

**Report on ECAL Gain Monitoring
and Calibration System**

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6th SANE Meeting

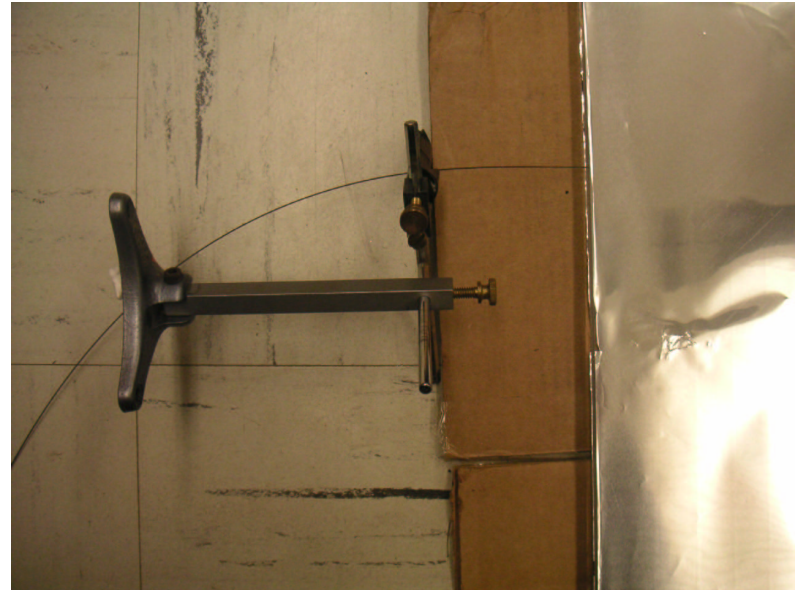
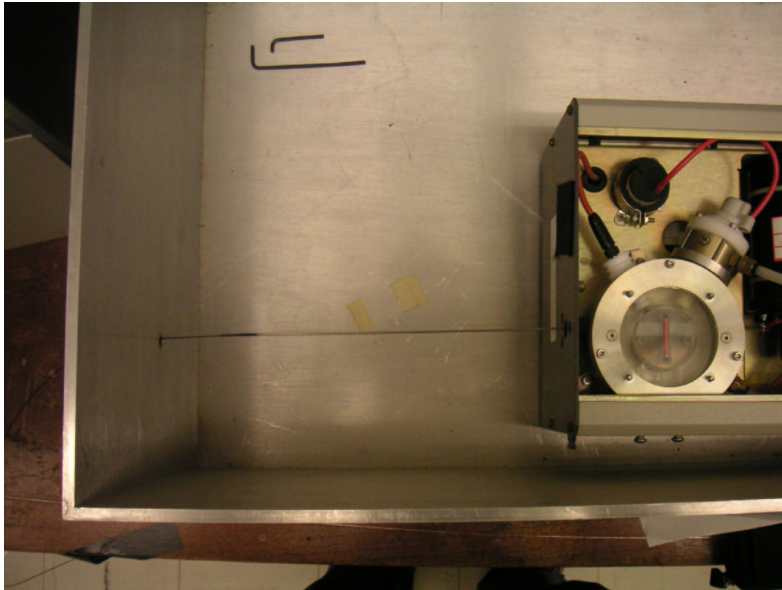
Jefferson Lab, Newport News, VA

January 14, 2005

Prototype Gain Monitoring System

- UVa Nitrogen Laser LN120C, 337 nm Radiation
- Plexiglas II-UVA Plate, $\frac{1}{2}'' \times 40'' \times 70''$,
One Side Covered with $20 \mu\text{m}$ Aluminized Mylar
- Single Quartz Fiber, 1 mm Diameter
- one ECAL lead glass bar, one $1'' \Phi \text{EY-84}$ Photomultiplier Tube
with RCS-type base
- Laser Pulse FWHM Width $\sim 1\text{ns}$,
Produces $\sim 10 \text{ ns}$ Analog PMT Signal

Experimental Setup I



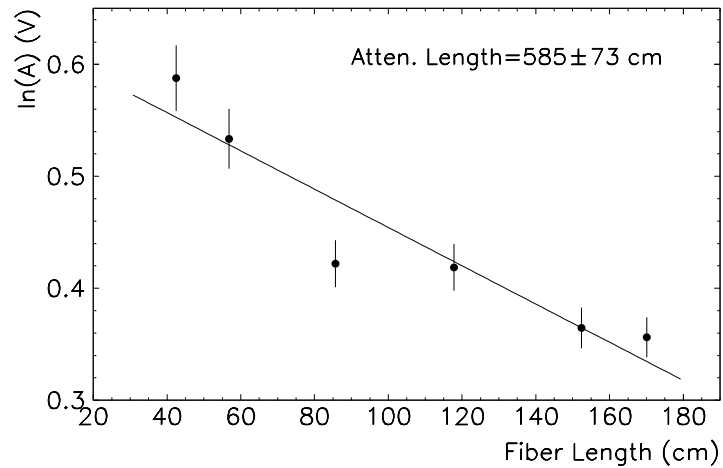
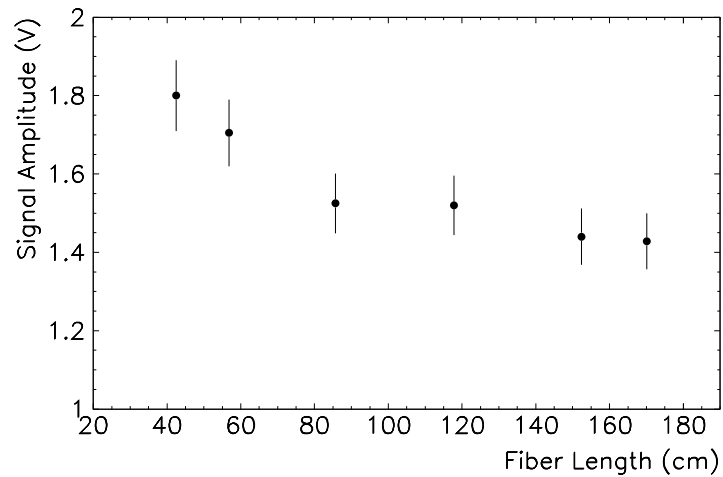
- Quartz Fiber, 1 mm Diameter

Experimental Setup II



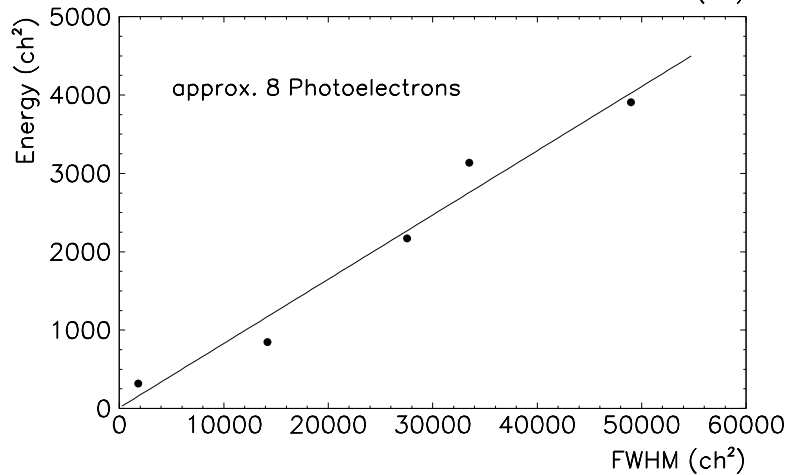
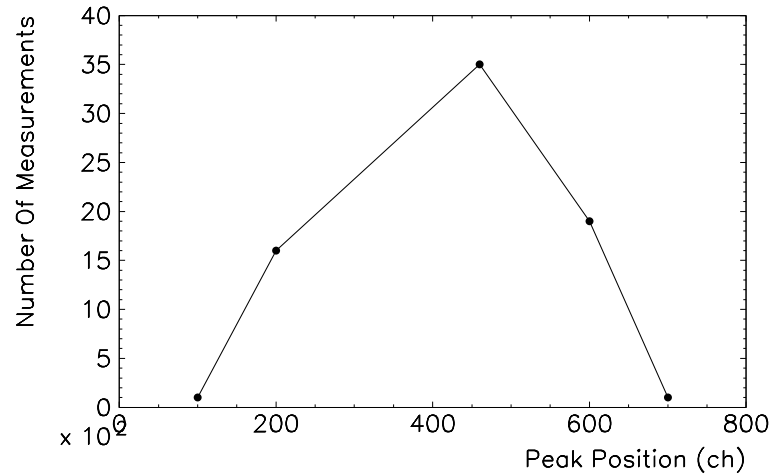
- Monitoring Pulses Sampled Directly off Plate = A
- Monitoring Pulses Sampled Thru Lead Glass Block $\approx A/2$

Fiber Attenuation Length



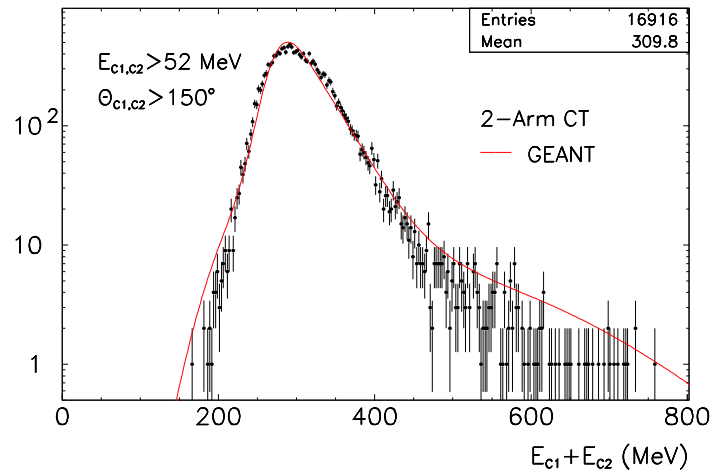
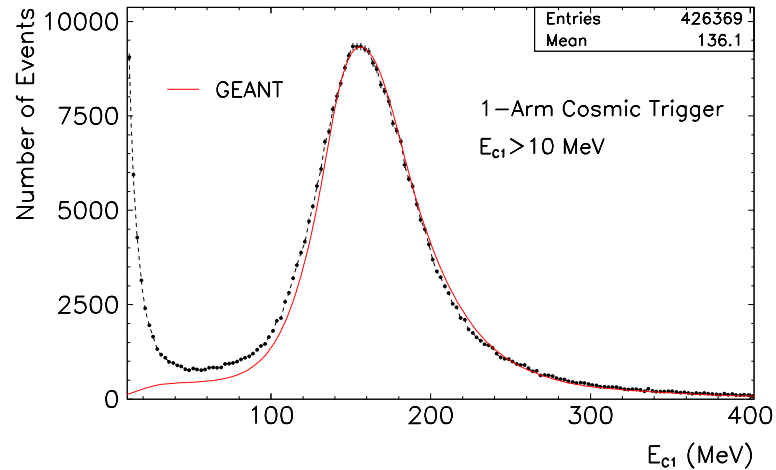
- 6 Different Fiber Lengths
- $A(x) = A_0 \exp(x/\lambda)$
- Attenuation Length 585 ± 73 cm

Photoelectron Statistics



- 80 Measurement for Each Fiber Output
- Extract Signal FWHM
- $\sigma_E^2 = \sum_i \sigma_i^2 + \bar{E}^2 / \bar{N}_{tot}$
- Result: $\sim 7 \pm 1$ Photoelectrons

Example of Cosmics in PIBETA Detector



DATA vs SIMULATION

- GEANT3.21 Code
- PIBETA Calorimeter
- Simulated Physics Triggers
- Cosmics Muon Generator

Potential ECAL Problems Due to Gain Monitoring System

(Conversation with C F Pedrisat)

- Potentially Degraded Position Resolution of ECAL?
(All Neutral Trigger vs Charged Particle Trigger)
 - Induced Cross-Talk Between ECAL Modules?
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- Bring Prototype Plate and Laser to JLAB
- Check Potential Problems with In-Situ Prototype
- Design the Self-Contained, Easily Removable System