

Jefferson Lab Overview

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Monday, June 22, 2020

 **Jefferson Lab**



U.S. DEPARTMENT OF
ENERGY

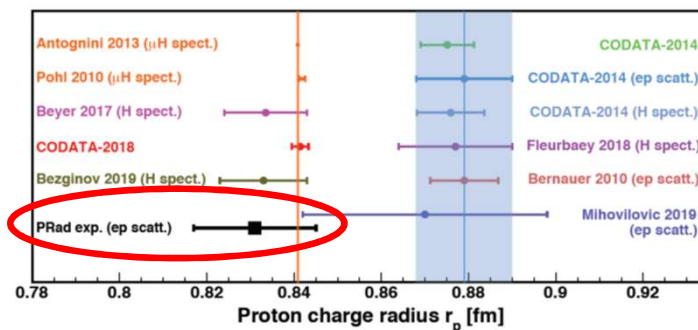
Office of
Science



Jefferson Lab News and Highlights

- 12 GeV Scientific era is in full swing
 - Completed several high profile experimental programs
 - Completed second full year of CEBAF 12 GeV Operations; delivered ~32 weeks operations in FY19, most weeks since 2010; reliability 81.5%
 - Executing CEBAF reliability and gradient program; challenges in achieving top energy due to gradient limitations
- EIC Project planning progressing in partnership with BNL
- Moving toward CD-1 for MOLLER Project; SoLID Proposal submitted to DOE-NP
- Stood up new Computational Sciences and Technology Division; Advanced computing initiatives underway
- Supporting broader DOE mission with LCLS-II, LCLS-II HE, SNS-PPU
- New staff adding depth and leadership in critical areas
- Launched enhanced Fellows program (Isgur and Grunder)
- Renewed focus on improving safety culture and performance
- Significant progress on Inclusion and Diversity Initiatives

Proton Radius: Nature 575, 147 (2019)



Tritium target cell

LCLS-II Cryoplant



Jefferson Lab Staff and Users Continue to be Recognized for their Accomplishments

Oppenheimer Leadership Program: Jennifer Logan, CFO and Business/Finance Director



The first JLab employee selected to participate in the Oppenheimer Leadership Program "established to develop the next generation of DOE leaders through exposure to the breadth and depth of the National Laboratory system ..."

~ Department of Energy

2019 Frances Slack Prize: Simonetta Liuti (UVA/JLab User)



"...achievements in developing a new approach to global analyses of parton distribution functions with modern statistical methods."

~ APS Physics

2019 Virginia's Outstanding Scientist: Volker Burkert (JLab)



"...for his foresight and leadership in expanding the CLAS nuclear and particle physics detector capabilities, and utilizing the full power of CLAS and JLab to deliver new insights into the origin of visible mass in our universe."

~ Gov. Ralph Northam and Science Museum of VA Chief Wonder Officer Richard Conti

2019 PECASE Award: Justin Stevens (W&M/JLab User)



"...the highest honor bestowed by the U.S Government to outstanding scientists and engineers who are beginning their independent research careers and who show exceptional promise for leadership in science and technology."

~ Office of Science and Technology Policy

2019 Office of Science Early Career Award: Ari Palczewski (JLab)



"To study advanced surface modifications of Nb for higher Q and higher gradient."

~ DOE Office of Science

2019 APS Fellowship: Evgeny Epelbaum (Ruhr University Bochum/JLab User)



"...For pioneering developments in nuclear forces and electroweak currents in chiral effective field theory and for their successful applications in few- and many-body systems..."

~ APS Physics

2019 APS Fellowship: Kent Paschke (UVA/JLab User)



"...For using parity violation in electron scattering to study the structure of the nucleon and nuclei and the physics beyond the standard model, and for achieving unprecedented control over helicity-correlated systematic errors associated with polarized electron beams..."

~ APS Physics

2019 APS Fellowship: Bernd Surrow (Temple University/JLab User)



"...For developing the methodology and fundamental measurements for determining the spin structure and dynamics of the proton using W-boson and jet production in high-energy polarized proton collisions, and for developing a future electron-ion collider facility..."

~ APS Physics

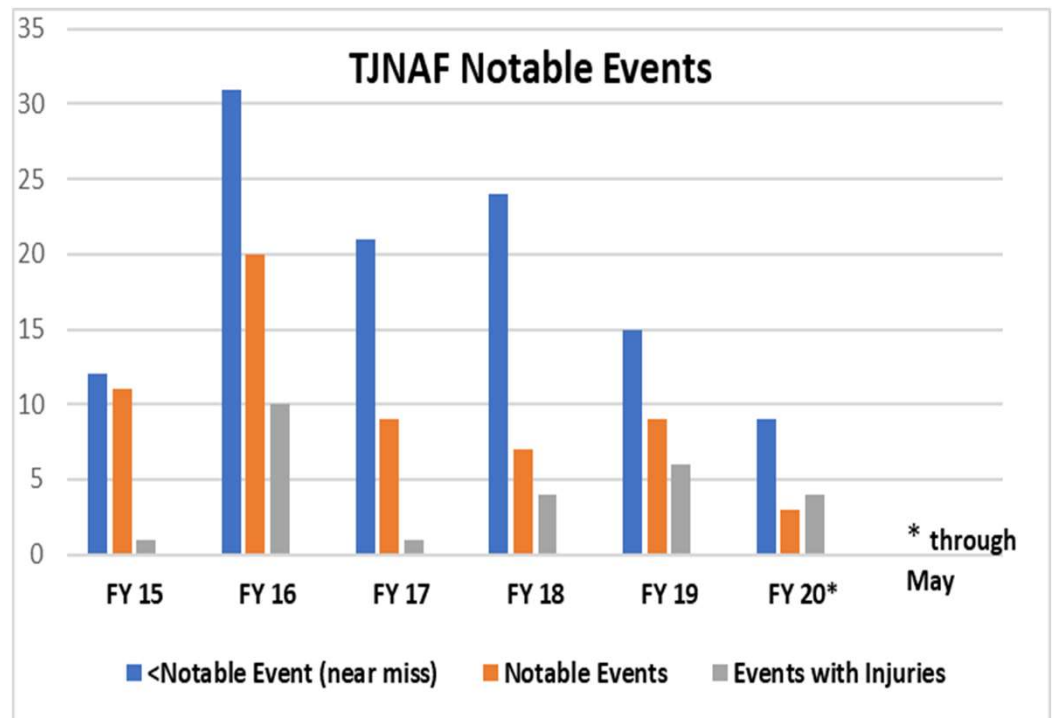
World Class Science Requires World Class Safety

We want you to be able to come to Jefferson Lab and safely carry out your research

- Recent near-misses bring ongoing safety culture issues to the fore
- We have been putting considerable effort into Human Performance Improvement, which is a proven approach for ***influencing safety and operational culture*** toward better performance

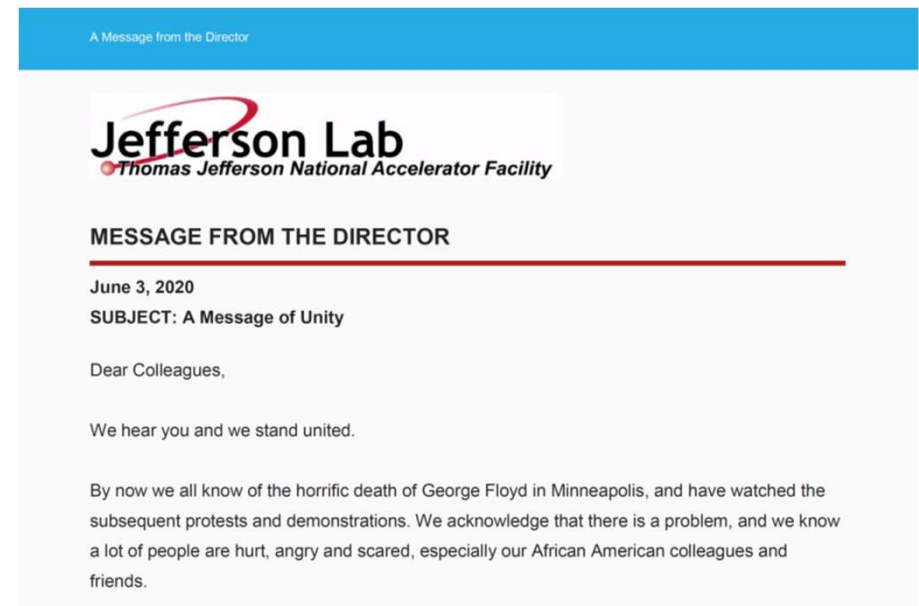
My message to you:

- Have a questioning attitude
- Ask yourself, what can go wrong?
- Pay attention to your surroundings – situational awareness
- If you have any concerns let them be known
- Ensure that our students in particular are properly trained and supervised

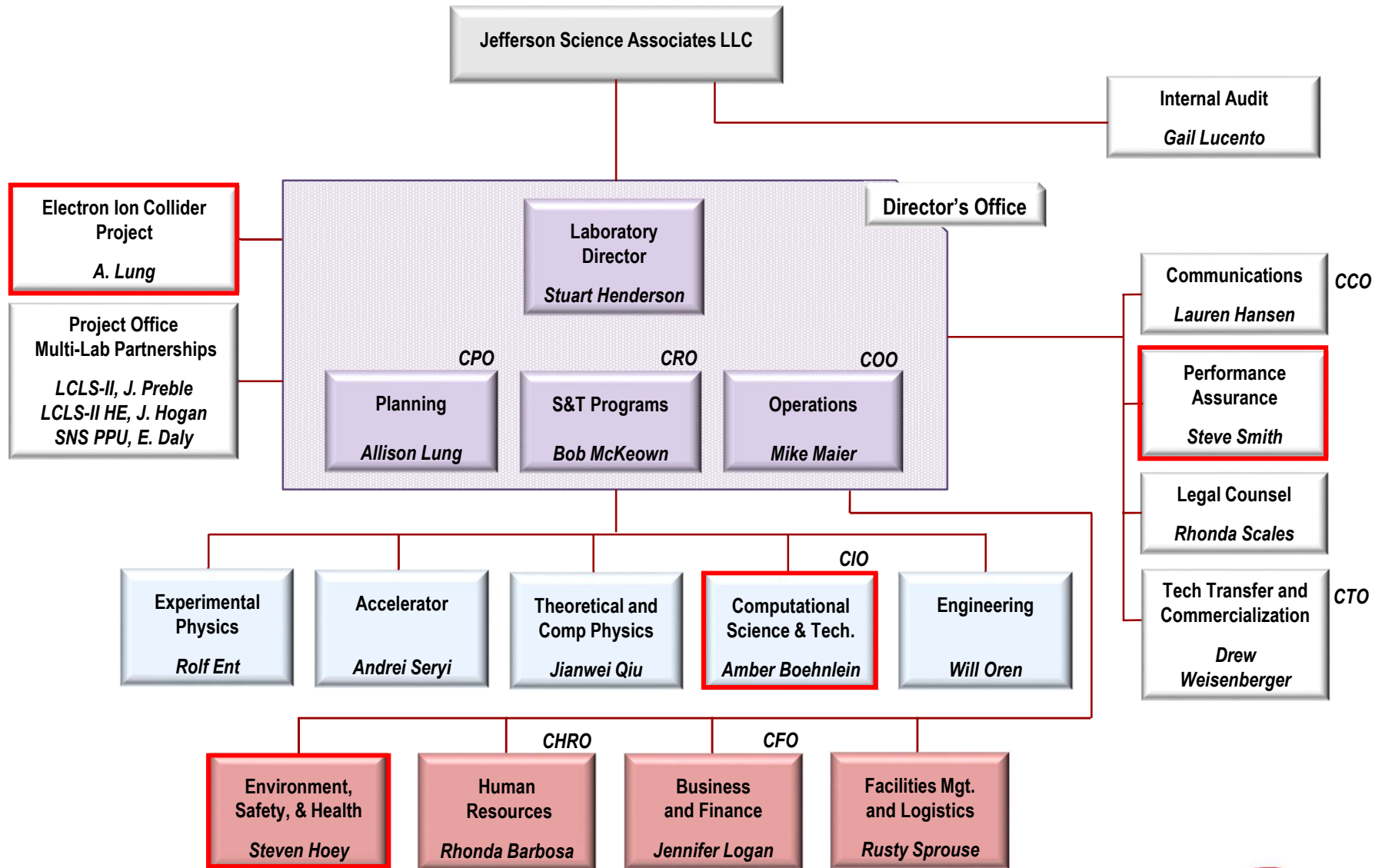


Diversity and Inclusion Initiatives at Jefferson Lab

- D&I Culture Survey: Achieved 70% employee participation and 18% user participation in the D&I culture survey, with ~1100 comments. Survey results will be shared with lab staff and user community.
- Steven Uwajeh has joined Jefferson Lab as our D&I Program Lead; he is an accomplished D&I and HR professional and joins us from Shell Oil.
- New mandatory course: “Building a Respectful Workplace in a Technical Environment,” focusing on harassment, bullying, constructive communications, and creating a psychologically safe work environment
- Launched Safe Zone Ally Training facilitated by D&I Council members
- Message of Unity in response to death of George Floyd
- Camille Ginsburg appointed Co-Chair of D&I Council
- Education and Outreach – K-12/STEM events and programs; significant enhanced engagement in Newport News school system
- Strengthened partnerships with local universities through targeted outreach events
- Grew participation in the Introduce a Girl to Engineering Day program by 50%

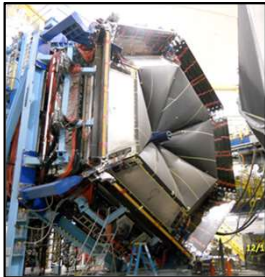


Jefferson Lab Organization

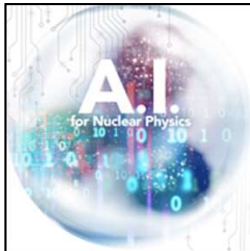


Vision for Jefferson Lab

Jefferson Lab supports the DOE Office of Science and serves the Nuclear Physics user community as a world-leading center for fundamental nuclear science and associated technologies



1. Deliver on 12 GeV Scientific Program



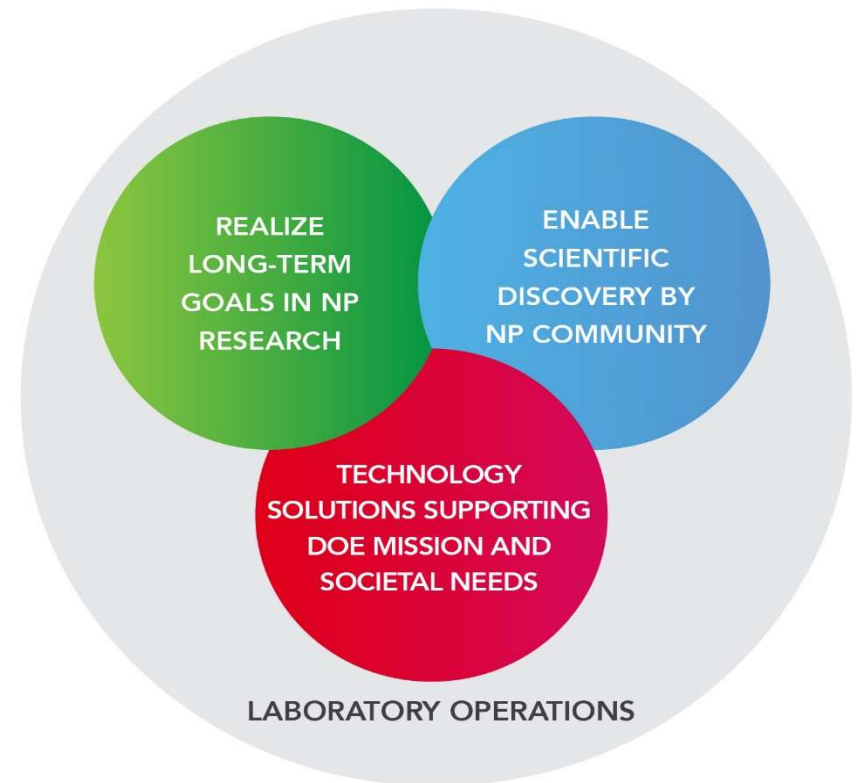
2. Support long-term goals in nuclear physics



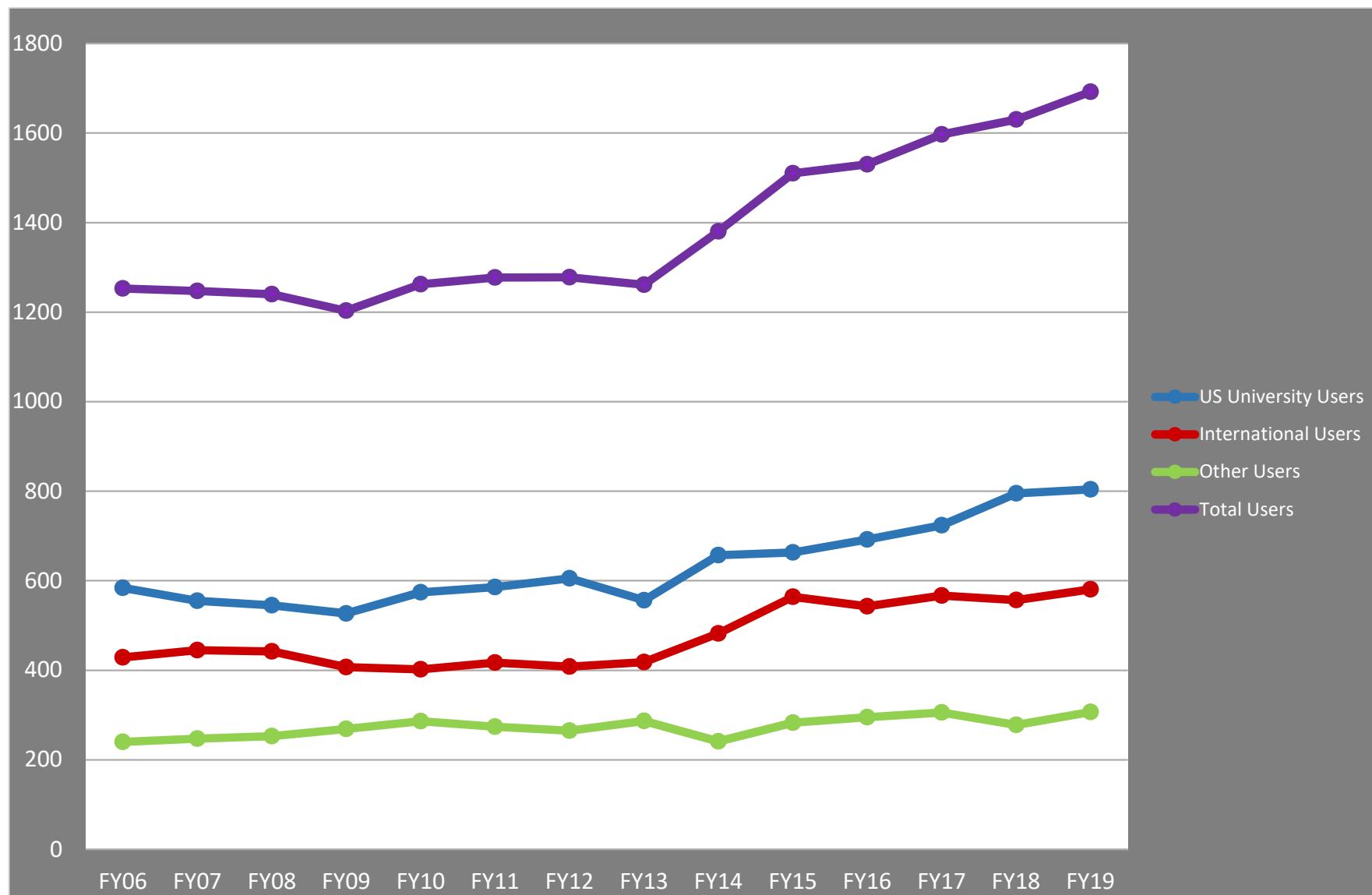
3. Provide technology solutions supporting DOE mission



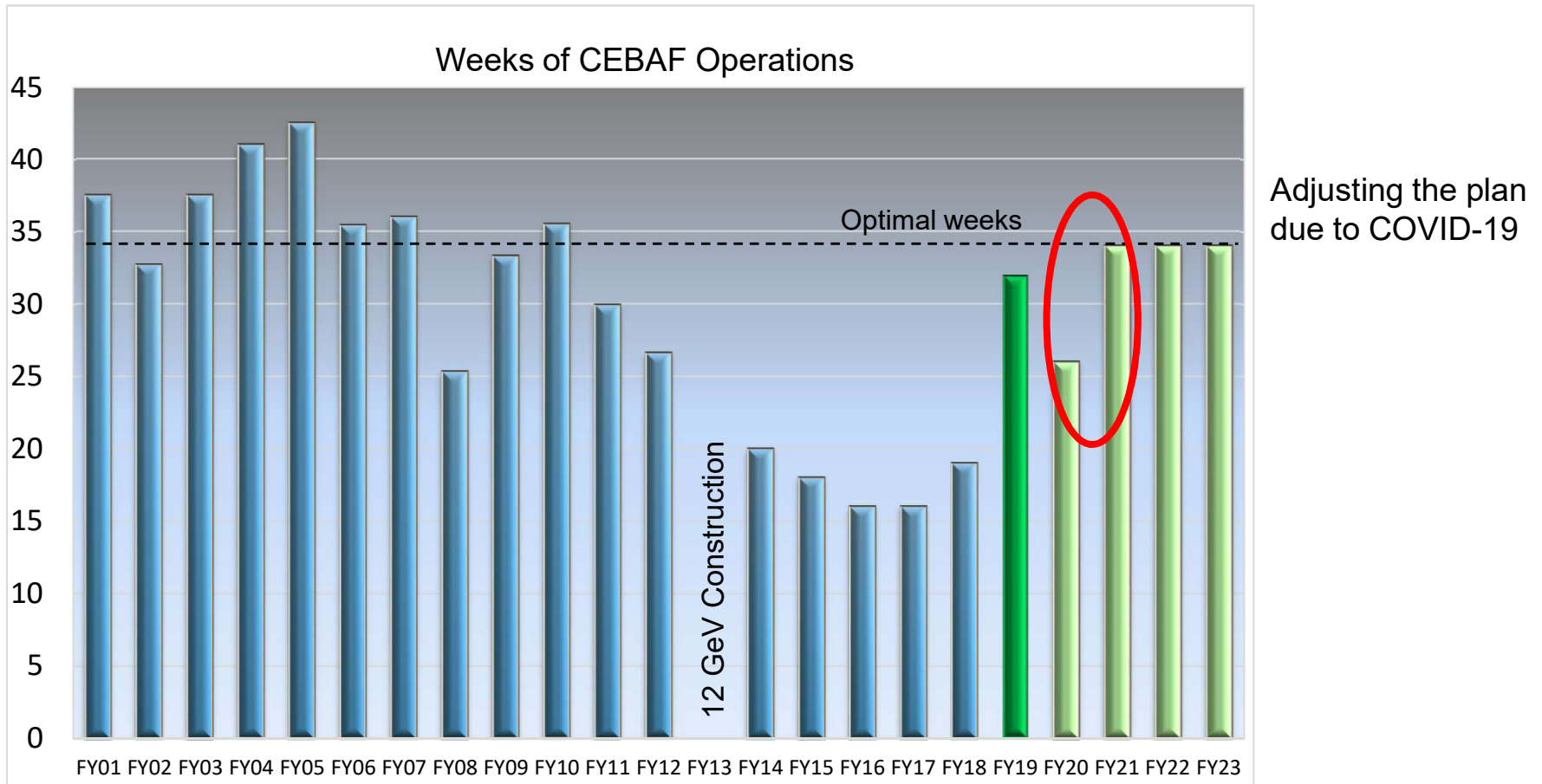
4. Enable world-class science through excellence in Laboratory Operations



Jefferson Lab's User Community Continues to Grow



Highest Priority Has Been Increasing Weeks of CEBAF Operation



- FY19: delivered most weeks of operation since 2010
- Long shutdown starts in FY20 for 2K cold-box installation
- Working towards optimal 34 weeks of reliable operations
- Thanks to Office of Nuclear Physics for their support of CEBAF and the 12 GeV Program

Impact of COVID-19

- Jefferson Lab transitioned to “minimum safe” operations on March 23, 2020 (MEDCON 6)
 - Terminated ongoing CEBAF run with ~6 weeks remaining
 - Maintained safe operation of site and equipment with 20-50 staff on site, all other staff working remotely
 - Prepared plans, site, buildings, processes, training for eventual resumption of on-site operations
- Entered phase 1 of resumption of operations (MEDCON 5) on June 8, 2020, following approval by DOE
 - Plan for ~200 staff on-site, with limited case-by-case user access
- Users will be able to access the site in MEDCON 4, subject to new access requirements
- Our plan is to resume the CEBAF run to complete the FY20 program, then proceed to the long Scheduled Accelerator Down
- Jefferson Lab has had no staff with confirmed COVID-19, two staff were presumed-positive

Electron Ion Collider Receives CD-0 Approval

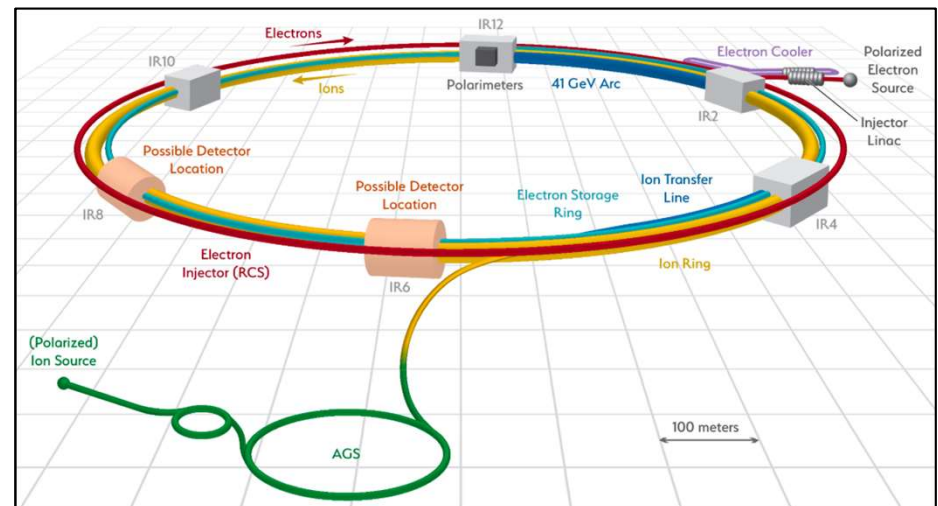
- EIC Panel evaluated proposals from JLAB and BNL (Aug – Oct, 2019)
- CD-0 approved Dec. 19, 2019
- DOE announced selection of Brookhaven National Lab to host EIC Jan. 9, 2020

U.S. Department of Energy Selects Brookhaven National Laboratory to Host Major New Nuclear Physics Facility

January 9, 2020



The Relativistic Heavy Ion Collider (RHIC) at Brookhaven National Laboratory will provide crucial infrastructure for the new Electron Ion Collider.



Electron-Ion Collider

- CD-0 approved Dec. 2019
- Site Selection at Brookhaven National Lab announced Jan. 2020
- From T. Hallman (NSAC 3/2/20):
 - *“An SC Prime Directive: The Project will be carried out as a full intellectual partnership between the BNL and JLAB teams (and other collaborators) with major participation by all”*
- From S. Binkley (NSAC 3/2/20):
 - *“Look to strengthen smaller/single purpose laboratories to be more multidiscipline”*



- Positive, constructive engagement with BNL leadership on EIC partnership
- Both labs firmly committed to EIC success
- That commitment formalized in BNL-JLAB Partnering Agreement, signed May 7, 2020
- Established JLAB EIC Project organization under leadership of A. Lung; Integrated BNL-JLAB team is being developed

Jan 23, 2020 @ JLab



Feb 10, 2020 @ BNL



Feb 28, 2020 @ JLab



BNL-JLab EIC Partnering Meeting
February 28, 2020 • Jefferson Lab

Approved 12 GeV Experimental Program: A decade-long program is on the books

- CEBAF has a long program ahead that is complementary to the envisioned EIC program
- CEBAF will remain the prime facility for fixed target, high luminosity electron scattering with special role in the high-x region

Topic	Hall A	Hall B	Hall C	Hall D	Total
Hadron spectra as probes of QCD	0	219	11	540	770
Transverse structure of the hadrons	150.5	85	146	25	406.5
Longitudinal structure of the hadrons	19	230	211	0	460
3D structure of the hadrons	359	872	196	0	1427
Hadrons and cold nuclear matter	220	275	205	15	715
Low-energy tests of SM and Fundamental Symmetries	547	180	0	79	806
Total Days	1295.5	1861.0	769.0	659	4584.5
Total Approved Run Group Days (includes SoLID)	1295.5	1026	726	459	3506.5
Total Days Completed	211.5	221	129.0	138	699.5

- In full year running, can complete ~100 Run Group Days per year in each Hall

PAC approved program includes two significant experimental system projects: MOLLER and SoLID

In addition, letters of intent and proposals have been received for

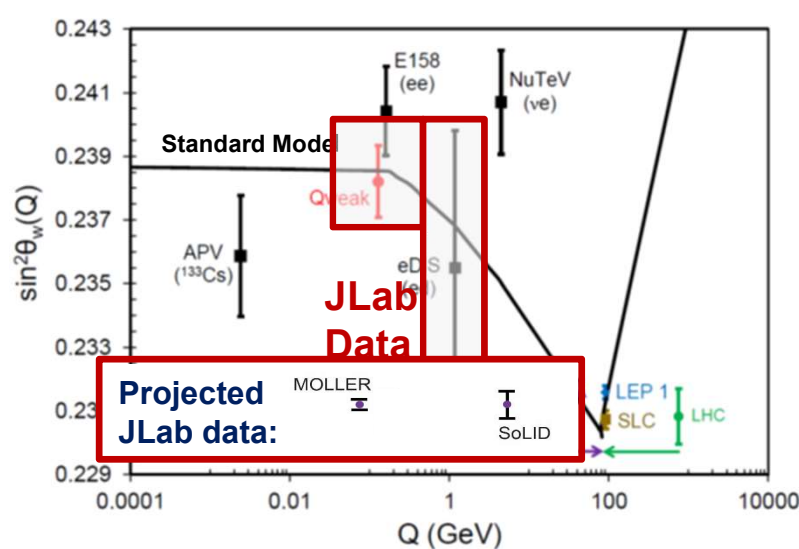
- (Polarized) positron program
- K-Long Program in Hall D
- Double-deeply virtual Compton scattering (DDVCS) program

Some of these may motivate further enhancements of CEBAF and its experimental capabilities

Making the most of the 12 GeV Upgrade: MOLLER and SoLID

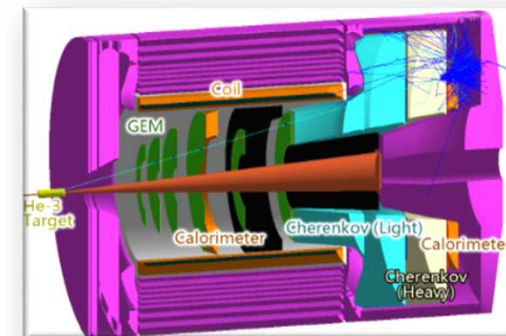
MOLLER

- Parity violating electron scattering provides a high precision test of the standard model.
- Unique discovery space for new physics up to 38 TeV mass scale, with a purely leptonic probe.
- CD-0 approved 2017
- Jim Fast joined Jefferson Lab to lead MOLLER Project
- Preparing for DOE-OPA CD-1 Review Sept. 2020



SoLID

- Solenoidal Large Intensity Device – new multipurpose detector facility optimized for high luminosity and large acceptance, enabling very broad scientific program
- Science program:
 - precision 3D nucleon imaging
 - J/Psi production near threshold
 - ✓ **both important prerequisite science for EIC**
- parity-violating deep inelastic scattering: SM test and new physics
- Proposal submitted to DOE-NP

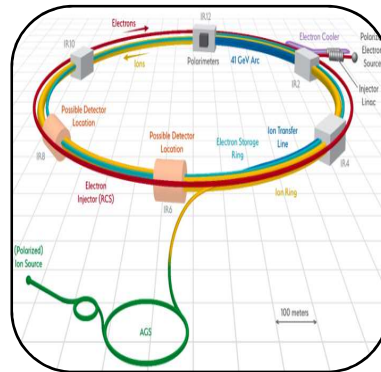


Jefferson Lab's Future Science and Technology Directions



CEBAF-based Program

Vibrant 12 GeV Program
Potential opportunities in
fixed-target, high luminosity
complementary to EIC
Theory and Computation
supporting NP goals



Electron-Ion Collider

EIC Construction Project
Scope and Responsibilities
Engagement/leadership in EIC
scientific program



Technology Development

Stewardship responsibility for
superconducting RF and
cryogenics technology within
DOE



Scientific Mission Diversification

Jefferson Lab expertise can
benefit other DOE Office of
Science programs
Exploring potential in close
coordination with Office of
Science



Perspective

- The Lab is healthy and in a strong position moving forward
- Our priorities are
 - Ensuring that the 12 GeV program is successful
 - Moving EIC forward aggressively in partnership with BNL
 - Exploring potential areas of scientific diversification
- What I would ask is that you keep in mind the competitive environment in which we are operating:
 - Keep up the good work and proceed with an appropriate sense of urgency
 - Let your voice be heard. Decision-makers need to hear from you about the importance of your work, training the next generation and the importance of Jefferson Lab in achieving your goals

***Thank you for your continued enthusiasm and support for
Jefferson Lab and its future***

Thank you!



Jefferson Lab Staff
October 24, 2016