

qq events up to 500 GeV with the Threshold Accepting method

- Cost function
- Algorithm refinements: Single d-quark events at 50 GeV
- Algorithm tests: qq events up to 500 GeV
- Summary
- Missing pieces

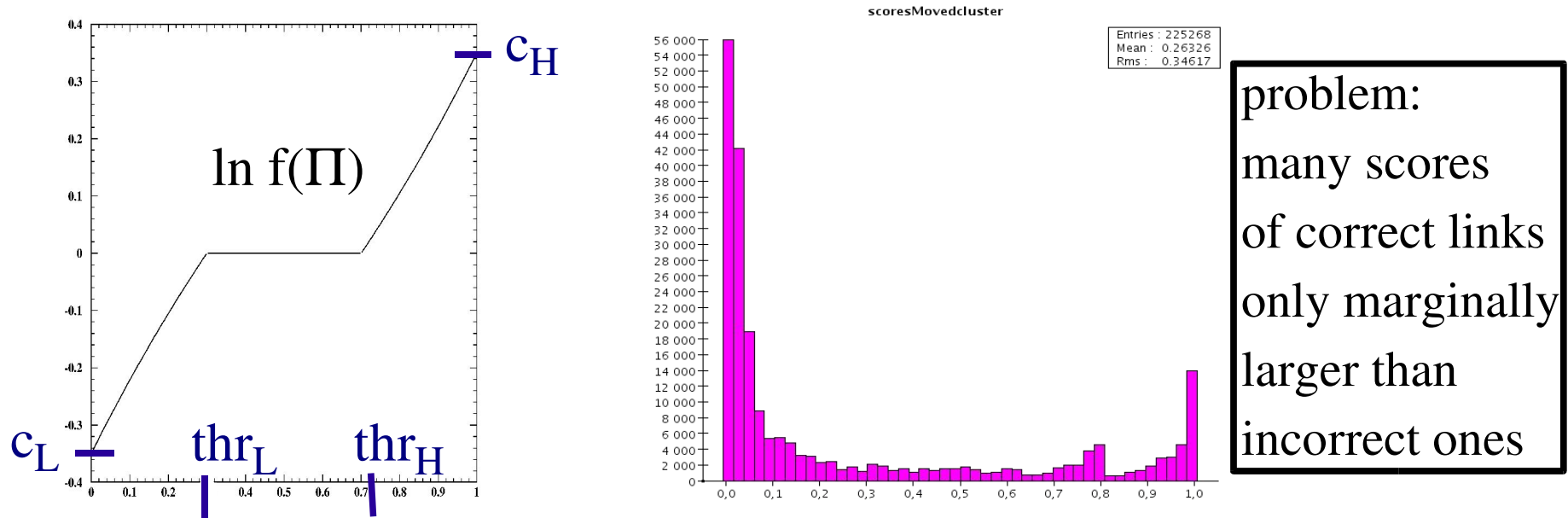
Cost function

for maximum scored link of sub-cluster moved in-
to shower (identical links when moving out - stored
in a tree). Factor 5 faster than old function!

- $P = (1/\sqrt{(2\pi)\sigma} \text{Exp}\{-1/2(E-p)^2/\sigma^2\})^\alpha \cdot (/) f(s_i)$,
 α expresses relative reliability of $E \setminus p$ - vs. geo-
metrical costs. $f(\text{scores } s_i)$ see below.
- To be maximized! Or minimize the negative
logarithm:
cost function = $\alpha \cdot (c + \sigma + 1/2(E-p)^2/\sigma^2) - (+) \ln f(s_i)$

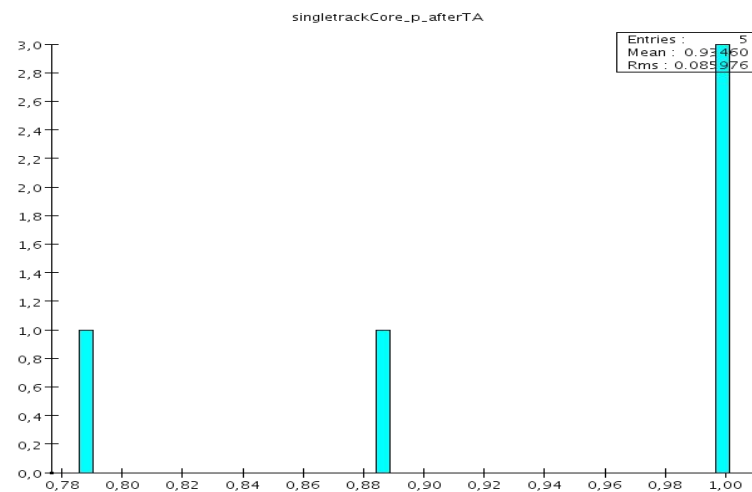
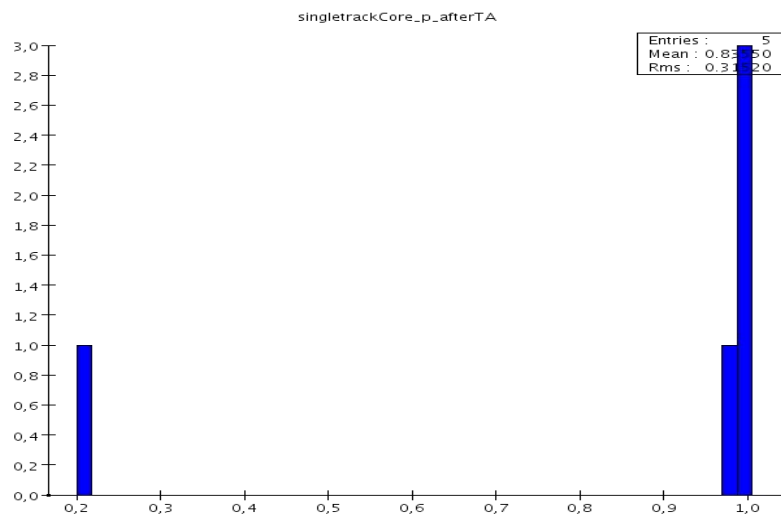
Score function $f(s_i)$

- $f(s_i) = f(\text{product } \Pi \text{ of scores } s_i \text{ of links in branch leading to leaf})$
- Tried: two exponentials

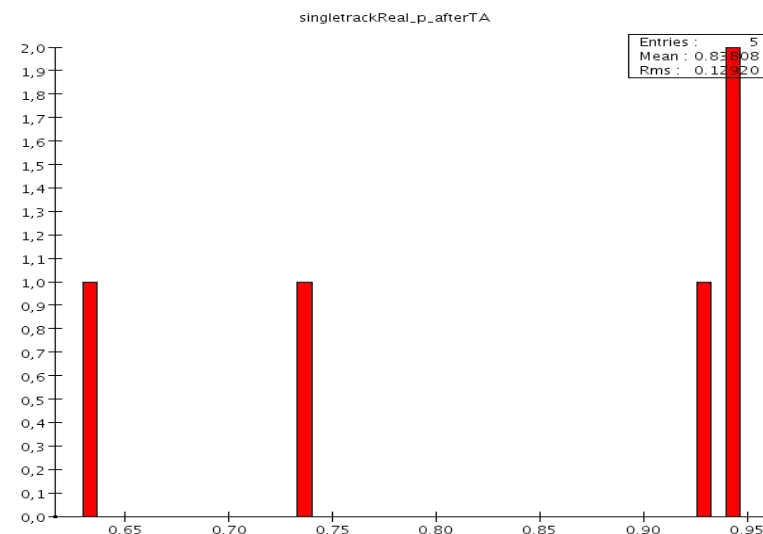
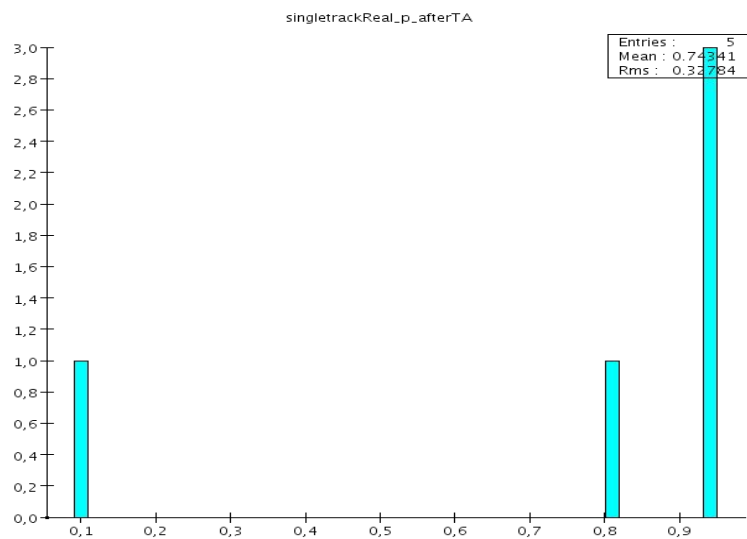


- Scores s_i by given routines – however without penalty for differing Dtree clusters
- Count non-existing link with score 0.

single d-quark at 50 GeV, single events



core
purity



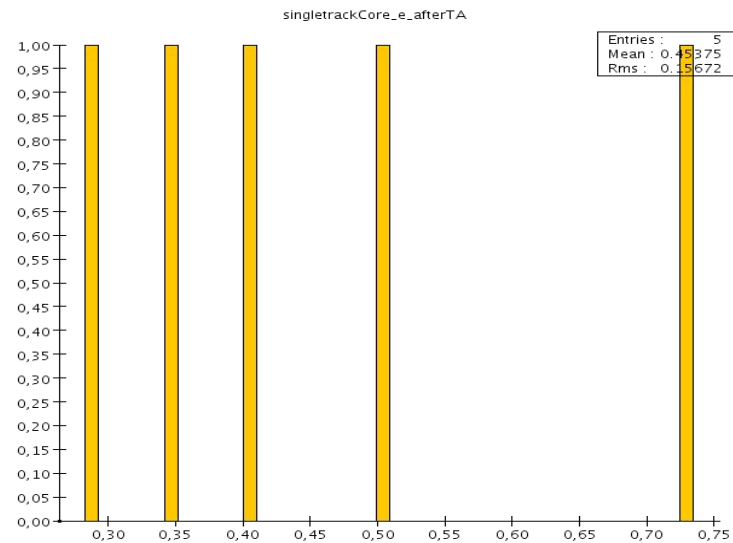
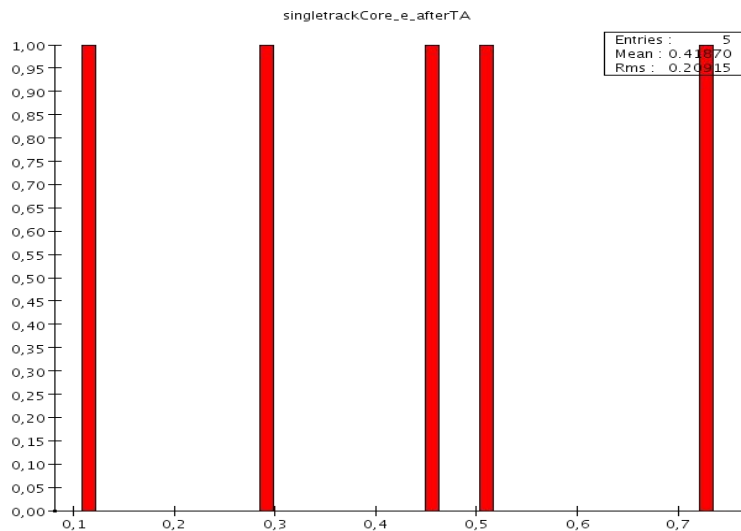
real
purity

file 0 event 0: OLD

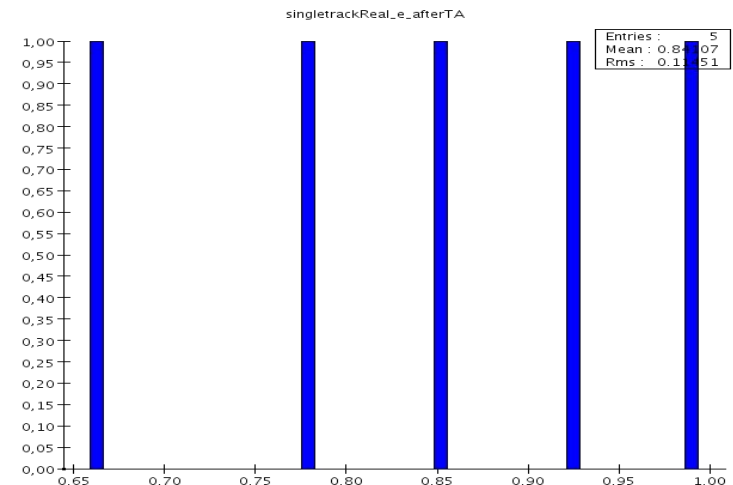
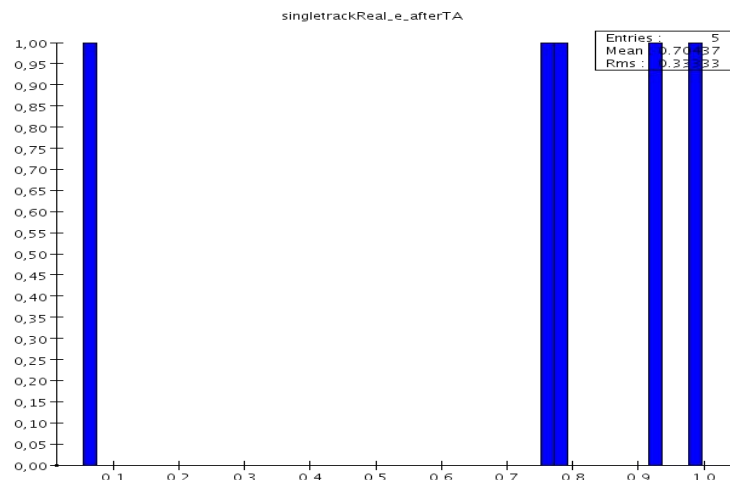
NEW:

Often slight decrease, but unphysicalities cured

single d-quark at 50 GeV, single events



core
efficiency



real
efficiency

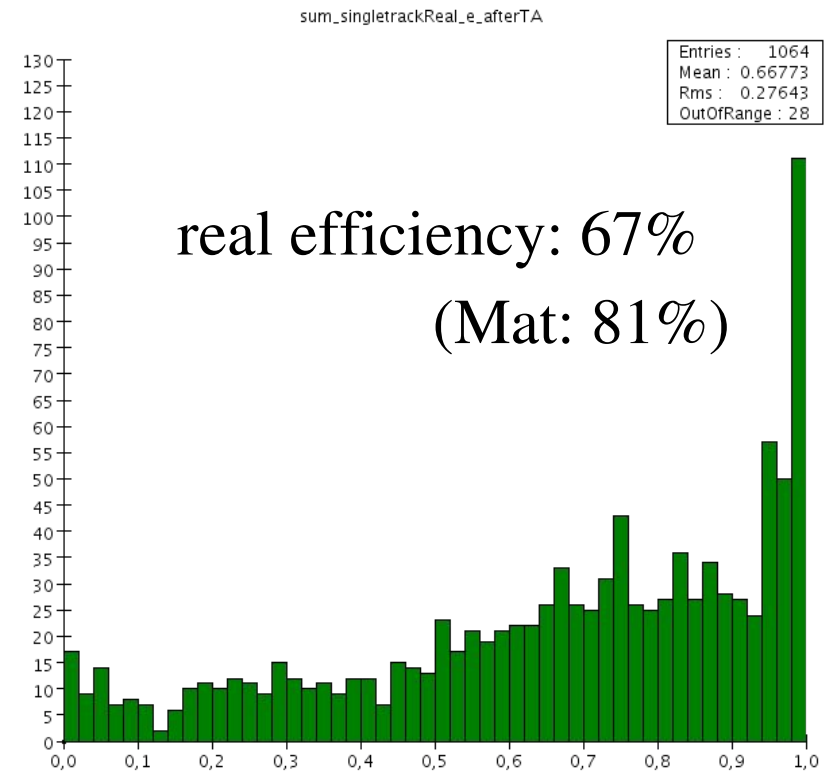
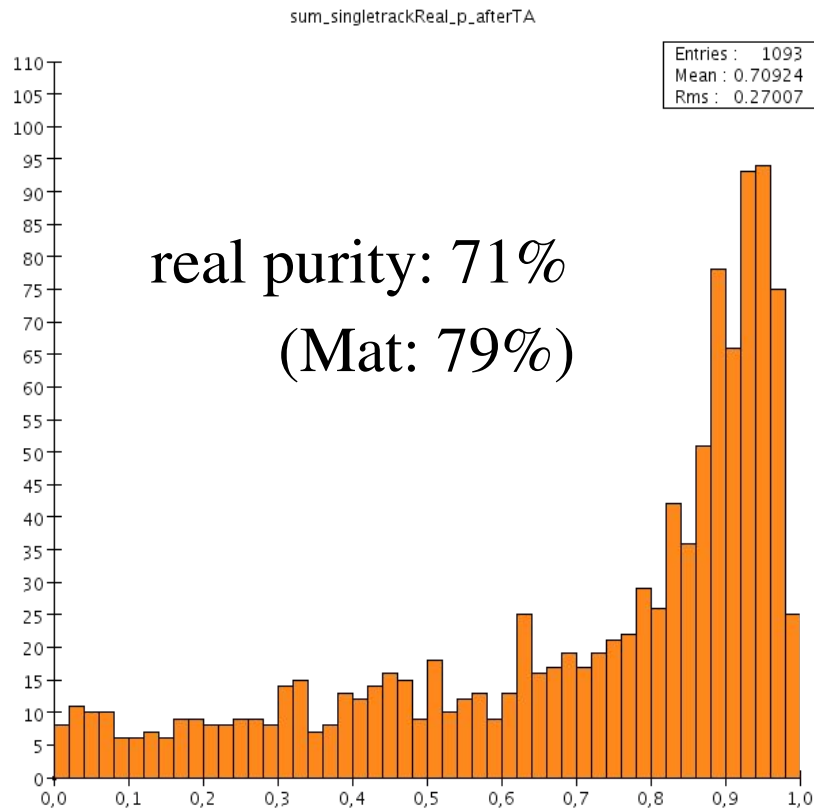
file 0 event 0:

OLD

NEW:

Efficiencies improved

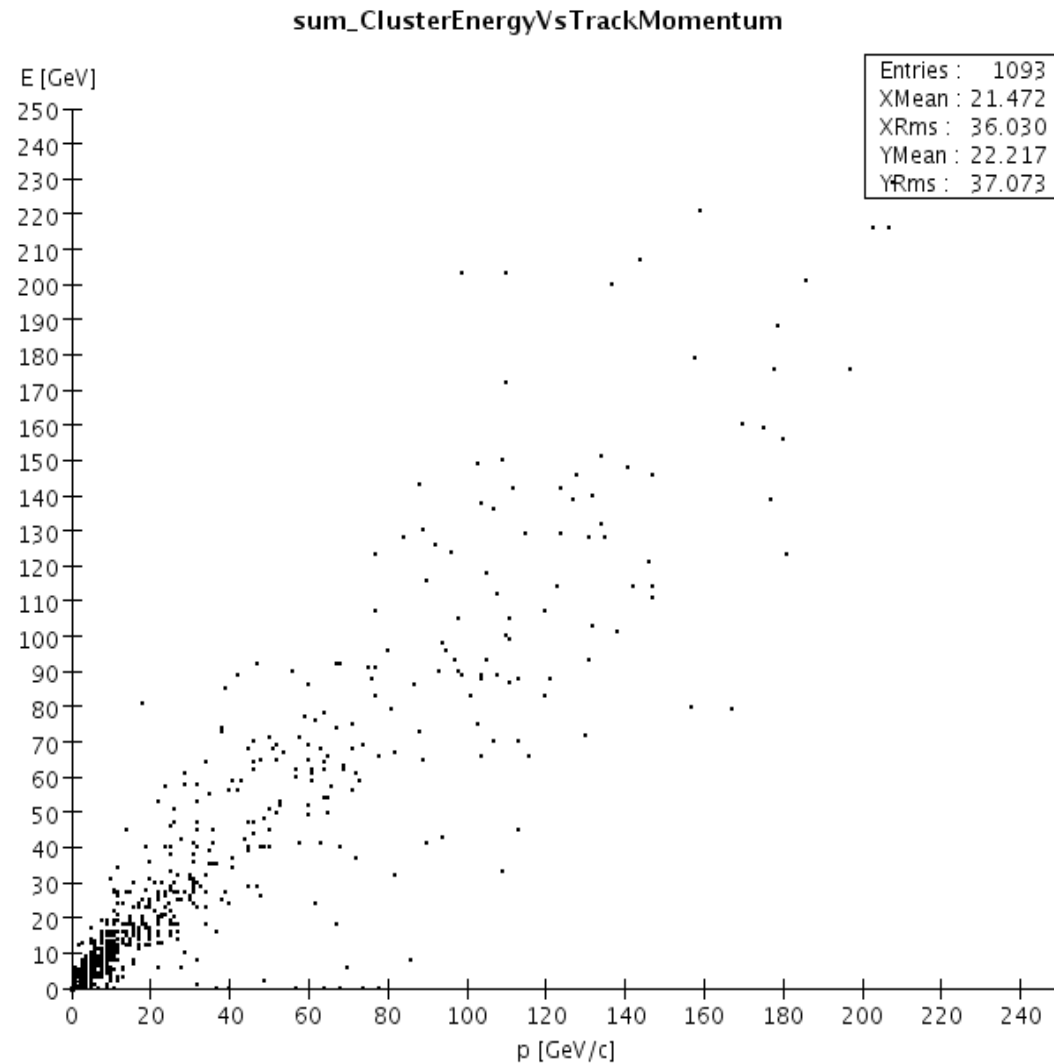
qq 500 GeV, 80 events



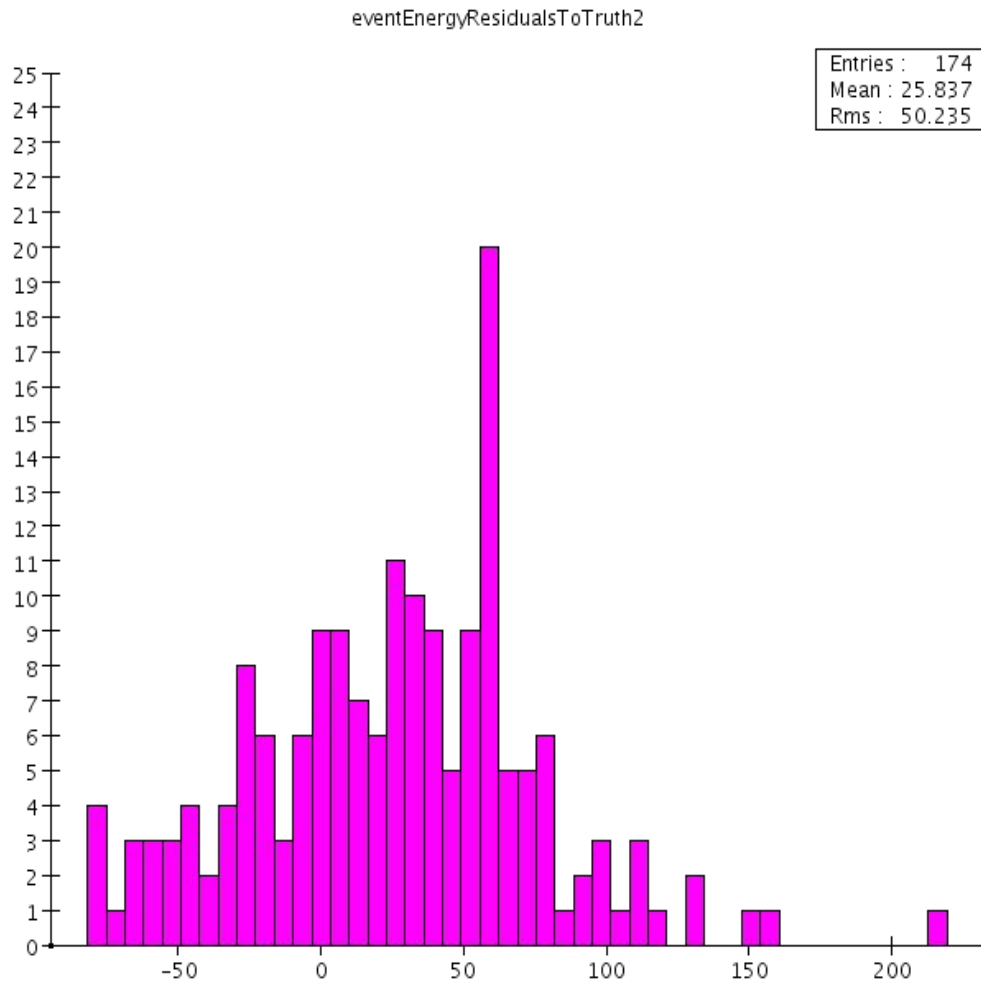
- purity: not far

- efficiency: to be improved

Cluster energy vs. track momentum



Resolution estimate with 240 events



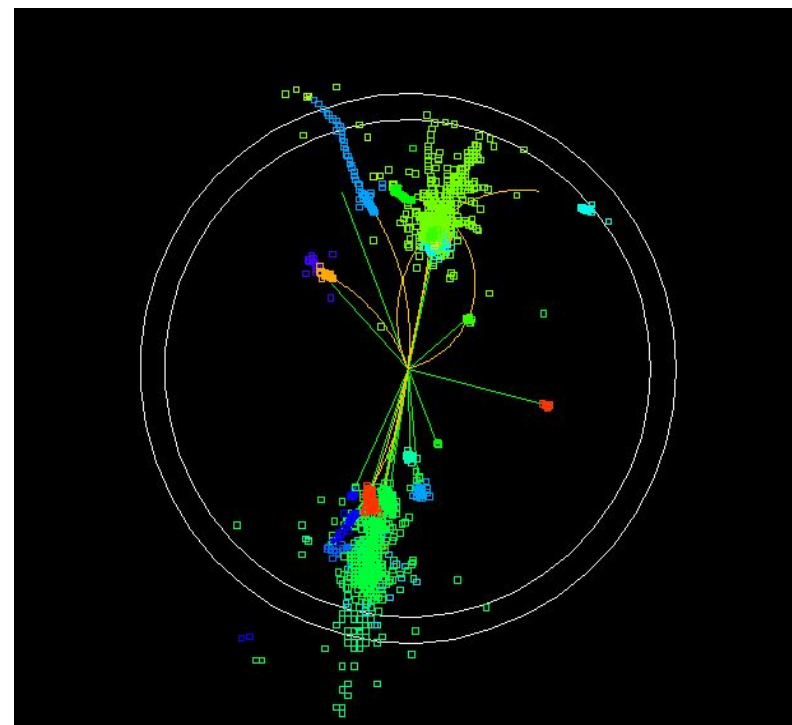
Barrel, rms90=5.0%.

Mat: 4.2%.

Note: Without either
cone algorithm: 11%

Summary

- New clustering
- Complete PFA
- No cone algorithm so far
- Better performance than given clustering without cones
- Efficiency to be improved



qq event at 500 GeV

Missing pieces

- Further reduction of running time
- Basic tree: Original algorithm better
- Improve $E\backslash p$ -comparison
 - Jets
- Neutral showering in TA loop with penalty on shower multiplicity
- Work on specific problems in qq and ZZ processes at 500 GeV