

12 GeV UPGRADE

Like a giant, powerful microscope, Jefferson Lab's CEBAF accelerator and its experimental halls allow scientists to peer into matter to study the tiniest particles that comprise it. Doubling the maximum energy of the lab's electron beam to 12 billion electron-Volts (Giga electron-Volts or GeV), building a new experimental research building and upgrading equipment in the three existing experimental areas will effectively increase the resolution of this "microscope," allowing scientists to probe quarks, gluons and other particles with improved precision. The upgrade will provide a cutting-edge research facility for the international community for decades to come and make it possible for Jefferson Lab to continue to contribute to the economic vitality of the region.

WHAT WE WILL STUDY

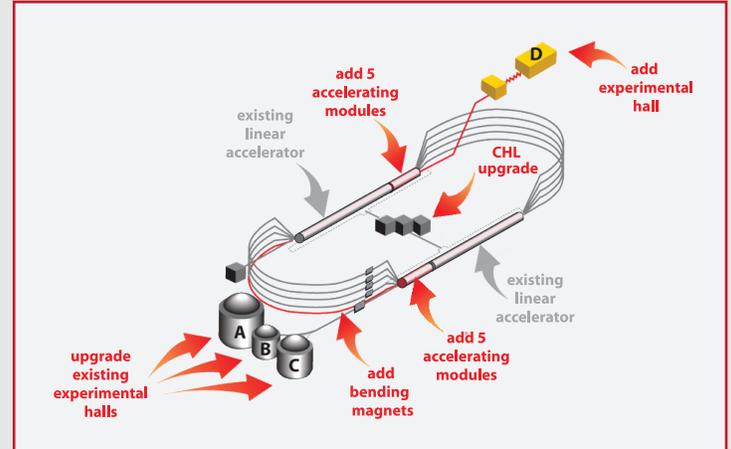
The upgrade will enable scientists to study the nucleus of the atom with unprecedented precision. Scientists aim to study the protons and neutrons in the nucleus and the quarks and gluons that make up protons and neutrons.

THE UPGRADE WILL ALLOW FOUR MAIN AREAS OF RESEARCH:

- Study the mechanism that confines quarks and seek an answer to one of the great mysteries of physics: Why is one quark never found alone?
- Research the fundamental structure of neutrons and protons.
- Seek an answer to how protons and neutrons bind together to form the nucleus.
- Study the limits of the Standard Model, the theory that describes the fundamental Particles and their interactions.

QUICK FACTS

- The U.S. Department of Energy's Office of Nuclear Physics within the Office of Science provides primary funding for the project. The Commonwealth of Virginia, the National Science Foundation and the international scientific community also are contributing critical support.
- Total Project Cost (design/construction/commissioning): \$338 million



TIMELINE

- 2004 Critical Decision Zero (CD-0) approval from the DOE, recognizing the "mission need" for the upgrade and allowing the lab to develop conceptual, acquisition and project execution plans
- 2006 CD-1 approval from the DOE, allowing for project engineering and design efforts to begin
- 2007 CD-2 approval from the DOE, finalizing the project definition as well as allowing a request for the project's construction funding to be included in the federal budget
- 2008 CD-3 approval from the DOE, clearing the way for start of construction
- 2009 Civil construction groundbreaking takes place
- 2012 Accelerator shutdown for the main installation phase of the construction project
- 2014 Achieved DOE Critical Decision 4A (CD-4a). Completed accelerator and civil construction, achieved required accelerator commissioning milestones and transitioned to initial operations
- 2017 Project Completion