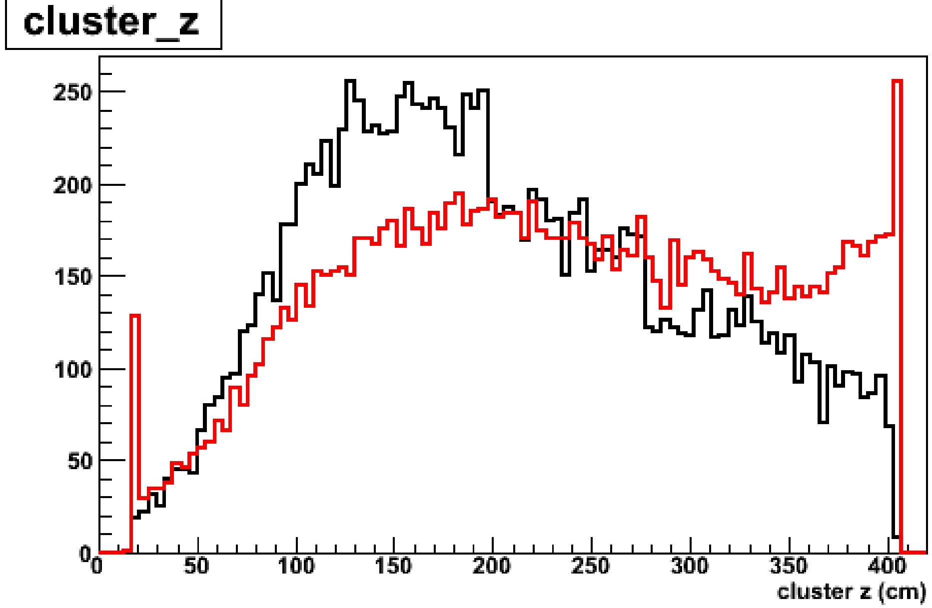
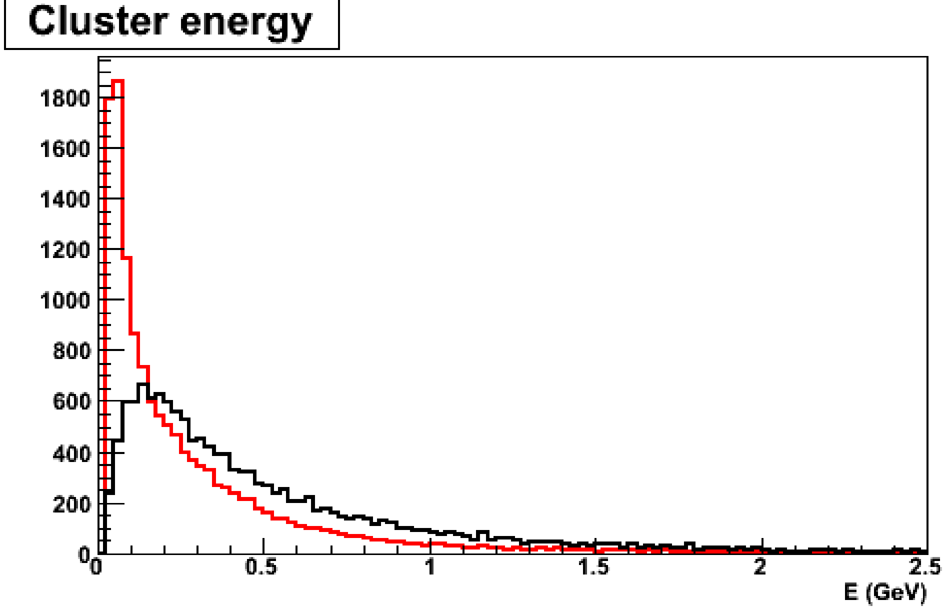
How to deal with hadronic showers

1. Cluster all hits. Optimize clustering for EM showers.
2. Do tracking.
3. Clusters very near a track will not be consider as photons.
4. **Loose, rough cuts to eliminate junk photons before kinematic fitting (needed to reduce combinatorics)**
5. Kinematic fit with all combos of remaining photons
6. Global analysis to identify true photons

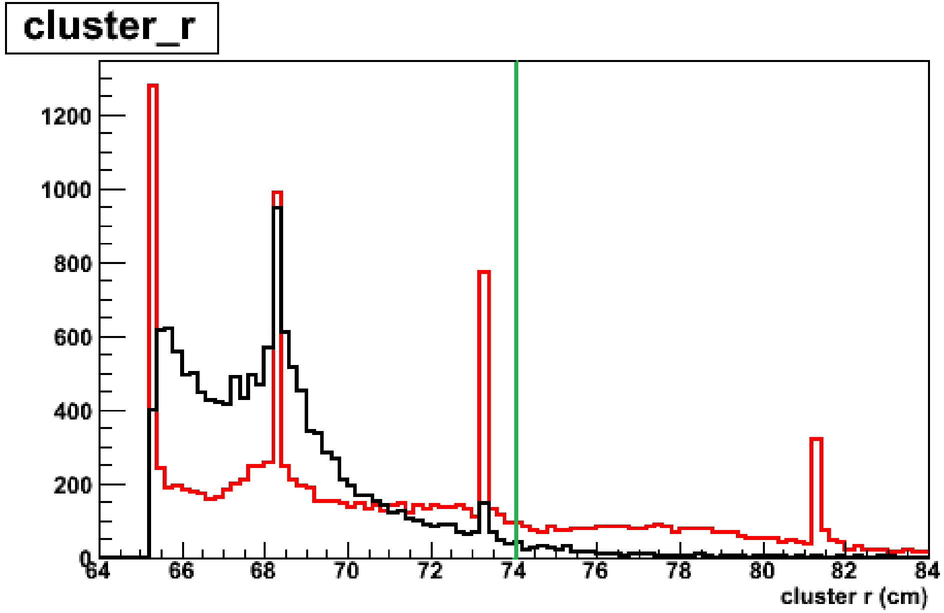
- Simulate 10,000 Pythia events
- Identify “good” BCAL showers if they match thrown photons within certain tolerances
- Everything else is classified as a “bad” BCAL shower
  - Hadronic showers
  - Noise hits
  - EM splitoffs
- Before all cuts: only 26% “good”
  - 13710 “good” showers vs. 38369 “bad” showers
- Compare distributions of “good” showers vs “bad” ones

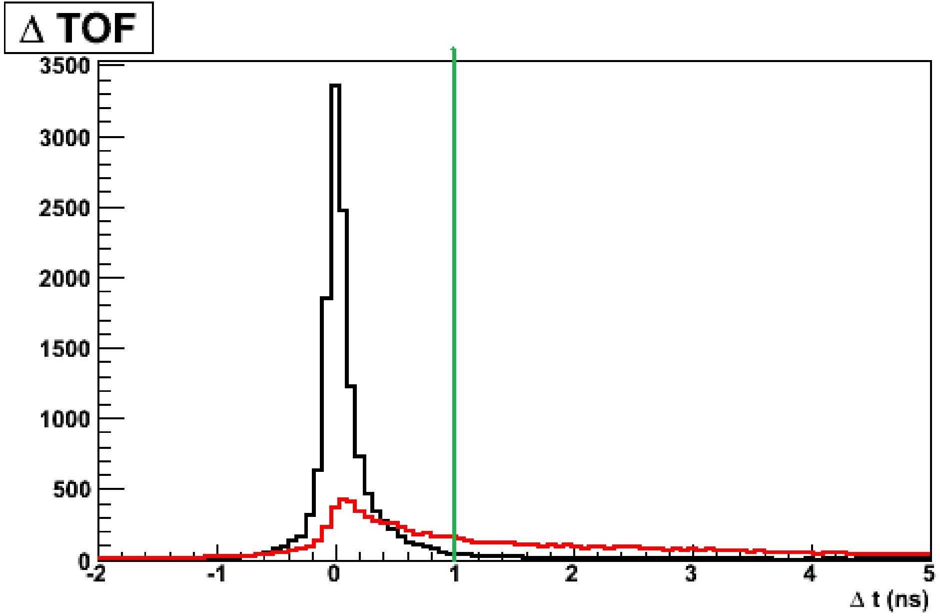




Red - “bad” shower
Black - “good” shower

Histograms have been rescaled

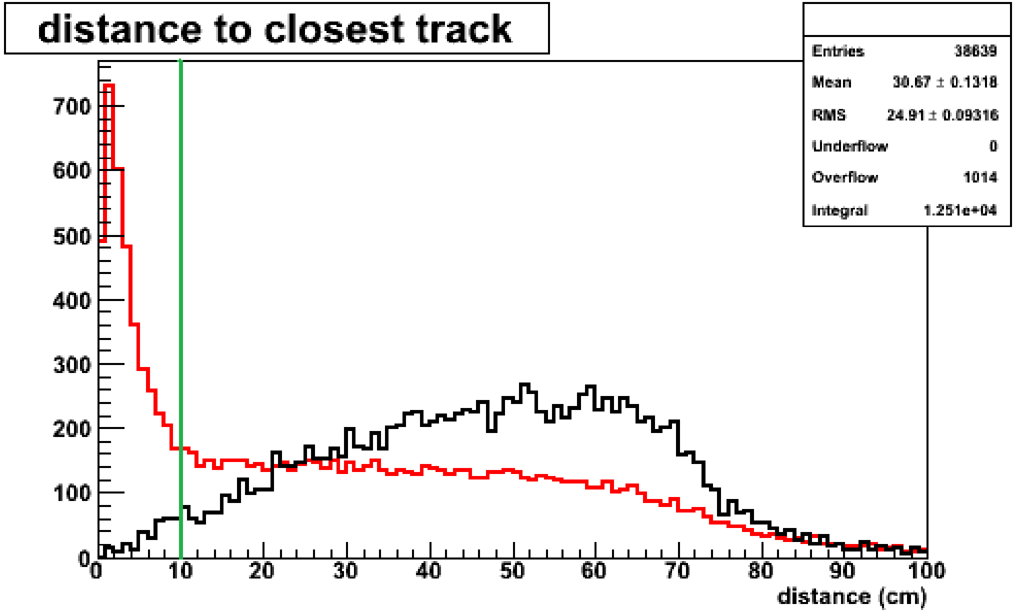


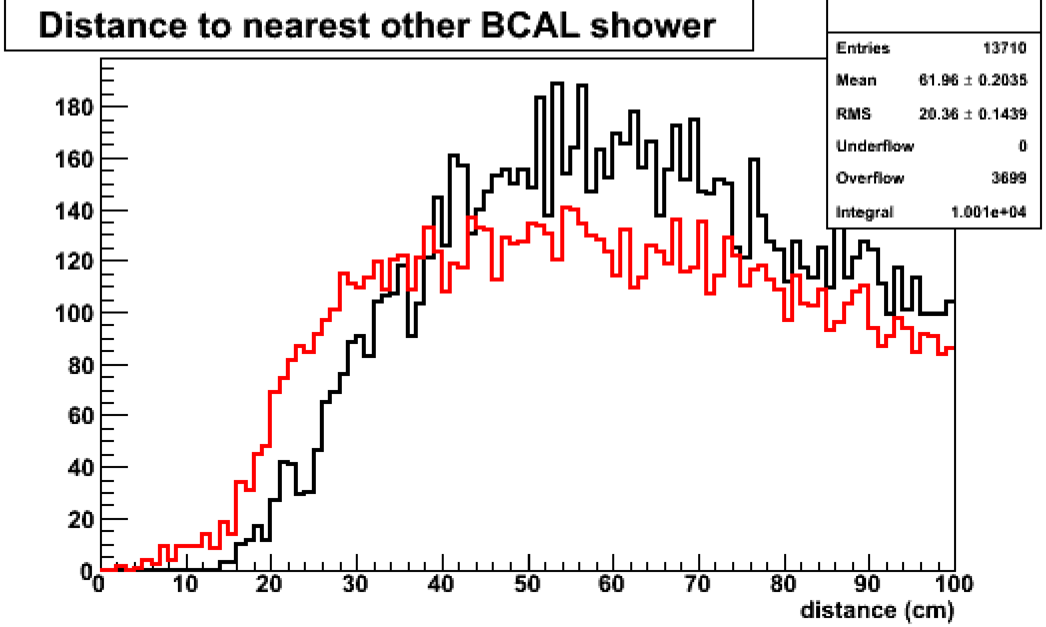


ΔTOF = TOF_measured – (distance from cluster to center of target)/c

Red - “bad” shower
Black - “good” shower

Histograms have been rescaled





Red - “bad” shower
Black - “good” shower

Histograms have been rescaled

- After cuts on r, ΔTOF, closest_track_dist, closest_shower_dist as shown:
  - Preserve 91% of good photons
  - Reject 81% of bad photons
  - Left with a sample 62% good photons (improved from 26%)