

Hall C – July 2021



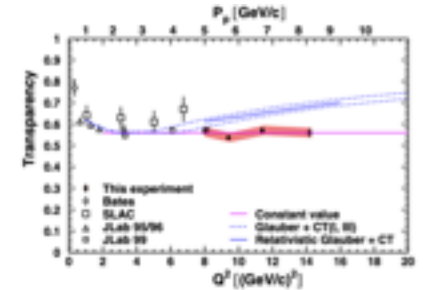
Hall C Publications

Measurement of the Beam-Normal Single-Spin Asymmetry for Elastic Electron Scattering from ^{12}C and ^{27}Al

[Phys. Rev. C **104**, 014606 \(2021\)](#) (Androic et al.) (QWEAK)

Spectroscopy of $A = 9$ hyperlithium by the $(e, e'K^+)$ reaction

[Phys. Rev. C **103**, L041301, \(2021\)](#) (Gogami et al.)

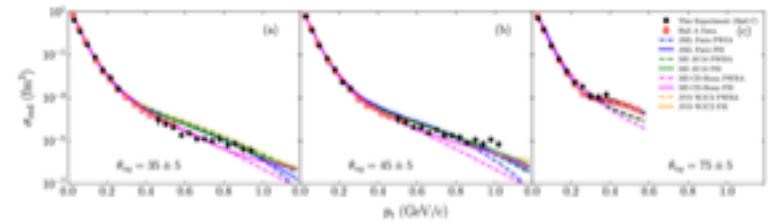


Ruling out color transparency in quasi-elastic $^{12}\text{C}(e, e'p)$ up to Q^2 of 14.2 (GeV/c) 2

[Phys. Rev. C, **126**, 082301 \(2021\)](#) (Bhetuwal et al.)

Probing the Deuteron at Very Large Internal Momenta

[Phys. Rev. Lett **125**, 262501 \(2020\)](#) (Yero et al.)



A Precision Measurement of the Beam-Normal SSA in Forward-Angle Elastic ep Scattering (QWEAK)

[Phys. Rev. Lett **125**, 112502 \(2020\)](#) (Androic et al.)

Parity-Violating Inelastic Electron-Proton Scattering at Low Q^2 Above the Resonance Region (QWEAK)

[Phys. Rev. C **101**, 055503 \(2020\)](#) (Androic et al.)

Graduated Students: [Burcu Duran \(J/Ψ\)](#)

Hall C – 2020

Fall 2019

Polarized ^3He target installed

Spring 2020

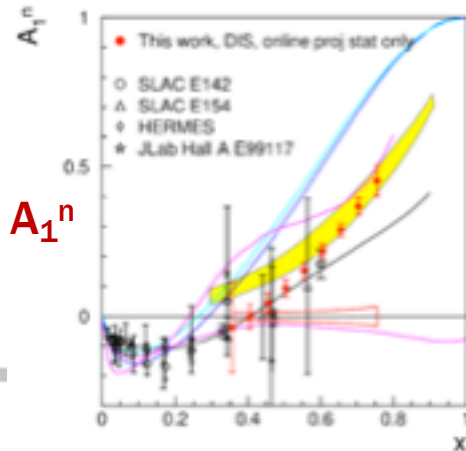
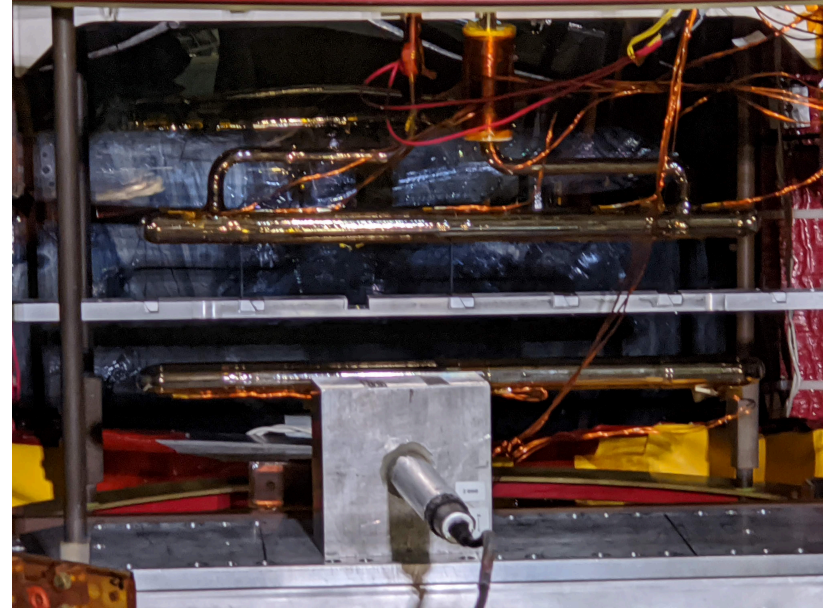
E12-06-110 A_1^n run

E12-06-121 g_2^n/d_2^n setup
interrupted by MEDCON6

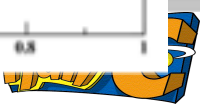
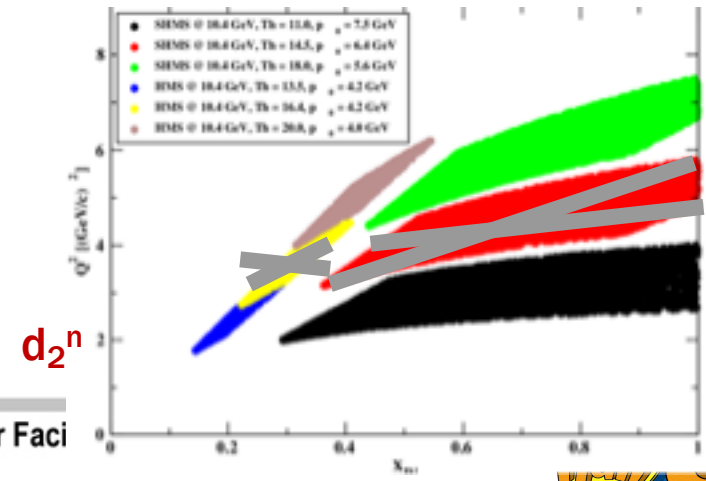
August/September 2020

E12-06-121 g_2^n/d_2^n

E12-06-121A ^3He elastic asymmetry



erson National Accelerator Faci



Hall C – 2021+

-> August 22, 2021

Scheduled Accelerator Down, Hall Maintenance

August 23 – Dec 20, 2021 (possible 2 week delay)

E12-19-006 Exclusive $p(e,e'\pi^\pm)$ LT separated cross sections (PionLT)

Scaling and Pion Form Factor (was E12-06-101/E12-07-105)

Beam Energies 9.2, 8.0, 9.9, 6.0 GeV

May 2, 2022 – December 20, 2022

E12-17-005 CaFe – Short Range Correlations $^{40}\text{Ca}(e,e'p)$, $^{48}\text{Ca}(e,e'p)$

E12-10-008 EMC effect, light to heavy nuclei

E12-06-105 $x>1$ light to heavy nuclei

E12-19-006 Continue exclusive PionLT

2023

Not scheduled: NPS, LAD, NucR, ...?

Neutral Particle Spectrometer

Motivation for NPS: Validation of Reaction mechanisms for TMDs & GPDs

6 approved experiments: **DVCS & SIDIS ($e, e'\pi^0$), WACS(γ, π^0), pol. WACS, Backward π^0**

1 conditionally approved: Timelike Compton Scattering

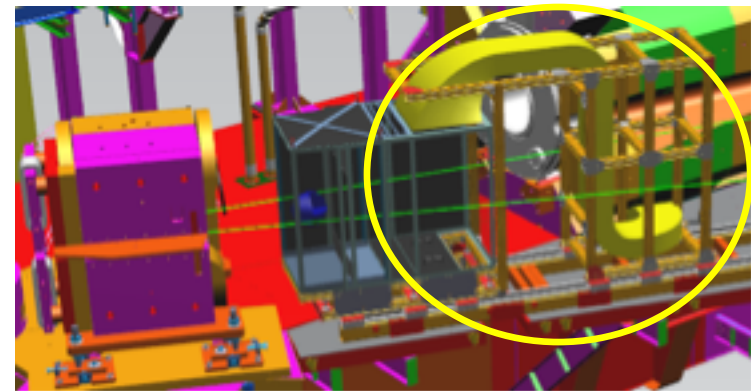
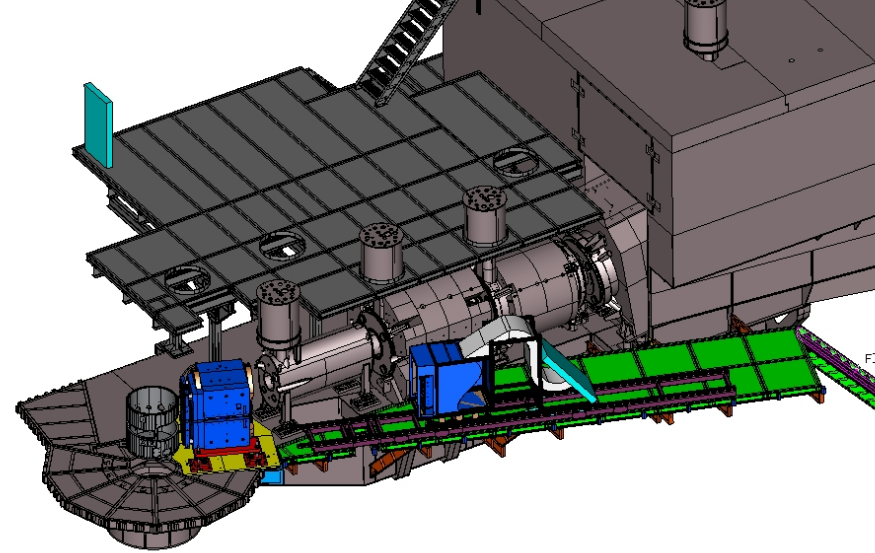
NPS (Expts E12-13-010/E13-13-007, E12-14-003/E12-14-005) passed ERR, beam time request submitted

NPS: PbW04 calorimeter behind sweep magnet
Rides on SHMS carriage.

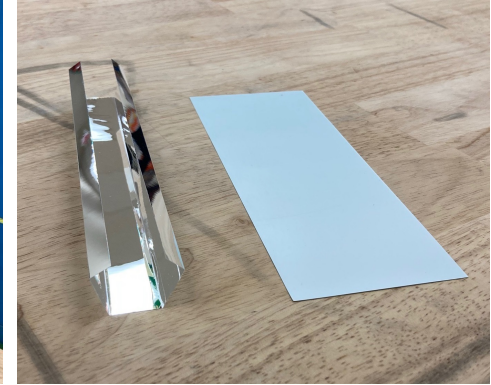
Supported by NSF MRI PHY-1530874

Hall C Engineering group:

- SHMS Platform extension + stairs
- Detector and sweep mag support
- Cable cart, trays, roof mods
- Beamline modifications



NPS



NPS Calorimeter frame shipped from Orsay

30+ PbWO_4 crystals arrive per month

Reflectors for crystals pre-shaped

JLab Detector Support Group:

- Cable fabrication

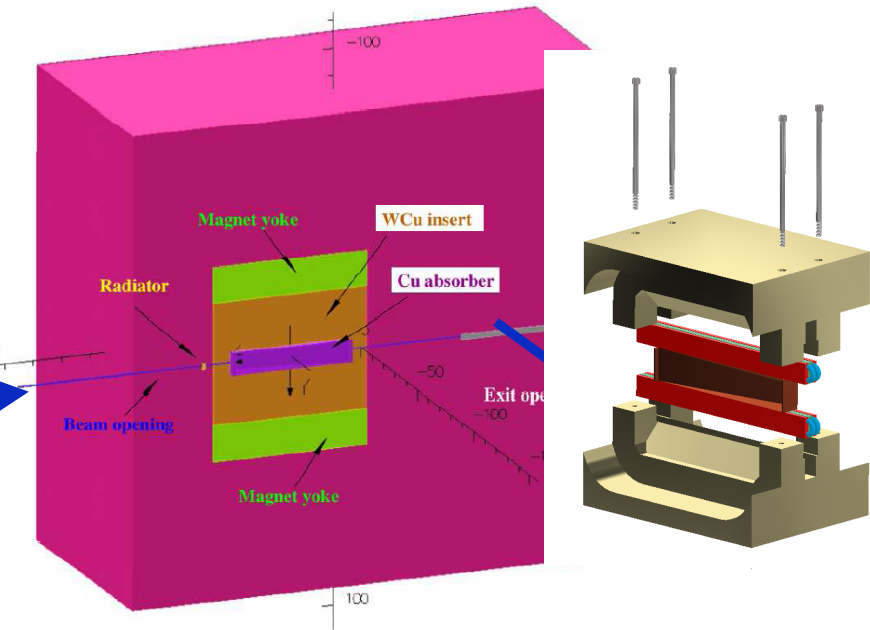
- Interlock system

- Controls – Environmental and HV

Compact Photon Source (Hall C)

A high-intensity compact photon source that could provide a factor of 30 gain in figure-of-merit for photo-production experiments of solid-state polarized targets

High-energy photoproduction in 3D dynamic proton structure – **two approved experiments to date (Polarized Wide-Angle Compton Scattering and Timelike Compton Scattering)**

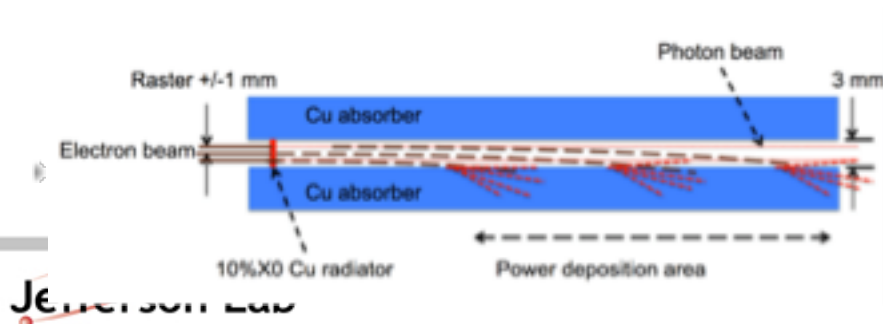


CPS conceptual design:

- a radiator to produce photons
- a magnet to dump the electrons with a small photon collimator
- a central copper absorber to handle the power deposition
- tungsten powder and borated plastic to hermetically shielding

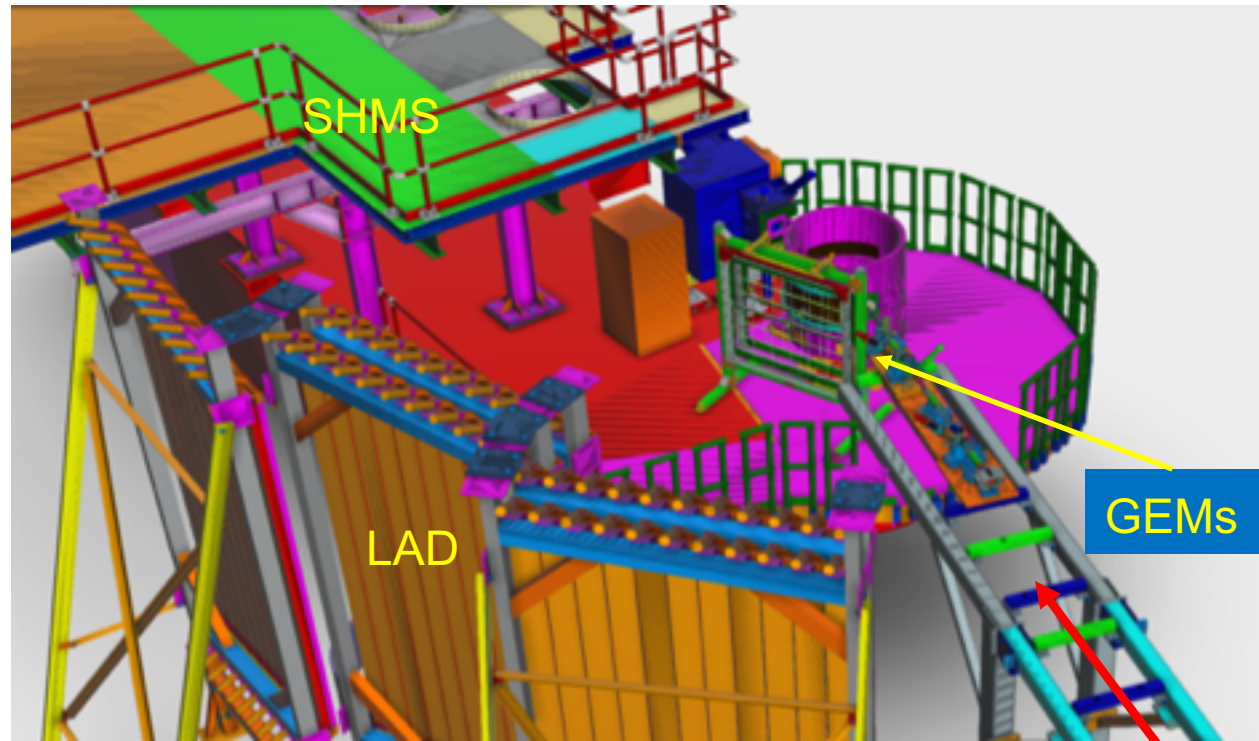
Conceptual Design for Hall C CPS
published in NIMA **957**, 163429 (2020)

Hall C engineering group building 30 kW
Cu absorber prototype – test stresses and
heat removal

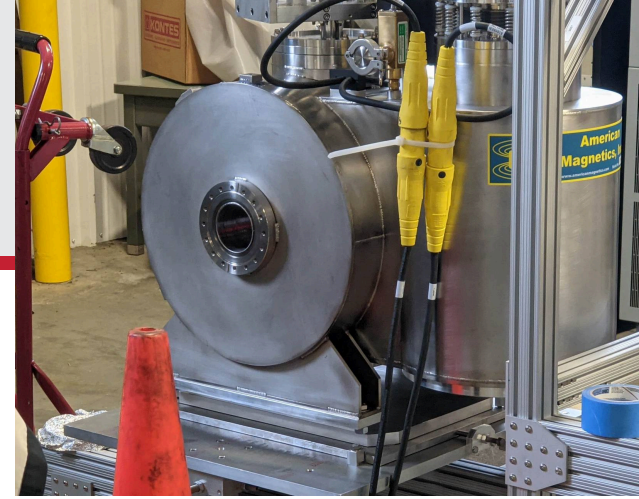


LAD – Large Acceptance Detector

- E12-11-007: Deuteron EMC – $d(e, e' \text{ backward } p)$
- Very large solid angle for $L = 10^{36} \text{ cm}^{-2} \text{ s}^{-1}$ and $\theta > 90^\circ$
- Optimized for medium momentum nucleons
 $0.3 \leq p_N \leq 0.7 \text{ GeV}/c$
- Uses 5 scintillator planes which are built from old CLAS-6 TOF scintillators refurbished @ODU.
- HV supply for scintillator planes delivered.
- Successful ERR review, scheduling requested
- Will use PRAD GEMs

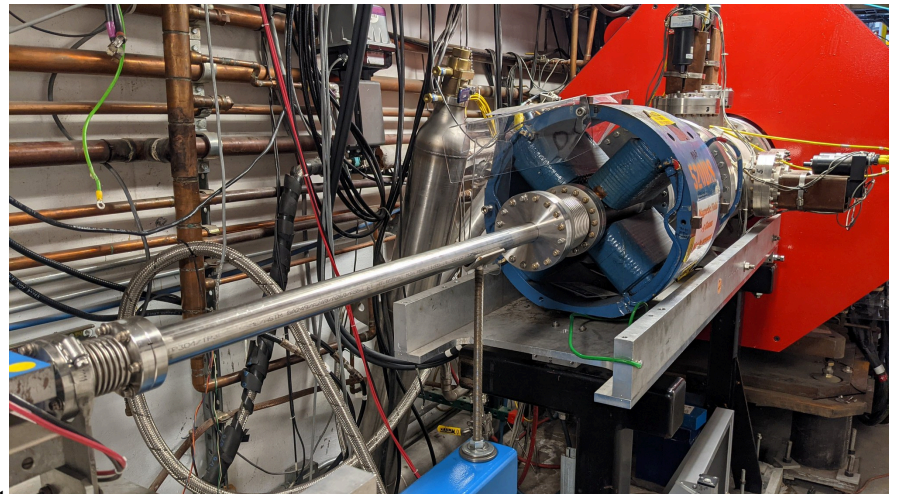


Moller solenoid replacement



New solenoid on loan to MOLLER collaboration for Kerr Effect measurements.

To be mapped in fall and installed in 2022.



deBever et.al, NIMM A400, 379 (1997)

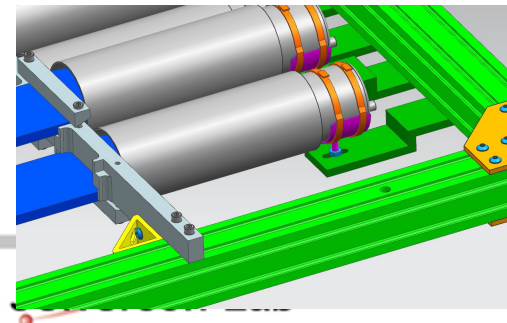
HMS Upgrades and Maintenance

25+ year old HMS Quadrupole power supplies replaced. Remote polarity reversal restored. Tested down to 20A. (Existing supplies 25+ years old. One failed.)



HMS detector work

- Replacing 25 year old hodoscope
- New plastic and tubes
- New 5" tubes for Aerogel
- Gas Cherenkov maintenance



Hall C Future Task Force

In anticipation of Long Range Planning exercise evaluate opportunities in Hall C for next decade+. Prepare white paper.

Hall C is optimized facility for precision measurement of small cross sections.

Unique Eq: SHMS, HMS, NPS, CPS
High power & polarized targets
Precision polarimetry
High luminosity

During MOLLER/SoLID era only flexible configuration high power electron hall (in the world).

Chairs: Thia Keppel, Steve Wood

Members: Eric Christy (Hampton U.), Dipangkar Dutta (Mississippi State U.) David Hamilton (U.Glasgow), Or Hen (MIT), Tanja Horn (CUA), Garth Huber (U. Regina), Ed Kinney (U. Colorado), Nilanga Liyanage (Uva), Wenliang Li (W&M), Ellie Long (New Hampshire), Dave Mack (JLab), Carlos Munoz-Camacho (IJCLab-Orsay), Brad Sawatzky (JLab), Karl Slifer (New Hampshire), Holly Szumila-Vance (JLab), Arun Tadepalli (JLab), Bogdan Wojtsekhowski (JLab)

Hall C Future Topics

Bi-weekly meeting topics have included:

Positron beams

Electro-weak with e^+/e^-

Neutral Particle Spectrometer and Compact Photon Source

High luminosity solenoid for DVCS, DVMP, TDIS

Higher energy CEBAF

Nuclear effects

Polarized targets

Strangeness form factors (coincidence parity)

u-channel DVCS

Hypernuclear physics

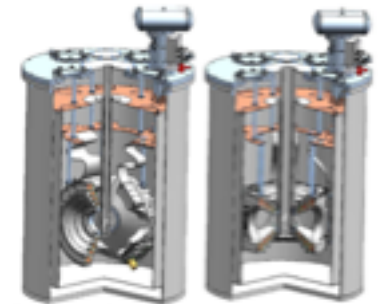
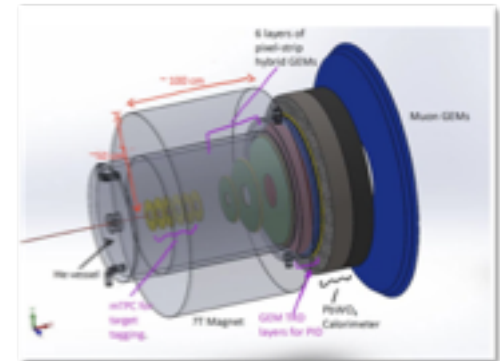


Figure 17: Cutaway of the 2-Component for the Magnet

