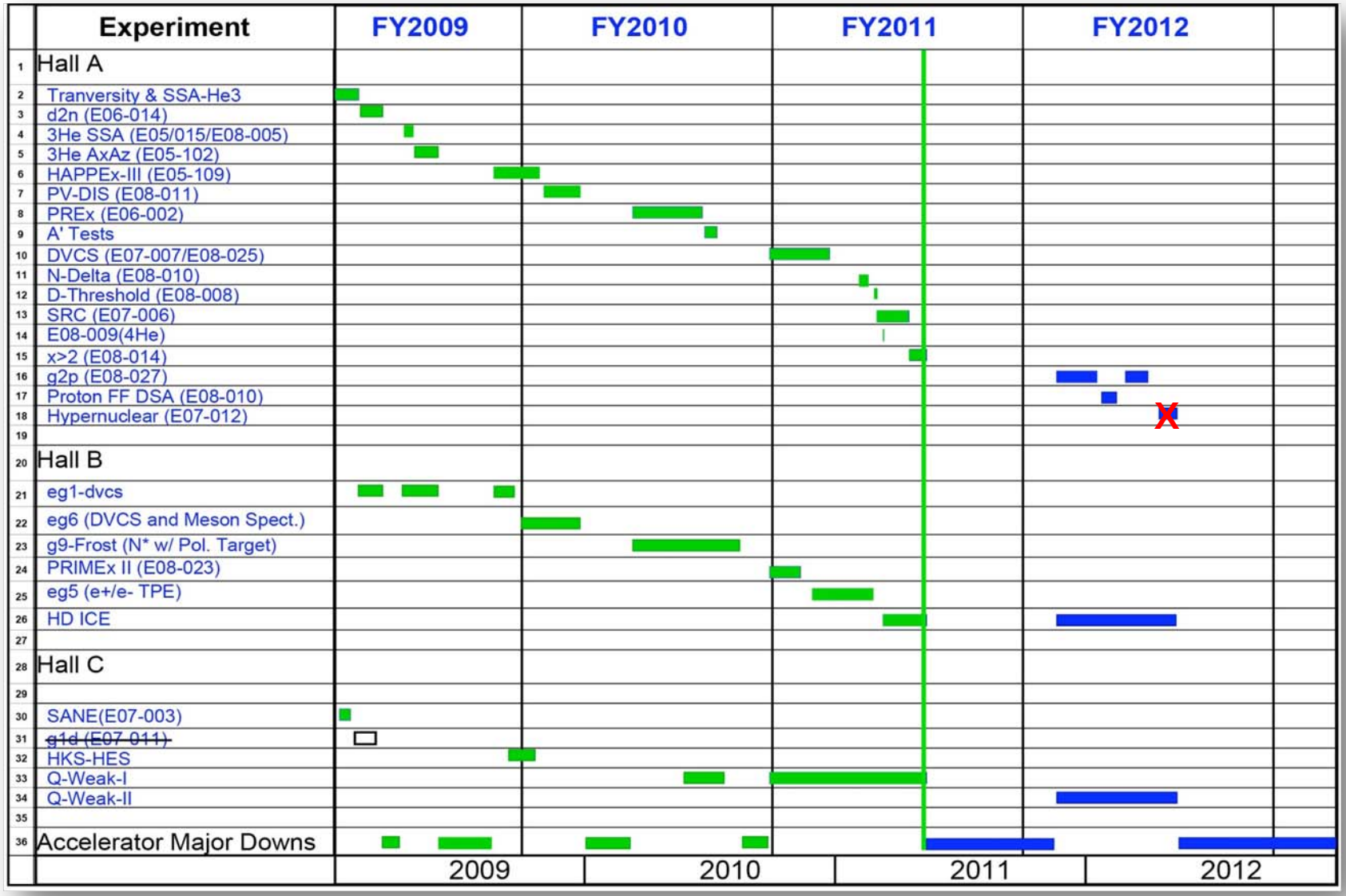
Jefferson Lab

Hugh Montgomery

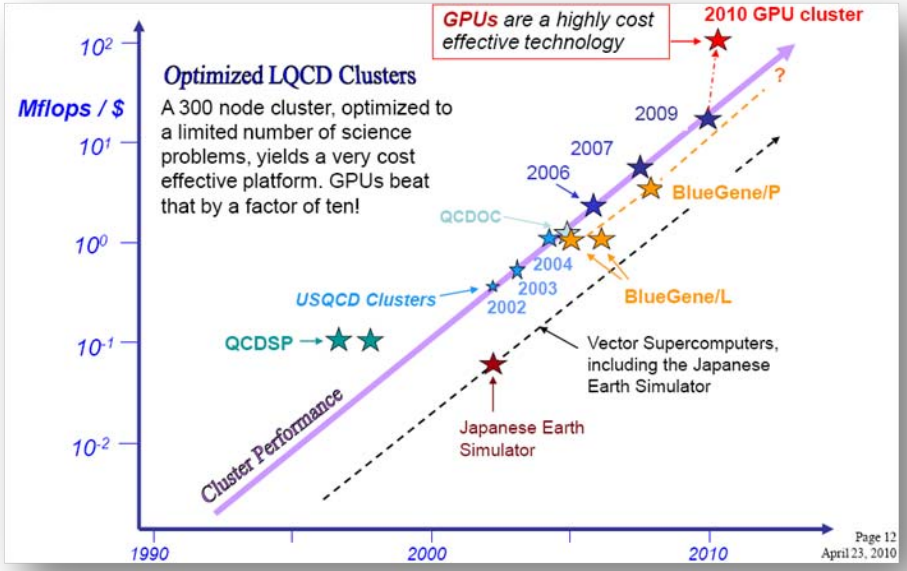
NSTAR 2011
May 16, 2011

Experimental Nuclear Physics Program



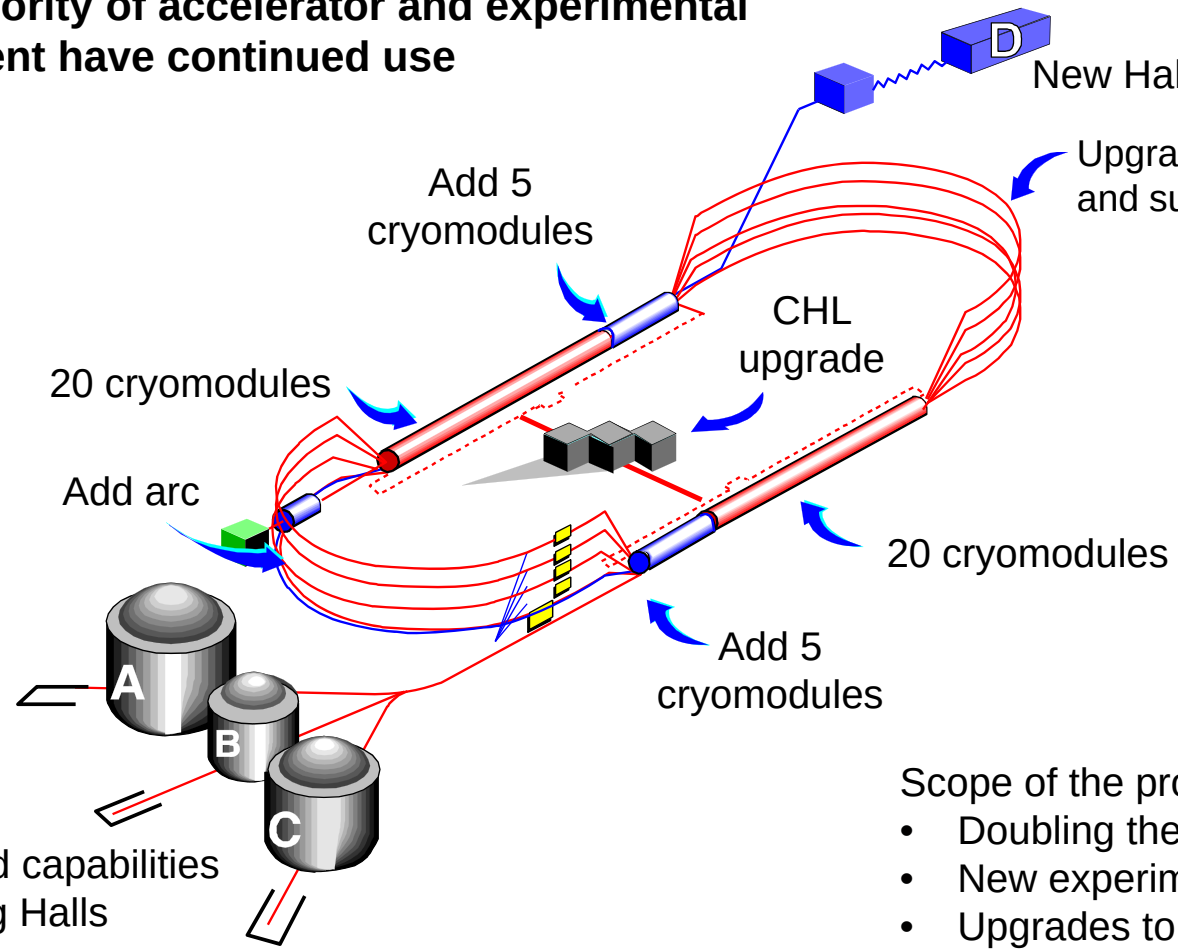
Theoretical and Computational Physics

- Strongly coupled to local universities through joint appointments which support 50% of effort
- Strongly coupled to Jefferson Lab experimental program
  - Radiative Corrections
  - Excited Baryon Analysis Center
  - Imaging of the nucleon
  - Lattice Gauge calculations of QCD



12 GeV Upgrade Project

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

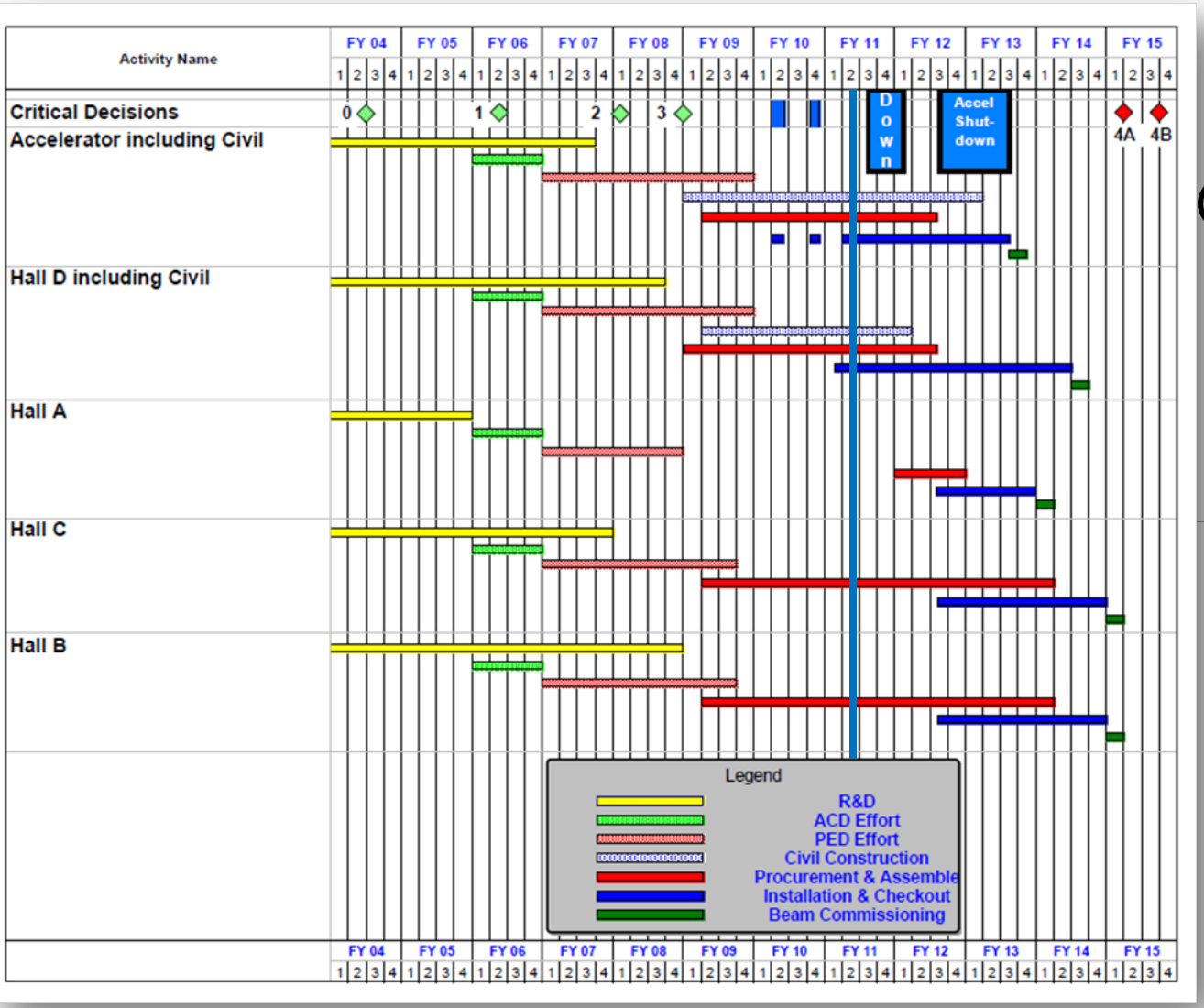


Maintain capability to deliver lower pass beam energies: 2.2, 4.4, 6.6….

Scope of the project includes:

- Doubling the accelerator beam energy
- New experimental Hall and beamline
- Upgrades to existing Experimental Halls

12 GeV Upgrade Schedule



Two short parasitic installation periods in FY10

6-month installation
May – Oct 2011

12-month installation
May 2012 – May 2013

Hall A commissioning start
October 2013

Hall D commissioning start
April 2014

Halls B/C commissioning start
October 2014

Project Completion
June 2015

Hall D Status – Dec. 2010

Ready For Equipment (RFE)
Dec. 28, 2010

Jefferson Lab 12 GeV Upgrade

An exciting scientific opportunity

- Explore the physical origins of quark confinement (GlueX)
- New access to the spin and flavor structure of the proton and neutron
- Reveal the quark/gluon structure of nuclei
- Potential new physics through high precision tests of the Standard Model

Strong User community involvement

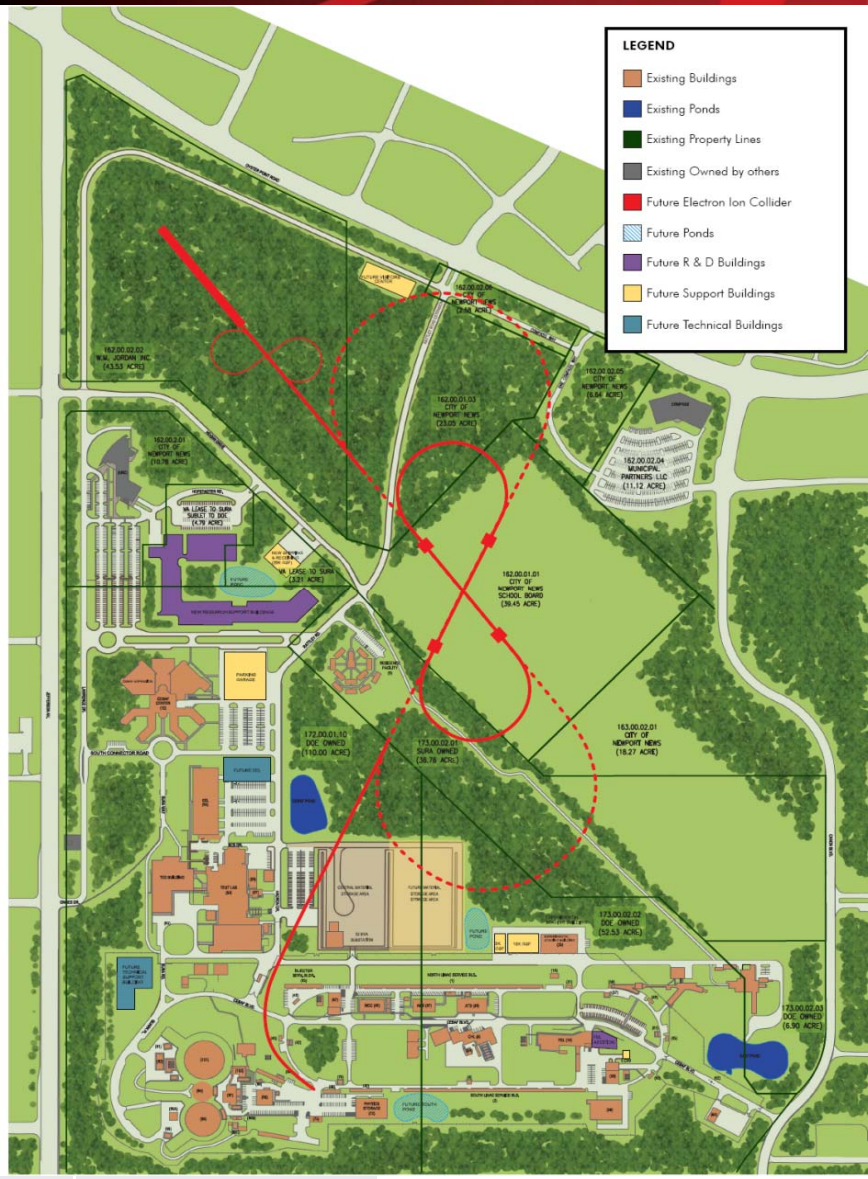
- NSF MRI and NSERC funding to universities for detector elements
- Strong international collaborations and contributions
- > 32 PAC-approved experiments – ranking in progress

Accel-Civil-Physics scope leverages the existing facility

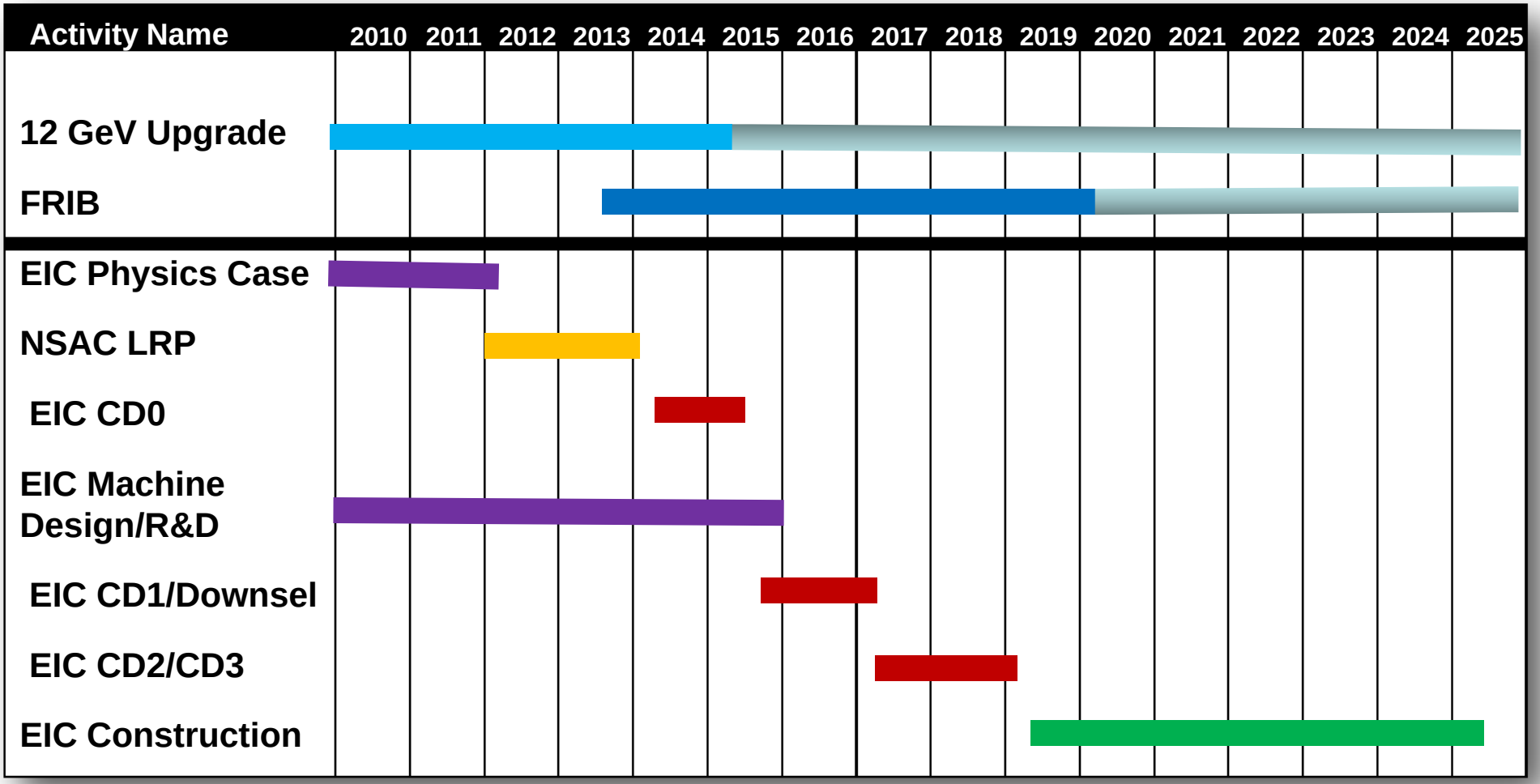
Construction is well underway!

Electron Ion Collider at Jefferson Lab Site

	Energies	s
(M)EIC@JLab	Up to 11 x 60+	240-3000
Future ELIC@JLab	Up to 11 x 250 (20? x 250)	11000 (20000?)
Staged eRHIC@BNL	Up to 5 x 250	600-5000
eRHIC@BNL	Up to 20 x 325 (30 x 325)	26000 (39000)
ENC@GSI	Up to 3 x 15	180
LHeC@CERN	Up to 150 x 7000	4200000



Electron Ion Collider Realization Imagined



Infrastructure Construction

Jefferson Lab

Experimental and Theoretical Nuclear Physics Programs
Scope expanding – Electroweak, New Phenomena

12 GeV Upgrade Project.

Accelerator science, superconducting radio-frequency and cryogenic techniques

Synergistic R&D and science program using the Free Electron Laser facility

Laboratory infrastructure (TEDF Project)

Accelerator based future in science

Welcome to Jefferson Lab