Recovery of jets in dead calorimeter regions

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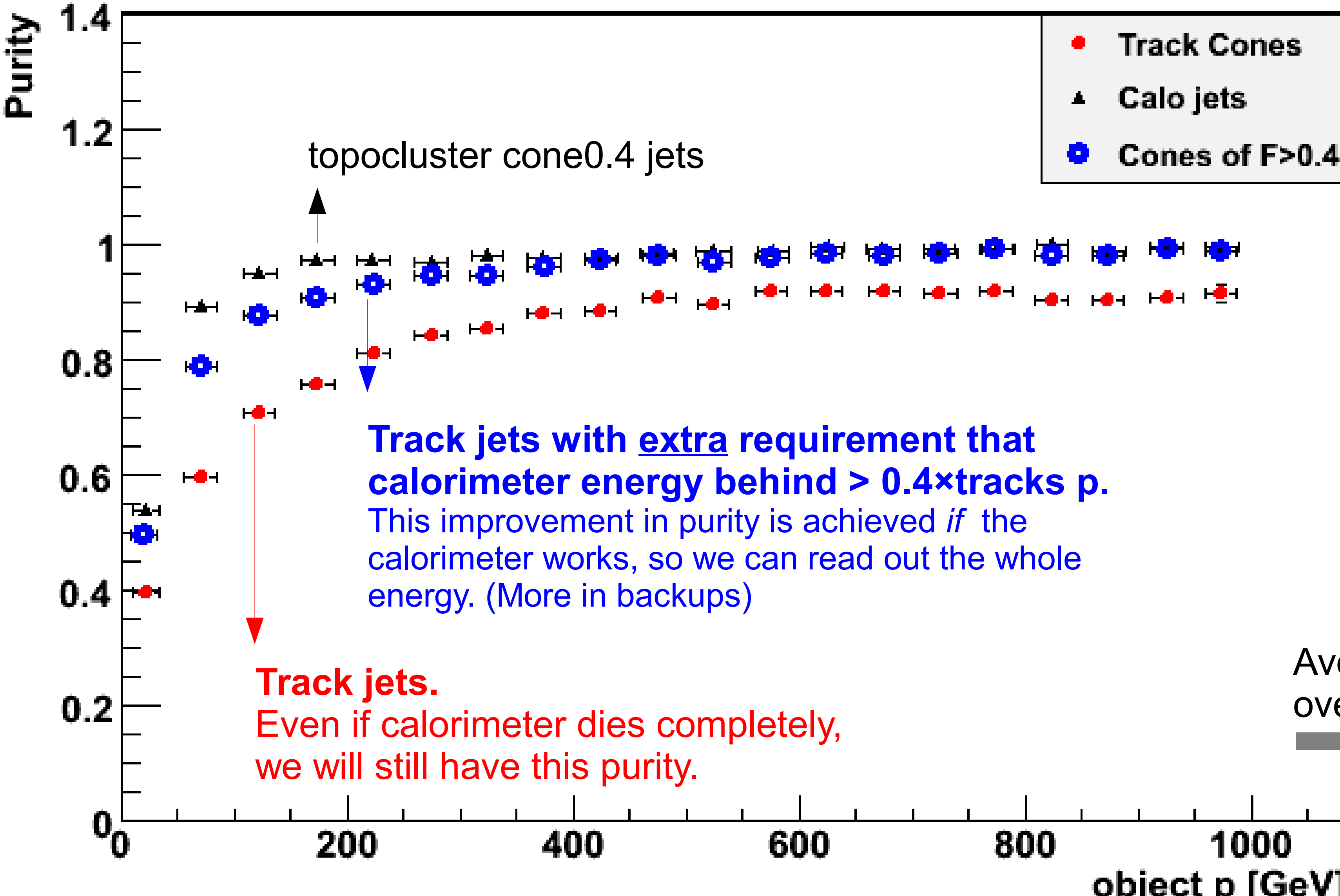
Summary

- Imagine a dead part of the calorimeter.
- We identify jets using tracks (Cone R=0.4, clustering only tracks from same vertex).
- We will show how pure/efficient those track jets are.
- We then try to guess the true energy of the reconstructed jets.
  - We use for that the total energy in the (surviving part of the) calorimeter, and the total p of tracks.
- We will show how well we can estimate the energy.

Purity of track jets

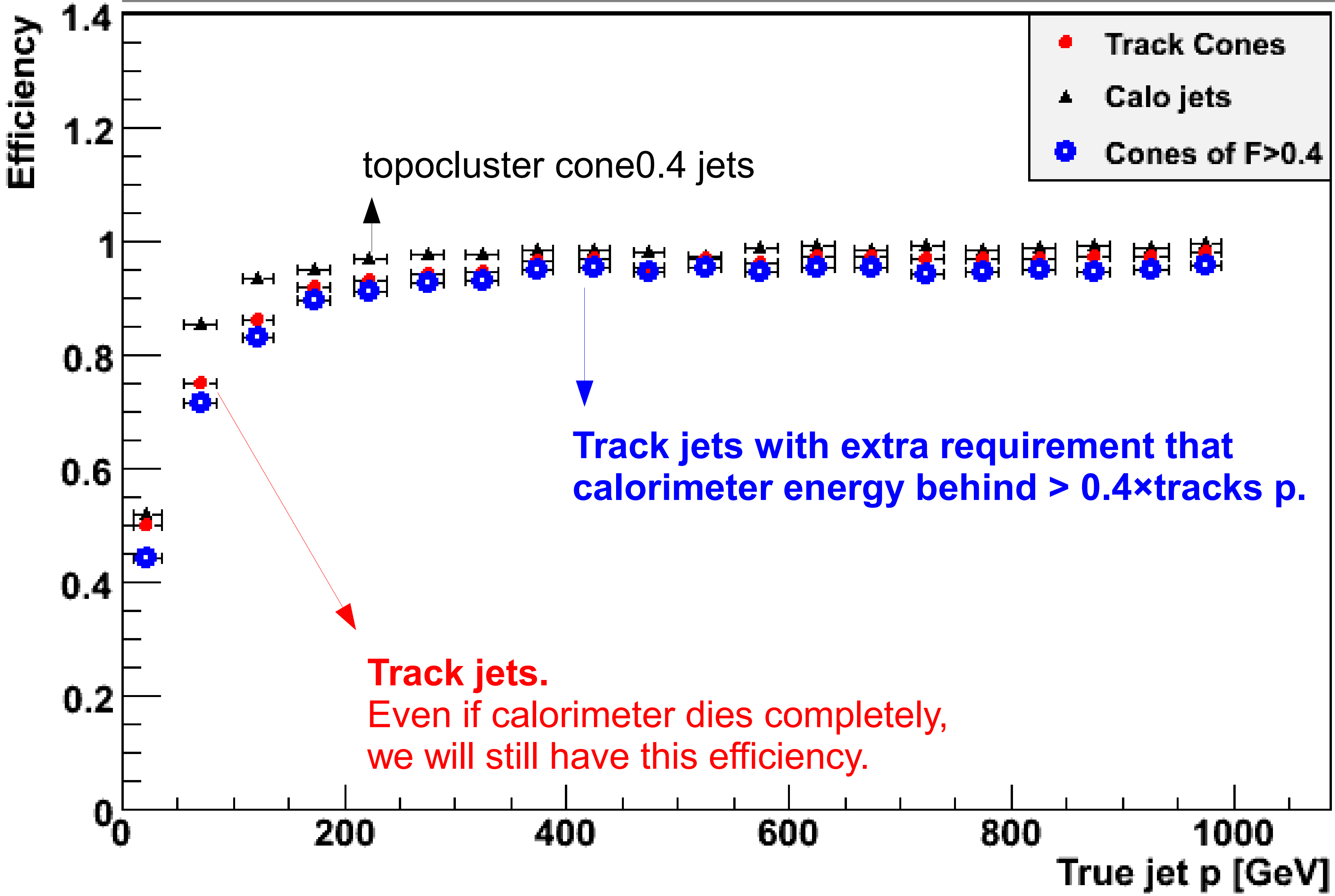
"matching" means : **ΔR<0.2** from true (particle) jet, found using cone0.4.



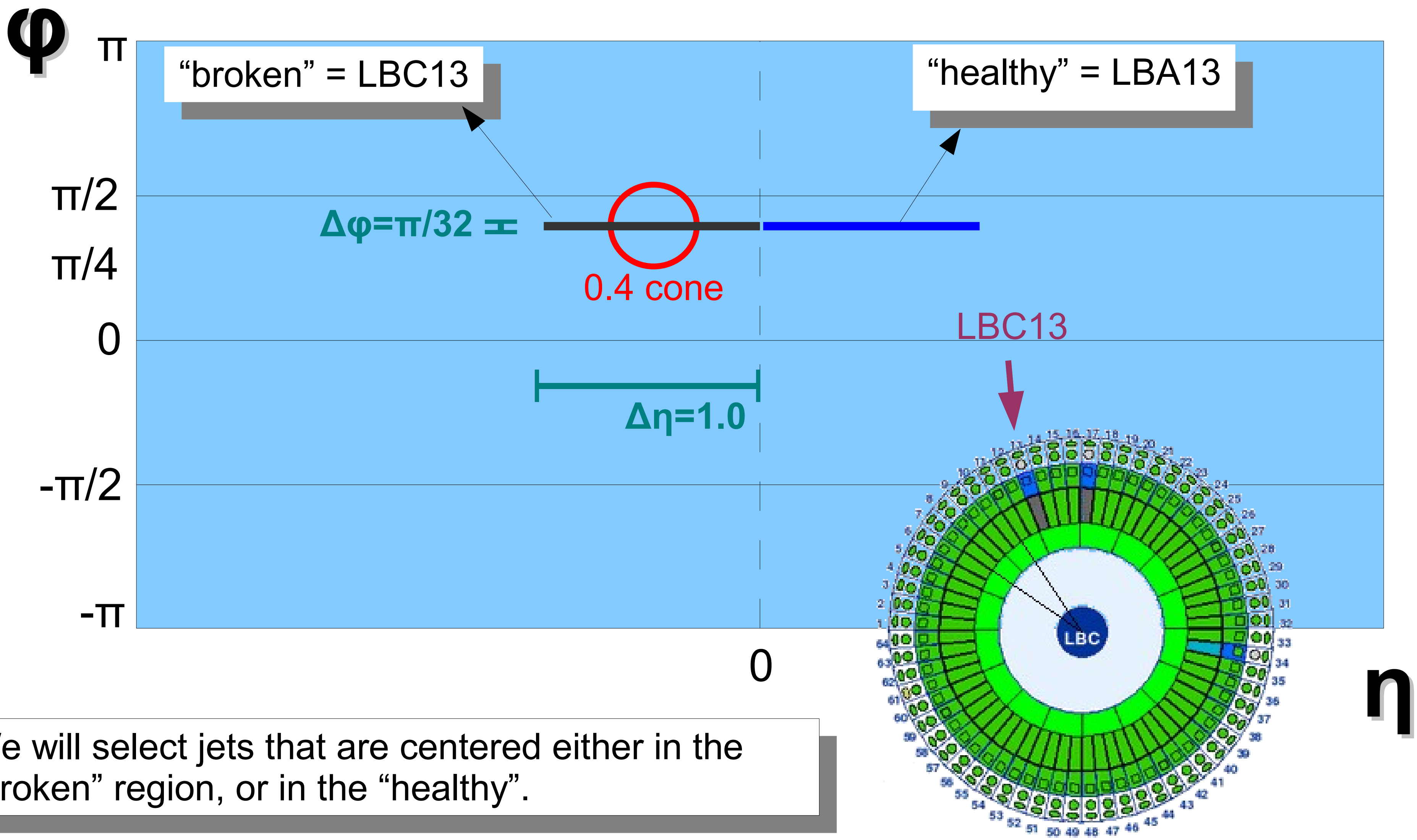
Average over |η|<2.6

Efficiency of track jets

"matching" means : **ΔR<0.2** from true (particle) jet, found using cone0.4.



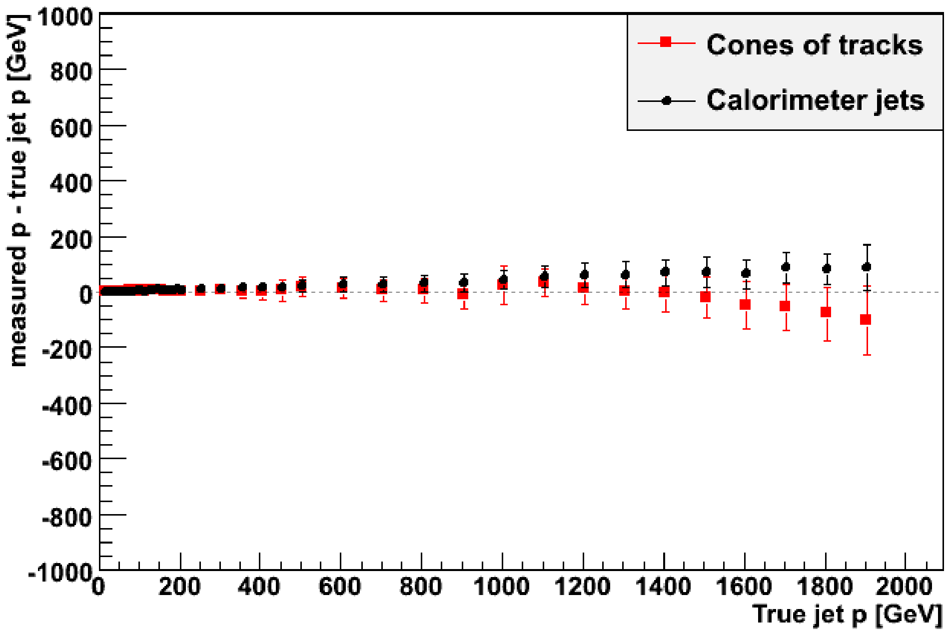
Broken LBC13 assumed



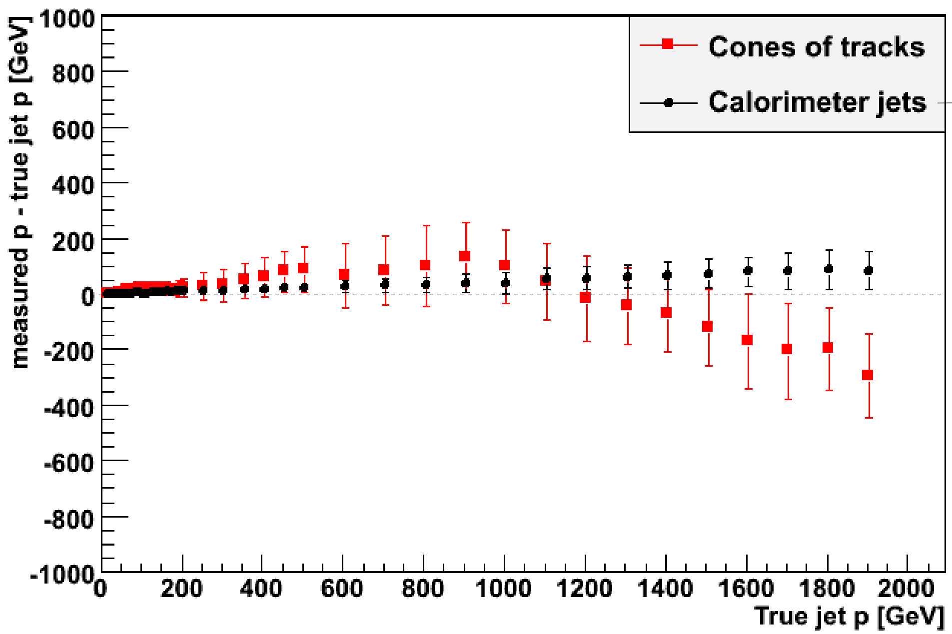
We will select jets that are centered either in the “broken” region, or in the “healthy”.

How does linearity change?

Healthy side



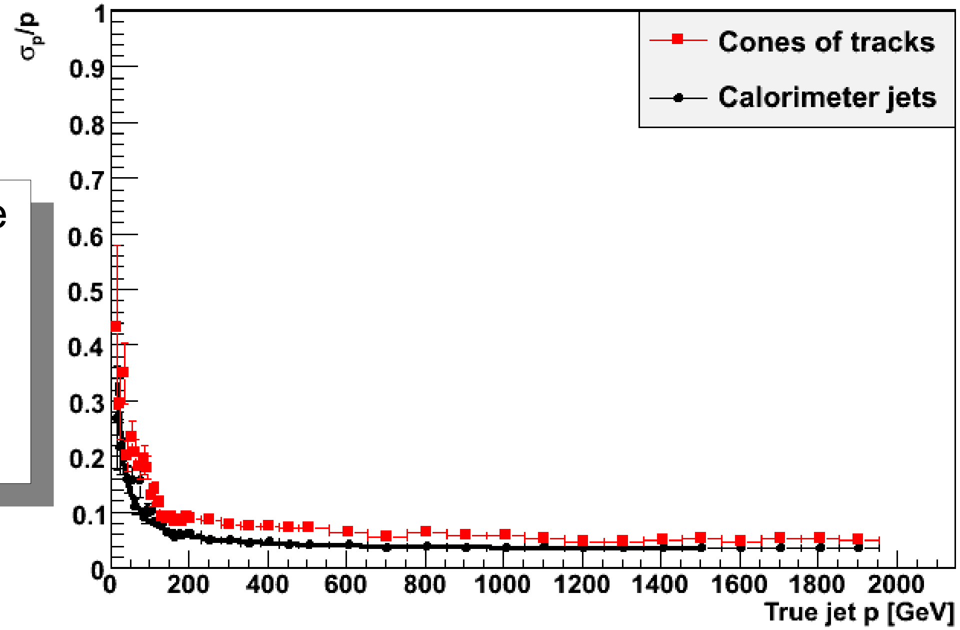
Broken LBC13



We didn't re-reconstruct CaloJets (yet) to reflect damage.
It's here only to guide the eye.

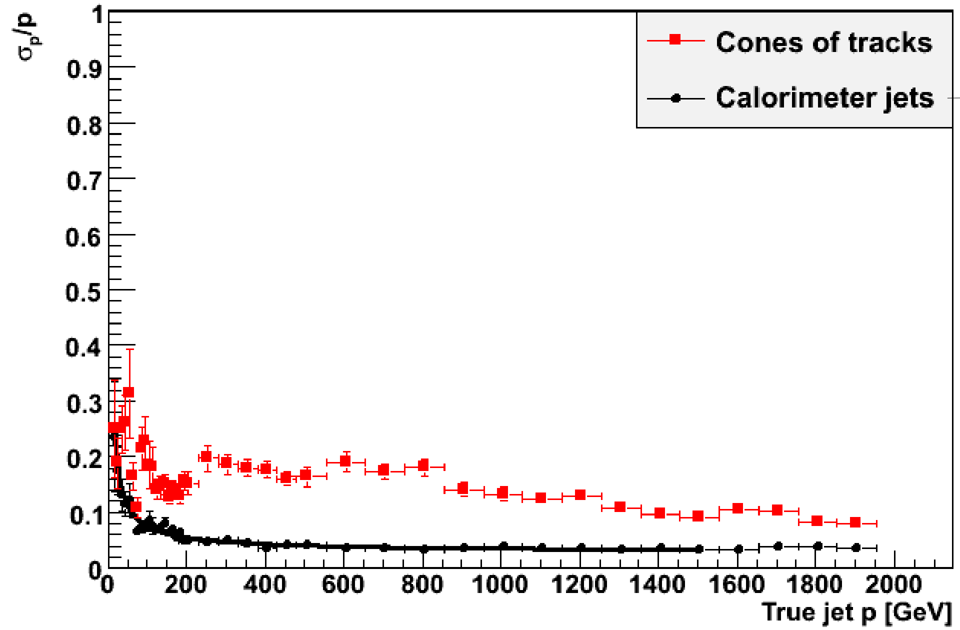
How does resolution change?

Healthy side



Even with perfect detector, track jets are slightly worse than topocluster jets, because they don't use H1-corrected cell energies; we simply guess true p from the total (uncorrected) calorimeter E and the total tracks' p.

Broken LBC13



We didn't re-reconstruct CaloJets (yet) to reflect damage.
It's here only to guide the eye.

Summary

- Track jets are reasonably pure and efficient.
- We can combine info from calorimeter and tracks to make a local calibration of jet energy, for the problematic region, based on MC.
- Later that may be improved with *in situ* studies.

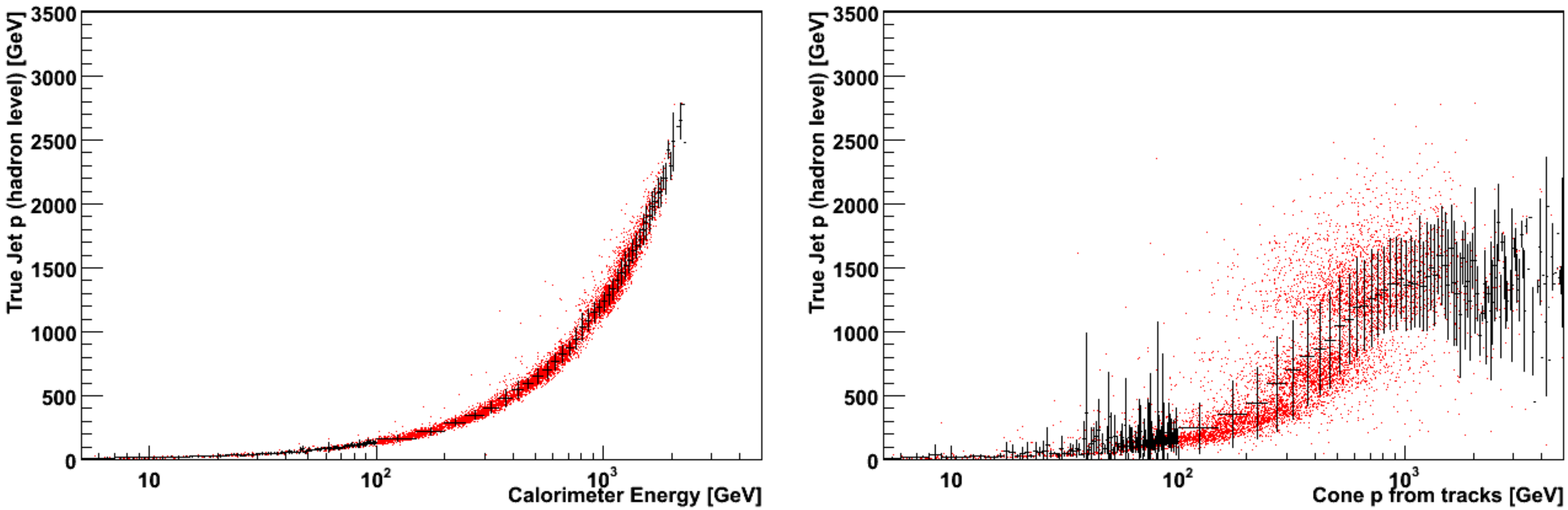
To do

- Recently we moved to ESD 14.2.20.3, and saw what happens to topocluster jets in the damaged region.
- First signs exist that track jets with this local calibration perform better when there is detector damage.
  Still trying to understand what we see.

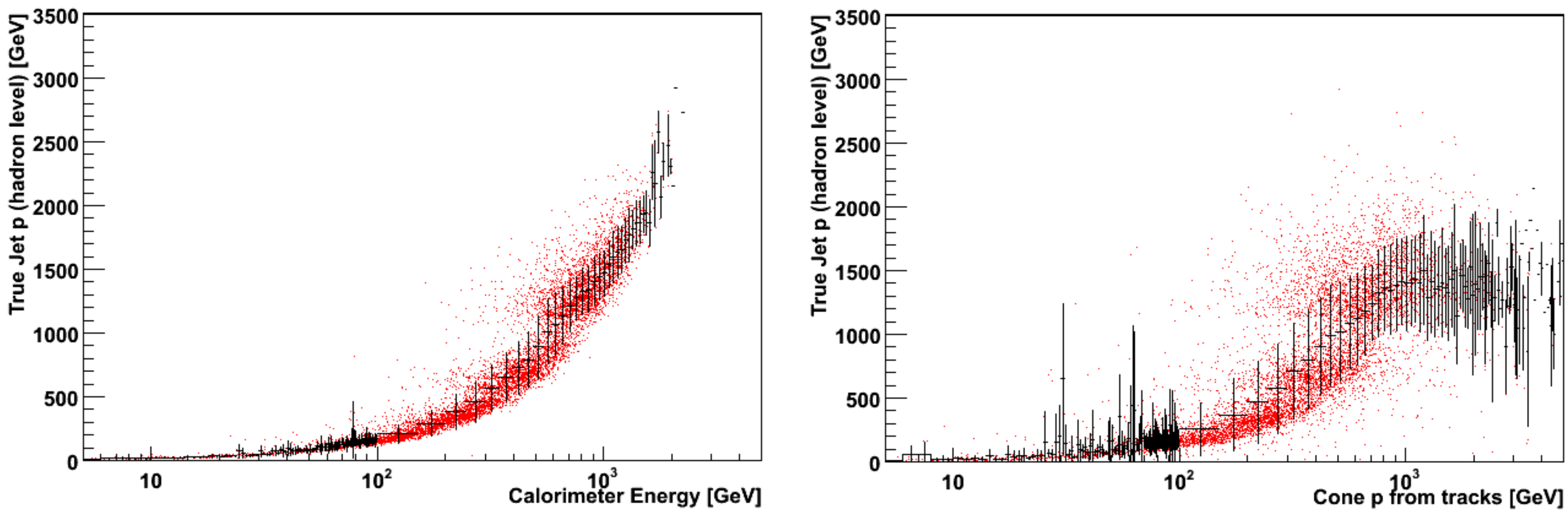
Backups

From observables to true p

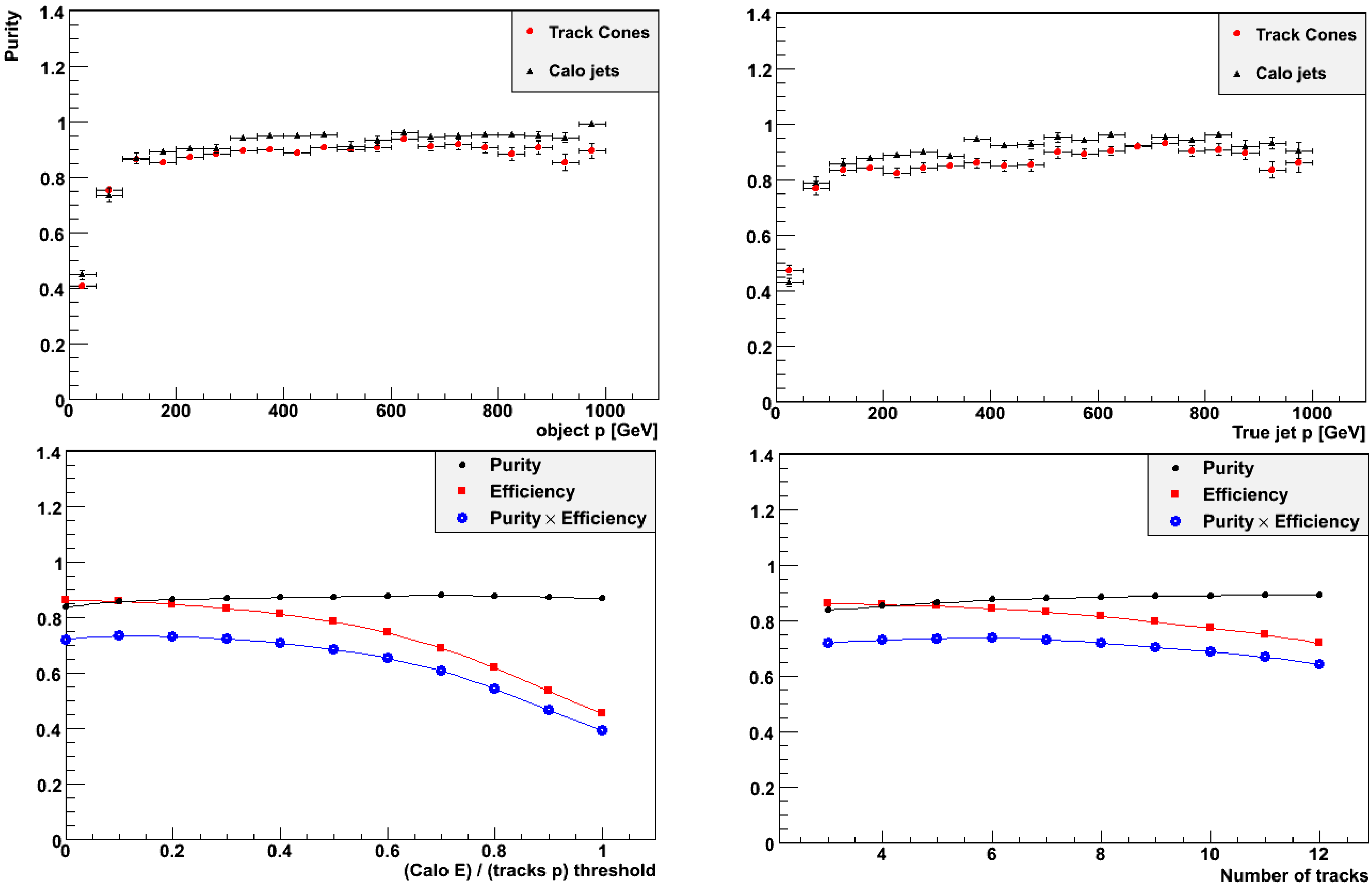
Healthy side



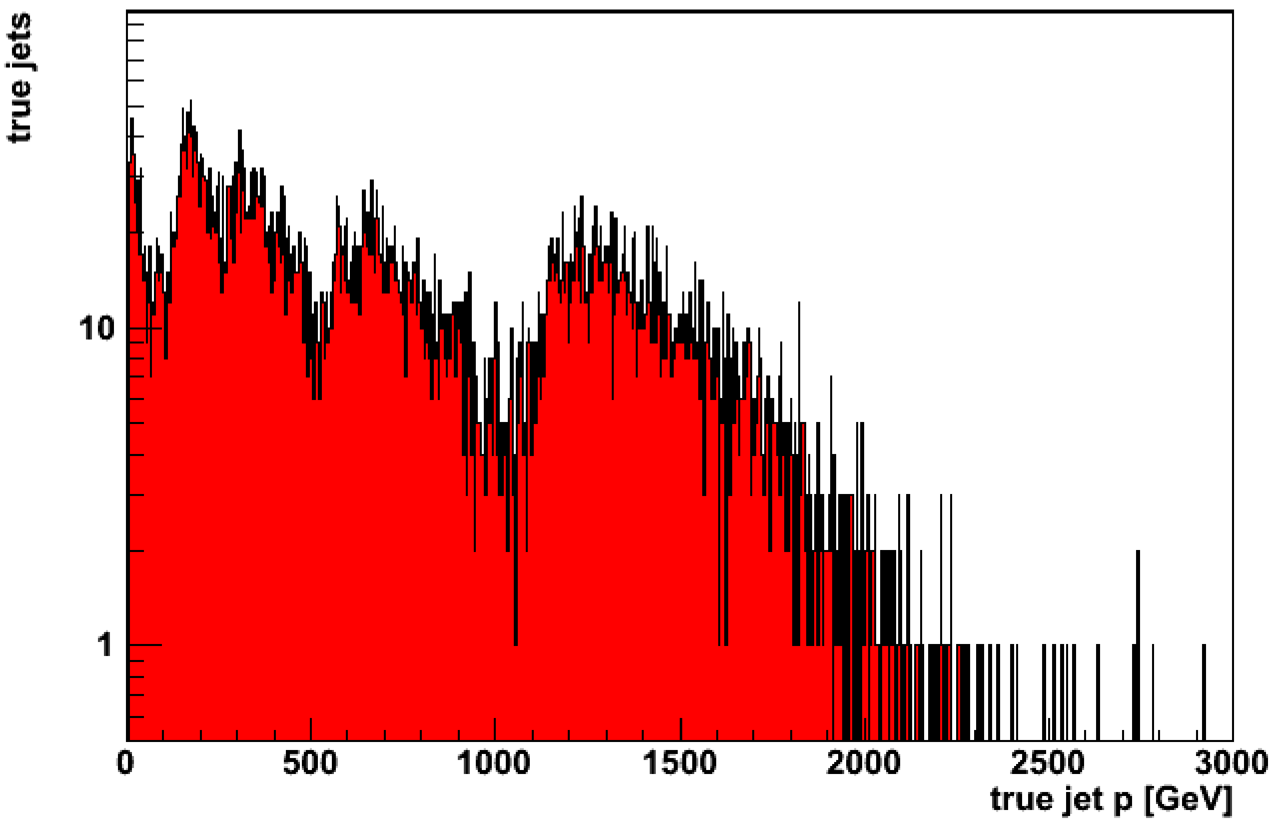
Broken LBC13



Optimization of efficiency & purity at the LBC13 hole

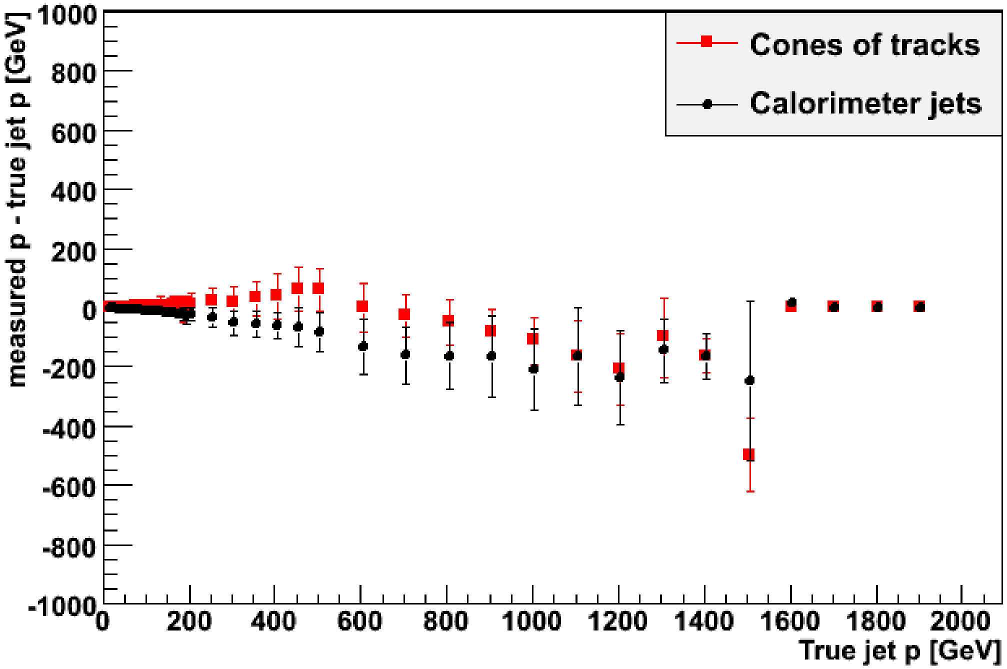


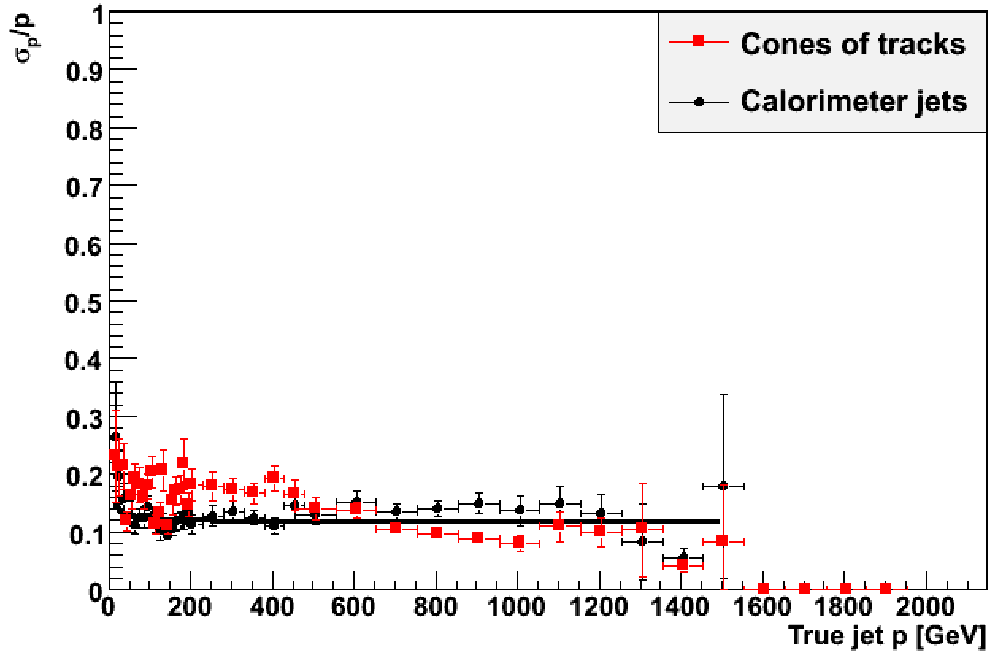
The p spectrum of true jets



- We used for this ESDs J0-J7 made with release 14.2.10.
- Lately, to re-reconstruct topoclusters/jets/MET, we had to move to 14.2.20.3. We're still making sense of the differences.

What are the “signs” that this calibration is better in the damaged region?





Very PRELIMINARY

This shows how our locally calibrated track jets (“cones of tracks”) and the calorimeter topocluster jets seem to perform at the region of dead LBC13.
Slightly better linearity and resolution above ~700 GeV.
Statistics are limited, especially above 1 TeV.