Extending L3 Tracking Acceptance

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Why is this pressing?

- single muon triggers use L3 tracking
- this is where $W \to \mu\nu$ comes from
- about half of higgs/top/np/wz physics depends on single muon triggers or could be helped by them

Tools

- data sample
  - $Z \to \mu\mu$ 0mb MC
  - 1000 events
  - SFTDigiMCChunk included
  - no SMT
- code
  - gtr_l3 package — runs L3 global (D. Whiteson) tracking in the offline framework
  - modified to save cluster info in L3 tracks
  - SFTDigiMCChunk included
  - no SMT

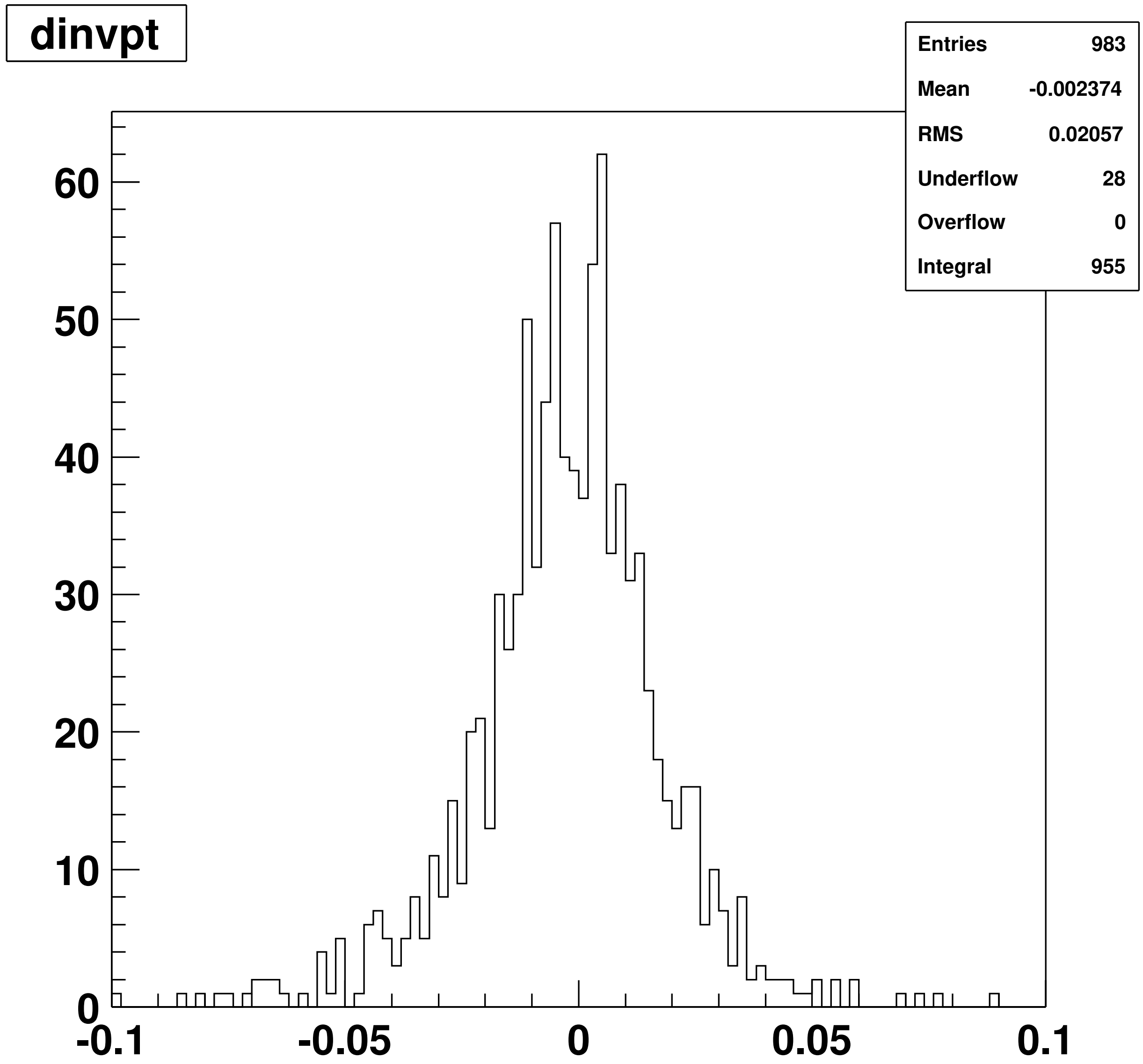
L3 global axial pattern recognition

- seeded by a pair of hits in adjacent CFT layers
- outer hit of the pair must be in 8th layer
- predict position at next layer
  - assume trajectory is linear in r vs ϕ — this a good approximation for stiff tracks from the origin
  - extrapolate using hits in previous two layers
- look for hits near expected position. can branch to pursue multiple candidates.
- require 8 axial CFT, or 7 CFT and ≥ 2 SMT hits

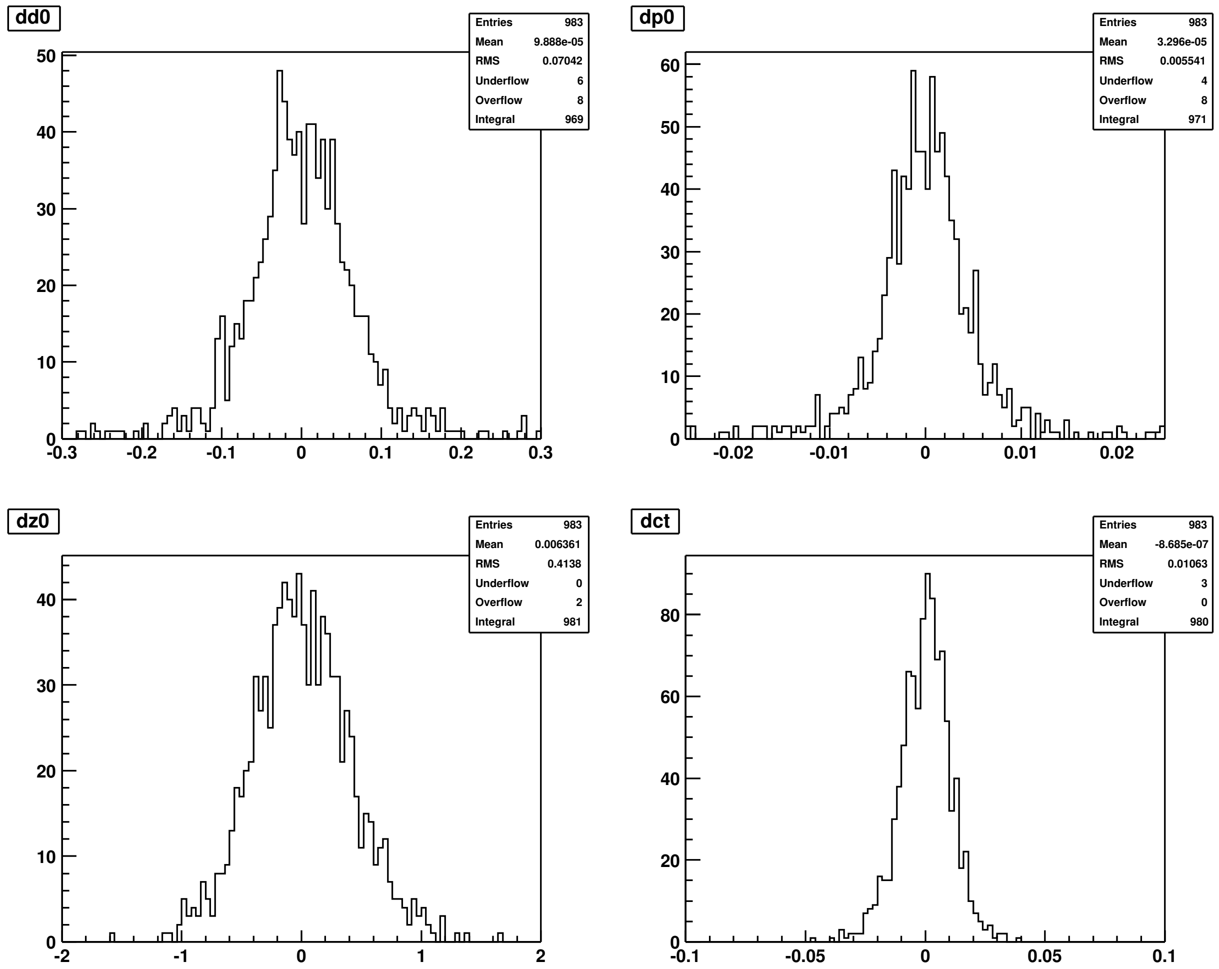
Definitions of terms

- fiducial particles: $p_T > 1$ GeV, charged
- matched tracks: every axial cluster used by the reconstructed track includes at least one fiber that was hit by the same particle matched to them) / (number of fiducial particles)

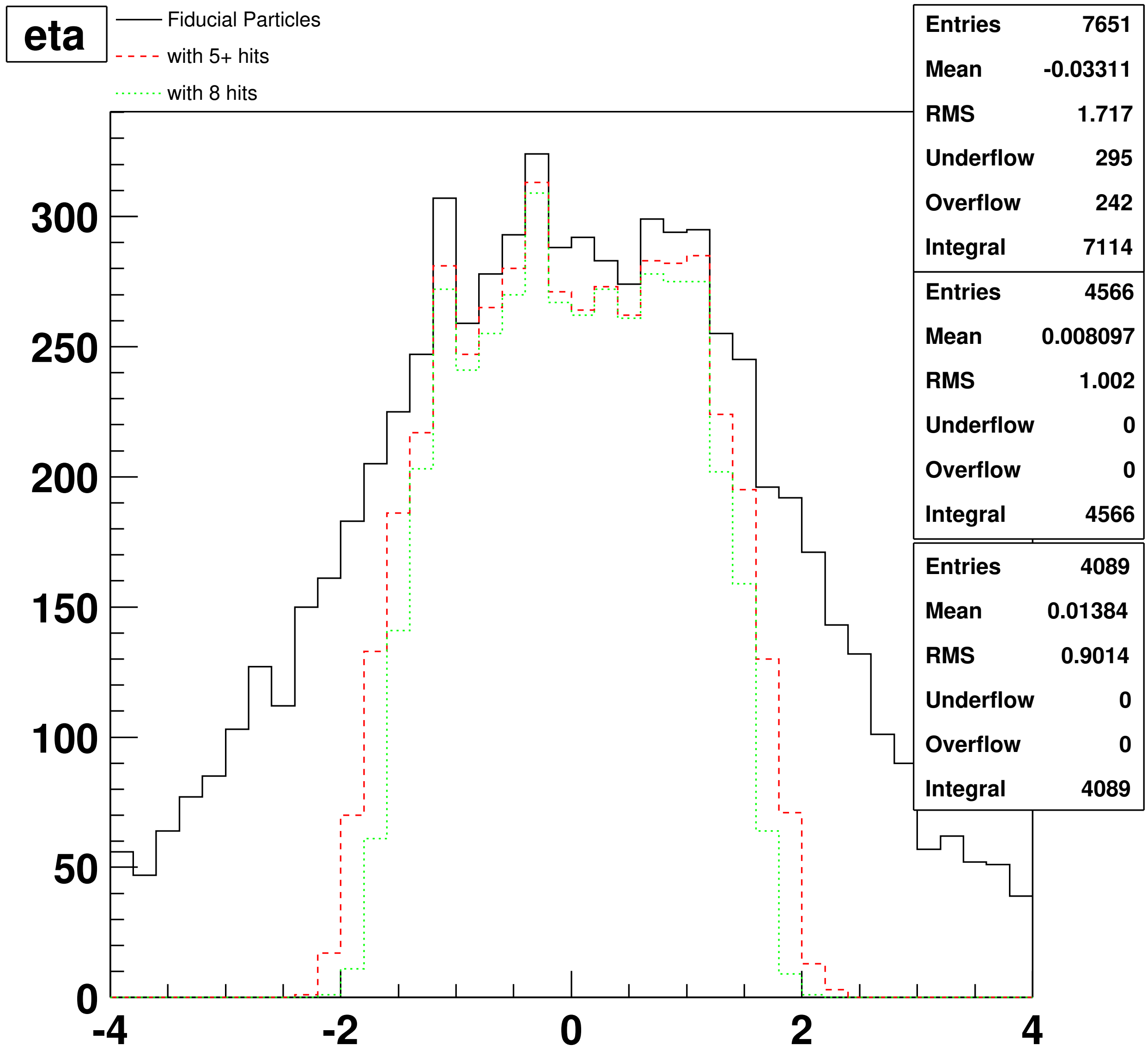
$1/p_T$ residual



Other track parameter residuals

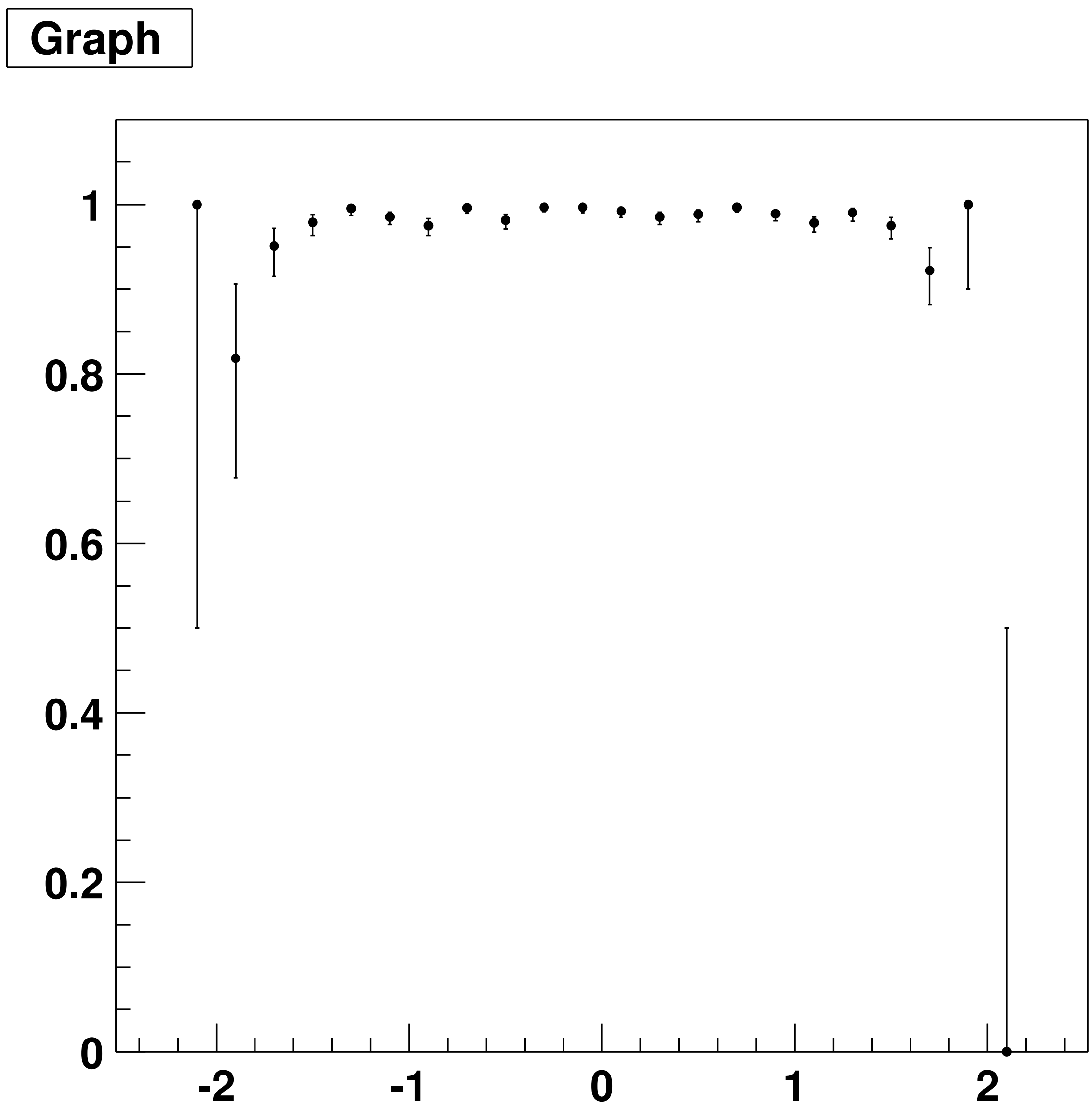


Particle η



11.5% relative loss from 5+ to 8 hits

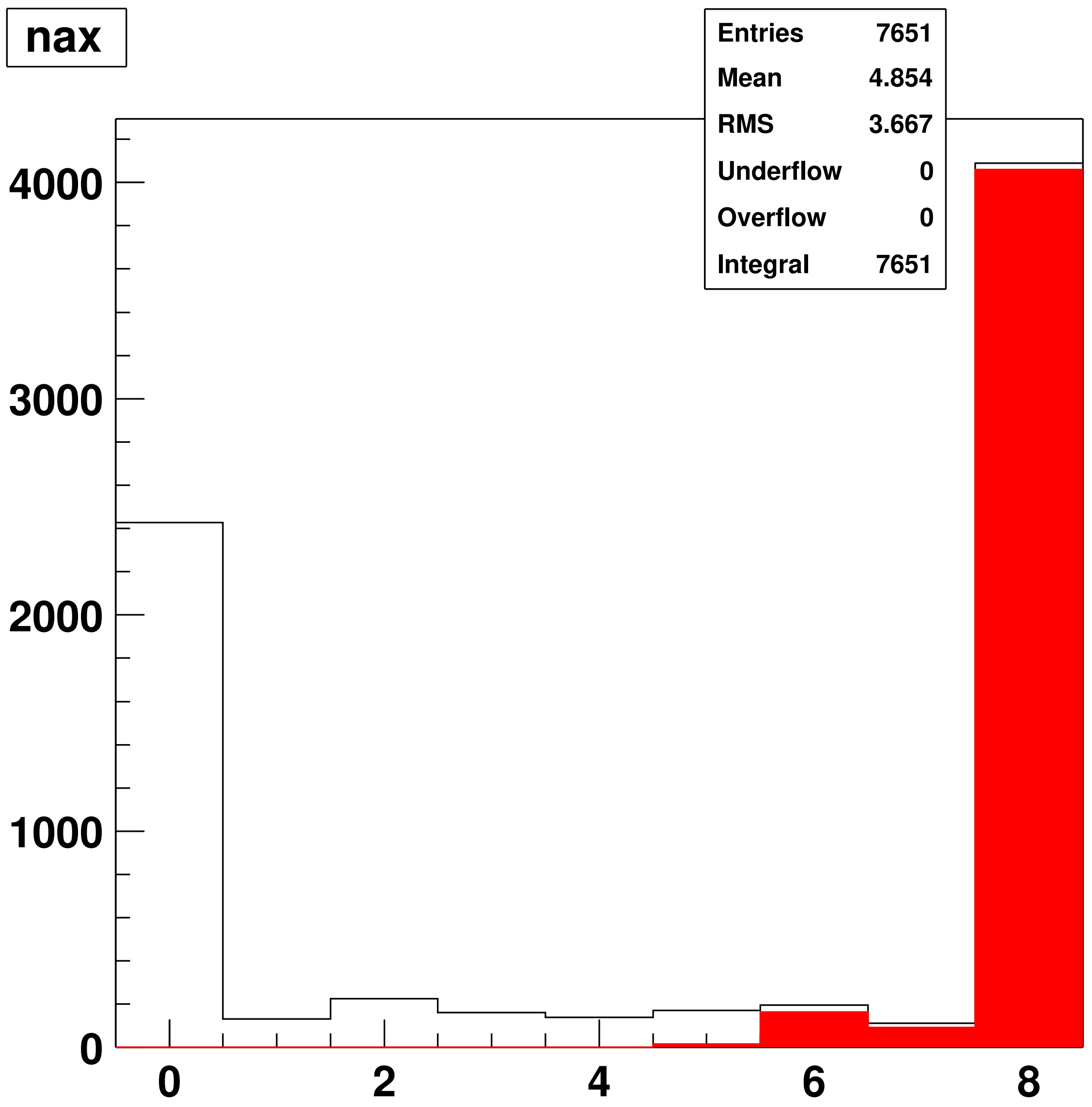
ϵ(particles w/8 hits)



Modifications

- allow seeds in 6th and 7th as well as 8th layers
- don't count layers outside the seed layer as misses

ϵ after modifications



7.5% relative gain

Summary

- efficiency of the algorithm very high when hits are available
- potential gain of about 12% in MC from seeds in 6th and 7th layers due to geometry
- gain in data may be larger as losses due to hit efficiency would be recovered