



Jefferson Lab



Forward Tagger: Crystals, Irradiation Tests, Status

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INFN Genova

CLAS12 Workshop, Jefferson Lab, USA

June 18th, 2014





 Jefferson Lab

The logo for Jefferson Lab consists of a red arc that curves around the text 'Jefferson Lab', which is written in a black, sans-serif font.

ECal Software; Progress, Work Planning, Parameters, Implications and Possibilities

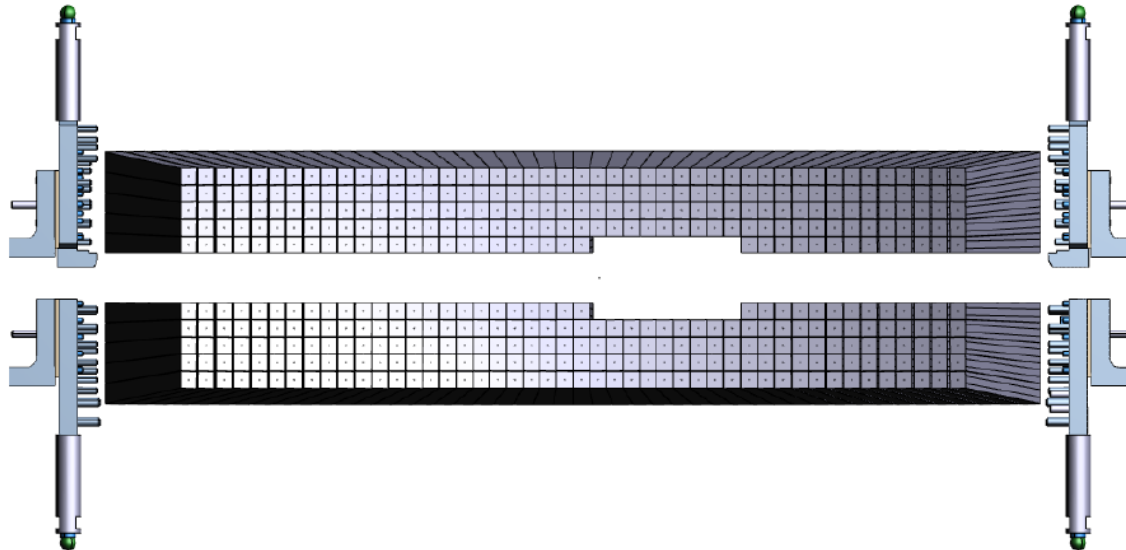
Stuart Fegan
INFN Genova
HPS Summer 2014 Collaboration Meeting
Jefferson Lab, USA, June 18th, 2014



Introduction

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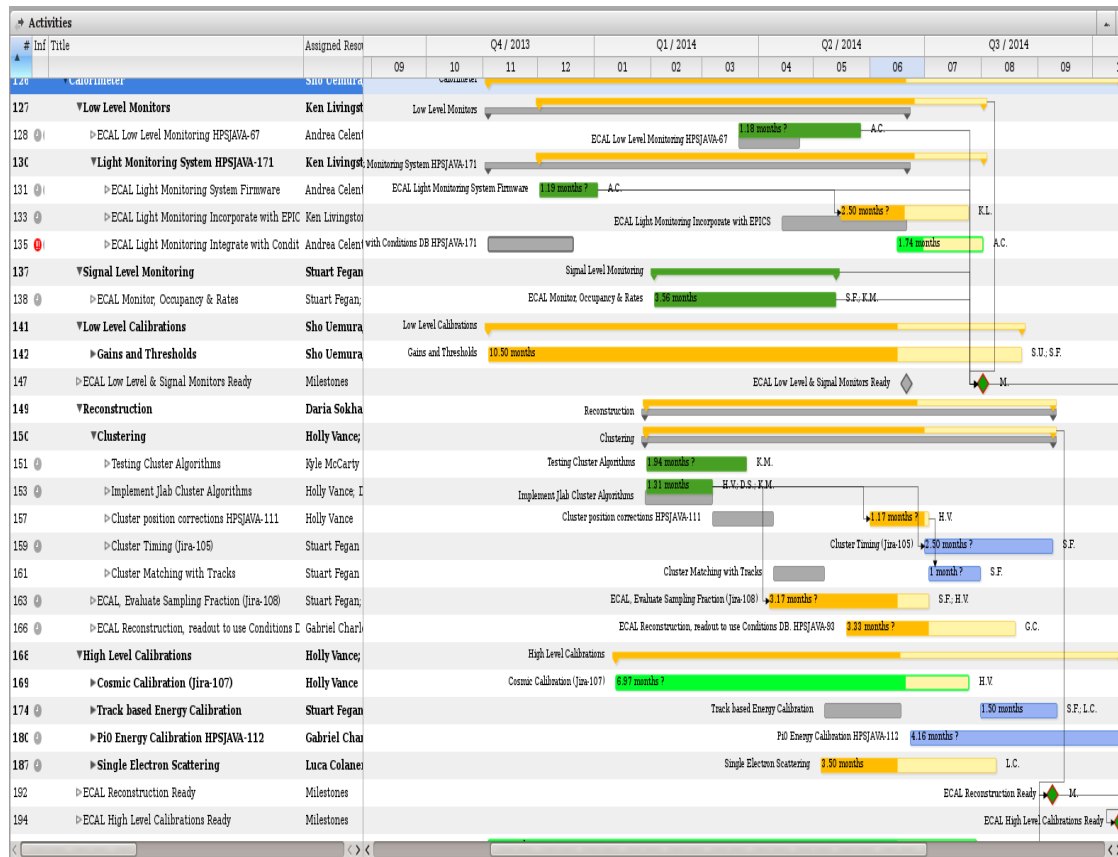
- ECal software effort is well underway, with a lot of progress made since the last collaboration meeting
- However, there is much more still to be done, and time is beginning to run out
- Need to prioritise remaining tasks, to ensure our efforts are being directed appropriately, and make sure relevant parties are kept in the loop





Schedule and Management

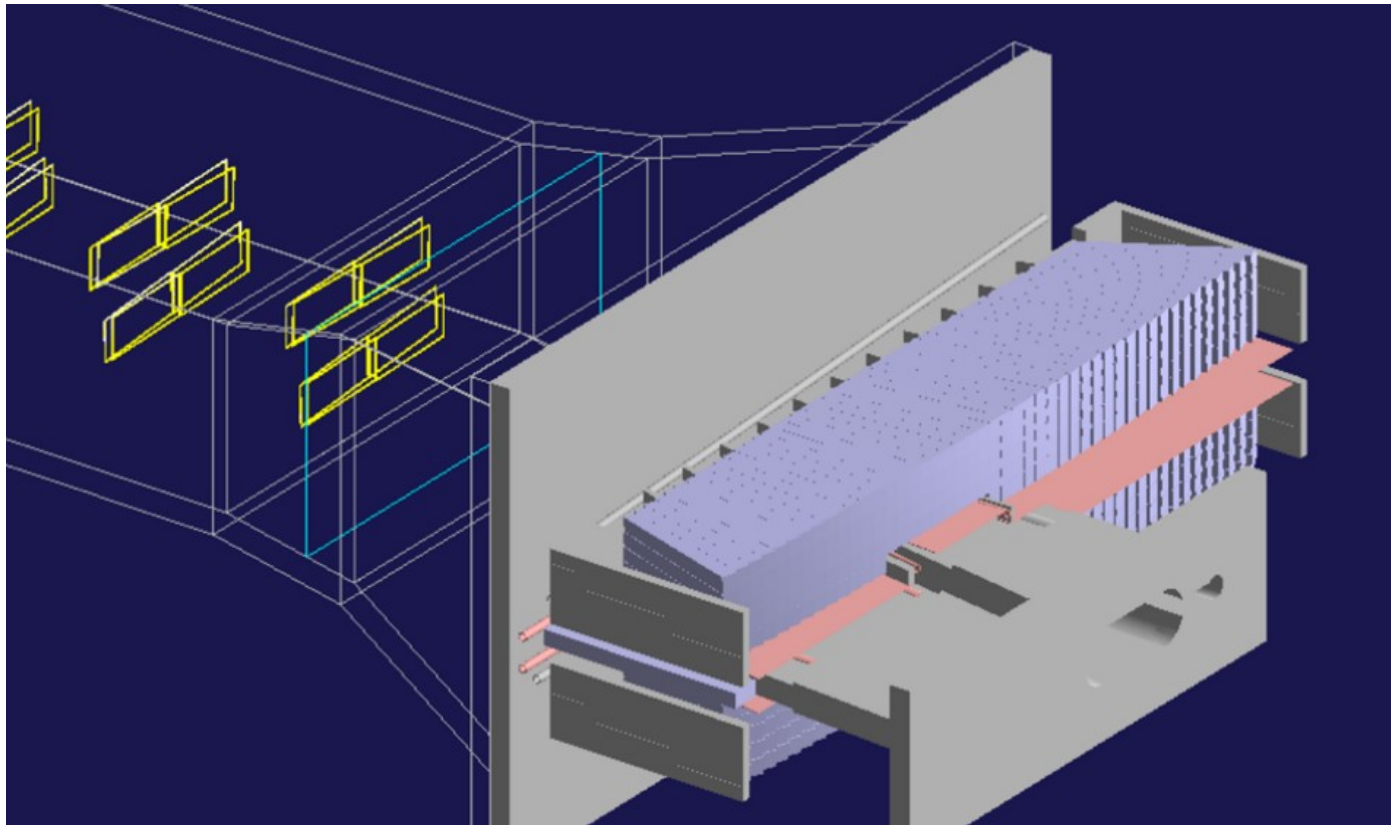
- With a combination of JIRA and the software schedule maintained by Maurik, we have a good handle on the ECal tasks



- All tasks assigned, and sensibly distributed (avoiding >100% assignments of peoples time, and clearing a few issues on who is actually working on a task)
- Some tasks a little behind, but this will reduce as the work rate continues picking up

Geometry

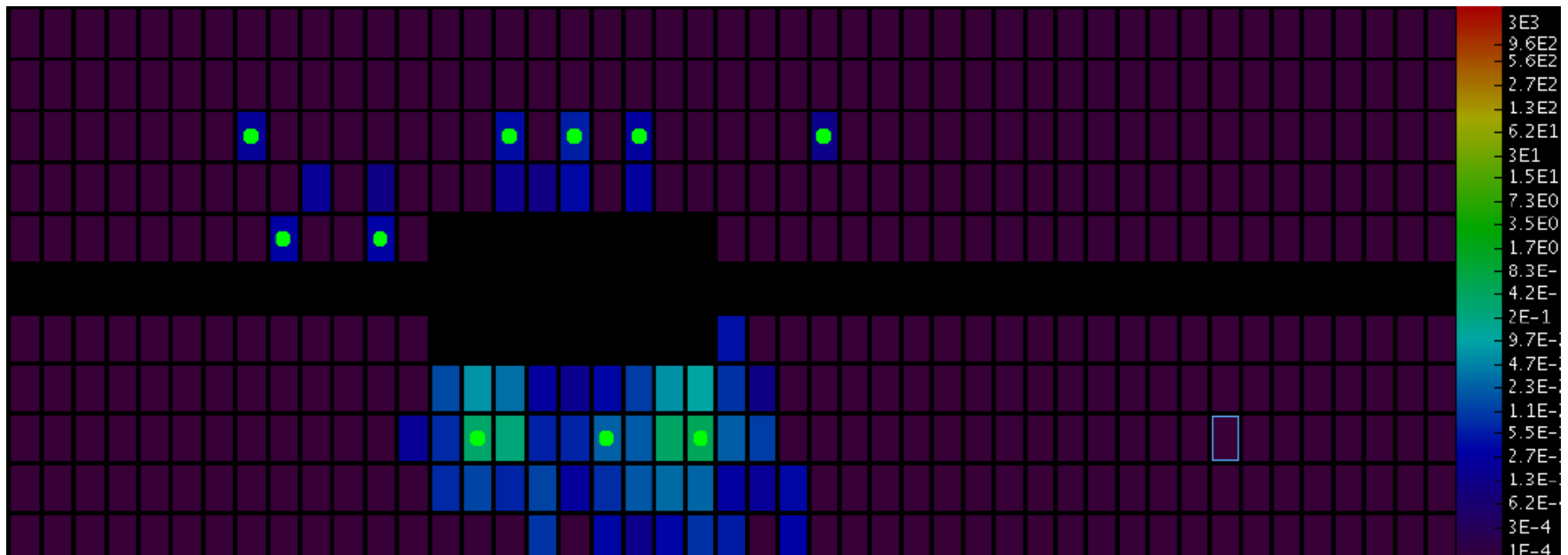
- Updates implemented, adding materials that will be present on the calorimeter that weren't already considered (cooling pipes, copper plates, etc)



- New geometry being used to study rates, showers and sampling fraction

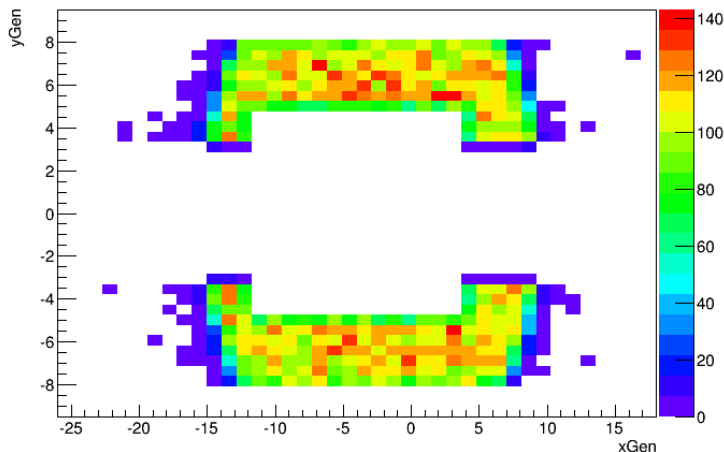
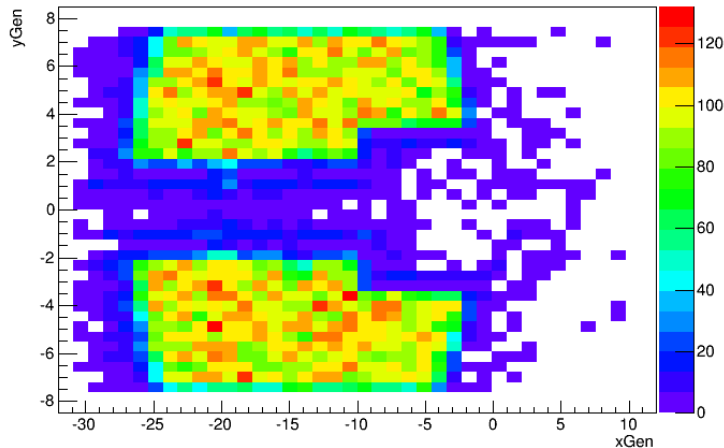
Reconstruction: Clustering

- In addition to pre-existing HPS cluster algorithms (3x3, neighbour mapping), JLab cluster algorithm from the IC has been implemented in HPS Java
- Tests and comparisons well under way, including updates for energy and position resolution



Clustering (cont)

- Cluster position corrections is latest area of the reconstruction chain to be progressed (plots courtesy of Holly)



- Using MC data to study methods of cluster position correction

$$x_{cluster} = \frac{\sum w_i x_i}{\sum w_i}$$

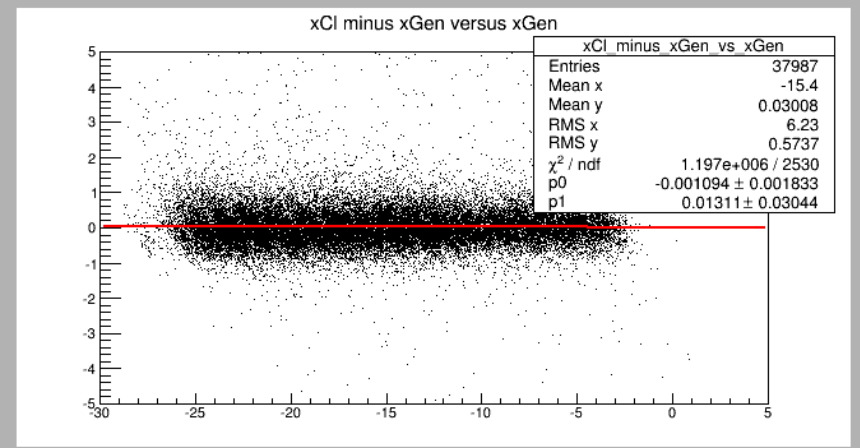
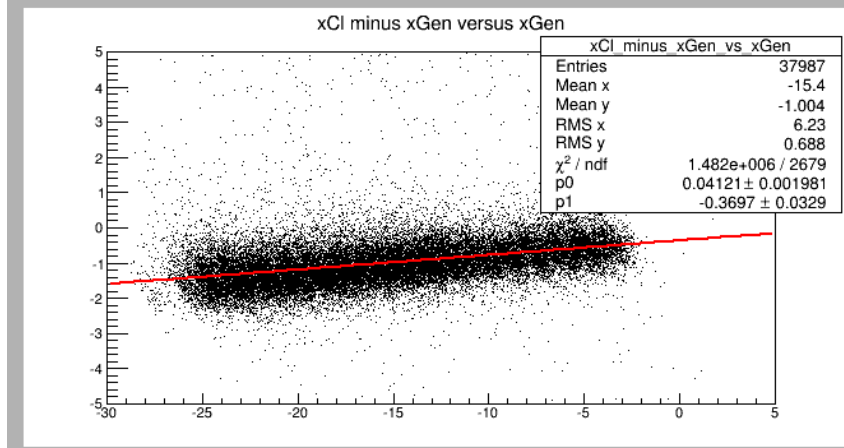
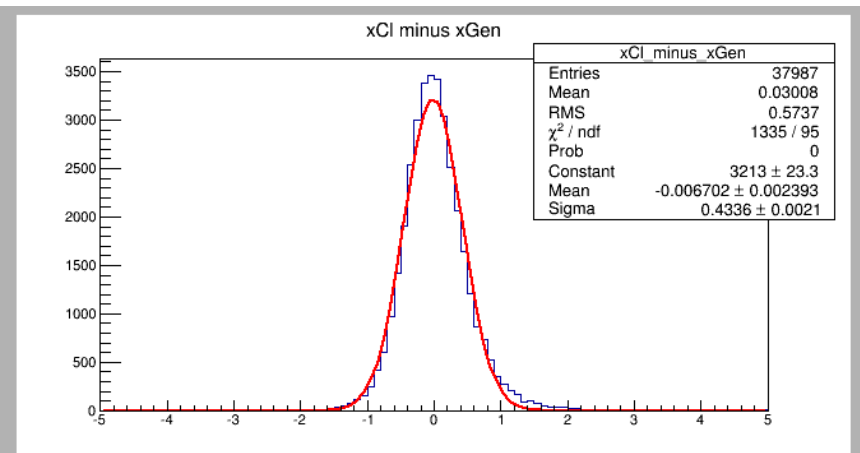
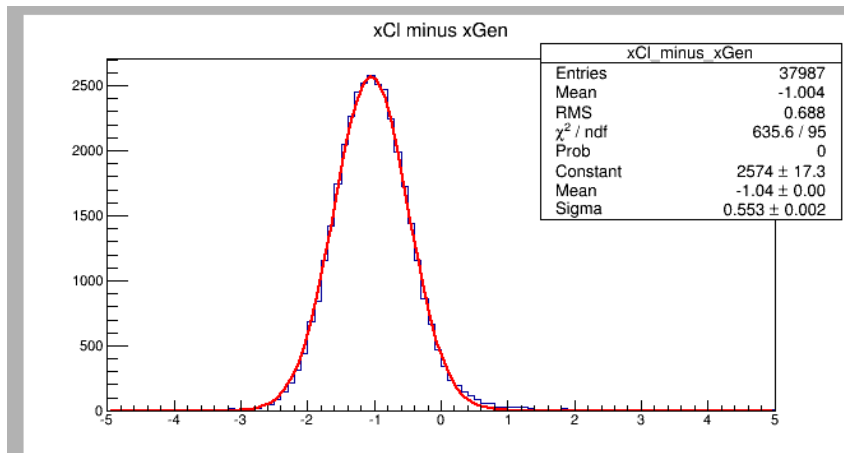
$$w_i = E_i$$

$$w_i = \log(1000 \times E_i)$$

$$w_i = \max(0, [w_0 + \ln(E_i/E_{clust})])$$

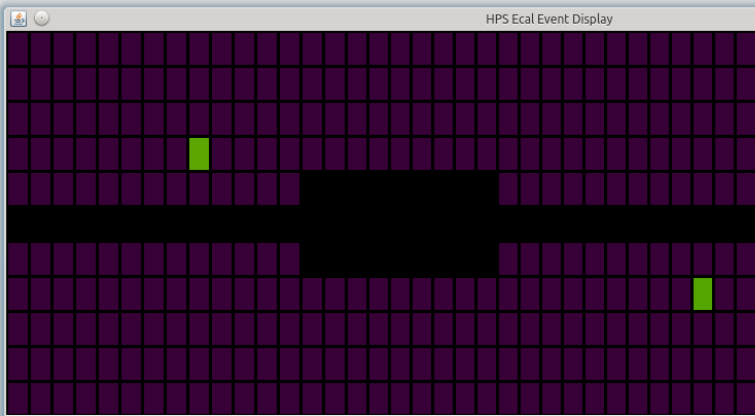
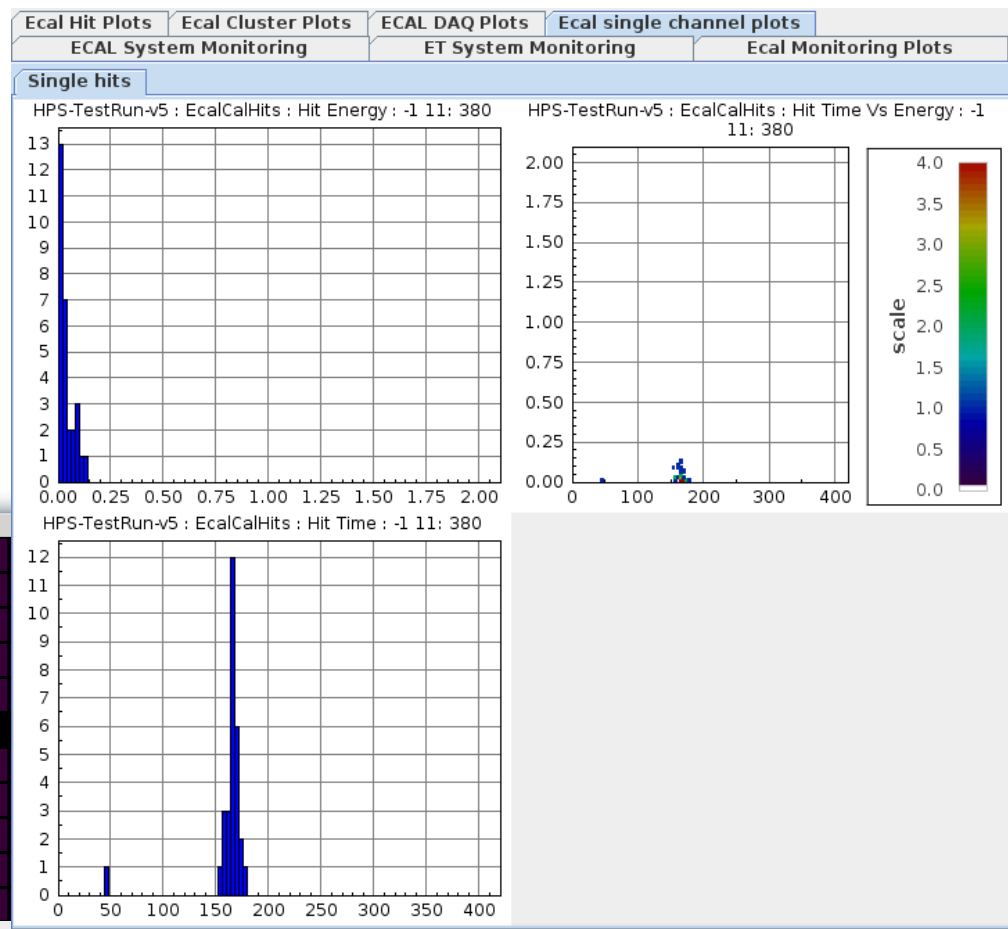
Clustering (cont)

- Depth correction from fit to x-position difference



Monitoring Application and Event Display

- ECal monitoring integrated with HPS java monitoring application
- Final definition of plots for various run conditions underway



x Index: ---
 y Index: ---
 Cell Value: ---

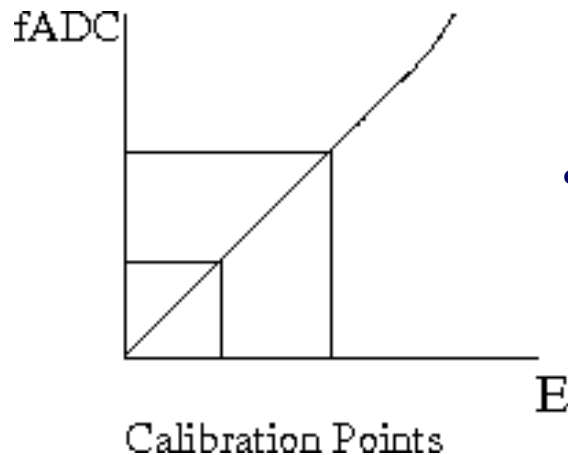


Calibrations

- 4 calibration methods identified and assigned
- Cosmic rays (Holly): trigger on cosmics and analyse resulting data and find ECal gain and threshold constants
- Pi0 (Gabriel): reconstruct pi0 from it's decay photons and adjust gains until pion peak is at correct mass
- Single electron (Luca): use signals from coulomb-scattered full energy electrons to calibrate ECal
- Track-based (me): matching tracks with clusters and fitting to get energy deposition in individual crystals.
- Calibration constants will be stored in the conditions system

Light monitoring and pre-calibration

- In addition to the aforementioned calibrations, light monitoring system can be used to provide a pre-calibration
- As discussed yesterday, this isn't so much a calibration, more an initial step before using physics to calibrate



- Light output and energy should be understood in terms of signals from the fADCs; this is a directly proportional relationship
- For the LEDs, it is desirable to know the voltage (and corresponding DAC setting) required for depositing the minimum and maximum energy in each crystal, as well as intermediate value(s), to understand the behaviour of the whole calorimeter during installation



Summary

- ECal group is now actively working on software and more or less up to speed on the workings of hps java
- A little slow adapting to some of the nuances of the project sometimes, especially large changes
- Keeping the lines of communication open is key to continued smooth progress
- Current software tasks making good progress (which I hope I've shown here)
- Looking to encourage people to present progress at the weekly meeting, even if it's just a single plot or slide