Hall D Report

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New Hall for Photoproduction Experiments: Overview

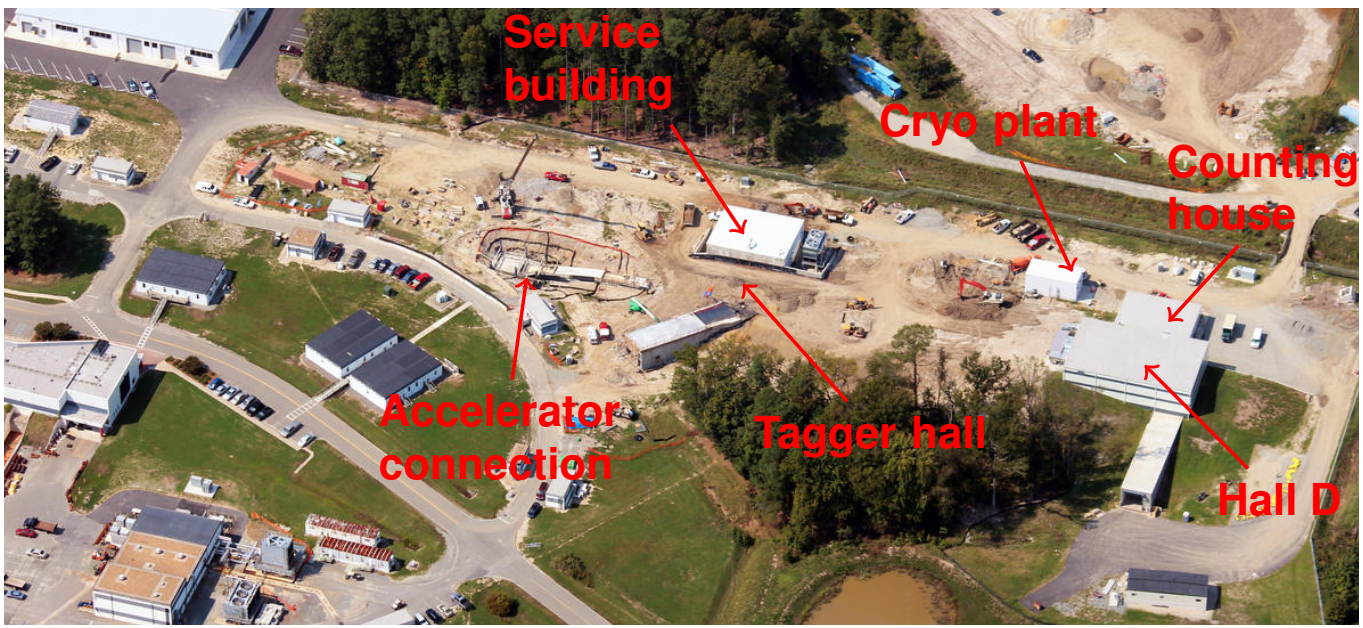
Primary motivation: experiment *GlueX*

Search for gluonic excitations in meson spectra

- 12 GeV endpoint γ-beam (linearly polarized)
- Hermetic spectrometer for $h^{\pm}$, γ
- Ultra high rate DAQ

Other physics

- PRIMEX-η - approved
- Rare decays - proposed
- other development ...



Status of construction: Civil is finished! The rest is $\sim$ 50% done

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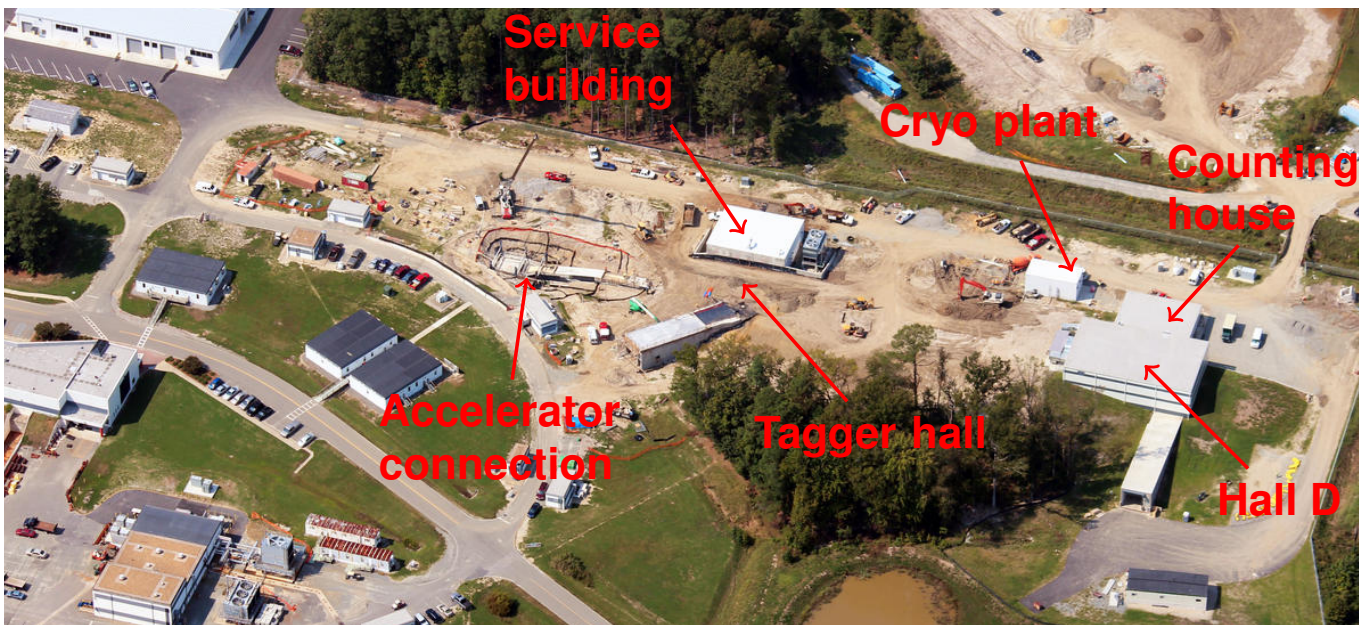

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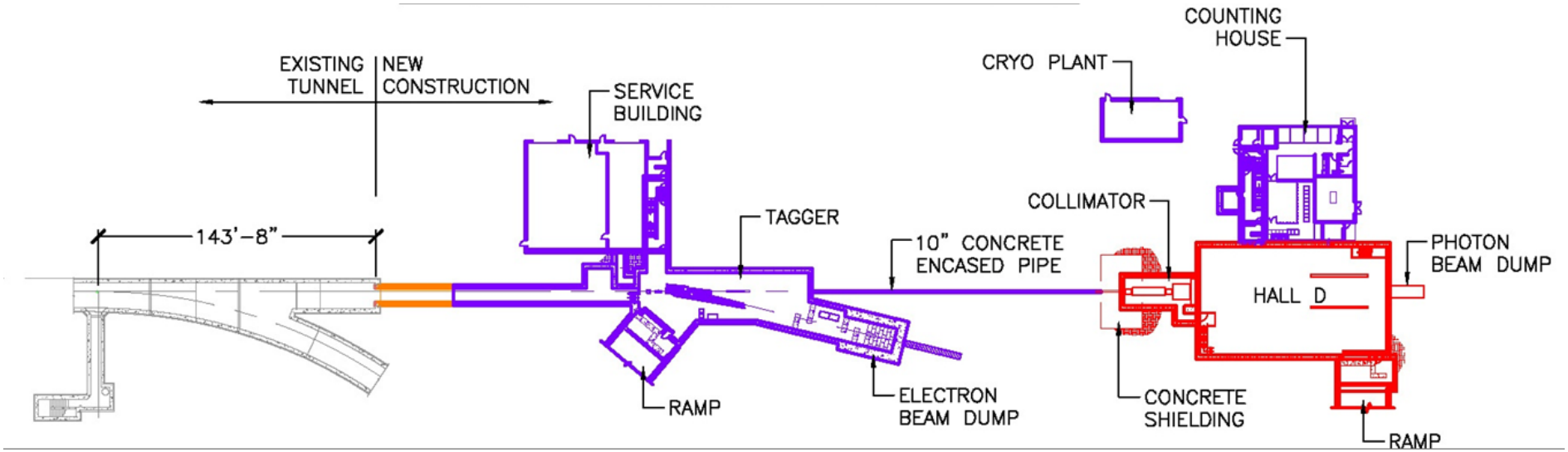
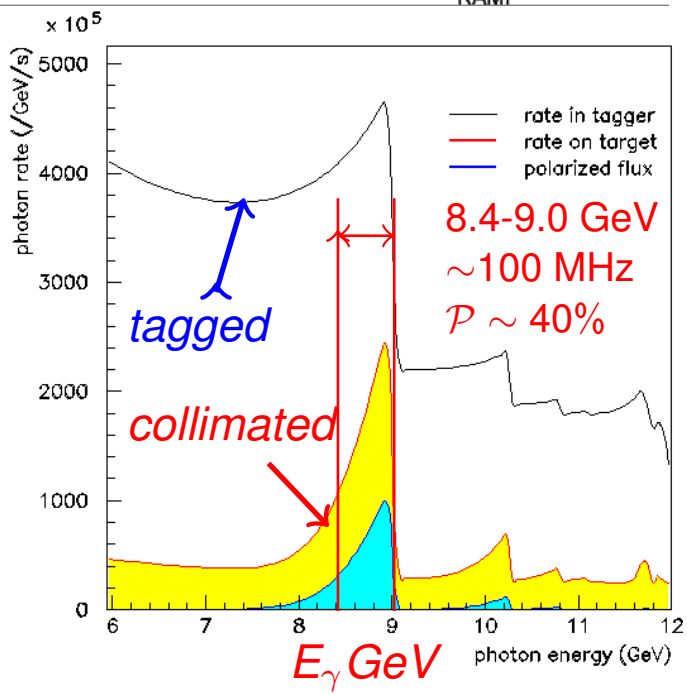
Photon Beamline



- 12 GeV e^- beam $0.05 - 2.2$ μA
- 20 μm diamond: coherent <25 μrad
- Collimation $r < 1.8$ mm at ~ 80 m
- Coherent peak $8.4 - 9.0$ GeV
  photons: 100 MHz $\quad \mathcal{P} \sim 40\%$
- Energy/polarization measured:
  - Tagger spectrometer $\sigma E/E$ ~0.1%
  - Pair spectrometer: spectrum $\Rightarrow \sigma\mathcal{P}/\mathcal{P}$ ~5%



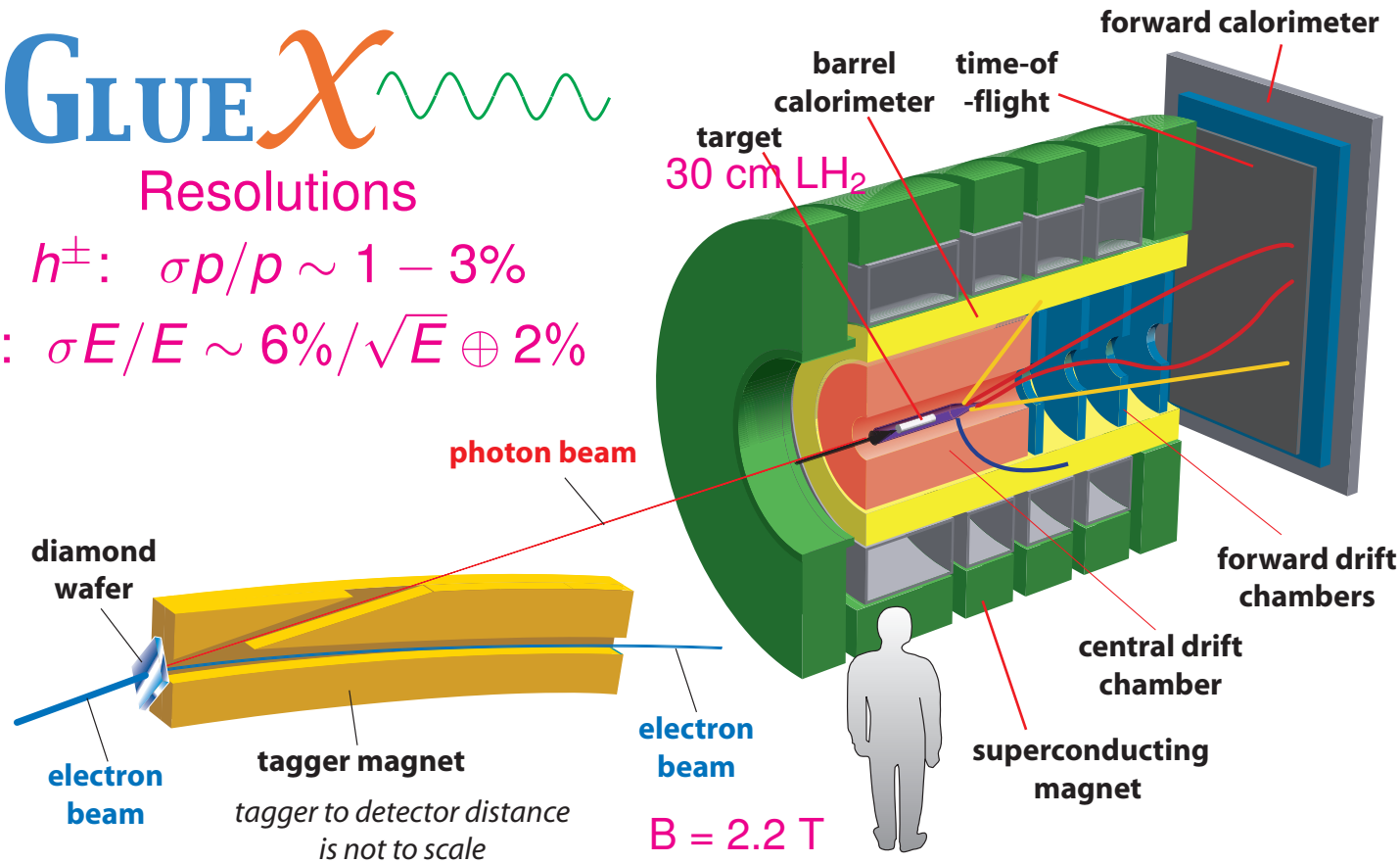
Hall D/GlueX Spectrometer and DAQ

GLUEX

Resolutions

$h^{\pm}$: $\sigma p/p \sim 1-3\%$

γ: $\sigma E/E \sim 6\%/\sqrt{E} \oplus 2\%$



Photoproduction γp 15 kHz for a 100 MHz beam

Beam 10 MHz/GeV: inclusive trigger 20 kHz $\Rightarrow$ DAQ $\Rightarrow$ tape

Beam 100 MHz/GeV: inclusive trigger 200 kHz $\Rightarrow$ DAQ $\Rightarrow$ L3 farm

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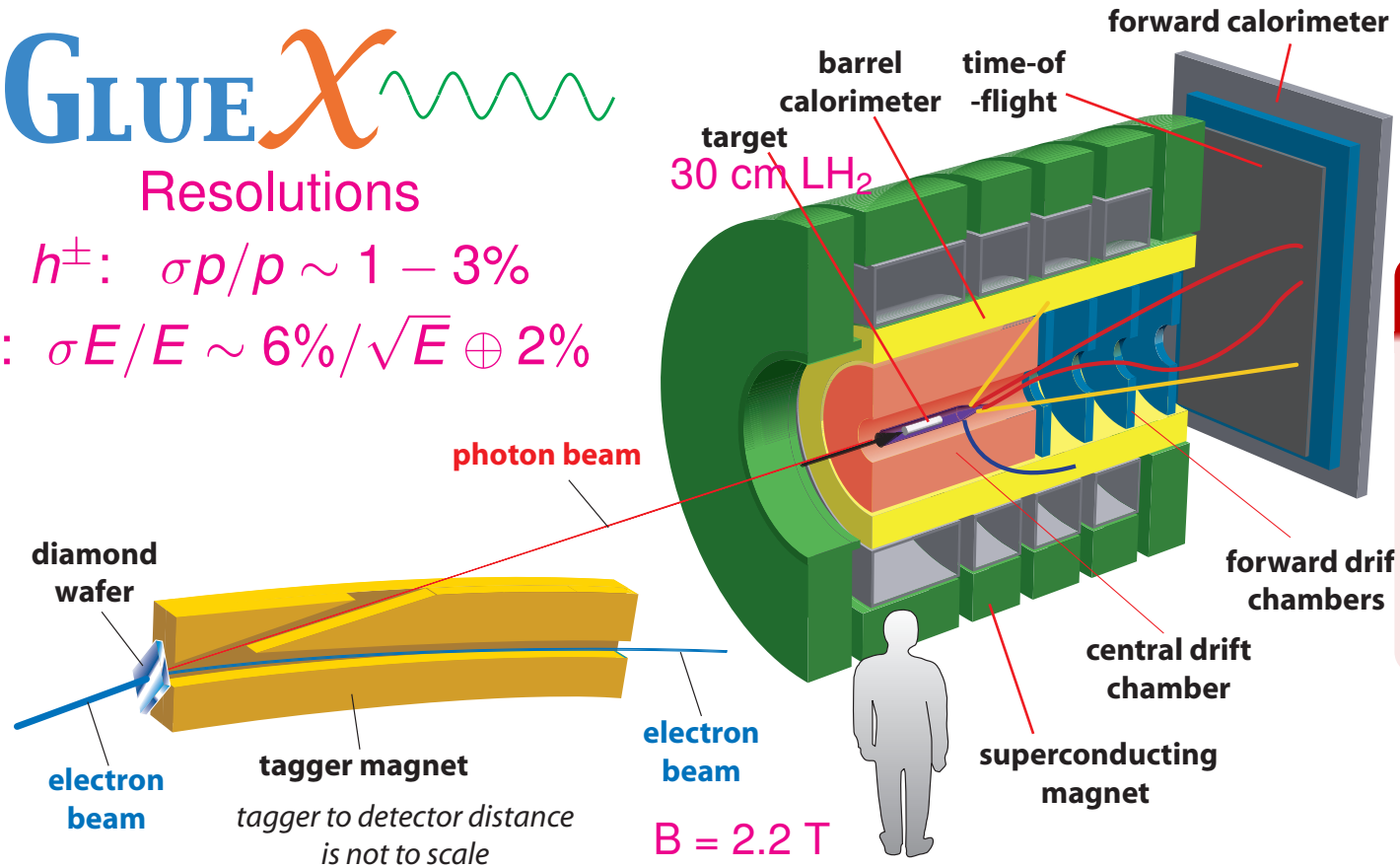

Plans to add

- 2017 L3
- 2018 Cherenkov (ϕ detection)

Photoproduction γp 15 kHz for a 100 MHz beam

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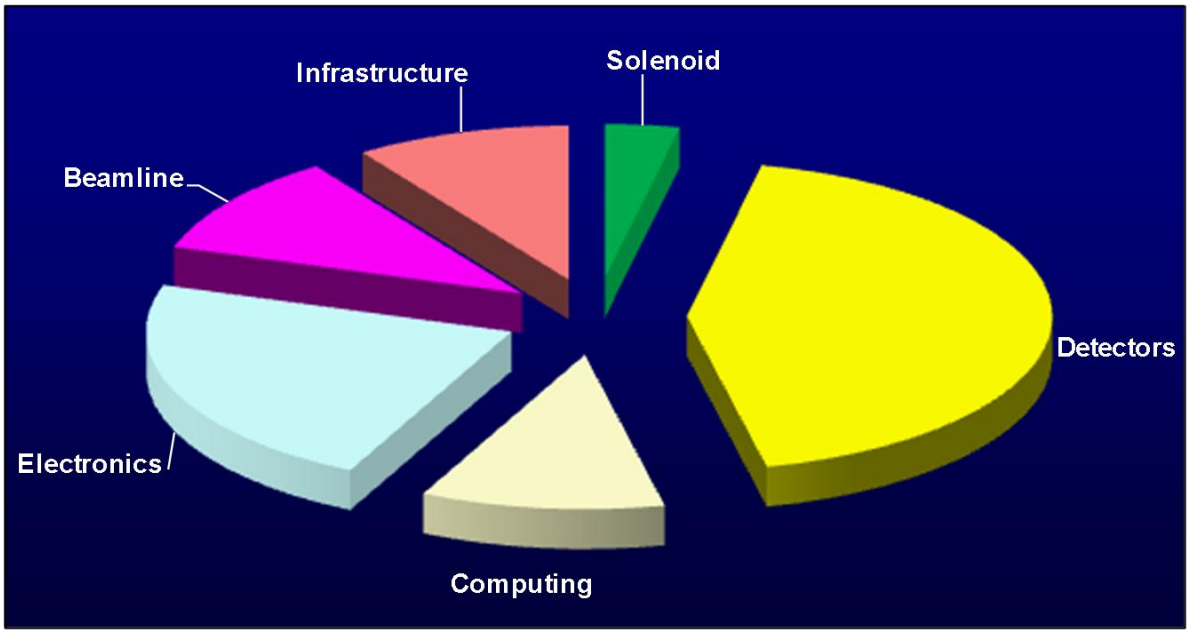
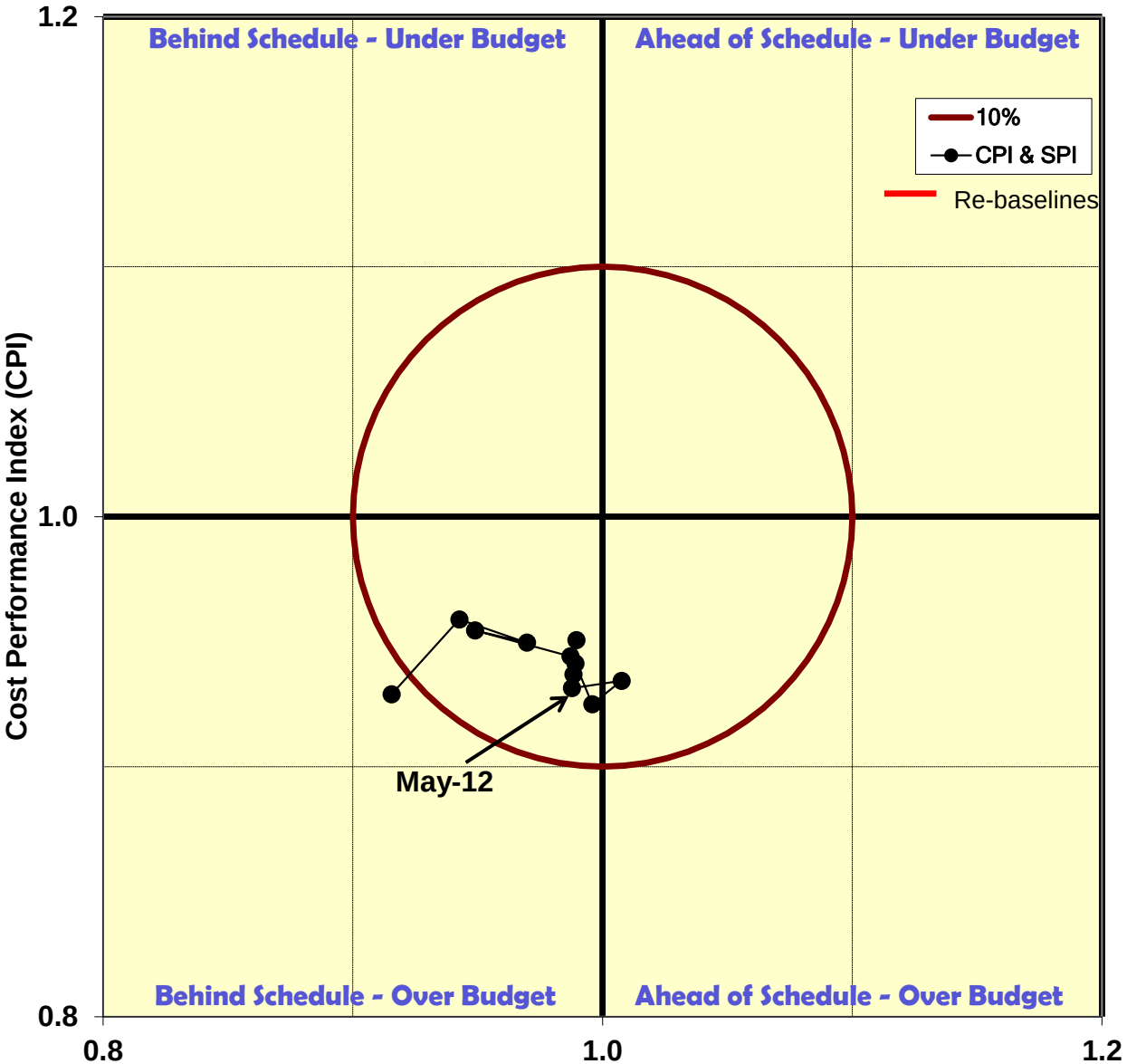
Hall D Project Budget



Funding	Name	Budget	Completed	Milestone
12 GeV Upgrade	Civil		100%	BFO Jan 2012
12 GeV Upgrade(+VA)	Beamline and detector	$41 M	~50%	Oct 2014 - beam
JLab BIA	Other*	$5 M	100%	ended Oct 2011

* - Magnet refurbishing, Electronics design, Offline Software, Miscellaneous

Hall D Project Cost/Schedule Variances



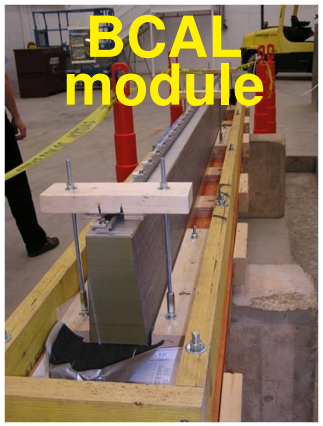
12GeV progress:

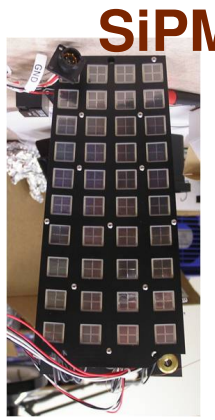
- 1% late
- 6% over budget

Progress with construction

Solenoidal Magnet: tested at 1500 A

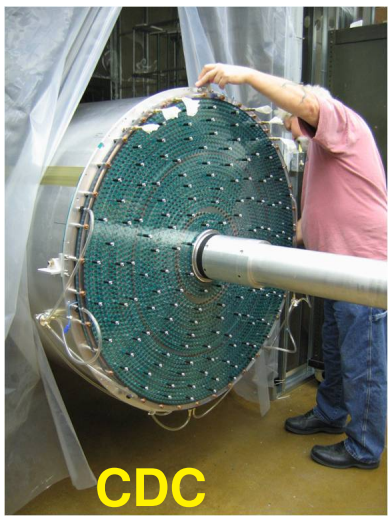
BCAL: All 48 modules built

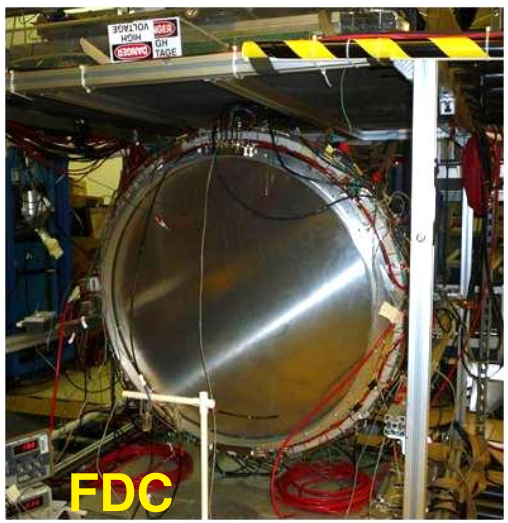




CDC: all 3500 wires strung

FDC: 60% done





FCAL: all 2800 lead glass and PMTs

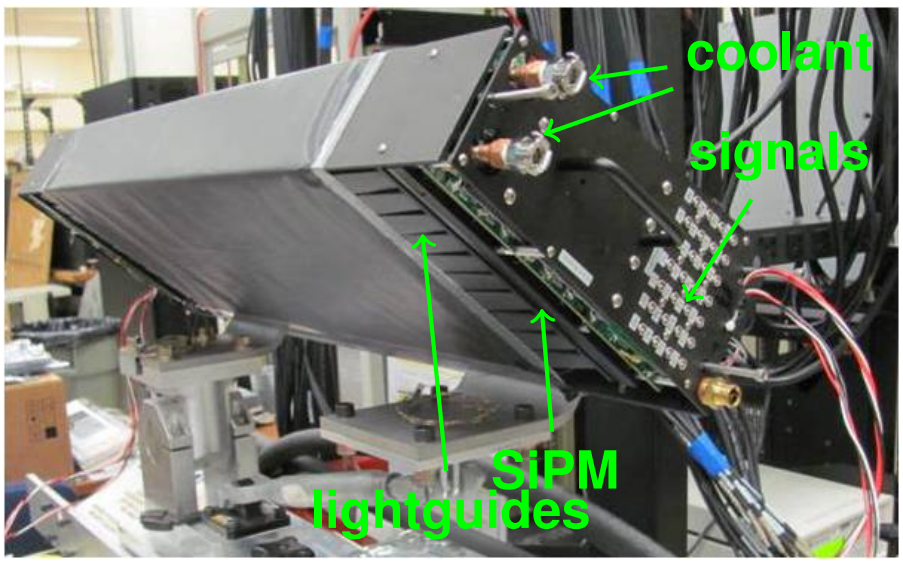
Electronics: 70% ordered

Tests of the Components

Calorimeter tests

e^- from Hall B tagger: 0.2 - 1.2 GeV

- FCAL 5×5 array
- BCAL mini-module 57 cm long



- Electronics: FADC-250
- Analysis in progress

Diamond radiator

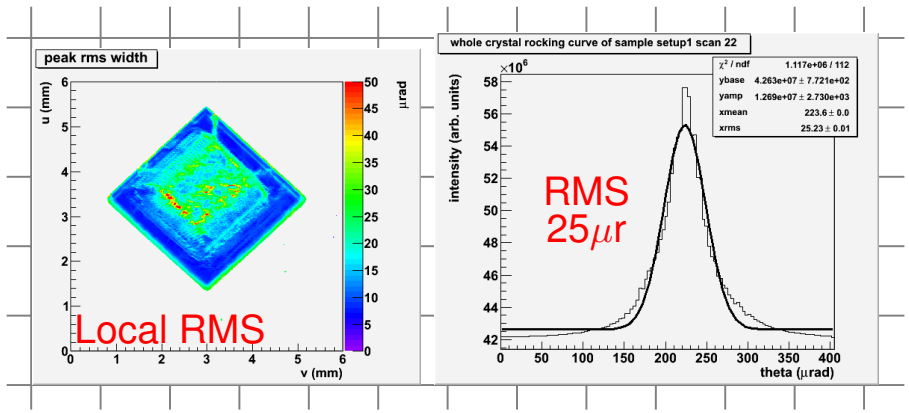
Specs: 20 μm thick, $<$ 20 μr RC

Thinning at UConn:

300 $\rightarrow$ 20 μm by laser ablation

First sample: 30 μm thick, 2 $\times$ 2mm^2 in a 3 $\times$ 3mm^2 crystal

Testing at CHESS:



- First result - close to the specs!
- Further improvements possible work in progress

Plans for commissioning and early running

- GlueX is the first experiment to run
- Other experiments may run after the 1-st production run of GlueX

After the electron beam commissioning:

1. Run I 30 PAC days: photon beam/detector commissioning
   - Troubleshooting, alignment, calibration
   - Electron beam $6 < E < 12$ GeV, 50-200 nA, relaxed emittance
   - Amorphous radiator
2. Run II 30 PAC days: physics commissioning
   - Commissioning of the linearly polarized beam
   - Electron beam $E > 11$ GeV, 200 nA
   - Amorphous and diamond radiators
   - Study of the acceptance for various reactions, preparing for PWA
3. Run III 60 PAC days: GlueX production at low luminosity
   - Electron beam 12 GeV, 200 nA (2 μA for short periods)
   - Diamond radiator, 10 MHz/coh.peak
   - Address the initial goals of GlueX in the non-strange sector.
   - Commissioning of the high luminosity running (limited by L3)

The Hall D/GlueX collaboration

- Jefferson Lab (CDC, FDC, BCal, beamline, software)
- Carnegie Mellon (CDC)
- Catholic University (Tagger hod.)
- Christopher Newport (Trigger)
- Florida International (start-counter)
- Florida State (ToF wall)
- Indiana University (FCal, software)
- IUCF (FDC, Solenoid)
- University of NC, A&T (PS)
- University of NC, Wilmington (PS)
- University of Connecticut (beamline, MC)
- University of Athens (B/FCAL)
- University of Pennsylvania (ASIC for CDC, FDC)
- University of Regina (BCal)
- University Santa Maria (Chile) (BCal readout)
- University of Massachusetts (targets, electronics)
- Yerevan (beamline, controls)
- MIT(Cherenkov)
- University of Arizona(beamline)