



Jefferson Lab Status

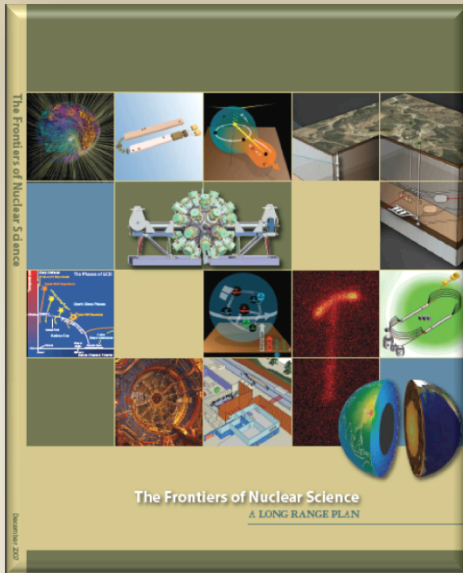


R. D. McKeown
Deputy Director For
Science

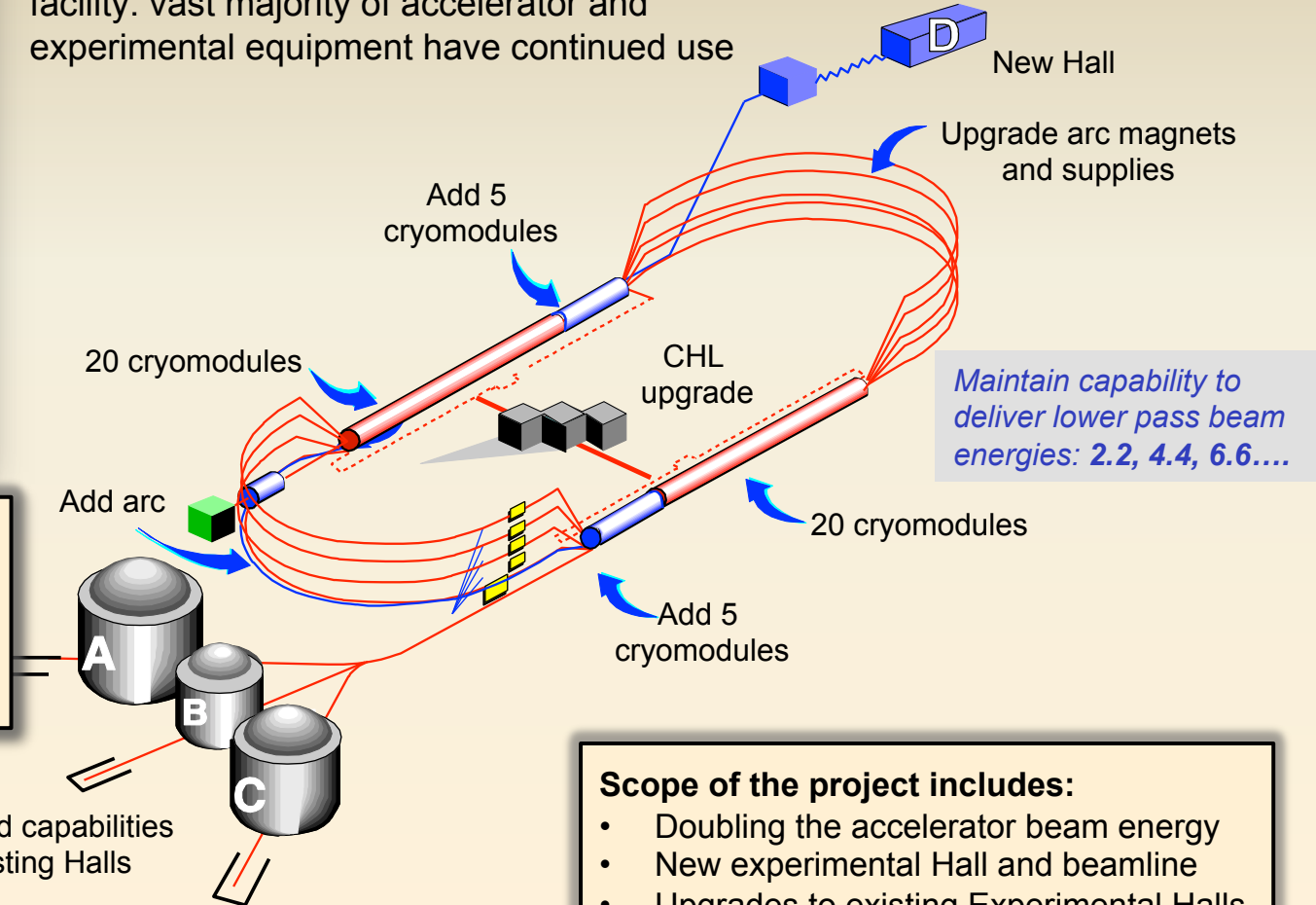
Gamma-Z Workshop
Dec. 16, 2013

Jefferson Lab
Thomas Jefferson National Accelerator Facility

12 GeV Upgrade Project



Upgrade is designed to build on existing facility: vast majority of accelerator and experimental equipment have continued use

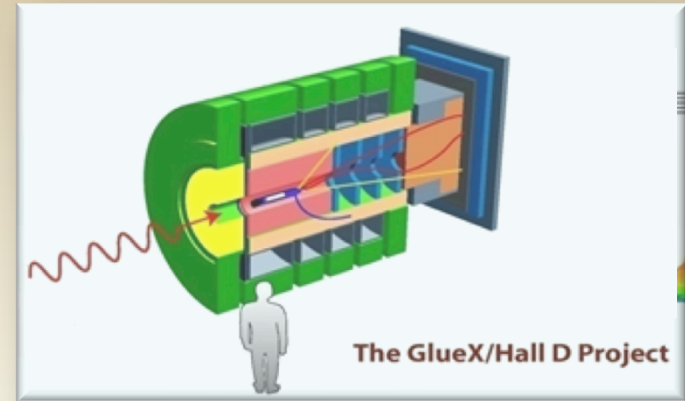
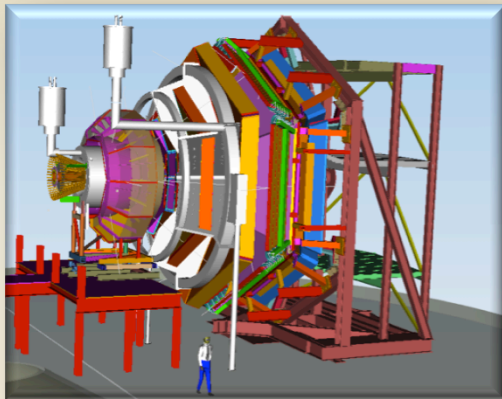


The completion of the 12 GeV Upgrade of CEBAF was ranked the highest priority in the 2007 NSAC Long Range Plan.

- Scope of the project includes:**
- Doubling the accelerator beam energy
 - New experimental Hall and beamline
 - Upgrades to existing Experimental Halls

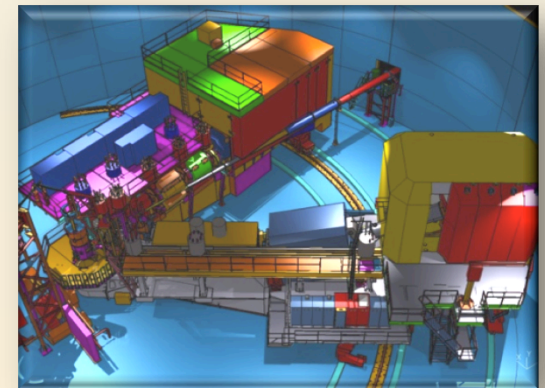
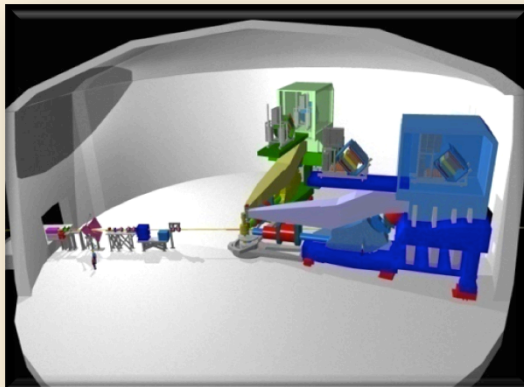
12 GeV Scientific Capabilities

Hall D – exploring origin of **confinement** by studying **exotic mesons**



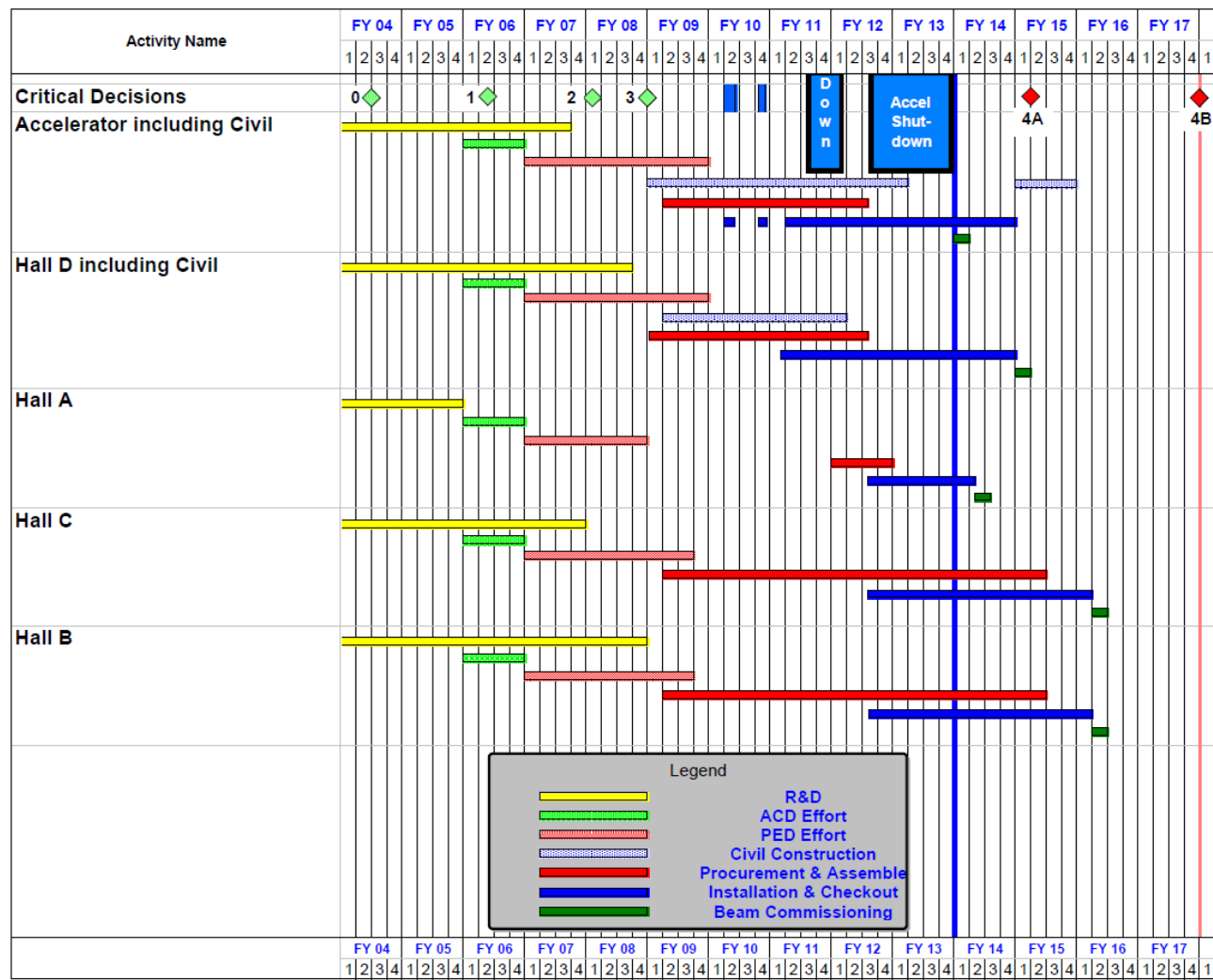
Hall B – understanding **nucleon structure** via generalized parton distributions

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 Project Schedule



FY12: reduction of \$16M
FY13: Pres Request – no restoration

16-month installation
 May 2012 - Sept 2013

Accelerator commissioning start
 Oct 2013

Hall A commissioning start
 Feb 2014

Hall D commissioning start
 Oct 2014

Halls B & C commissioning start
 Jan/Feb 2016

Project Completion
 September 2017

Re-baseline Approved
 September 4, 2013

12 GeV Project Highlights



Hall D & Counting House

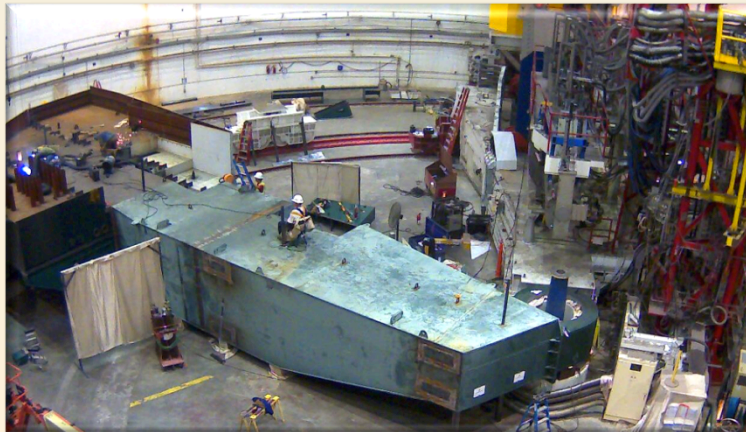
Hall D



Hall D Central Drift Chamber

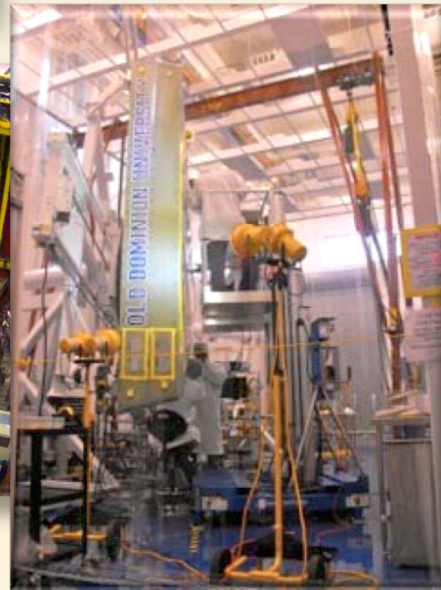


12 GeV Cryomodules



Hall C

Hall B Drift Chamber









































Arc Magnets

Three year plan

Dec 2013

Jefferson Lab Three-Year Schedule

Calendar Year		2014		2015		2016	
Fiscal Year		2014		2015		2016	
CEBAF	Activity Beam	Commissioning 		Comm. 	Physics 	Physics 	Physics 
	Activity Beam	Const.	Comm. 	Comm. 	Physics 	Physics 	Physics 
Hall A	Activity Beam	Const.	Comm. 	Comm. 	Physics 	Physics 	Physics 
	Activity Beam	← <i>CLAS12 Construction/Installation</i> →		Non-CLAS12 Ops 		Comm.	Comm. 
Hall B	Activity Beam	← <i>CLAS12 Construction/Installation</i> →		Non-CLAS12 Ops 		Comm.	Comm. 
	Activity Beam	← <i>SHMS Construction/Installation</i> →		Non-CLAS12 Ops 		Comm.	Comm. 
Hall C	Activity Beam	← <i>SHMS Construction/Installation</i> →		Non-CLAS12 Ops 		Comm.	Comm. 
	Activity Beam	← <i>GlueX Installation</i> →		Comm. 	Comm. 	Physics 	Physics 
Hall D	Activity Beam	← <i>GlueX Installation</i> →		Comm. 	Comm. 	Physics 	Physics 
	Activity Beam	← <i>GlueX Installation</i> →		Comm. 	Comm. 	Physics 	Physics 

 Beam for Commissioning  Beam for Physics  Non-CLAS12 Ops

12 GeV Approved Experiments by Physics Topics

Topic	Hall A	Hall B	Hall C	Hall D	Other	Total
The Hadron spectra as probes of QCD (GluEx and heavy baryon and meson spectroscopy)		1		2		3
The transverse structure of the hadrons (Elastic and transition Form Factors)	4	3	2	1		10
The longitudinal structure of the hadrons (Unpolarized and polarized parton distribution functions)	2	2	6			10
The 3D structure of the hadrons (Generalized Parton Distributions and Transverse Momentum Distributions)	5	10	4			19
Hadrons and cold nuclear matter (Medium modification of the nucleons, quark hadronization, N-N correlations, hypernuclear spectroscopy, few-body experiments)	4	2	6		1	13
Low-energy tests of the Standard Model and Fundamental Symmetries	2			1	1	4
TOTAL	17	18	18	4	2	59

12 GeV Approved Experiments by PAC Days

Topic	Hall A	Hall B	Hall C	Hall D	Other	Total
The Hadron spectra as probes of QCD (GluEx and heavy baryon and meson spectroscopy)		119		320		439
The transverse structure of the hadrons (Elastic and transition Form Factors)	144	85	102	25		356
The longitudinal structure of the hadrons (Unpolarized and polarized parton distribution functions)	65	120	165			350
The 3D structure of the hadrons (Generalized Parton Distributions and Transverse Momentum Distributions)	409	982	161			1552
Hadrons and cold nuclear matter (Medium modification of the nucleons, quark hadronization, N-N correlations, hypernuclear spectroscopy, few-body experiments)	159	120	179		14	472
Low-energy tests of the Standard Model and Fundamental Symmetries	513			79	60	652
TOTAL	1290	1426	607	424	74	3821

More than 7 years of approved experiments



Jefferson Lab: Today and Tomorrow

- **The Jefferson Lab electron accelerator is a unique world-leading facility for nuclear physics research**
- **12 GeV upgrade ensures at least a decade of excellent opportunities for discovery**
 - **New vistas in QCD**
 - **Growing program Beyond the Standard Model**
 - **Additional equipment: SBS, MOLLER, SoLID**
- **EIC moving forward:**
 - **Strong science case, much builds on JLab 12 GeV program**
 - **MEIC design well developed – time scale following 12 GeV program is “natural”**