

Hall C Research Program



- Have been running experiments since November 1995
- 613 PAC Days run, or 29.7 experiments (→ 61 PAC days/year)
(If 94 days "lost" in PAC jeopardy process are included ~ 70 PAC days/year)
- 263 +27 (+50) PAC Days in queue, or 12.6 experiments
27 days Conditionally Approved (CA), and 50 days "out of books"
(almost all large-scale installation experiments)
(Backlog: 4.1 Years, assuming 70 PAC days/year)

BUT ... Hall C has "hidden" backlog

- 8 Large Installations to date: t_{20} , G_E^{n-98} , HNSS, G_E^{n-00} , G_E^{n-01} , GO (x2), HKS
- 400+ users representing 20 different countries
- No collaboration, but steering committee to represent user community involved in diverse Hall C program dominated by large-installation experiments.

Experiments completed in Hall C since 2004

Exp	Title	Spokespersons	DAYS
E00-006	G0 Forward Angle Measurements	D. Beck	47
E02-019	$x > 1$ at high Q^2	J. Arrington, D. Day, B. Filippone, A. Lung	25
E03-103	EMC Effect in Light Nuclei	J. Arrington, D. Gaskell	10
E03-008	Subthreshold J/Psi Photoproduction	P. Bosted, J. Dunne	7
E01-107	Pion Transparency in Nuclei	D. Dutta, R. Ent, K. Garrow	14
E02-109 Part I (1/3)	Measurement of $R = \sigma_L/\sigma_T$ on Deuterium in the Resonance Region	M.E. Christy, C. Keppel	4.33
E04-001 Part I (1/3)	Measurement of F2 and R on Nuclear Targets in the Resonance Region	A. Bodek, C. Keppel	1.67
E01-011	Spectroscopy Study of Medium to Medium-Heavy Mass Λ Hypernuclei	O. Hashimoto, S. Nakamura, J. Reinhold, L. Tang	19
E02-017	Direct Lifetime Measurement of Heavy Hypernuclei	B. Hu, A. Margaryan, L. Tang	7

- HMS + SOS running until mid-January, 2005
- In January, 2005 installation of the HKS experiment started
- In October, 2005 installation of the G0-Backward experiment started

$\Sigma = 135$
~ 70/year

2005 Publications



E00-006	Strange Quark Contributions to Parity-Violating Asymmetries in the Forward $G0$ Electron-Proton Scattering Experiment.	PRL	95
E97-006	Nuclear Transparency from Quasielastic $^{12}\text{C}(e,e'p)$.	PRC	72
E93-038	The Ratio of Proton Electromagnetic Form Factors via Recoil Polarimetry at $Q^2 = 1.13$ (GeV/c) ² .	NP	A764
E93-038	Measurements of the Neutron Electric to Magnetic Form Factor Ratio G_E^n/G_M^n via the $^2\text{H}(e,e'n)^1\text{H}$ Reaction to $Q^2 = 1.45$ (GeV/c) ² .	PRC	xx
(none)	Linear Beam Raster for Cryogenic Targets.	NIM	A539
(none)	The Aerogel Threshold Cerenkov Detector for the High Momentum Spectrometer in Hall C.	NIM	A548
E00-006	The Cryogenic Target for the $G0$ Experiment at Jefferson Lab	NIM	A551
Submitted:			
E89-009	Hypernuclear Spectroscopy using the $(e,e'K^+)$ Reaction.	PRC	
E94-110	Measurements of $R = \sigma_L/\sigma_T$ and the Separated Longitudinal and Transverse Structure Functions in the Nucleon Resonance Region.	PRL	
Spin-off:			
(E94-110)	Quark-Hadron Duality in Electron Scattering	PR	406
(E89-008)	Low-Q Scaling, Duality, and the EMC Effect		submitted
(E94-110)	Q^2 Evolution of Generalized Baldin Sum Rule for the Proton		submitted
(E94-110)	Experimental Constraints on Non-Linearities Induced by Two-Photon Effects in Elastic and Inelastic Rosenbluth Sep.		submitted
(E89-008)	Moments of Nuclear and Nucleon Structure Functions at Low Q^2 and the Momentum Sum Rule.		submitted

PAC-27 Approved Experiments in



- | | | | |
|----------------|---|----------------|-----------|
| E05-008 | The Qweak Experiment: A Search for Physics at the TeV Scale via a Meas. of the Proton's Weak Charge | 35 days | A |
| E05-017 | Measurement of Two-Photon Exchange in Unpolarized Elastic e-p Scattering | 13 days | A- |

PAC-28 Approved Experiments in



- | | | | |
|----------------|--|------------------|-----------|
| E05-101 | Helicity Correlations in Wide-Angle Compton Scattering | 14 days | A- |
| E05-108 | GO Backward Angle Measurements (II) | (50) days | A- |
| E05-115 | Spectroscopic Investigation of Hypernuclei in ... (II) | 20 days | A- |

Hall C Approved Experiment Summary



Base Equipment Experiments (1.6 experiments, 16 days):

E04-001	Measurements of F2 and R on Nuclear Targets	5 days, 1/3 complete
E05-017	Measurement of Two-Photon Exchange in Unpolarized Elastic e-p Scattering	13 days

Large Installation Experiments beyond HKS (11 experiments, 274 days):

E04-115	GO Backward Angle Measurements	70 days	A
E04-101	Measurement of the PV Asymmetry for the N- Δ	0 days	B+
E05-108	GO Backward Angle Measurements (II)	(50) days (CA)	A-
E04-108	Measurement of G_E^p/G_M^p to $Q^2 = 9 \text{ GeV}^2$	40 days	A
E04-019	Measurement of the Two-Photon Exchange Contribution in e-p Elastic Scattering Using Recoil Polar.	18 days	A-
E03-109	Spin Asymmetries on the Nucleon Experiment	27 days (CA)	A-
E04-113	Semi-Inclusive Spin Asymmetries on the Nucleon	25 days	A-
E05-101	Helicity Correlations in Wide-Angle Compton Scattering	14 days	A-
E05-008	The Qweak Experiment: A Search for Physics at the TeV Scale via a Meas. of the Proton's Weak Charge	35 days	A
E04-110	The Neutron Electric Form Factor at $Q^2 = 4.3 \text{ GeV}^2$ from the D(e,e'n) Reaction via Recoil Polarimetry	25 days	A-
E05-115	Spectroscopic Investigation of Hypernuclei in ... (II)	20 days	A-

Color coding indicates experiments using similar apparatus

More Realistic Assumption on future Hall C experiments and backlog, including

- a) "hidden" backlog
- b) installation times

"Typical" Hall C year = 70 PAC days + ~4-month long installation

1) GO Backward at 687 MeV (+ N- Δ)	70 PAC days	5 months	2006
2) GO Backward at 362 MeV	(50 PAC days)		
3) GEp-III	40 PAC days	4 months	2007
4) GEp-2gamma	18 PAC days		
5) SANE Experiment	27 PAC days	3 months	2008?
6) Semi-SANE Experiment	25 PAC days		
7) Wide-Angle Compton Scattering	14 PAC days		
8) HMS L/T ($A > 2$)	3 PAC days		
9) e-p Linearity Test	13 PAC days		
10) Qweak Phase I	35 PAC days	6 months	
11) HKS-HES Experiment	20 PAC days	5 months	
12) GEn at $Q^2 = 4.3$	25 PAC days	3 months	
13) HMS L/T ($A = 2$)	9 PAC days		
14) HKS-HES Experiment II	30 PAC days		
15) Qweak Phase II	93 PAC days	3 months	

Total 422 PAC days 29 months
> 6 years program ...

—Note that we can not really count (50 PAC days) of low GO run off books.

Original Near-Term Program in Hall C

DATE	EXP	PROGRAM	SPOKESPERSON
June-September, 2005	E01-011	Spectroscopy Study of Medium to Medium-Heavy Mass Λ Hypernuclei	O. Hashimoto, S. Nakamura, J. Reinhold, L. Tang
September-October, 2005	E02-017	Hypernuclear Life Time Experiment	B. Hu, A. Margaryan, L. Tang
October 2005-March, 2006		G0 Backward Experiment Installation	
March-December	E04-115, E05-108	G0 Backward Angle Measurement	D. Beck
March-December (parasitic with E04-115)	E04-101	Parity-Violating Asymmetry in the N-Δ Region	N. Simicevic, S. Wells

Schedule shifted by ~3 months compared to early '05 version, due to:

- 1) More running time for HKS to compensate for difficult startup.
- 2) G0 backward installation now 5 instead of 3 months:
 - a) Installation schedule was untenable with only 5 techs.
 - b) G0 shielding more complicated.

Revised Near-Term Program in Hall C

DATE	EXP	PROGRAM	SPOKESPERSON
October 2005-March, 2006		GO Backward Experiment Installation	
March-May, 2006	E04-115 (+ E04-101)	GO Backward Angle Measurement (+Parity-Violating Asymmetry in the N- Δ Region)	D. Beck (N. Simicevic, S. Wells)
May-July, 2006		Down	
July-August, 2006	E05-108	GO Backward Angle Measurement (1/2)	D. Beck
September-December, 2006	E04-115 (+ E04-101)	GO Backward Angle Measurement (+Parity-Violating Asymmetry in the N- Δ Region)	D. Beck (N. Simicevic, S. Wells)
January-March, 2007	E05-108	GO Backward Angle Measurement (1/2)	D. Beck
<u>April-September, 2007</u>		GEP-III installation (assuming May-September accelerator down again in 2007)	
September, 2007 - April, 2008	E04-108 + E04-019	GEP-III (+ GEP-2g?)	E. Brash, M. Jones, C. Perdrisat, V. Punjabi

Schedule has also shifted due to forced Summer down (and may shift again)

Budget Revisions (Ongoing)



The FY06 Budget for JLab is some 8% lower than the FY05 budget. In addition, DOE-allowed R&D work for the 12 GeV project has highest priority. Without 12-GeV construction funds in yet, need to redirect funds within JLab.

Implications:

- 1) Save on power bill by low-energy (or no) running from May-September
- 2) Summer 2006 Run is reduced by 7 weeks (i.e., 26% less running)
- 3) Hall C FY06 budget for ops & capital funds reduced by ~\$300K (~15%)
→ impact on expenditures for future large installations

- Summer Run may still be completely removed!!! ←
- If FY07 budget ~ FY06 budget, may get another ~\$300K reduction
- Not unlikely that Hall C will in future only get ~50 PAC days per year

Impact on Hall C Program:

- 1) All Hall C expenditures for large installations will slow down
- 2) Strongly believe we will stick to May-September down times
→ Installations occur in this period.
→ Stick to same setup for September-May periods.



- Hall C physics program is now essentially **only** large-installation experiments.
- To finalize experimental program in "fast" time scale need:
 - 1) **Sufficient Capital funds to keep large installations moving.** ☹️
 - 2) **Sufficient technical manpower to prepare installations well, saving largely on actual installation times.** 😊 and later ☹️
 - 3) **Need to run at least 70 PAC days per year.** ☹️

Lost some 9 months since ~one year ago due to schedule changes.

Expectation: **Hall C run periods consist of large-installation groups of experiments from September - April, while installations occur from May-September.**

May only be able to execute 50 PAC days per year...

March 2006 until May 2007
September 2007 until May 2008
September 2008 until May 2009
September 2009 until May 2010
September 2010 until May 2011
September 2011

GO runs
GEp-III, GEp-2g
SANE, etc.
Qweak
HKS/HES, GEn
Qweak-II

HMS

Even larger delays possible ...



Steering Committee

- Hall C maintains experiment-specific collaborations, with 400+ users from 20 countries
- Hall C Steering Committee with as main tasks
 - Provide effective channel of communication
 - Represent the interests of Hall C users and Hall C
 - Organize annual Hall C physics workshop
- 2003: John Arrington (ANL)
Donal Day (UVa)
Joerg Reinhold (FIU)
Phil Roos (UMd)
- 2004: Betsy Beise (UMd)
Donal Day (UVa)
Joerg Reinhold (FIU)
Wim Van Oers (Manitoba)
- 2005: Betsy Beise (UMd)
Osamu Hashimoto (Tohoku)
Allena Opper (Ohio)
Wim Van Oers (Manitoba)
- 2006: Osamu Hashimoto (Tohoku)
Roy Holt (ANL)
Garth Huber (Regina)
Allena Opper (GWU)

January Hall C Users Meeting



- Thursday Physics Updates (25 minutes each)
- Friday Upcoming Experiments + Instrumentation
- Friday Evening 7 pm Party at my house
- Saturday Upcoming Experiments + 12 GeV

Please provide an electronic version, or copy, of your talk to Rachel!!!!