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*:

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

- E_{global} is the energy of topo clusters within a cone

  Only the most energetic cone of each event is used

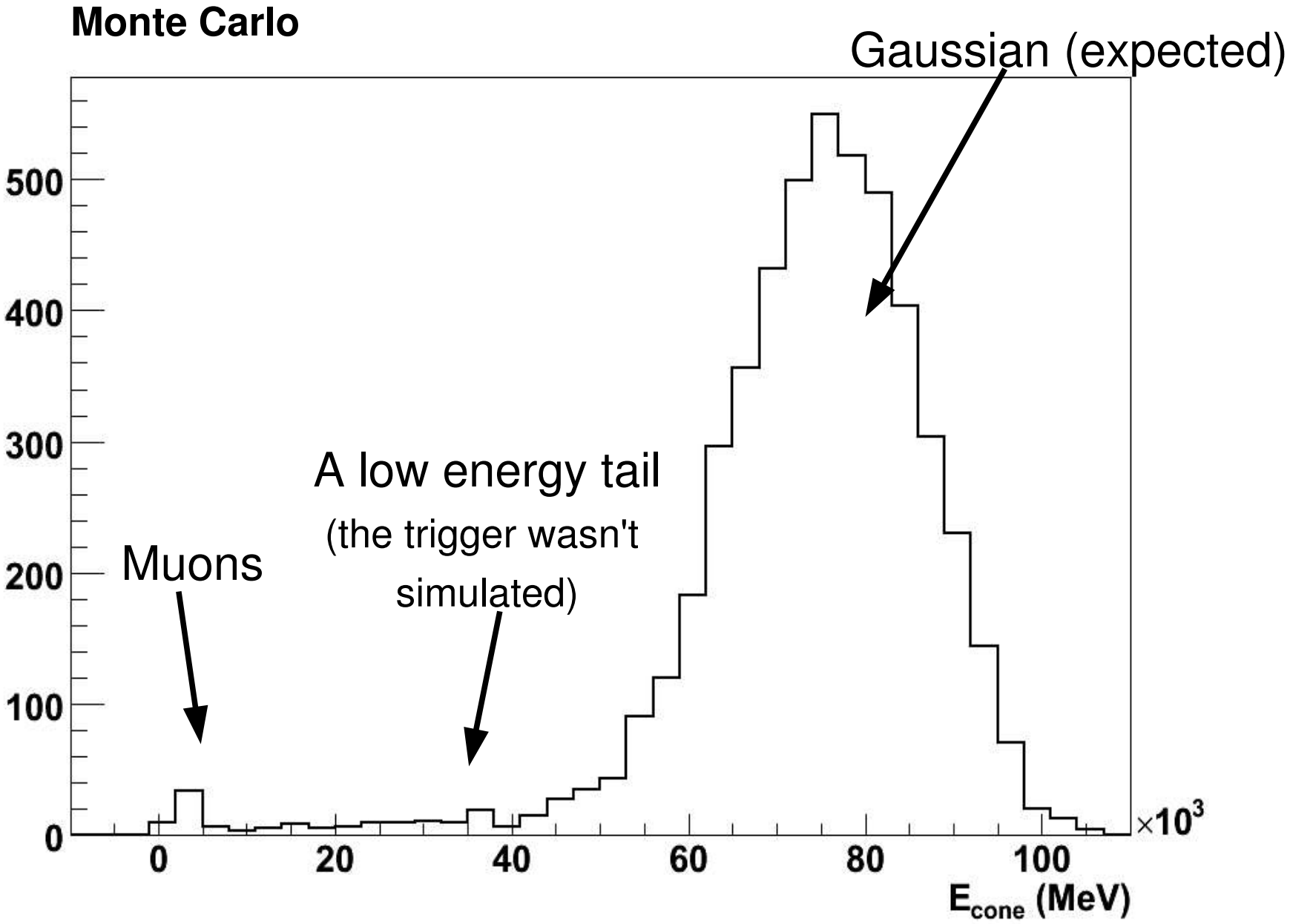
- $w = E^{\text{cell}}_{\text{dep}} / E^{\text{cell}}_{\text{rec}}$

  (= energy truly deposited / energy reconstructed on the EM level)

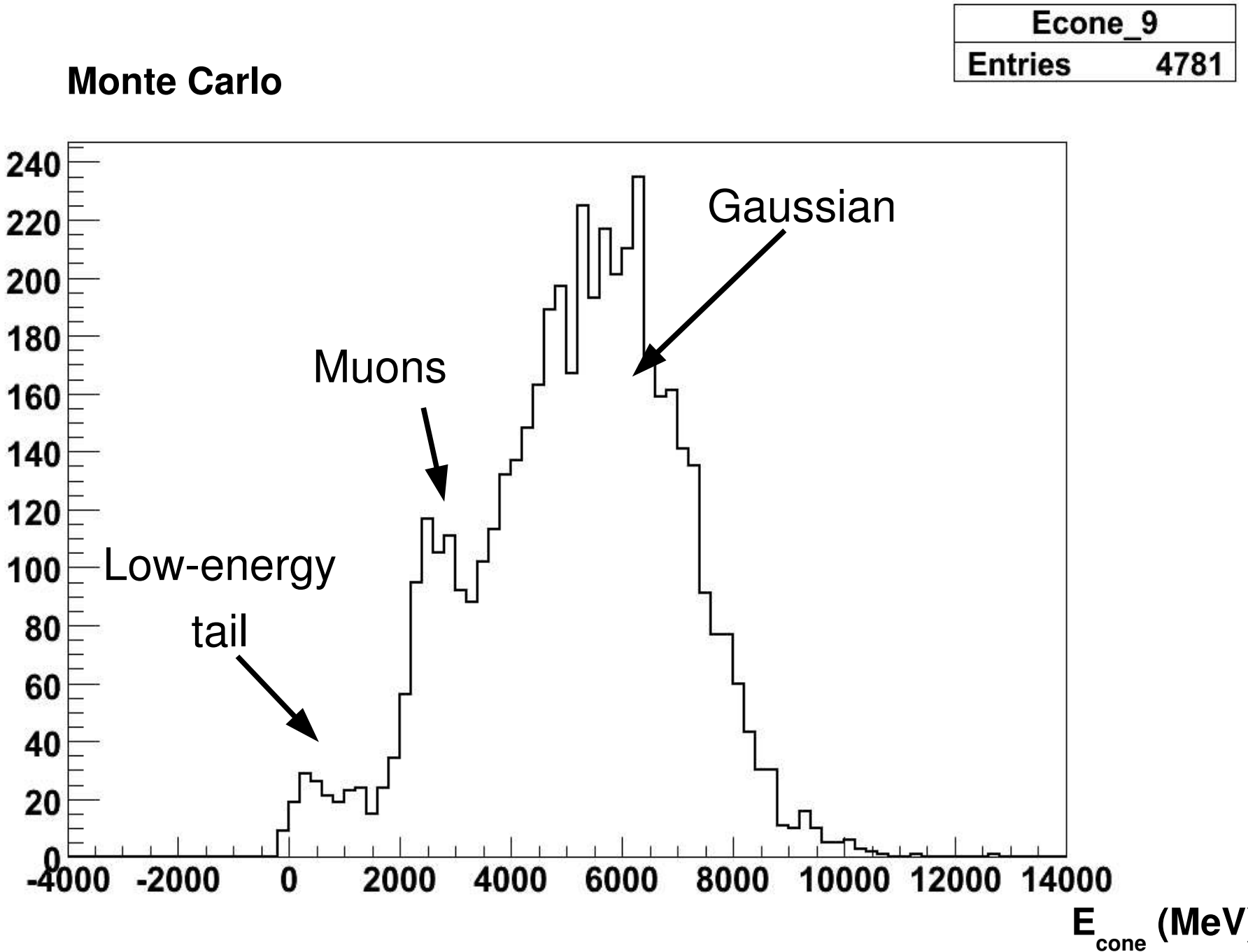
- Simulated pions (ver 10.0.4) used to determine the weights

  Are currently moving to ver 11.0.41

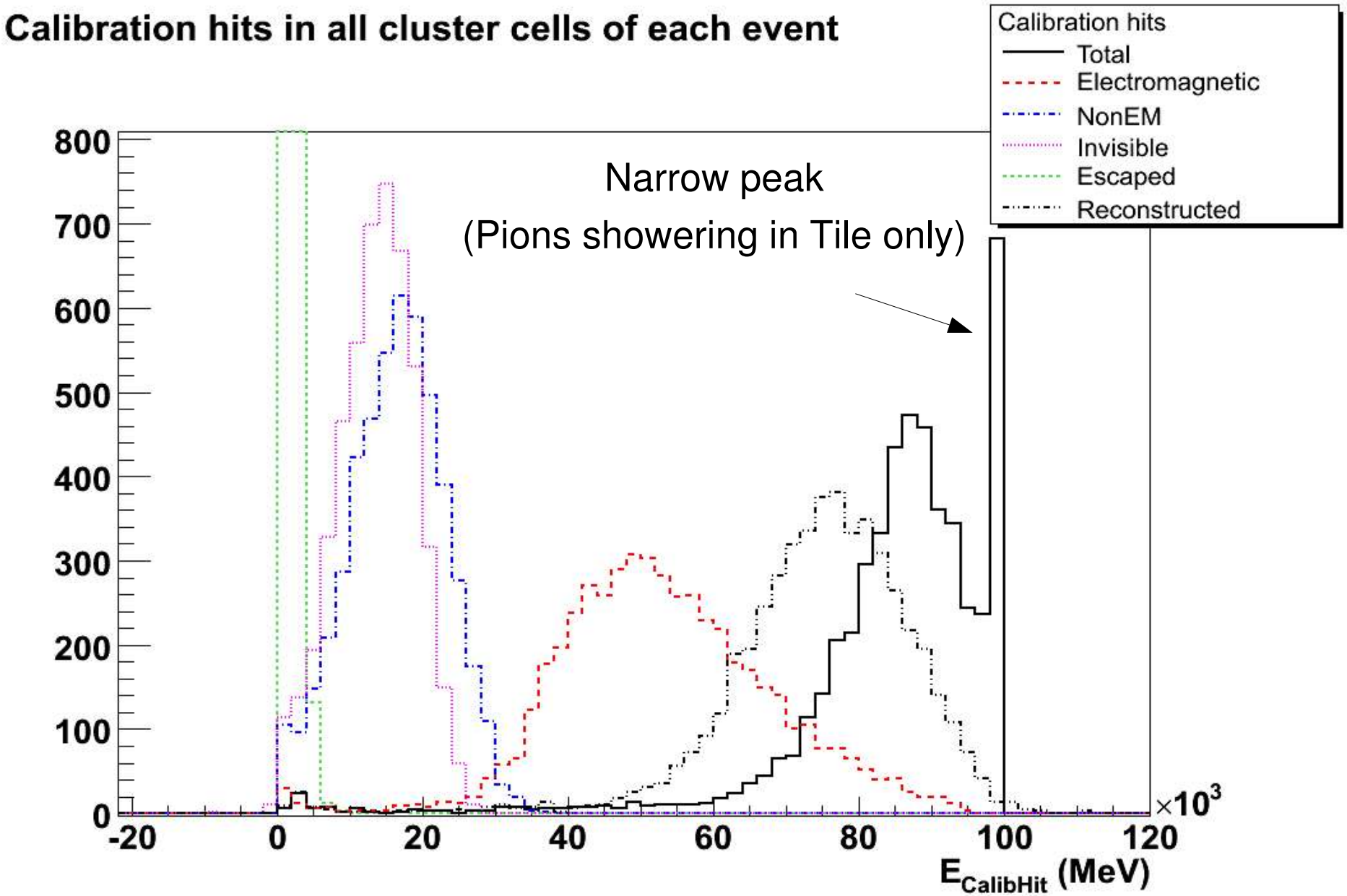
Energy cone for $E_{\text{beam}} = 100$ GeV, $\eta = 0.35$, opening angle 11°



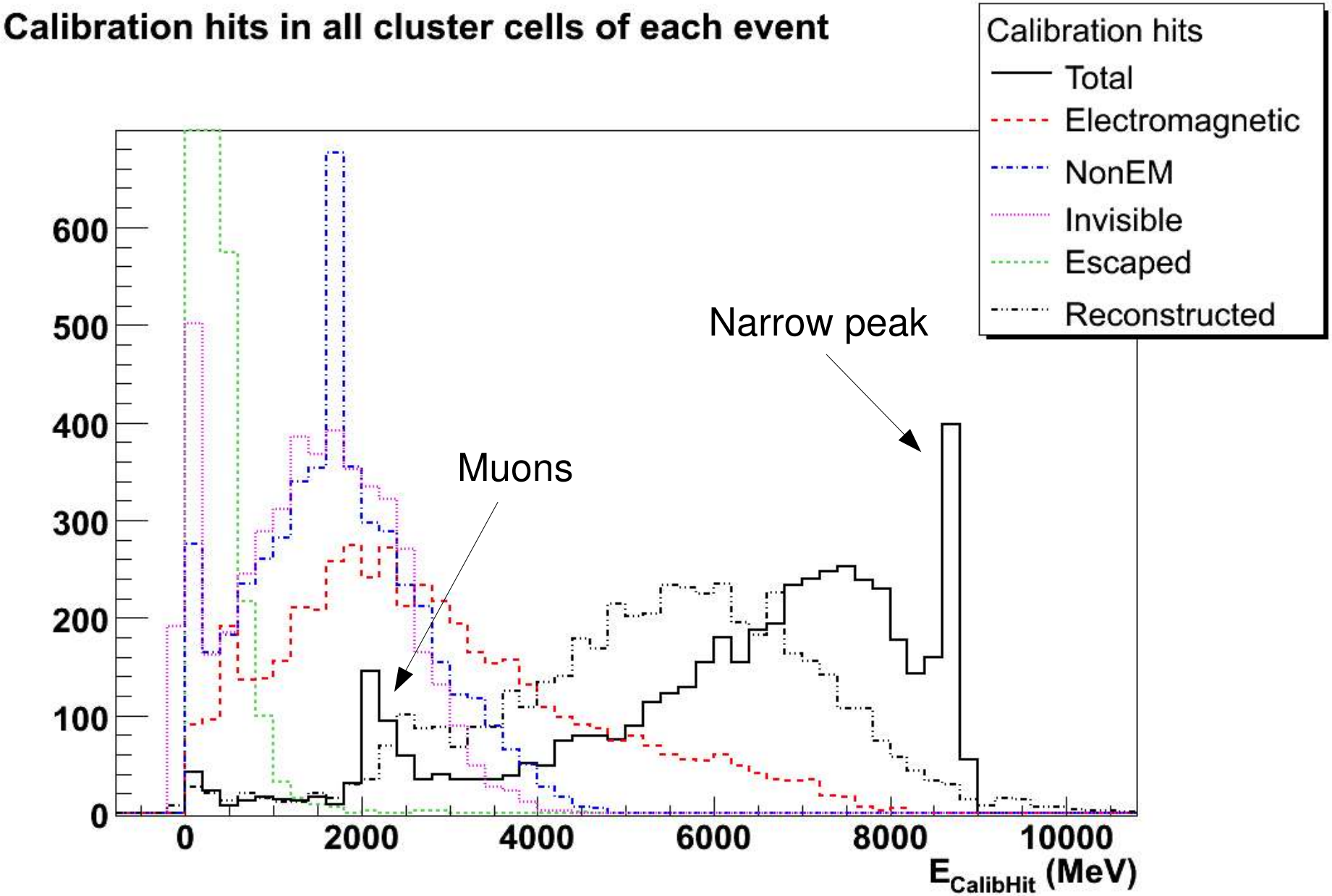
Energy cone for $E_{\text{beam}} = 9$ GeV, $\eta = 0.35$, opening angle 11°



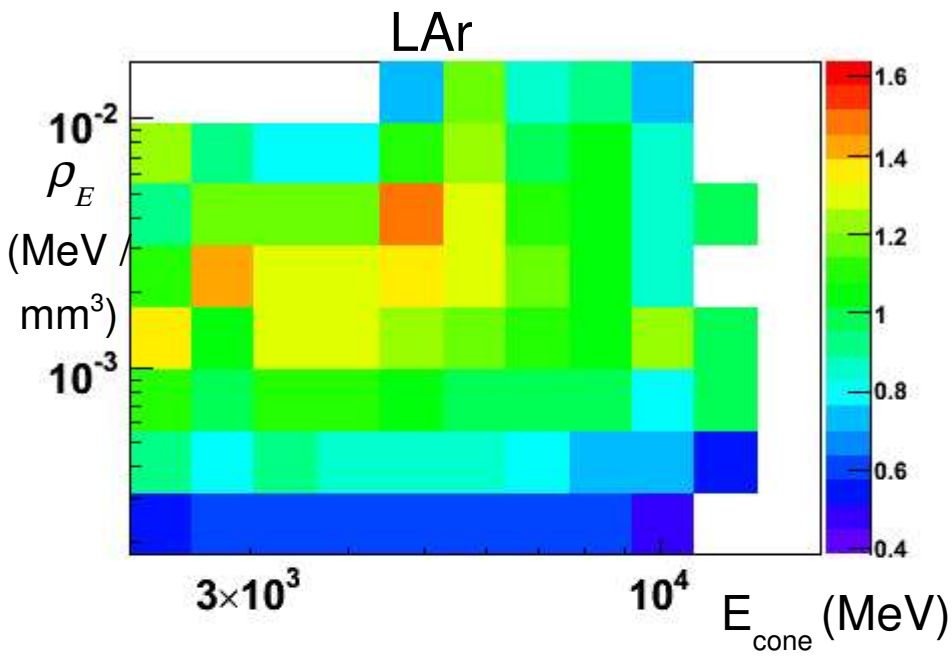
CalibHits in all cluster cells per event, $E_{\text{beam}} = 100$ GeV

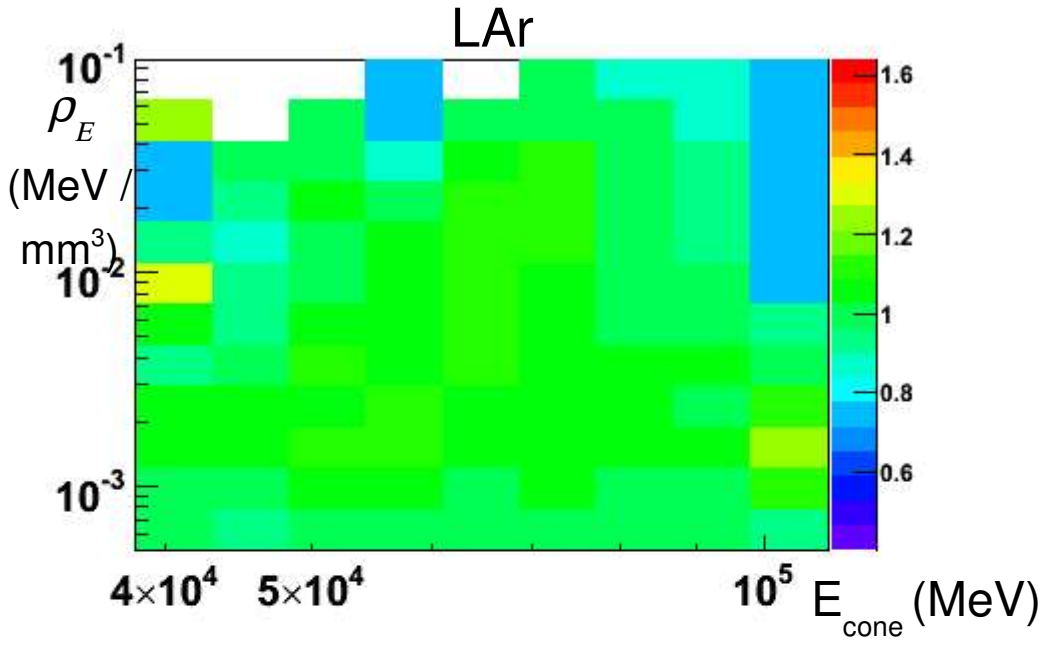


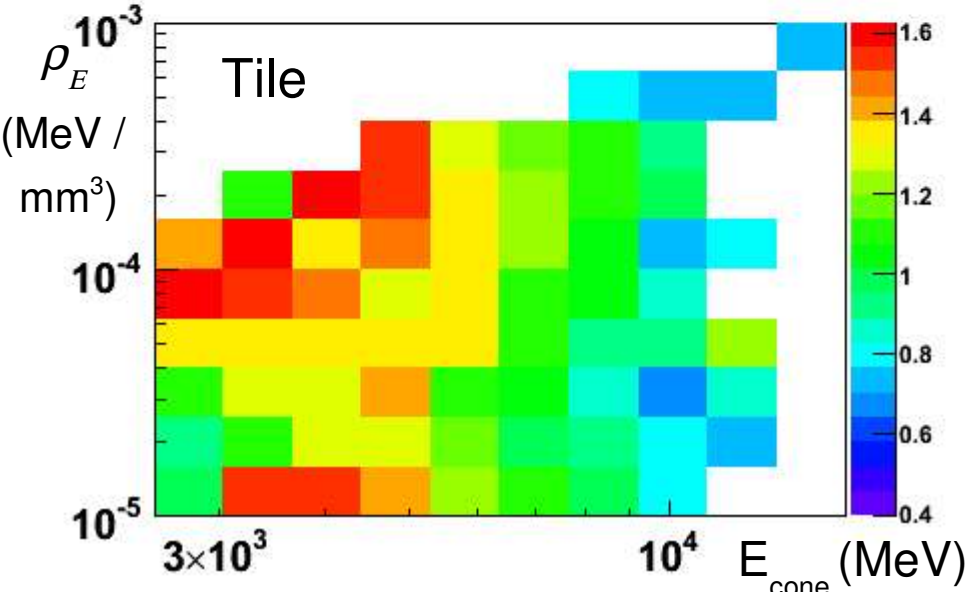
CalibHits in all cluster cells per event, $E_{\text{beam}} = 9$ GeV

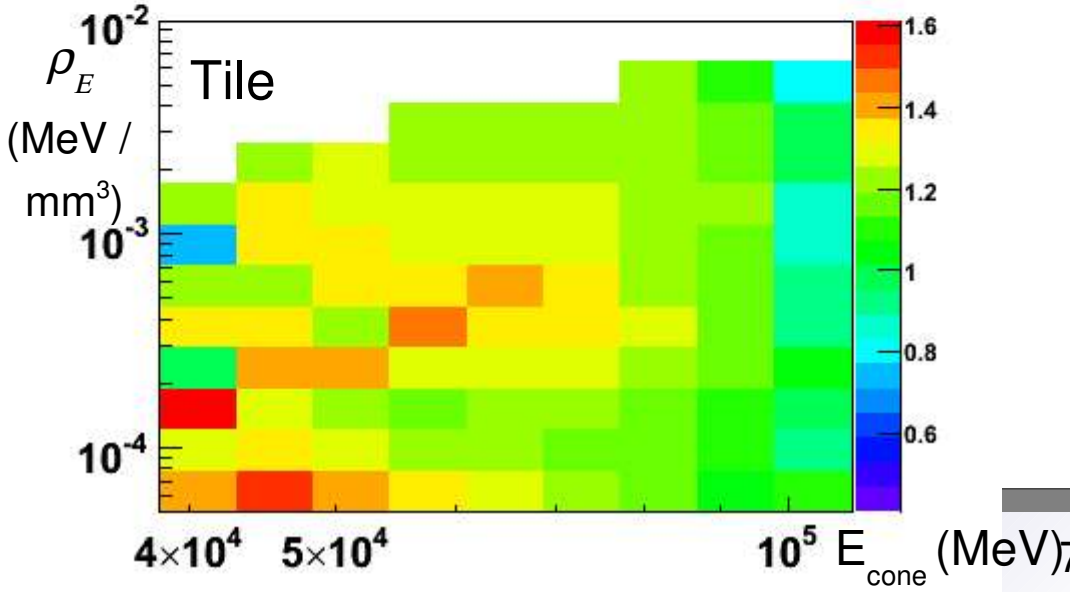


Weight tables

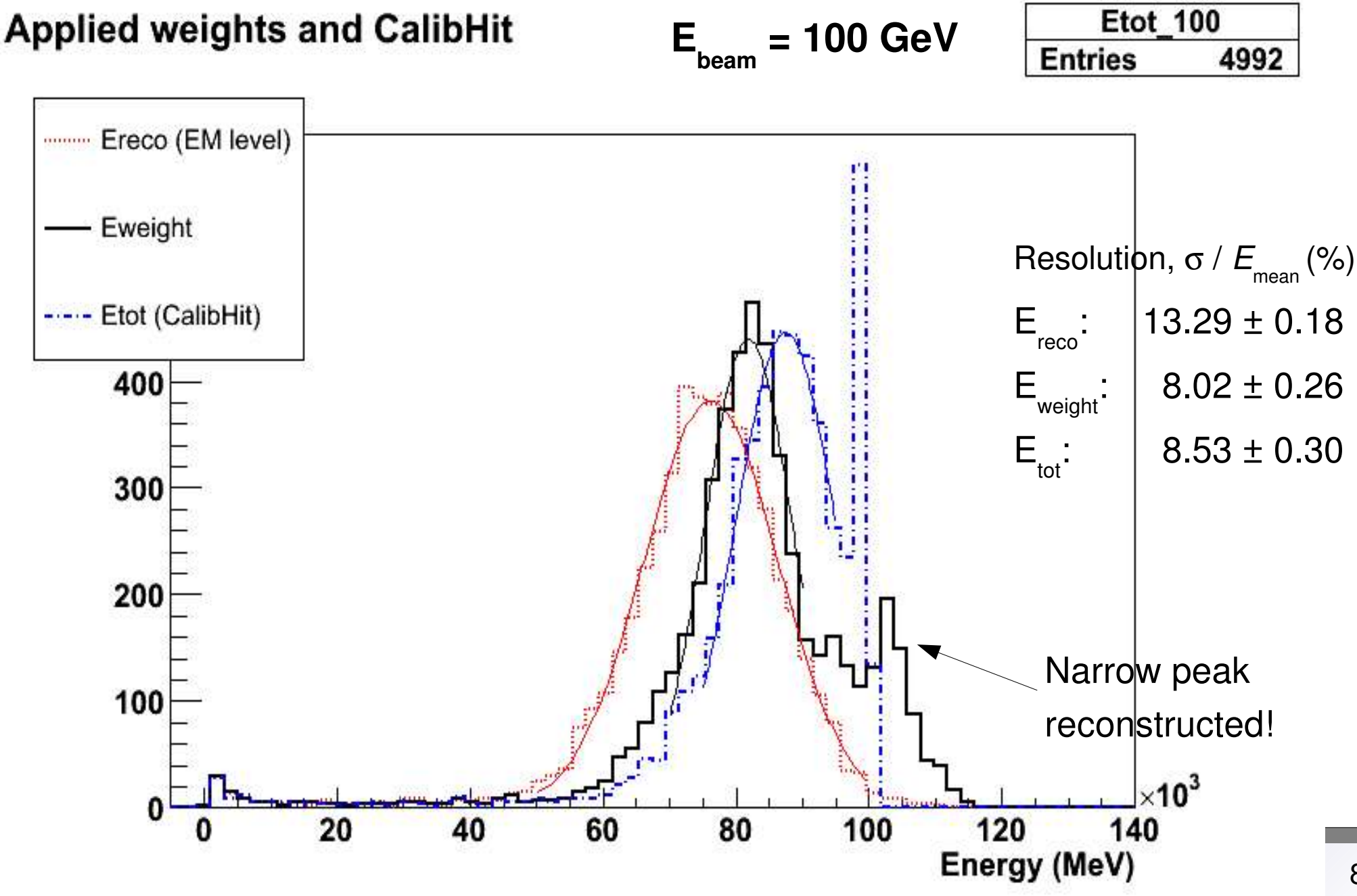




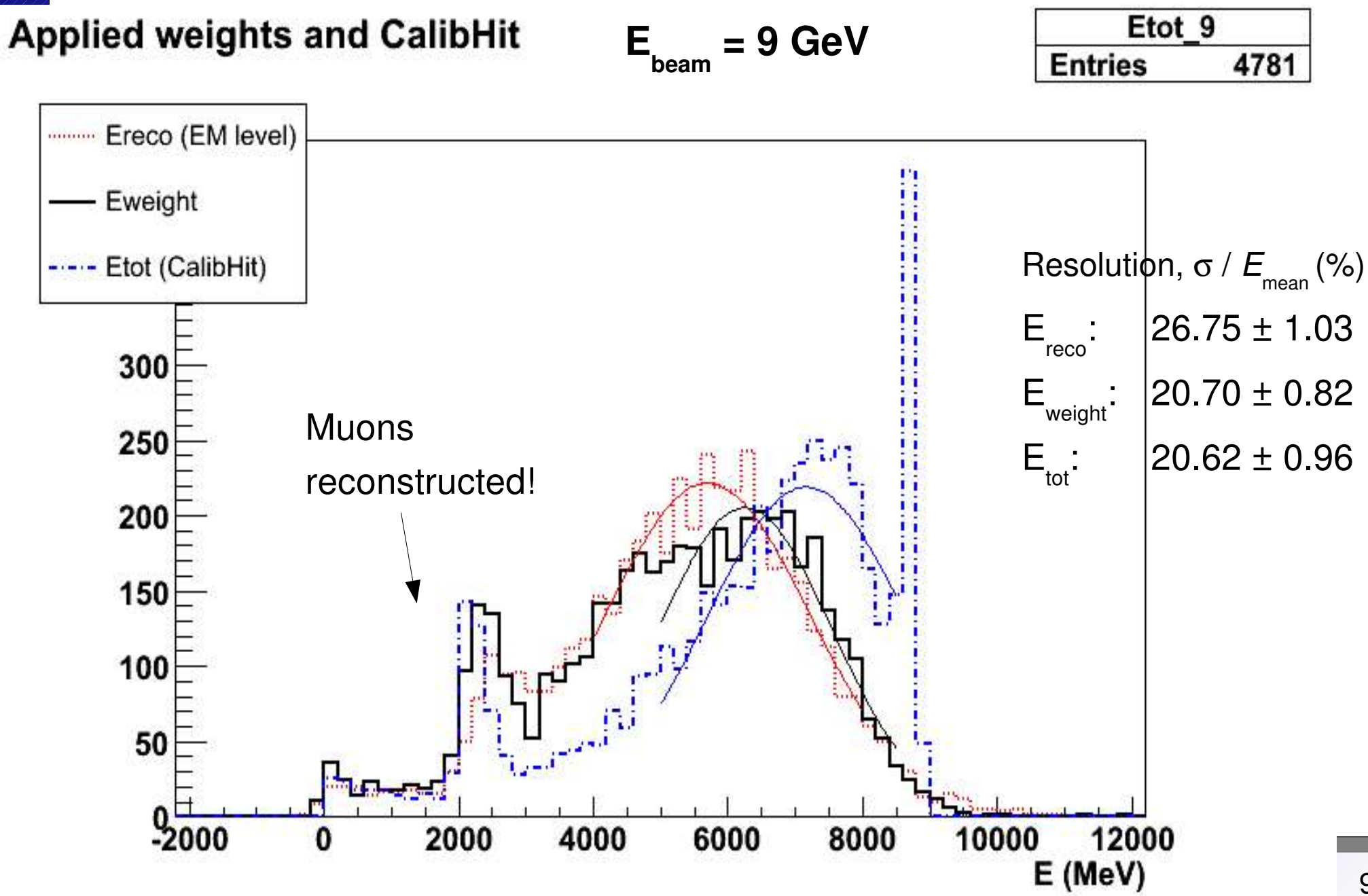




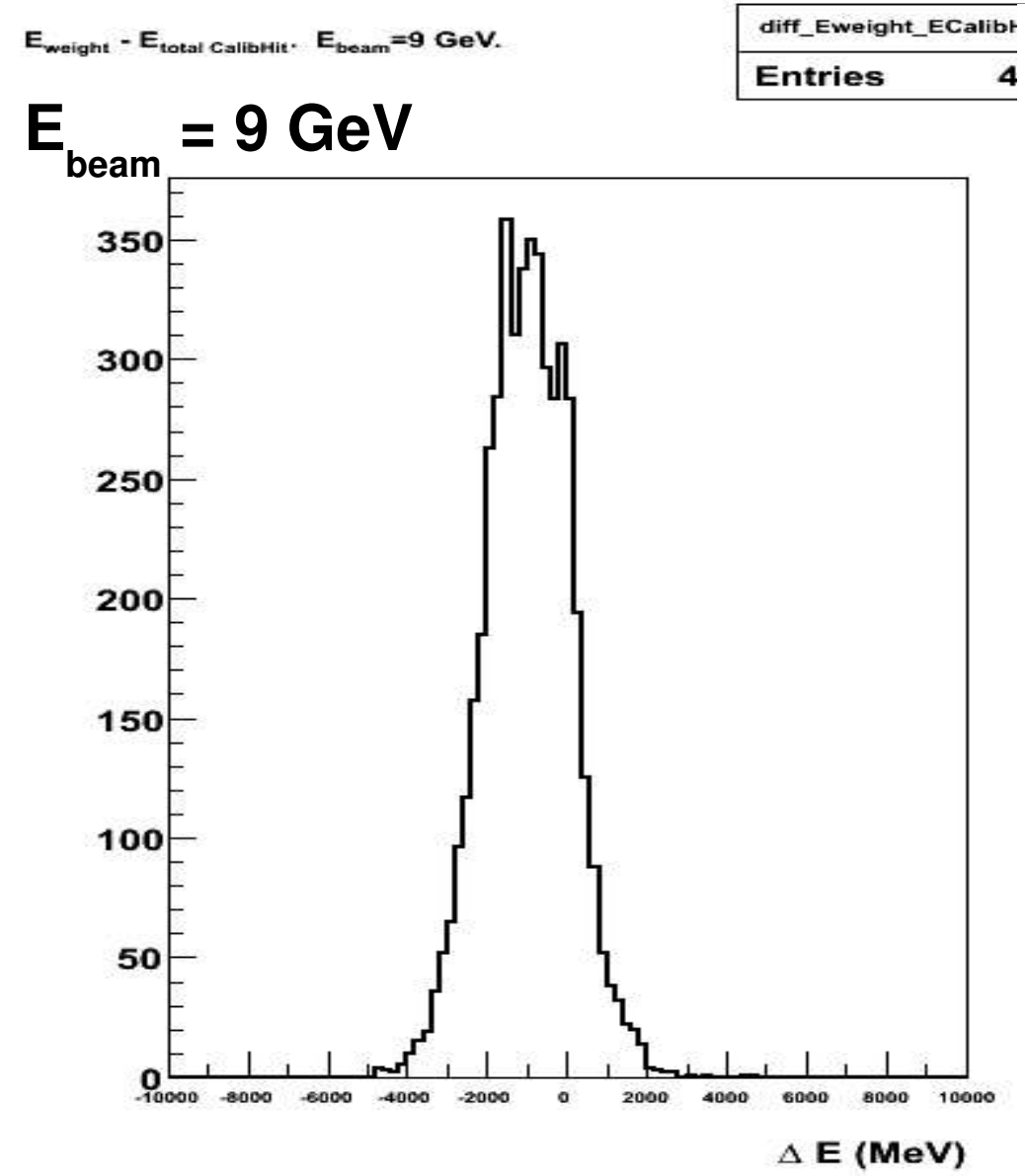
Weights applied on independent MC sample

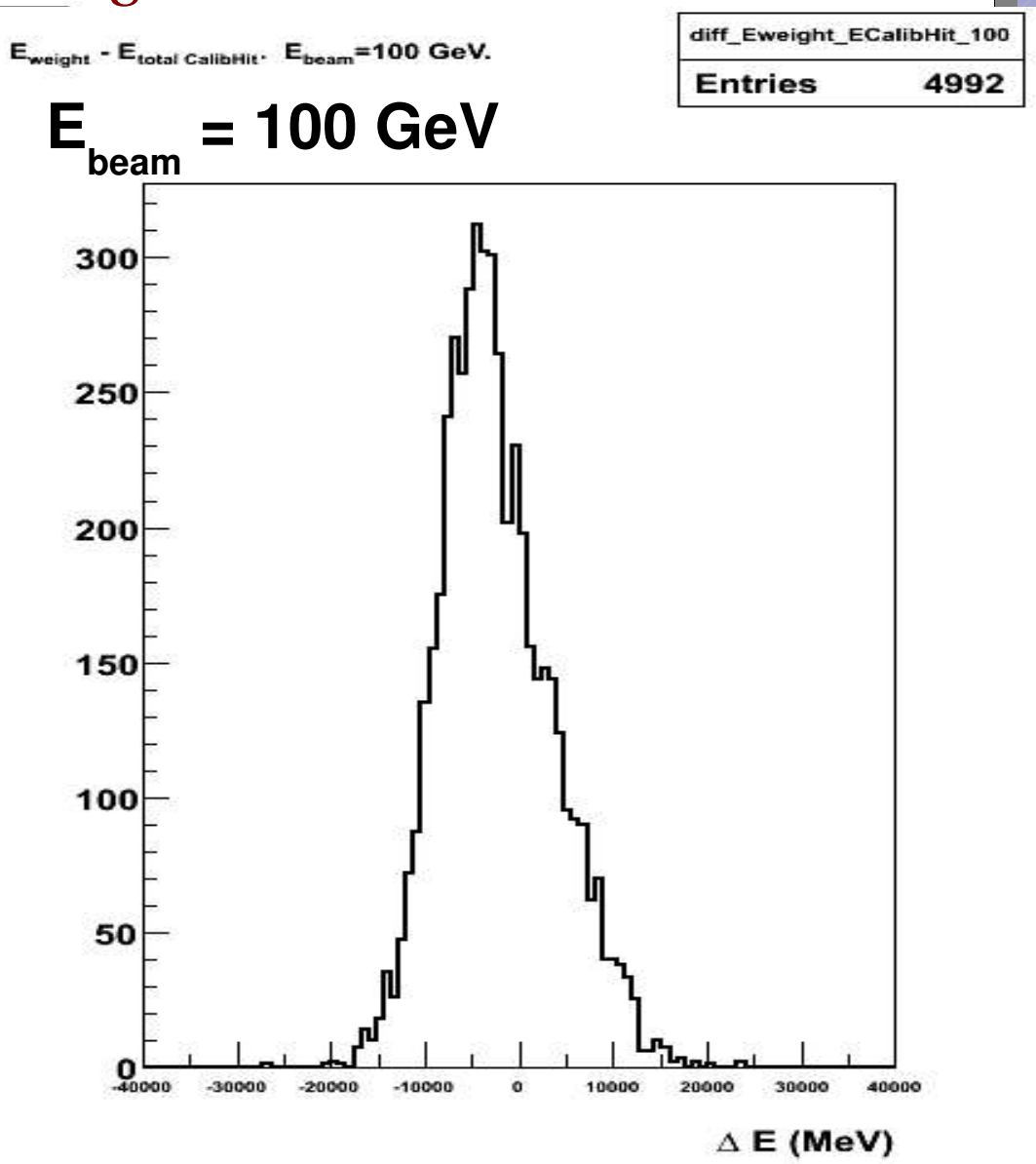


Weights applied on independent MC sample



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





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?

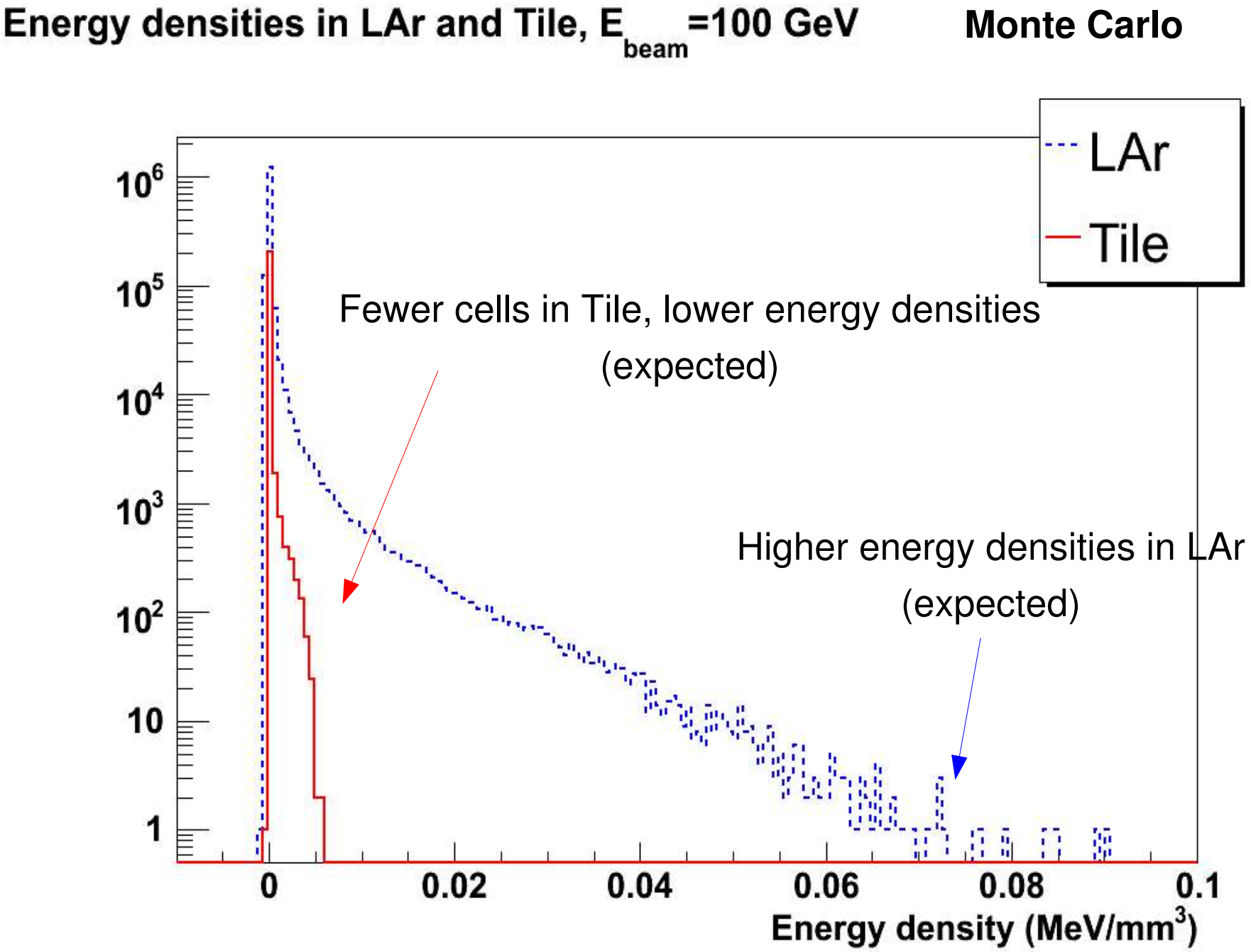
  Cut out “EM clusters”?

  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



Extra: The energy densities of cells within topo clusters