

The CEBAF Experimental Program and Possible Future Upgrades

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Jefferson Lab

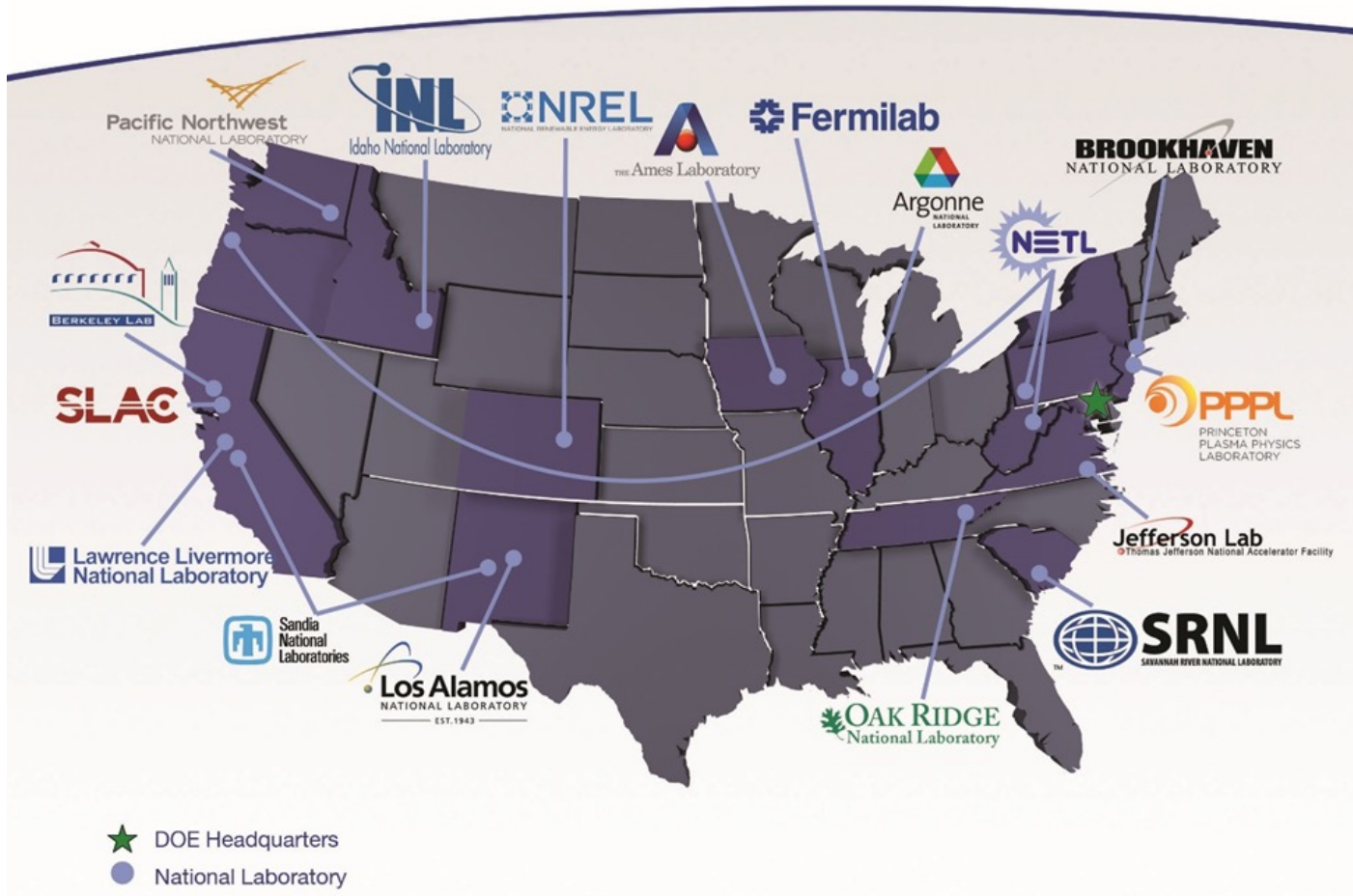


NEWS > POLITICS > VIRGINIA POLITICS

Jefferson Lab operator search abruptly canceled by Trump administration, raising questions about contract



DOE National Laboratories



Total of 17 DOE National Labs:

16 Government Owned and Contractor Operated &

1 Government Owned and Government Operated

Recent M&O Bid Processes

• LANL (Los Alamos)

- On 9 June 2018, Los Alamos National Laboratory acquired a new industrial firm administration (**Triad National Security, LLC**).
- Between June 2006 and June 2018, Los Alamos National Laboratory was administered by Los Alamos National Security, LLC. Prior to June 2006, the administrator was the University of California.

• SRNL (Savanna River)

- On 22 December 2020, Savannah River National Laboratory acquired a new nonprofit administrator, **Battelle Savannah River Alliance, LLC**.
- The previous administrator, Savannah River Nuclear Solutions, continues to administer the Savannah River Site.

• FNAL (Fermi)

- Just completed the process and on 1 January 2025 the new contractor: **Fermi Forward Discovery Group, LLC** will be running the lab.
- New LCC led by the University of Chicago and Universities Research Association (URA) and two industrial partners, Longenecker & Associates and Amentum

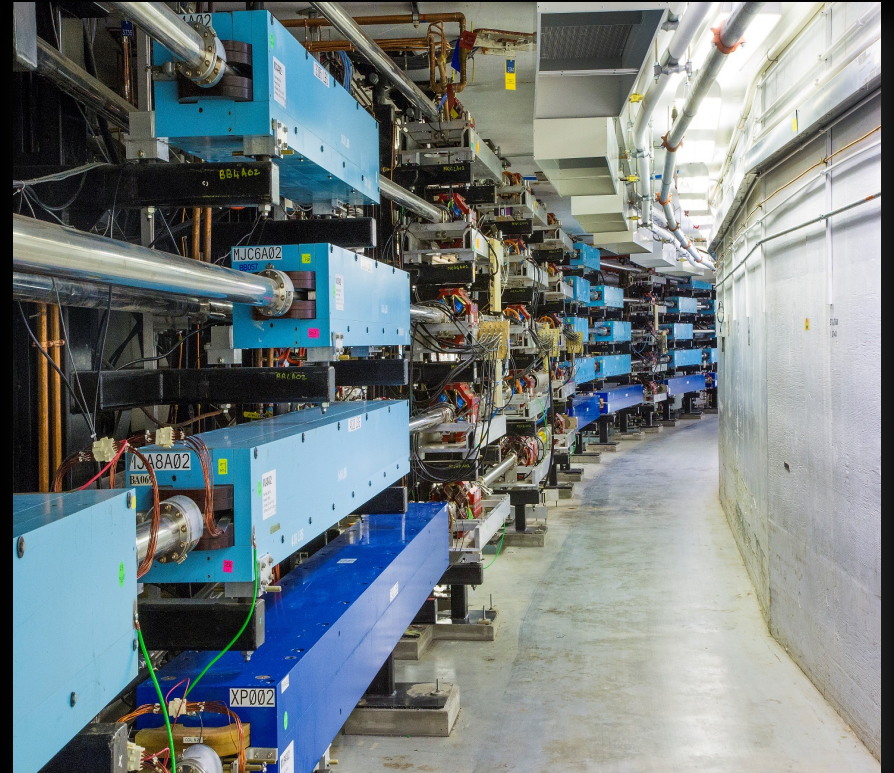
• TJNAF (Jefferson Lab)

- Announcement was just made that **NONE** of the bids were accepted.
- Likely, though hasn't happened yet, that JSA Contract will be renewed for a year.
- JSA has been on one-year renewals since 2014.

Reference: <https://science.osti.gov/Acquisition-Management/M-and-O-Competitions>

CEBAF: Race-track design to send polarized electrons at different energies and different currents to multiple halls simultaneously with up to 1.1 Megawatt of power.





CEBAF Accomplishments During Last Year's Period

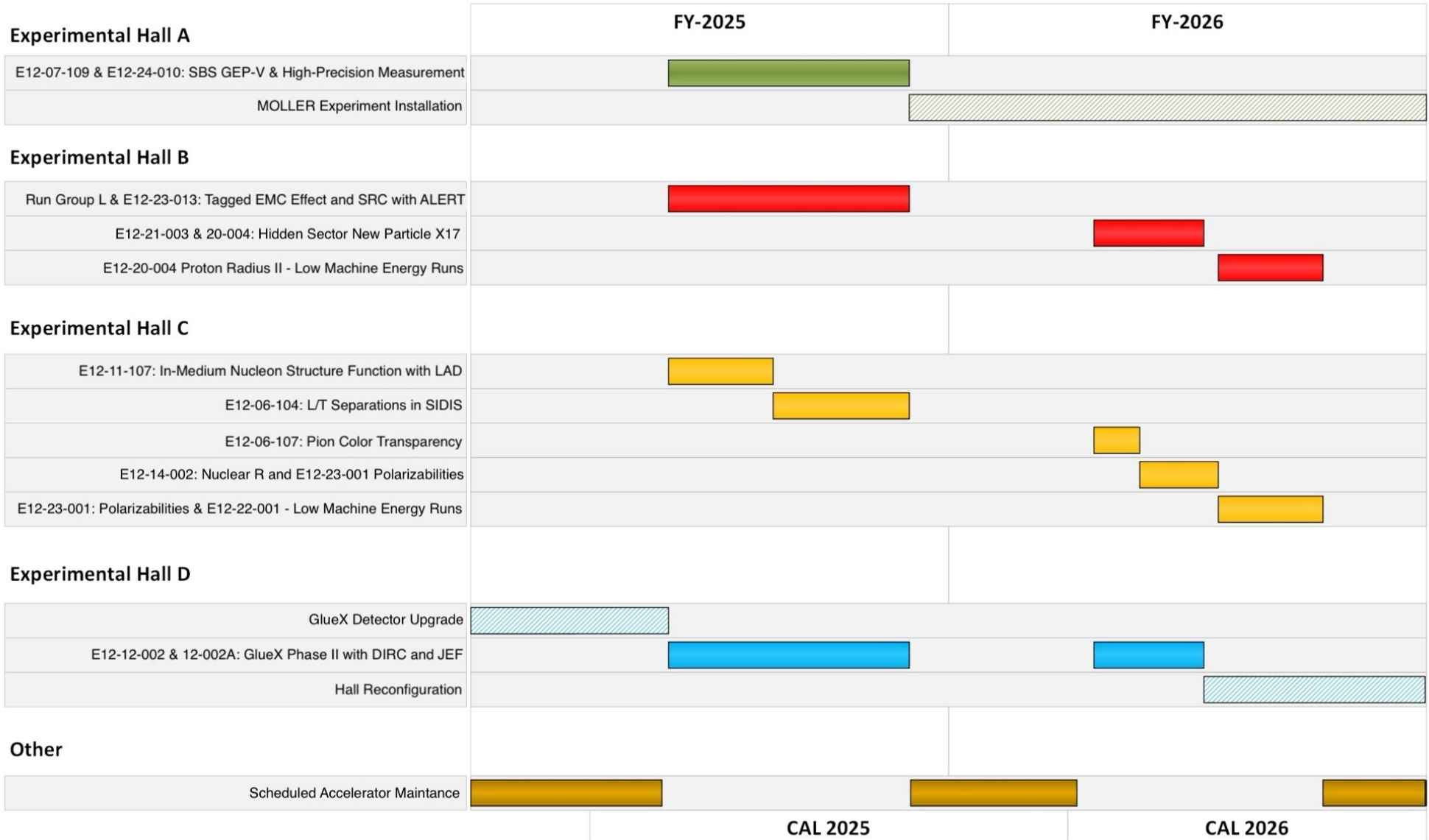
- Hall A
 - 39 PAC Days Completed with major reconfirmation from pol. ^3He to cryo-target during run
 - **Completed** Polarized ^3He GEN Experiment (E12-09-016)
 - **Completed** GEN Recoil Polarization Experiment (E12-17-004)
 - **Completed** K_{LL} Experiment (E12-20-008)
 - Unfortunately, due to beam dump problems the short, A_{LL} experiment (E12-20-008) was canceled.
- Hall B
 - 104 PAC Days Completed
 - **Completed** Run Group D (E12-06-106 and A). [color transparency & TMD measurements]
 - Partially Completed Run Groups K (E12-16-010, A, and B) and E (E12-06-117)
- Hall C
 - 116 PAC Days Completed
 - Partially Completed Neutral Particle Spectrometer (NPS) Run Group (E12-13-010, E12-13-007, E12-22-006, E12-23-014)
- Hall D
 - 4 opportunistic calendar days
 - Installation of new calorimeter during most of the run period
 - Opportunistically extracted beam to Hall D for short beam test in March '24
 - Test went very smoothly, checking out beamline and detector performance

TOTAL OF 259 PAC DAYS RUN, 5 Experiments Completed, and 8 Experiments Partially Completed

HUGE THANK YOU TO LEADERSHIP FOR RUNNING 30 WEEKS INSTEAD of 27 WEEKS

Upcoming Schedule

- CEBAF has now run at an energy of 1047 MeV/linac for two run periods
- Next run will hopefully increase to 1060 MeV/linac plus the ~100 MeV from the injector thus:
 - 10.7 GeV to Halls A, B, C
 - 11.8 GeV to Hall D
- Budget expectation was for ~25 weeks of physics running in FY25&F26
- Full year CR that is voted on today likely means less.
- Beam is being tuned up right now and currently we expect beam for physics starting March 21st
- CEBAF schedule: <https://www.jlab.org/physics/experiments/schedule>



CAL 2025

CAL 2026

Notional CEBAF and Projected EIC Efforts on One Chart

This is to get an overall sense of what is planned, please do not take the dates too seriously!!

Activities	Fiscal Year																		
	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
Moller Project and Experiment	Dark Blue	Dark Blue	Dark Blue	Light Blue	Light Blue	Light Blue													
SoLID			Green	Green	Green	Green	Green	Green											
Positron Source (R&D)	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue										
CEBAF Upgrade preCDR/preplan	Dark Blue	Dark Blue	Dark Blue																
Positron Project (potential)									Green	Green	Green	Green							
Positron Physics													Yellow	Yellow	Yellow				
22 GeV Development (R&D)				Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue								
22 GeV Project (potential)												Green	Green	Green	Green	Green	Green		
EIC Project (partner with BNL)	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Dark Blue	Light Blue	Light Blue						
CEBAF Up	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow			Yellow	Yellow	Yellow			Yellow	Yellow

NOTE: Jefferson Lab is responsible for a significant fraction of EIC accelerator & detector scope.

Polarized Electrons for Polarized Positrons (PEPPo)

<https://doi.org/10.1103/PhysRevLett.116.214801>

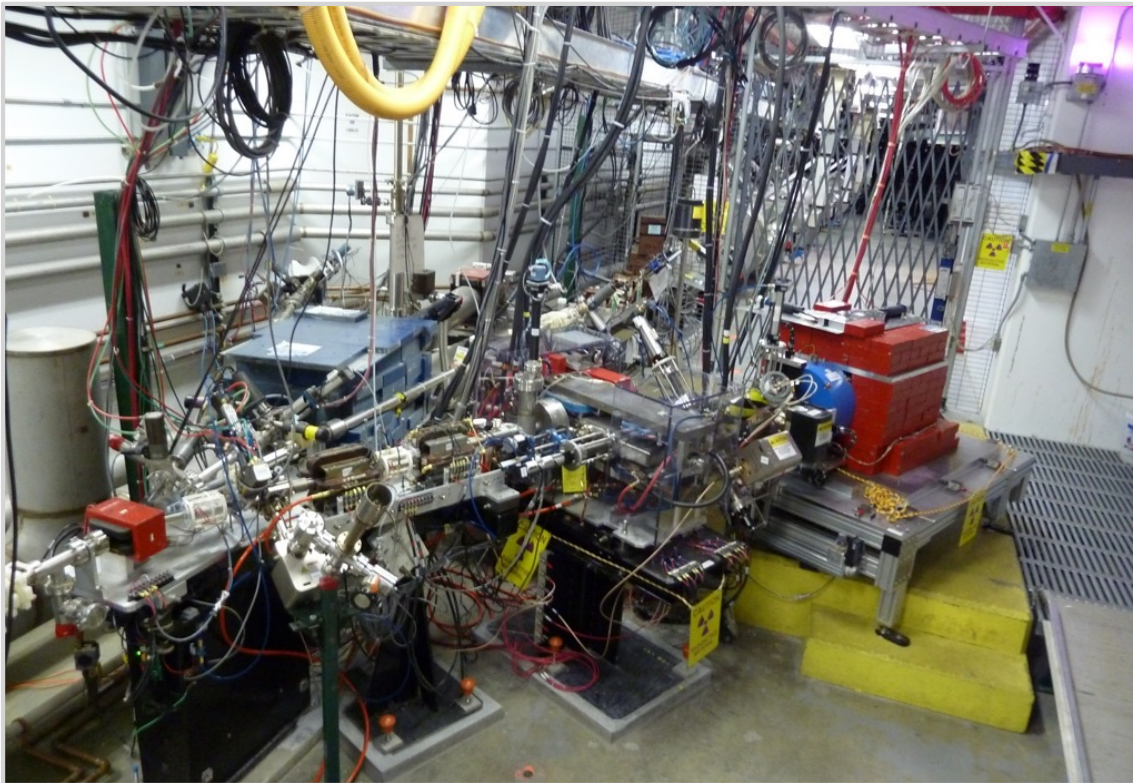


Photo of the PEPPo setup in the injector area of CEABF.

INTERNATIONAL WORKSHOP ON
POSITRONS
AT JEFFERSON LAB

March 25-27, 2009
JEFFERSON LAB

TOPICS:

- Positron-proton elastic scattering
- Deeply virtual Compton scattering
- New 12 GeV experiments with positrons
- Technology of positron sources
- Polarized positrons
- Electron/photon drivers
- Positron & electron polarimetry
- Applied physics with positrons

International Advisory Committee:

- X. Artru (IPN Lyon)
- L. Cardman (JLab)
- P. Cole (Idaho State U.)
- A. Freyberger (JLab)
- P. Guichon (CEA Saclay)
- R. Holt (ANL)
- A. Hunt (Idaho Accelerator Center)
- C. Hyde (LPC Clermont Ferrand)
- M. Klein (U. Liverpool)
- K. Kumar (U. Massachusetts)
- H. Poelker (JLab)
- J. Sheppard (SLAC)
- A. Variola (LAL Orsay)

Local organizing committee:

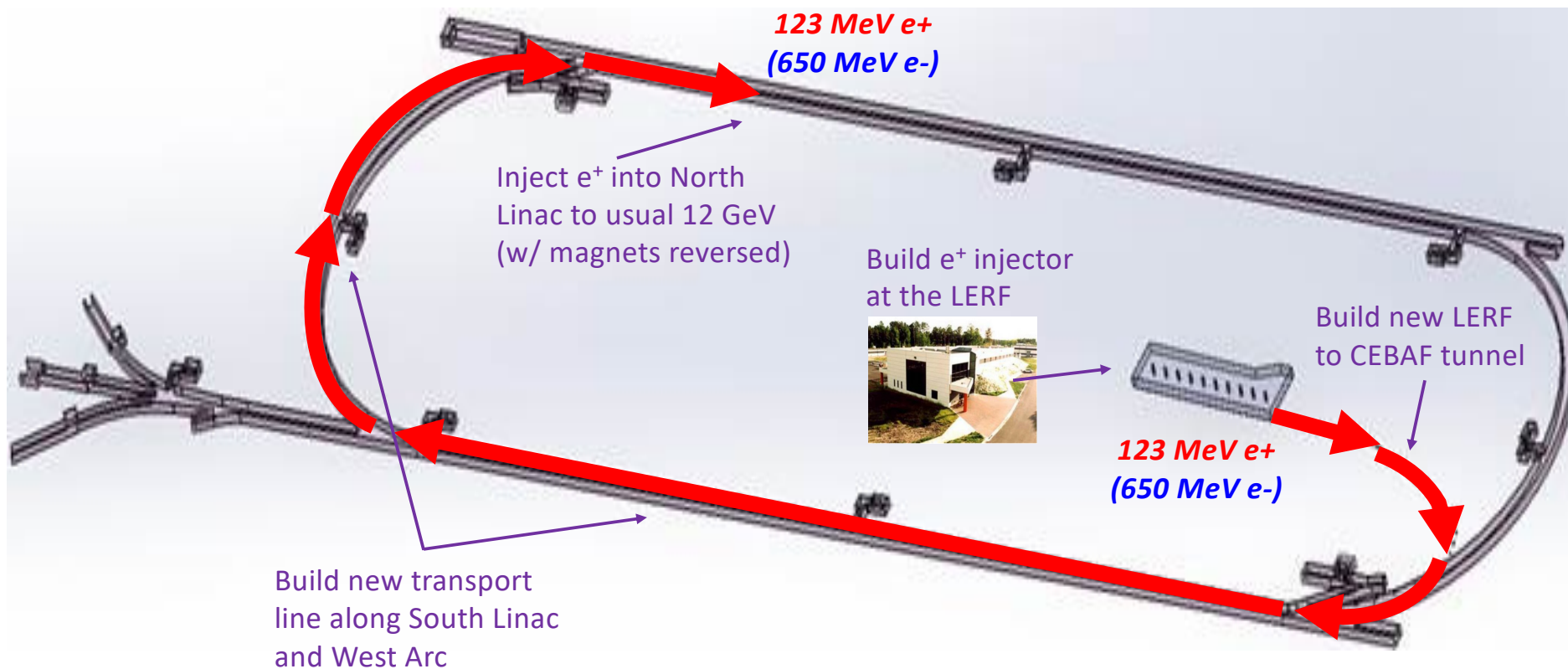
- L. Elouadrhiri (JLab)
- T. Forest (Idaho State U.)
- J. Grames (JLab)
- W. Melnitchouk (JLab)
- E. Youtier (LPSC, Grenoble)

email: jpos09_admin@jlab.org
conferences.jlab.org/IPOS09

Jefferson Lab

Low Energy Recirculator Facility (LEFRF) As The New Injector Facility for CEBAF



Current List of Conditionally Approved Positron Experiments

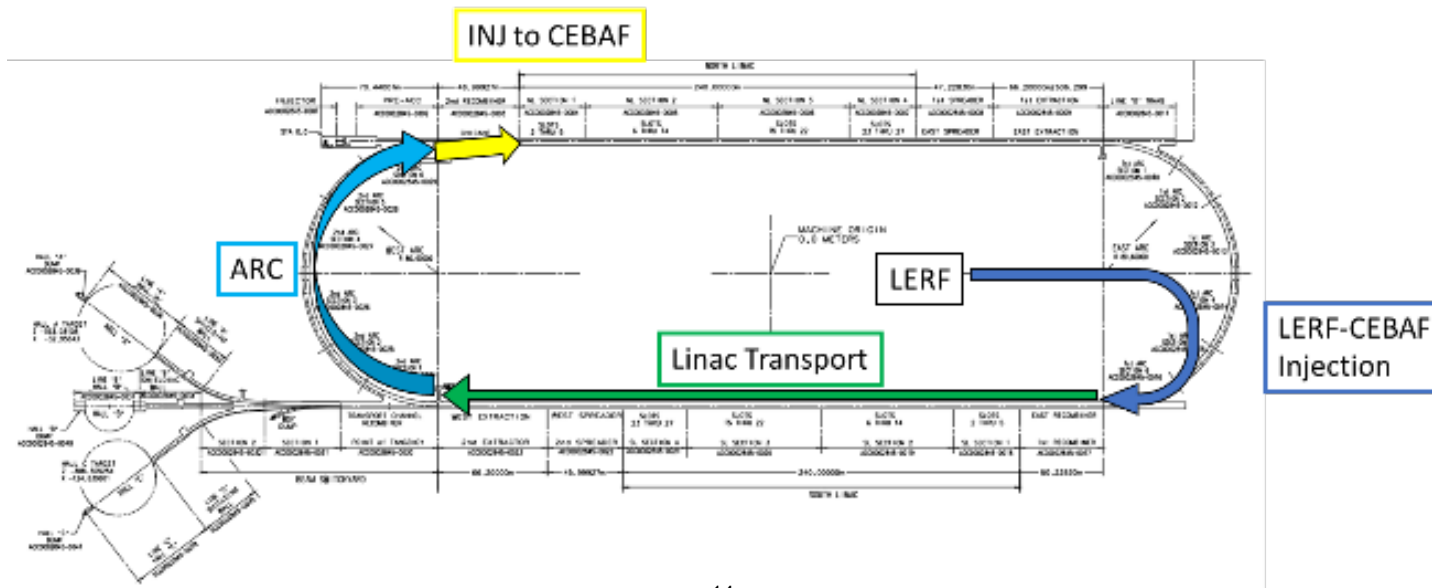
NUMBER	TITLE	CONTACT PERSON	HALL	DAYS REQUESTED	DAYS AWARDED	SCIENTIFIC RATING	PAC DECISION
PR12+23-002	Beam Charge Asymmetries for Deeply Virtual Compton Scattering on the Proton at CLAS12	Eric Voutier	B	100	100	A-	C1
PR12+23-003	Measurement of Deep Inelastic Scattering from Nuclei with Electron and Positron Beams to Constrain the Impact of Coulomb Corrections in DIS	Dave Gaskell	C	9.3	9.3	A-	C1
PR12+24-005	A Dark Photon Search with a JLab positron beam	Bogdan Wojtsekhowski	B	55	55	A-	C1
PR12+23-006	Deeply Virtual Compton Scattering using a positron beam in Hall C	Carlos Munoz Camacho	C	137	137	A-	C1
PR12+23-008	A Direct Measurement of Hard Two-Photon Exchange with Electrons and Positrons at CLAS12	Axel Schmidt	B	55	55	A	C1
PR12+23-012	A measurement of two-photon exchange in unpolarized elastic positron-proton and electron-proton scattering	Michael Nycz	C	56	56	A-	C1

C1 = Conditionally Approved w/Technical Review by the Lab

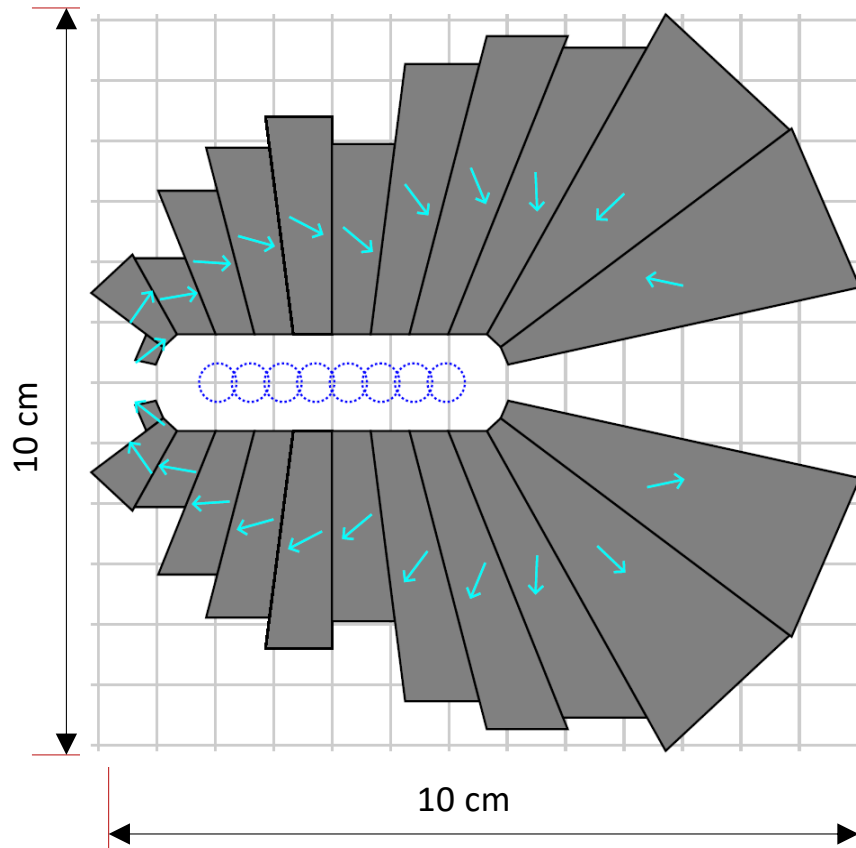
**Already Approved 210 days Hall B & 202 days in Hall C for 412 total PAC days
PAC day = two calendar days as already a few years of positron physics**

A CEBAF ENERGY UPGRADE IS TECHNICALLY FEASIBLE: 22GEV UPGRADE

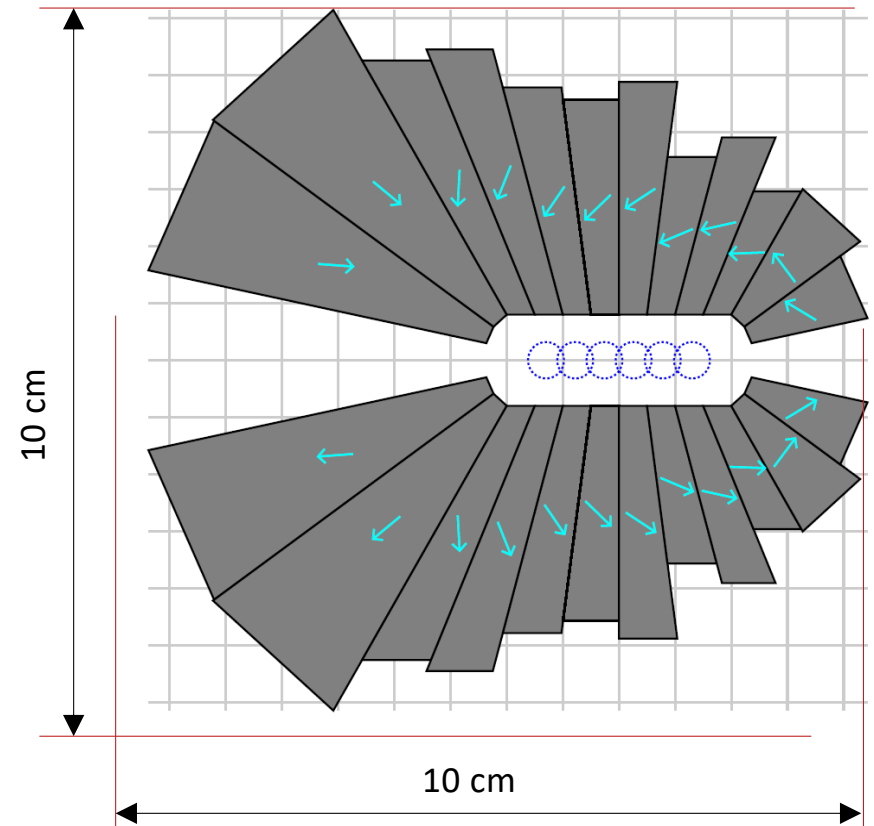
- Capitalizing on recent science insights and US-led accelerator science and technology innovations, develop a staged program at the luminosity frontier
- Injection energy Upgrade for 650 MeV Electron (e-) in LERF
- **Replace arcs on each side with new Fixed Field Alternating-gradient (FFA) magnets arcs to upgrade to 22 GeV for Halls A, B and C.**
- It will be possible to also send this beam to Hall D though details being worked out.



Permanent Magnet Design – Open Mid-plane Geometry



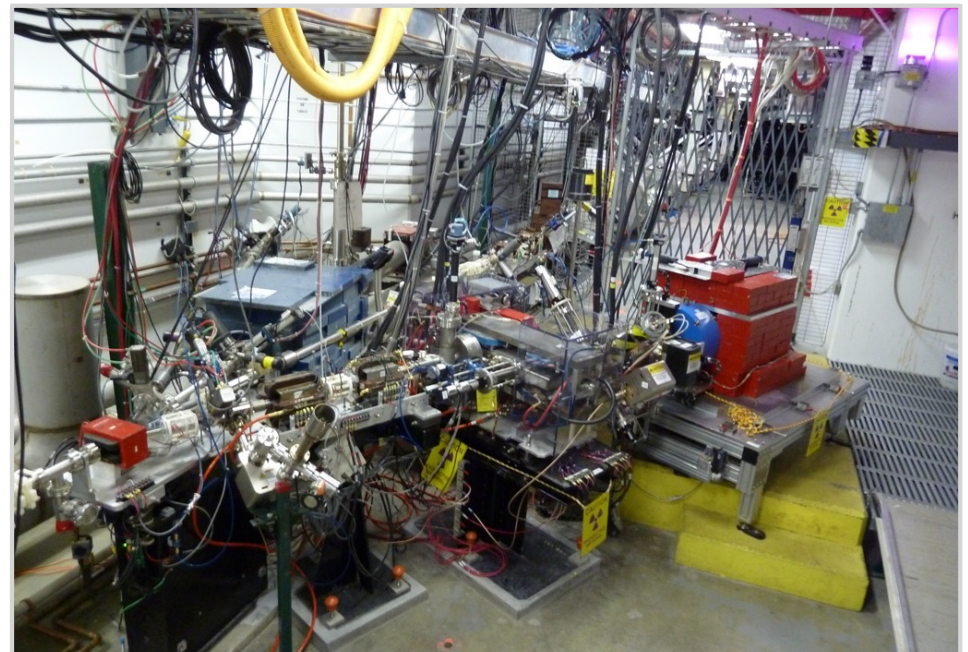
Focusing Magnet



Defocusing Magnet

Summary

- Jefferson Lab's electron program already extends well into the mid-2030's.
- Positron source will be developed in the JLab LERF/FEL building and connected to CEBAF. This source will be future upgraded to provide the source for 22 GeV beams.
- Ideas are being developed to use strong permanent magnets to allowed 22 GeV electrons in the current CEBAF tunnels.
- A demo experiment for 22 GeV is being considered for the Hall C line BSY dump.



Thank you!

