

Report from the Clustering Working Group

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History and Numbers

- First meeting took place on July 14;
- 6 meetings since that;
- Once per two weeks;
- 9 talks and many useful discussions:
 - LCIO implementation in FCAL software;
 - geometry implementation: DD4HEP or SLIC;
 - details and comparison of different BeamCal clustering algorithms used in different groups;
 - FCAL svn repository;

LumiCal

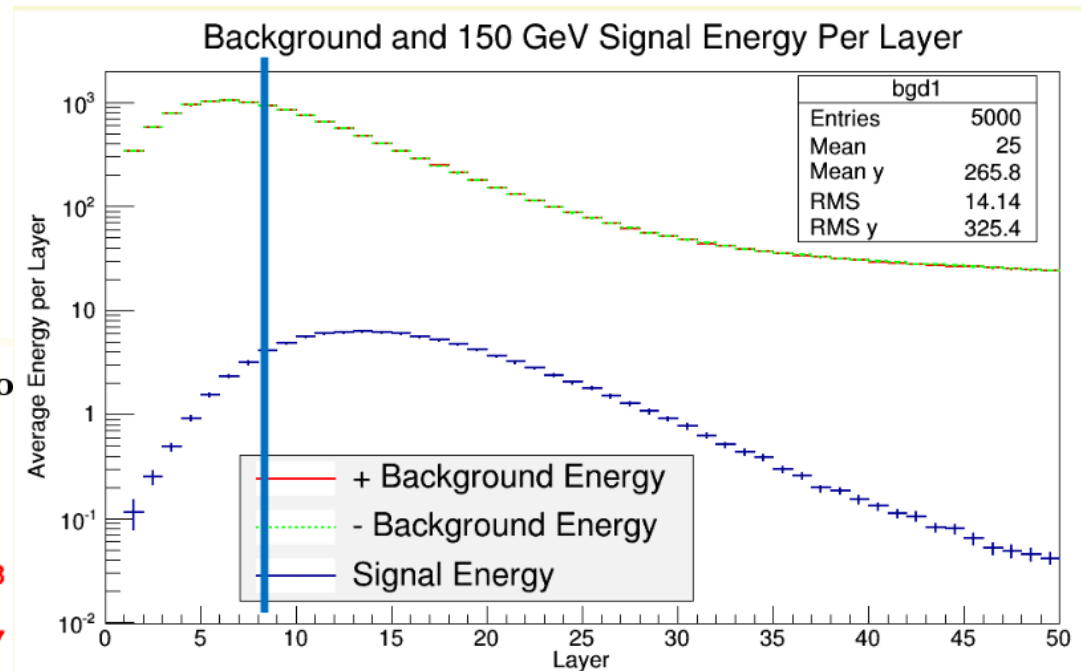
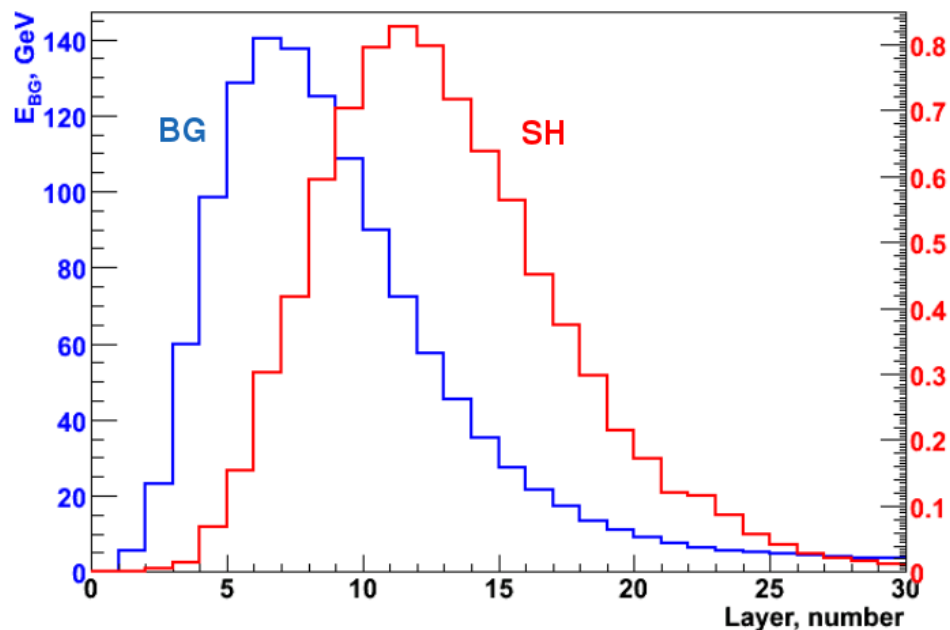
- Test and submit new version of LumiCal cluster reconstructor in svn repository;
- Submit updated version of LuCaS to FCAL svn repository:
 - the capability of LCIO output;
 - geometry for beam test in October 2014;
 - tracking detector in front of LumiCal.

BeamCal

- There are 3 BeamCal clustering algorithm:
 - the one used by UCSC group;
 - the one used by Lucia;
 - the one developed by André and used by Strahinja.
- UCSC group (Bruce) discusses the details of interface implementation to try other algorithms.
- Comparison => reliability and improvements.

Similar Plots for Comparison

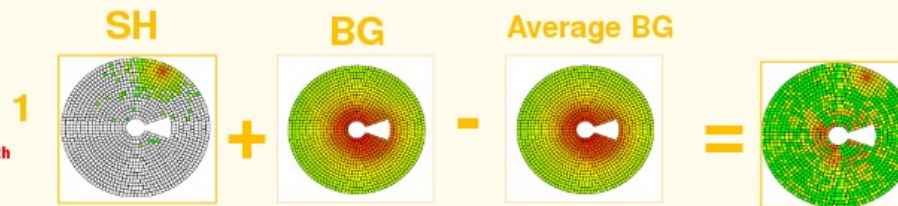
Longitudinal distributions of energy deposition in who calorimeter from background and 500 GeV shower



Quite difficult to compare!

Reconstruction Algorithm

1. SH + BG – average by 10th previous BXs BG



2. Consider layers from 5th to 20th
3. Select pads with energy above threshold energy, 3 RMS, and combine them to towers

4. Search tower with max number of pads

* if there ≥ 9 pads (not necessarily consecutive) – consider this tower as shower core

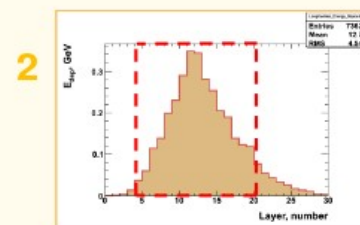
5. Search for neighbor towers

* if in neighbor ≥ 6 pads & at least 1 neighbor
=> shower defined

* Neighbor towers are considered to be shower towers within $R_m=1.2$ cm or at least 8 towers around core

6. For each shower calculated

- R_{COG} , φ_{COG} , E_{sh}



Reconstruction Algorithm

For any given segmentation strategy and scale, we don't know which palette choice will be optimal (P0, P1, P2,...)

➔ Explore efficiency/purity with several choices and take best for that segmentation scheme

For each palette choice, perform the following event-by-event

- Subtract mean background from each palette
- Seed reconstruction with 50 most energetic palettes
- Extend these 50 palettes into cylinders, summing energy along the way
- Accept as signal candidate any event for which the most energetic cylinder is greater than a cut ("sigma cut") expressed in terms of the rms width of the mean-subtracted background in that cylinder

Looks rather different and it would be interesting to compare them!

* The parameters of algorithm (red numbers) have gotten from

Lucia Bortko | Optimization of the

Important

- Work on the optimization and improvements of reconstruction to match the physics requirements of the experiments:
 - Electron / hadron identification;
 - Electron / gamma identification.
 - Deliver new developed methods and algorithms to ILC software framework.
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- Continue using webex for remote connectin?
 - Continue once in two weeks?
 - Next meeting - November 3, 4 pm (CET)?