

# ECAL Resolution /CERN 2006/

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# Motivation

According to the PFA, neutral flow is reconstructed in calorimeter

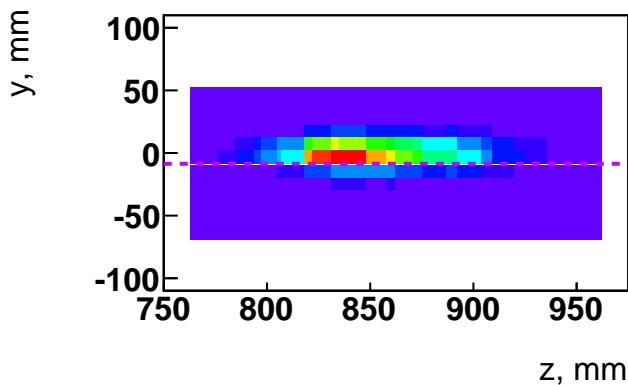
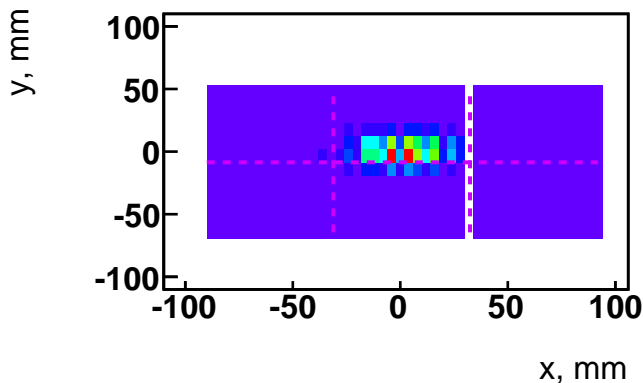
Charged flow is isolated and reconstructed in tracker

Both ECAL energy and space resolution are important.

Space resolution has not been measured yet.

Beam test data collected at CERN and Fermilab are available.

# The CALICE Si-W ECAL prototype



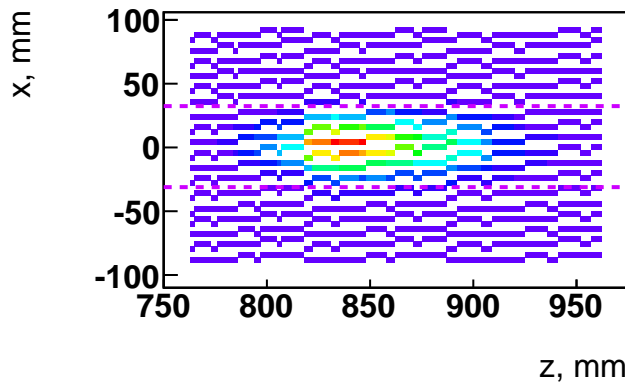
30 layers with 3 x 2 wafers with 6 x 6 pads

In total: 6480 pads, 10 x 10 mm<sup>2</sup> each

layers aligned in y but shifted in x

absorber: 1.4 mm (layer 0 - 9), 2.8 mm (layer 10 - 19), 4.2 mm (layer 20 - 19)

Inter-wafer gaps ~ 1 mm



# Space resolution from data

1. Calculate energy weighted mean shower position,  $\vec{b} = \sum_{\text{hits}} \vec{r}_i w_i / \sum_{\text{hits}} w_i$
2. Measure distance to the track from drift chambers
3. Fit distance to Gaus

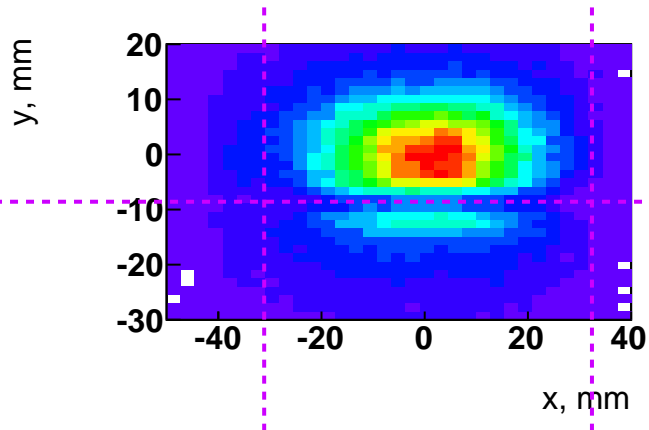
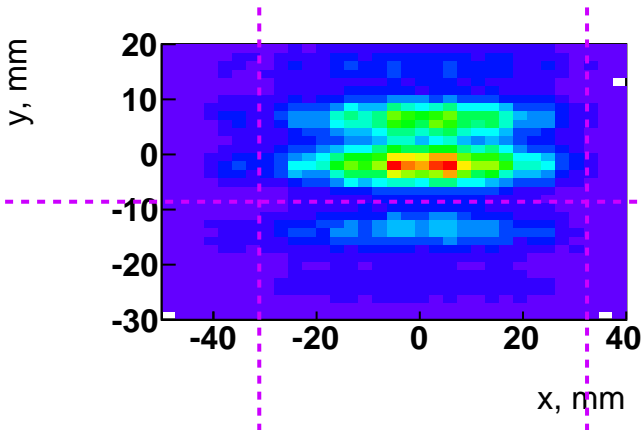
linear weights:  $w_i = E_i / E_{\text{tot}}$

logarithmic weights:

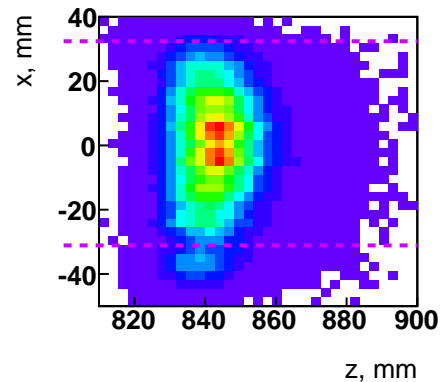
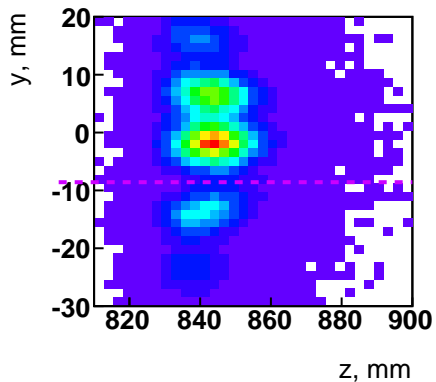
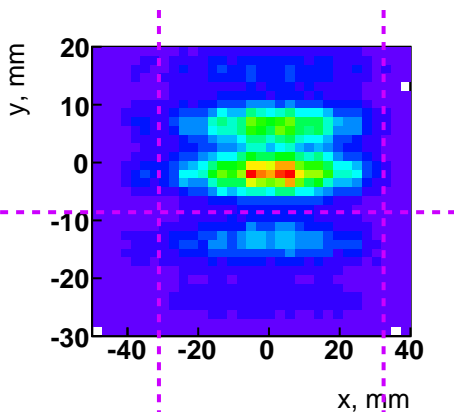
$$w_i = \max\{0, w_0 + \log(E_i / E_{\text{tot}})\}$$

took  $w_0 = 5^*$

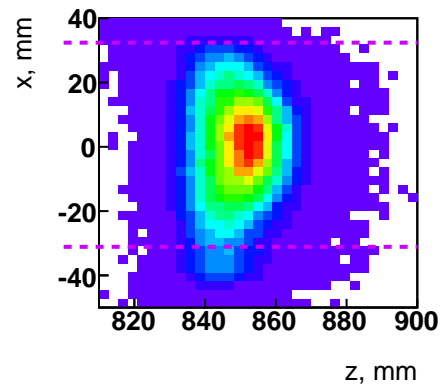
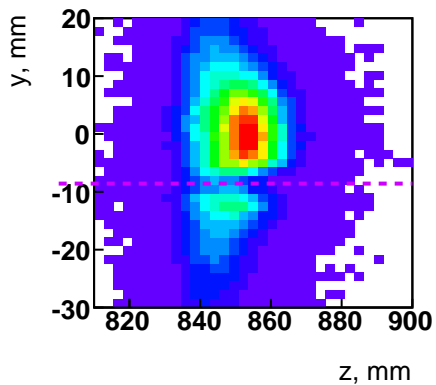
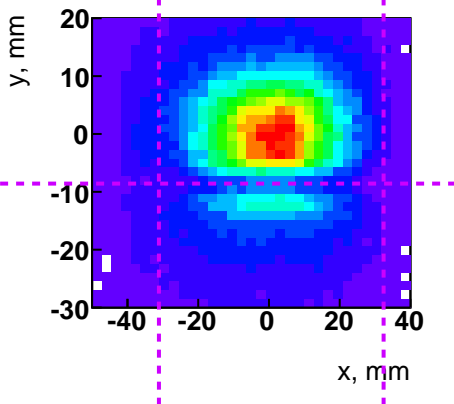
\*a dedicated study performed by Loran Morin



**b** →

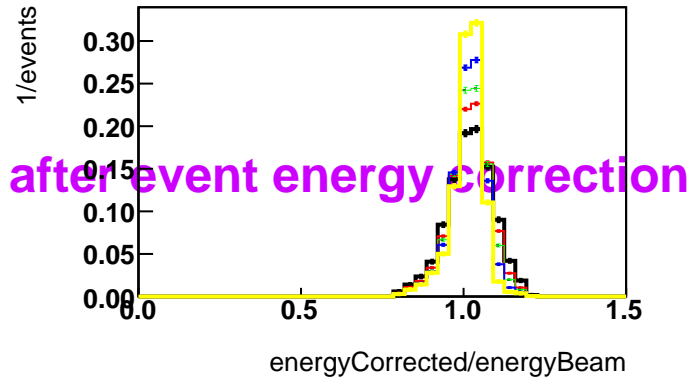
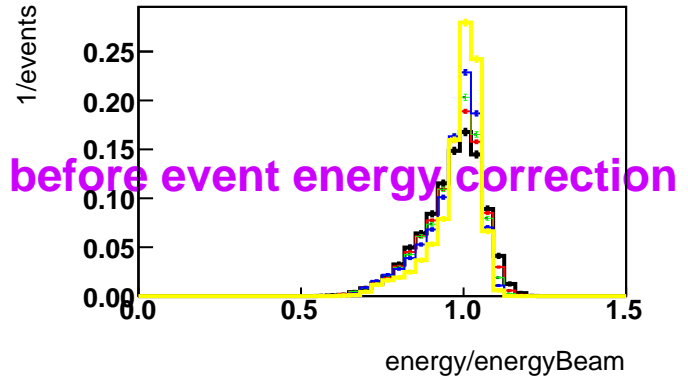
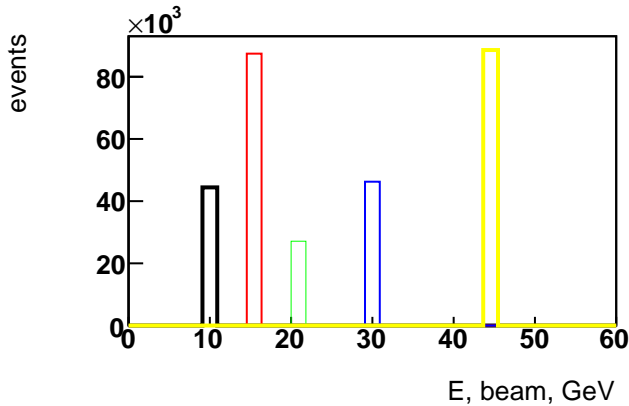


↑ **linear / logarithmic** ↓

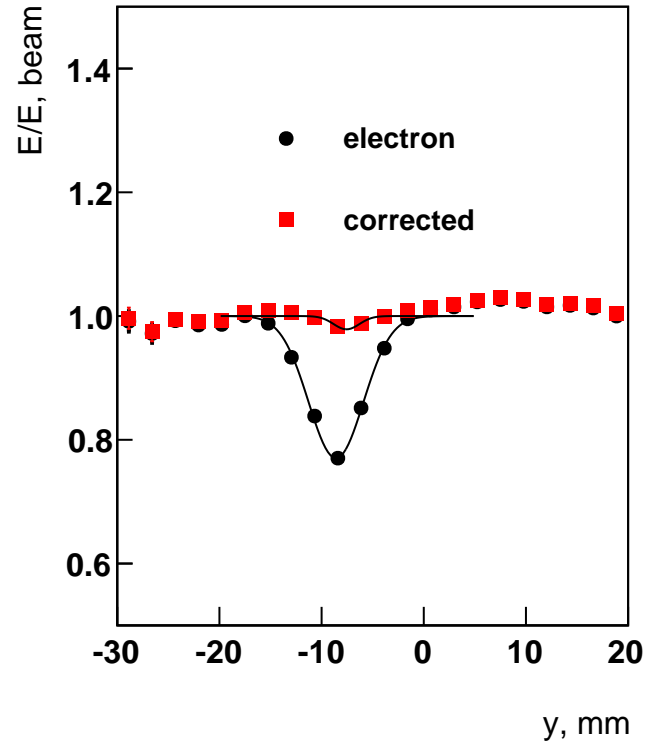
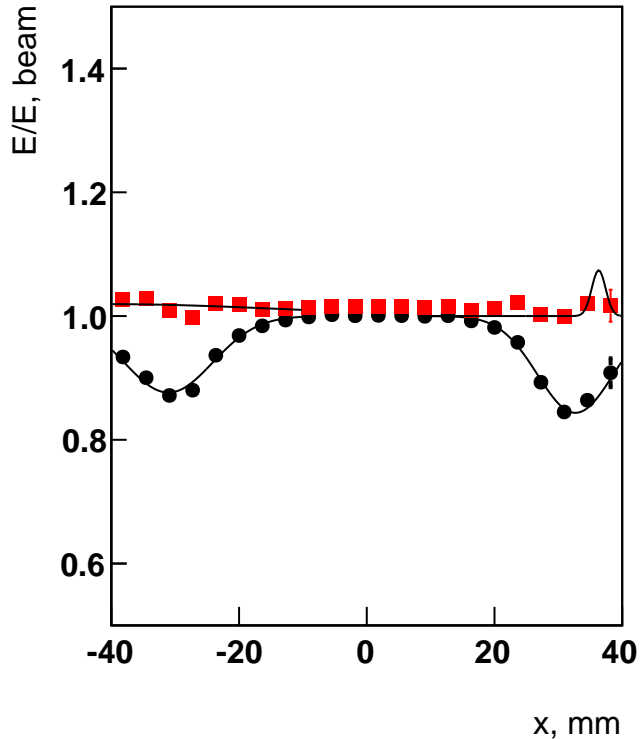


# Energy correction

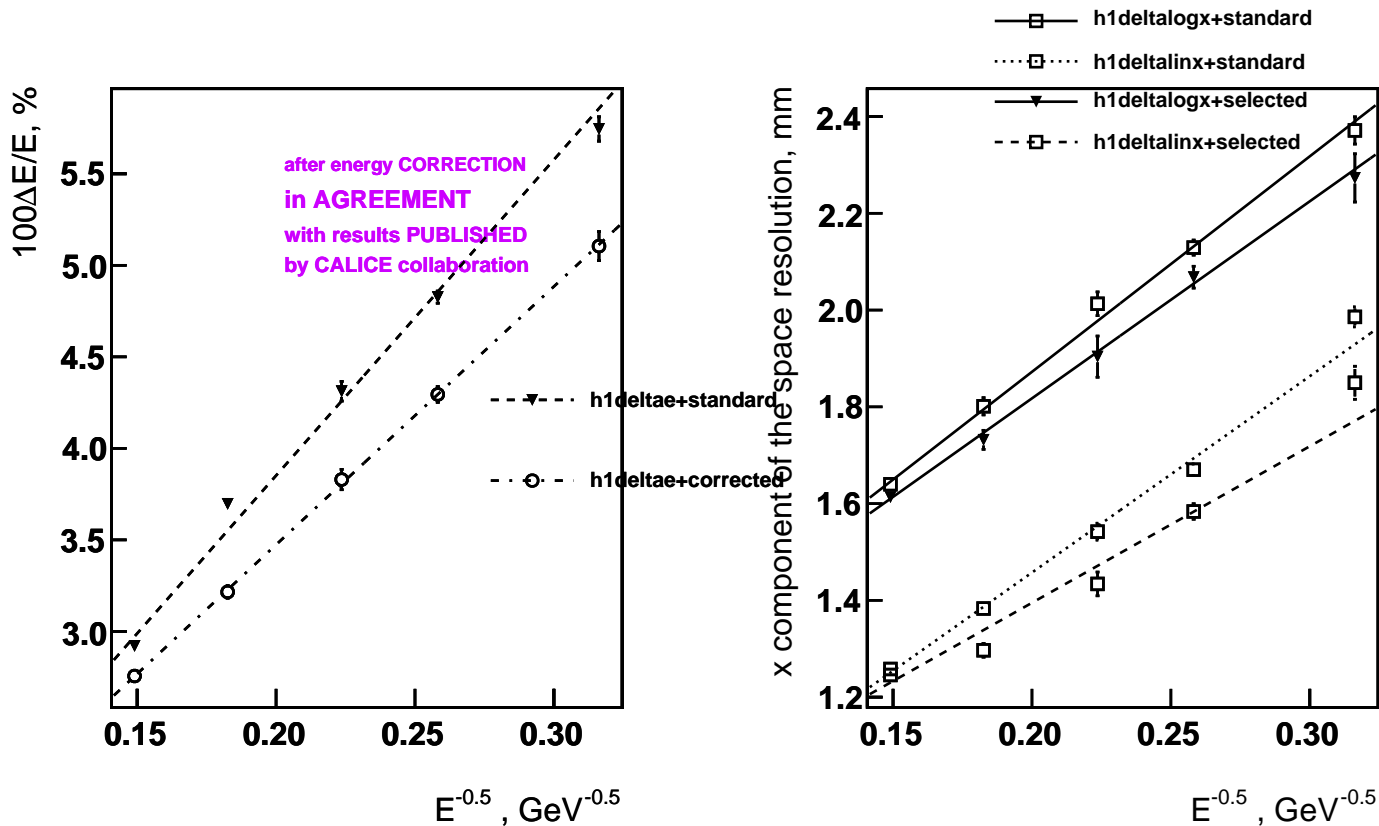
1. Ignore hits with  $E_i \leq 0.6$  MIP
2. Account for absorber  $E_i * 1.1/2/2.7$
3. Correct event energy



# Inter wafer gaps



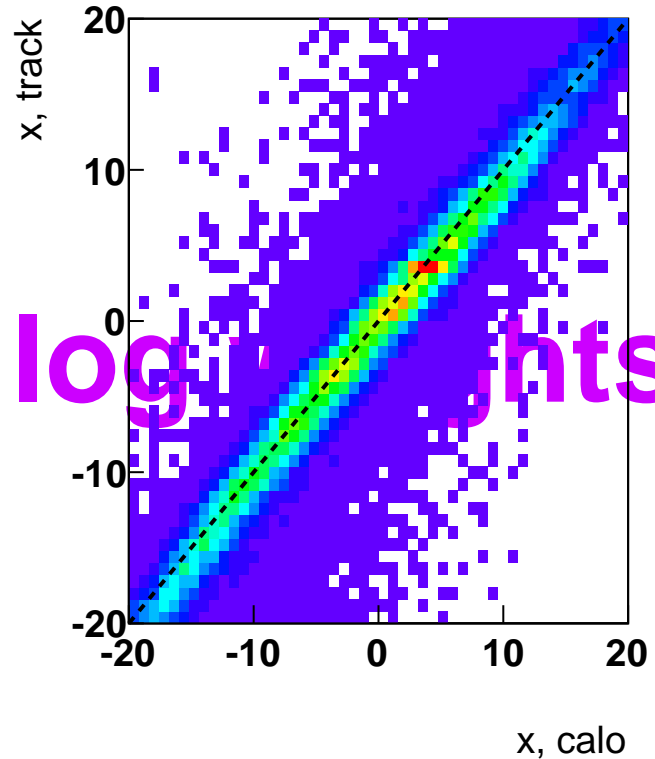
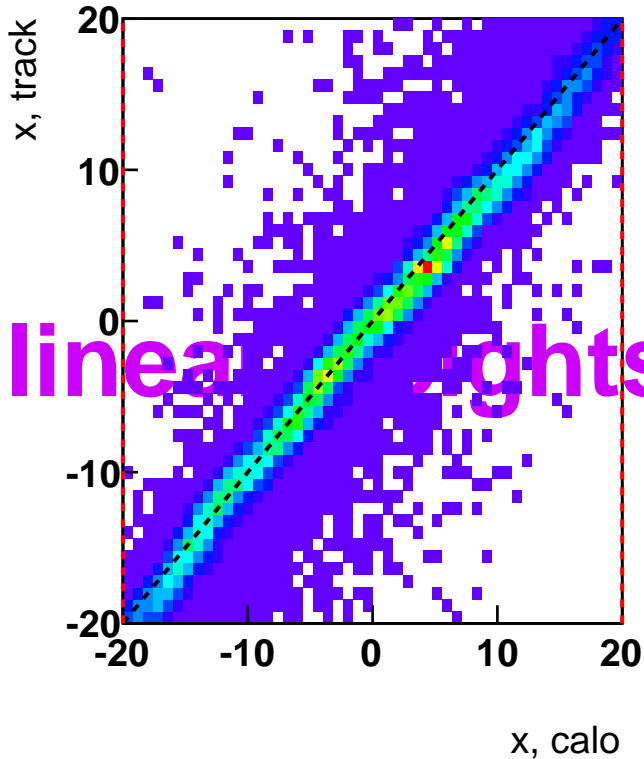
# Results and conclusions



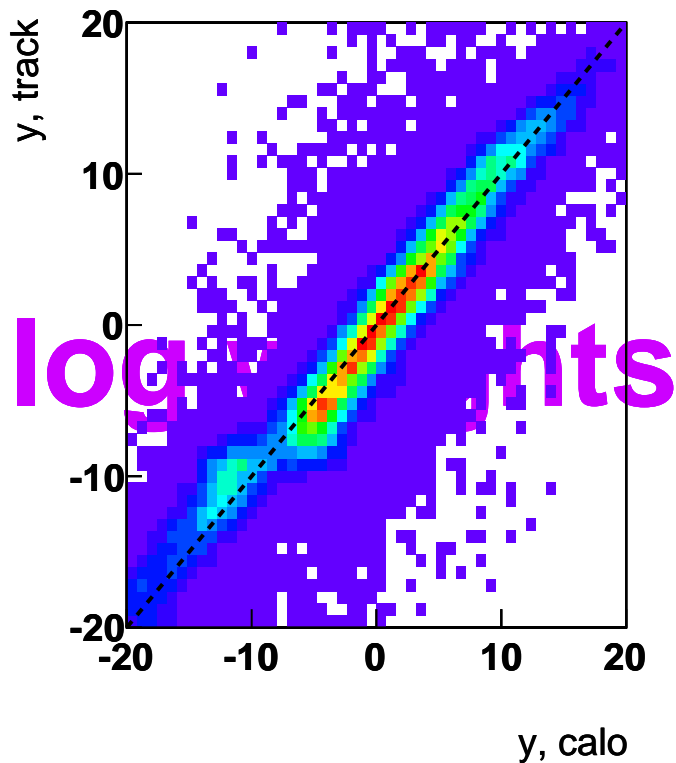
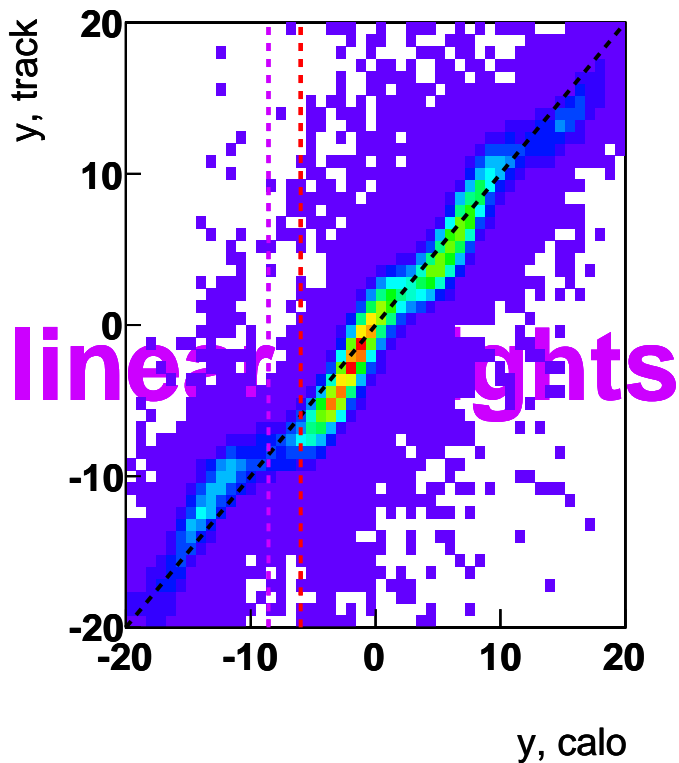


# APPENDIX

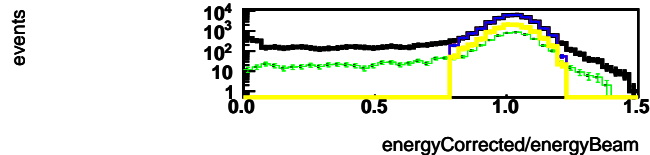
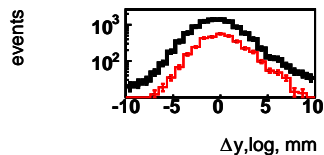
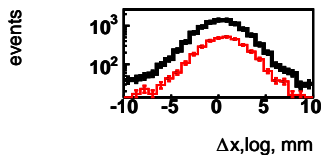
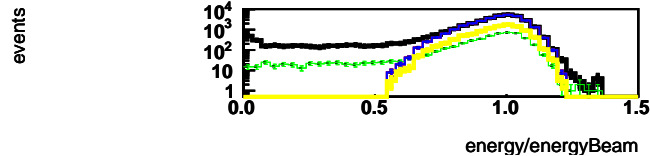
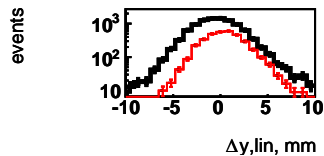
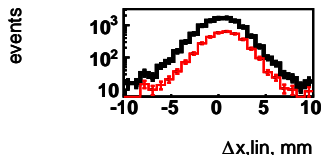
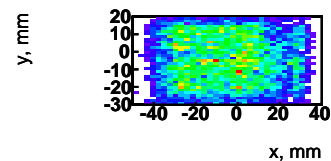
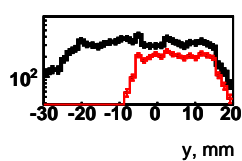
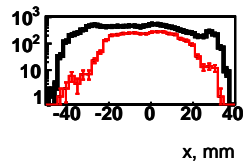
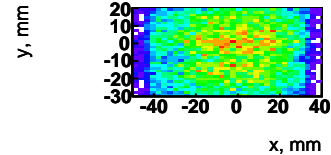
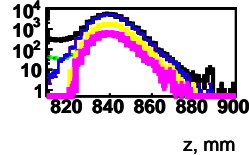
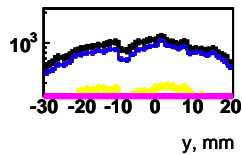
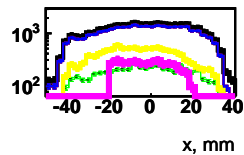
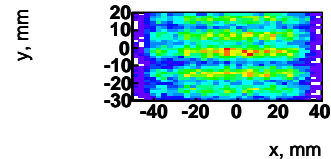
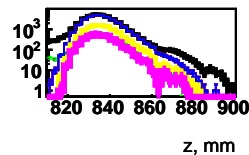
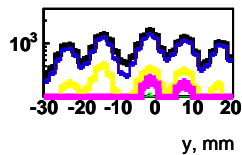
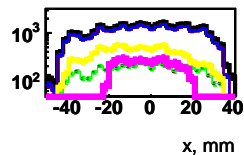
# Reference, x



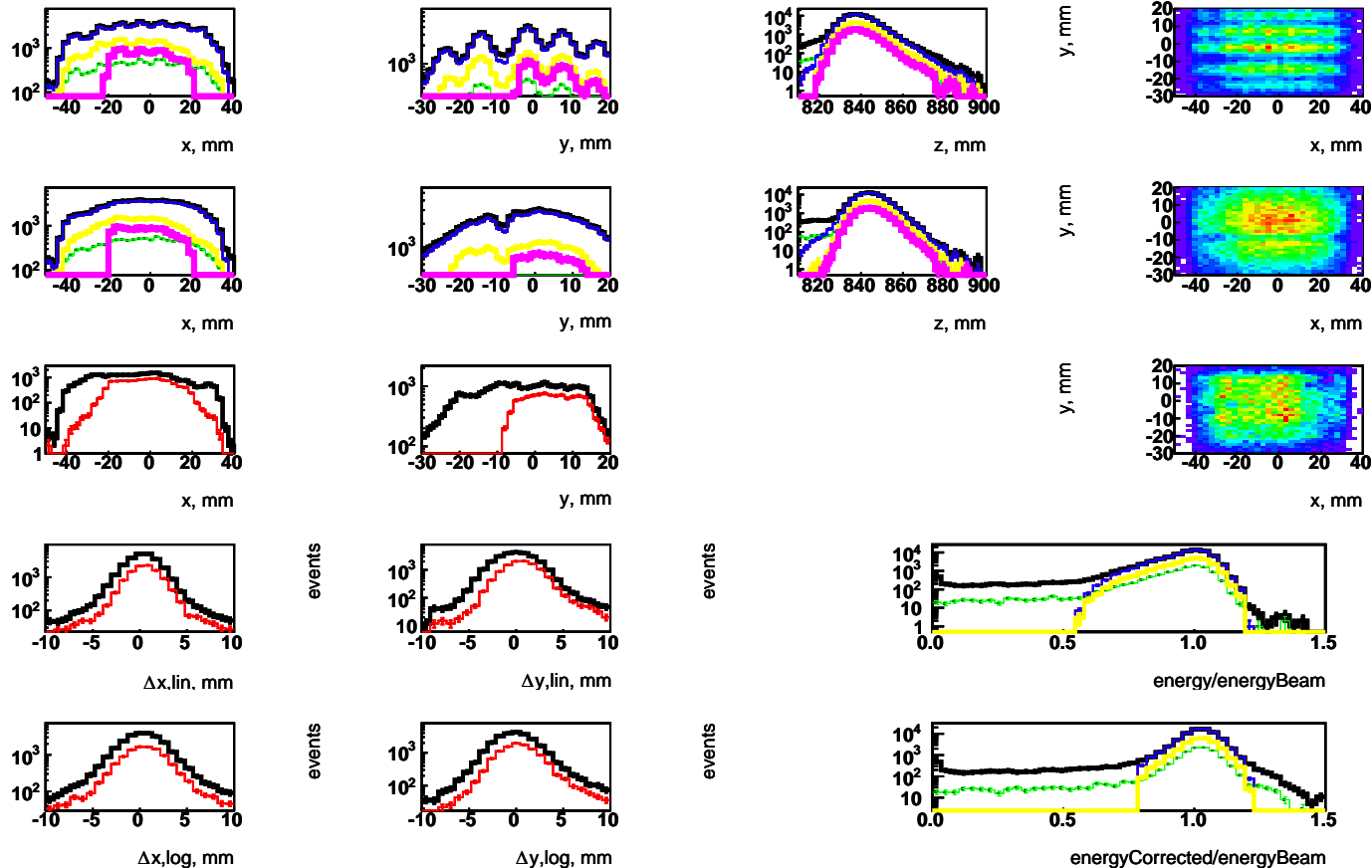
# Reference, $y$



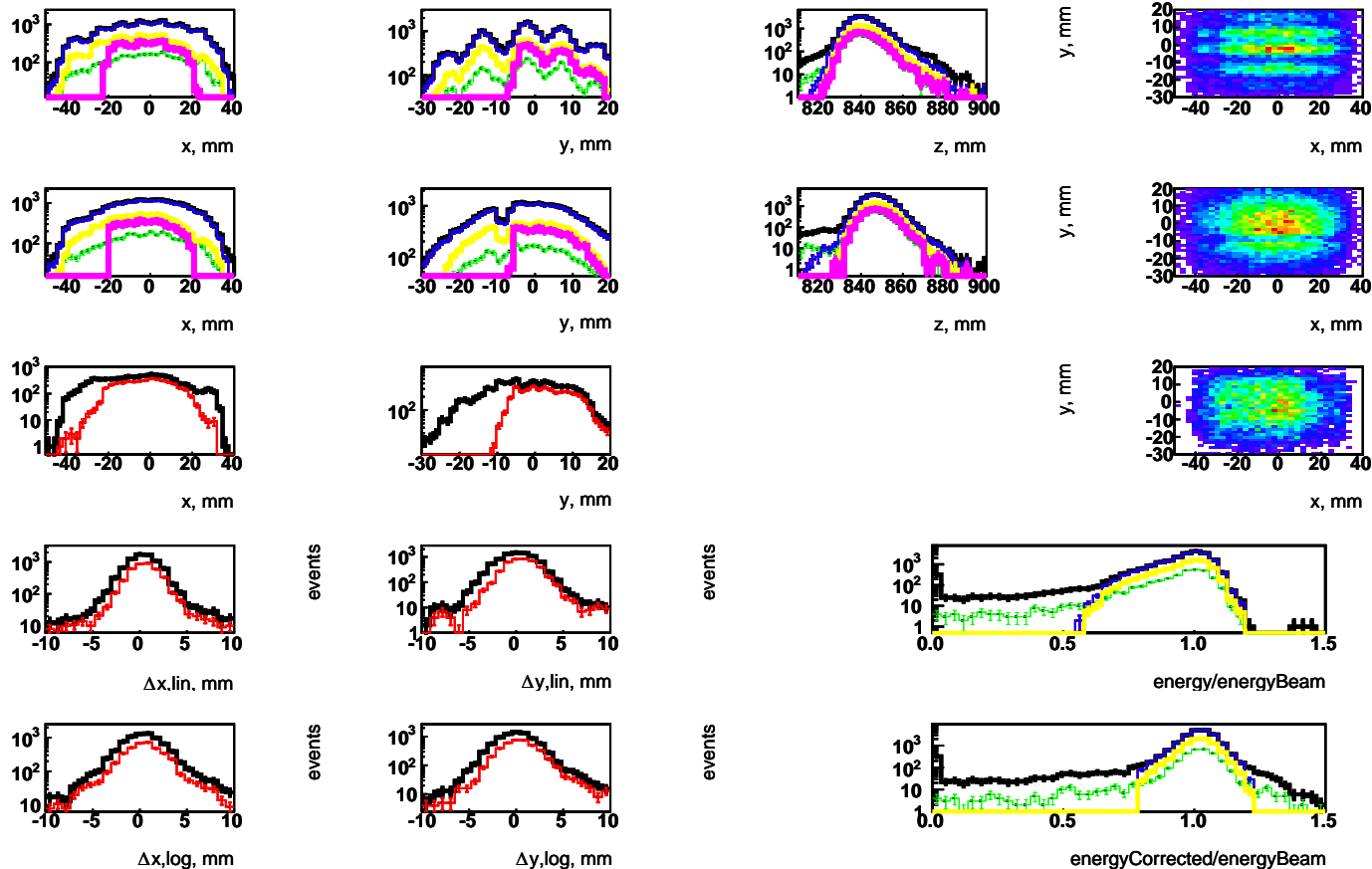
# Measurement at 10 GeV



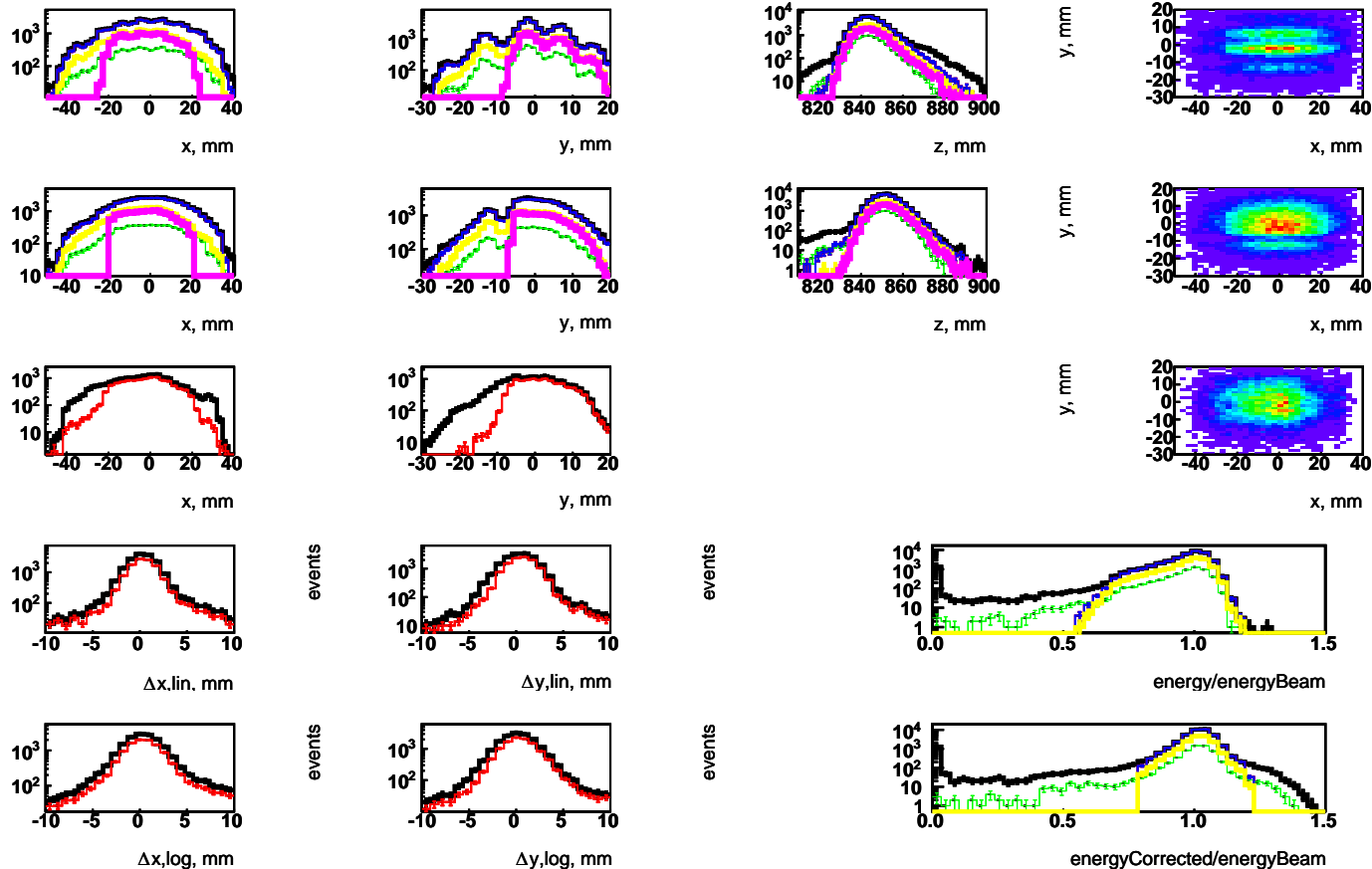
# Measurement at 15 GeV



# Measurement at 20 GeV



# Measurement at 30 GeV



# Measurement at 45 GeV

