

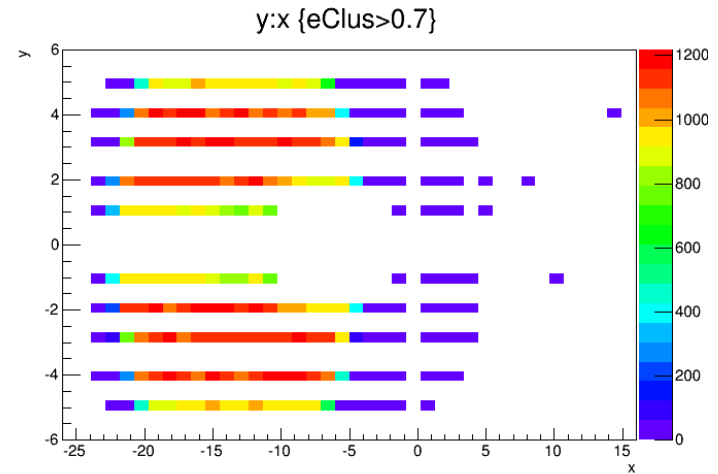
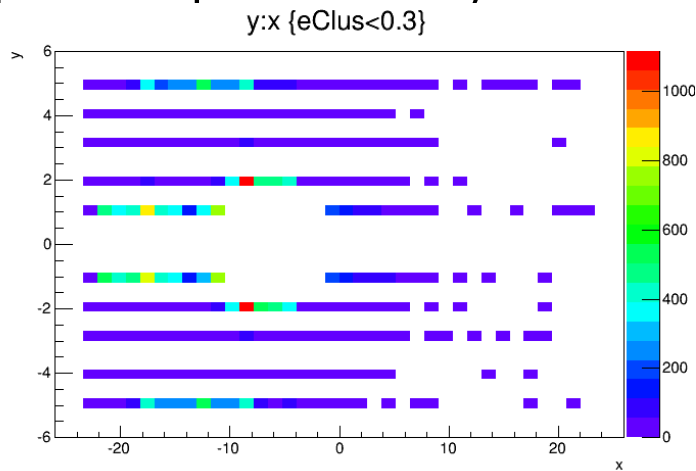
Ecal Updates

Holly Szumila-Vance

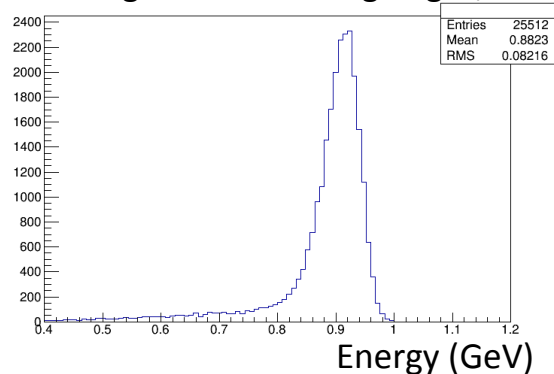
15 May 2014

Ecal Recon Software

- Electrons from target at 0.5 GeV, 0.75 GeV, 1 GeV, 1.25 GeV, 1.5 GeV, 2.5 GeV, 5 GeV (random momenta)
- Cutting all clusters on edge crystals
- Simulate noise, random Gaussian sampling, 1 sigma = 3 MeV (from previous presentation)



Cluster Energies after Cutting Edges, 1 GeV initial



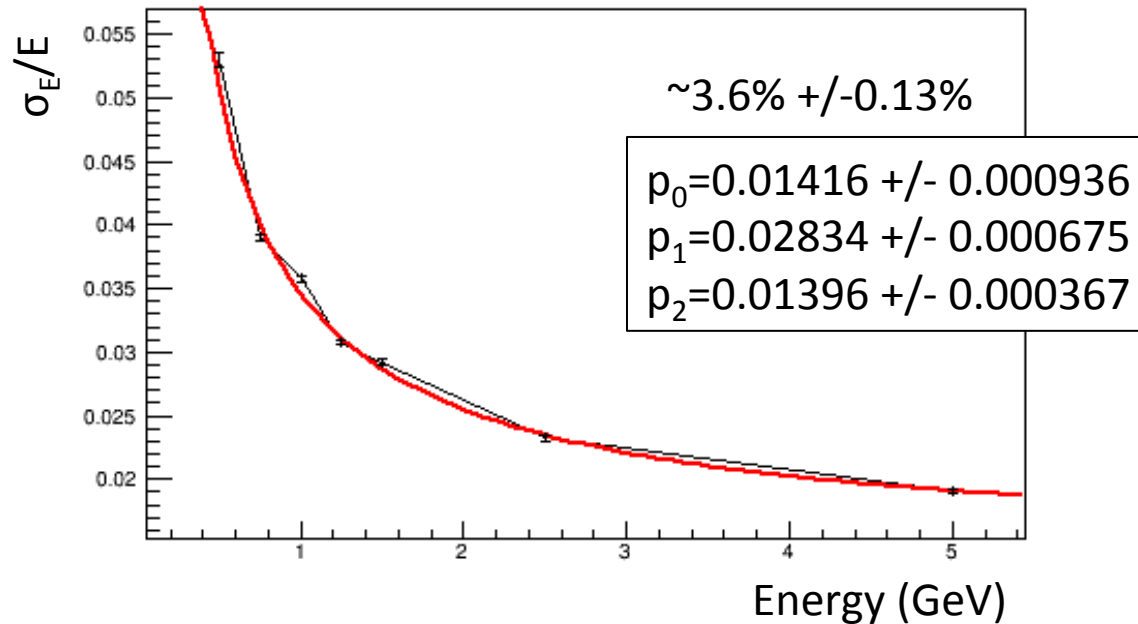
$$\frac{\sigma_E}{E} = \frac{p_0}{E} \oplus \frac{p_1}{\sqrt{E}} \oplus p_2$$

p_0 : pre-amplifier noise

p_1 : fluctuations in development of showers

p_2 : calibration errors, energy leaving back of crystals

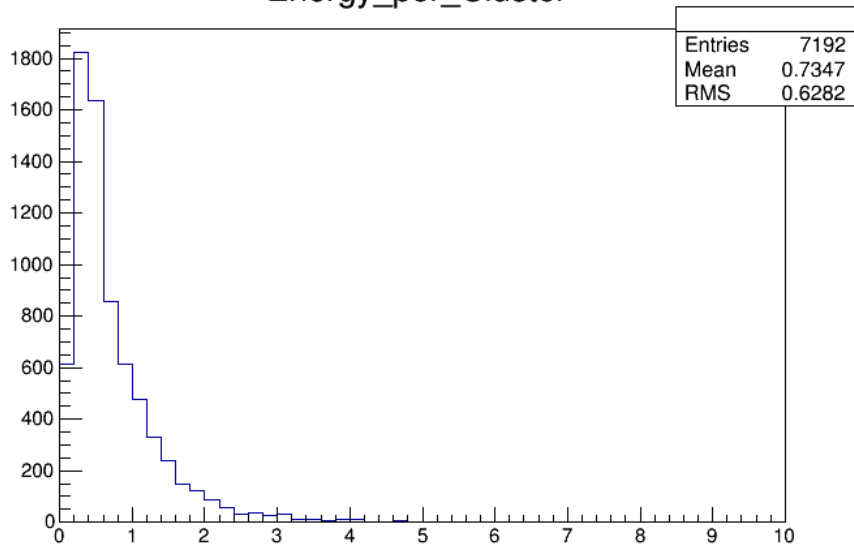
Energy Resolution Evolution with E, Noise



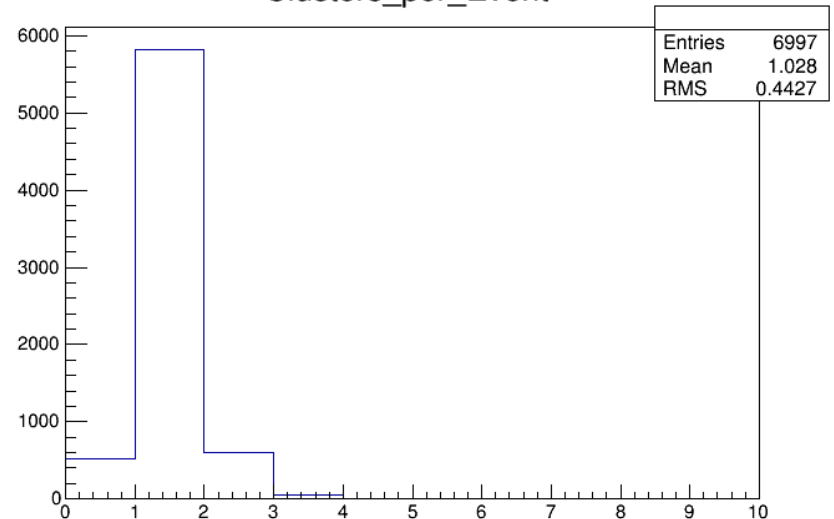
Test Run Comparison-31 March

- Used raw hits from test run data to compare new cluster algorithm with 3x3
- Test run data was characterized by high thresholds
- I used threshold of 7.5MeV on “raw” data when analyzing the comparison

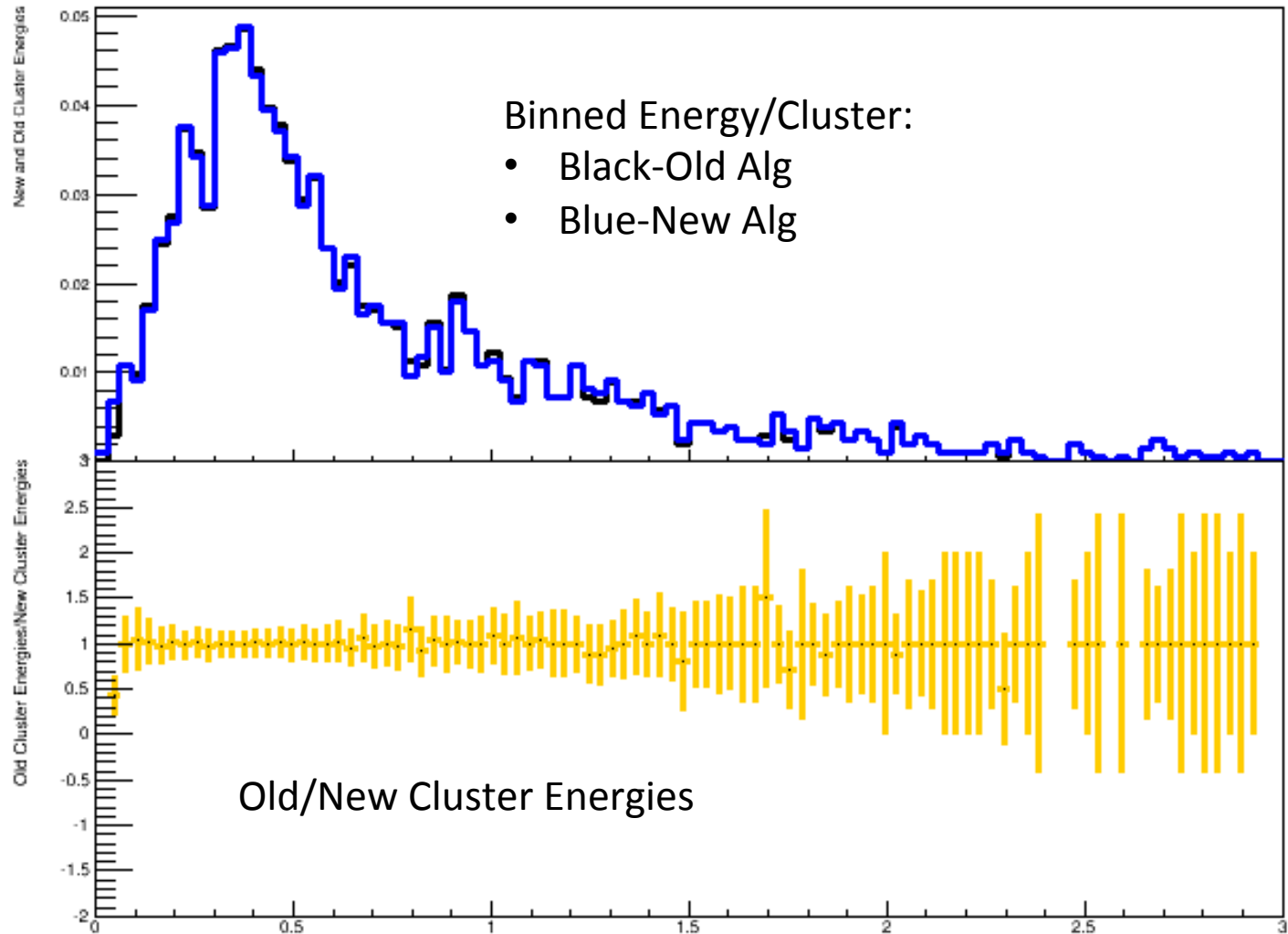
Energy_per_Cluster



Clusters_per_Event

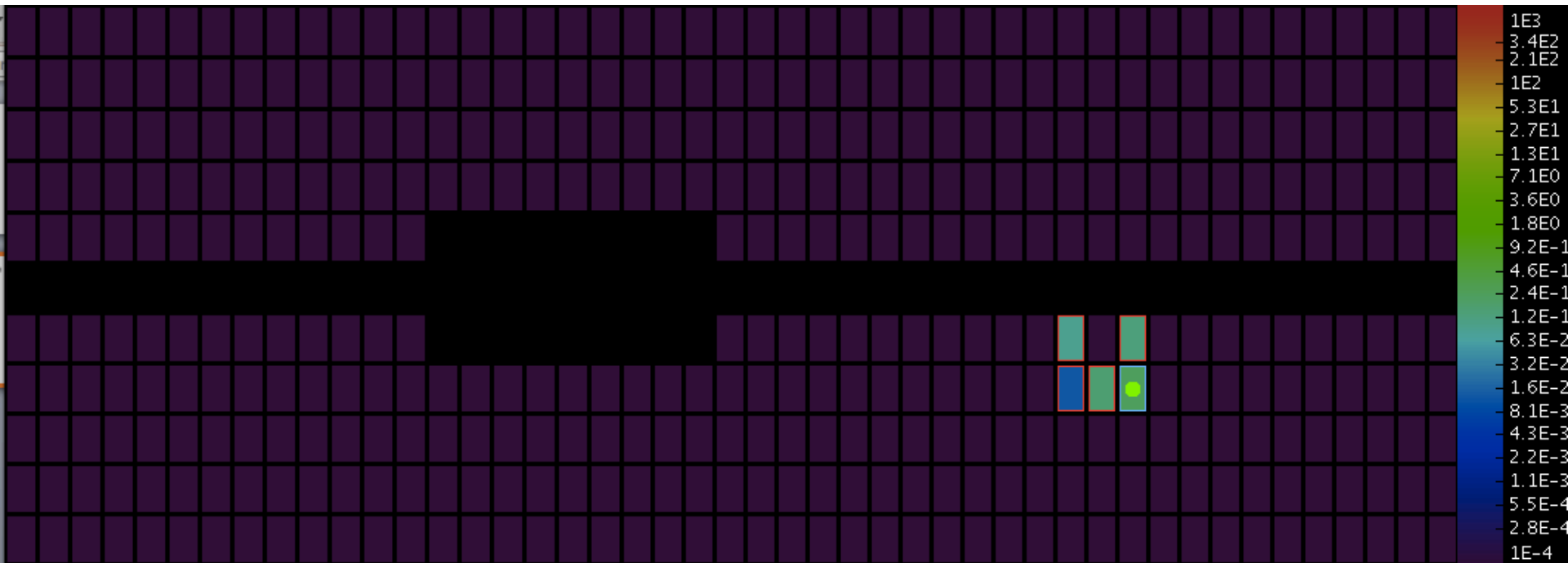


Test Run Comparison



Test Run Comparison

Most differences look like this:



x Index: 13

Shared Hits: 0

y Index: -16

Component Hits: 5

Hit Energy: $2.4569E-1$

Cluster Energy: $0.64246410690\dots$

Ecal Recon Software To Do:

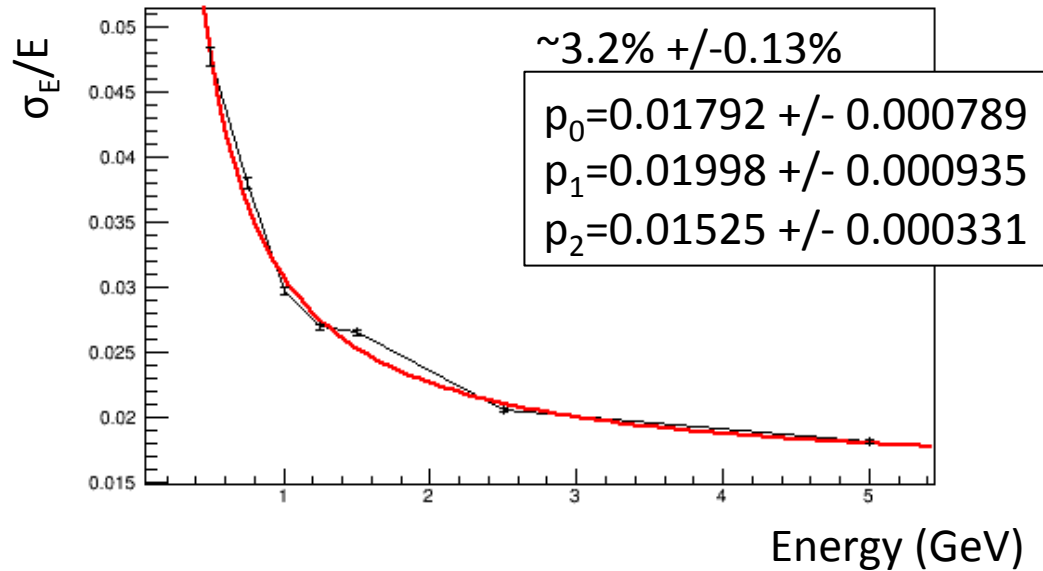
- Implement depth correction to cluster position, evaluate position resolution
- Evaluate sampling fraction for positrons (same procedure)
- Fiducial/edge cuts/edge extrapolations (expected at 0.75 of the crystal from CLAS IC)
- Optimization

Thoughts on Cosmic Calibration

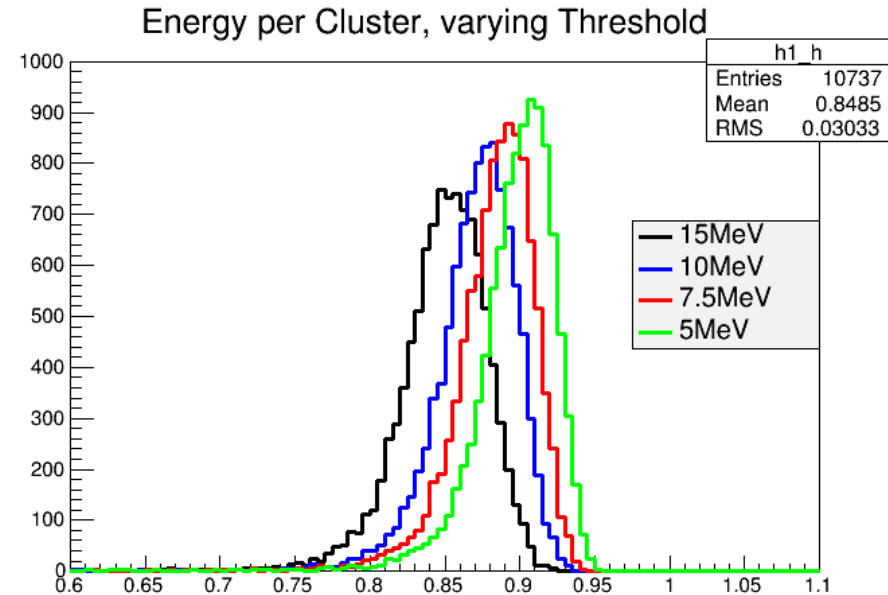
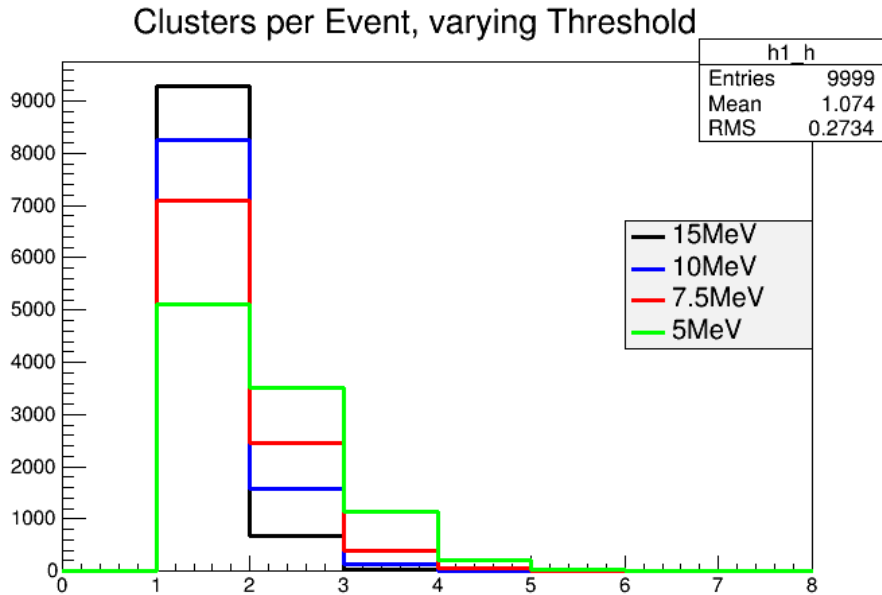
- Setup 1: Two scintillators, one placed above, one placed below, 75 cm x 20 cm
 - Expected trigger rate: 15 Hz
 - Expected energies MIP
 - Tracking algorithm to straight line fit top and bottom hits, compare these fits
- Setup 2 (thought of last Ecal meeting): Two scintillators placed directly behind Ecal facing beamline
 - Expected trigger rate: ~ 1 Hz
 - Expected energies MIP
 - Clustering would be roughly the same as normal

No Noise in Pre-Amp Limit

Energy Resolution Evolution with E, no Noise (upper limit)



Clustering Threshold-31March



7.5 MeV seems optimal

Based on 1GeV incident particle, no angle

This threshold is for individual crystals