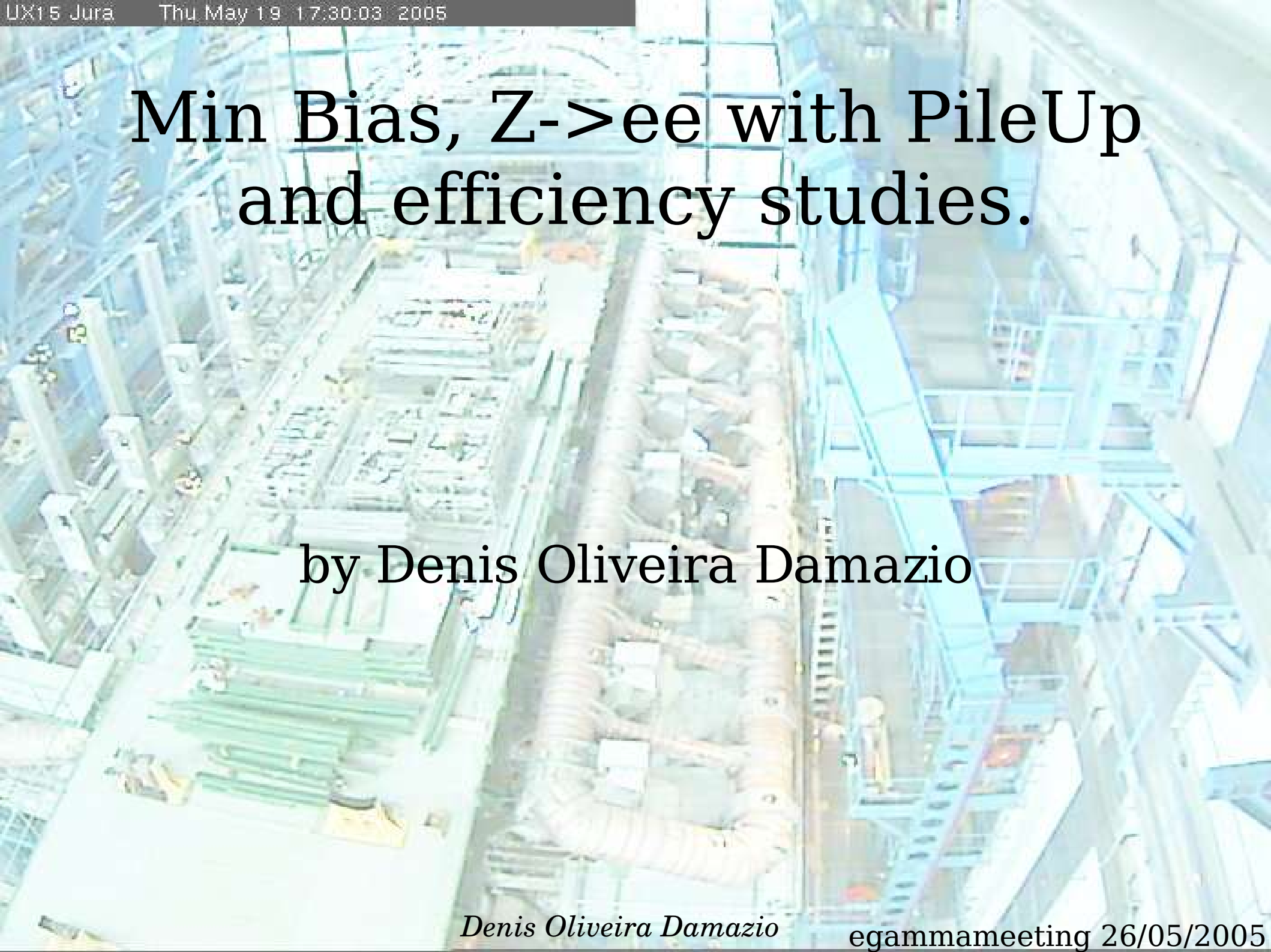


Min Bias, Z->ee with PileUp and efficiency studies.

by Denis Oliveira Damazio

Outline of this presentation

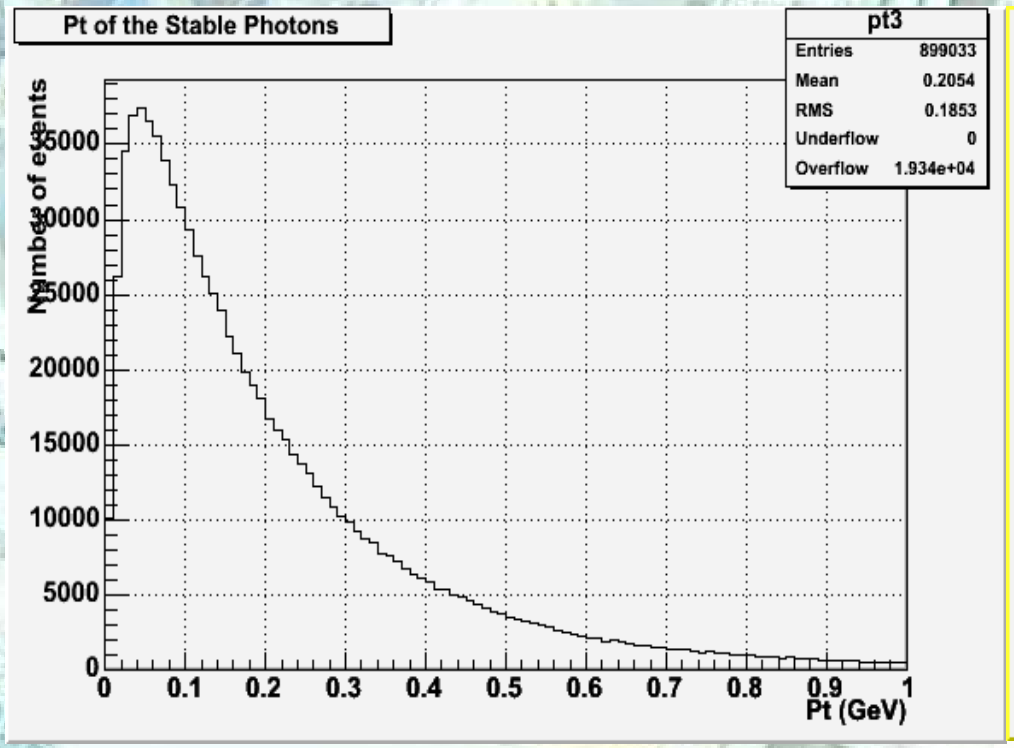
- Min bias seen by CBNT_Truth, xKalman and egammaRec. In particular, clusters formed by photons and tracks formed by pions. Comparison with Min bias found at a Z->ee with pileup run (9.0.3).
- Pile-Up issues for egamma. Efficiency analysis for the electrons provided by the Z0.

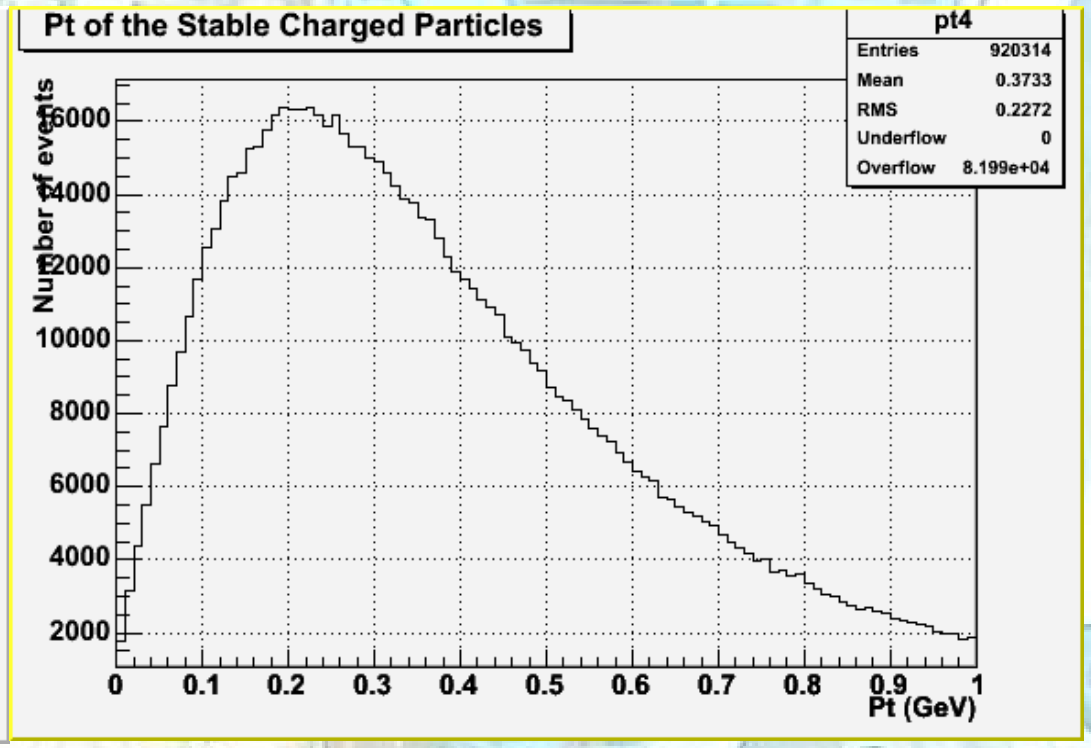
Minimum Bias methodology

- Using minimum bias sample (003014) digitized with 10.0.0 and reconstructed with 10.0.1 to check details.
- CBNT_truth configured (« All » Selector used) to provide information on very low Pt particles (from 100 MeV up).
- exercising xKalman and egammaRec.
- Comparison with Min bias events found in a Z->ee + PileUp run.

Minimum Bias below 1 GeV (Truth Information).

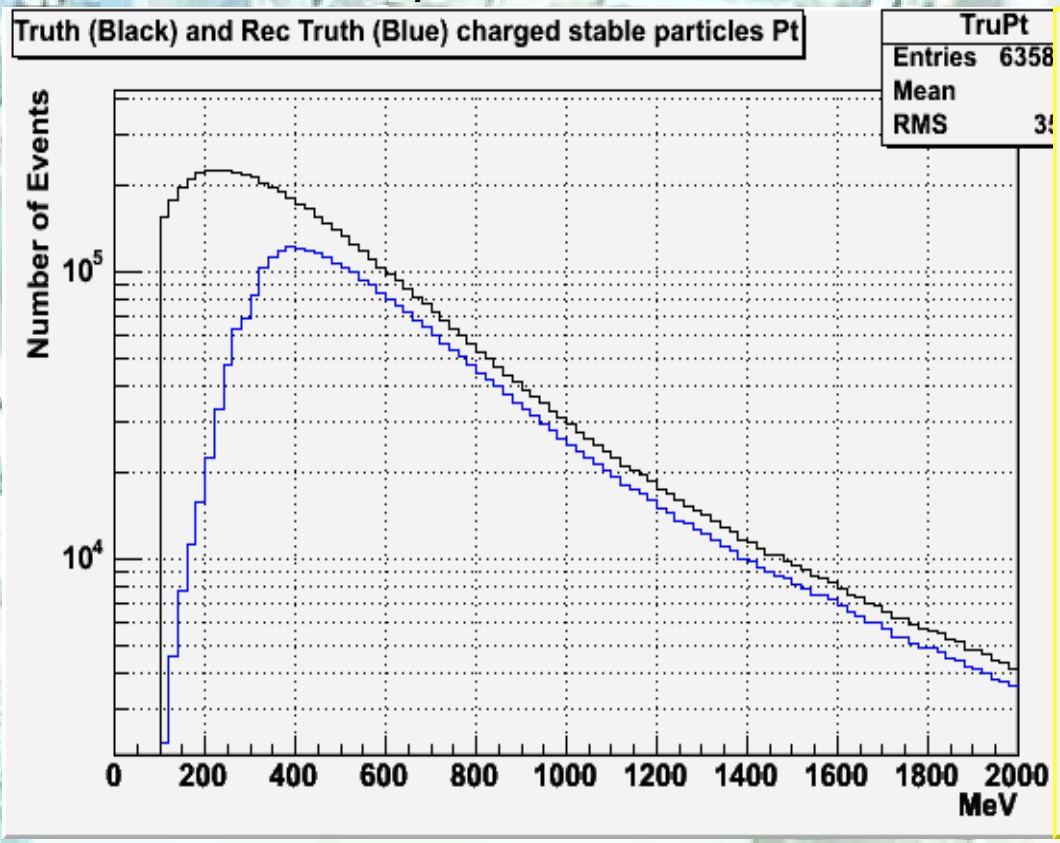
similar amount of photons and charged particles (mainly pions)

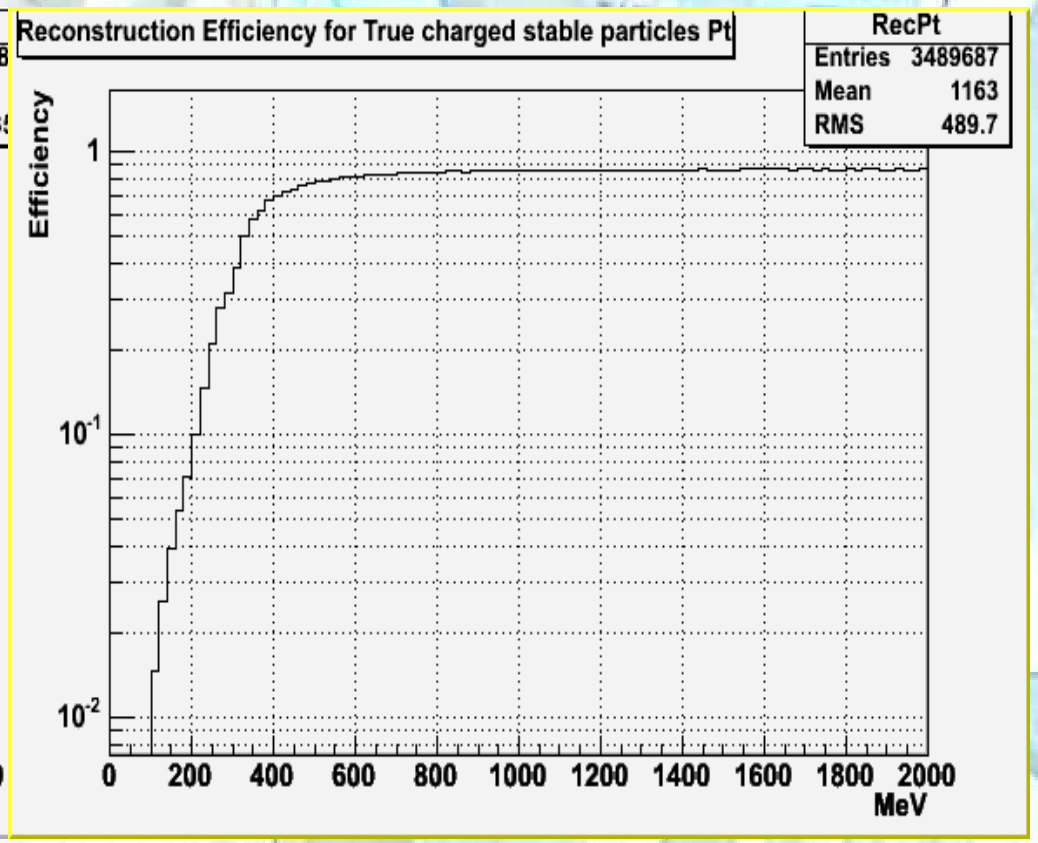




Track Reconstruction below 1 GeV (Pt) using xKalman

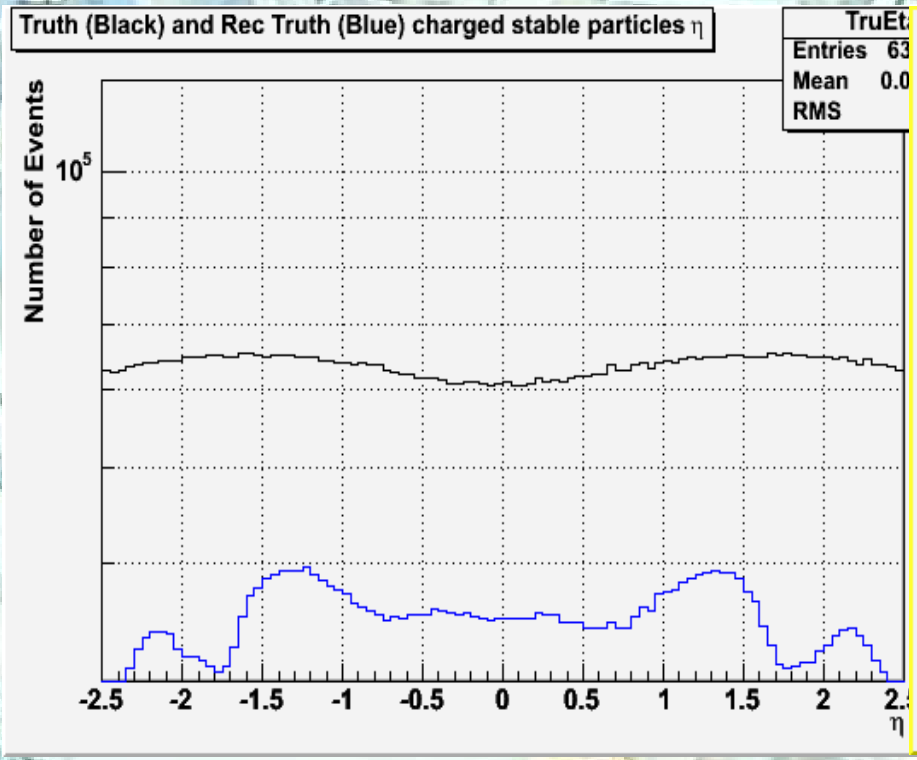
For each truth charged stable particle within eta<2.5, a position matching (delta R < 0.02) reconstructed track is found. Truth/Truth measure of Pt.

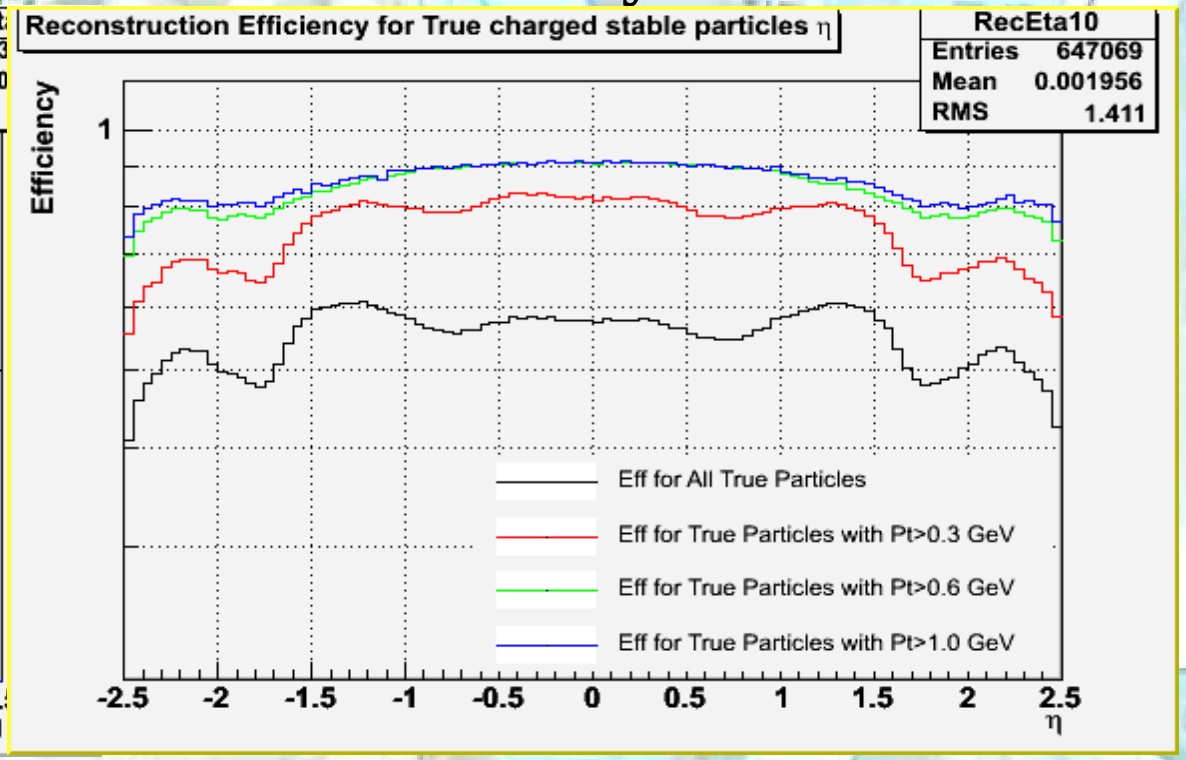




Track Reconstruction as a function of eta using xKalman.

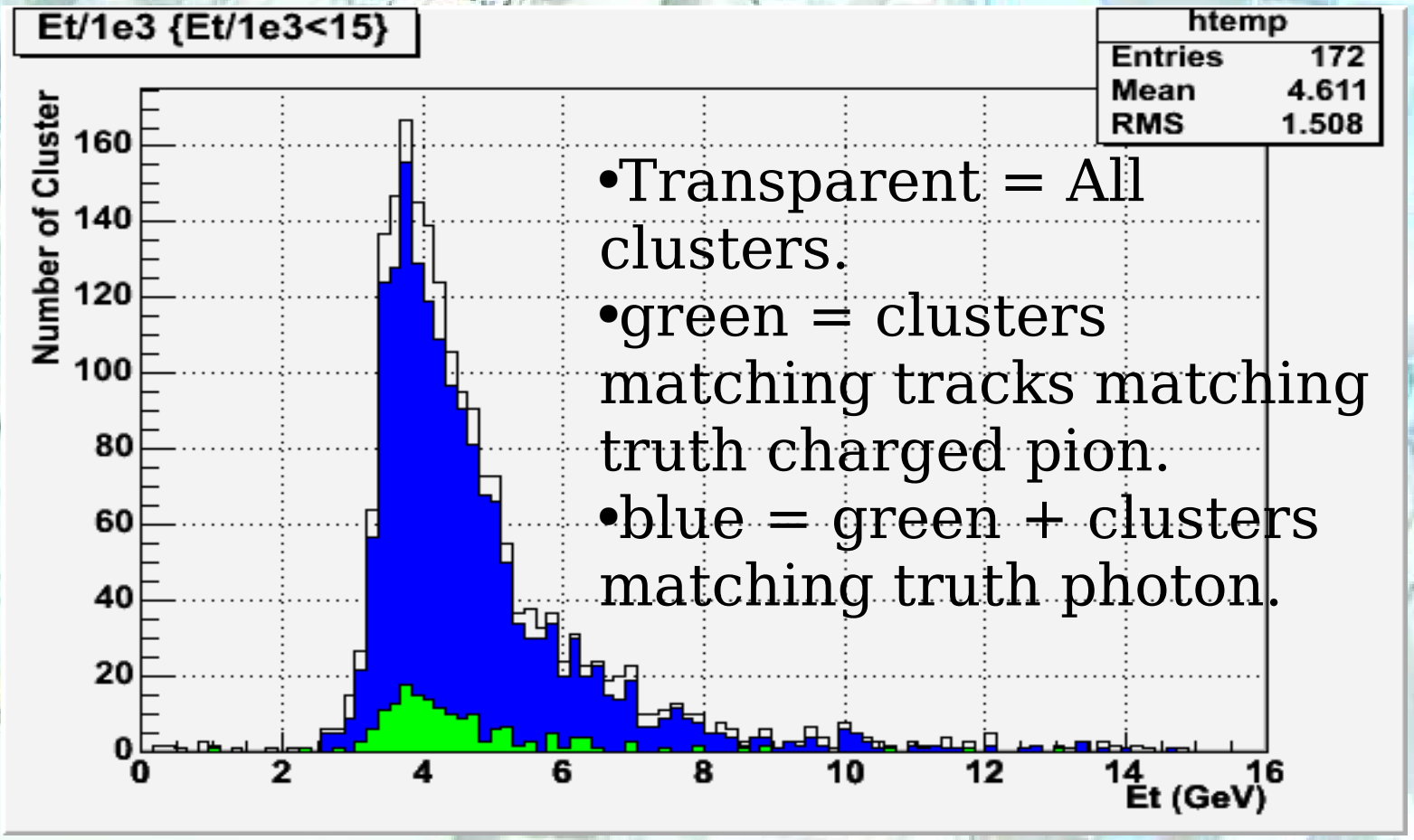
For each truth charged stable particle within eta<2.5, a position matching (delta R < 0.02) reconstructed track is found. Truth/Truth measure of eta. DeltaR should vary for lower Pt.



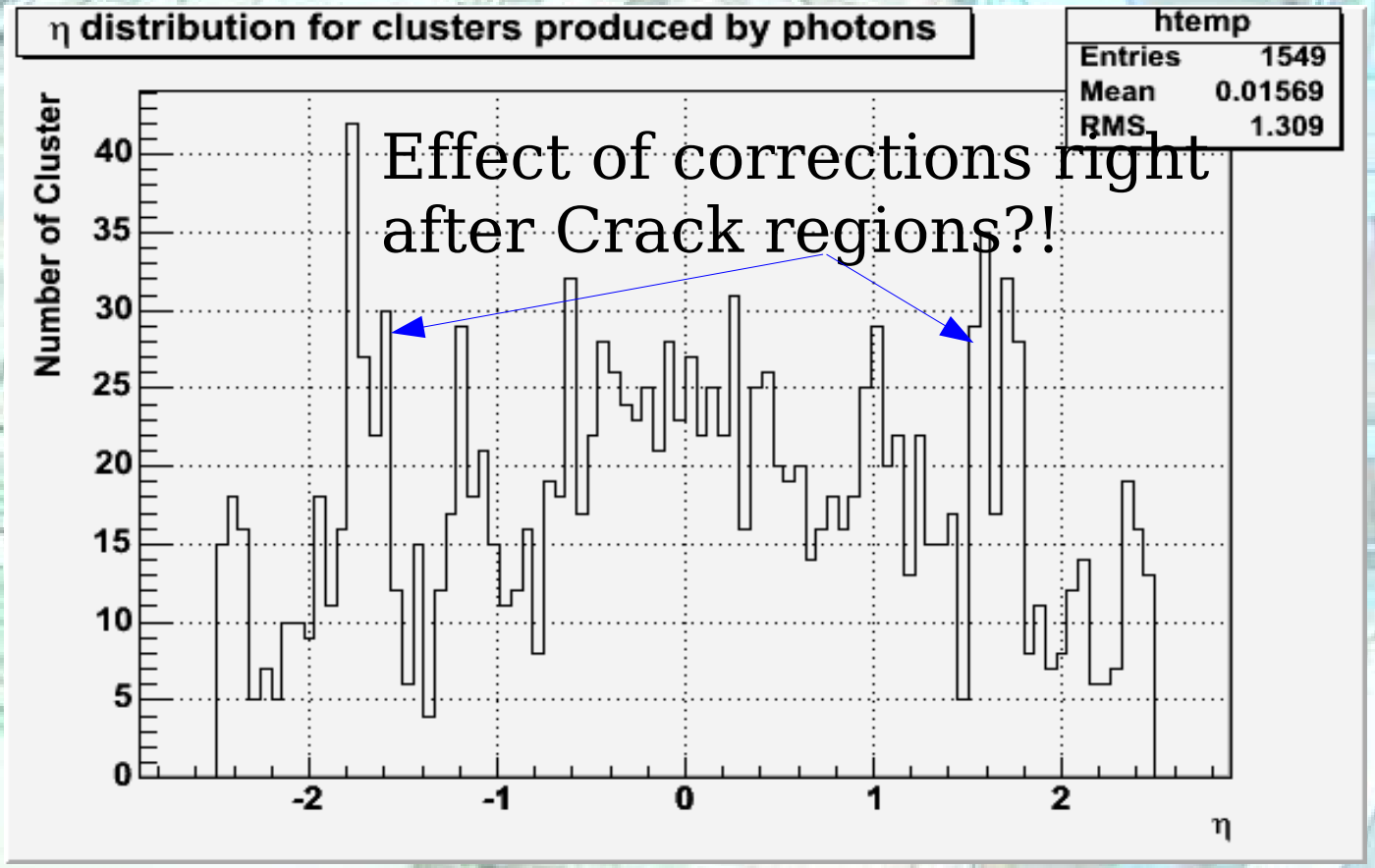


Will this efficiency influence in the egamma_SE efficiency since it is seeded by tracks??!

Minimum bias reconstructed clusters by egamma (eg_IsEM=0 required!)

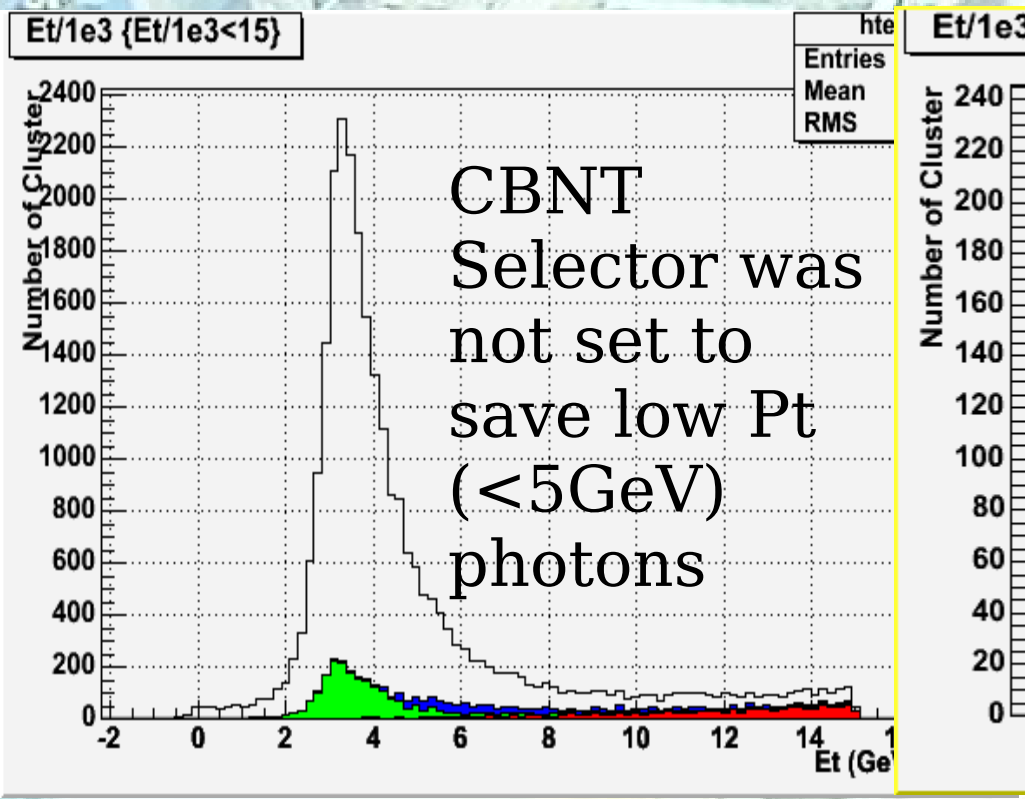


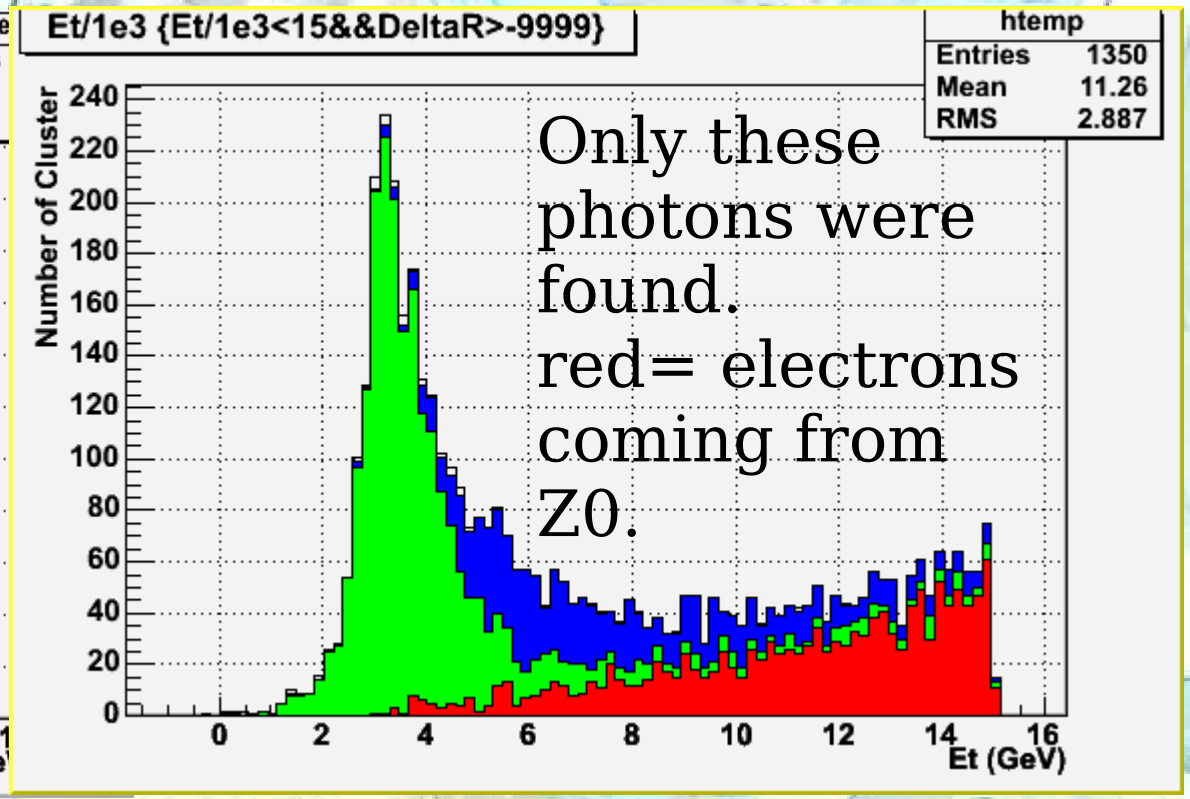
Looking at the reconstructed Et for the clusters which matched photons as a function of Eta



Looking at the reconstructed Et for the clusters which matched photons as a function of Eta (High Lumi Z->ee run)

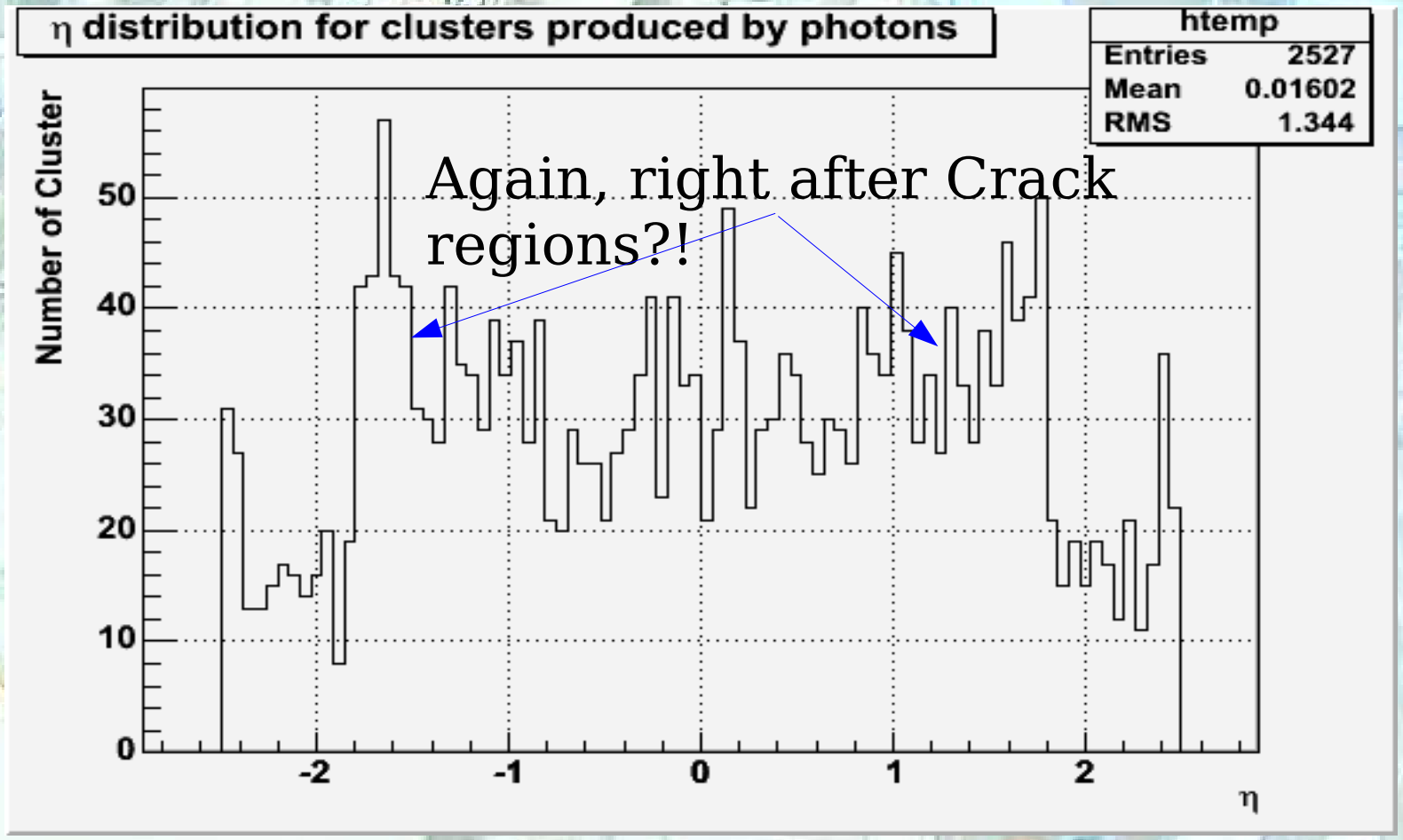
Reconstruction with 9.0.3





However, the same behaviour for photons found. Calibration problem?!

Reconstruction with 9.0.3



Conclusions about Min bias

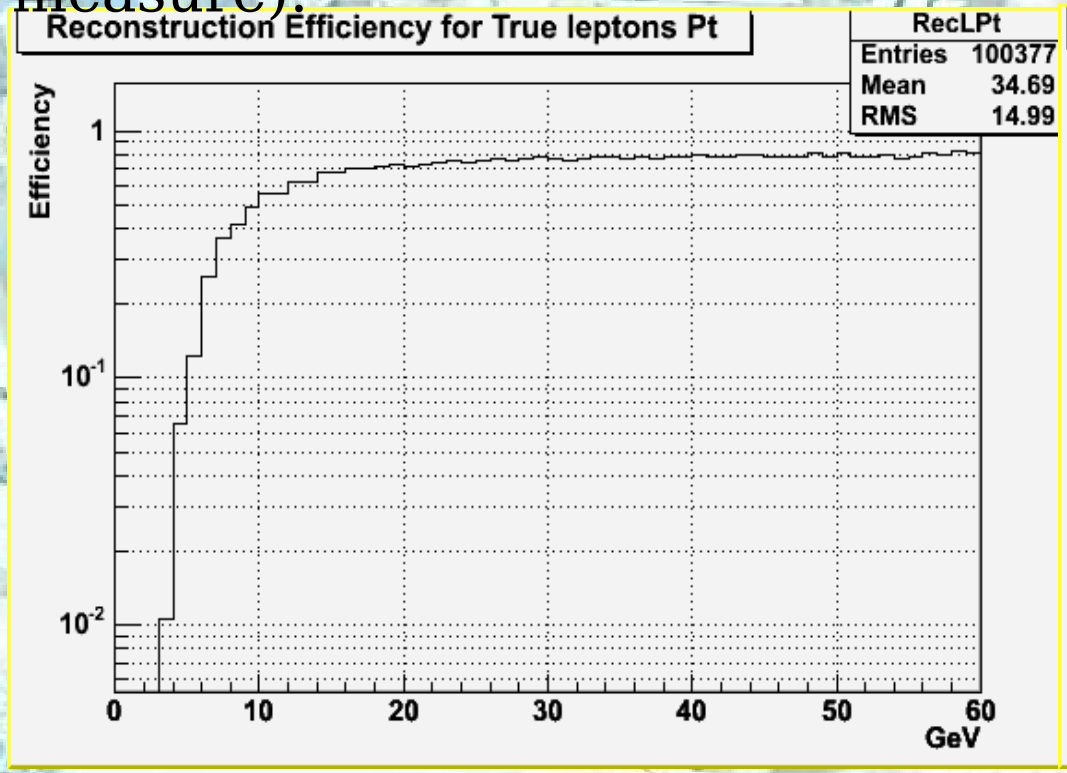
- Could xKalman rec efficiency be improved by an algo setting?! To be discussed with Track guys.
- What about iPatRec? And egamma_SE? Still to check.
- Can we count tracks (weighted by rec efficiency) and estimate number of Min Bias events?! Luminosity measure?!
- Why some charged pion clusters have isEM=0?! To check interaction profile. Low rate though. Would like to see a rejection plot. NN/LH could help?
- Corrections problems for photons?!
- The plots you saw are going to be placed in the usual web site. The ntuples to be placed in castor for the SM group to access.

PileUp efficiencies for Z->ee

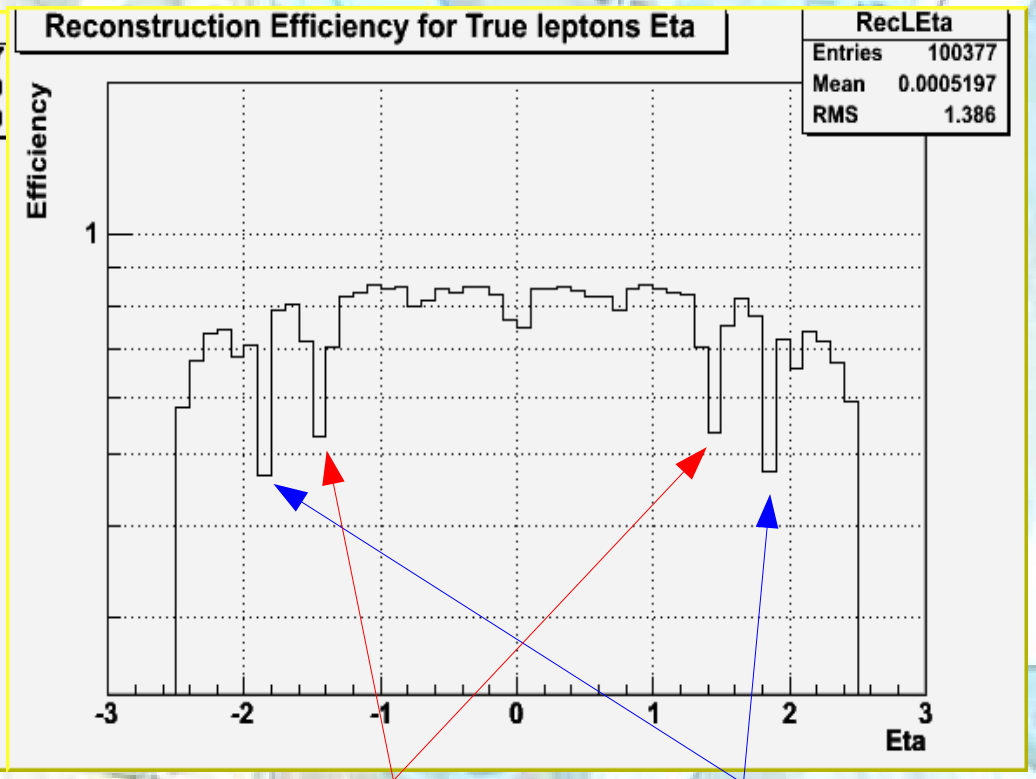
- Two samples from Z->ee with and without pileup analyzed.
- No special setting for the pileup run. Pileup performed with the minimum bias previously discussed.
- Reconstruction performed with 9.0.3 (Could not perform reconstruction with 10.0.1 for pileup events so far! Problem to access ROOT 3 objects with 10.0.1).

Zee efficiency without PileUp

Rec. Efficiency as a function of Pt. Truth e^- coming from Z0 matched with rec. cluster. (Truth/Truth measure).



Reconstruction Efficiency as a function of Eta

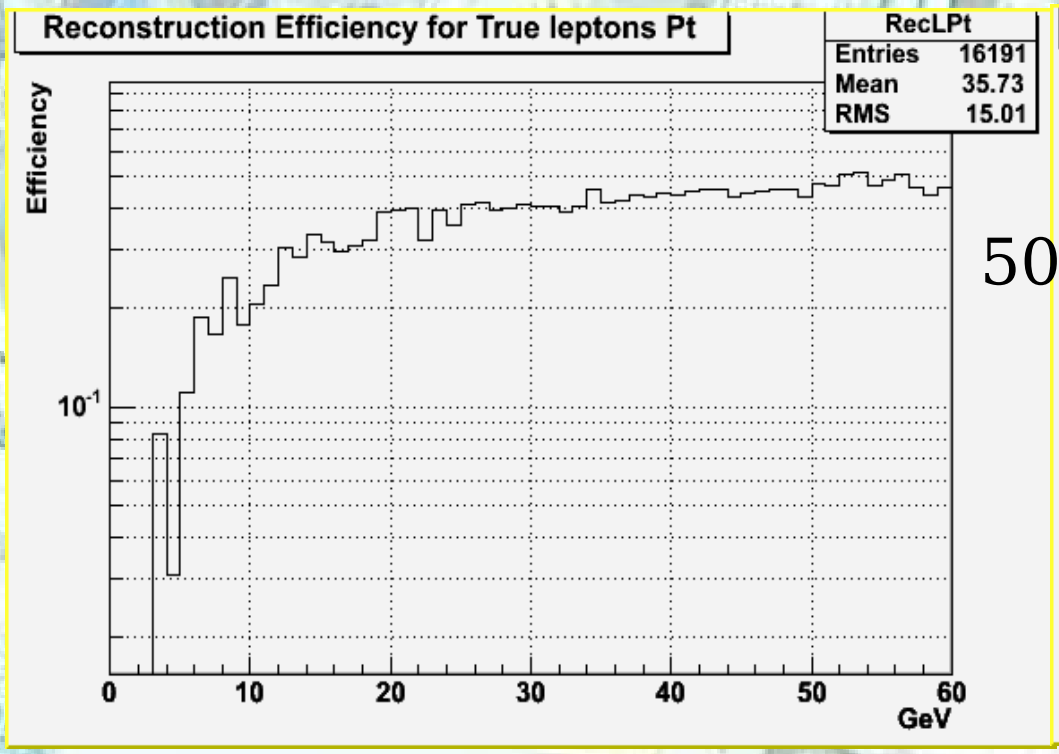


Known and fixed bug

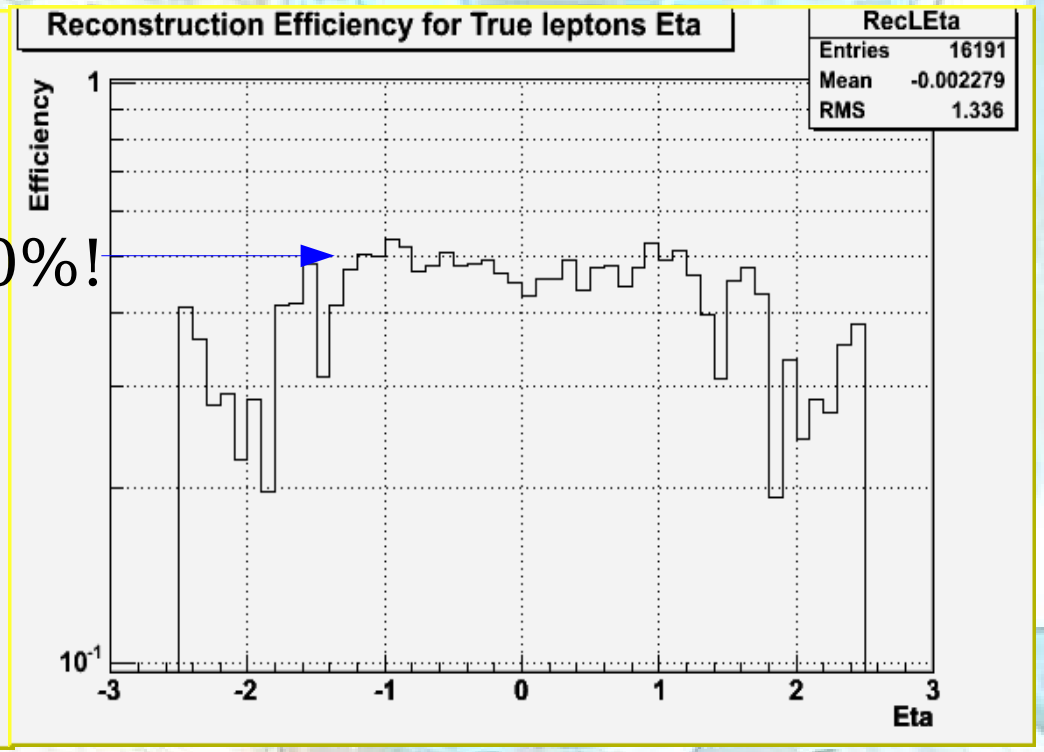
Cracks

Zee efficiency with PileUp. No egamma tunning for pileup.

Reconstruction Efficiency as a function of Pt



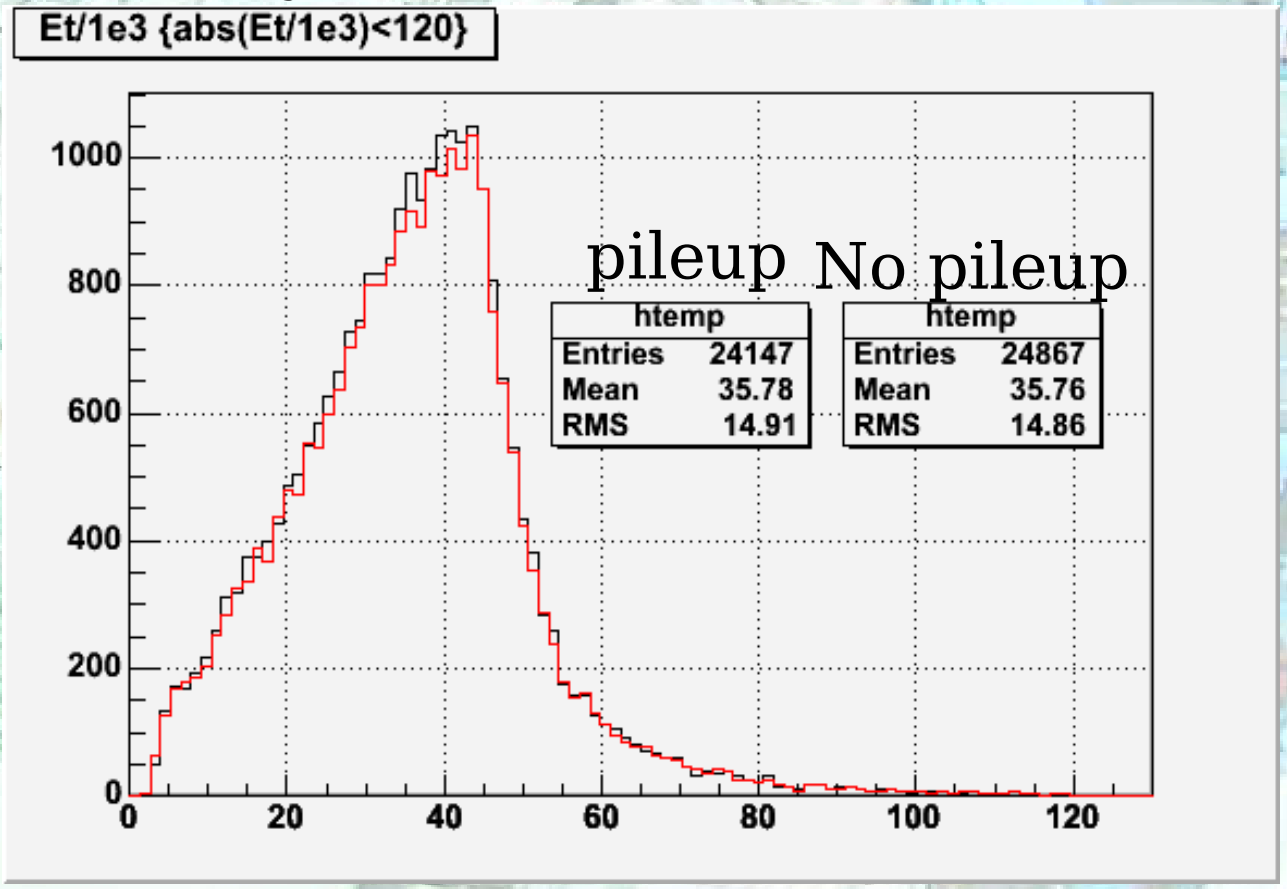
Reconstruction Efficiency as a function of Eta



50%!

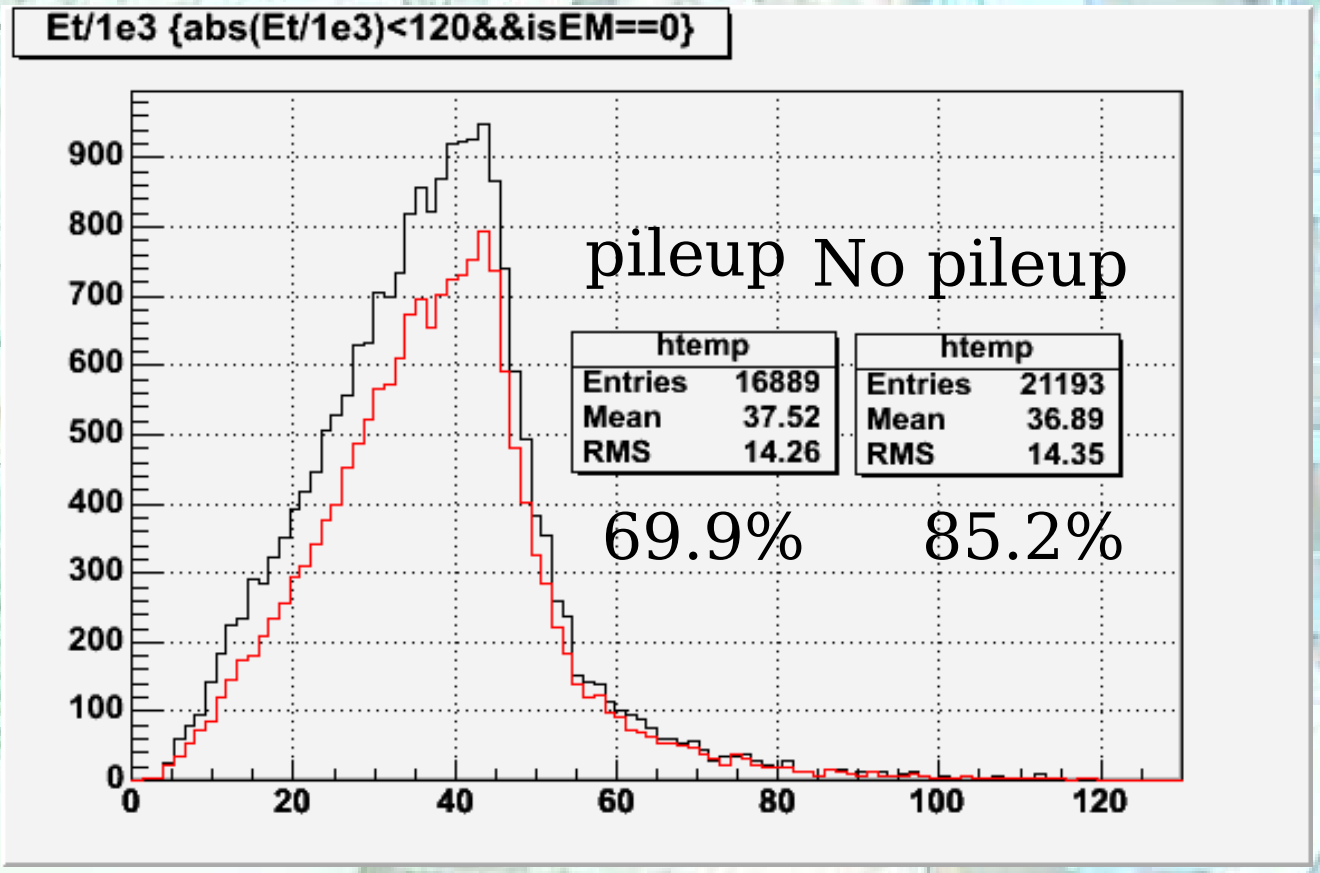
Trying to identify a cause for the decaying rec. efficiency

All rec cluster with Delta R < 0.1 of the truth electron decay from the Z0 for the SAME events.



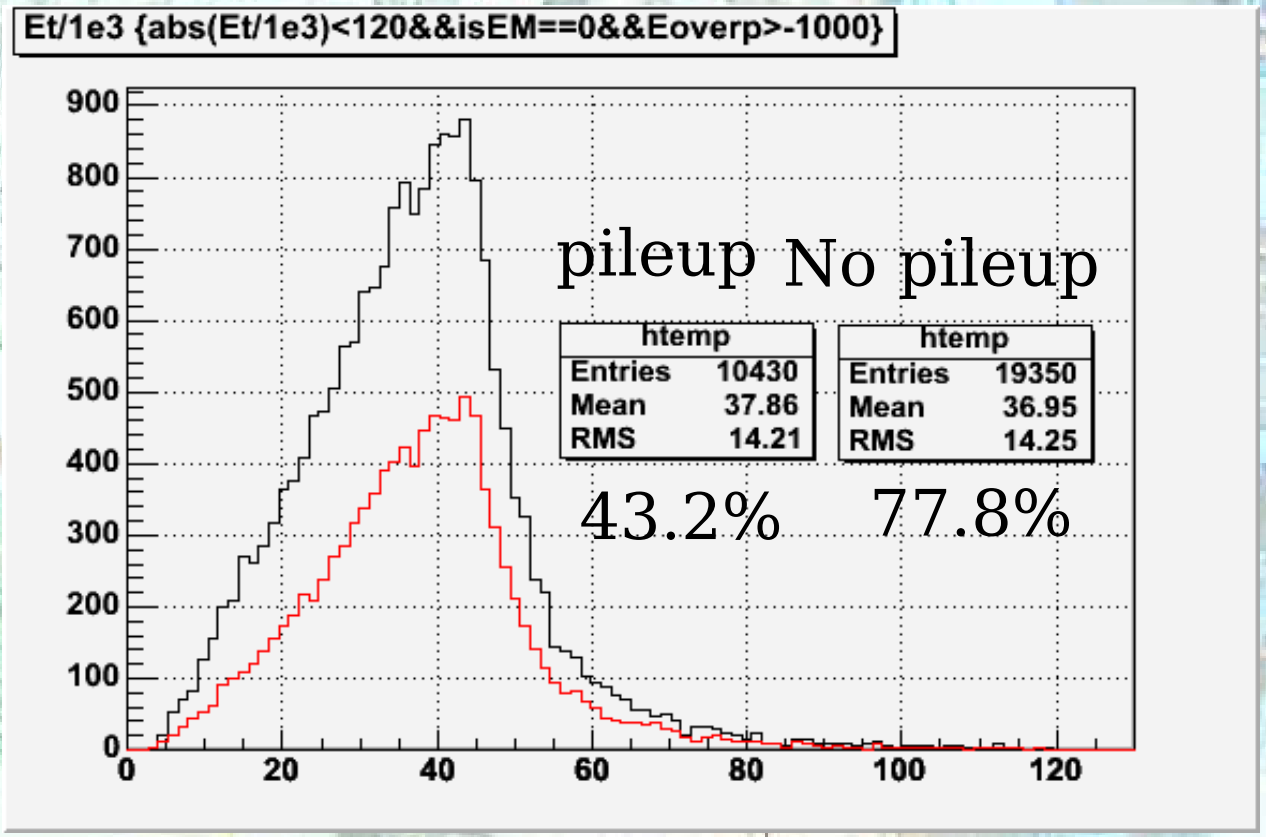
Trying to identify a cause for the decaying rec. efficiency

Rec cluster with Delta R < 0.1 of the truth electron decay from the Z0 for the SAME events. Only isEM =0 clusters.



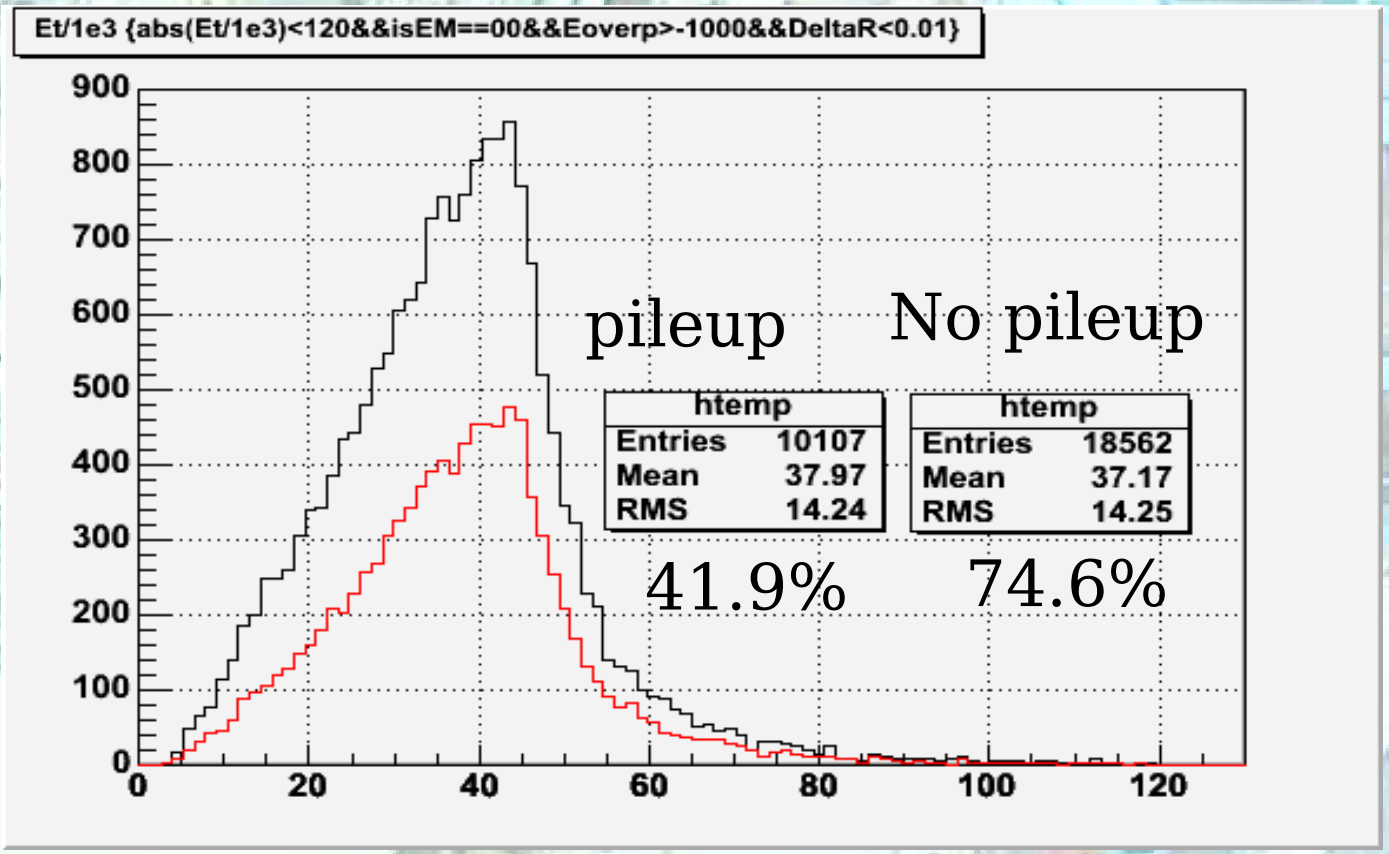
Trying to identify a cause for the decaying rec. efficiency

All rec cluster with Delta R < 0.1 of the truth electron decay from the Z0 for the SAME events. isEM=0 + track match.



Trying to identify a cause for the decaying rec. efficiency

All rec cluster with Delta R < 0.1 of the truth electron decay from the Z0 for the SAME events. isEM=0 + track match + trackToTruth match (Delta R < 0.01).



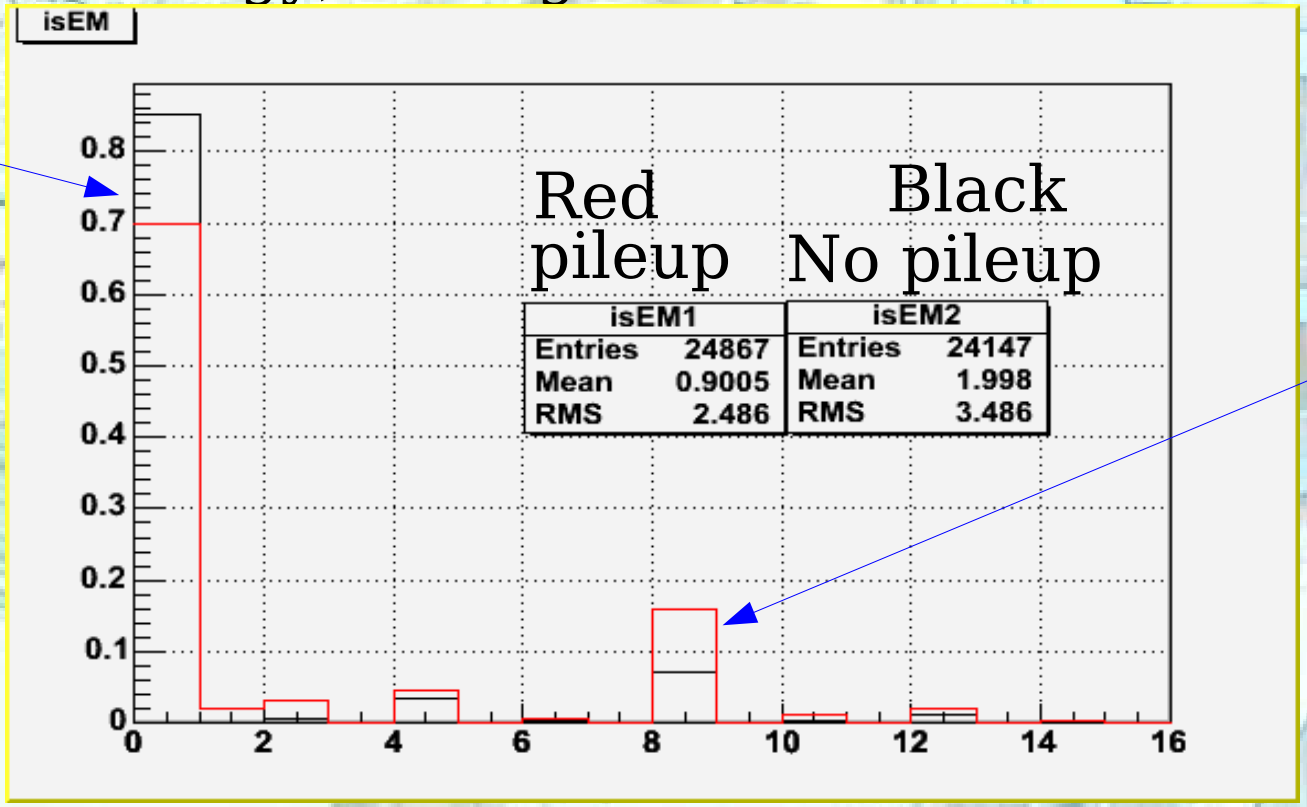
Sumary of cuts and efficiencies

Cut Applied	Z->ee run	Z->ee + pileup Run
Detal R < 0.1 from truth e	100,00%	100,00%
above + isEM==0	85.2%	69.9%
above + trk match	77.8%	43.2%
above +trk match true electron <0.01	74.6%	41.9%

Trying to identify a cause for the decaying rec. efficiency

All cluster with Delta R < 0.1 of the electron decay from the Z0 for the SAME events. This shows the decaying probability of finding a EM flagged cluster with cause 8 (hadronic energy) leakage.

well defined EM cluster



Excess of hadronic leakage. Could this be better with egamma set to pileup?!

Conclusions about pileup section

- We should run reconstruction with the pileup sample to understand the problems. ROOT 3/4 to access DC2 data with 10.0.1.
- I should check the egamma settings for high luminosity. The same for xKalman. (too many clusters without track match).
- Use Z0 mass to reject min bias produced clusters, count real Z0 and real min bias -> luminosity.