

Effect of dark hits

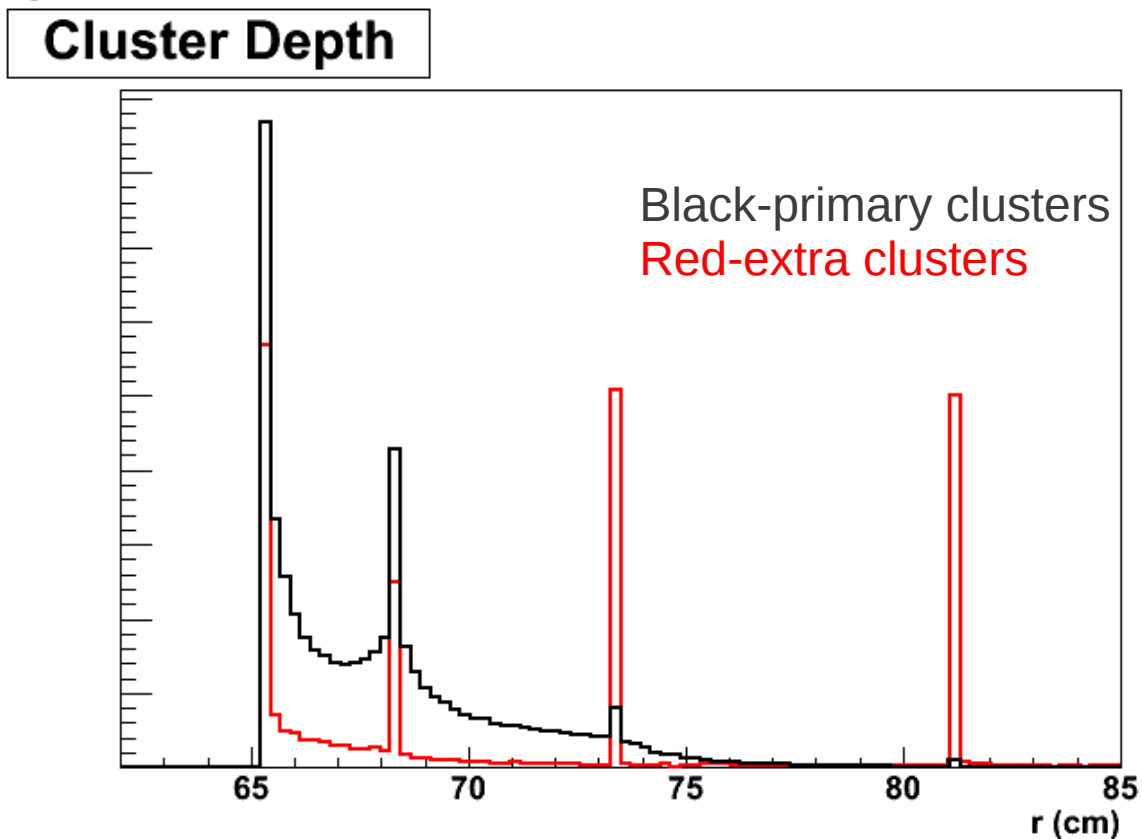
- Compare simulation (mcsmear) with and without dark hits
- Single-photon event sample
 - 5.0 -> 4.6 double-ended hits / event
 - .97 -> .92 clusters / event
- Pi0 sample
 - 6.2 -> 5.8 double-ended hits / event
 - 1.39 -> 1.34 clusters / event

Effect of dark hits

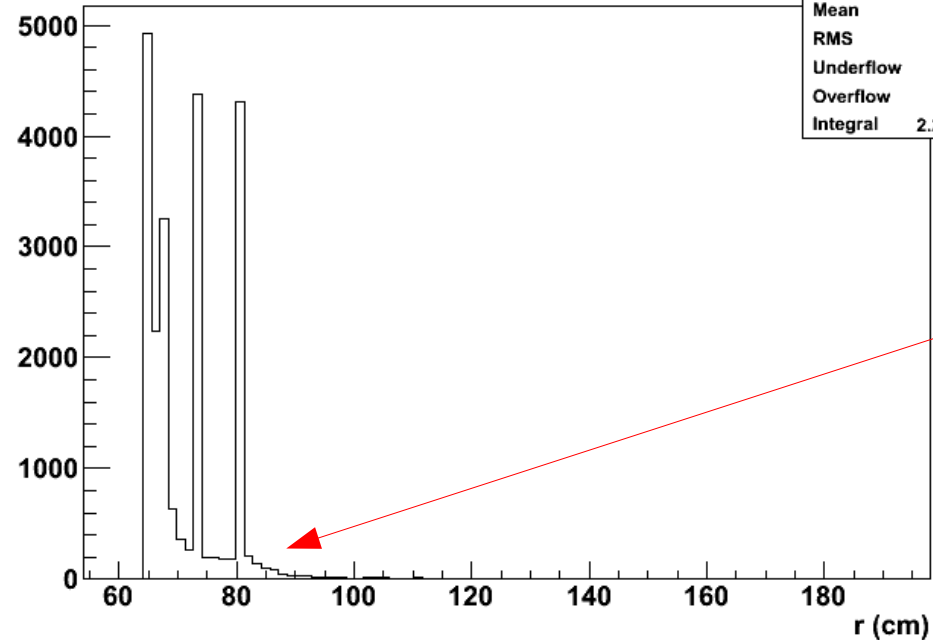
- Why?
 - NOT because noise creates entirely spurious hits
 - Noise pushes real signal above thresholds
- Run empty events thru mcsmeas (with dark hits)
 - 22 (single-ended) BCAL hits / 1000 events
 - Is this right?

Where are the “extra clusters”?

- Single-photon events
- In events with two clusters: consider **lower-energy** cluster as the “extra” one

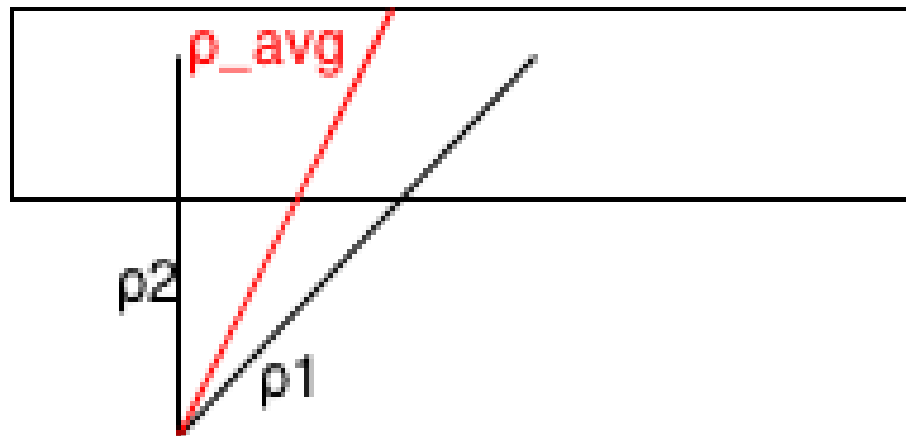


extra cluster depth



Clusters outside the BCAL??

- IU algorithm determines cluster position by averaging hit positions in **spherical** coordinates (ρ , θ , φ)



Matching BCAL Clusters to tracks

- Current code
 - Calculate closest approach of track to cluster location
 - Track associated with cluster if
 - $|\Delta z| < 10 \text{ cm}$ &&
 - $\left| \Delta\phi + 0.002 + \frac{0.008314}{(p + 0.3788)^2} \right| < 3 \left(0.025 + \frac{0.00058}{p^3} \right)$
 - ???
- Many clusters can be associated with one track, but TOF (for PID) is determined only by the closest cluster (rather than highest energy cluster)

Matching BCAL Clusters to tracks

- Single-charged pion sample
 - Kinematics according to pythia sample
- Compute closest distance between **thrown** track and BCAL cluster
- Only ~50% of clusters in black box

