

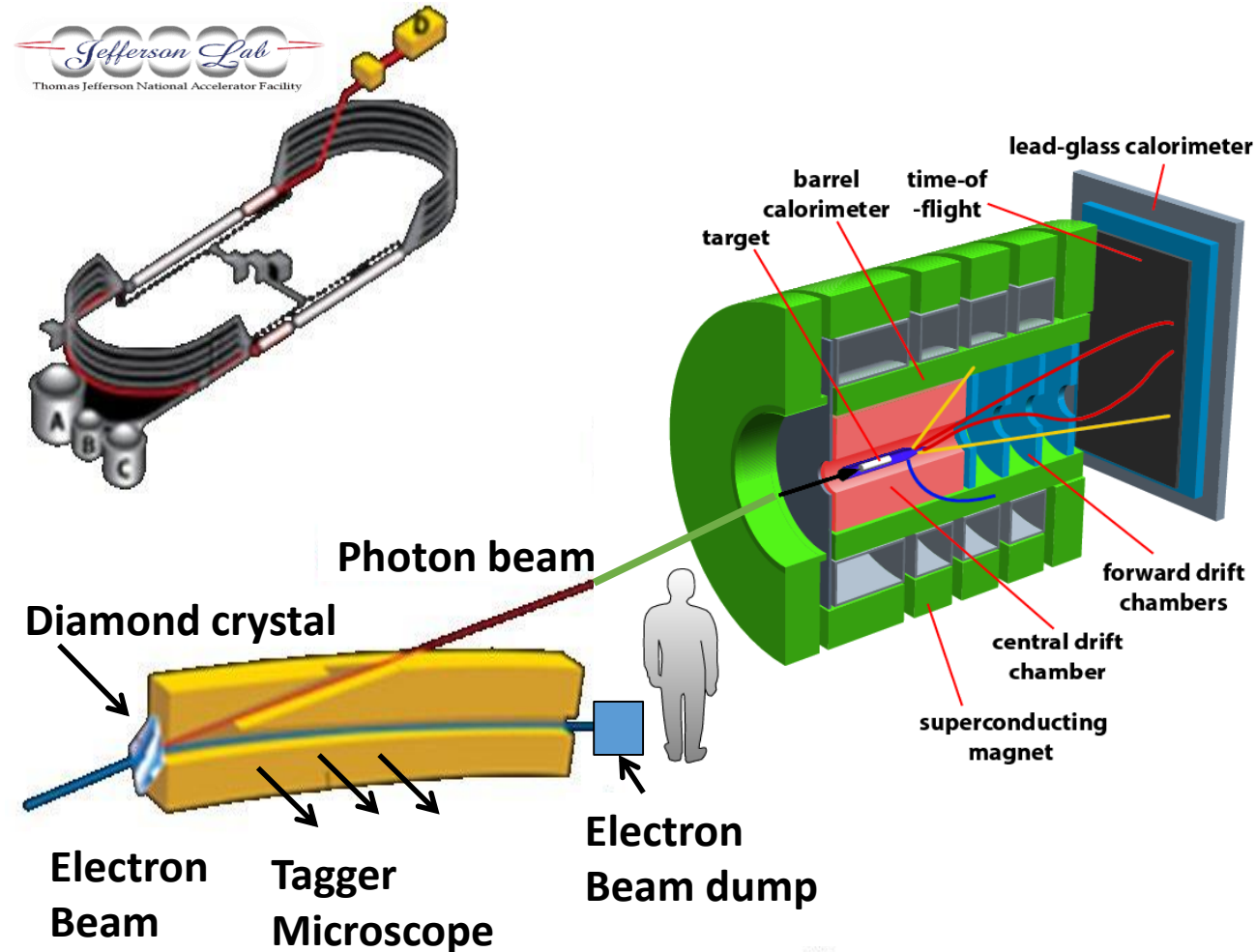
# Tagger Microscope Development and Construction for the GlueX Experiment

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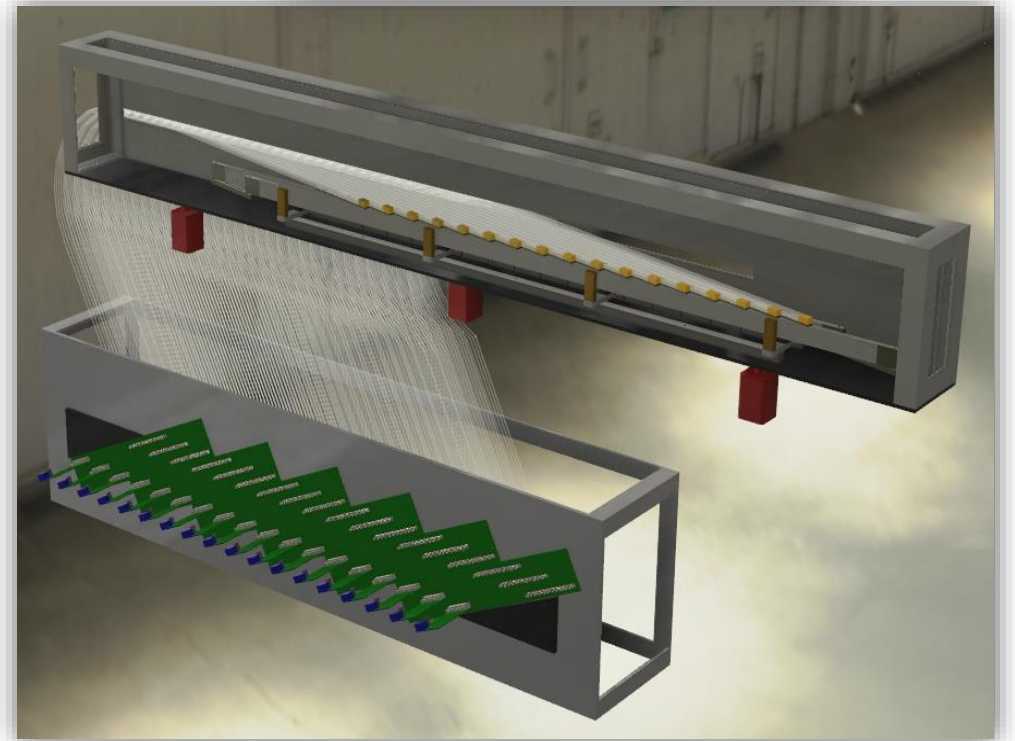
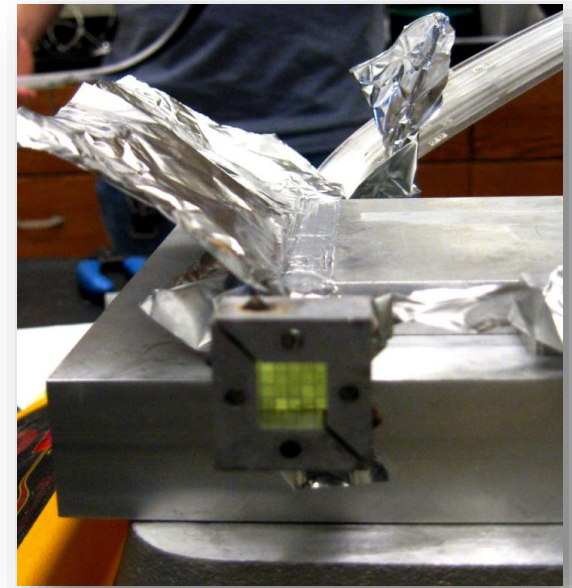
# GlueX

- Search for mesons with gluonic excitations and measure their spectrum and couplings
- Use 20 micron diamond wafer to create  $\sim 9\text{GeV}$  polarized photon beam from 12GeV electrons through coherent bremsstrahlung
- Precise photon energy determined by tagger microscope



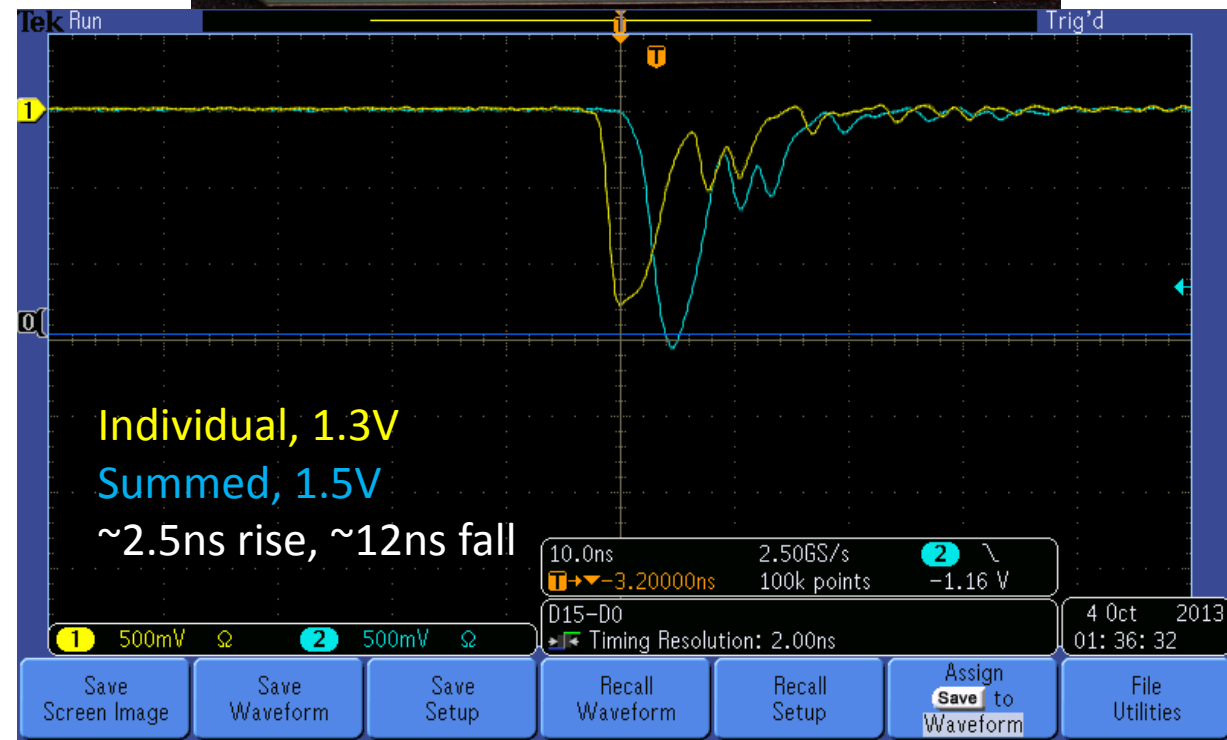
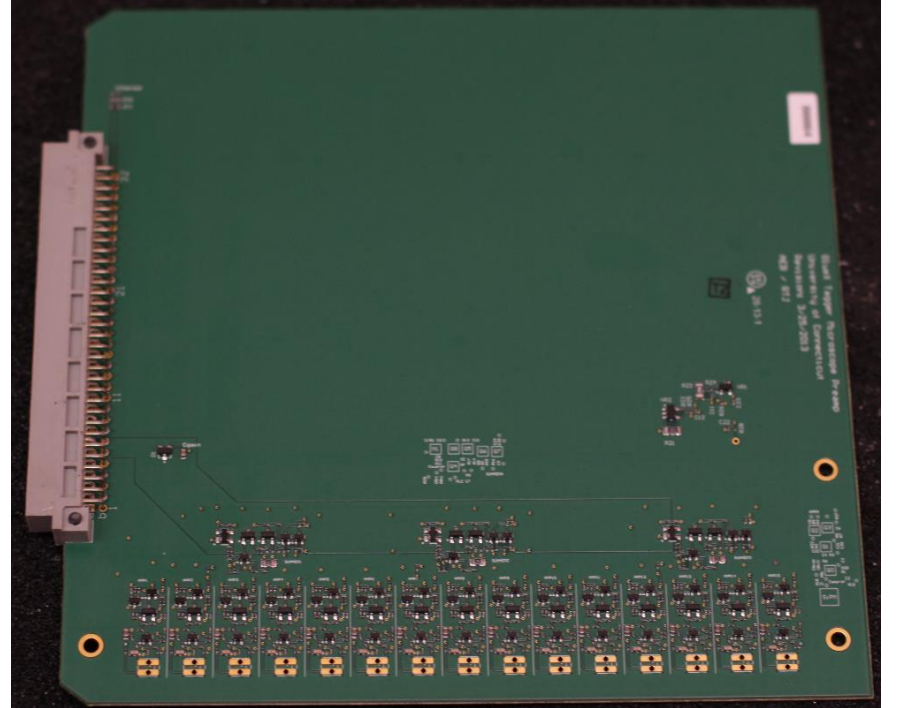
# Tagger Microscope

- Highly segmented detector
- Electrons incident on scintillating fiber
  - 17 bundles of 5x6 2mm square fibers
  - Each column represents 4MeV resolution
- Intercepts electrons in energy range 3.0-3.6GeV
- Permits tagging of photons in coherent peak 8.4-9.0GeV with rates up to  $2.5 \times 10^8$  photons/s
- Fibers propagate signal into a “dark box” on to Silicon Photomultipliers (SiPMs) on custom circuit boards



# Preamplifier

- Three types of circuit boards: preamp, backplane, bias control board
- 34 preamps
  - 15 individual channels per board
  - 3 summed outputs
- Amplifies signal from fibers
- Sends output through Eurocard connector to backplane for readout
- Pulses have  $\sim 2.5\text{ns}$  rise times,  $\sim 12\text{ns}$  fall times
- 200ps leading edge timing resolution



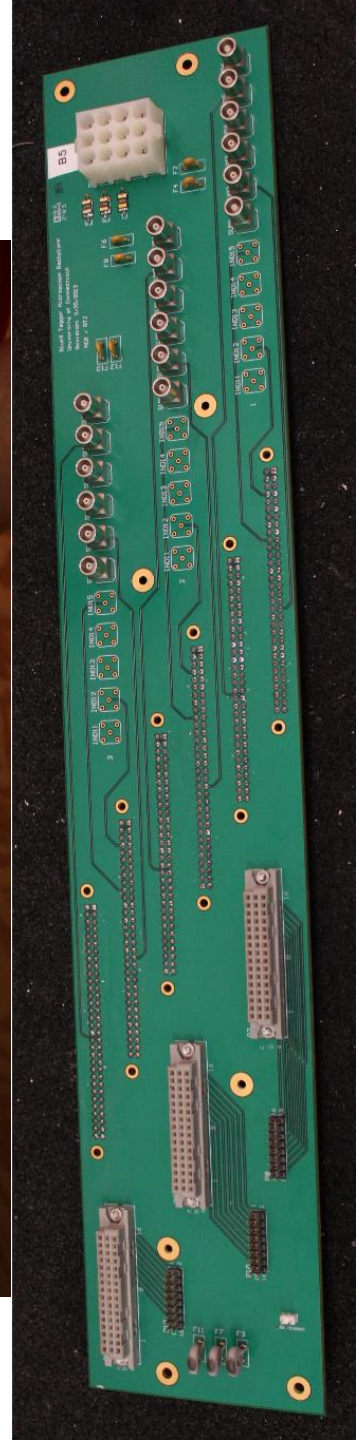
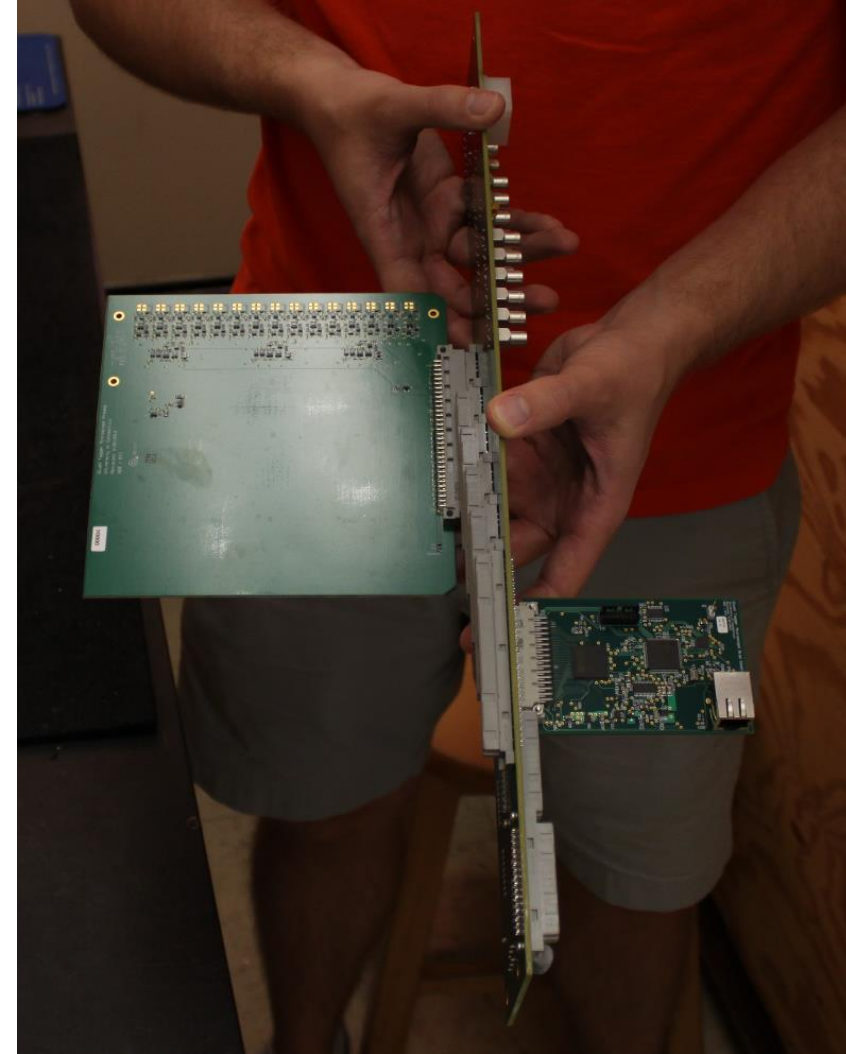
# Bias Control Board

- Provides control over SiPM biases through FPGA
- Communication through Ethernet cable
- Individually turn on/off biases
- Monitor important voltage levels and board temperatures
- 17 bias boards
  - Can control 2 preamps



# Backplane

- Receives signal from preamp
- Contains signal output cables
- Provides power to all boards
- Signals between boards
- 6 backplanes
  - 6 preamps:1 backplane
  - 3 bias control boards:1 backplane



# Construction

- Currently constructing fiber bundles and microscope enclosure
- Finishing initial QA on electronics and attaching SiPMs
- Further QA in upcoming months
  - Light testing of fibers
  - Pulse and cosmic ray tests of electronics
- Planned finish date Feb 2014



Questions?