

12 GeV Upgrade Project - Status

Allison Lung UGBOD Meeting January 13, 2015



12 GeV Upgrade Project









12 GeV Scientific Capabilities

Hall D – exploring origin of confinement by studying exotic mesons





Hall B – understanding nucleon structure via generalized parton distributions

Hall C – precision determination of valence quark properties in nucleons and nuclei





Hall A – form factors, future new experiments (e.g., SoLID and MOLLER)





12 GeV Upgrade Status

<u>Civil Construction essentially complete:</u>

- Cooling towers ; Tunnel Air Conditioning in FY15

Accelerator Construction complete:

- Operation during project commissioning of Halls B & C remaining

#	System	Technical Definition	PEP Date	ACTUAL
1	Accelerator	12 GeV capable 5.5 pass machine installed	Dec 2014	June 2014
2	Accelerator	11 GeV capable beamline to Halls A/B/C installed	Dec 2014	June 2014
3	Accelerator	12 GeV capable beamline to Hall D tagger area installed	Dec 2014	April 2014
4	Accelerator	Accelerator commissioned by transporting a > 2 nA electron beam at 2.2 GeV (1 pass)	Dec 2014	Feb 2014
5	Civil	New experimental Hall and Counting House: > 10,500 sq. ft.	Dec 2014	June 2012

Received CD-4A Approval ahead of schedule; ESAAB July 30, 2014 'Accelerator Project Complete and Start of Operations'







5.5 Pass: 10.5 GeV to Hall D Tagger





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Physics Construction Progress (non-magnet)

- <u>Detectors and electronics</u> at 97% complete
 - Hall D complete
- DAQ/Computing (software/firmware) at 82%
 - Halls C, D complete
 - Hall B plans procurements FY2015
- Beamline at 82%
 - Hall D at 98%
 - Halls B & C plan procurements/assembly FY2015/2016
- Infrastructure at 83%
 - Hall D complete
 - Halls B & C have major installations in FY2015/2016





Hall D: Detector Complete



Hall D Key Performance Parameter

Commissioning run: 3 weeks in Oct-Dec 2014:

Detector operational: events recorded with a > 2 nA electron beam at > 10 GeV beam energy (5.5 passes)

KPP Demonstration:

- 1. Detector running for ~one shift recording data from all subsystems.
- 2. Snapshots of beam status screens and/or accelerator elog entries demonstrating the electron beam current and energy.
- 3. Plots showing relative timing (coincidence) of the signals in TAGx, TOF, BCAL, FCAL, ST, PS (with TAGx).
- 4. Event displays showing correlations of particle hits in the CDC, FDC, ST, TOF, BCAL, FCAL.
- 5. Plots of reconstructed particle trajectories showing target position.
- 6. Particle identification plots using signals from calorimetry and timing detectors (e.g. FCAL, BCAL, TOF).





Hall D – Key Performance Parameter



2-day running period: 50-100nA, 10.08 GeV electrons



KPP achieved – December 2014 !

Thanks to dedicated effort by Accelerator Ops, Engineering, Hall D staff, and GlueX Collaboration

Remaining Project scope: Diamond radiator (UConn) – In progress





Hall C: Detector Progress



Hall C: SHMS Magnet Progress





D – wound & potted; due Dec 2015



Q2 – wound; due Jan 2016



Q3 – winding start; due March 2016

Jefferson Lab





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Hall C: SHMS Progress

Prepared for first magnet arrival in January 2015.

ERR required to operate Q1 magnet is scheduled for Jan 21st.







Hall B: Detector Progress





HTCC Full Mirror Complete



SVT Region 1, 2, 3 Under Test





See V. Burkert's talk





Hall B CLAS12 Magnet Progress

Torus – FNAL epoxy problem resolved; now in production; 2 (of 6) coils delivered to JLab and passed our QA tests. Cryostat factory in full operation.

Solenoid – Everson Tesla in PA completed practice coil; passed MRR in Dec 2014; start of production coil winding this month. **Project critical path.**

Torus Coil #1 in foam cryostat at JLab being readied for LN2 cooldown







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MRR = manufacturing readiness review

Key Upcoming Dates

Hall	Key Event	Projected Date
В	Torus 1 st Coil Cold Mass Arrives	November 2014
В	Torus 6 th Coil in Cryostat Done	June 2015
В	Torus Installation	October 2014 ('spit') – May 2016
В	Solenoid Coil Winding	January 2015 – September 2015
В	Solenoid Arrives	March 2016
В	Detector Commission with Beam	~January 2017
С	1 st Magnet (Q1) Arrives	January 2015
С	2 nd Magnet (HB) Arrives	March 2015
С	Last Magnet (Q3) Arrives	March 2016
С	Last Magnet Tested	May 2016
С	Detector Commission with Beam	~August 2016





Physics Construction Cost Summary



Estimate-To-Complete (\$M) (as of 1-Oct-2014)







MAGNET TECHNICAL, COST & SCHEDULE MAJOR RISKS

		SCHEDULE	COST
Hall C D/Q2/Q3 – Sigma Phi			650
Transition from Dipole to Quad winding (S)	Retired		
Agreement on Dipole collaring temperature (T,C,S)	Retired		
Dipole collaring (S)	2QFY15	1-3 Months	
Cryostat assembly (S)	4QFY15	1-3 Months	
Hall B Torus – Fermilab and JLab			2500
Potting procedure recertification (T,C,S)	Retired		
Additional cost contingency usage (C)	2QFY15		
Design and installation integration issues (C,S)	3QFY16	3-6 Months	
Hall C HB – MSU			250
Additional cost contingency usage (C)	2QFY15		
Hall C Q1 – Scientific Magnetics and JLab			100
Additional shield leaks develop (C,S)	2QFY15	2-12 Months	
Hall B Solenoid – ETI			1000
Winding and potting process verified (T,C,S)	1QFY15	2-3 Months	
➢ Field quality (T,C)	1QFY15		
Transition into production(T,C,S)	2QFY15	6-9 Months	
Cryostat assembly (S)	1QFY16	1-3 Months	
All Magnets – Reaching full design field (T)	4QFY16		1500
TOTAL POSSIBLE ~3-12 months			~\$6M







Cost & Schedule Performance

Director's Review, OPA Review, both in November 2014.

Conclusion: Cost and Schedule Performance are an issue.

- 12 GeV ETC did not reflect 'known' future costs and schedule delays, therefore contingency was not as healthy as it might appear.
 - \$13.7M \$6M (possible hit) = \$7.7M or ~25% Cost Contingency
 - Cost contingency use has been ~\$0.4M \$1M per month in FY2014
 - 13 months 12 months (possible hit) = 1 month Schedule Contingency
 - Lost between 4 and 8 months on all SC magnets Mar to Sep 2014
- Deadline January 19th to complete update of Project plan capturing the 'most likely' hits on cost and schedule. Team is working hard
- DOE returns for Mini-Review on March 12th to assess ETC & performance.





Summary

CD-4A !!

QuickPic - BEAM ON HALL D TAGGER DUMP!

Lognumber 3285622. Submitted by eforman on Wed, 05/07/2014 - 23:41. Last updated on Wed. 05/07/2014 - 23:

Logbooks:	ELOG	Hall D
Tags: Readme Entry Makers: eforman		Tagger Dump
Fig. 2 [05/07/2014	23:41:27]	55 1



Hall D KPP !!

2-day running period: 50-100nA, 10.08 GeV e-



Project 92% Complete, 96% Obligated

Accelerator (100%); Physics Hall D (100%)

Civil (93%) ; Halls B/C (78%)

Challenges

- Taken major schedule hit on each of the 7 SC Magnets
- Cost and Schedule performance puts completion within Plan at risk

Next steps

- ETC Update followed by DOE Review
- Strategize/prioritize resources to improve Project performance

Accelerator Complete !!





BACK-UP SLIDES







Physics Construction Cost Summary





