

Highlights from the Lab

- 12 GeV scientific era is going strong
 - More than 30 weeks operation in FY22, FY23 (planned), and FY24, enabled by supportive Operations budget
 - High-profile results emerging from 12 GeV program (and still from 6 GeV program)
 - Progressing on CPP with CM refurbishments
- Successful partnership with BNL in management, design, construction of EIC Project
- MOLLER Project achieved CD-3A (approve Long Lead Procurements) in March 2023, Fall review for CD2/3; SoLID ready to move ahead
- Exploring exciting scientific opportunities enabled by cost-effective and technically innovative CEBAF upgrade concept
 - Positrons at 12 GeV (starting soon)
 - Electrons at 22 GeV
- Initial steps toward diversifying Jefferson Lab's scientific mission, HPDF news to come in weeks

NPES Experimental Schedule

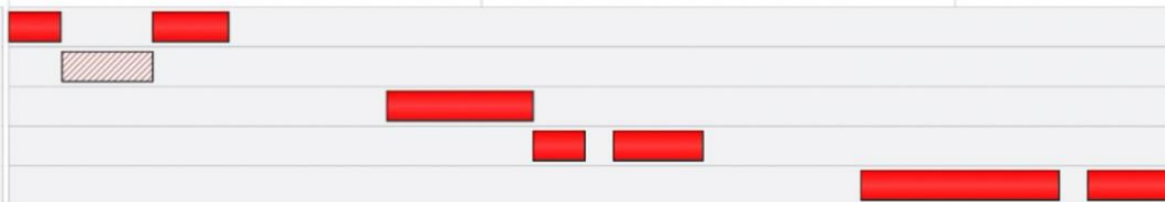
Experimental Hall A

SBS Nucleon Form Factors (GEN)
Recoil Polarization and K_LL
SBS Nucleon Form Factors (GEP-V)



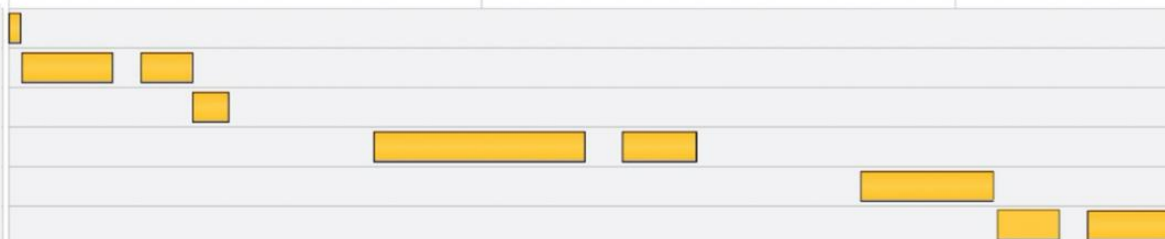
Experimental Hall B

3D Imaging – polarized H & D
Repair of CLAS12 Magnet Power Supply
Hadronization + Color Transparency
3D Imaging – protons & nuclei
Tagged EMC Effect (ALERT) and Hadron Formation



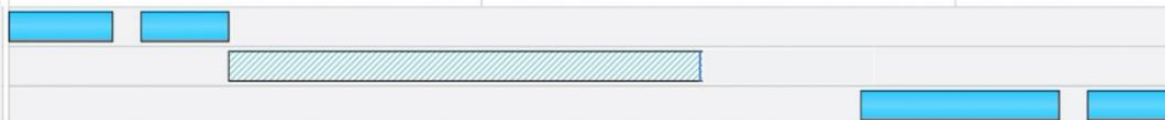
Experimental Hall C

Pion Form Factor
Café, $x > 1$, super-fast quarks & EMC Effect
Deuteron ($e, e'p$)
Neutral Particle Spectrometer Experiments
LAD - Bound Neutron Structure
Pion Color Transparency and R SIDIS



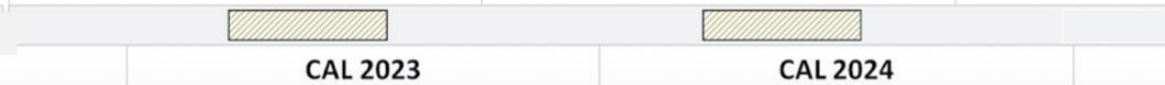
Experimental Hall D

Pion Polarizability, Rare Eta and Start GlueX Phase II
GlueX Detector Upgrade
GlueX Phase II with DIRC



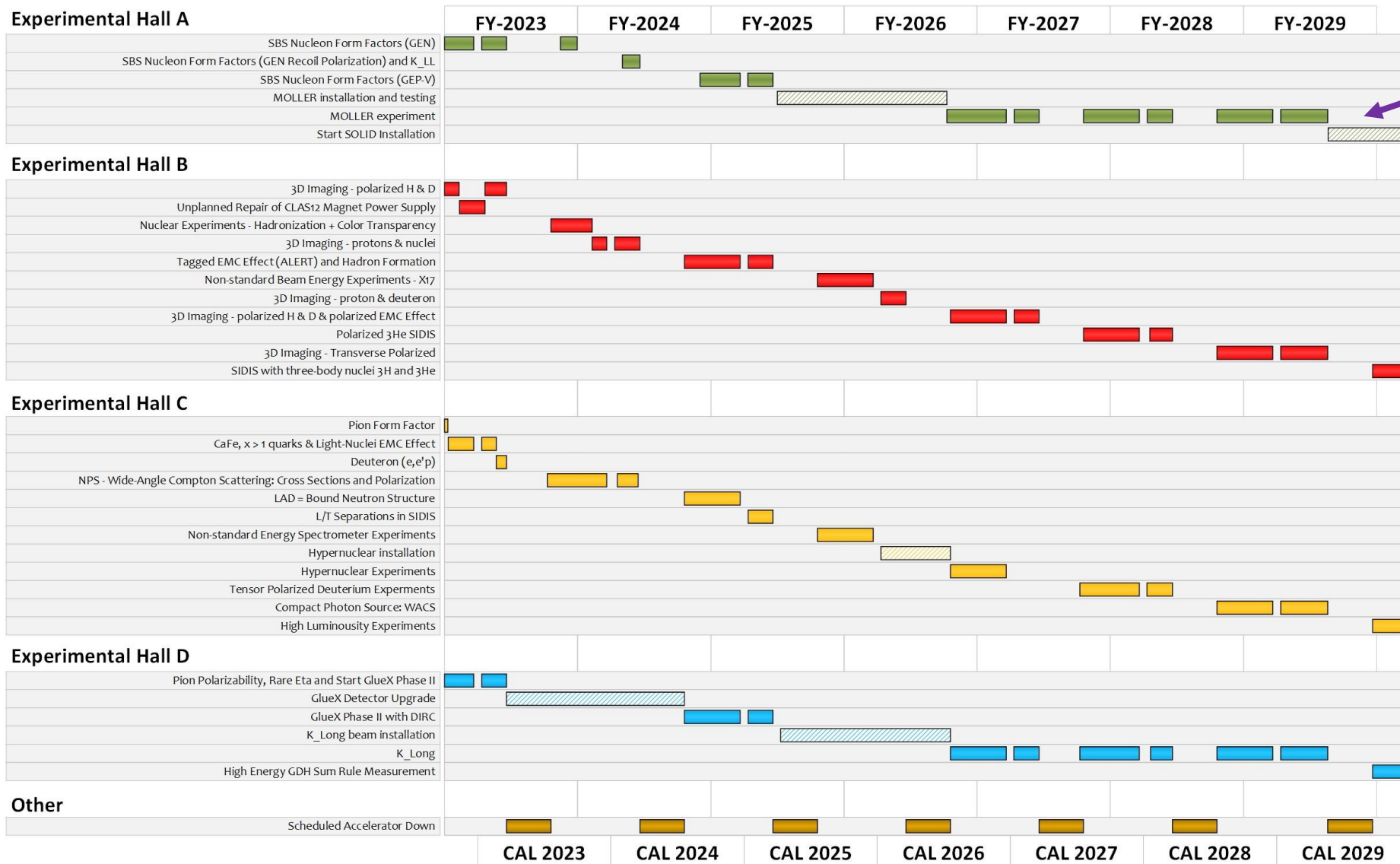
Other

Schedule Accelerator Down (SAD)



- Current schedule to March 2025
- Will shift “right” due to safety pauses
- Assumes 33 weeks of physics running annually
- Total CEBAF power has been a challenge
- MOLLER installation begins next!

Extended Experimental Schedule – *less certain!*



- SoLID installation could start ~mid-FY29

- 86% complete in FY29 without SoLID, 70% complete with SoLID (assuming optimal running operation)

...not including new proposals

- May move into upgrade era

What about K_L ? ERR Results... please read carefully!

14 comments, and the following recommendations:

- Complete a bottom-up cost estimate (30% accuracy) and deliver to Physics Division management by the end of September 2023 – prior to awarding any major procurements.
- Work with lab management, including RadCon, to document requirements for decommissioning and disposal of the KLF apparatus and incorporate this information to develop designs that are compatible with required timelines for removal and disposal of equipment. Make all efforts to obtain this guidance from lab management by the end of September 2023.
- Proceed with detailed engineering work.
- A report of relevant beam studies results from the 2024 run period should be delivered to Physics Division management by June 2024 (compatibility with MOLLER).
- Perform time-dependent and thermal cycling (e.g. from beam trips) simulations of targets (copper and beryllium) and blockers (tungsten) that receive high (kW) power deposition to assure that thermal and mechanical performance is adequately understood. Fatigue, cracking, etc. Provide report to Physics Division management by June 2024.

What about K_L ? ERR Results... please read carefully!

- Include residual field from dipole in beam optics calculations and determine extent of degaussing that will be required to operate KLF. Provide report to Physics Division management by March 2024.
- Perform an FMEA including safety assessment of off-normal events, e.g, cooling system failures, power supply failures, beam excursions etc. Provide results at next ERR.
- Within 2 months, assign a dedicated scientist or team to assess radiation tolerance of equipment, in the tagger hall in particular, and assess if any components will need to be shielded or potentially replaced to restore GlueX.

Also, from the charge...

13. What are the cost and schedule estimates for the construction of the K-Long Facility? Have the resources been identified? Capital cost of \$2.4M and 3 years. However, estimates are not current so it is anticipated the cost could be significantly higher due to a typical escalation of costs for many of the required materials. Labor plan assumes a modest increase in labor beyond what can be identified.

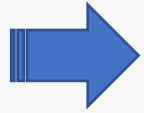
Conclusions

- The Lab is in a strong position moving forward
 - Supportive funding for CEBAF Operations
 - Moving EIC forward
 - Laying the groundwork for an exciting role for CEBAF in the EIC era – positrons and 22 GeV
 - Diversifying Jefferson Lab’s scientific mission
 - Increasing our impact in accelerator S&T
- We have a lot of work to do for K-Long...
 - Read the ERR!
 - Resources needed beyond the laboratory – the collaboration will be critical
 - Doesn’t look like it will start with MOLLER
 - *Looking forward to working with you!*

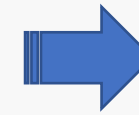


Feasible, Cost effective, Innovative Path from e⁺ to 22 GeV

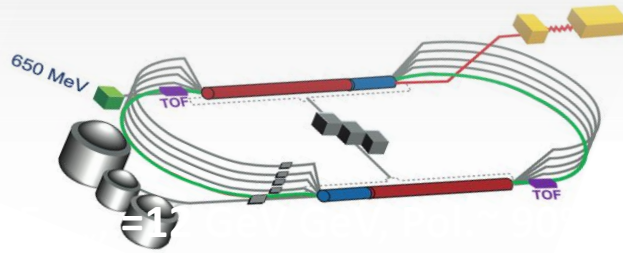
- CEBAF's approved program extends into 2030s
- CEBAF will remain the prime facility for fixed target electron scattering at very high luminosity



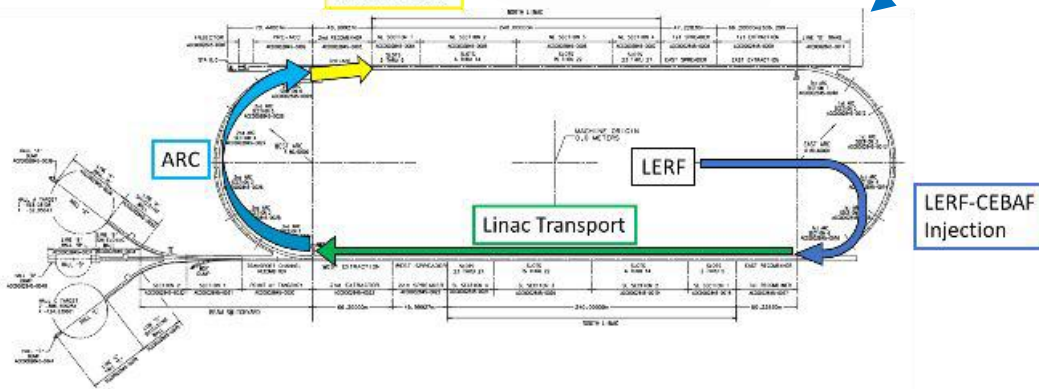
Capitalize on recent science insights and US-led accelerator science and technology innovations to develop a **staged program at the luminosity frontier**



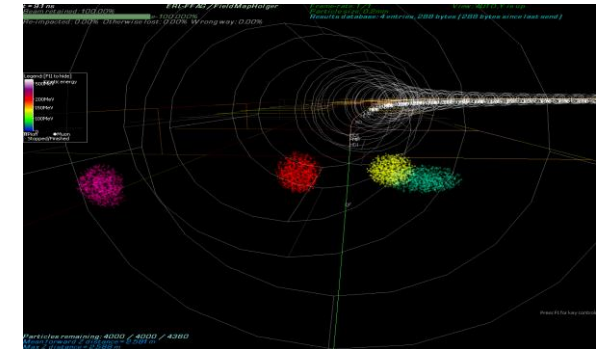
- 12 GeV Positron beam
- CEBAF @ 22 GeV



INJ to CEBAF



- Starting with 12 GeV CEBAF
- **NO new SRF** (1.1 GeV per linac)
- **New 650 MeV recirculating injector**
- Remove the highest recirculation pass (Arc 9 and A) and **replace them with two FFA arcs** including time-of-flight chicane
- Recirculate 4.5+6times to get to 22 GeV



- **Positrons (e⁺) in the LERF with transport to CEBAF**
- Injection energy upgrade for 650 MeV Electron (e⁻) in LERF

High Performance Data Facility (HPDF)

- **Scientific community recognizes the need for a data-centered high performance computing facility**
- Focused on unique opportunities for data-intensive applications and real-time computing to support significant growth in DOE-SC user facility data
- Designed to meet the data management, long term storage, and data mining needs of researchers
- High Performance Data Facility proposal developed in partnership with other national laboratories (\$300-\$500M), just submitted
- Growing a data sciences program
 - Ex: Partnership with ODU and health care providers on public health analyses
 - Hires and joint faculty positions in process, including state funded positions
- Growing partnerships, programs and attracting funding



US-based MicroPattern Gaseous Detector Center - A Community User Facility

Need for US-MPGD center for NP, HEP, Medical application and beyond

- ❖ Large number of US institutions engaged in MPGD activities
 - limited inter-disciplinary interaction between the institutions
- ❖ The community needs a dedicated US-based MPGD User Facility with a:
 - **Production workshop** (like to the SiDet Facility for at FNAL) for fabrication of large MPGDs (μ RWELLS, GEMs, flexible PCBs...)
 - **Detector R&D Lab** (like the RD51 / GDD Lab at CERN) with equipment and instrumentation for detector assembly, testing, irradiation, high-rate and aging studies, for internal and external users with local technical and scientific support team
- ❖ US-MPGD center will greatly benefit the 12 GeV experimental program and EIC detector development
- ❖ Jefferson Lab is an excellent place for an MPGD center in the US
 - At the forefront in the deployment of large MPGDs in NP exps
 - In-house MPGD expertise and beam test capabilities for MPGD tests

Discussed at QCD LRP Town Meeting and also during the 2022 Snowmass meeting - in the meeting's white paper section 4.4.
Need for MPGD R&D facility in the US for the Nuclear Physics, HEP communities

- **Some funding (~\$ 2M start) included in 2024 DOE NP JLab projections**
- **JLab Detector Group member of RD51 CERN Collaboration !**

