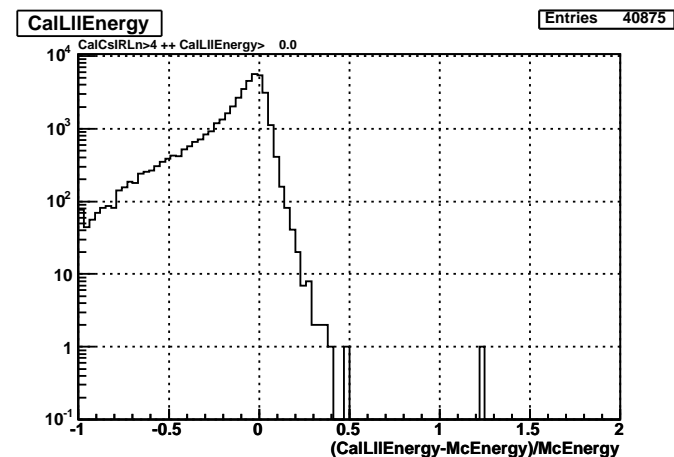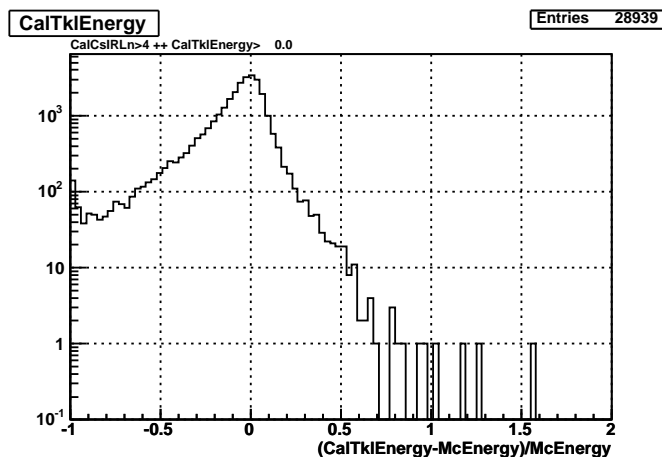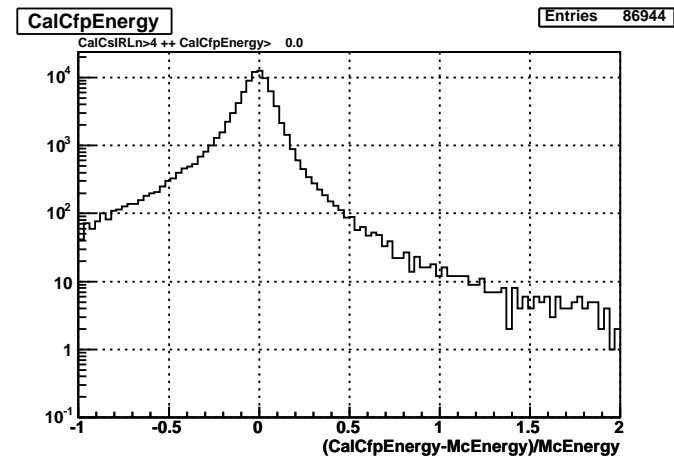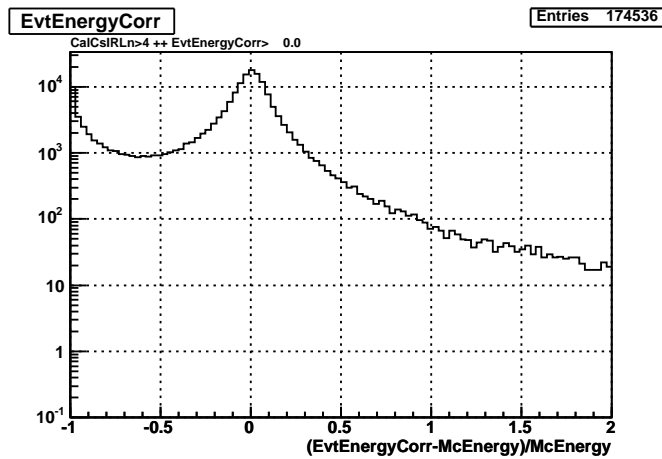# Discussion on energy tails

- allGamma-GR-HEAD1.594-merit-TKR-prune-1.root
  allGamma-GR-HEAD1.594-merit-TKR-prune-2.root

- four algorithms:
  - EvtEnergyCorr (parametric)
  - CalCfpProfile (profile)
  - CalTklEnergy (tracker + calo)
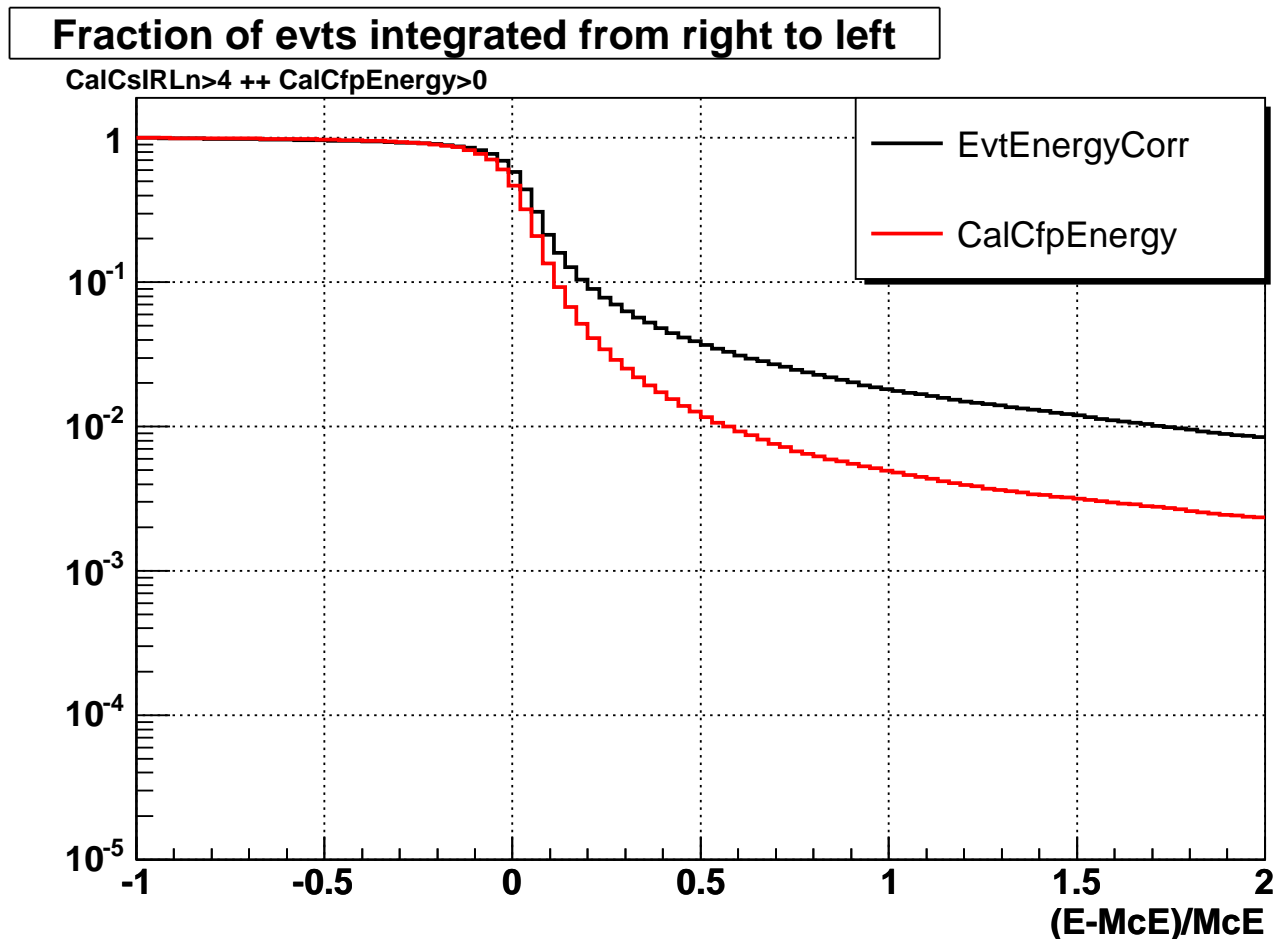 - CalLllEnergy (last layer)

- Quick comparisons

- Discussion

All algorithms

- CalCsIRLn>4 : no tail with Tracker and Last layer

When Profile runs (>1 GeV)

- Parametric's tail is larger ...

Fraction of evts integrated from right to left

CalCslRLn>4 ++ CalCfpEnergy>0

Legend:
- EvtEnergyCorr (black)
- CalCfpEnergy (red)

x-axis: (E-McE)/McE

When Profile runs (>1 GeV)

- but Profile's tail is flatter.

Fraction of evts integrated from right to left

CalCslRLn>4 ++ CalCfpEnergy>0

Legend:
- EvtEnergyCorr
- CalCfpEnergy

x-axis: (E-McE)/McE

Profile's "'wild' tail

- The parametric algorithm doesn't use the vertex direction but the direction given by the vertex point and the cluster centroid;

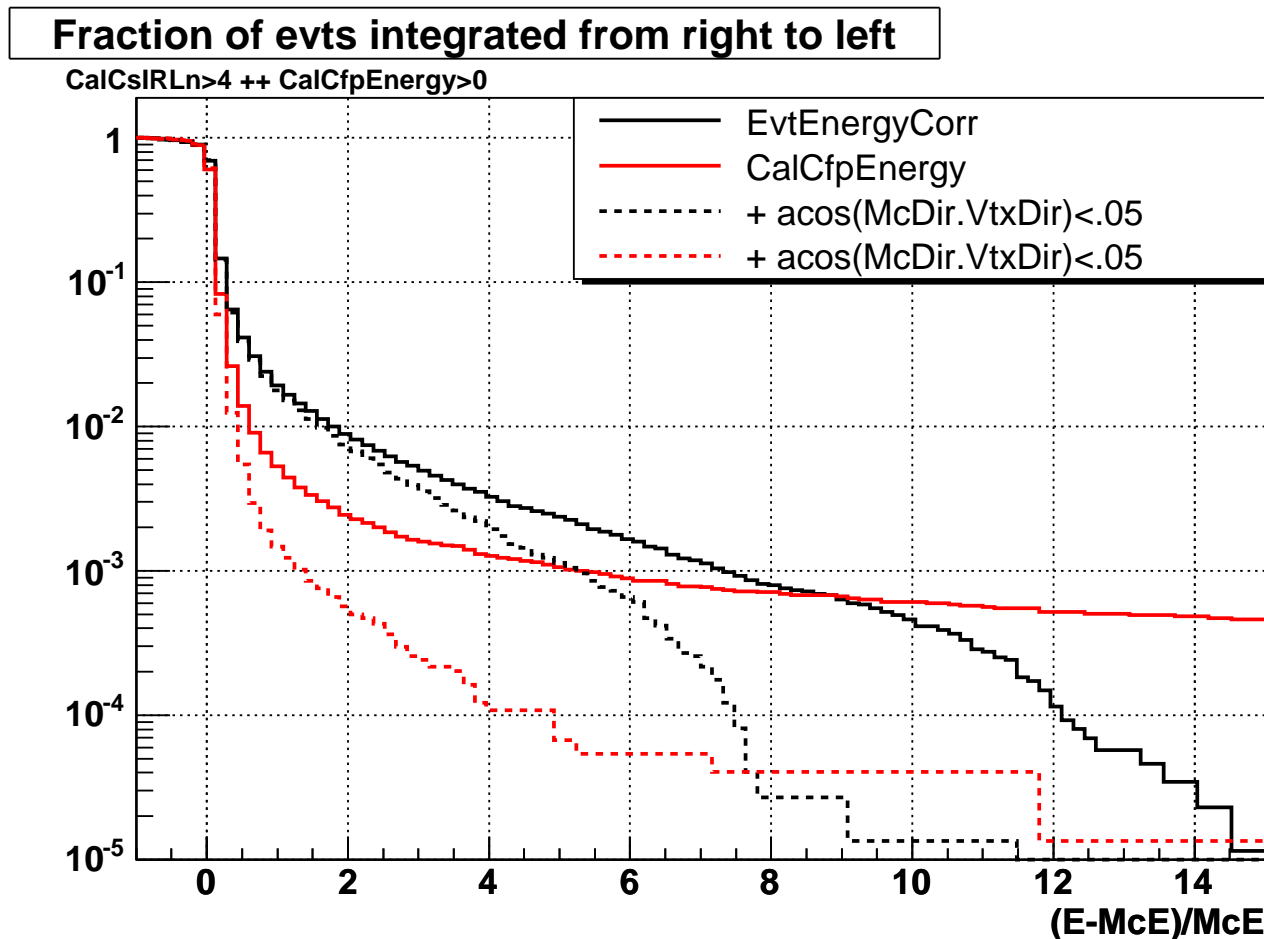- The profile algorithm uses the vertex direction;

- In my "private" analysis (before implementing it in GlastRelease) I uses vertex and calo information depending on the distance between the vertex direction and the cluster centroid;

- but not implemented yet

Requiring a good vertex direction
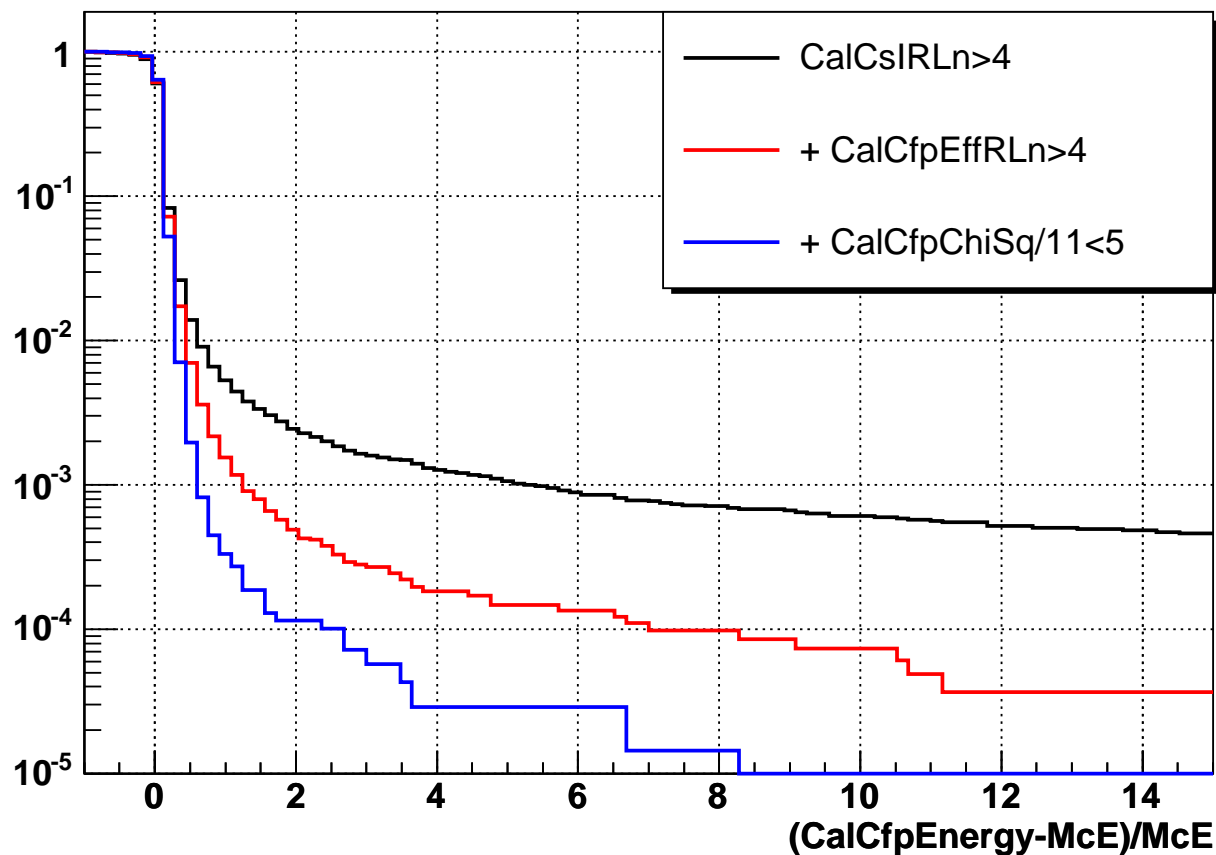
- the "wild" tail almost disappears

Fraction of evts integrated from right to left

CalCsIRLn>4 ++ CalCfpEnergy>0

Legend:
- EvtEnergyCorr
- CalCfpEnergy
- + acos(McDir.VtxDir)<.05
- + acos(McDir.VtxDir)<.05

x-axis: (E-McE)/McE

Profile variables cure the problem

- CalCfpEffRLn : effective radiation length in CsI

- CalCfpChiSq : the χ^2 of the profile fit

Fraction of evts integrated from right to left

Digression about direction information

- Vertex direction : the most accurate but can be bad at high energy

- Cluster Point - Vertex point : more conservative but less accurate

- I think that in some cases (in particular at small theta and near cracks) the accuracy of the tracker reconstruction is very interesting for the energy reconstruction

- To be done : optimize the direction information for the energy reconstruction
  - Using the vertex quality
  - Using the distance of the cluster centroid to the vertex trajectory

High energy tail : discussion

- It's not an obvious issue :
  - involves astrophysics $E^{\sim -2}$ spectra
  - involves IRF description accuracy

- Various situations : from best to worse :
  - No tail and IRF perfectly parameterized
  - High energy tail AND IRF perfectly parameterized
  - High energy tail BUT badly parameterized

Ideas, Suggestions, ...

- The classification tree could take into account a constraint on tails
  - presently : "best" means closest to McEnergy
  - suggestion : "best" means closest but $-n\sigma$ should be favoured to $+n\sigma$
- Not choose which is best but what are the optimized weights assigned to the energies
  - Can reduce the tails...
  - and improve the resolution.