

| | |
|------------------|--|
| mai 06 | DESY, 24 couches, 6 wafers/couche, 5184 voies e^- 1-6 GeV, 5 angles, 3 positions, 8 M triggers |
| aout -sept 06 | CERN, 30 couches, 6 wafers/couche, 6480 voies ECAL+AHCAL: π 30-80 GeV, 3 angles, 1.7 M triggers ECAL: e^- 10-45 GeV, 4 angles, 8.6 M triggers 30 M muons pour la calibration. |
| oct 06 | CERN, 30 couches, 6 wafers/couche, 6480 voies ECAL+AHCAL+TCMT: e^+, e^- : 3.8 M triggers, 6-45 GeV π^+, π^- : 22 M triggers, 6-80 GeV 40 M muons pour la calibration. |
| juillet -aout 07 | CERN, 30 couches, 9 wafers/couche, 9072 voies ECAL, HCAL, TCMT: 4 angles, 12 positions e^+, e^-, π^+, π^- : 200 M triggers, 6-80 GeV |
| mai-juillet 08 | FNAL, 30 couches, 9 wafers/couche, 9720 voies e^+, e^- : 1-30 GeV π^+, π^- : 1-60 GeV 17.3 M triggers |

“Design and electronics commissioning of the physics prototype of a Si-W electromagnetic calorimeter for the International Linear Collider”

2008 JINST 3 P08001

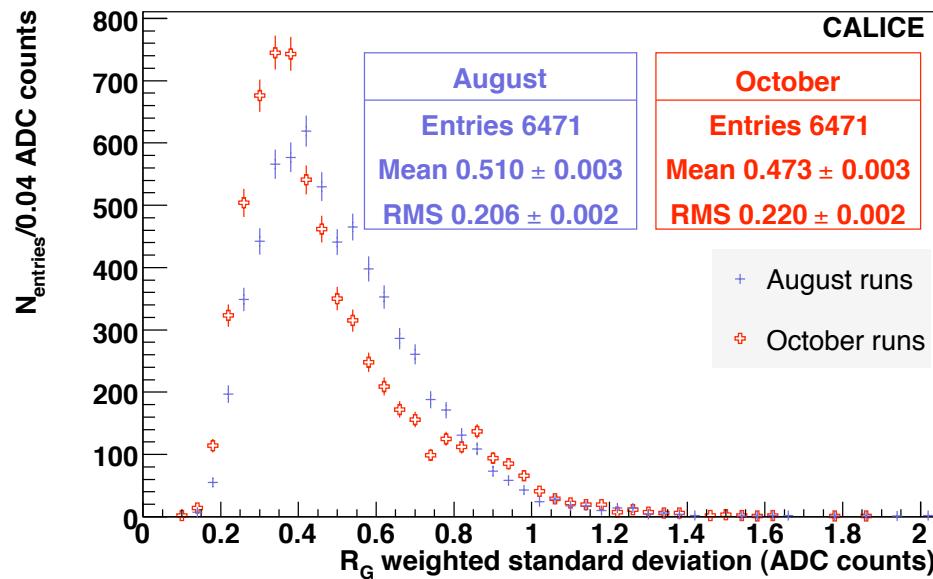
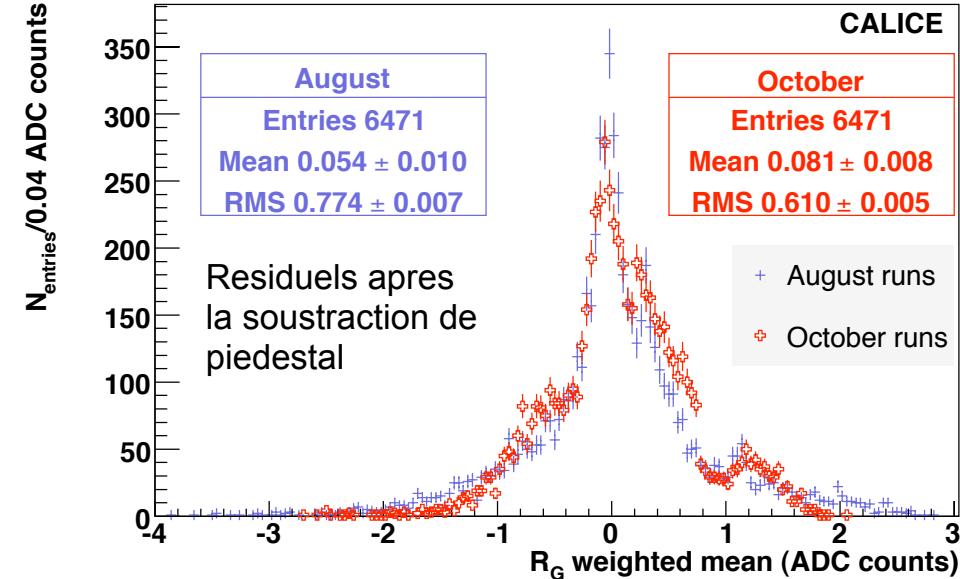
“Design and electronics commissioning of the physics prototype of a Si-W electromagnetic calorimeter for the International Linear Collider”

2008 JINST 3 P08001

Excellent fonctionnement du détecteur - très grande stabilité de l'électronique (monitorée en temps réel et calibrée avec des MIPs)

Sur l'ensemble des voies:

- 99,86% des voies fonctionnelles
- bruit moyen par voie : 0.13 MIPs
- dispersion du bruit voie à voie 0.012 MIPs

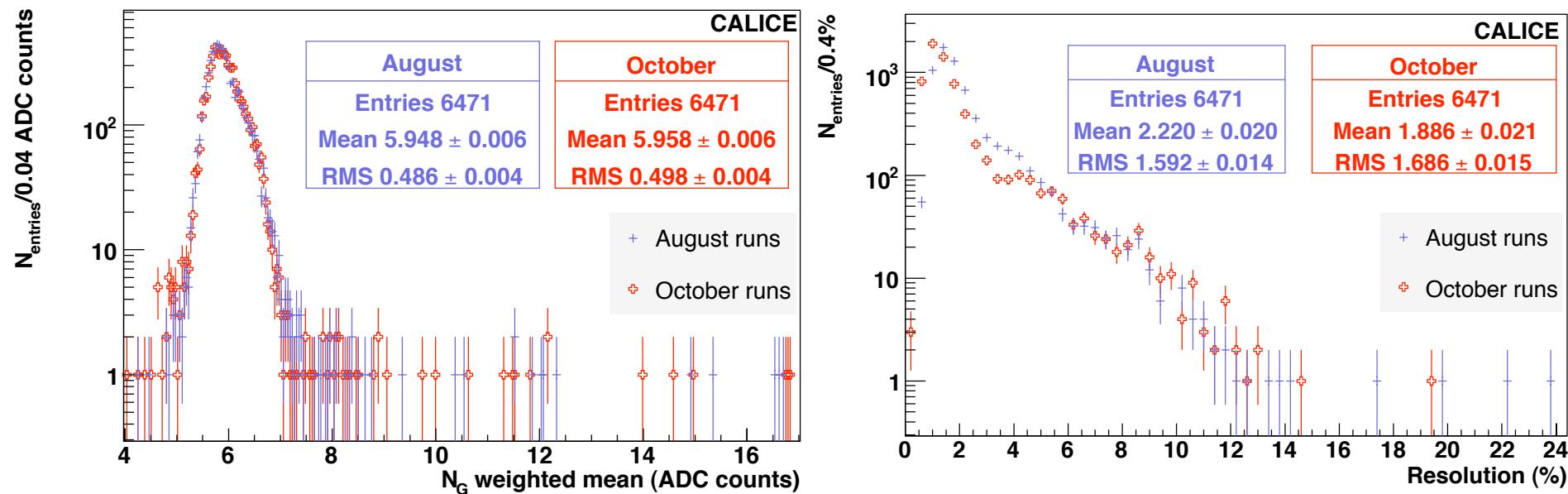


Mean pedestal offset $< 0.17 \pm 0.02$ % of a MIP

Standard deviation channel-to-channel = 1.67 ± 0.02 % of a MIP

Residual offset run-to-run $\approx 1.1 \pm 0.1$ % of a MIP

Standard deviation channel-to-channel = 0.48 ± 0.01 % of a MIP



Mean noise = 12.9 ± 0.1 % of a MIP

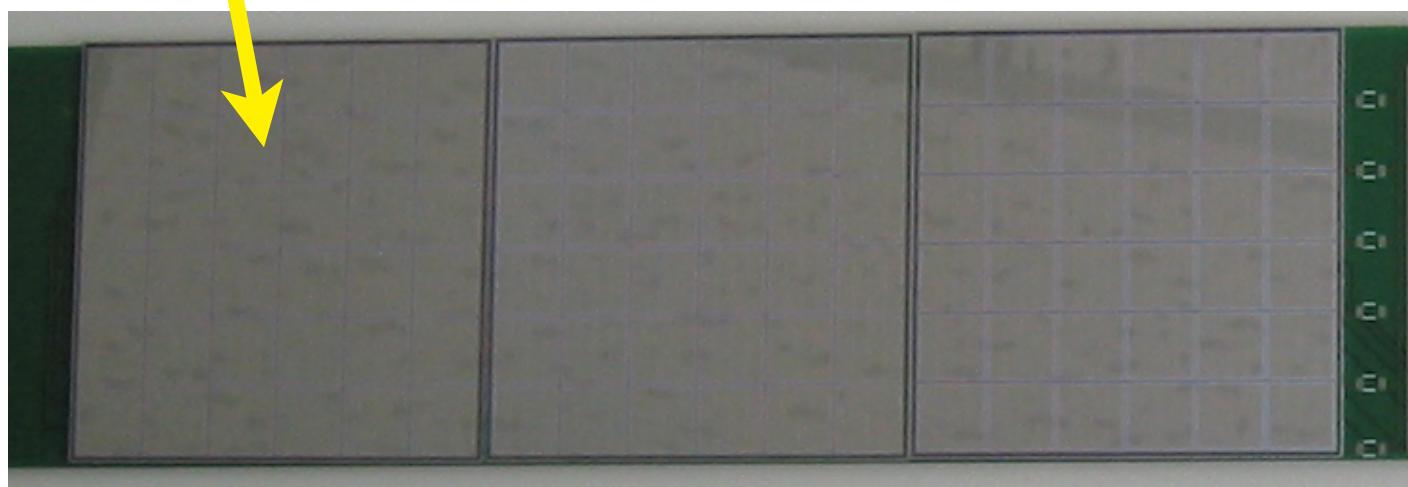
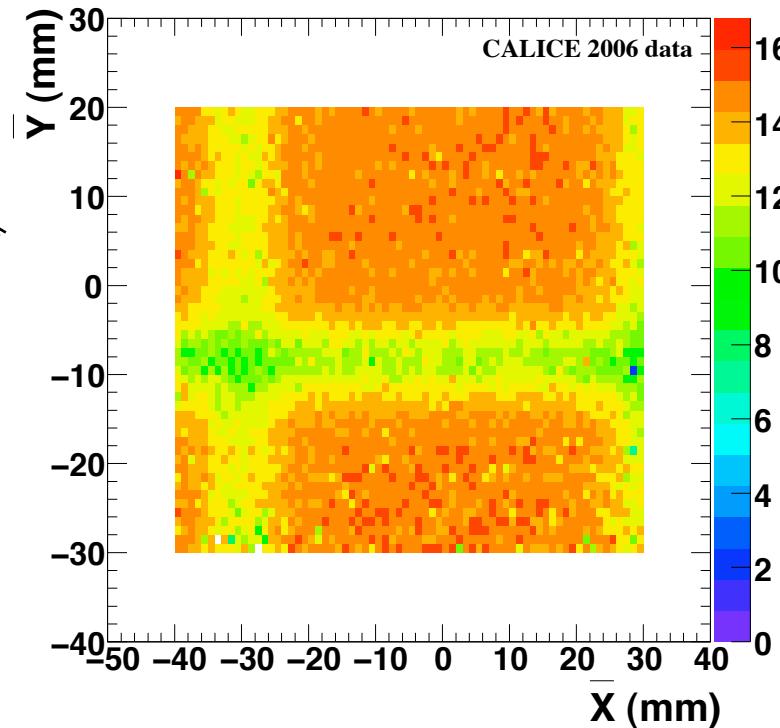
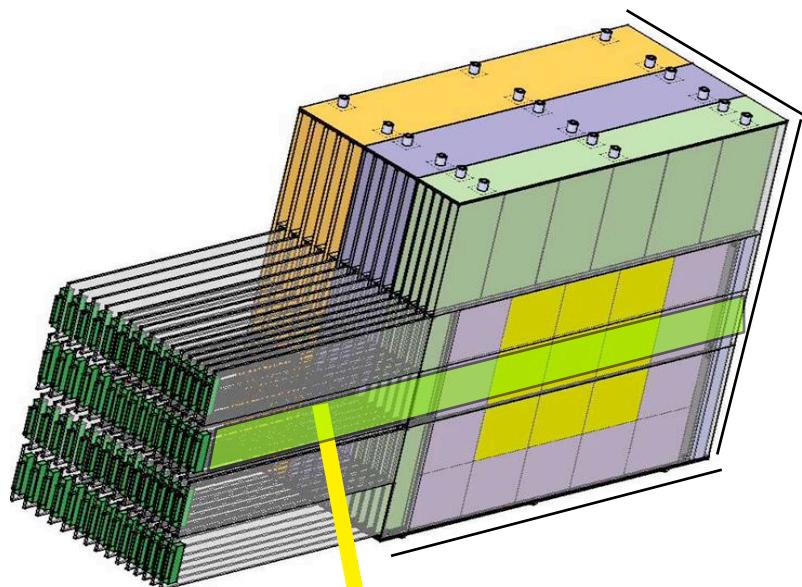
Standard deviation channel-to-channel = 1.1 ± 0.1 % of a MIP

Relative spread run-to-run = 2.00 ± 0.03 % of a MIP

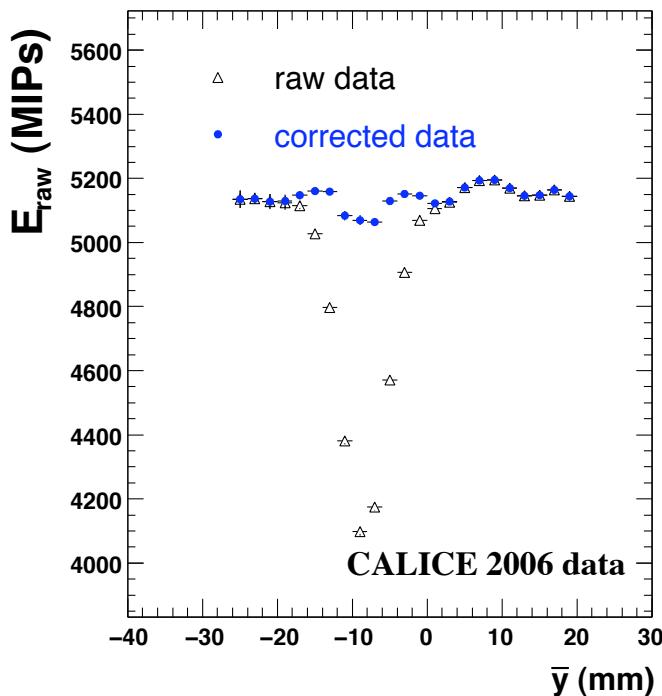
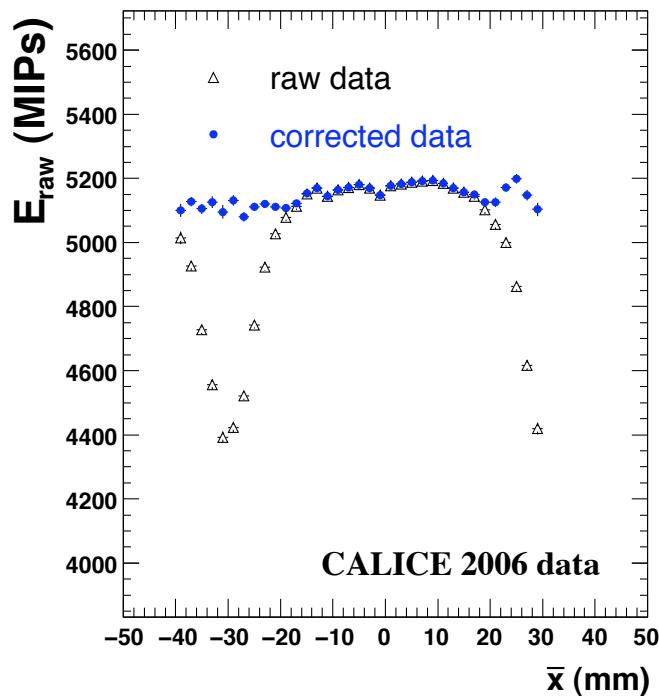
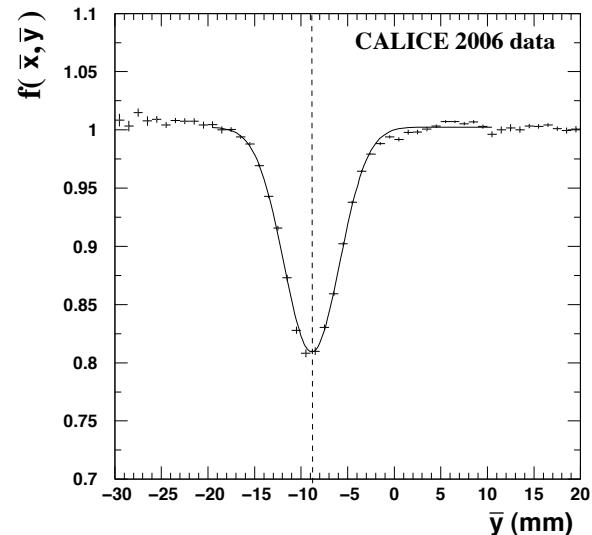
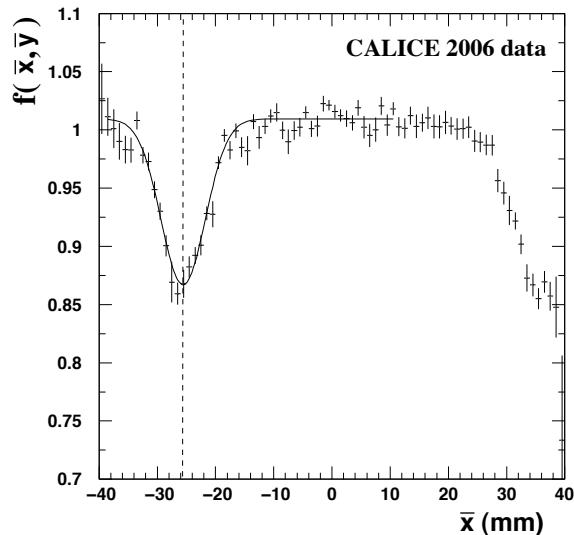
Spread channel-to-channel = 1.60 ± 0.01 % of a MIP

20 % of the channels have run-by-run variations > 3%
→ run-by-run noise measurement

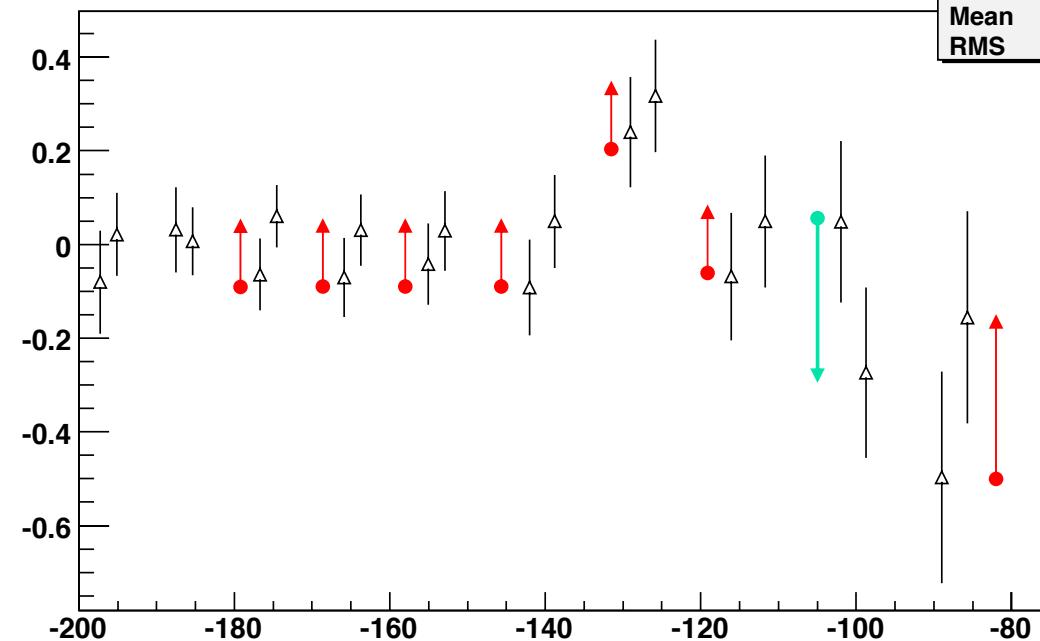
L'uniformité du détecteur



$$f(\bar{x}, \bar{y}) = E_{\text{raw}} / E_{\text{beam}}$$



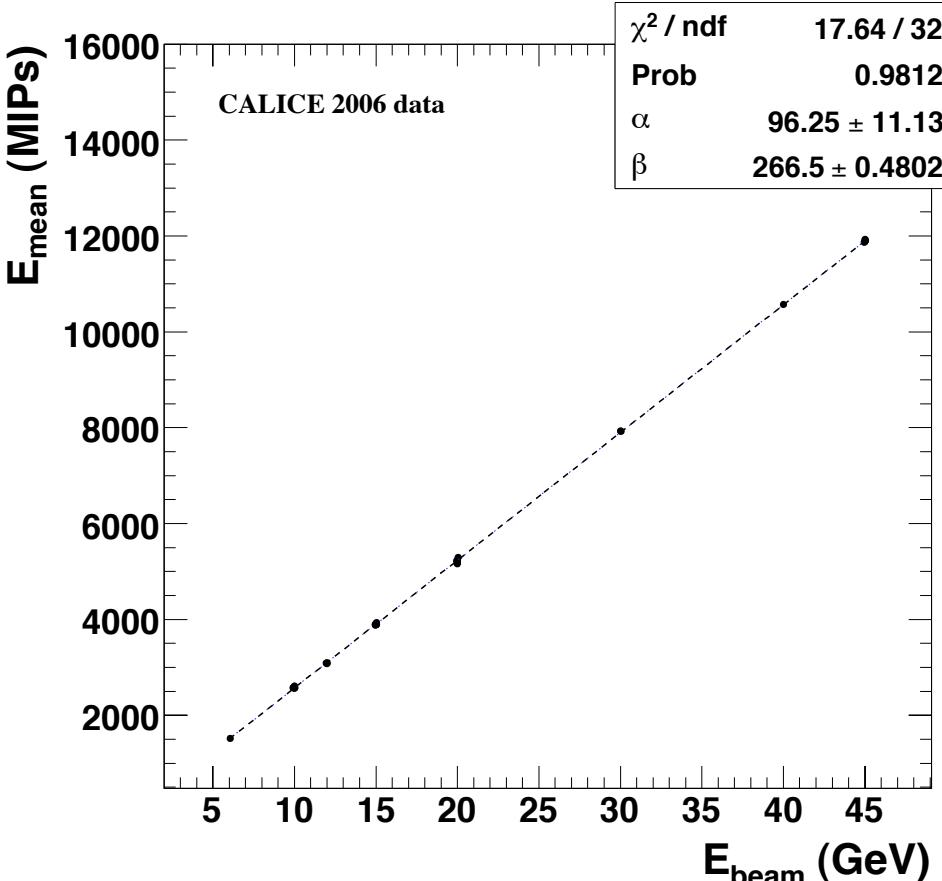
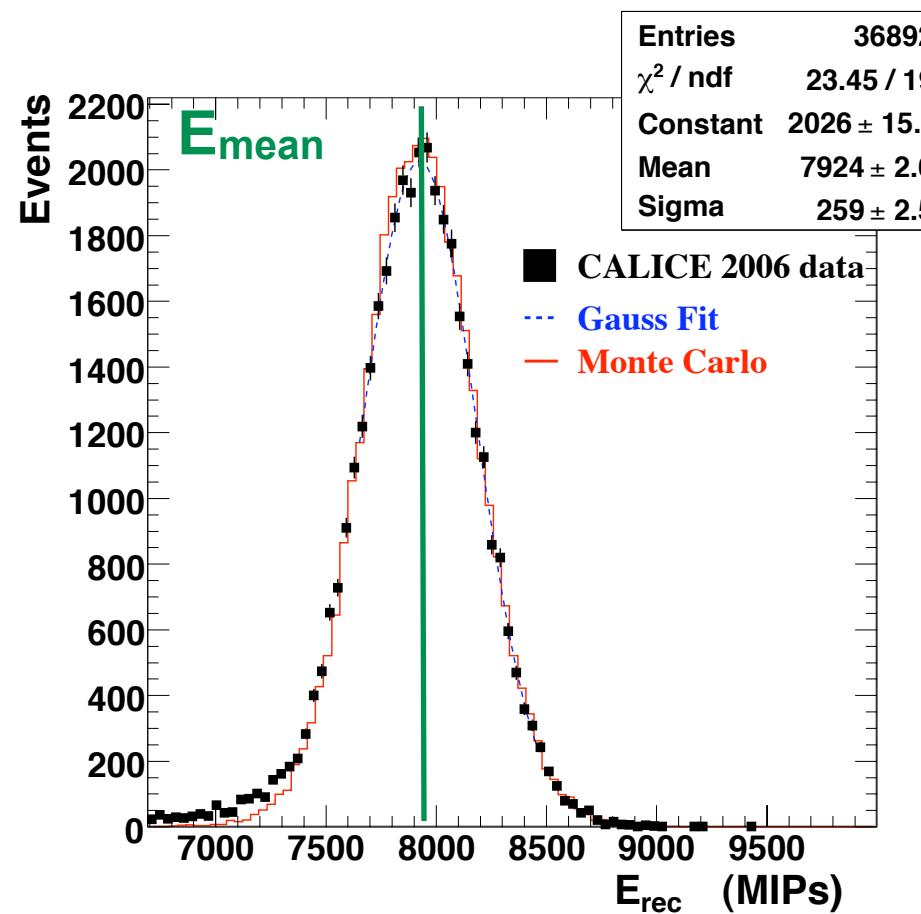
Y Gaps position



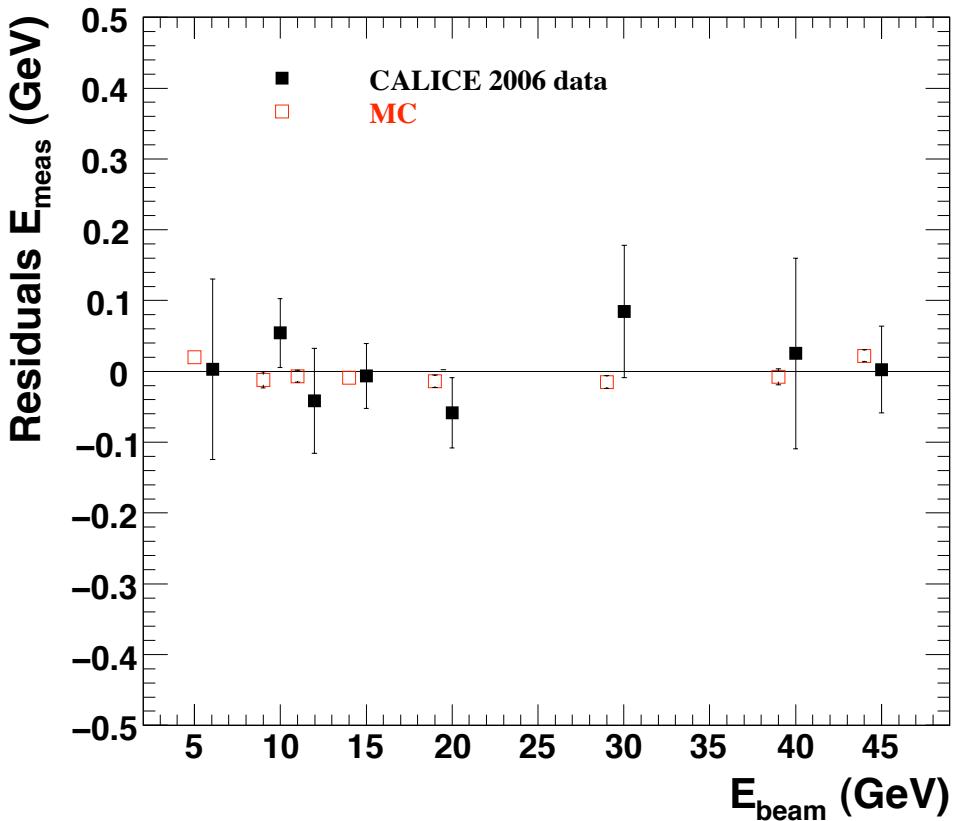
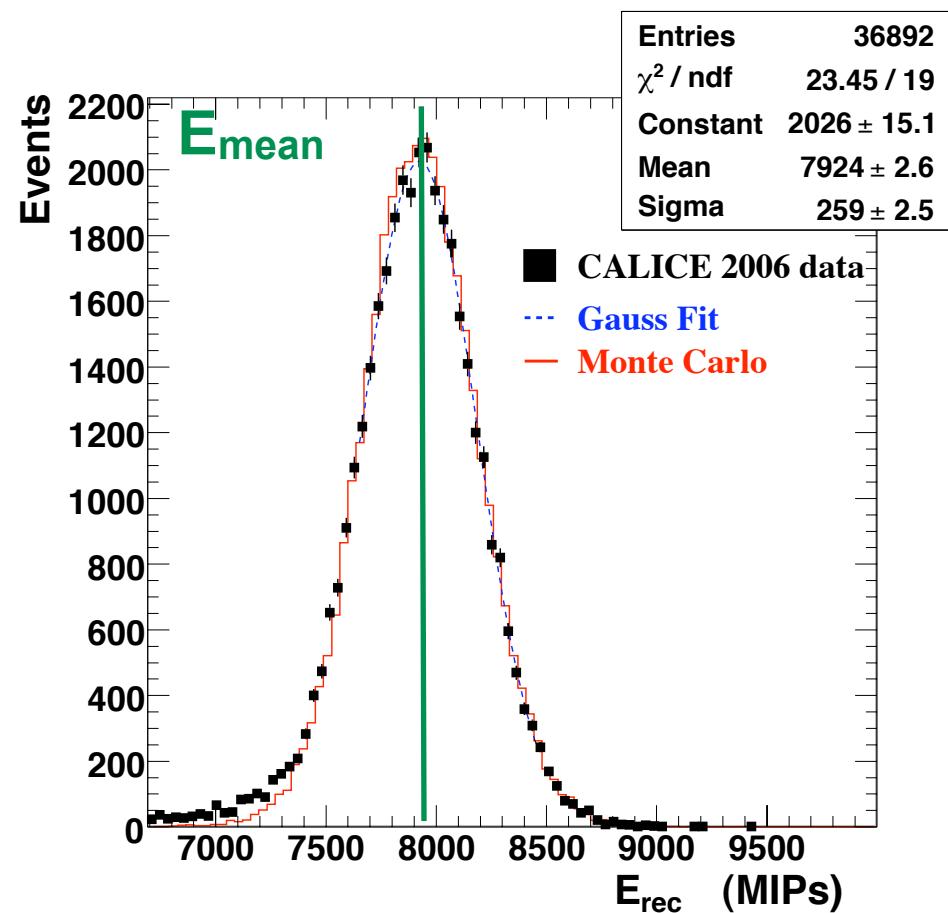
↑ Systematic shift in a slab

The 9th slab : singularity

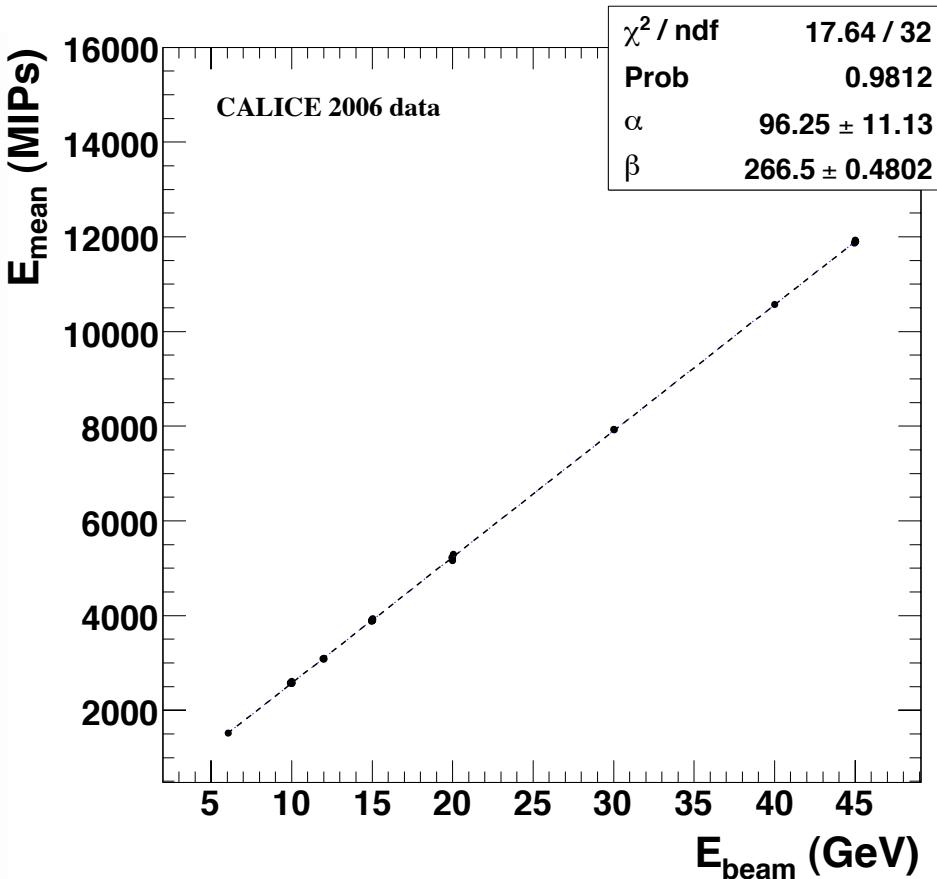
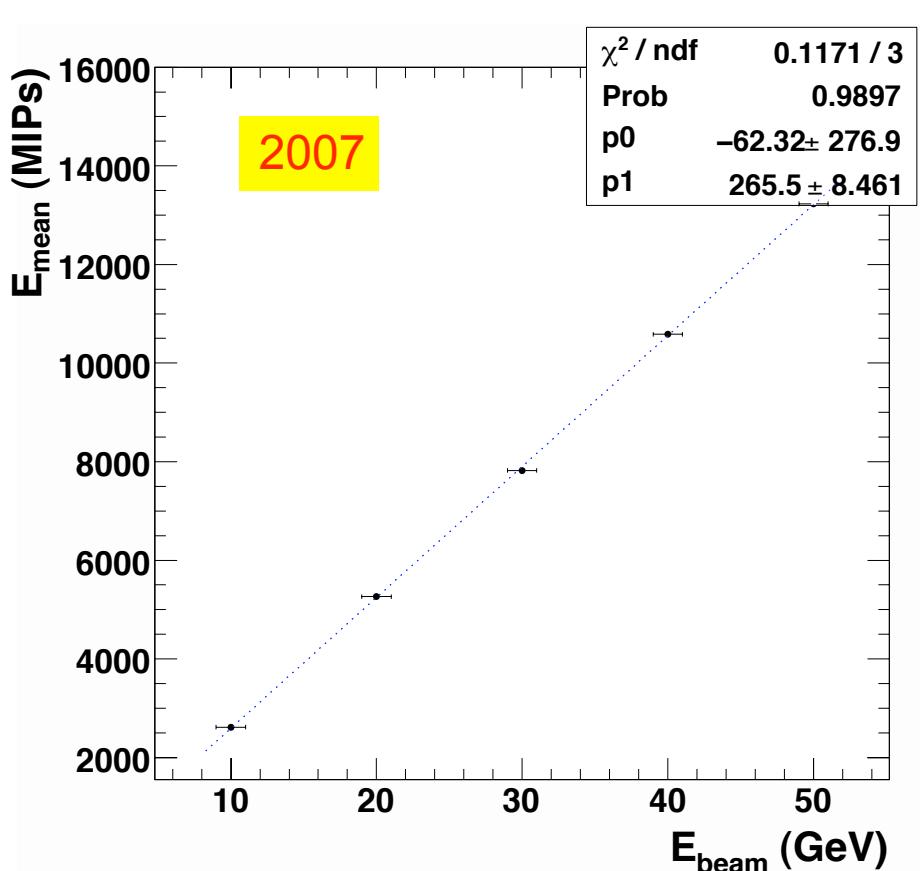
- les défauts d'alignement observés en y inférieurs à 0.5 mm
- troisième stack déplacé de 1 mm par rapport aux deux premiers

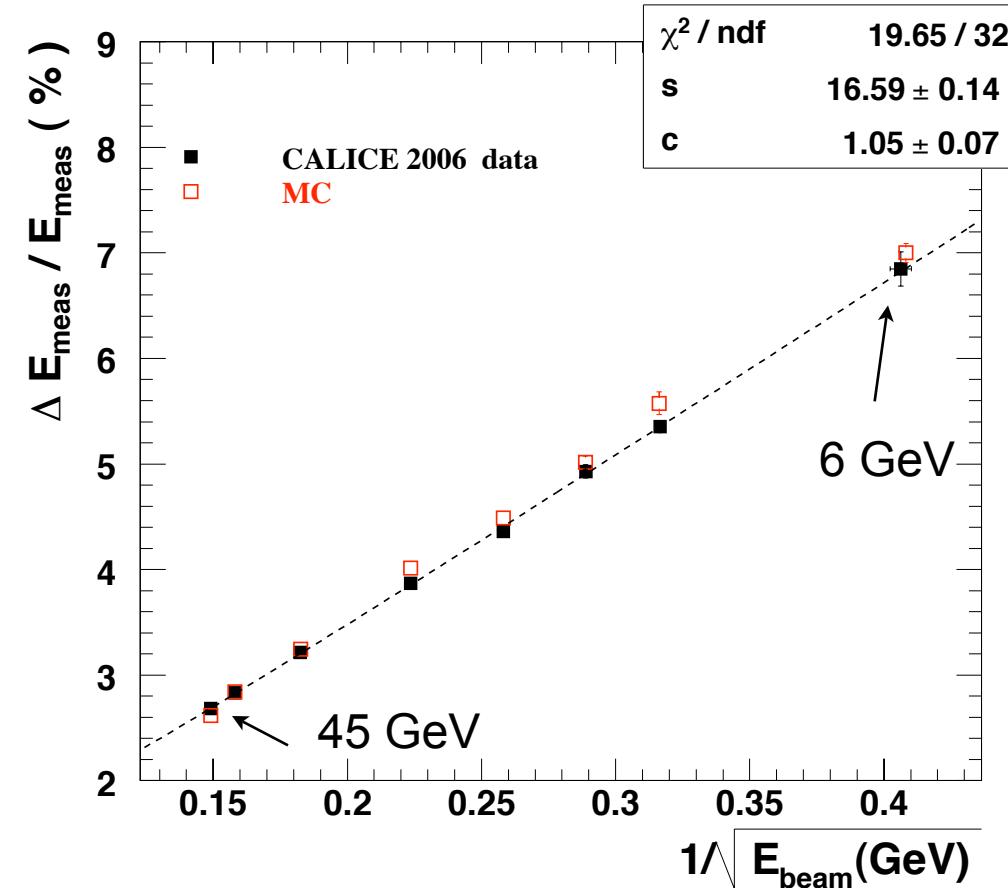


$$E_{\text{meas}} = E_{\text{mean}} + \alpha$$



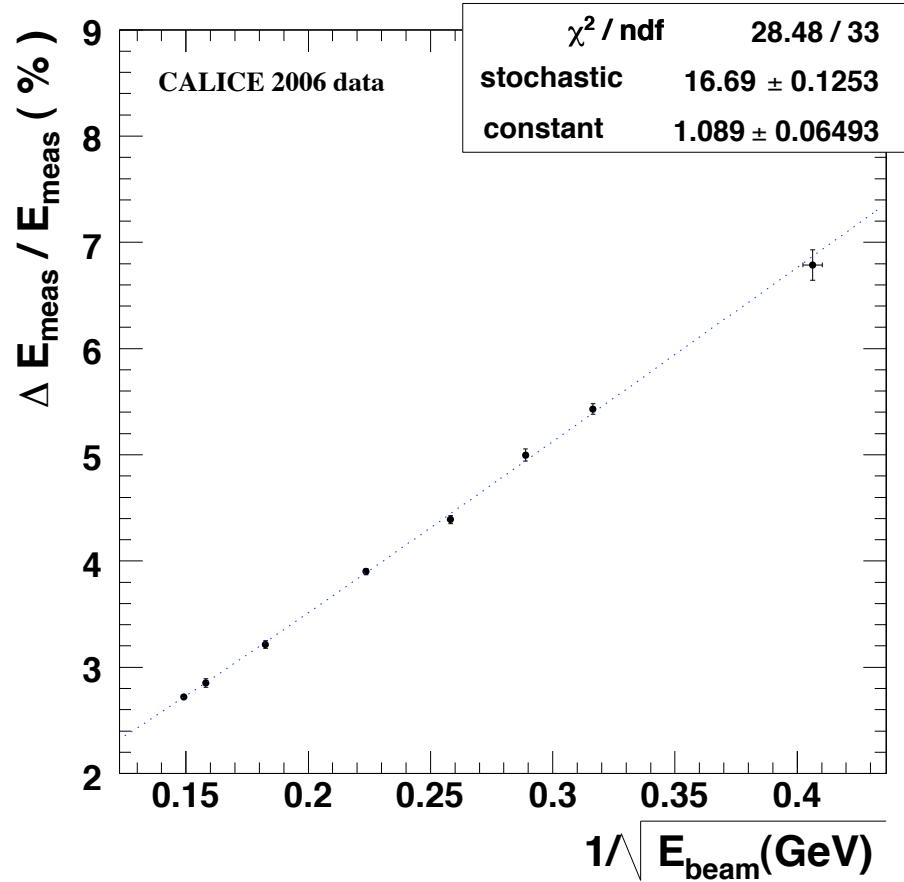
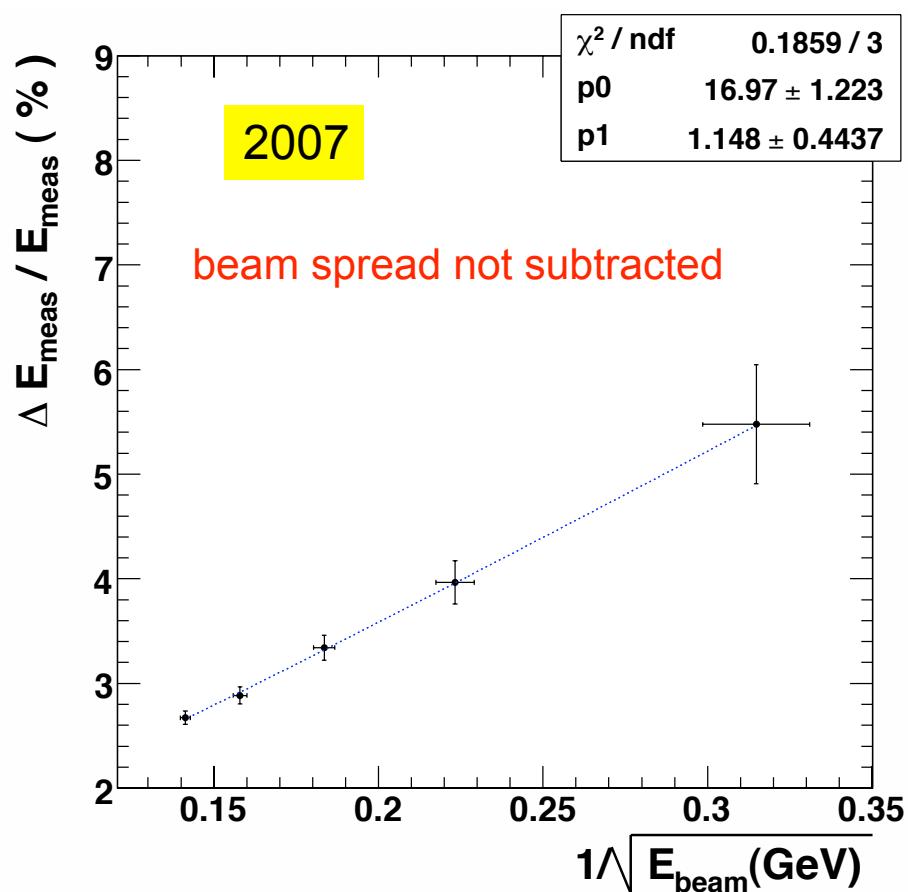
$$E_{\text{meas}} = E_{\text{mean}} + \alpha$$





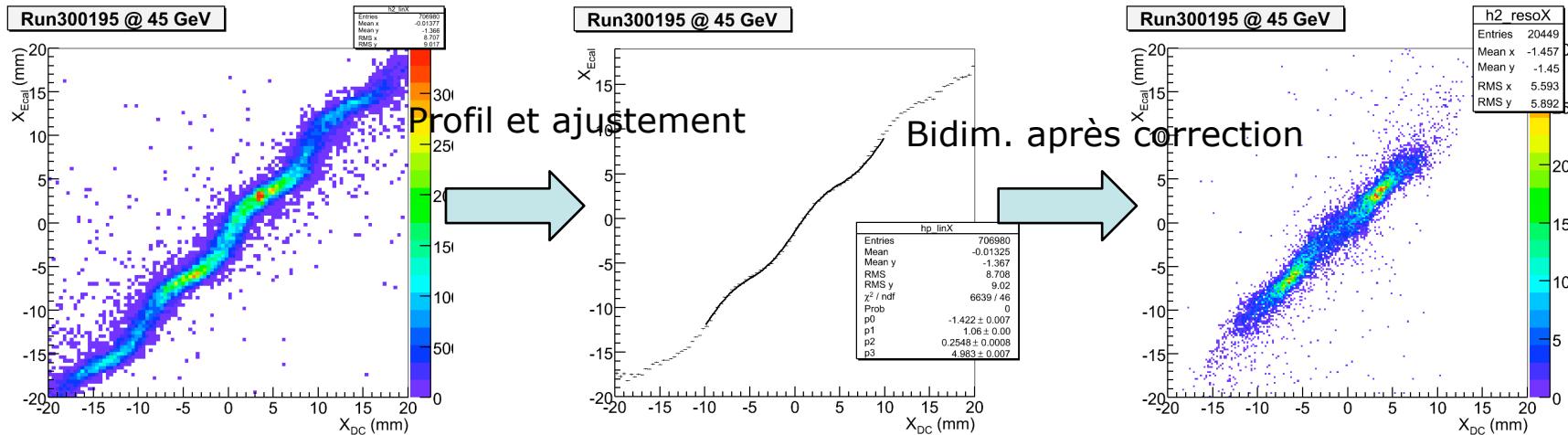
$$\frac{\Delta E}{E} (\%) = \frac{16.6 \pm 0.1}{\sqrt{E} (\text{GeV})} \oplus (1.1 \pm 0.1)$$
$$\frac{\Delta E}{E} (\%) = \frac{17.1 \pm 0.1}{\sqrt{E} (\text{GeV})} \oplus (0.5 \pm 0.1)$$

“Response of the CALICE Si-W Electromagnetic Calorimeter Physics Prototype to Electrons”
arXiv:0811.2354, submitted to NIM

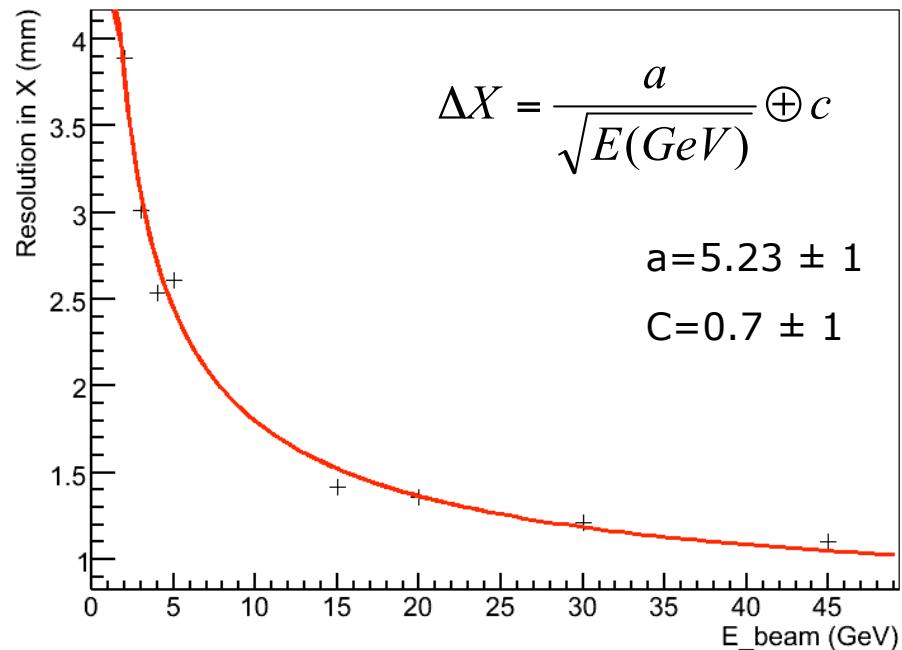


Etude de la résolution en position (« CERN test beam »)

- « S-shape » correction



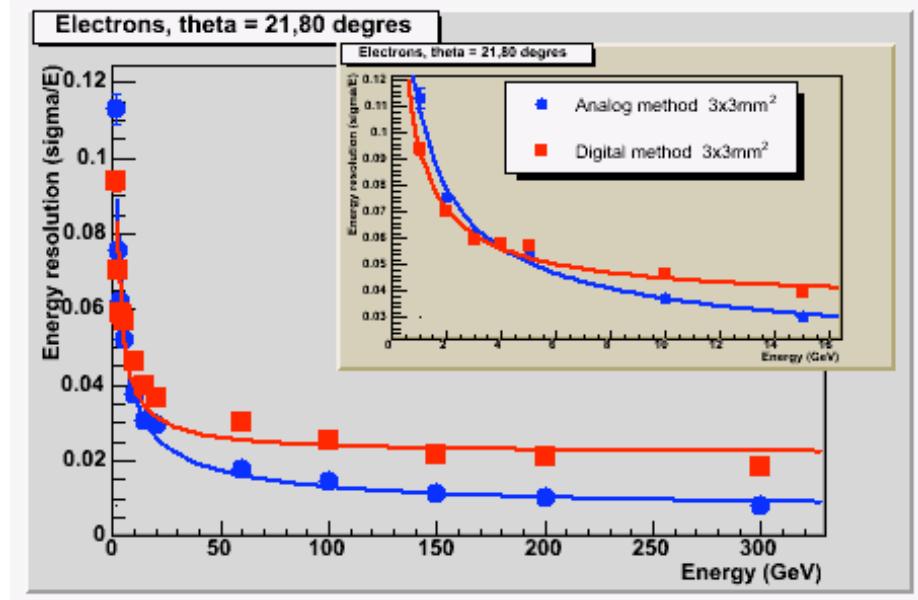
- Résolution en position
La contribution des chambres à dérive n'a pas été retranchée



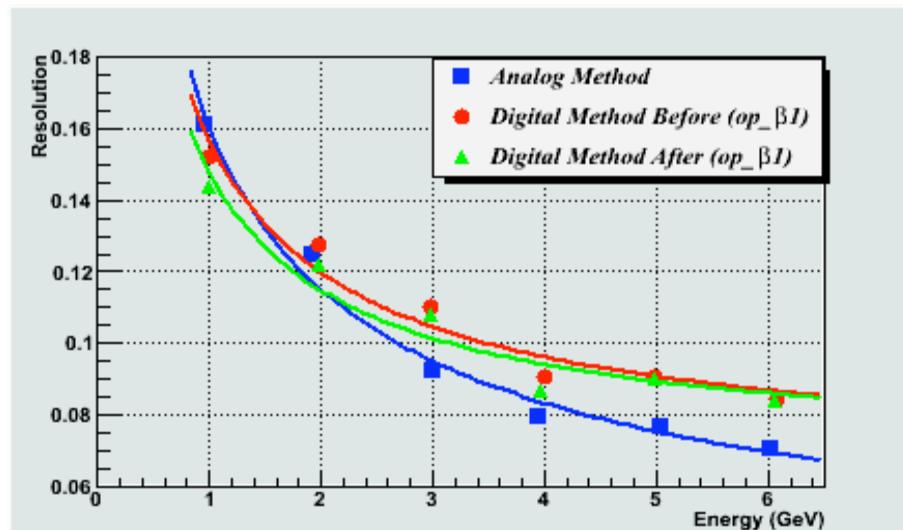
Système calorimétrique avec une excellente performance et granularité. Qu'est-ce qu'on fait avec?

- Etudier avec beaucoup de détail les gerbes électromagnétiques et hadroniques et valider
 - * les modèles
 - * les simulations MonteCarlo
 - * nos descriptions des géometries...
- Valider les algorithmes ILD bas niveau (clusterisations, PIDs) et haut niveau (PFA)

Comparison of Analog and Digital methods

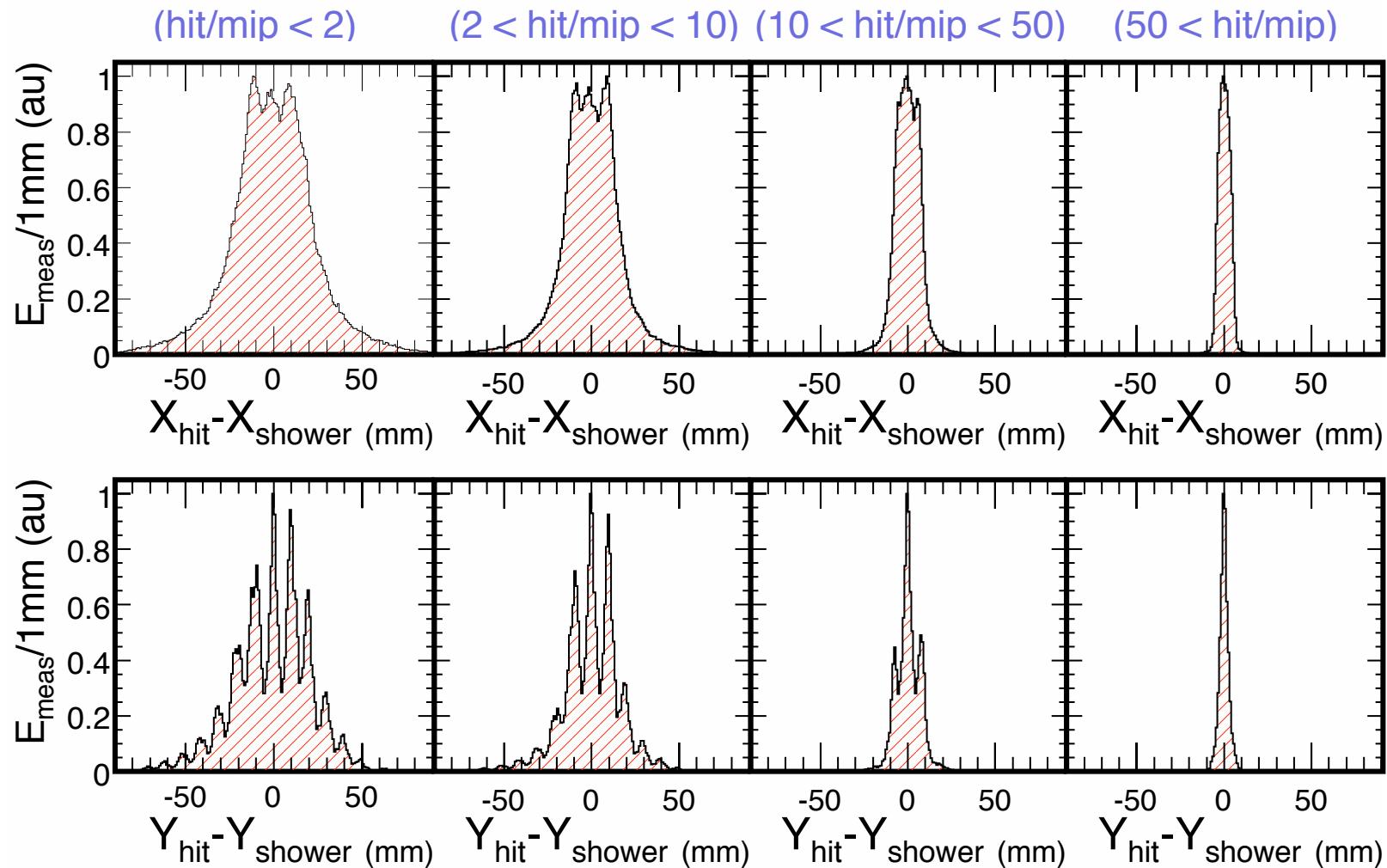


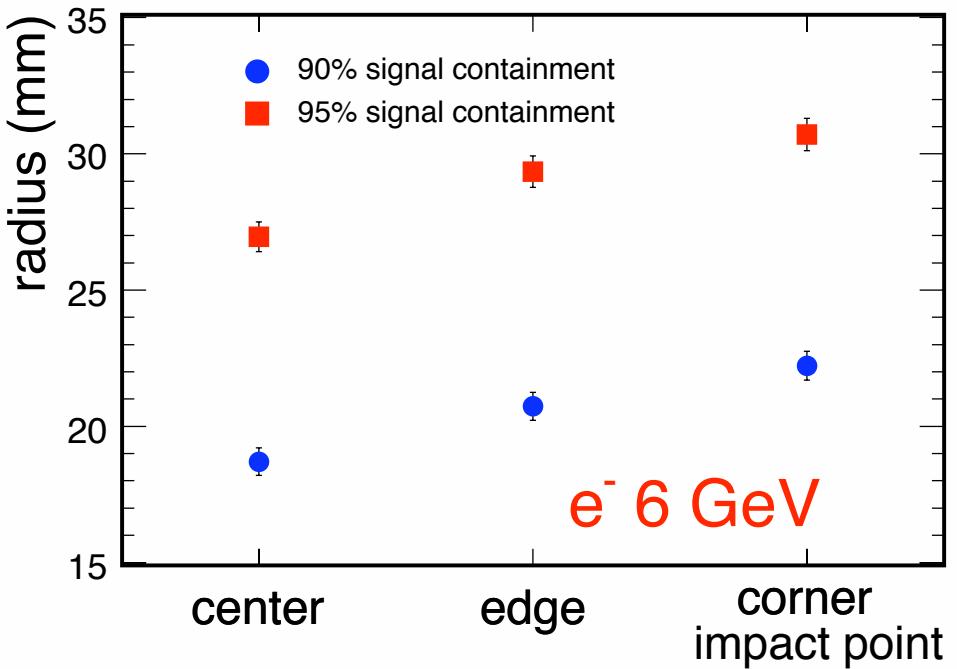
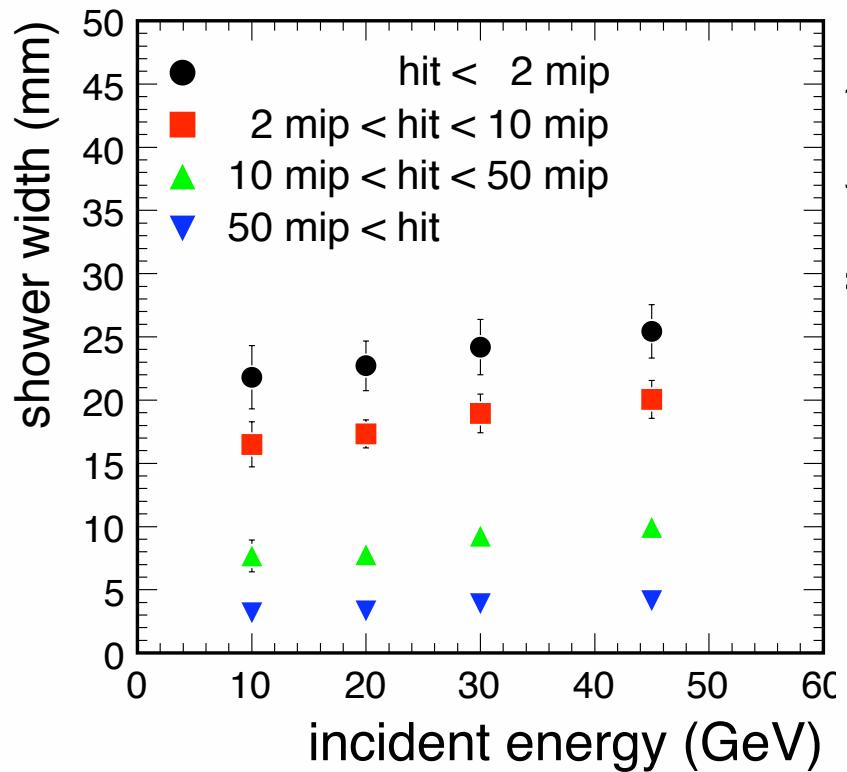
Simulations with $3 \times 3 \text{ mm}^2$ detection pads

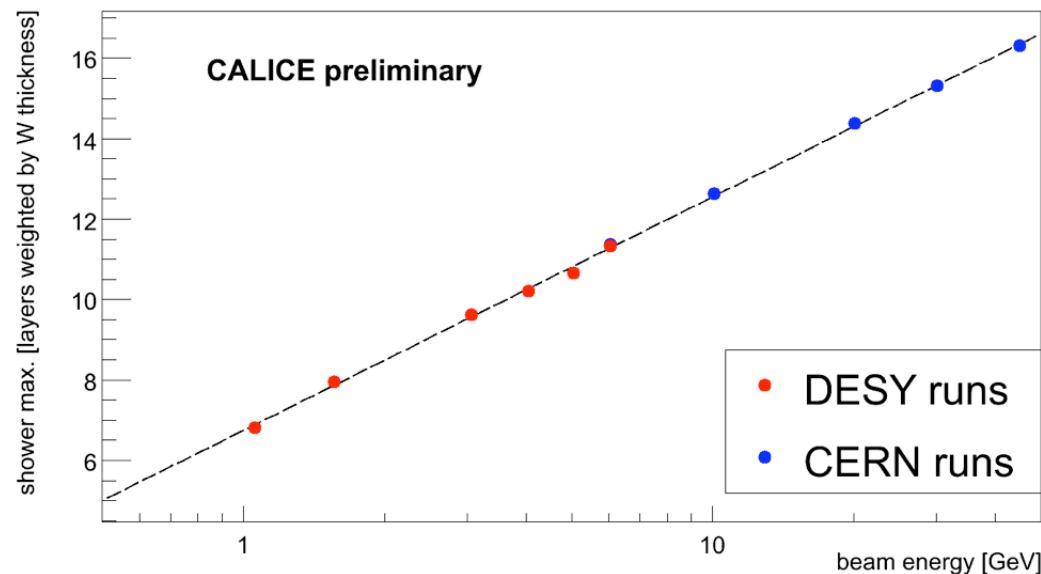
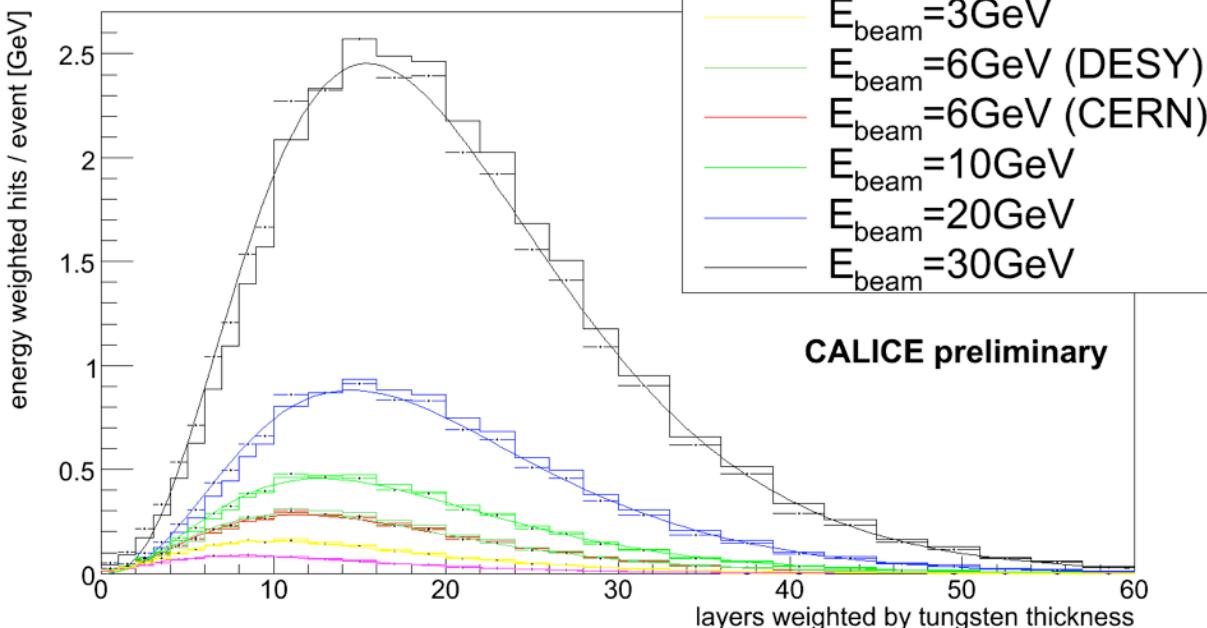


DESY data with $10 \times 10 \text{ mm}^2$ detection pads

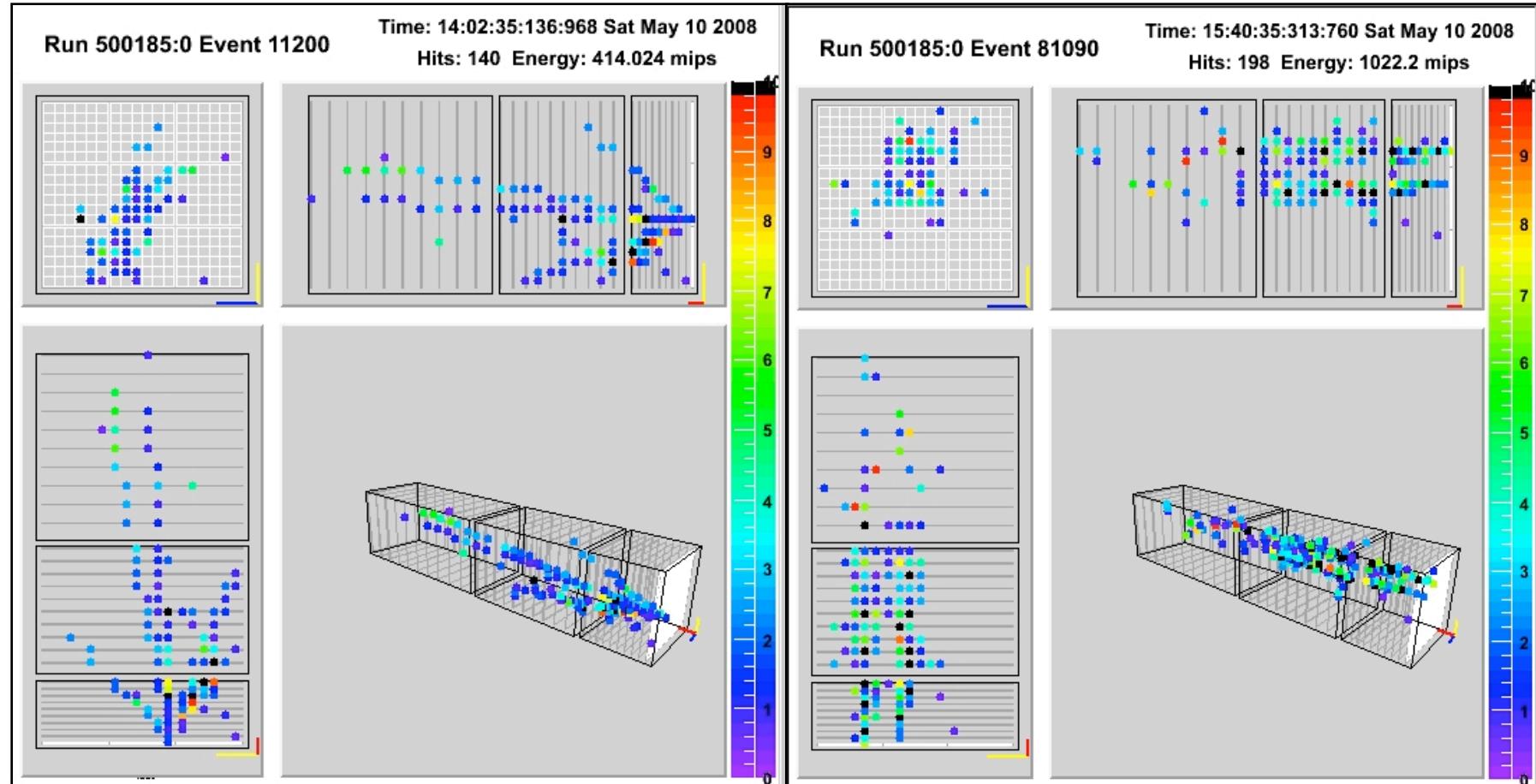
D. Benchekroun,
Y. Khoulaki





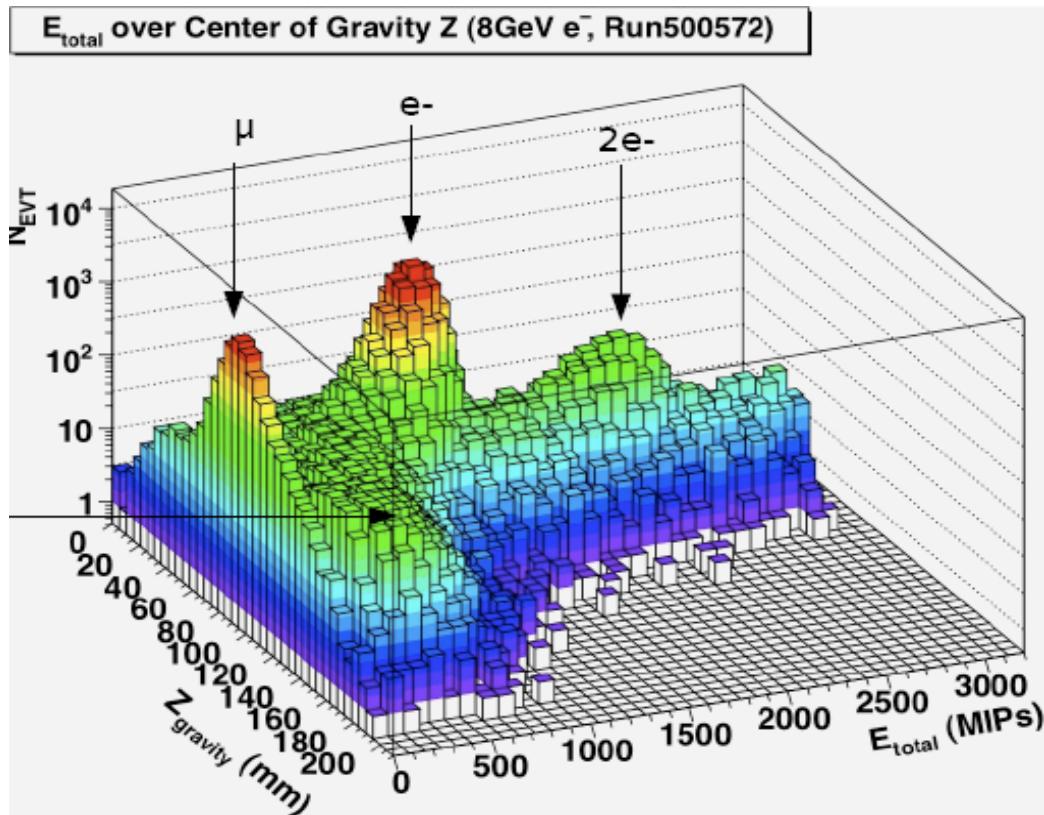


... accent sur la reponse aux hadrons !



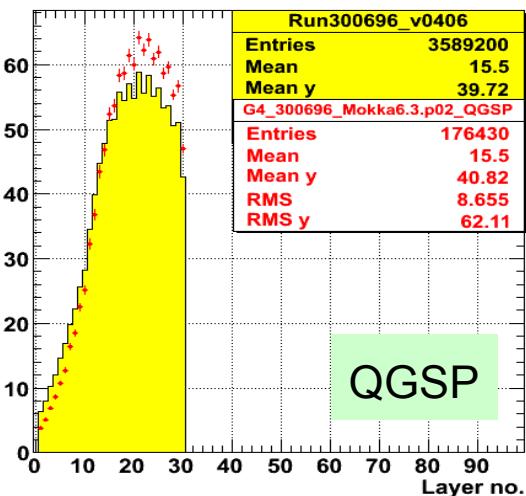
FNAL 8 GeV pion beam

... accent sur la réponse aux hadrons !

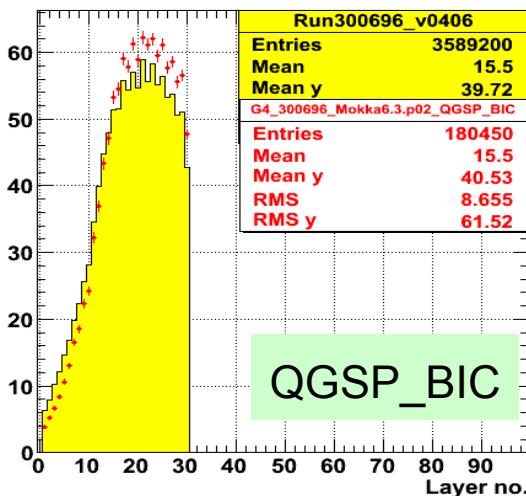


- Large muon contamination
- Multi-particle events (up to 5 π^-)
- Particle types are separated clearly in the ECAL

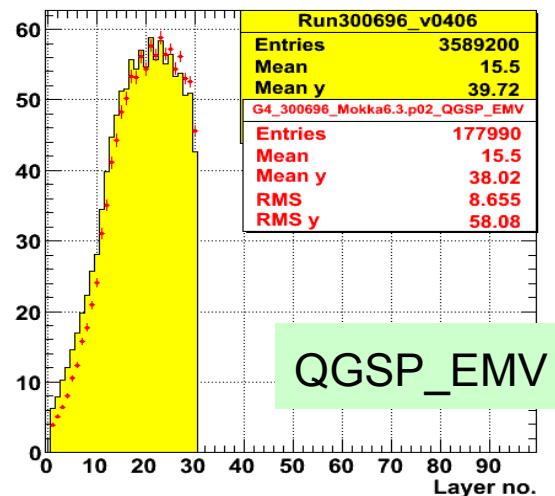
Energy v Plane



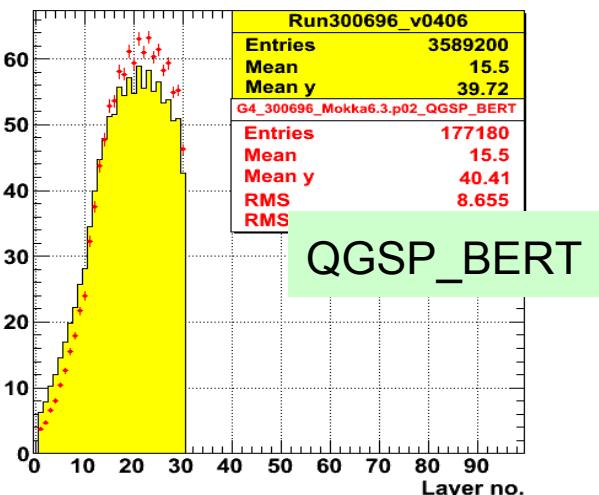
Energy v Plane



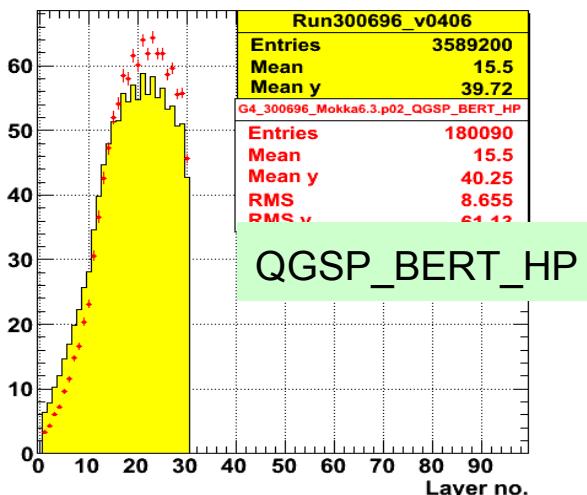
Energy v Plane



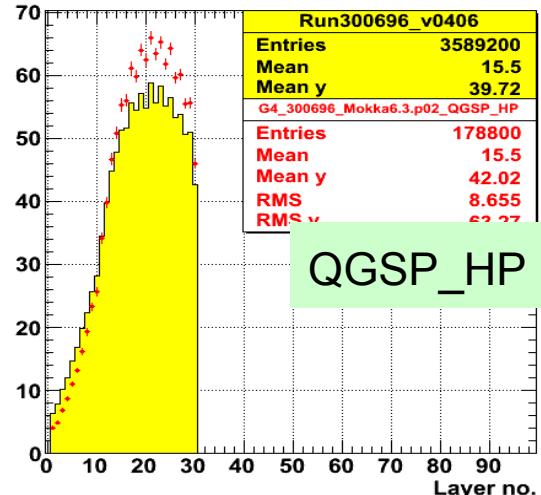
Energy v Plane



Energy v Plane



Energy v Plane



GARLIC

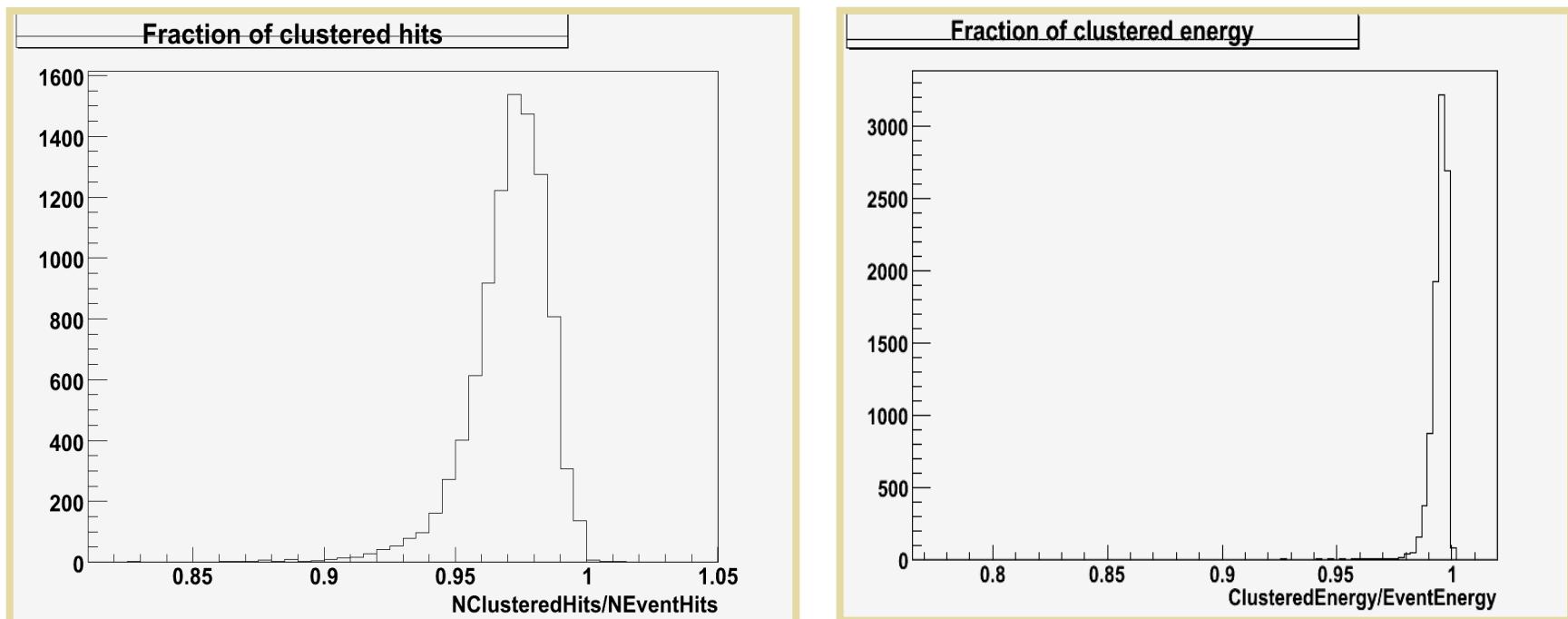


- Try to improve clustering of photon contribution in jets
- Based on REPLIC
- Implemented in the MARLIN software framework
- For SiW ECAL: Prototype + ILD version
- Seed search via 2-dim energy projection in first $7X_0$
- Clustering based on neighbour criterion
- Several iterations from front to back
- Designed for pointing photons, works for all angles
- Rejection via simple criteria (#hits, minimum energy, seed criteria,...)
- + Computation of cluster variables (eccentricity, width, direction, energy deposit in different regions,...) - ANN
- Correction for wafer guard ring and module gaps

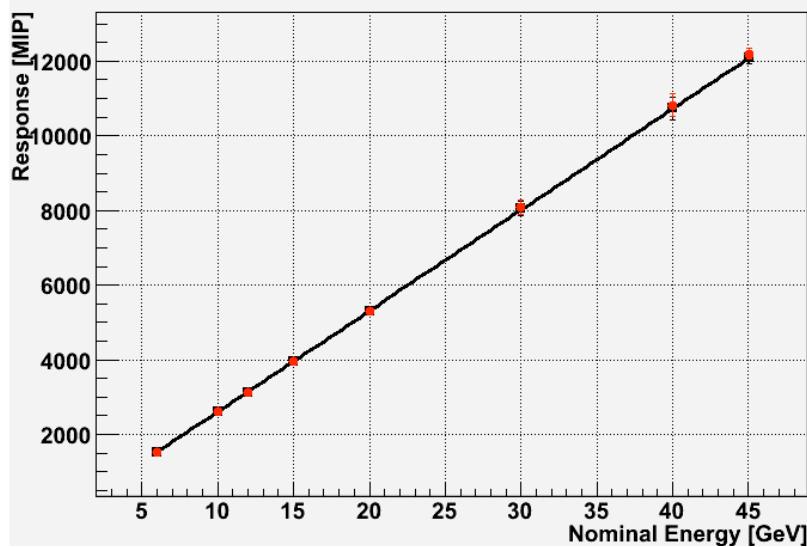
- „Ghost hits“ in fiber gap are counted
- Supression of noise hits and flactuations
- Works well at angles $\neq 0$
- Further optimisation possible



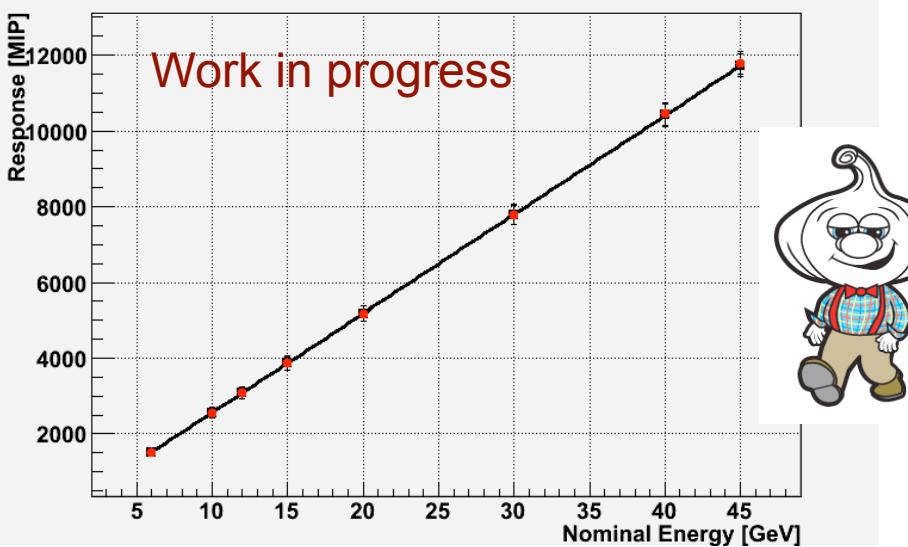
0 deg



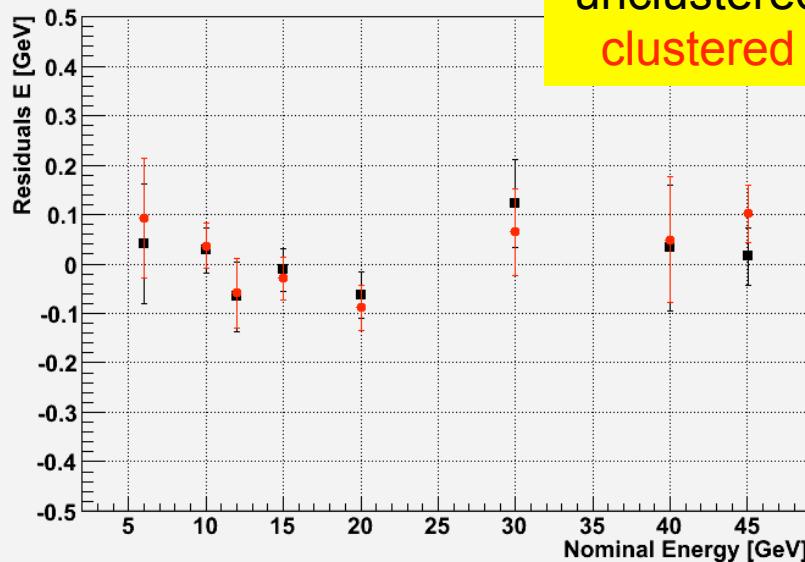
Linearity



Linearity MC

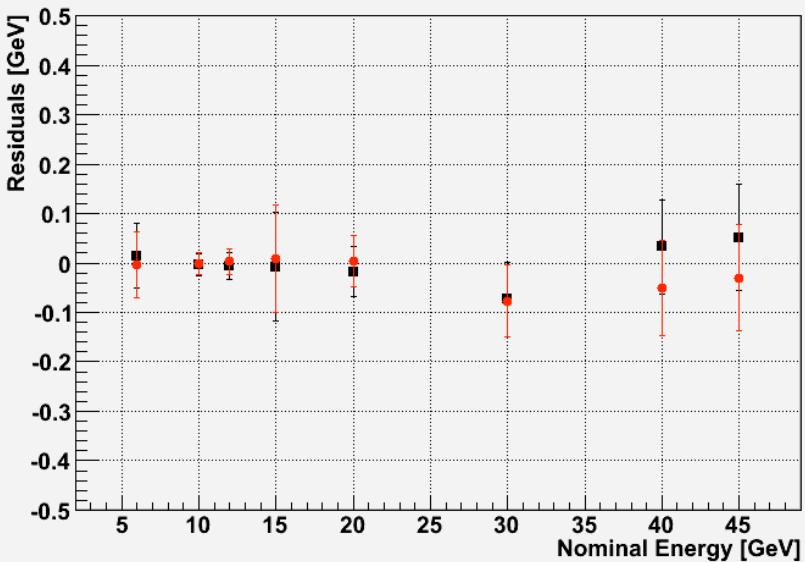


Residuals to Linearity



unclustered
clustered

Residuals to Linearity MC

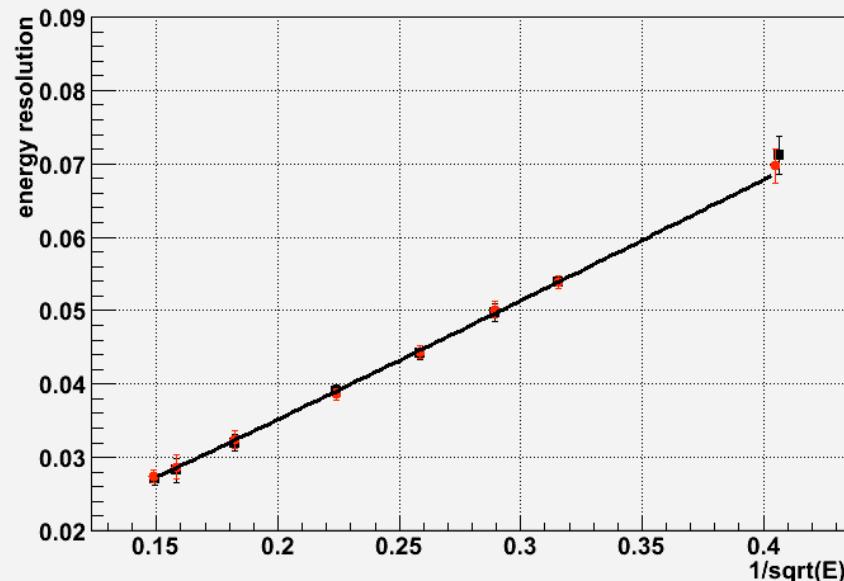




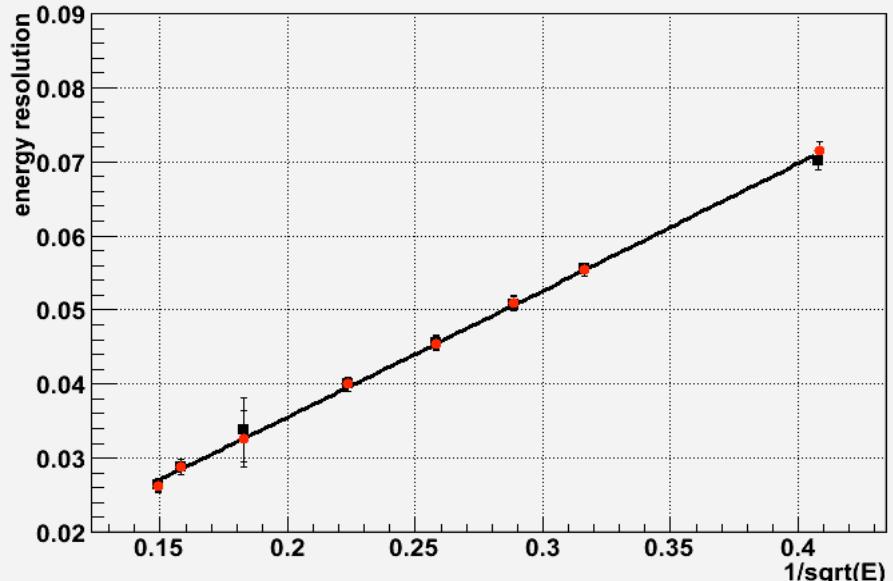
Résolution en énergie

unclustered / clustered

Energy Resolution



Energy Resolution MC



**Beaucoup de choses intéressantes à faire,
nouvelles contributions bienvenues!**