Improving the PFA

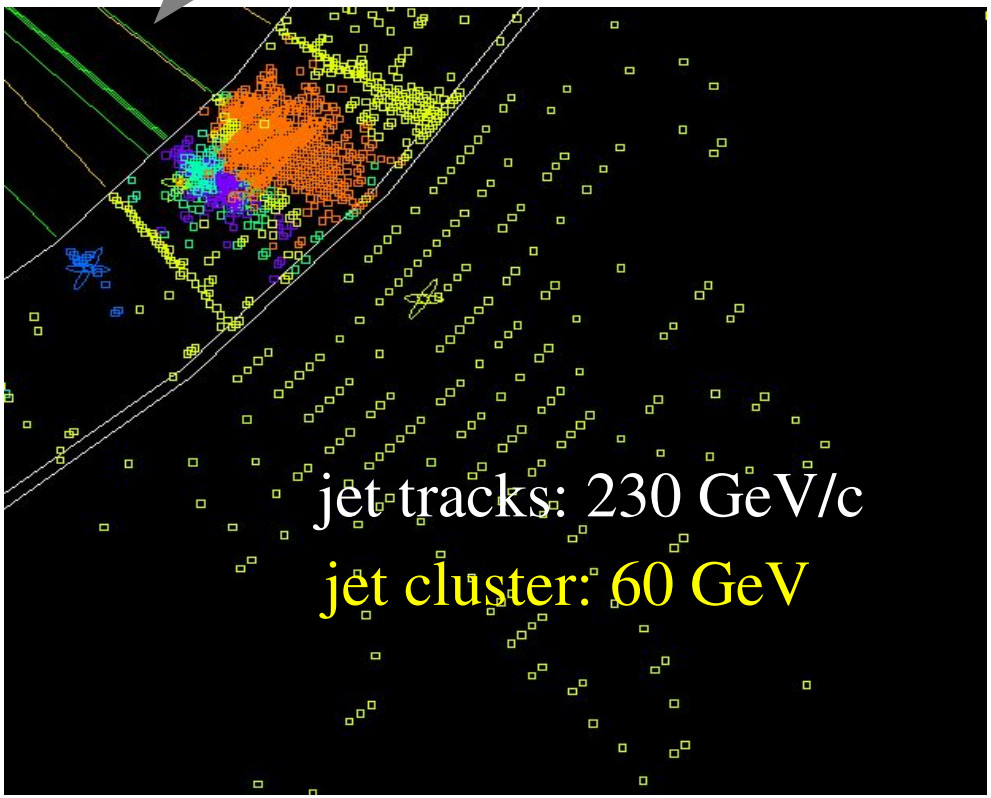
Track / cluster balance

- Motivation
- 2nd cone algorithm
- Track tolerances: main clustering vs. 2nd cone
- Conclusion and outlook

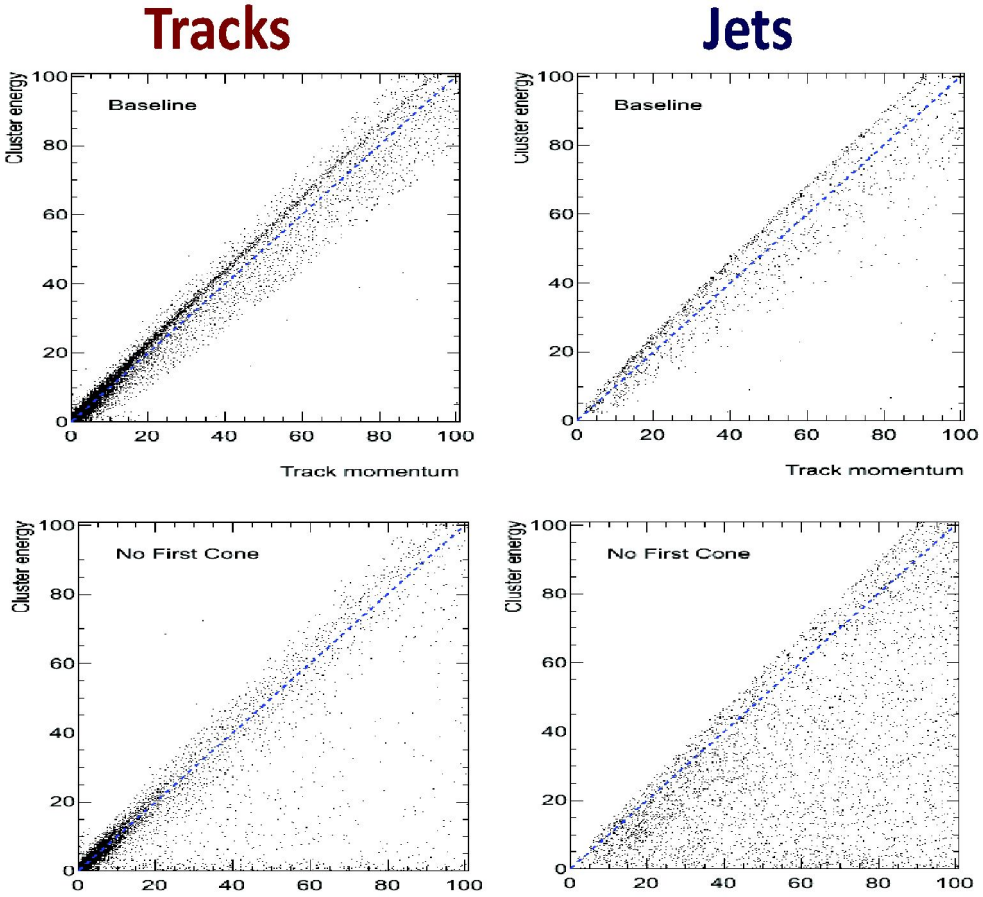
Motivation

(04/08/2010)

183GeV ch +fake 169GeV n



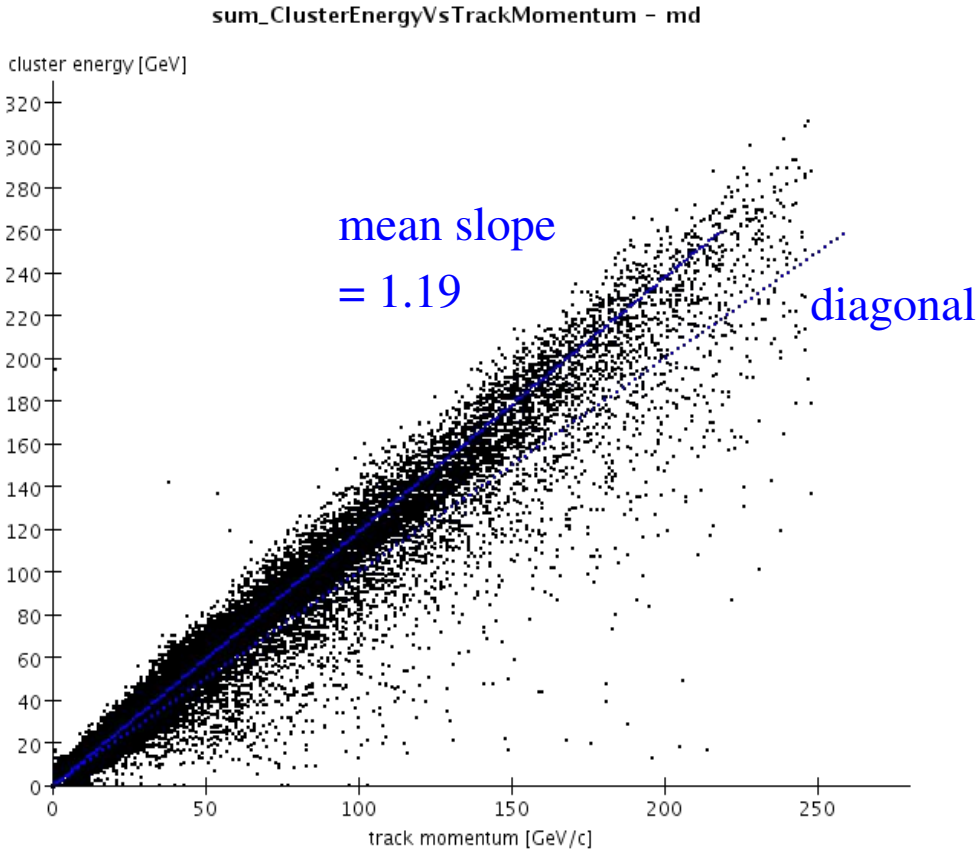
(Remy 03/11/2010)



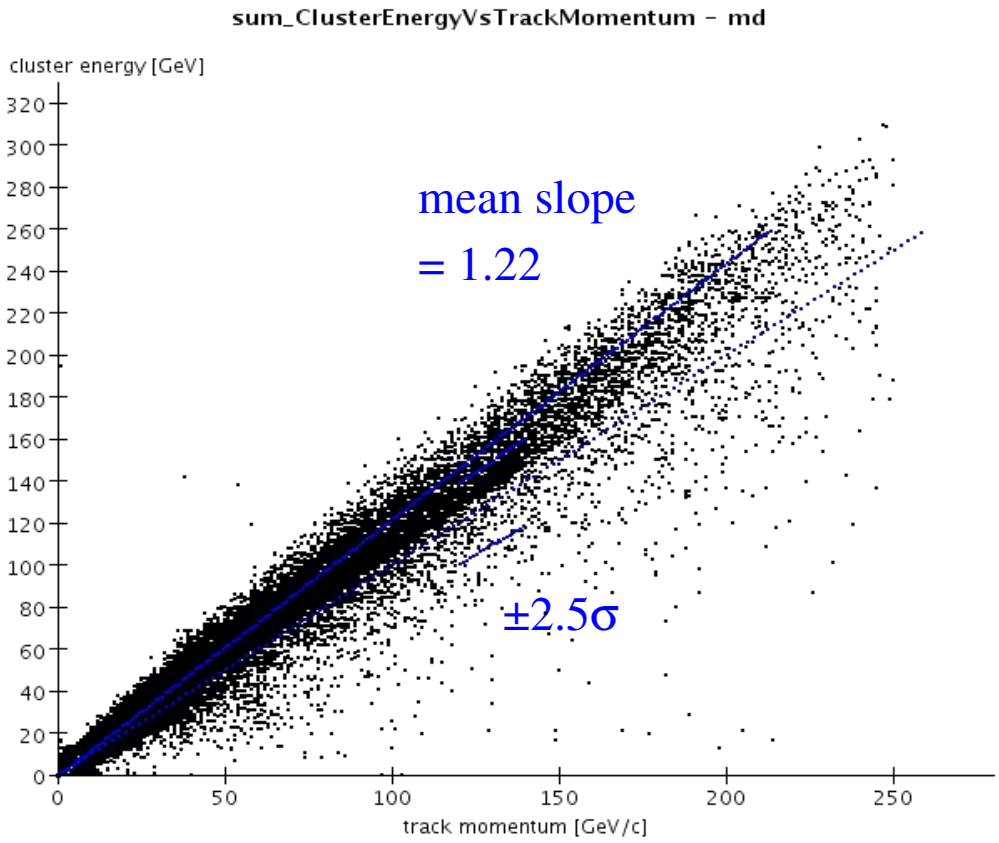
2nd cone algorithm

Studied 500 GeV qq, cluster energy vs. (non jet) track momentum:

w/o 2nd cone



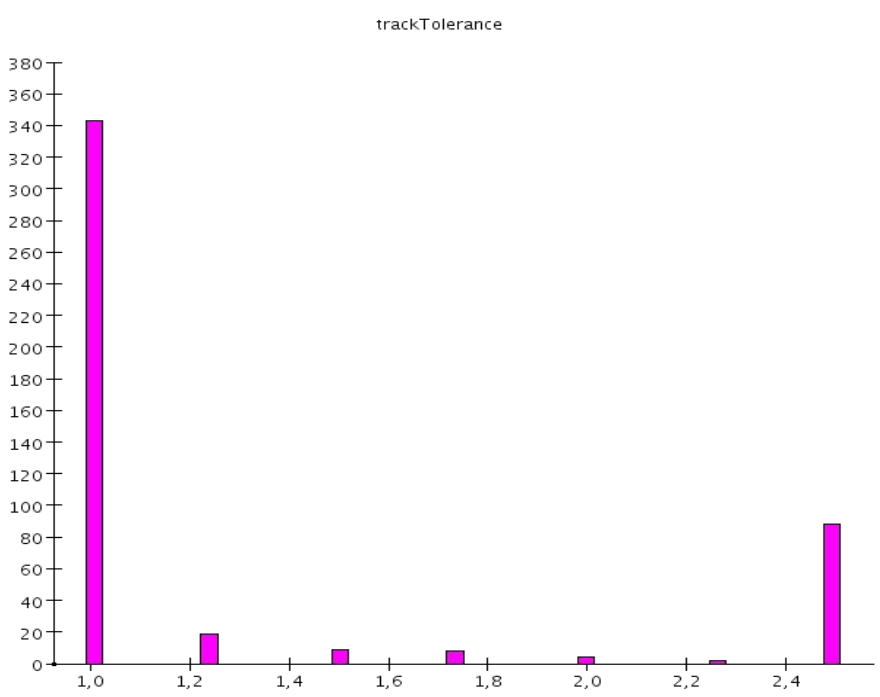
with 2nd cone:



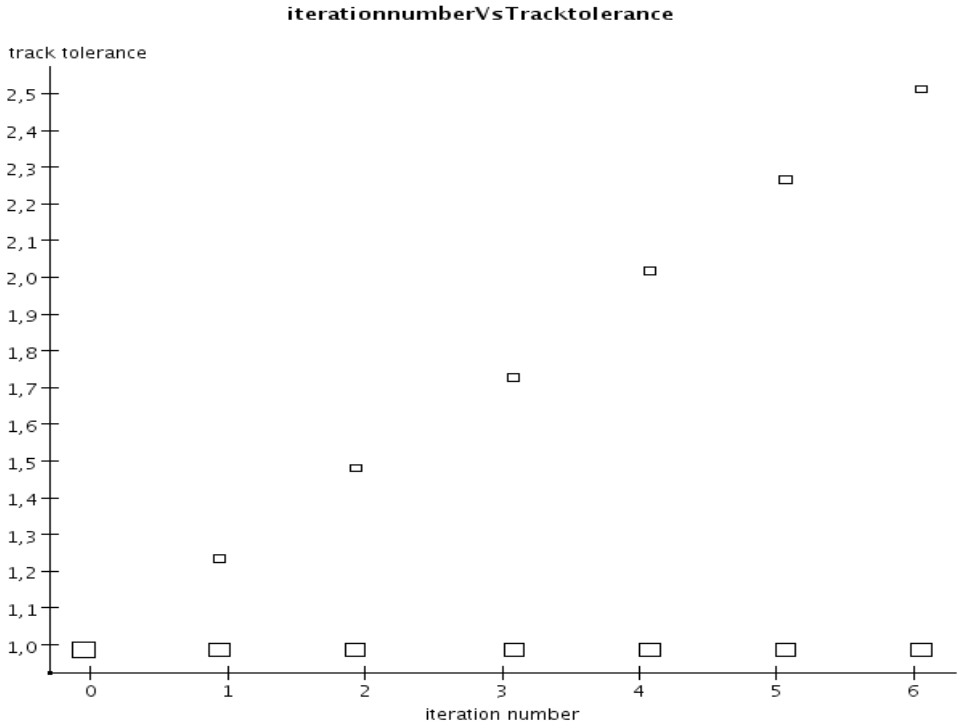
cone algorithms increase the energy resolution "artificially"

Track tolerances

Estimated track uncertainty generally $\sigma=0.7 \cdot \sqrt{p}$ [GeV/c]. Jets always tolerate cluster energies by 1.5σ, but tracks loop up to 2.5σ .



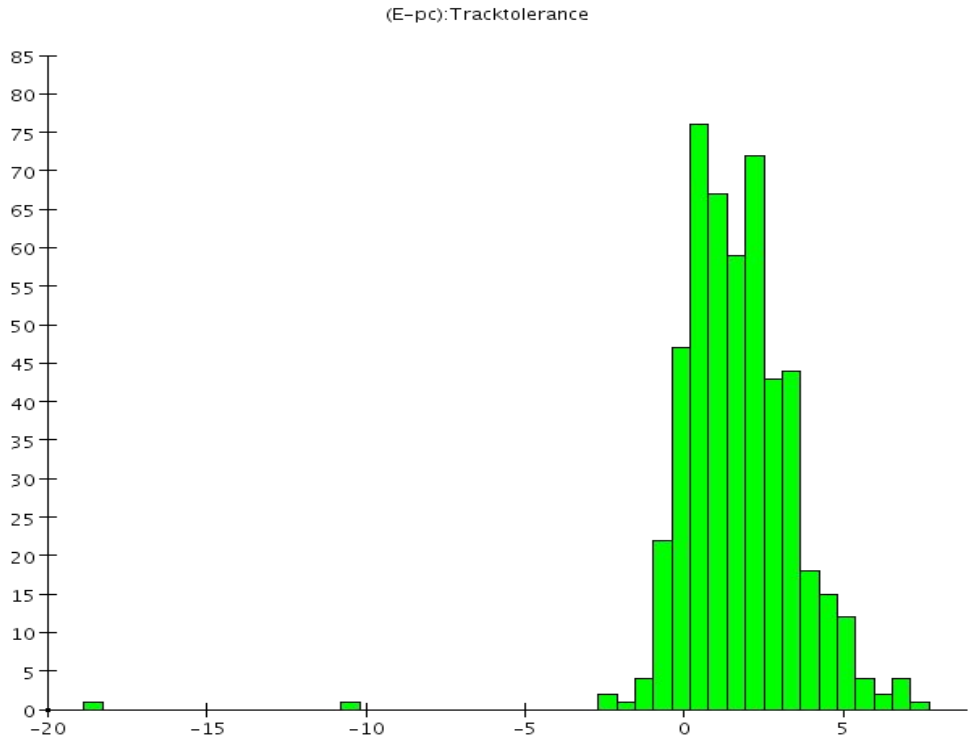
track tolerances
(40 events)



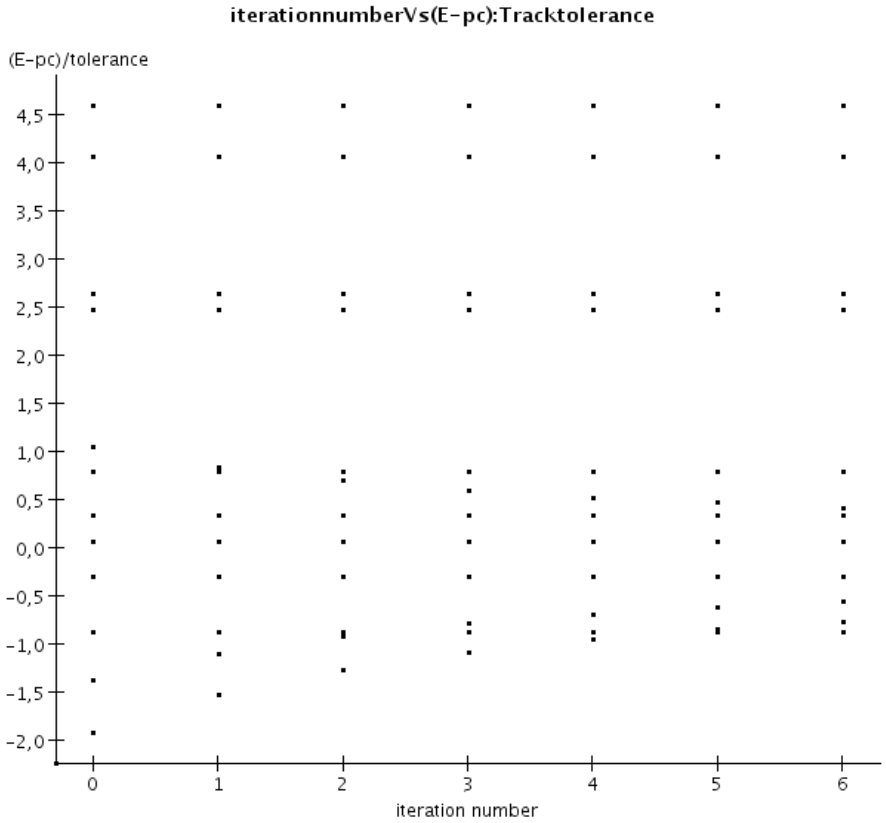
track tolerances at every iteration
(1 event)

Track tolerances

Tolerance is increased for track with vetoed links to unused clusters by 0.25σ in every iteration as long as E ≤ pc+1.5σ .



(E-pc)/Tracktolerance
(40 events)



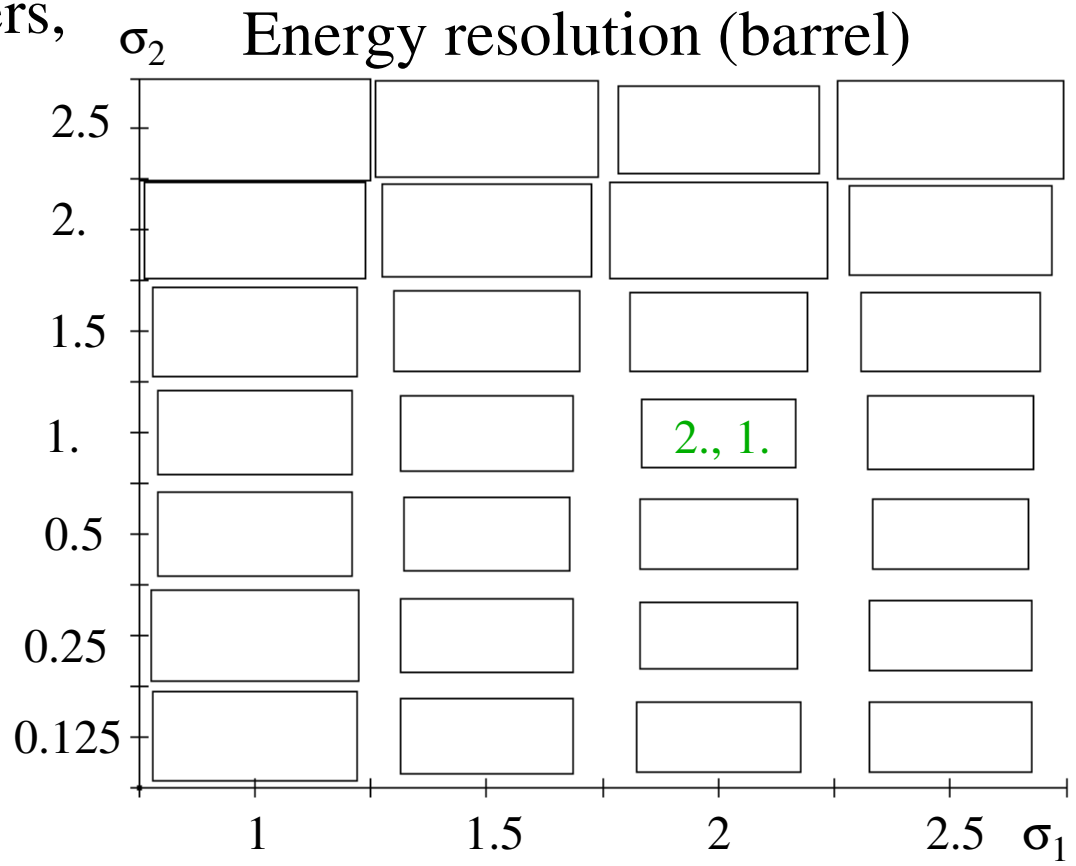
(E-pc)/Tracktol. at every iteration
(1 event)

Tolerances in main clustering vs. 2nd cone

Regarded them as technical parameters, factors

- σ_1: maximum tolerance in main clustering
- σ_2: constant tolerance in 2nd cone algorithm

and varied them independently.



Best resolution: 3.3%(barrel), 3.1%(fwd)

baseline: 3.3% , 3.2%

LOI: 3.5% , 3.4%

(results based on cheat tracking)

σ_1	σ_2	mean90
1	1	-7,3 GeV
2	1	-9,6 GeV
2,5	2,5	-16 GeV

Conclusion and outlook

- Studied cluster/track balance in the cone algorithms
- Technical view of tolerances, slight improvement of the resolution
- Improvement of track/cluster balance in the main clustering? Combinatorically expensive, but general heuristics can be tested.