

ATLAS Calorimeter Compensation using the Numeric Method – a status report

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The numeric method

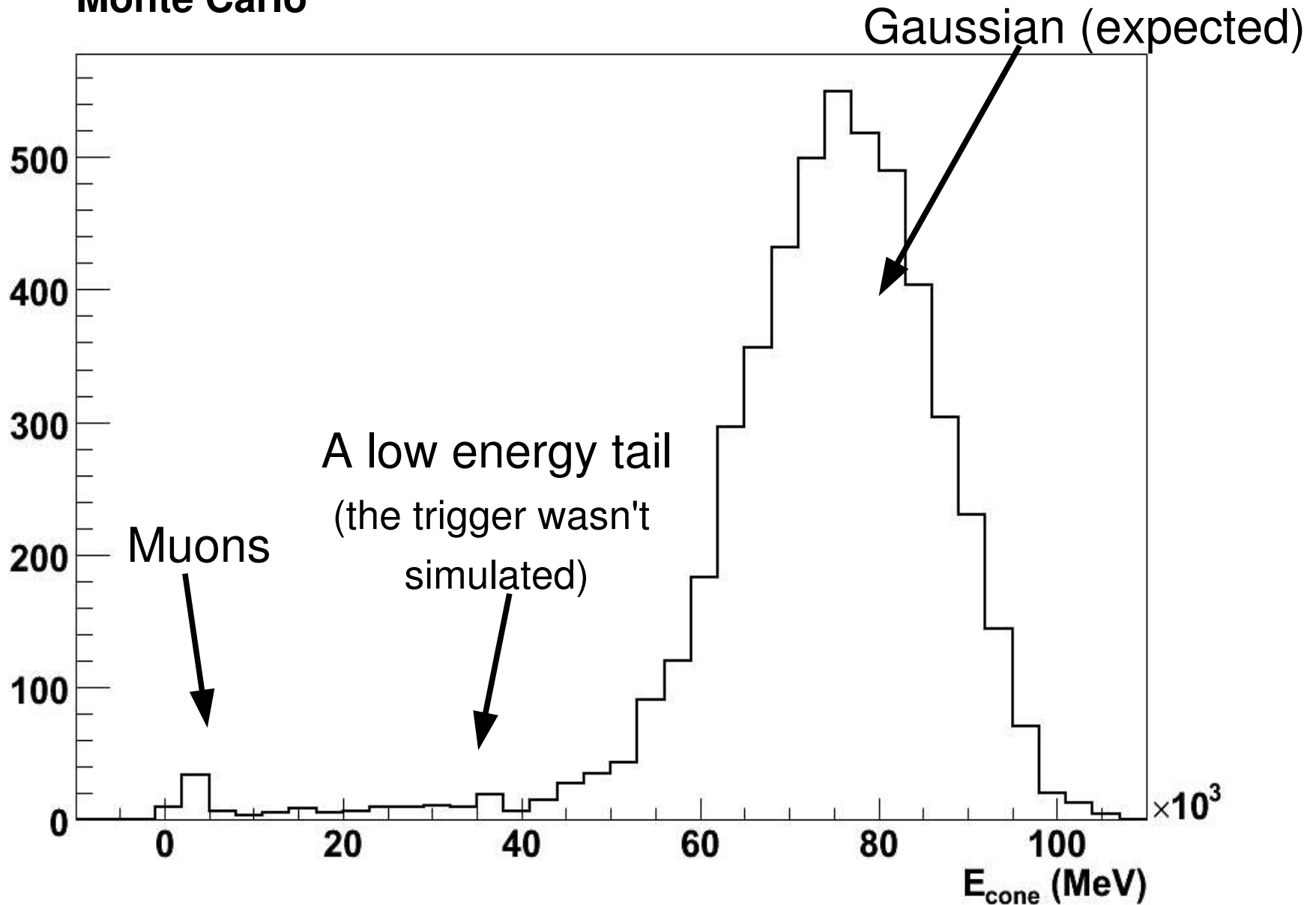
Non-iterative procedure using tabulated correction factors w on the *cell level*:

$$E_{\text{corr}}^{\text{cell}} = w(E_{\text{rec}}^{\text{cell}} / \text{Vol}^{\text{cell}}, E_{\text{global}}) \cdot E_{\text{rec}}^{\text{cell}}$$

- E_{global} is the energy of topo clusters within a cone
Only the most energetic cone of each event is used
- $w = E_{\text{dep}}^{\text{cell}} / E_{\text{rec}}^{\text{cell}}$
(= energy truly deposited / energy reconstructed on the EM level)
- Simulated pions (ver 10.0.4) used to determine the weights
Are currently moving to ver 11.0.41

Energy cone for $E_{\text{beam}} = 100 \text{ GeV}$, $\eta = 0.35$, opening angle 11°

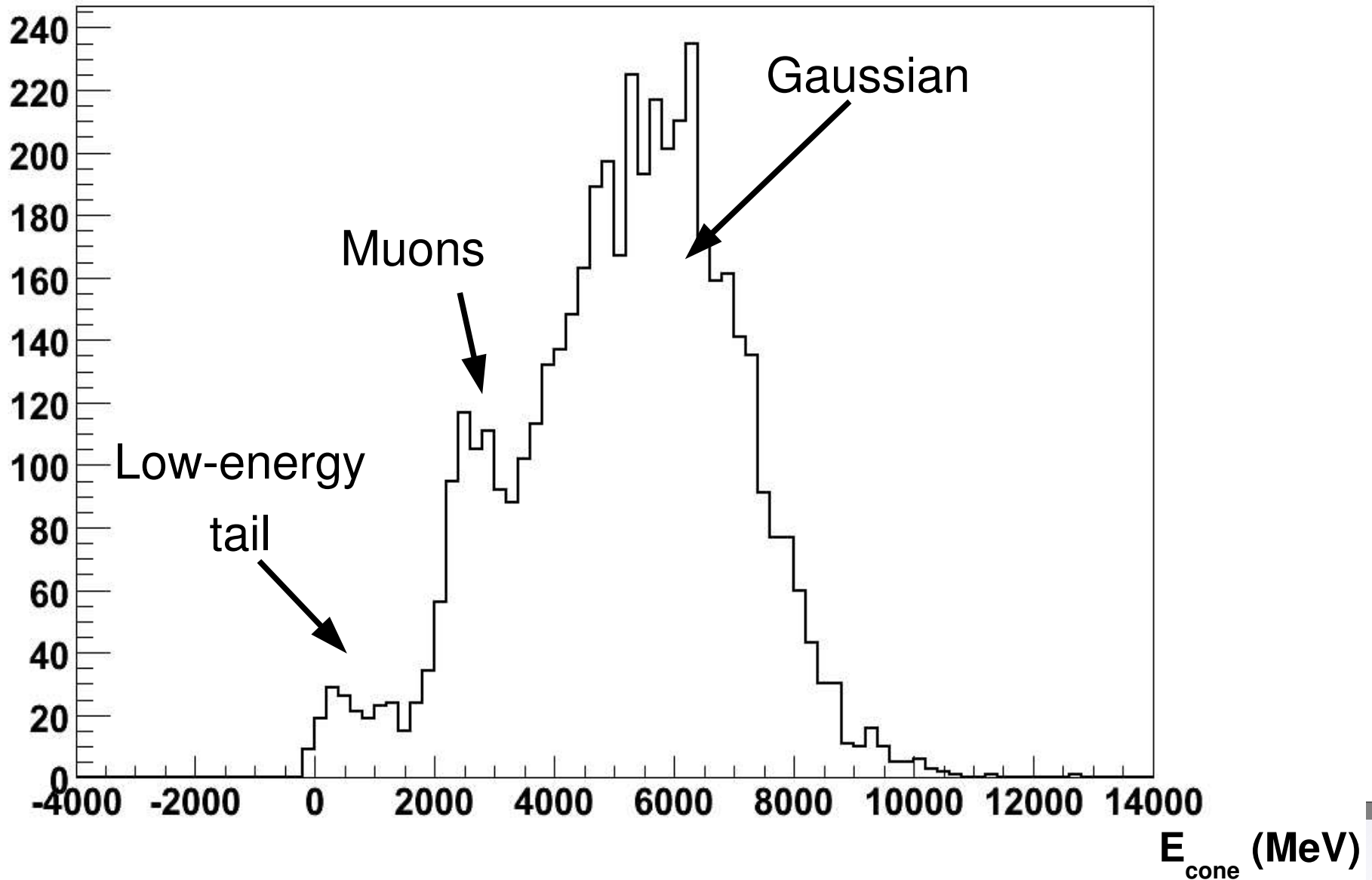
Monte Carlo



Energy cone for $E_{\text{beam}} = 9 \text{ GeV}$, $\eta = 0.35$, opening angle 11°

Econe_9	
Entries	4781

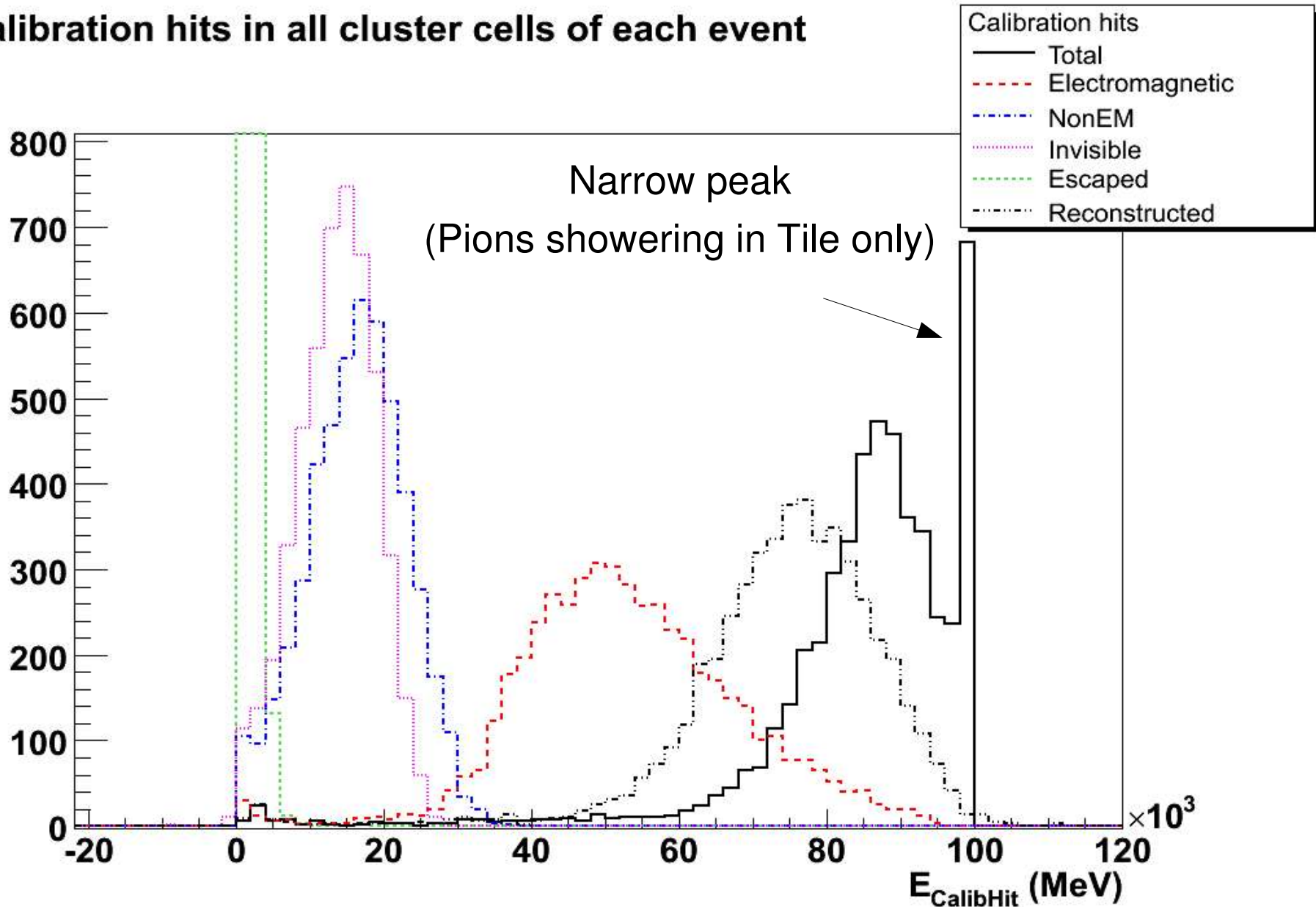
Monte Carlo



CalibHits in all cluster cells per event,

$$E_{\text{beam}} = 100 \text{ GeV}$$

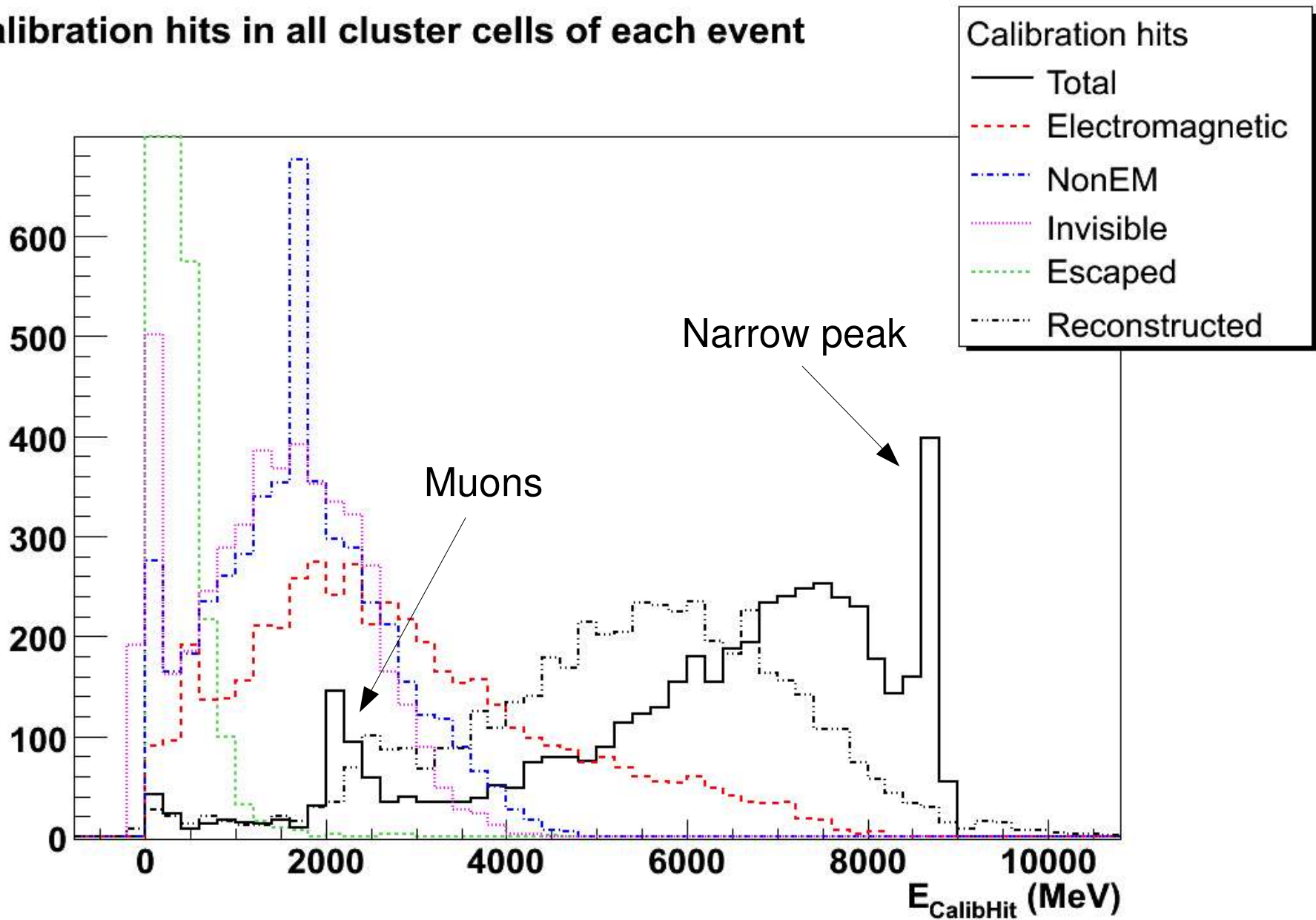
Calibration hits in all cluster cells of each event



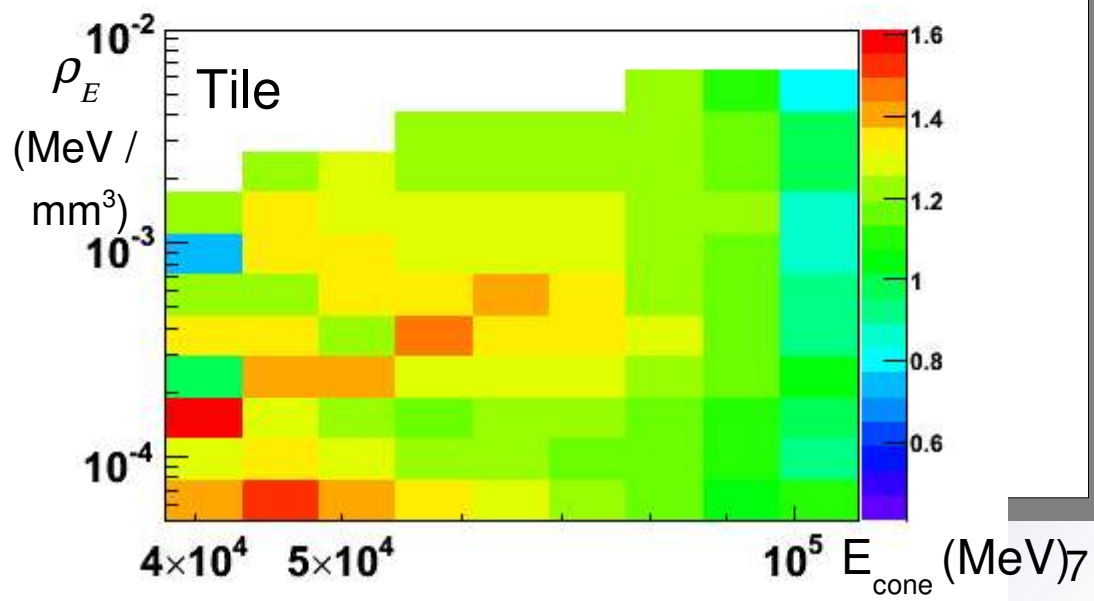
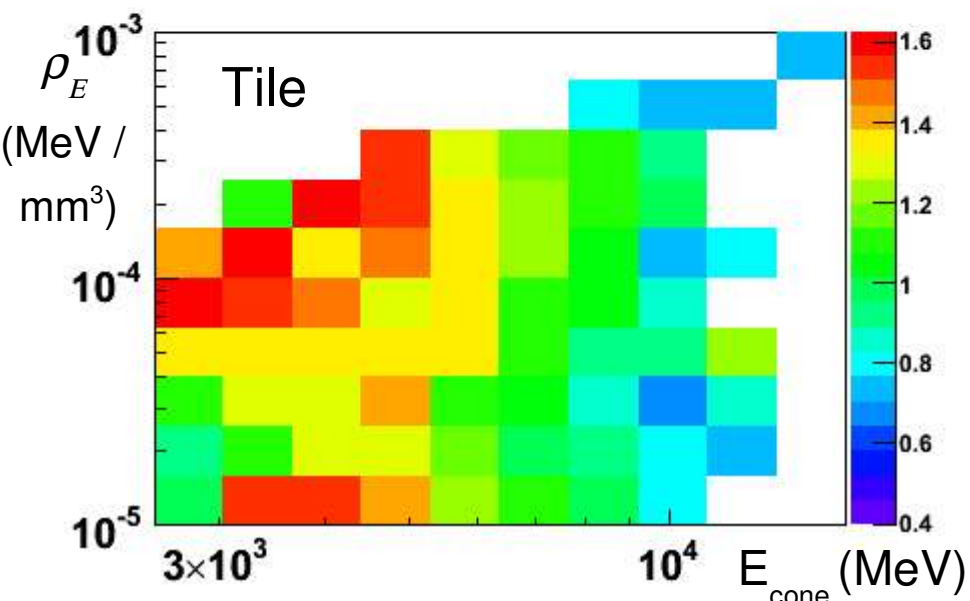
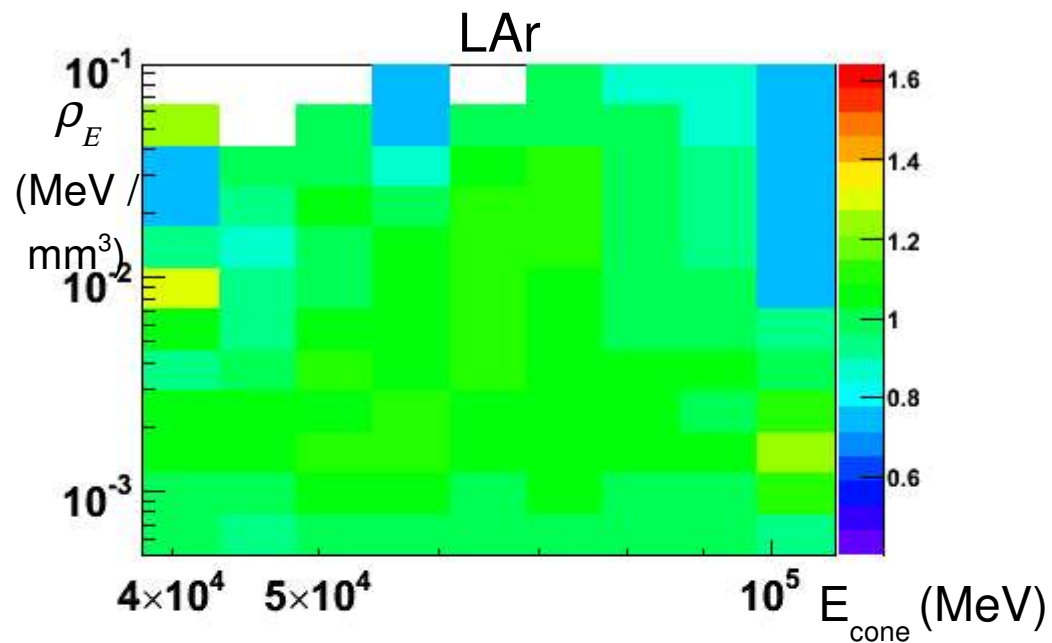
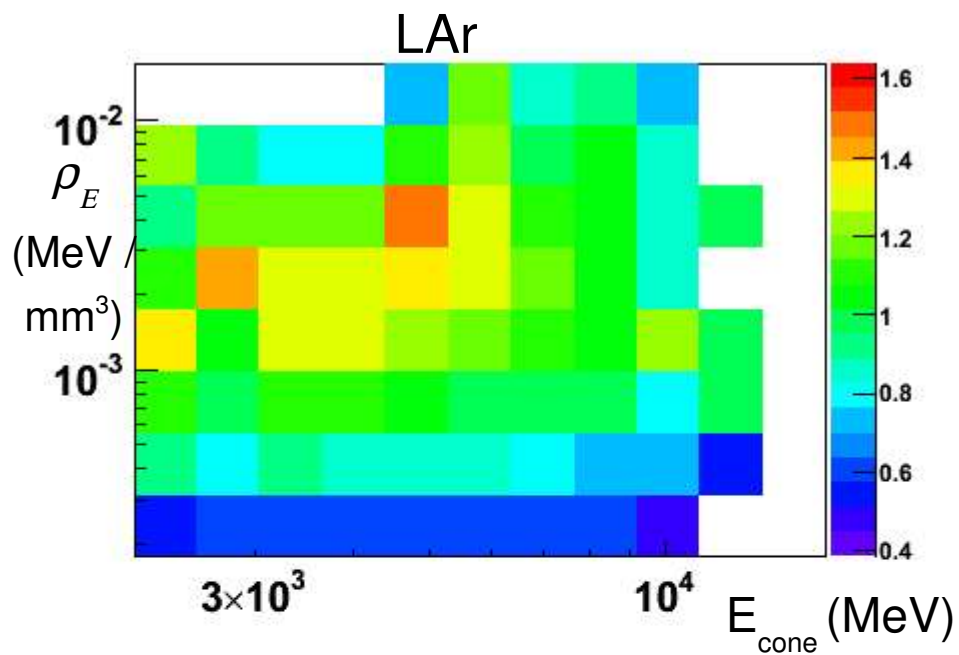
CalibHits in all cluster cells per event,

$$E_{\text{beam}} = 9 \text{ GeV}$$

Calibration hits in all cluster cells of each event



Weight tables

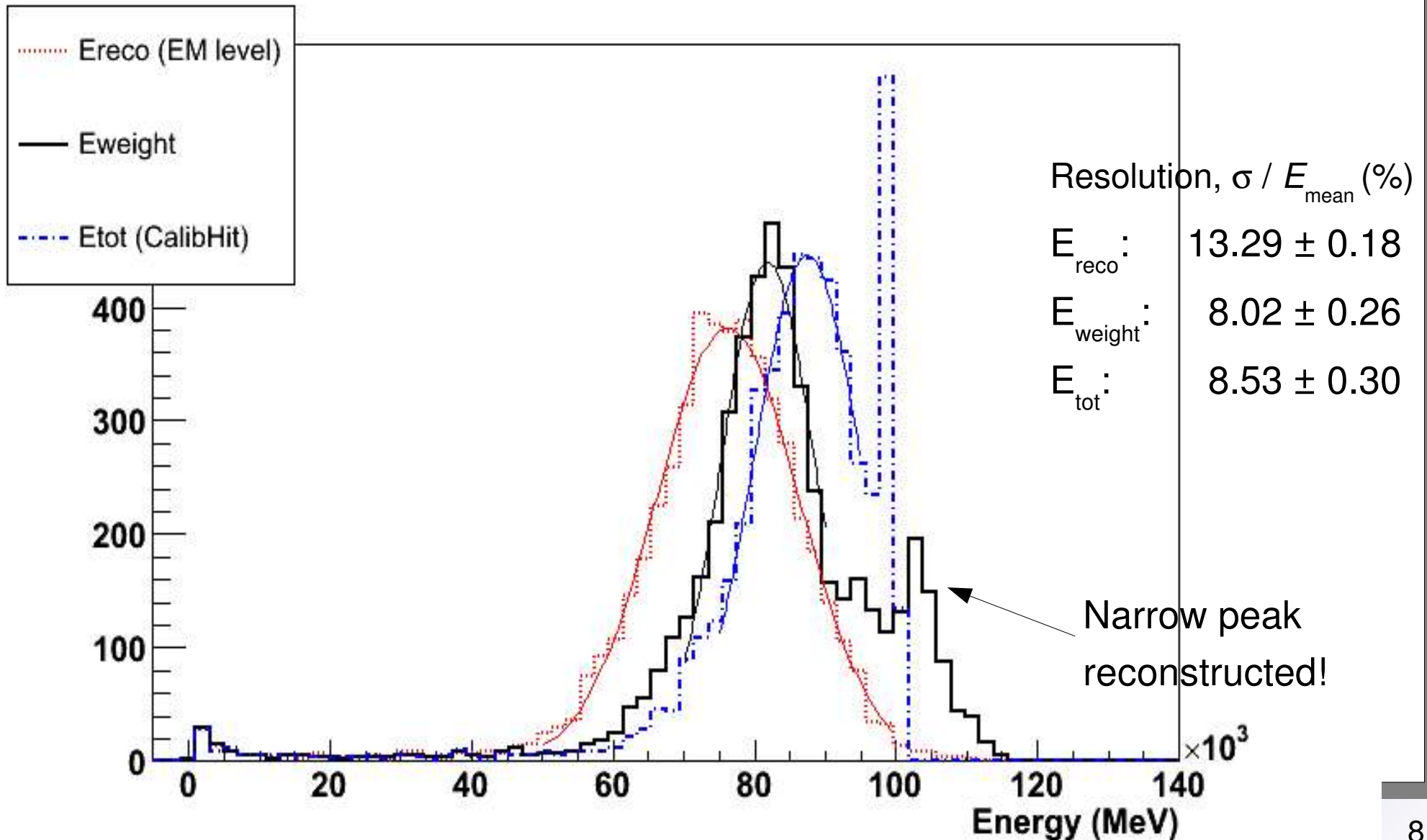


Weights applied on independent MC sample

Applied weights and CalibHit

$E_{\text{beam}} = 100 \text{ GeV}$

Etot_100	
Entries	4992

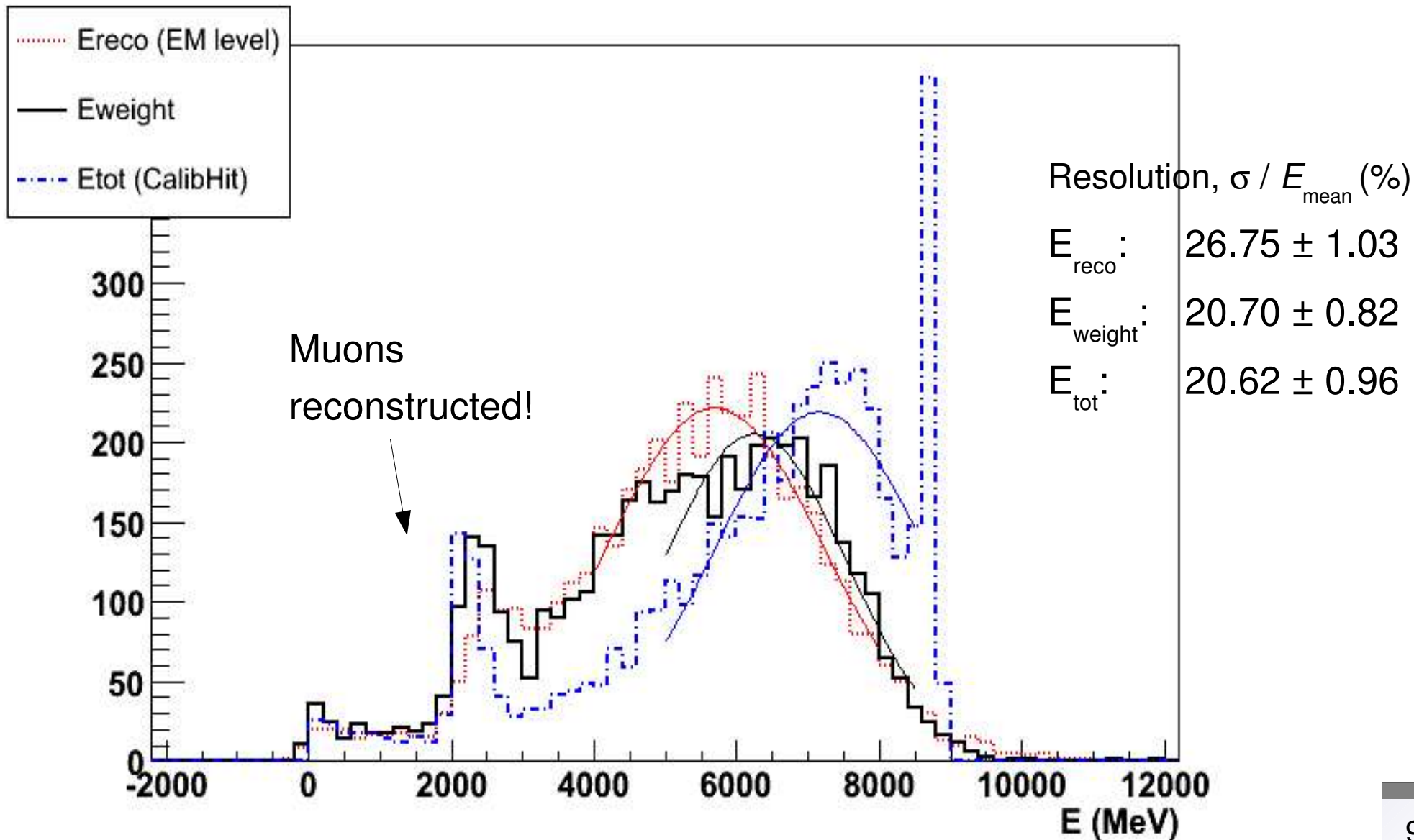


Weights applied on independent MC sample

Applied weights and CalibHit

$E_{\text{beam}} = 9 \text{ GeV}$

Etot_9	
Entries	4781



Difference $E_{\text{weight}} - E_{\text{CalibHit}}$

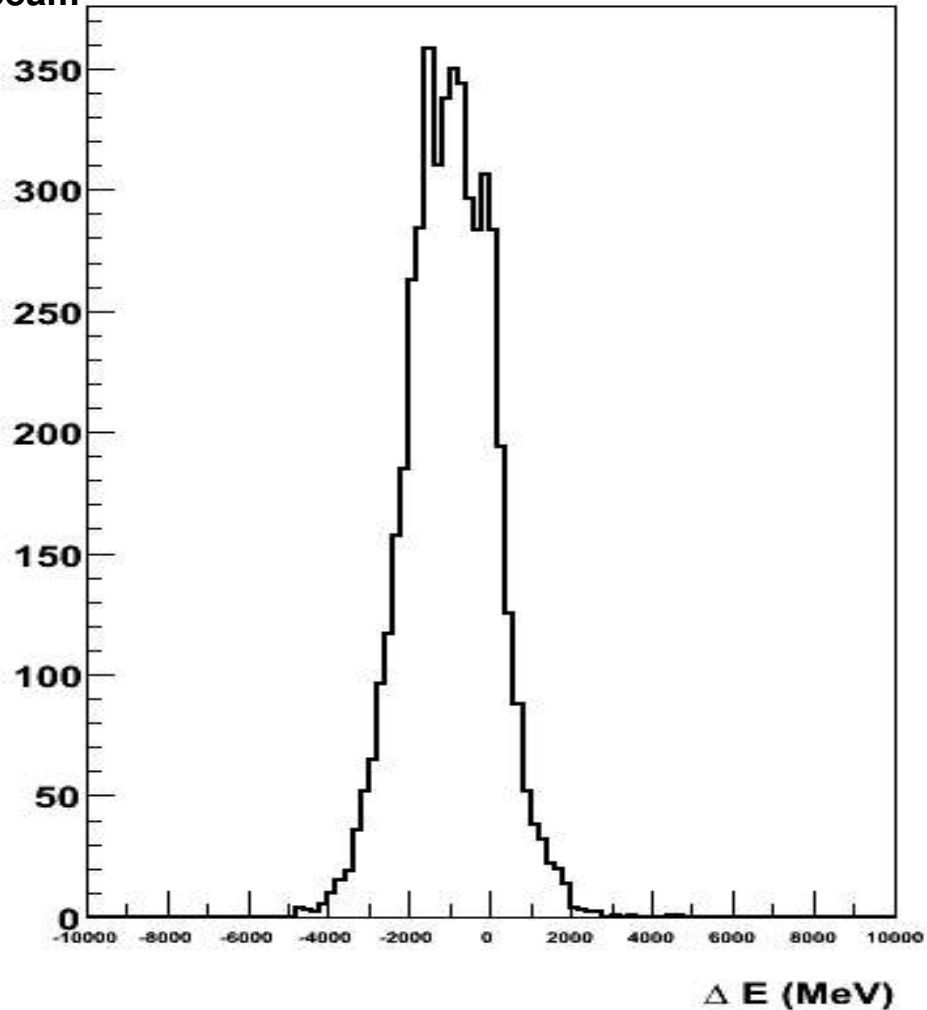
$E_{\text{weight}} - E_{\text{total CalibHit}} \cdot E_{\text{beam}} = 9 \text{ GeV}$.

diff_Eweight_ECalib	
Entries	4

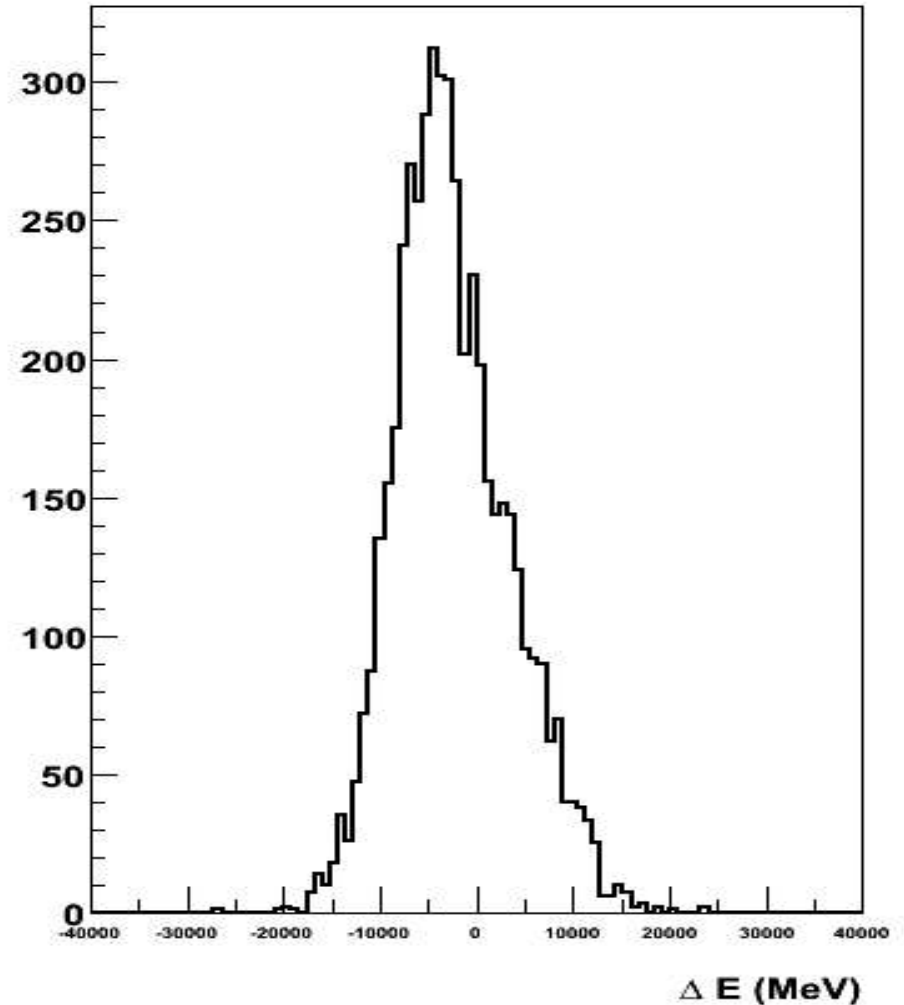
$E_{\text{weight}} - E_{\text{total CalibHit}} \cdot E_{\text{beam}} = 100 \text{ GeV}$.

diff_Eweight_ECalibHit_100	
Entries	4992

$E_{\text{beam}} = 9 \text{ GeV}$



$E_{\text{beam}} = 100 \text{ GeV}$



To do

- Use the new ntuples, version 11.0.41.
Work underway.
- Look at EM fraction in clusters
- Improve the cone algorithm
Iterate the cone axis
- Include more energies
and combine the weight tables
- Compare to other methods, apply on real CTB data
- Dead material corrections

Summary

- First weights ready, from 100 GeV and 9 GeV simulations, ver 10.0.4

Now we are moving to ver 11.0.41

- **Open questions:**

Same features for the new ntuples?

Cut out “EM clusters”?

How do the peaks differ in energy density etc?

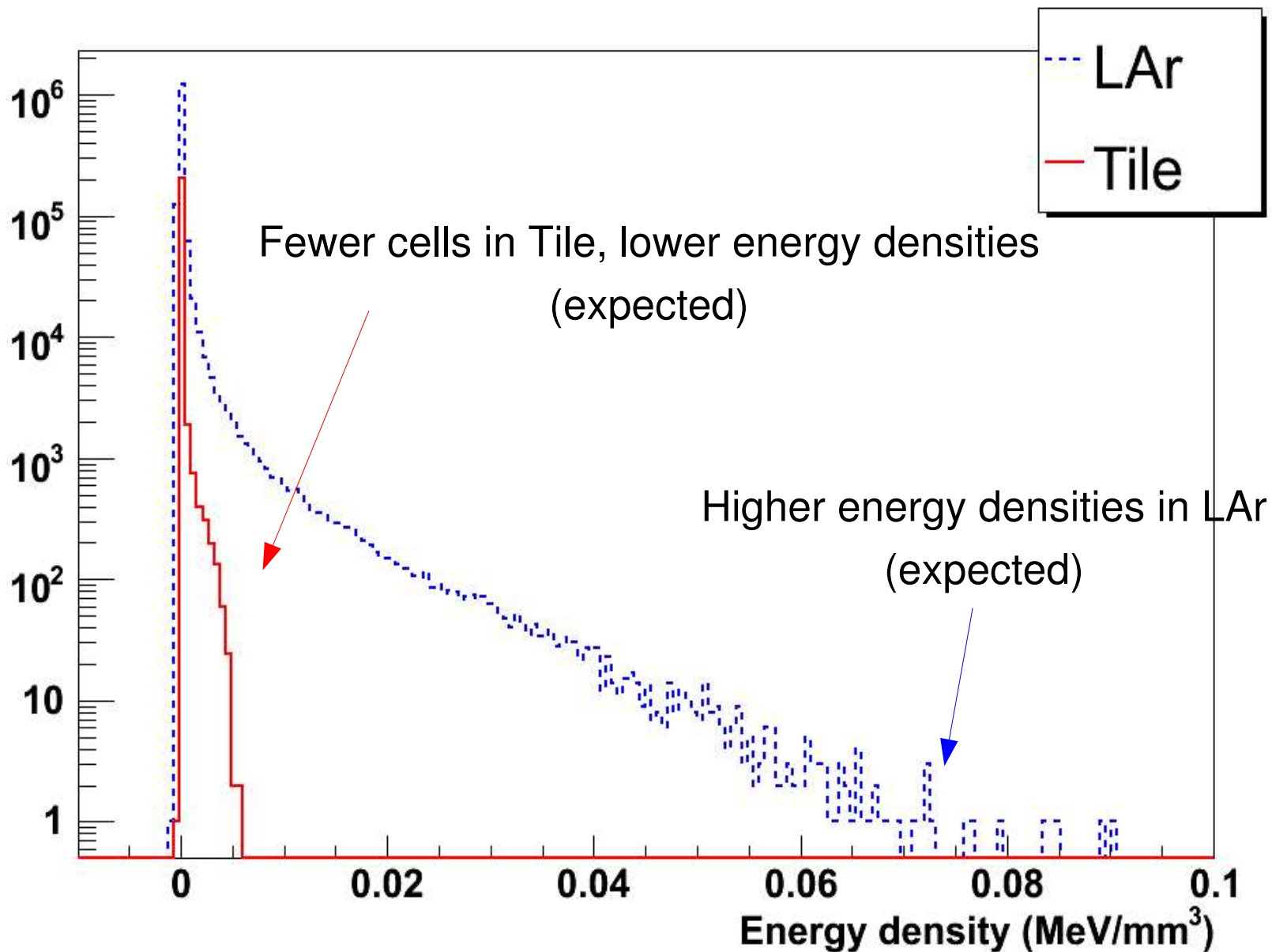
- **Weights applied.**

Narrow peak reconstructed for 100 GeV, not 9 GeV

Extra: The energy densities of cells within topo clusters

Energy densities in LAr and Tile, $E_{\text{beam}} = 100 \text{ GeV}$

Monte Carlo



Extra: The energy densities of cells within topo clusters

Energy densities in LAr and Tile, $E_{\text{beam}} = 9 \text{ GeV}$

Monte Carlo

