Energy Resolution Simulation TB2023 first attempt

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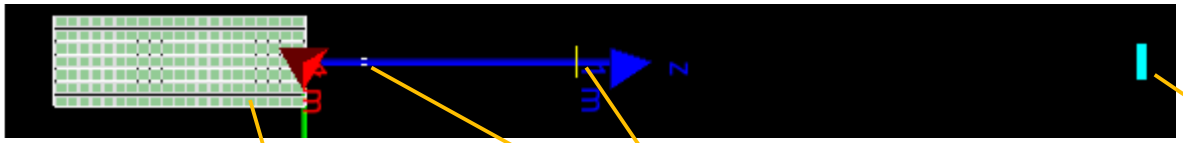
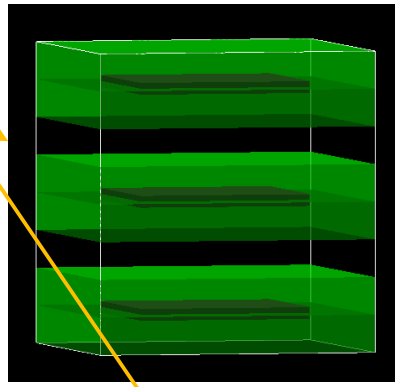
Status of the simulation geometry



Beam

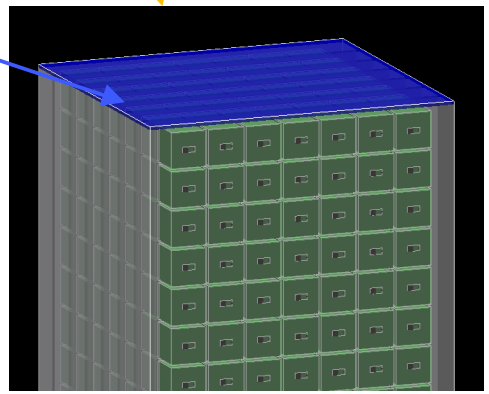
Charge Tagger



Trigger box: for tiles of 0.5 cm thickness each (instead of tile 0.5 – finger 0.5 – finger 0.5 – tile 0.5 cm)

Calo

3 mm aluminum



SCD: one single detector of 1500 um thickness (instead of 300-300-150-150-150-150-150-150 um)

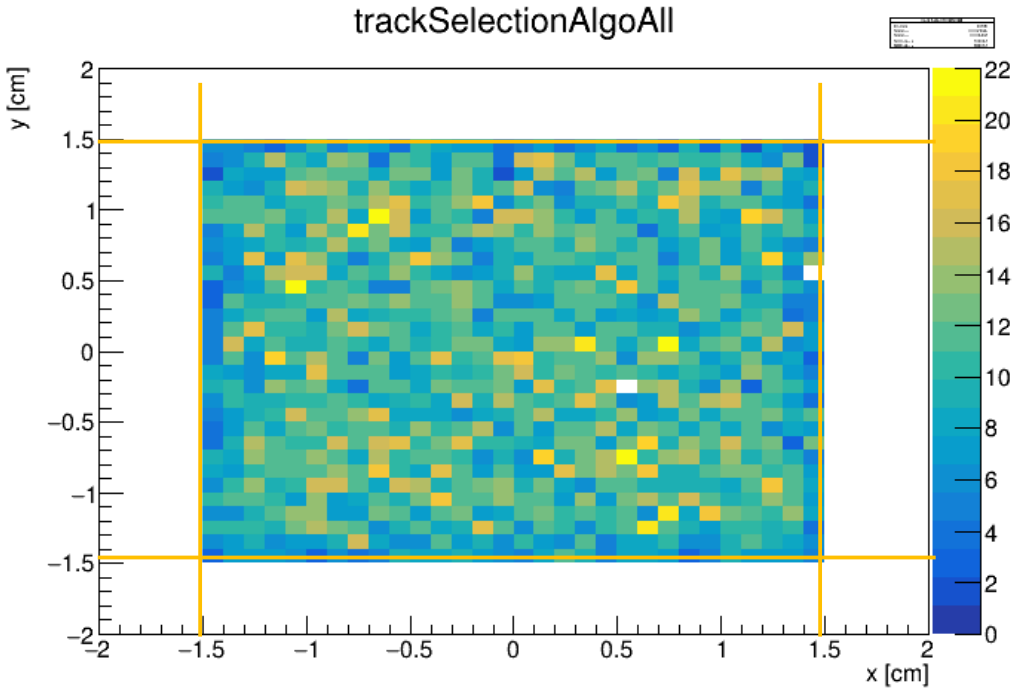
Particle generation

Generation: 3x3 cm centered on the central cube of the calorimeter face

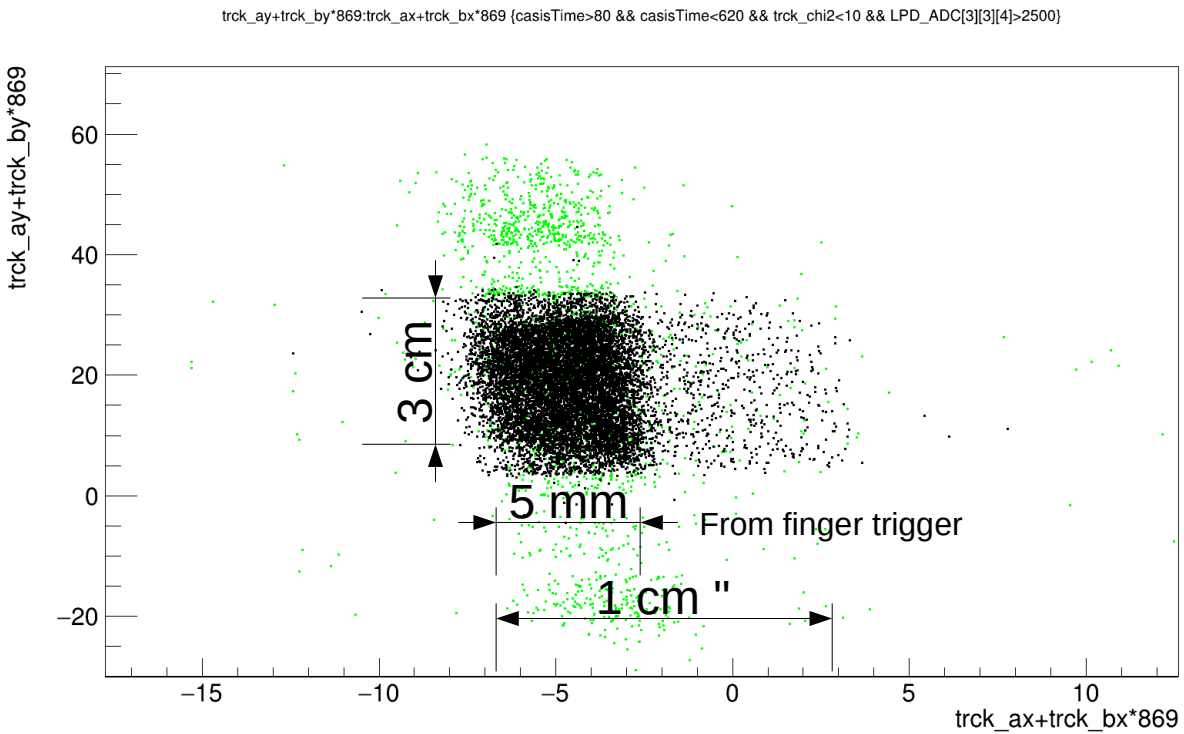
Zenith angle: 0-1 mrad

Electrons 243.8 GeV
10k events

“beam profile” selected on the first crystal



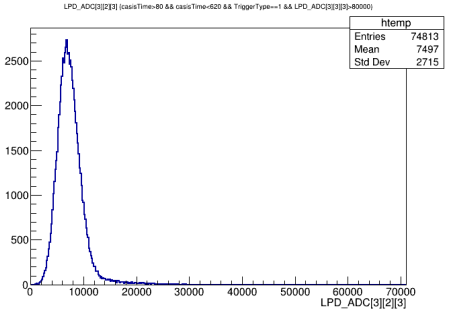
Beam profile from data

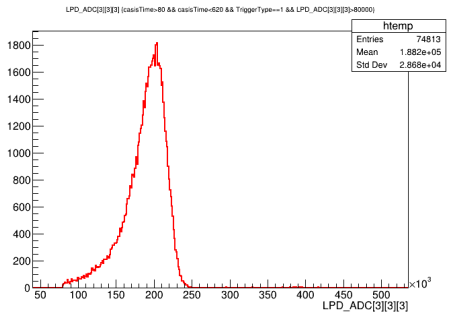


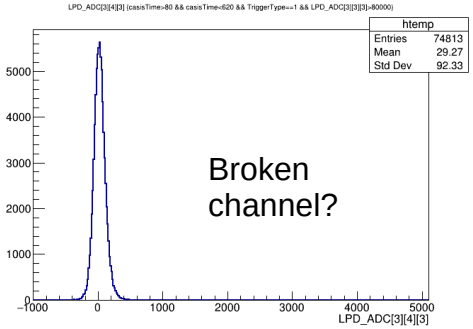
The beam illuminate the entire crystal in the vertical direction, but only a small fraction on the horizontal direction

Beam is not centered on the crystal

4th layer

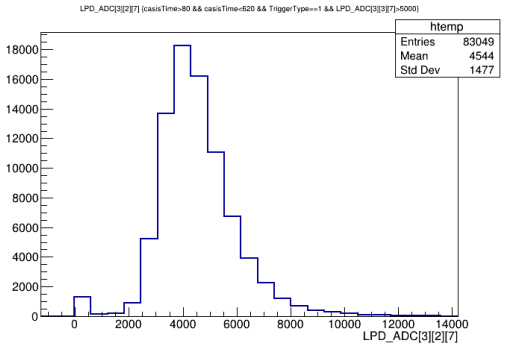


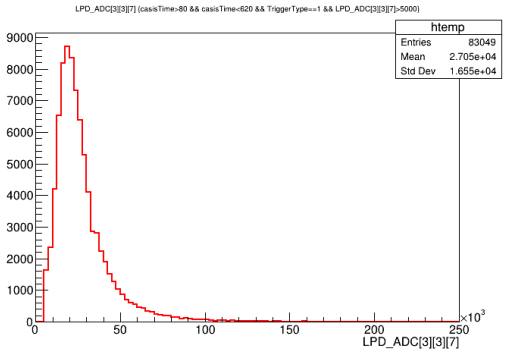


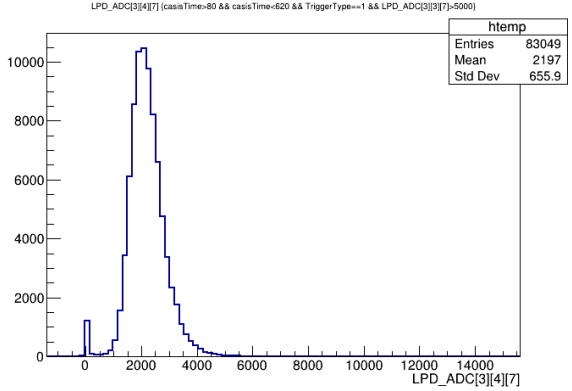


Broken channel?

8th layer

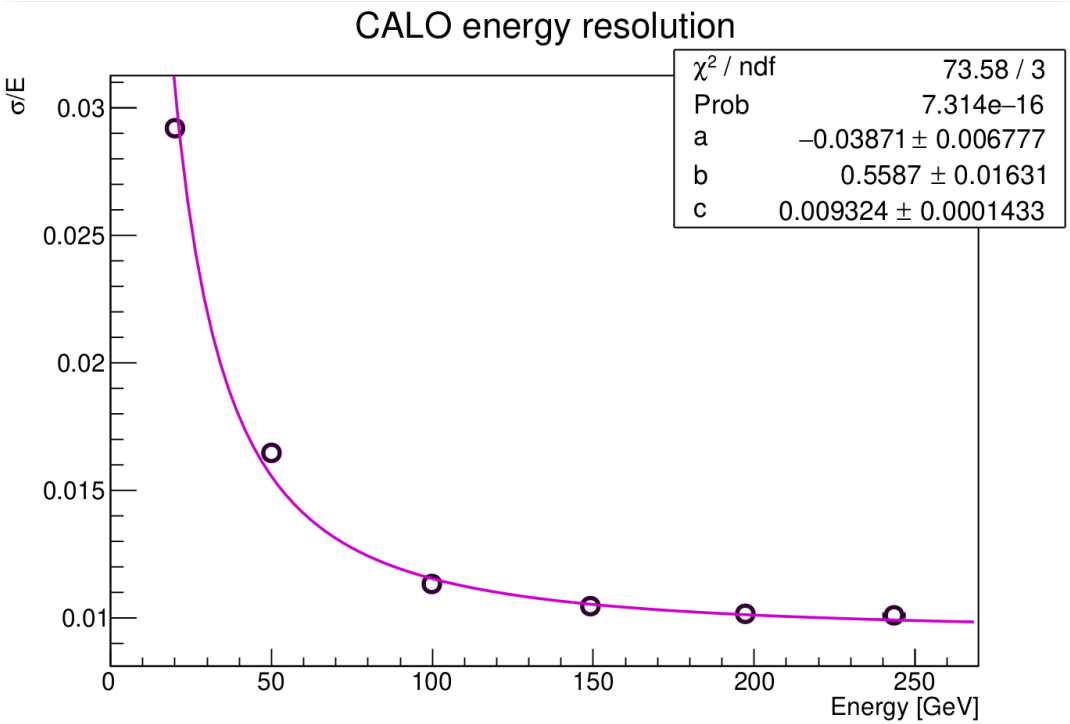






Reminder on data raw estimate of energy resolution

- No-calibrated data
- Only 3x3x11 matrix analyzed
- Energy resolution from fit of LogaGaus



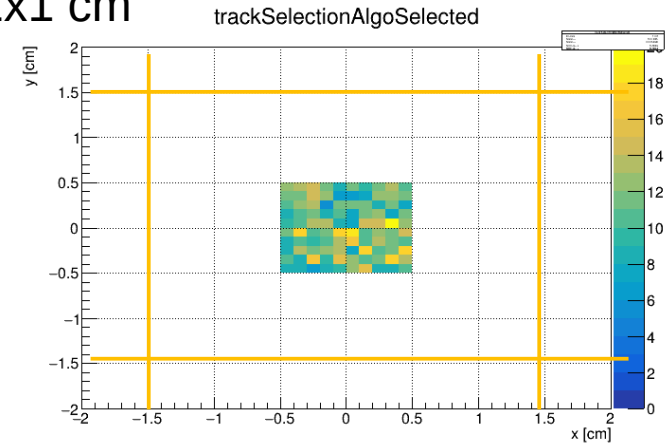
Energy resolution from simulation

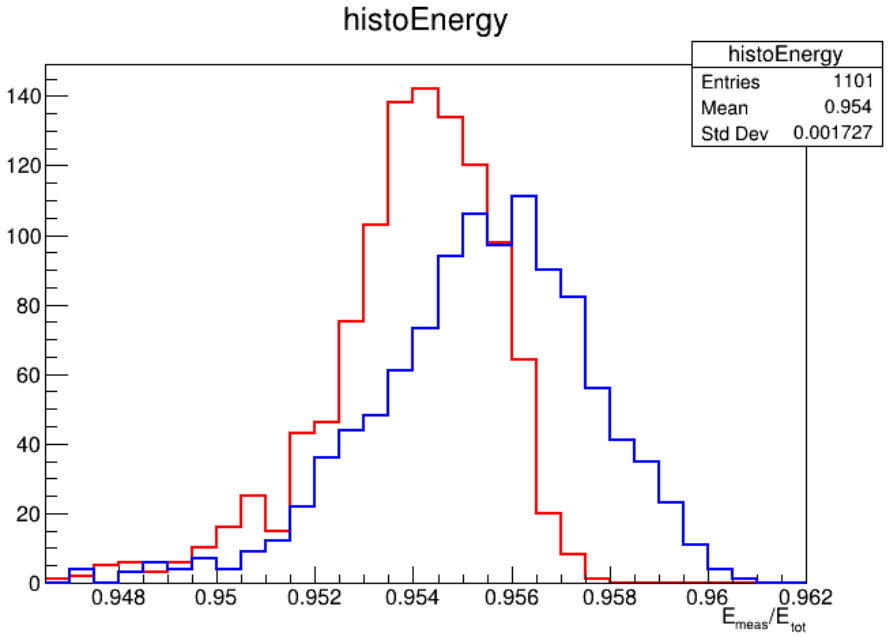
Digitized data
All calibrated calo crystals are considered (about 830 crystals)
Calibration and noise values from real data
Without zero suppression

Energy resolution = RMS/Mean

MC: 0.18%
Dig: 0.23%

Selection of track intersect with face of first crystal:
Centered 1x1 cm

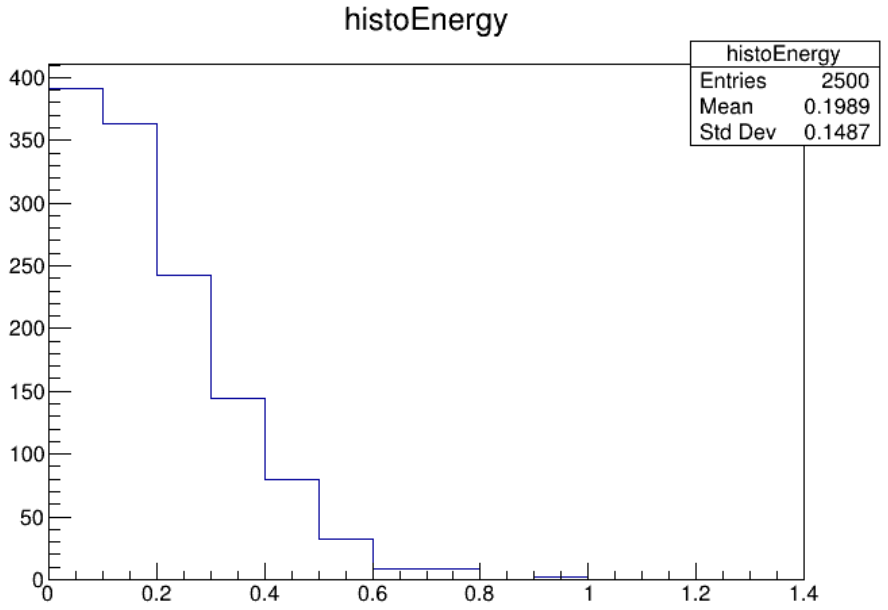




Impact of noise

- Simulated geantini
- Add noise

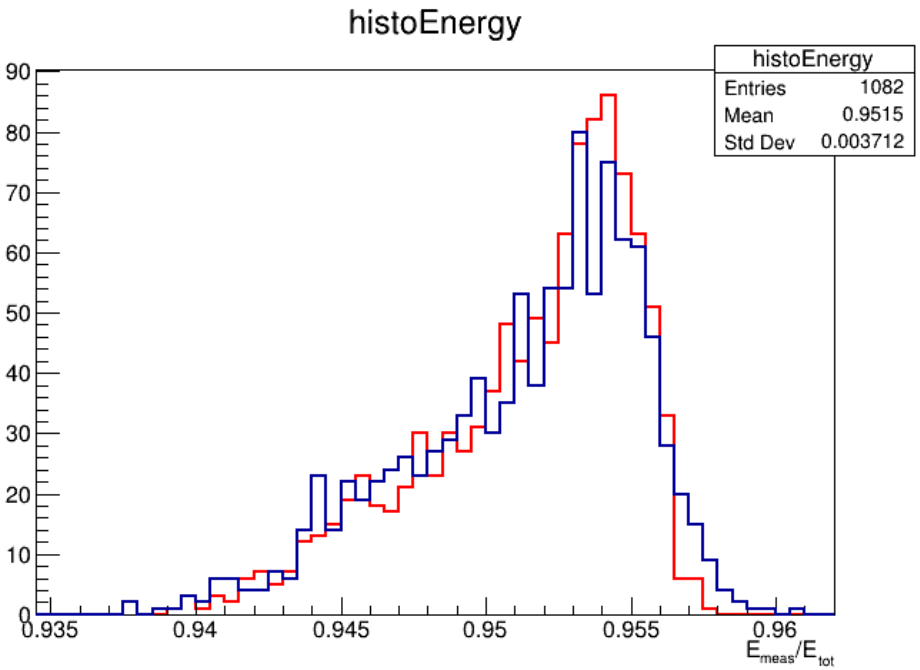
Up to 1 GeV → negligible for 250 GeV



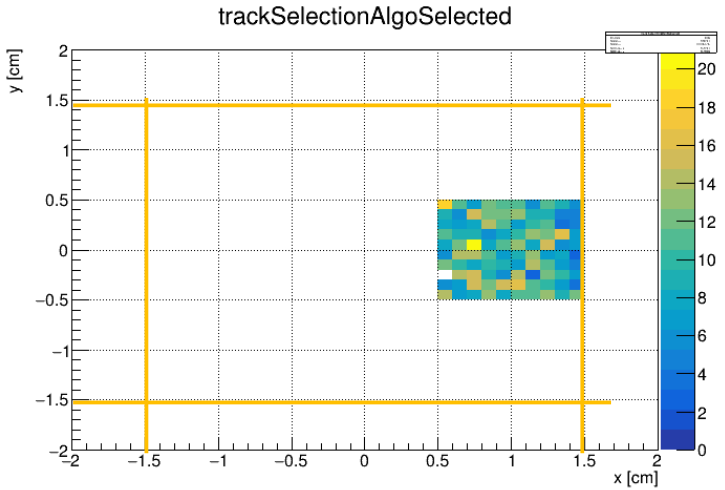
Geometric effects

Selection of track intersect with face of first crystal:
Middle right 1x1 cm

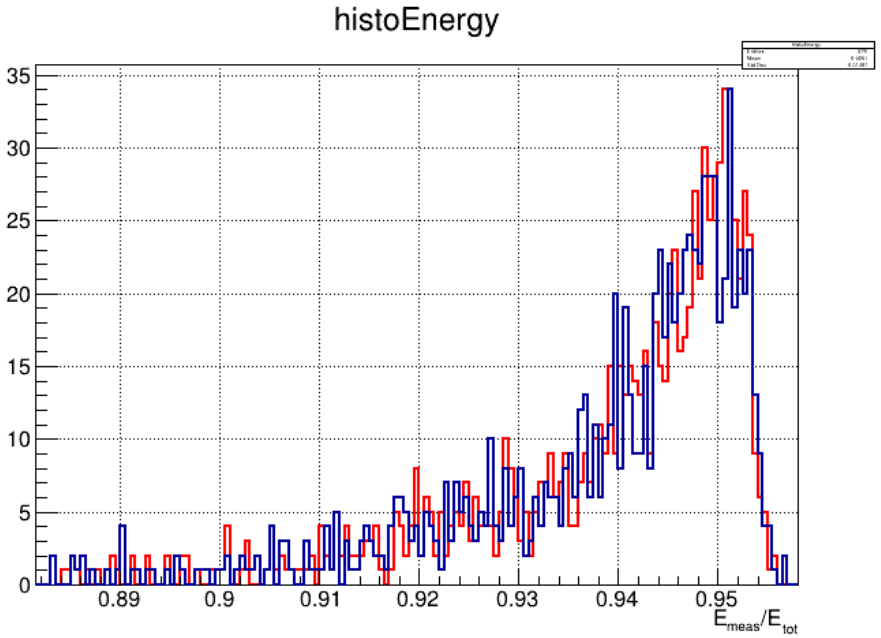
MC: 0.4%
Dig: 0.5%



Selection of track intersect with face of first crystal:
Right 1x1 cm



MC: 1.46%
Dig: 1.55%



Conclusions

- The most influencing factor for the energy resolution seems to be the geometry
- Lorenzo is calibrating real data in number of MIP, starting from Elena pedestal shift corrected data and Gabriele PS muon calibration
- Then comparison of showers axis with calo and tracks from silicon to study the geometry between the two detectors
- Let’s hope...