

# 2014-16 Strategic Plan

## Southeastern Universities Research Association Doing Business for Jefferson Science Associates, LLC [936]

### Mission

As a national and international nuclear physics research facility, Jefferson Lab provides unique research capabilities at the forefront of nuclear physics and light source research and development (R&D) for university users, provides research opportunities for Virginia faculty and students, and explores and develops core technologies for the economic benefit of the Commonwealth.

### Vision

Jefferson Science Associates (JSA)/Jefferson Lab (JLab) will continue to lead the world in exploring the complex dynamics by which quarks (elementary particles of matter) interacting via gluons (the strong force between quarks), form the stable and solid massive matter of everyday experience. To this end, Jefferson Lab will continue to conduct experiments using a unique facility that is continually being upgraded to serve some 2,000 users, provide theoretical analysis to guide and evaluate experiments, and develop state-of-the-art computer simulations to compute experimentally verifiable predictions. Jefferson Lab will lead the world in the technology of superconducting radio frequency (SRF) and energy recovering linear accelerators (linacs). These technologies will be put to use with JLab participation for the research aims of nuclear physics and basic energy sciences. Research and development (R&D) activities using the technology capabilities of the Free Electron Laser (FEL) will continue to build on the investments made by the Navy and to leverage Commonwealth funds to develop applications that benefit economic development in Virginia. A prerequisite to achievement of all of these goals, and success for Jefferson Lab, is exceptional institutional management.

### Values

### Finance

#### Financial Overview

Commonwealth financial assistance for educational and general services supports the Governor's Distinguished Continuous Electron Beam Accelerator Facility (CEBAF) Professorships, Scientists and Fellows, provides research support for development of new technologies including the Free Electron Laser, and leverages federal investment in the \$338 million 12 GeV CEBAF upgrade. A critical component of this upgrade is a new experimental Hall D, which will provide capabilities to explore new scientific avenues that address some of the most pressing fundamental questions regarding the quark structure of matter and the force that holds matter together. The Laboratory received \$1.8 million in funding from the Commonwealth in FY2013 and \$1.2 million in FY2014 (through Old Dominion University) to support upgrading the Free Electron Laser equipment, specifically the Cryogenic Unit and Buncher Cavity. Commonwealth support of \$6 million in FY2010 and \$3 million in FY2011, from the Higher Education Research Initiative in Chapters 879/781 and Chapters 874/890, supported the 12 GeV CEBAF upgrade project. Experimental Hall D construction is now complete and installation of experimental equipment is underway.

In addition to the \$1.15 million of initial appropriations received from the General Fund for FY2015, the laboratory was awarded \$3.7 million from the Commonwealth's Development Opportunity Fund to support site characterization studies for a future potential \$620 million Electron Ion Collider (EIC) at Jefferson Lab. In FY2016, the Lab will receive \$250 thousand for EIC preliminary Research and Development. An EIC has been ranked by the Nuclear Science Advisory Committee's Subcommittee on Facilities as "absolutely central" in its ability to contribute to world-leading science in the next decade. Two laboratories, including Jefferson Lab, are developing concepts for this facility and site characterization to move to the construction project process for the US Department of Energy. Completing these studies would advance Jefferson Lab's position as a possible site for this facility, allowing Virginia to extend and expand its world leadership in this area of nuclear physics.

*Note: The net change of \$3,642,500 from the initial FY2015 appropriation consists of: the addition of \$3,700,000 for EIC and a reduction of \$57,500 for the Commonwealth's reductions savings plan. The net change of \$192,500 from the initial FY2016 appropriation consists of the addition of \$250,000 for Preliminary R&D for EIC and a reduction of \$57,500 for the Commonwealth's reductions savings plan.*

#### Biennial Budget

	2015 General Fund	2015 Nongeneral Fund	2016 General Fund	2016 Nongeneral Fund
Initial Appropriation for the Biennium	1,150,005	0	1,150,005	0
Changes to Initial Appropriation	3,642,500	0	192,500	0

*(Changes to Initial Appropriation will be 0 when the plan is created. They will change when the plan is updated mid-biennium.)*

### Customers

#### Anticipated Changes to Customer Base

#### Current Customer List

Predefined Group	User Defined Group	Number Served	Potential Number of Annual	Projected Customer
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		Annually	Customers	Trend
Higher Education Institutions	Commonwealth Free Electron Laser users	11	11	Stable
Higher Education Institutions	Commonwealth nuclear physics students and faculty	256	256	Stable
Higher Education Institutions	Free Electron Laser users	17	17	Stable
Higher Education Institutions	Nuclear physics users	1,260	1,500	Increase

## Partners

Name	Description
United States Department of Energy	The United States Department of Energy is the landlord and primary funding source for the infrastructure and operations of Jefferson Lab.

## Agency Goals

- **Maintain a 90-1 ratio of federal/private matching funds to state provided funds for basic and applied research.**

### Summary and Alignment

Enhancement of Virginia's economy requires that new science and technology is moved from the laboratory and university to the marketplace. By effectively leveraging Commonwealth-provided funds to yield new applications and developments from Jefferson Lab, the lab is helping university researchers to identify and develop new products and services to stimulate high-tech economic development in Virginia based on the unique research capabilities at Jefferson Lab. Commonwealth funds were also utilized to leverage federal investment in the \$338 million 12 GeV CEBAF upgrade. This goal is aligned with Chapter 4.9:1 Virginia Higher Education Opportunity Act of 2011, purposes 5 (To promote university-based research that produces outside investment in Virginia, fuels economic advances, triggers commercialization of new products and processes, fosters the formation of new businesses, leads businesses to bring their facilities and jobs to Virginia, and in other ways helps place the Commonwealth on the leading edge in the knowledge-driven economy; and 6 (To support the national effort to enhance the security and economic competitiveness of the United States of America, and to secure a leading economic position for the Commonwealth of Virginia, through increased research and instruction in science, technology, engineering, mathematics, and related fields, which require qualified faculty, appropriate research facilities and equipment, public-private and intergovernmental collaboration, and sustained state support.

### Associated State Goal

Economy: Be a national leader in the preservation and enhancement of our economy.

### Associated Societal Indicator

Business Climate

### Objectives

- » **Increase the total funding for the support of basic and applied research by leveraging state funds from all other non-state sources by a factor of 90 or greater.**

#### Description

Increase the total funding for the support of basic and applied research by leveraging state funds from all other non-state sources by a factor of 90 or greater.

#### Objective Strategies

- Jefferson Lab uses state funds to develop proposals, foster collaborations and for targeted experiments used to develop new applications with potential economic development impact for the Commonwealth and to leverage further federal investment.

#### Measures

- ◆ Ratio of federal/private matching funds to state-provided funds for the support of basic and applied research.

- **Leverage Jefferson Lab's unique capabilities, expertise, facilities and resources to increase Virginia university participation in basic and applied science and emerging areas of research.**

### Summary and Alignment

By increasing the number of Virginia university faculty and students in high-profile experiments and in exploring and developing technologies for application, Jefferson Lab raises the profile of the research conducted, attracts more and better students and faculty to Virginia and advances the development of applications with economic development impact for the Commonwealth. This goal is aligned with Chapter 4.9:1

Virginia Higher Education Opportunity Act of 2011, purposes 2 (To take optimal advantage of the demonstrated correlation between higher education and economic growth by investing in a manner that will generate economic growth, job creation, personal income growth, and revenues generated for state and local government in Virginia), 4 (To enhance personal opportunity and earning power for individual Virginians by increasing college degree attainment in the Commonwealth, especially in high-demand, high-income fields such as science, technology, engineering, mathematics, and health care, and by providing information about the economic value and impact of individual degree programs by institution), 5 (To promote university-based research that produces outside investment in Virginia, fuels economic advances, triggers commercialization of new products and processes, fosters the formation of new businesses, leads businesses to bring their facilities and jobs to Virginia, and in other ways helps place the Commonwealth on the leading edge in the knowledge-driven economy), and 6 (To support the national effort to enhance the security and economic competitiveness of the United States of America, and to secure a leading economic position for the Commonwealth of Virginia, through increased research and instruction in science, technology, engineering, mathematics, and related fields, which require qualified faculty, appropriate research facilities and equipment, public-private and intergovernmental collaboration, and sustained state support).

#### Associated State Goal

Education: Elevate the levels of educational preparedness and attainment of our citizens.

#### Objectives

- » **Make Jefferson Lab available to Virginia universities for high-profile experiments and applications development, and increase Virginia university participation in emerging research areas such as medical imaging and nanotechnology.**

##### Description

Make Jefferson Lab available to Virginia universities for high-profile experiments and applications development, and increase Virginia university participation in emerging research areas such as medical imaging and nanotechnology.

##### Objective Strategies

- Jefferson Lab is seeking to increase the participation of Virginia university faculty and students in research at the Lab to enhance Virginia's economic development and to attract the best and brightest students and faculty to pursue these opportunities.

##### Measures

- ♦ Percentage of participation by Virginia university faculty and students in research at Jefferson Lab

- » **Increase the total funding for the support of basic and applied research by leveraging state funds from all other non-state sources by a factor of 90 or greater.**

##### Description

Increase the total funding for the support of basic and applied research by leveraging state funds from all other non-state sources by a factor of 90 or greater.

##### Objective Strategies

- Jefferson Lab uses state funds to develop proposals, foster collaborations and for targeted experiments used to develop new applications with potential economic development impact for the Commonwealth and to leverage further federal investment.

##### Measures

- ♦ Ratio of federal/private matching funds to state-provided funds for the support of basic and applied research.

## Major Products and Services

To provide world-class unique facilities for research in nuclear physics -- products include: experiments, Ph.D.s, papers in refereed journals, invited talks and scientific and technical prizes or awards.

Provide research support and development of industry-university in emerging fields partnerships to explore and develop applications for lab-developed technologies that could provide economic benefit to the Commonwealth -- products are collaborations, partnerships, proposals, research papers and publications, patents, new business spin-offs, and licenses.

## Performance Highlights

Jefferson Science Associates (JSA)/Jefferson Laboratory measures its progress and performance via a performance-based management and operating contract with the United States Department of Energy (U.S. DOE). For activities funded by the Commonwealth of Virginia, it also reports progress towards metrics to the Virginia Performs database. These activities are:

1. Support for new research directions and technology development, including emerging technologies with economic development potential. Support for these research activities provides an opportunity for Virginia research universities to participate in research at an international level, and may lead to important developments in science, defense, security, health and manufacturing with economic impact.
2. The Governor's Distinguished Continuous Electron Beam Accelerator Facility (CEBAF) Professorships, Scientists and Fellows provide support for salaries that allow JSA and Jefferson Lab to attract and retain top scientific and technological talent to the Commonwealth.
3. Leveraging support for the \$338 million federal investment in the 12 GeV CEBAF upgrade of Jefferson Laboratory.

Jefferson Science Associates (JSA)/Jefferson Lab has shown excellent scientific and technological productivity in its basic research and technology transfer missions. The lab has approximately 1,300 active users from the international scientific community, including 133 on approved experiments led by scientists at Virginia research universities.

## Staffing

Authorized Maximum Employment Level (MEL)	0
Salaried Employees	0
Wage Employees	0
Contracted Employees	0

## Key Risk Factors

The primary impediment to the accomplishment of goals is the availability of adequate federal funding to operate and upgrade Jefferson Lab. Pressure on the discretionary portion of the federal budget since 2009 will continue to impact the Lab and could delay or obstruct progress toward goals and initiatives.

## Management Discussion

### General Information About Ongoing Status of Agency

JSA/Jefferson Lab will continue to be a national and international center for nuclear physics research and with the 12 GeV CEBAF upgrade, will remain at the forefront of the field for the next several decades. JLab expects to sustain or increase its scientific productivity in terms of Ph.D.s produced and in scientific papers and journal articles based on this program expansion. Jefferson Lab is also well-positioned to compete for another planned U.S. DOE Office of Science project, an Electron Ion Collider, a facility of central importance to the field of Nuclear Physics, as identified by the Nuclear Science Advisory Committee.

JSA/Jefferson Lab will continue its participation in photon science research and development (R&D) and technology using the capabilities of the Free Electron Laser (FEL), further building on the investments made by the Navy and leveraging Commonwealth funds to develop applications to benefit economic development in Virginia. Future FEL planned activities also include running a potentially groundbreaking nuclear physics experiment, "DarkLight", and an opportunity to develop isotope production.

JSA/Jefferson Lab will continue to identify and develop emerging research opportunities that open new avenues for collaboration with university researchers and business/industry partners.

### Information Technology

JSA/Jefferson Lab receives its primary funding from the DOE Office of Science that supports the information technology requirements of the facility.

Southeastern Universities Research Association (SURA) institutions, Old Dominion University (ODU), College of William & Mary (W&M), Virginia Polytechnic and State University (Va. Tech.) and University of Virginia (UVA) work collaboratively with Jefferson Lab to maintain E-LITE and MARIA networking services to provide high-speed connectivity to Virginia research institutions and to the Department of Energy's ESnet. This collaboration leverages the networking expertise at ODU, W&M, Va. Tech., and ESnet to provide a cost-effective, high-speed Internet connection to collaborators around the world in support of the laboratory's scientific mission.

### Estimate of Technology Funding Needs

### Workforce Development

JSA/JLab faces a specific workforce challenge in recruiting for positions with highly specialized skill sets that are critical to the Lab's success including SRF scientists and engineers, superconducting magnet engineers, electrical and mechanical R&D engineers.

### Physical Plant

JSA/Jefferson Lab receives its primary funding from the U.S. DOE Office of Science that supports the infrastructure and maintenance requirements of the facility.

## Supporting Documents

Title

File Type

**Sponsored Programs [11004]****Description of this Program / Service Area**

As a national and international nuclear physics research facility, Jefferson Lab provides unique research capabilities at the forefront of nuclear and light source physics for university users, provides research opportunities for Virginia faculty and students, and explores and develops core technologies for the economic benefit of the Commonwealth.

**Mission Alignment**

Jefferson Science Associates (JSA)/Jefferson Lab, as a basic research facility for university users, provides unique educational and research opportunities for students and faculty in the Commonwealth enhancing the educational and research and development (R&D) infrastructure of the Commonwealth.

Jefferson Lab is managed and operated via a performance-based contract by JSA, LLC for the U.S. Department of Energy. [www.energy.gov](http://www.energy.gov)

**Products and Services****Description of Major Products and Services**

To provide world-class unique facilities for research in nuclear physics -- products are experiments, Ph.D.s, papers in refereed journals, invited talks and scientific and technical prizes or awards. Support development of industry-university partnerships in emerging research fields to explore and develop applications for the Free Electron Laser and other lab-developed technologies that may provide economic benefit to the Commonwealth - products are collaborations, partnerships, proposals, research papers and publications, patents, and licenses.

**Anticipated Changes**

Jefferson Lab anticipates that the 12 GeV CEBAF upgrade project will ramp-up participation in the experimental program through the construction with significant new users (approximately 1/4 increase) by planned completion in 2017.

Increased capabilities at the Jefferson Lab (JLab) Free Electron Laser will enable the development of additional applications in the areas of defense, bioscience, nanotechnology, micromachining, and laser processing that may result in additional patents, licenses, products and business start-ups with economic development impact.

Emerging areas of technology will be identified and developed.

**Factors Impacting**

Declining federal funding levels in the physical sciences could:

- Negatively impact the number of students entering nuclear physics,
- Reduce the number of experiments that can be done at Jefferson Lab,
- Impact completion of the 12 GeV CEBAF upgrade.

Significant power cost increases could impact scientific output of Jefferson Lab, competitiveness for future projects, and expansion.

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Supporting Documents

Title File Type