Hall C Status

Mark Jones, Acting Hall A/C Group Leader
February 2022 Hall C Collaboration Meeting
Changes within Physics Division

- Thia Keppel, new Physics Division Head
- Doug Higinbotham, new interface between accelerator and experiment operations
- Sadie Cherry and Jennifer Finch, new Hall A/C admin support
- Mark Jones, Acting Hall A/C Group Leader
- Bob Michaels, Acting Hall A/C Deputy Group Leader
Successful Sept 2021 to Feb 2022 Run

Ran in Sept 2021 to Feb 2022

• **E12-19-006**: Study of the L–T Separated Pion Electroproduction Cross Section at 11 GeV and Measurement of the Charged Pion Form Factor to High $Q^2$ (Continuation of experiment from FY21, low epsilon kinematics)

**LH2 data**
Online results:
Clean identification of $p(e,e'\pi^+)n$ final state

**LD₂ Data**
• L/T–separated $\pi^-/\pi^+$ Ratios
• Verification that $\sigma_L$ is dominated by $t$–channel process

$$R_L = \frac{\sigma_L[n(e,e'\pi^-)p]}{\sigma_L[p(e,e'\pi^+)n]} = \frac{|A_V - A_S|^2}{|A_V + A_S|^2}$$
New HMS Power Supplies

- Updated the HMS quad current setting program
  - Removed Q3 momentum dependent correction needed with old PS.
  - Check at $p = 1.03$ GeV/c

Old current setting with new PS
Q3 is 1% lower

New current setting with new PS
Hall C Next Run Period Schedule

Plan to run starting June 2022 through March 2023

- **E12-17-005**: The CaFe Experiment: Short-Range Pairing Mechanisms in Heavy Nuclei
- **E12-10-008**: Detailed studies of the nuclear dependence of $F_2$ in light nuclei.
- **E12-06-105**: Inclusive Scattering from Nuclei at $x > 1$ in the quasielastic and deeply inelastic regimes
- **E12-19-006**: Study of the $L$–$T$ Separated Pion Electroproduction Cross Section at 11 GeV and Measurement of the Charged Pion Form Factor to High $Q^2$ (high epsilon kinematics)
- **E12-10-003**: Deuteron Electro-Disintegration at Very High Missing Momentum

- Inclusive electron scattering
- Variety of nuclei to study:
  - Density effects
  - $N/P = \text{# Neutron}/\text{# Proton}$ dependence
  - Isospin dependence (e.g. $^{40}\text{Ca}/^{48}\text{Ca}$)
- Study 2N and 3N short range correlations (SRC)
- Study the $F_2$ nuclear dependence (EMC effect)
Potential Issues in Next Run Period Schedule

- Presently budget uncertainty, since Congress passed CR until mid-March
  - Need to have appropriation bill to run starting in June
- Beam energy uncertainty
  - Plan to have $E_{\text{linac}} = 1.047$ (Hall C = 10.544)
    - Will not know until April/May when new cavities installed.
  - Fall back $E_{\text{linac}} = 1.028$ (Hall C = 10.355)
    - Smaller $\varepsilon$ range and increase error on the pion form factor.
- Total current limit due beam dump limit
  - Plans to update dump power limit to 1.1MW
  - When Hall A at 4 pass and 45uA, then Hall C 5 pass to 60uA.
- 48Ca target work
  - Large amount of work needed to recover 48Ca
Options of experiments to install after March 2023

- **Standard SHMS/HMS**
  - **E12-06-104** $R = \sigma_L / \sigma_T$ in SIDIS
  - **E12-06-107** Complete CT experiment
  - **E12-11-107** Spectator tagged DIS $d(e,e'p_s)$
    - Install Large Angle Detector
    - HMS/SHMS detect electron

- **HMS with Neutral Particle Spectrometer (NPS)**
  - **NPS**
    - Magnet with calorimeter
    - Calorimeter to detect $\gamma$ and $\pi^0$
    - Remove the SHMS HB magnet
  - **E12-13-010** is two experiments
    - Exclusive Deeply Virtual Compton
    - $\sigma_L$ and $\sigma_T$ measured in exclusive $\pi^0$ production
Hall C work during SAD 2022

Usual SHMS/HMS maintenance

NPS preparatory work

- Pull rails from Physics Storage and clean. Sections assembled for detector platform under carriage.
- Weld support brackets to SHMS.
- Test fit of deck and support arm braces.
- Install Handrail sockets on deck.
- SHMS roof block cutting
- Install additional Target access platform support bracing
- Install new Target platform section wedge.

Will confirm that the SHMS can reach 5.5 deg and SHMS/HMS minimum angle is maintained!

SoLID proto type test setup
Papers and Workshops

• **Physics with CEBAF at 12GeV and Future Opportunities** paper

• **J-FUTURE** workshop 28-30 March 2022  JLab / Messina University

• ETC* Trento workshop 26 — 30 Sept 2022: **OPPORTUNITIES WITH JLAB ENERGY AND LUMINOSITY UPGRADE**

• Jay Benesch [talk](#) at the Hall A collaboration meeting on energy upgrade.

• Hall C Futures Task Force is preparing a Hall C specific document
  • For info see [wiki page](#)
Summary

• After delayed start and some hiccups, had a good overall Sept 2021 to Feb 2022 running for Pion-LT experiment.
  • Thanks to all the shifts workers!

• Need to decide about what to experiments to run in the 2023 and beyond
  • Collaborations are organized and well prepared
  • Excellent science

• Looking towards the Hall C Future
  • Attend the Friday afternoon session