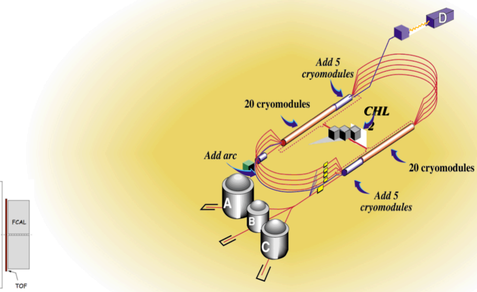
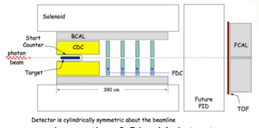
The GlueX Detector

GLUEXcitations Experiment

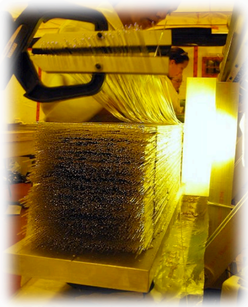
Jefferson Lab
Thomas Jefferson National Accelerator Facility





schematic of GlueX detector

Barrel Calorimeter

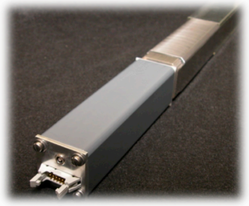


BCAL module being assembled from layers of fibers and Pb

- 48 modules arranged into cylinder
- Scintillating fiber + Pb
- 12.5% sampling fraction
- $\sigma_E/E = \frac{5.5\%}{\sqrt{E}} \oplus 1.6\%$
- $\sigma_z = \frac{5mm}{\sqrt{E}}$
- $\sigma_t = \frac{75ps}{\sqrt{E}} \oplus 33ps$
- 11° < θ < 120°
- Double-ended readout
- 300 km of fiber

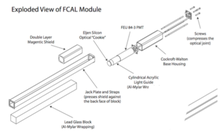
Polished BCAL module demonstrating optical clarity with cell phone held to opposite end

Forward Calorimeter



FCAL module showing assembled phototube and Crockoft-Walton base.

- 2800 Pb-glass blocks
- 4cm x 4cm x 45cm
- $\sigma_E/E = \frac{5.7\%}{\sqrt{E}} \oplus 2\%$
- $\sigma_{xy} = \frac{6.4mm}{\sqrt{E}}$
- 2° < θ < 11°



Drawing showing an exploded view of the FCAL module assembly.

Start Counter and Target

Target

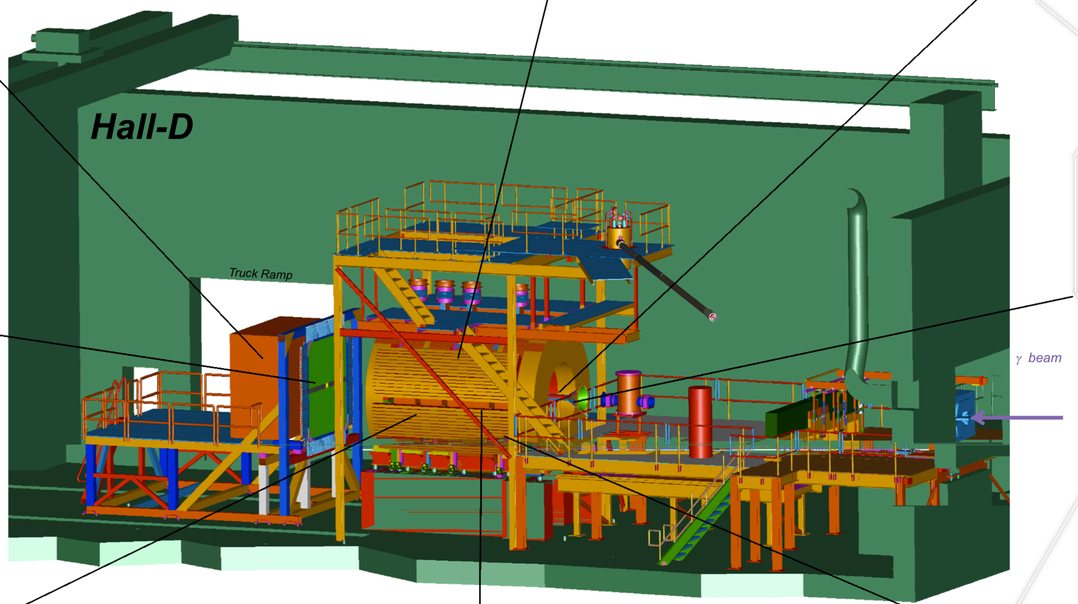
Target

- 30 cm long Kapton tube
- 3" diameter
- LH_2 or LD_2

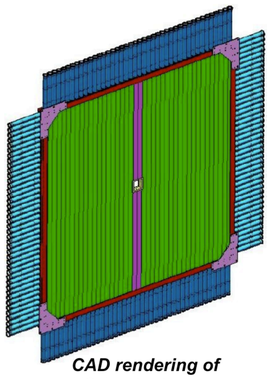
Start Counter

Start Counter

- 40 scintillators
- ~18" diameter
- 300ps (w/ tracking)
- Light guide + photdetectors



Time of Flight

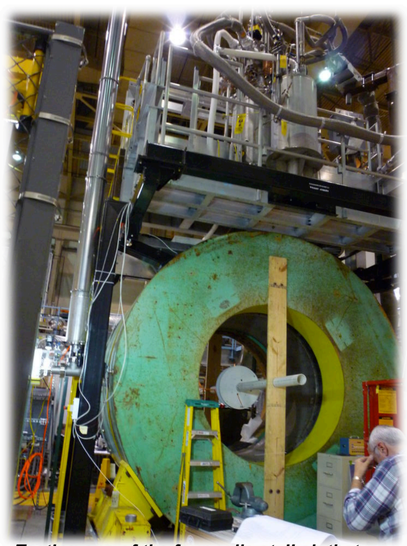


CAD rendering of TOF detector.

- 1" thick scintillator
- 2 planes
- 44 bars per plane (40 with double ended readout)
- σ_t = 60ps (both planes)
- 2° < θ < 11°

Superconducting Solenoid

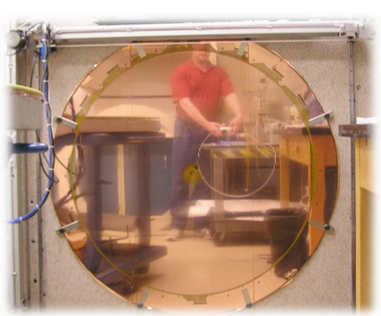
- 2T field
- 1500A
- 8.5 m^3 interior volume
- Used previously for LASS at SLAC and for MEGA at Los Alamos



Testing one of the four coils at JLab that make up the GlueX solenoid.

Forward Drift Chambers

- 4 packages, 6 planes/package
- sense wire readout
  - 96 wires/plane
  - 2304 sense wires
- cathode strip readout
  - 48 cathode planes
  - 216 strips/plane
  - 10,368 strips
- σ_r = ~200μm perpendicular to wire (drift time)
- σ_s = ~200μm along wire (cathode strips)
- 1°<θ<30°



FDC cathode plane mounted on flatness scanner.

Central Drift Chamber

GlueX CDC under construction at in a clean room at Carnegie Mellon. The straw tubes are in the interior region while support braces can be seen on the out edge.

- 3500 straw tubes
- 12 axial layers
- 16 stereo layers (6°)
- dE/dx for p<450 MeV/c
- 6° < θ < 155°
- $\sigma_r = 150\mu m$
- $\sigma_p/p = 1.5\% - 3\%$