medeiros
with a lot of input from Engineering and Ops (John Musson and Jay Benesch in particular)

Magnets re-installed on new supports
New Laser table support
New custom correctors and stands
Møller Quadrupole Refurbishment

In addition to installing new coils, MAG_TEST performed full refurbishment of both quadrupoles (sand off rust, paint, new water hoses, etc.)
Hall C Analysis Software Upgrade

FORTRAN ENGINE analysis code being replaced with C++/ROOT analyzer

Based on Hall A analysis software

- Ease sharing of software and people with Hall A
- Easier to reuse code between HMS & SHMS
- Likely easier and more natural to add new detectors (done often in Hall A)

Status

- Code, “hcana”, managed with “git” on github.com
- Supports CTP like parameters and reports. Hall A cut and histogram definition package similar to CTP
- DC Tracking code ported, Shower counter, hodoscopes, Cerenkov
- Basic support for most HMS/SOS detectors and spectrometer optics
- SHMS support needs new shower code and Flash ADC support
<table>
<thead>
<tr>
<th>Number</th>
<th>Experiment</th>
<th>Grade</th>
<th>App. Days</th>
<th>Cond. Days</th>
<th>Non-standard Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>E12-06-101</td>
<td>Pion Form Factor</td>
<td>A</td>
<td>52</td>
<td></td>
<td></td>
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<tr>
<td>E12-06-104</td>
<td>SIDIS R</td>
<td>A-</td>
<td>40</td>
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<tr>
<td>E12-06-105</td>
<td>x&gt;1</td>
<td>A-</td>
<td>32</td>
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<td>E12-06-121</td>
<td>He3  g_2</td>
<td>A-</td>
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<td>Polarized He3 target</td>
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<tr>
<td>E12-07-105</td>
<td>(e,e'π) Exclusive Factorizaton</td>
<td>A-</td>
<td>36</td>
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<tr>
<td>E12-09-011</td>
<td>(e,e'K) Exclusive Factorization</td>
<td>B+</td>
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<tr>
<td>E12-09-017</td>
<td>SIDIS P_t</td>
<td>A-</td>
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<td>E12-09-002</td>
<td>Charge Symmetry Violation</td>
<td>A-</td>
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<tr>
<td>E12-10-002</td>
<td>F2 @ large x</td>
<td>B+</td>
<td>13</td>
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<td>E12-10-003</td>
<td>d(e,e'p)</td>
<td>B+</td>
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<td>E12-10-008</td>
<td>EMC</td>
<td>A-</td>
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<tr>
<td>E12-12-110</td>
<td>Color Transparency</td>
<td>A</td>
<td>36</td>
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<td>Polarized He3 target</td>
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<tr>
<td>E12-11-002</td>
<td>He4(e,e'pol(p))</td>
<td>B+</td>
<td>37</td>
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<td>FPP in HMS</td>
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<td>E12-11-009</td>
<td>Neutron Form Factor</td>
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<td>Magnet + Neutron polarimeter</td>
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<td>E12-11-107</td>
<td>EMC d(e,e' backward p)</td>
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<td>LAD (Hall B TOF bars)</td>
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<td>Neutral Particle Spect.</td>
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<td>DVCS + Exclusive Pi0</td>
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<td>Deuteron Tensor SF b1</td>
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<td>E12-14-003</td>
<td>WACS at 8 &amp; 10 GeV</td>
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<td>Wide Angle Pi0 photoprod</td>
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<td>E12-14-006</td>
<td>Initial Stete Coor in WACS</td>
<td>B</td>
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<td>NPS, Pol NH3</td>
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</tbody>
</table>

Total Days 711 8.1 Years @ 25 Weeks/year
Early running plans – Year 1

2016:

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 $F_2^{p,d}$ structure functions at large $x$
  Momentum scans help understand acceptance

2 days E12-10-108 EMC Effect
  Integrate light nuclei with $F_2$ run,
  Point target helps acceptance studies.

3 days of E12-10-003 $d(e,e’p)$
  If time available
  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

2018:

Choose a “High Impact Experiment”?

E12-06-101  Pion Form Factor  (needs well understood SHMS)
E12-06-105  $x>1$
E12-06-110  $A_1^n$ (needs high Luminosity $^3$He)
            $g_2^n$, GeN?
At full momentum and minimum scattering angle, SHMS fringe fields steer beam beyond acceptable region on dump.

Most of the steering is from horizontal bender.
Beam steering can mitigated (on paper) by iron pipes and wedges. (Moore et.al., JINST 9, T11002 (2014) – arXiv:1406.7856)

Engineering of magnetic shielding starting. Ultimately need HB in hand to understand problem and solution.

Unpowered BE magnet to be installed upstream of target. Prebend of beam could remove ~1/2 of the displacement at dump.

Investigating a designing large bore BPM at end of Hall to monitor post-fringe field position.

First year “25 day commissioning run” SHMS $\geq 10^\circ$. Temporary minimal magnetic shielding can be used.