

6 GeV Experimental Instrumentation

12 GeV Scope: Add new Hall D (photon beam) Add SHMS to HMS Upgrade CLAS to CLAS12 11 GeV Beam Capability to Hall A







Overview of Technical Performance Requirements









Hall D	Hall B	Hall C	Hall A	
excellent hermeticity	luminosity 10 x 10 ³⁴	energy reach	installation space	
polarized photons	hermeticity	precision		
E _γ ~8.5-9 GeV	11 GeV beamline			
10 ⁸ photons/s	target flexibility			
good momentum/angle resolution		excellent momentum resolution		
high multiplicity reconstruction		luminosity up to 10 ³⁸		
particle ID				

12 GeV Schedule



May '11 - Oct '11: 6-month "down" for initial installations

Nov '11 - Apr '12: 6-month run 6 GeV

May '12 - May '13: 1-year "down" for major installation

Jun '13 - Sep '13: Accelerator commissioning

• Oct '13: Hall A commissioning start

• Apr '14: Hall D commissioning start

• Oct '14: Hall B & C commissioning start

The JLab 12 GeV Upgrade - Introduction

Rolf Ent, DIS2009, Madrid, April 28, 2009

- The JLab 12 GeV Upgrade Short Introduction
- The Hall A Deep Inelastic Scattering Program at 12 GeV
 Nilanga Liyanage
- The CLAS12 Detector at JLab to Measure Generalized Parton Distributions and Large-x PDFs

- Michel Guidal

- The SHMS and the Hall C L/T Separated DIS Program
 Cynthia Keppel
- The 12-GeV Upgrade DIS-Related Program

- Simonetta Liuti

backup

NSAC 2007 Long Range Plan

Recommendation I

"We recommend completion of the 12 GeV Upgrade at Jefferson Lab. The Upgrade will enable new insights into the structure of the nucleon, the transition between the hadronic and quark/gluon descriptions of nuclei, and the nature of confinement."

A fundamental challenge for modern nuclear physics is to understand the structure and interactions of nucleons and nuclei in terms of QCD. Doubling the energy of the JLAB accelerator will enable three-dimensional imaging of the nucleon, revealing hidden aspects of the internal dynamics.



Overview of 12 GeV Physics Program

Hall D - exploring origin of confinement by studying exotic mesons



The GlueX/Hall D Project

Hall B - understanding nucleon structure via generalized parton distributions

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





Hall A - short range correlations, form factors, hyper-nuclear physics, future new experiments

DOE CRITICAL DECISION SCHEDULE

CD-0 Mission Need	MAR-2004 (A)
CD-1 Preliminary Baseline Range	FEB-2006 (A)
CD-2 Performance Baseline	NOV-2007 (A)
CD-3 Start of Construction	SEP-2008 (A)
CD-4A Accelerator Project Completion and Start of Operations	DEC-2014
CD-4B Experimental Equipment Project Completion and Start of Operations	JUN-2015

Now split in two to ease transition into operations phase

Note \rightarrow 6 to 18 months schedule float included

(A) = Actual Approval Date

12 GeV FUNDING PROFILE

12 GeV - \$310M Total TPC - Jul-2007



12 GeV Approved Science Program

Six major science thrusts identified in the 12 GeV Conceptual Design Report:

- The Origin of Quark Confinement
- Form Factors Constraints on the GPDs
- Valence Quark Structure and Parton Distributions
- Deep Exclusive Scattering and GPDs
- Hadron Structure in the Nuclear Medium
- Symmetry Tests in Nuclear Physics

12 GeV Approved Science Program

- PAC30 and PAC32 considered only experiments requiring 12-GeV base equipment, or minor modifications thereof (often utilizing existing standalone detectors).
- PAC34 for the first time considered experiments requiring specialized equipment.

Hall	Approved Experiments	Conditionally Approved Experiments	Approximate Days Requested
А	7	3	430 (+ 300)
В	13	1	500* (+ 40)
С	7	8	310 (+ 300)
D	1		120

* total days for combined run groups

• Rough estimate: can execute 84 PAC days per year per Hall.