On the Origin of Extra-Showers from BCAL Reconstruction

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July 22, 2011

Legal Statement

1. Tag version sim-recon-2011-06-02 with correspondent calib-2011-06-02

2. We clearly understand that the used reconstruction code contains incorrect simulation of timing and sampling fraction; the results of this study are presented for the "code testing" purpose only and must not be used as an argument in the choice between fine and coarse segmentations.

3. The presented results are very preliminary and are the subject of possible changes in the future.

Photons are seeded from the center-of-the-target:

Energy :   uniformly over 0 – 4 GeV range
Phi :   uniformly over 0 – 360 deg range
Z :   uniformly over the size of BCAL

Motivation: Multiple showers are reconstructed from a single photon

Effect is much bigger for coarse segmentation and dark hits ON
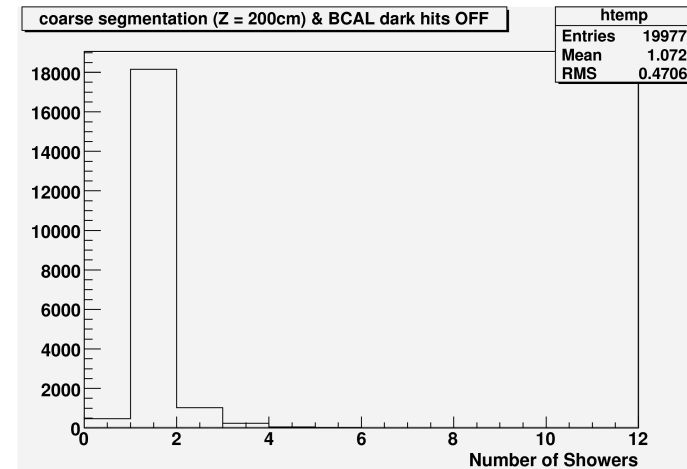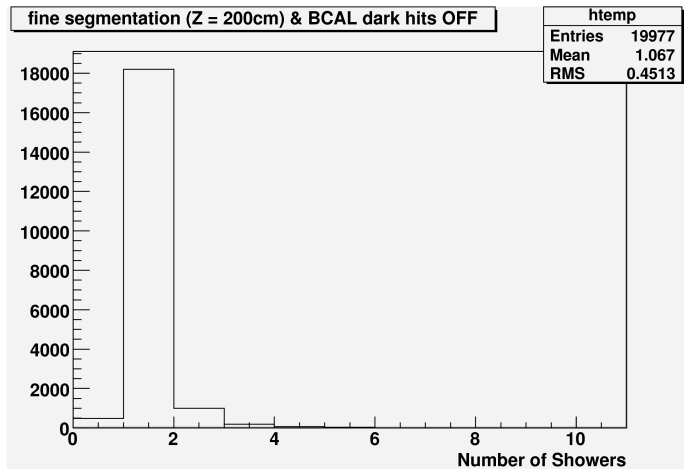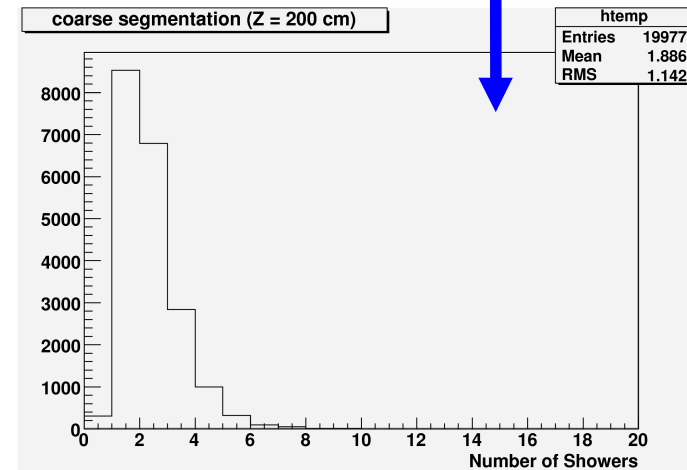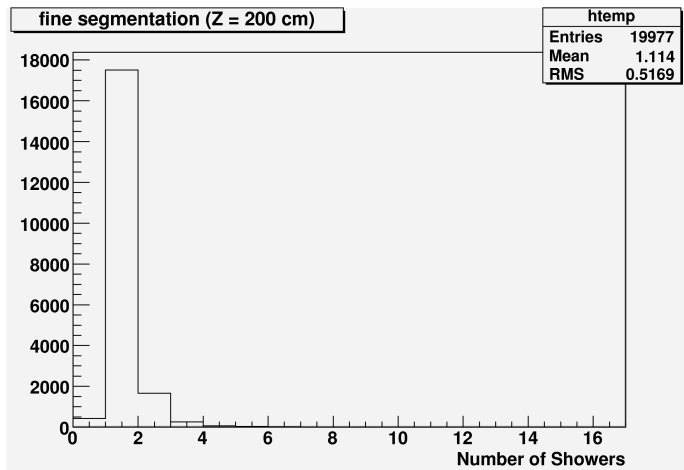
Origin of Multiple-Shower Reconstruction

1. Interactions in other material before enter the calorimeter produce a few secondary particles (real showers):
   Switch of dark noise OFF should not affect much the result.
   But it affect the result => so prior-to-BCAL interactions are NOT the origin of multiple-shower reconstruction

2. Split of the photon shower in the reconstruction code; higher noise can be one of the factors of the reconstruction failure:
   Extra-showers should be located around the main shower of maximal reconstructed energy

3. Independent misidentification of the noise in some cells as extra-showers (Pickup):
   Extra-showers should be scattered over the calorimeter volume without connection with the main shower of maximal reconstructed energy.
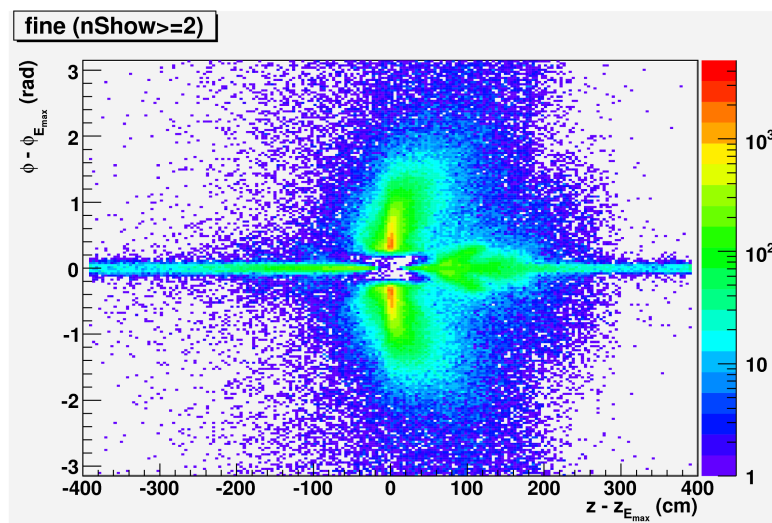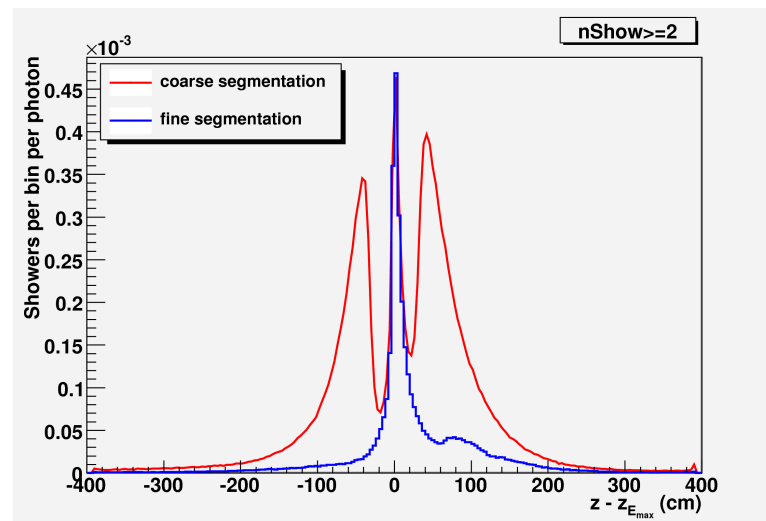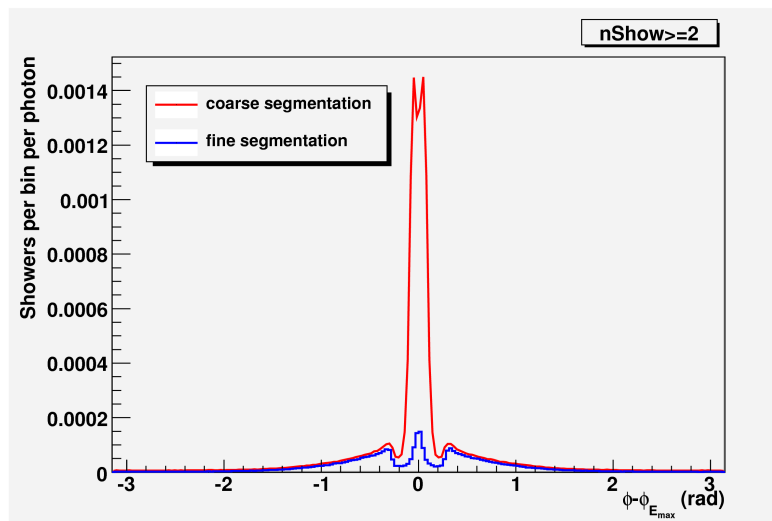   The main shower should contain most of the energy deposited in the calorimeter.

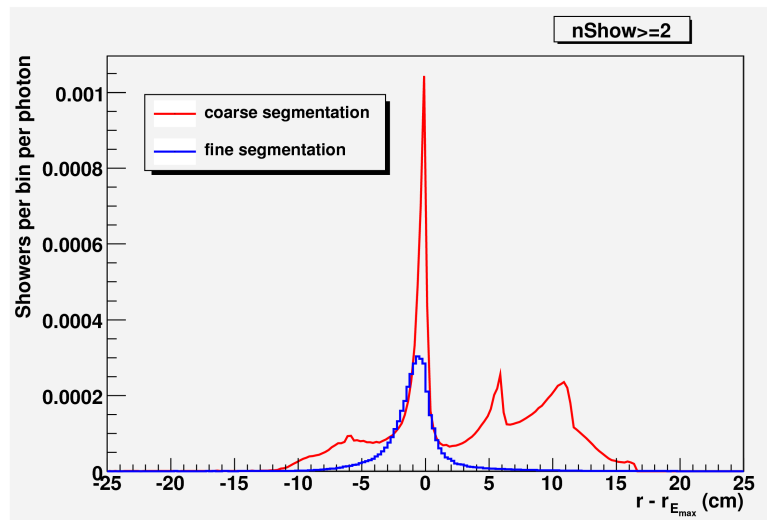# Matt's Reconstruction Code

Status: Under Development

Default in the used tag version

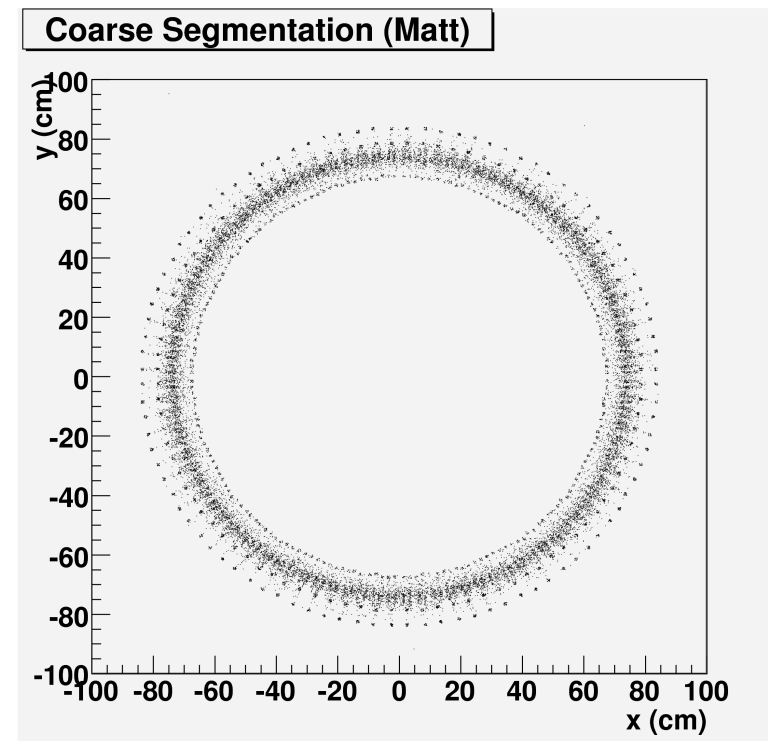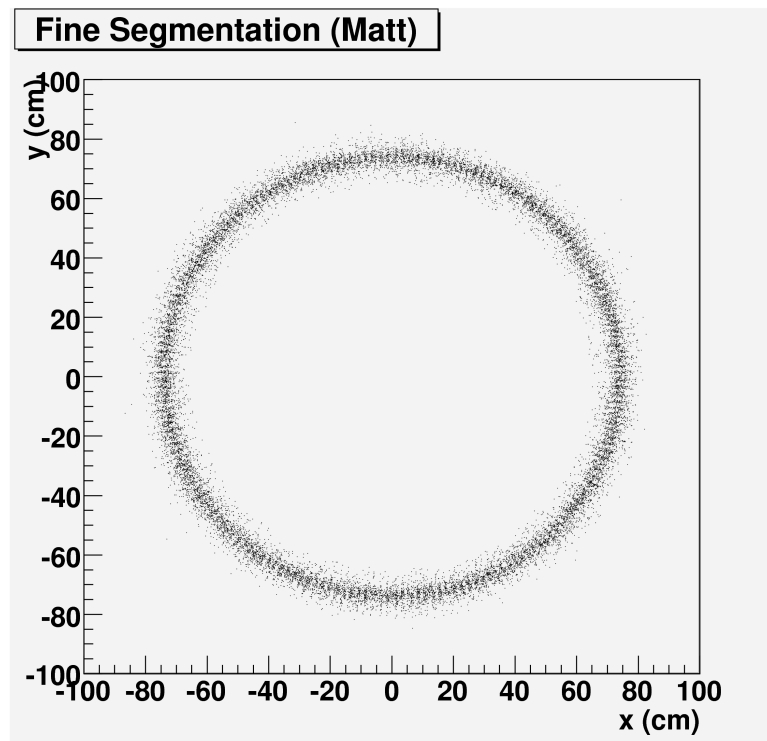# *Space Distribution of Extra-Showers*
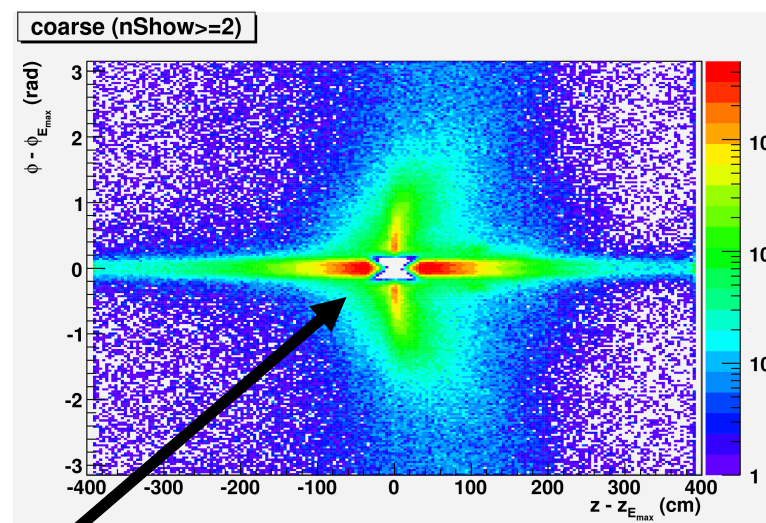
Horizontal red band indicates time/z-reconstruction problems in coarse-segmented BCAL
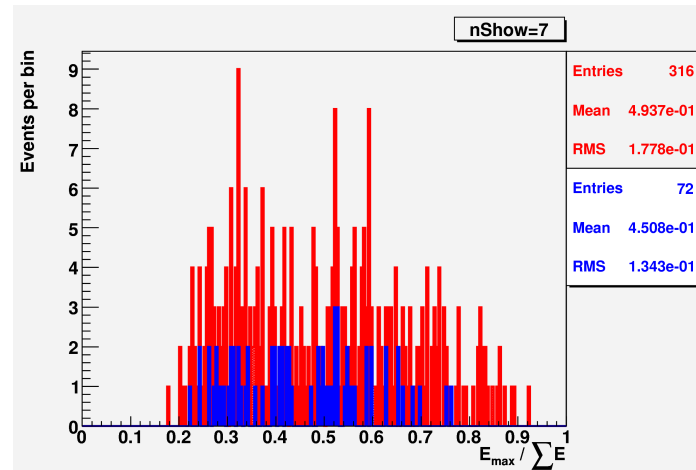
Space Distribution of Extra-Showers

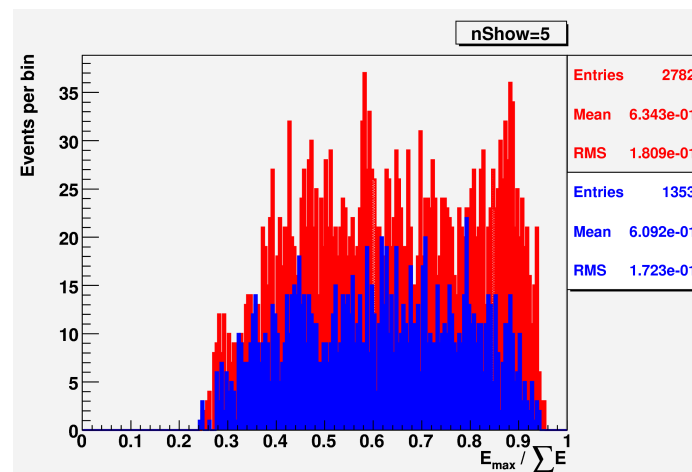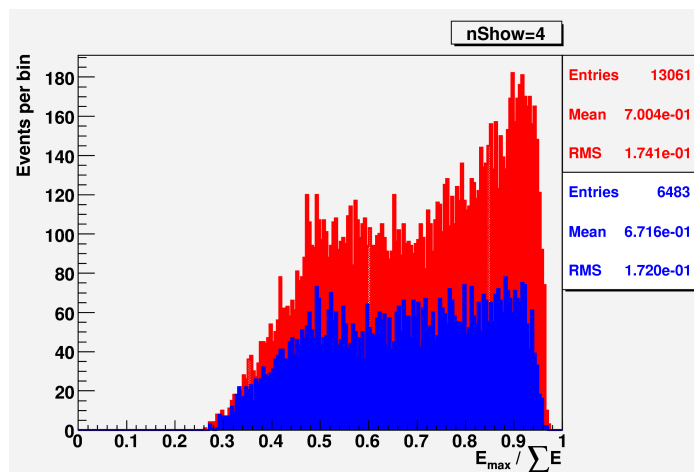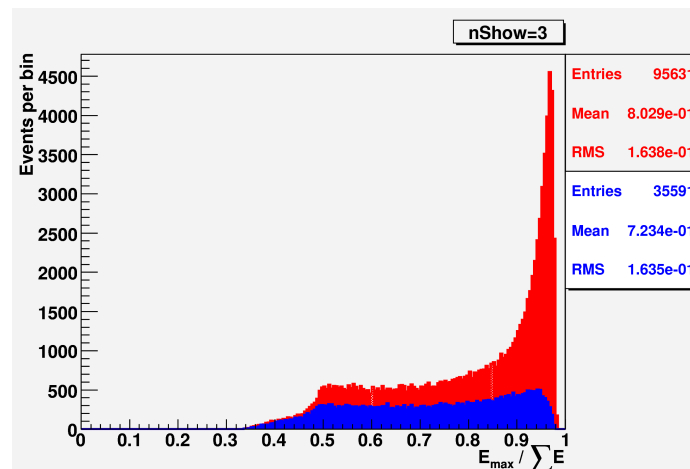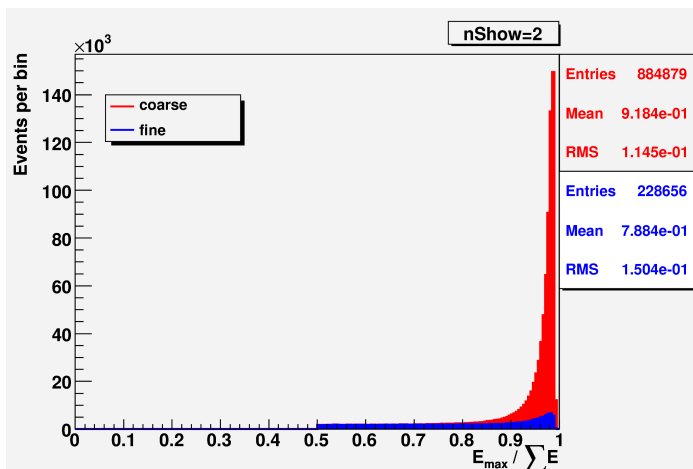**"6-cm structure" for the coarse segmentation**

E_{max} Fraction in the Total Reconstructed Energy
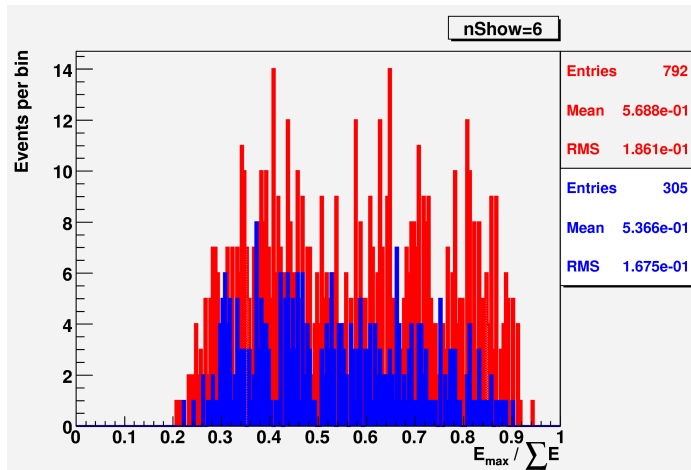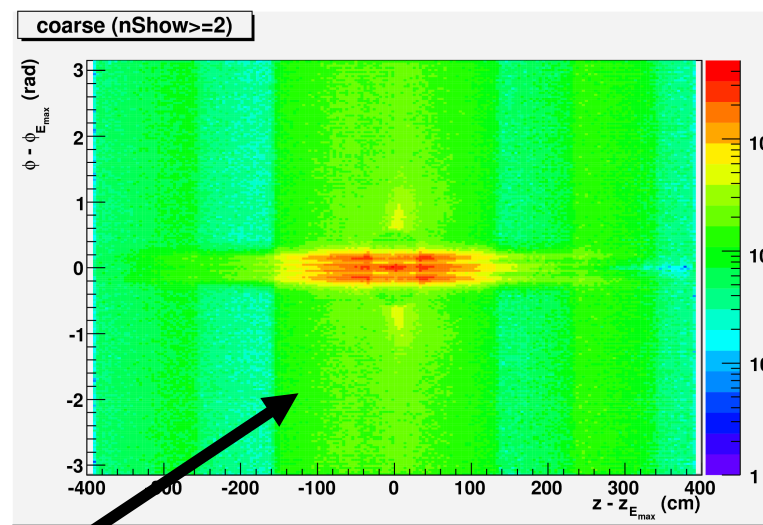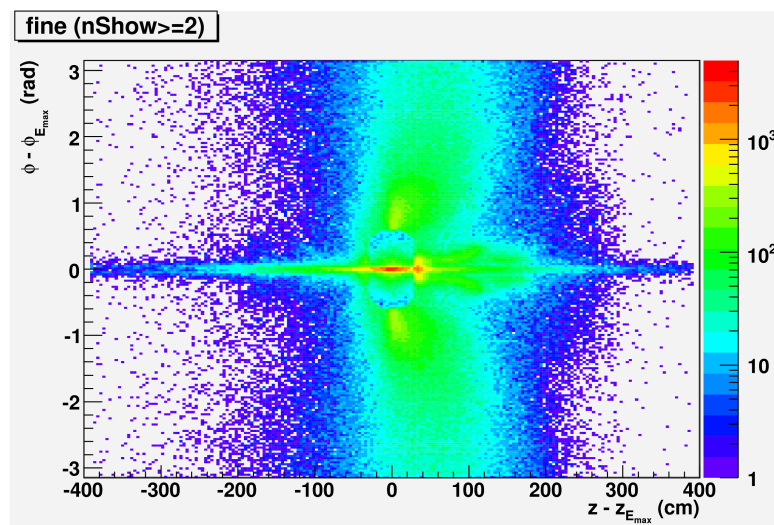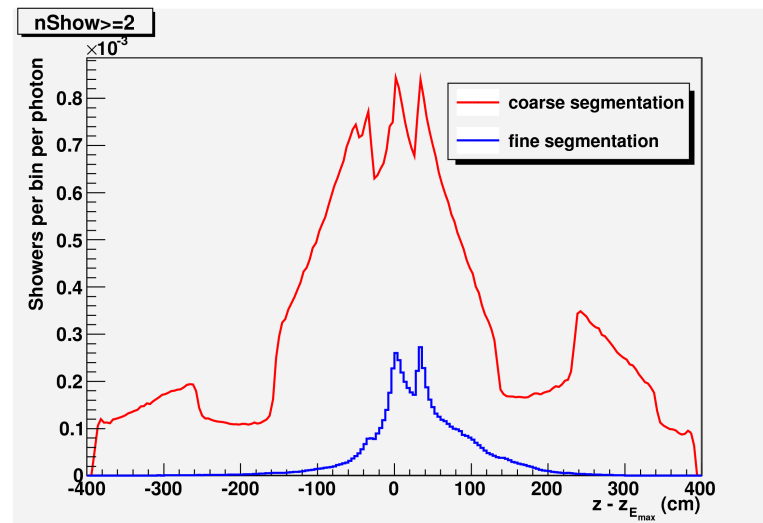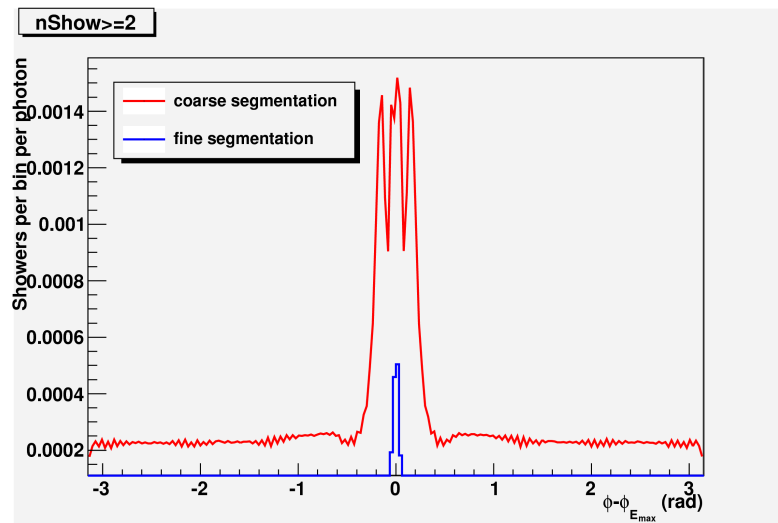
KLOE Reconstruction Code
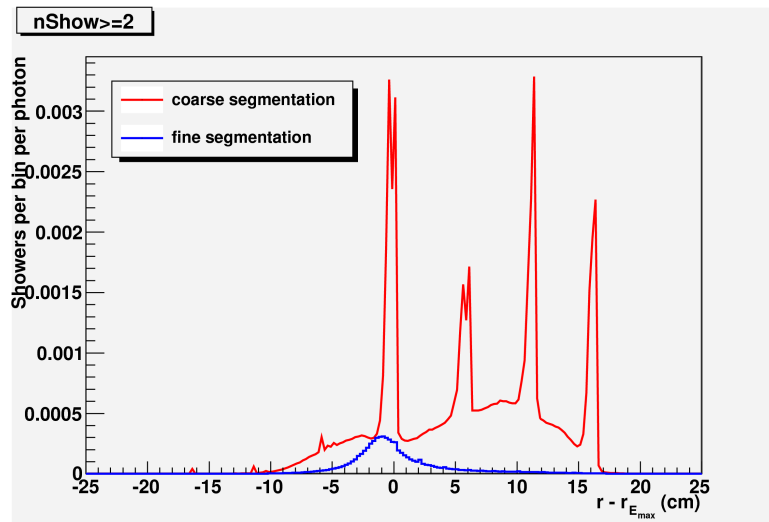
Not a default the used tag version

Access via
"event loop->Get(shower,"KLOE")" line
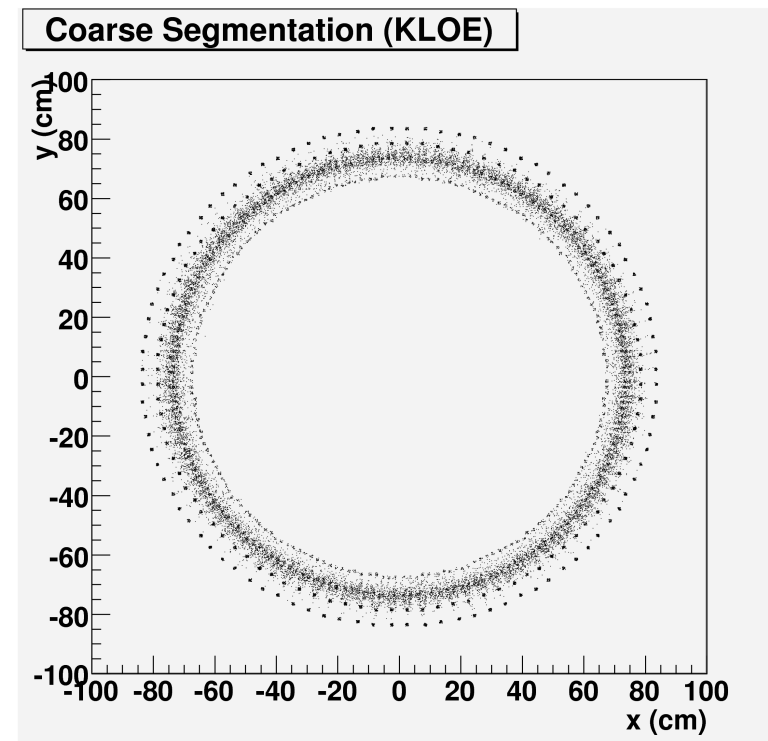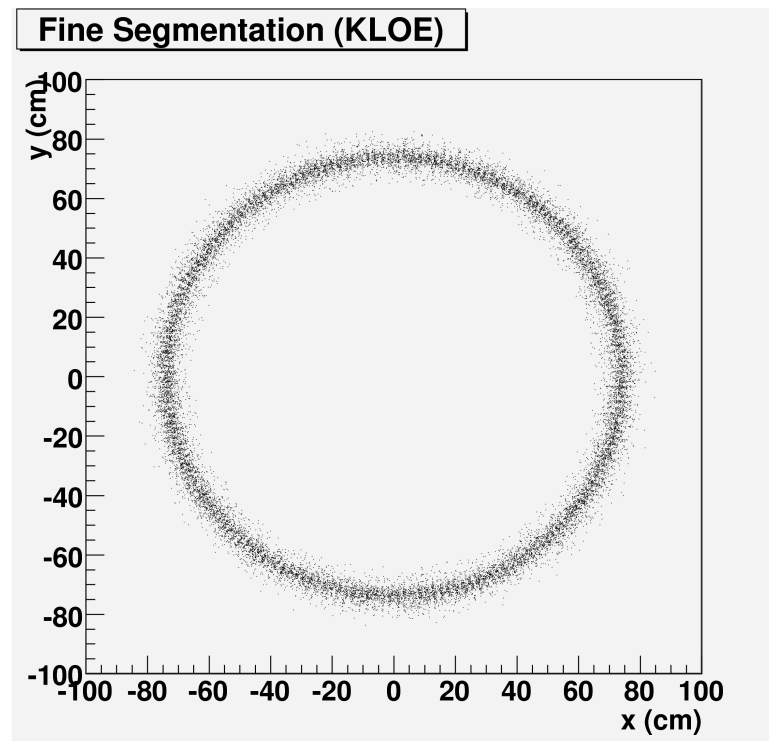
Space Distribution of Extra-Showers

**Clear dominance of the noise pickup
in coarse-segmented BCAL**

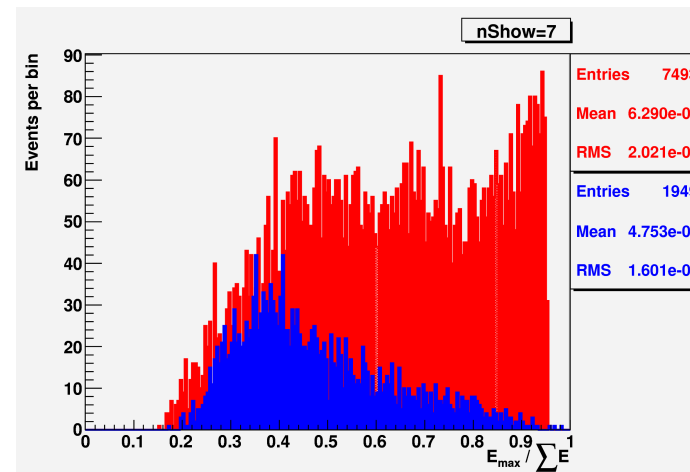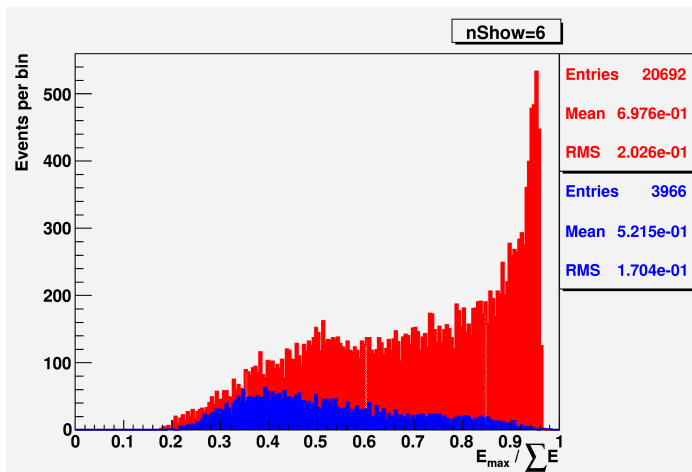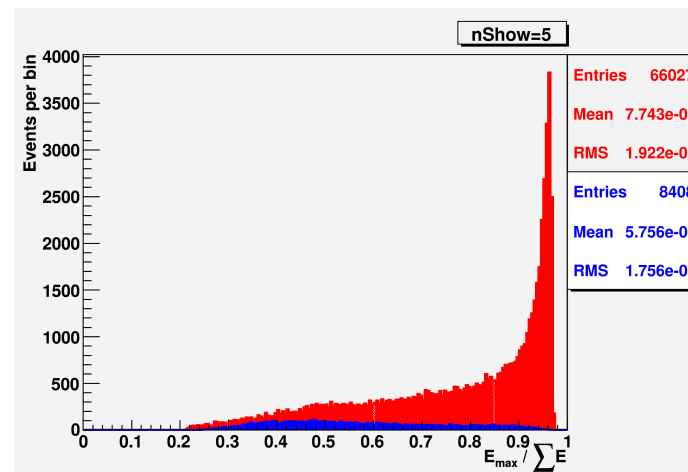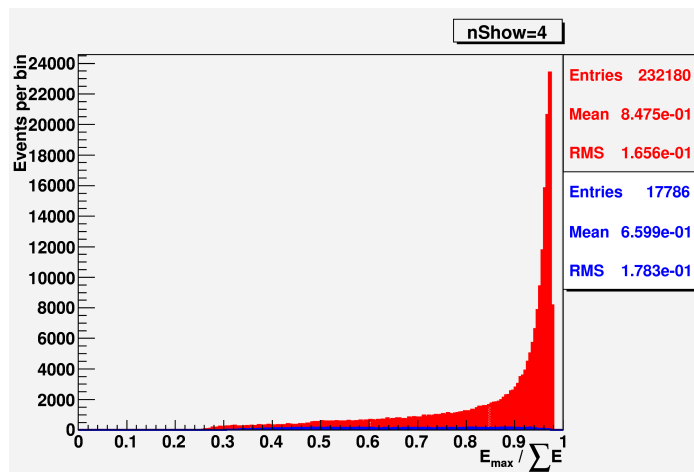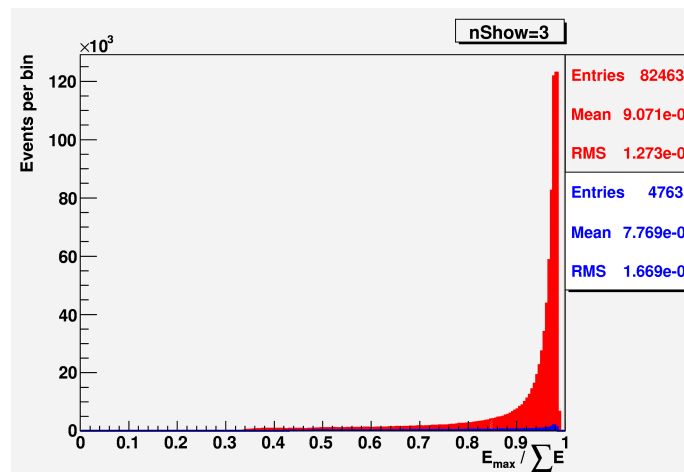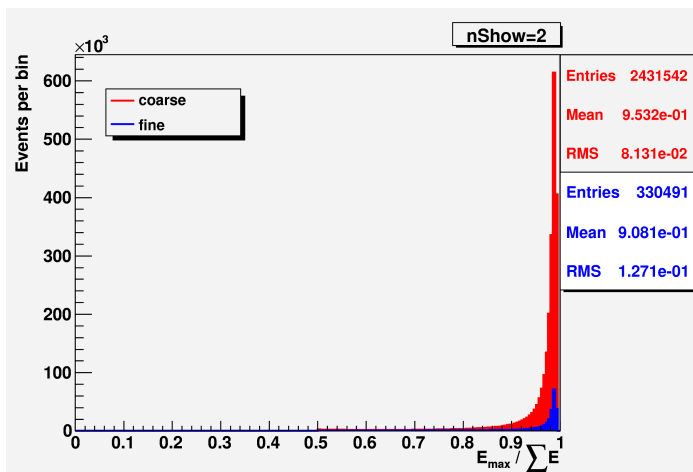# Space Distribution of Extra-Showers

"6-cm structure" for
the coarse segmentation

E_{max} Fraction in the Total Reconstructed Energy

Conclusions

1. Extra-showers from the KLOE reconstruction of coarse-segmented BCAL data are dominated by the noise pickup.

2. Extra-showers from Matt's reconstruction of coarse-segmented BCAL data are the results of both cluster split and noise pickup.

3. Reconstruction of extra-showers is not the result of the photon interaction prior the BCAL entrance.

4. Reconstruction of fine-segmented BCAL data is almost not produce extra-showers.