

Hall D Status

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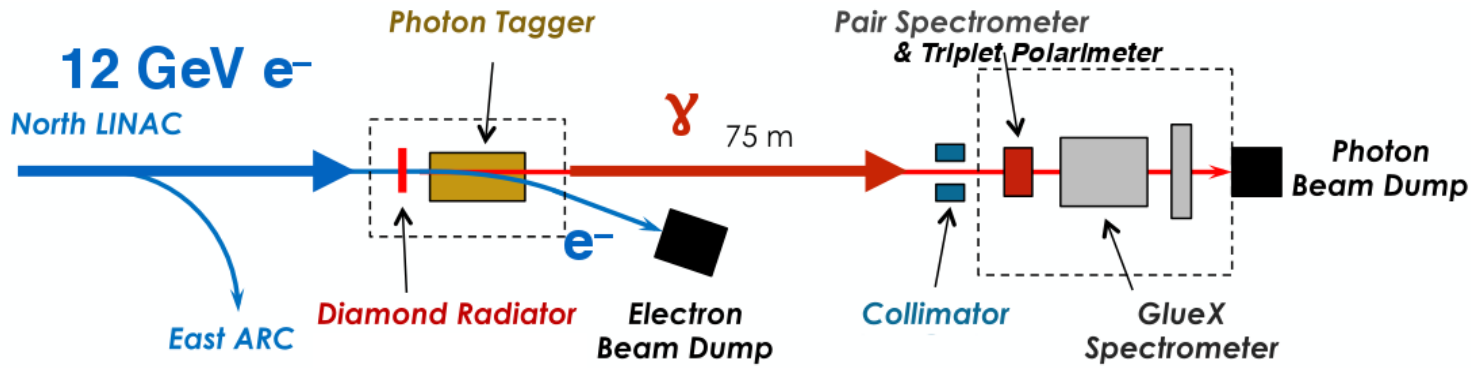
Overview

- Brief JLAB Status
- Hall D facility
- Physics program
- Budgeting and staff
- Schedule

JLAB Status

- The lab is in MEDCON3
 - Masks are not required, except for working at <3 ft from other people
 - Daily self-certification is still required
 - Users are allowed on site
 - Vaccination status has to be reported in order to work on site
- Hybrid and remote work policy for staff, formalizing the “remote work” conditions and requirements. Four categories, with a number of requirements. Formal agreements with the supervisors required.
 - Dedicated 100% on-site
 - Flexible: > 60% on-site
 - Remote: < 60% on-site, within commuting distance, no permanent office
 - Virtual: anywhere
- EIC: detector proposal have been reviewed (ECCE and ATHENA), ECCE is selected as the winner
- JLab White Paper:
 - Physics with CEBAF at 12 GeV and Future Opportunities : arXiv:2112.00060
 - Efforts underway to upgrade the accelerator and to define physics with 24 GeV electron beam.
 - A series of workshops is planned
- Management:
 - Deputy Director for Science is David Dean
 - New ENP AD is Cynthia Keppel
 - Hall B leaders is Patrick Achenbach
 - Search for Halls A,C leader continues

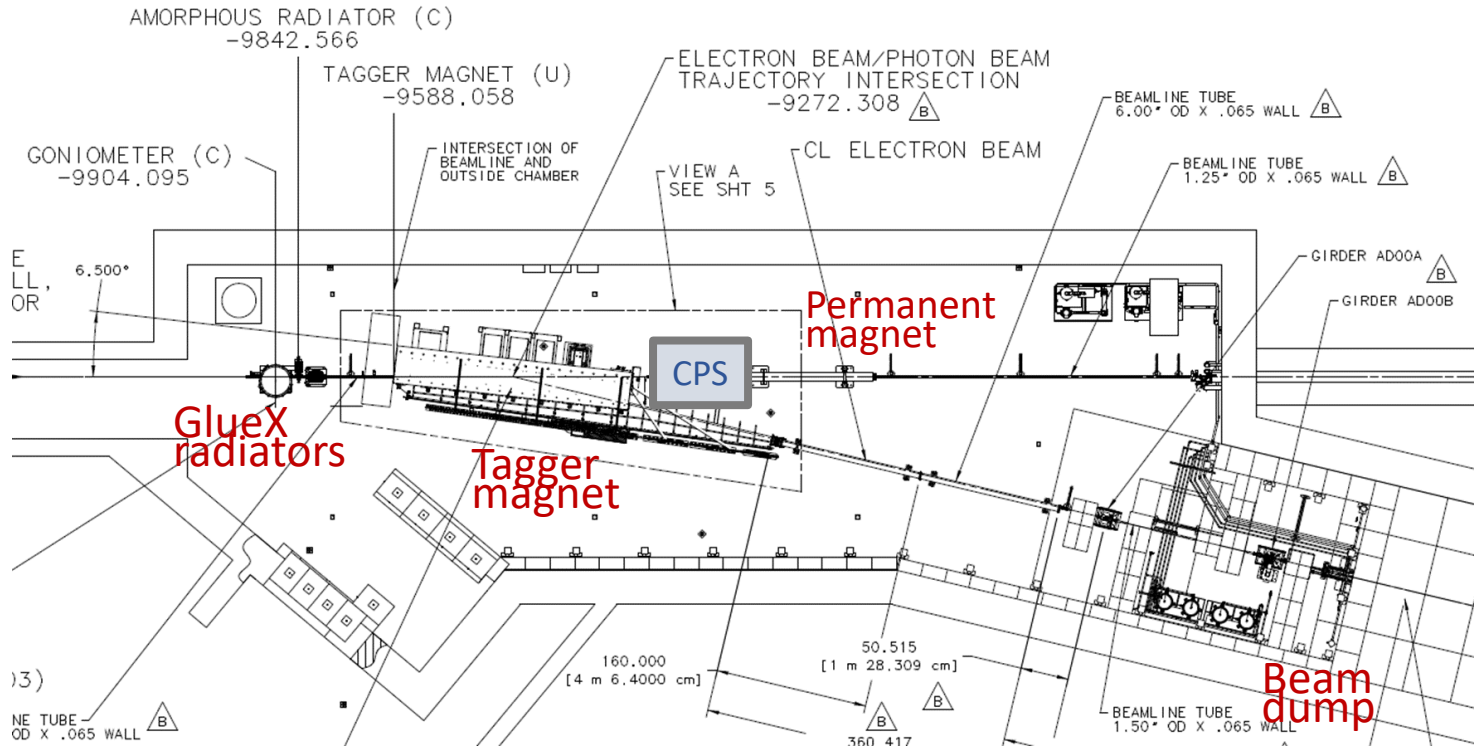
Hall D Apparatus



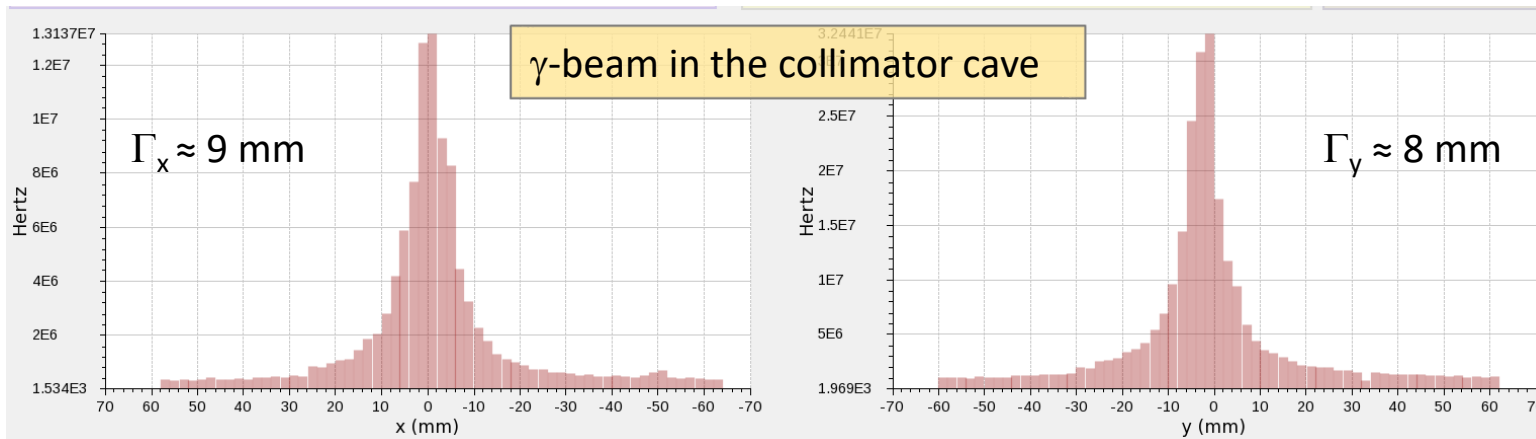
- Hall D complex consists of two halls:
 - Tagger Hall for photon beam creation
 - Hall D for particle and event detection
- Acceptance: $1^\circ < \theta < 120^\circ$
- Resolutions for h^\pm : $\sigma_p/p \approx 1 - 3\%$
- Resolutions for γ : $\sigma_E/E \approx 6\%/\sqrt{E} + 2\%$
- Trigger: photoproduction at $E_{\text{BEAM}} > 7 \text{ GeV}$
- In 2020: 85 kHz (signal + EM background)



Hall D Beam

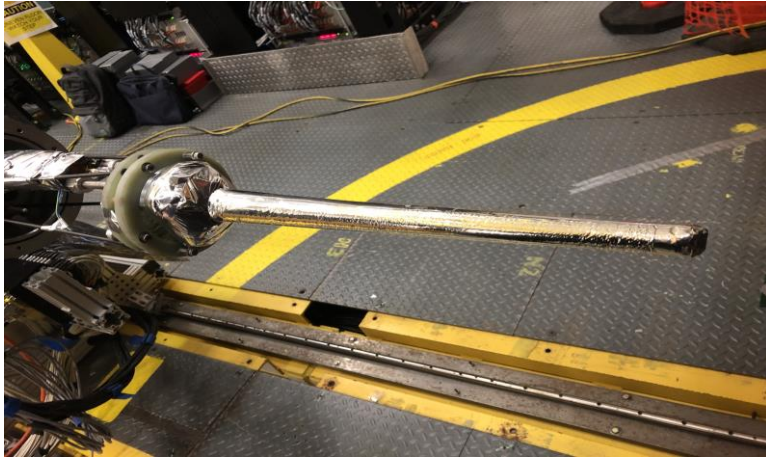


- Linearly polarized photon beam for GlueX produced 75m upstream of the main hall.
 - Beam bunches are spaced 4ns apart
 - There is a couple of nA bleedthrough from the other halls.
 - 1mm x 0.5mm beam size in σ_x and σ_y at the GlueX radiator
 - Beam also could be rastered upstream of the tagger hall using FFB magnets.
 - Can run 5 μ A e-beam on the tagger dump.
 - Photon beam monitor at the entrance to Hall D
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- HallC-style CPS could be placed in the tagger hall where there is plenty room for it.
 - A larger design could probably be accommodated as well.

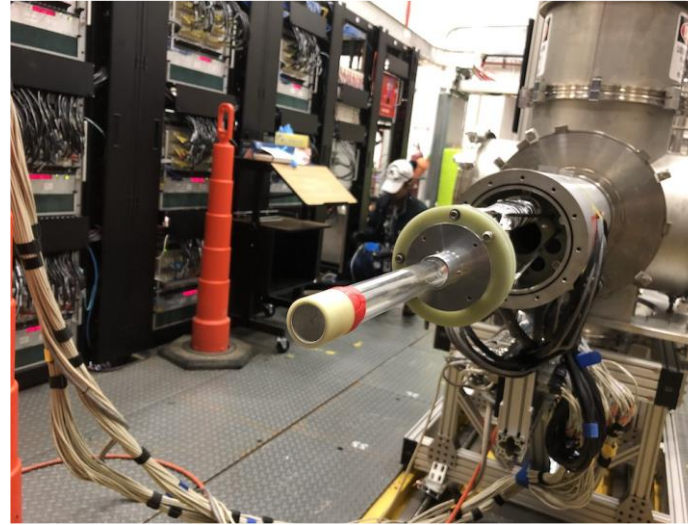


Hall D Targets

LH2, LD2, LHe $\varnothing 15 \times 300 \text{ mm}$



Be $\varnothing 25.4 \times 17.75 \text{ mm}$

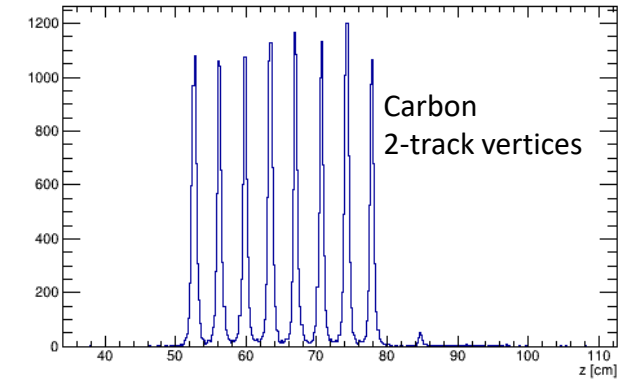


^{12}C $8 \times \varnothing 20 \times 2.3 \text{ mm}$



Target	Experiment	Thickness		Neutron Radiation, relative
		RL	g/cm^2	
LH2	GlueX, PrimeX- η	3.5%	2.1	1
LD2	SRC	4.1%	5.1	2.4
LHe	PrimeX- η , SRC	3.7%	3.5	1.7
Be	PrimeX- η	5.0%	3.3	1.6
Carbon	SRC	7.9%	3.4	1.6
Lead	CPP/NPP	5.0%	3.2	1.5

z for $r < 0.5 \text{ cm}$



^{208}Pb $\varnothing 25.4 \times 0.3 \text{ mm}$



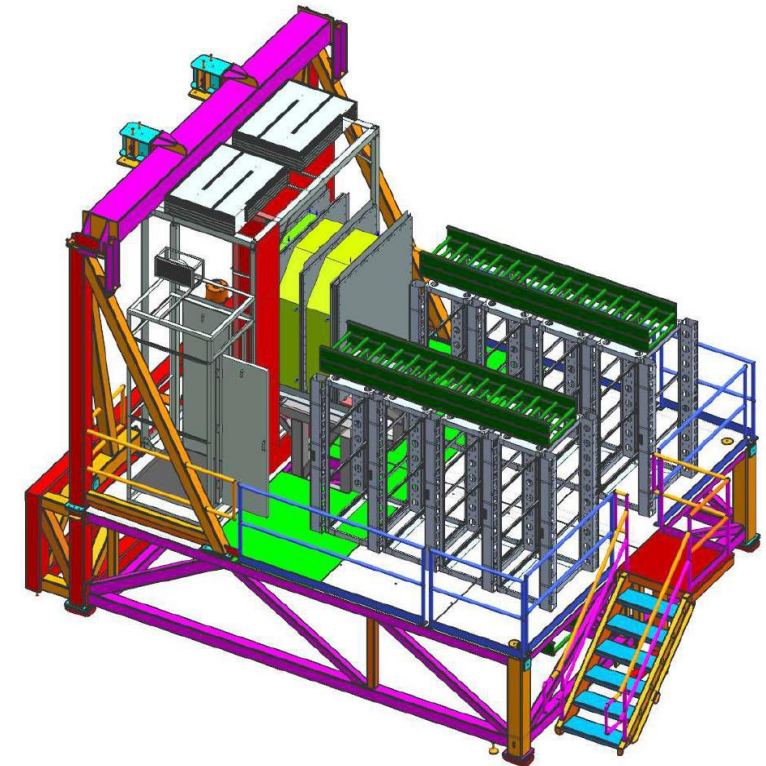
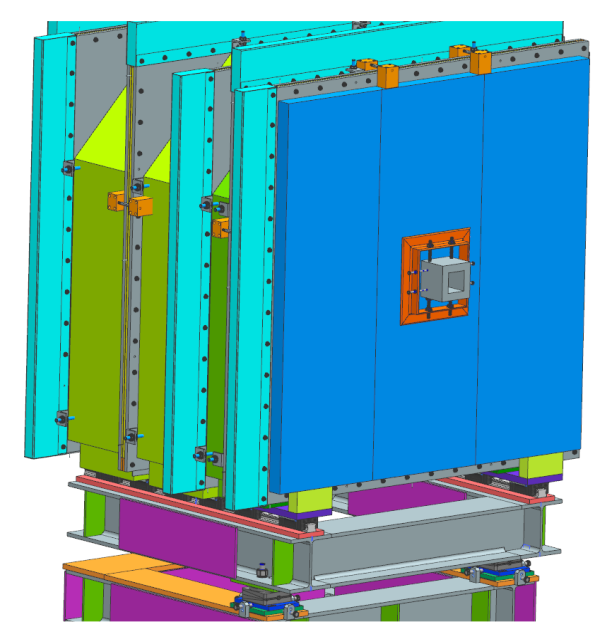
- Polarized target in the distant future (REGGE)

Physics program

Experiment	Title	PAC Rating	PAC days	PAC #	Data taken
E12-06-102	Mapping the Spectrum of Light Quark Mesons and Gluonic Excitations with Linearly Polarized Photons	A	120	30	100%
E12-12-002	A study of meson and baryon decays to strange final states with GlueX in Hall D	A	220	42	33%
E12-13-003	An initial study of hadron decays to strange final states with GlueX in Hall D	Grp	200	40	0%
E12-13-003 A	A Eta Decays with Emphasis on Rare Neutral Modes: The JLab Eta Factory(JEF) Experiment	Grp	100	45	0%
E12-10-011	A Precision Measurement of the eta Radiative Decay Width via the Primakoff Effect	A-	79	35	47%
E12-13-008	Measuring the Charged Pion Polarizability in the $\gamma\gamma \rightarrow \pi^+ \pi^-$ Reaction	A-	25	40	0%
A	Measuring the neutral pion polarizability	Grp		48	0%
E12-19-003	Studying Short-Range Correlations with Real Photon Beams at GlueX	B+	15	47	100%
E12-19-001	Strange Hadron Spectroscopy with Secondary KL Beam in Hall D	A-	200	48	0%
E12-20-011	Measurement of the high-energy contribution to the Gerasimov-Drell-Hearn sum rule	A-	33	48	0%

Upcoming runs

- Run certificate obtained for the CPP/NPP and PrimeX- η runs
- CPP/NPP run 50 calendar days this summer
- 7 days for CPP deinstallation and preparation for PrimeX- η
 - Removal of the muon detector
 - Reinstalling the -scope in the regular position
 - Reinstalling COMCAL
 - Reinstalling the cryo target
 - Move the crate with FADC125 back to CDC
- PrimeX- η run 95 calendar days
- 4 days for changeover to GlueX
 - DIRC installation
 - Target - extra thermal shield removal?
- GlueX-II run 101 calendar days, in 2 parts



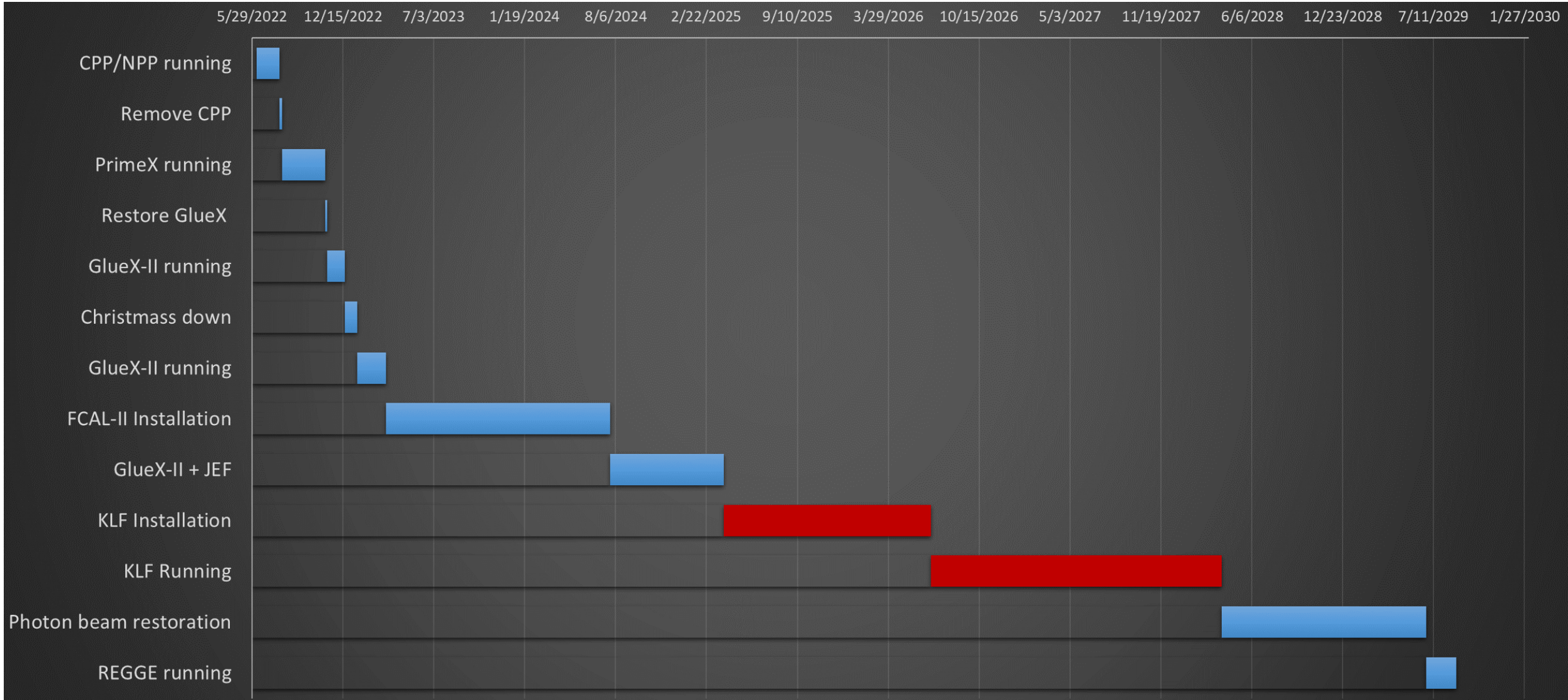
Hall D budget and staffing

- FY22 capital budget
 - FCAL2: crystals and electronics have already been paid for
 - KLF: Designer's work
- FY22 operation budget
 - General hall operation costs
 - CPP parts, cables etc
 - GEM-TDR prototype and GEMs for PS detector testing facility (contract with UVA)
 - Supported: 3 university postdocs and one tech (all at a 50% level)
 - FCAL2: parts, cables, frame, spare crystals and PMTs
- Hall D Staff:
 - Scientific group:
 - 11 staff scientists (Mark Ito has retired, Elton Smith will retire this August), 2 postdocs
 - New staff scientist : hired, starts in June
 - Staff scientist positions: two are open, interviews are being scheduled for June
 - Technical group:
 - 1 mechanical engineer, 1 designer, and 6 techs

KLF considerations

- Capital construction budget for KLF - \$2M (expected but not certain)
 - JLab: capital funding - \$0.5-0.7M/FY, start FY23: 2023-2026
 - External funding should be helpful.
 - Need a conceptual design with cost estimates.
- Budget for KLF items that also may be used for other experiments
 - JLab operations, starting FY23
- JLab: engineering design - gradual
 - KPT: one designer is working on the model of the Be target assembly and on the technical design the beamline in Hall D.
 - CPS: conceptual design needed before engineering design and procurements
 - Other elements: Lab will address the tasks depending on resources
- 2025: earliest finishing of the approved photon beam experiments
 - Includes a break for the FCAL2 installation
 - Often schedules gets delayed, it is not a guaranteed date

Hall D plans



- Assumed 33 weeks/year for Hall D running

- Assumed timely budgeting for KLF and REGGE

- Assumed timely construction of JEF, KLF, GDH

Summary

- Hall D experimental facility has been performing well
- Most of the physics data for meson production/GlueX program has been collected
 - Collaboration is working on publications
- Upgrade of the FCAL starts next year
 - Procurements from capital budget are complete
- KLF should be able to receive capital funding in FY23 for KLF
 - No funds allocated yet
 - Need a CPS conceptual design document with detail costs estimates to start procurements
- Earliest start of KLF installation is in the middle of FY25.