HBD Update

Introduction

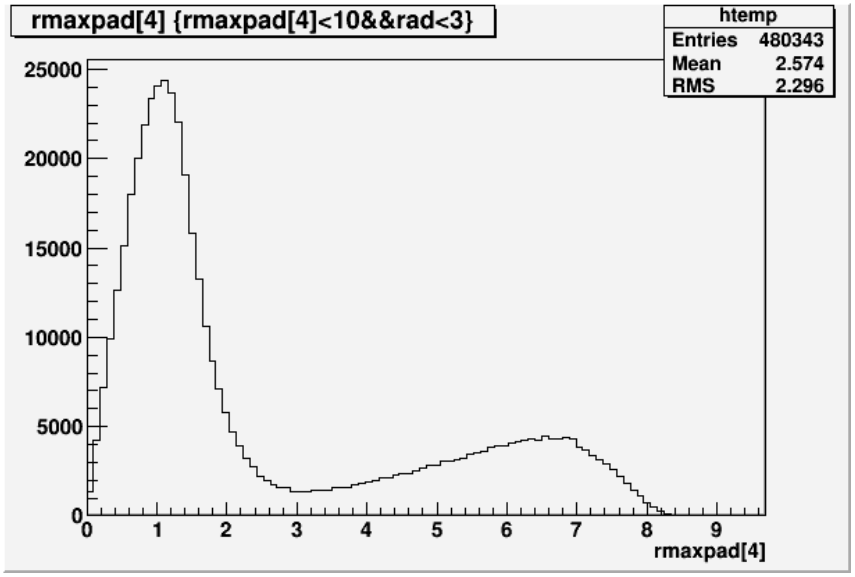
- For electron signals, the highest firing pad in the cluster is likely to be close to the electron track. (Tracks point to the highest firing pad.)
- For background fluctuations, every pad in the cluster has equal chance to be the highest firing pad.

- Devising a cut on distance from track projection to the max pad, to improve background rejection.

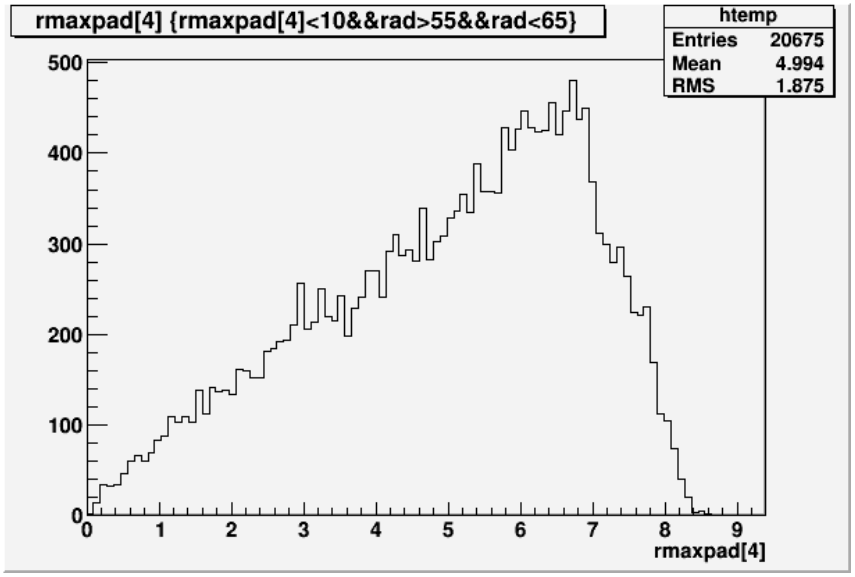
Distance between track and max pad

in embedding

Single electron
(omega → ee)



Backplane conversion
(pi0 → γγ)

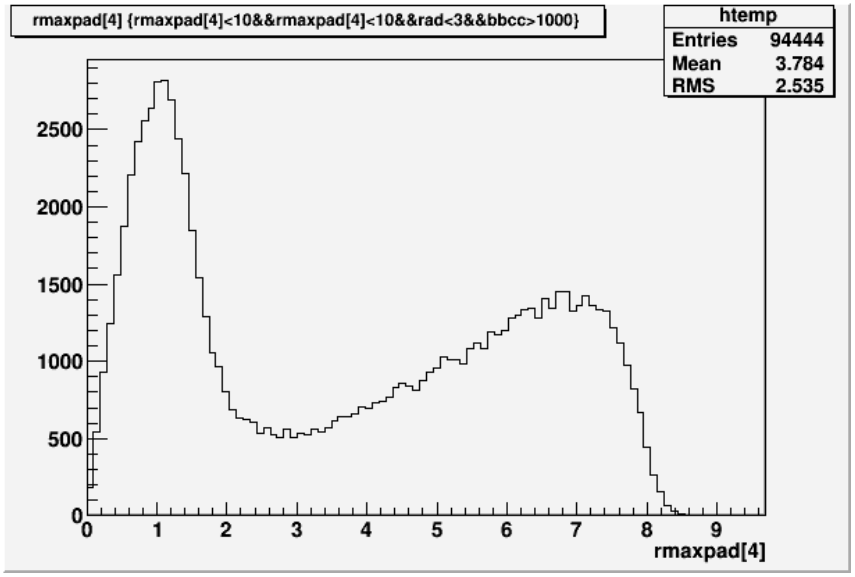


Min Bias

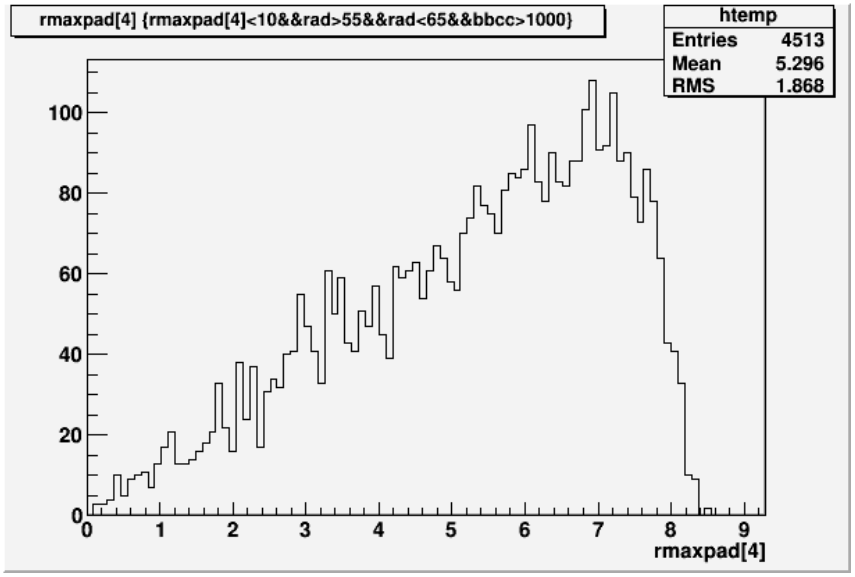
Distance between track and max pad

in embedding

Single electron
(omega → ee)



Backplane conversion
(pi0 → gg)

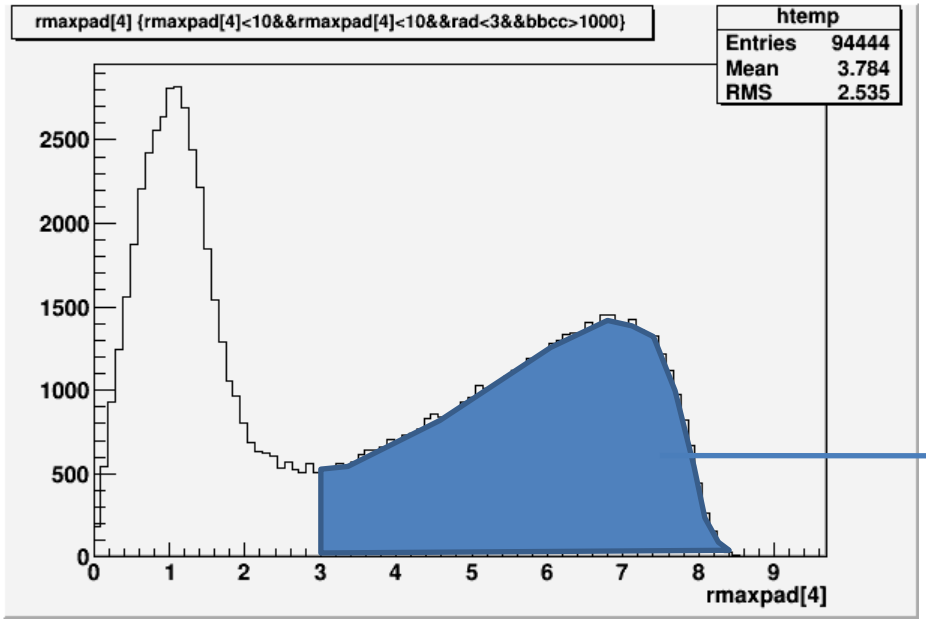


Central Events

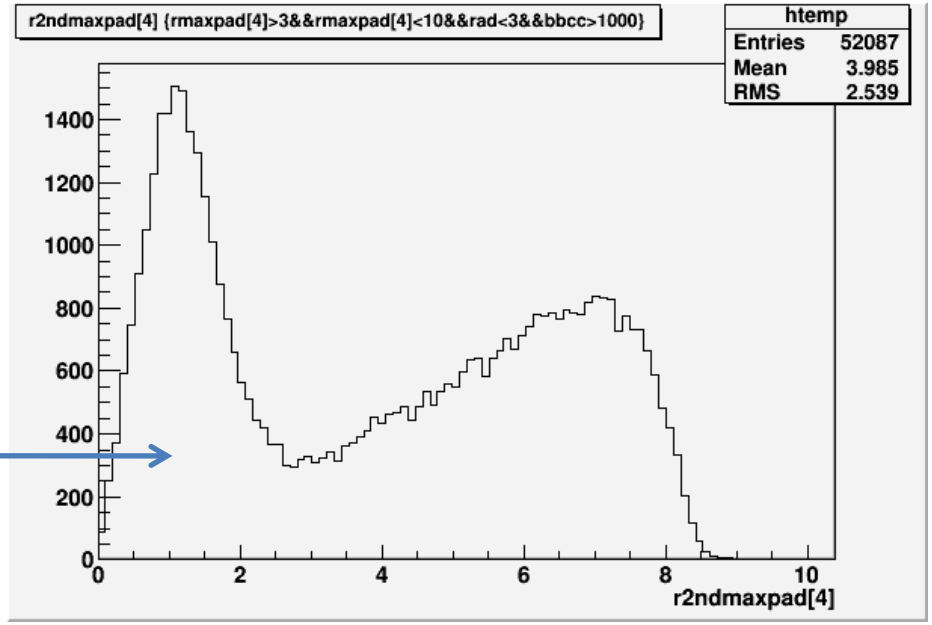
In cases where the first max pad is shifted away by fluctuation, (especially in central events), the 2nd max pad is still likely to be close to the track.

Single electron (omega → ee)

Distance to 1st Max Pad



Distance to 2nd Max Pad where D(1st MaxPad)>3cm

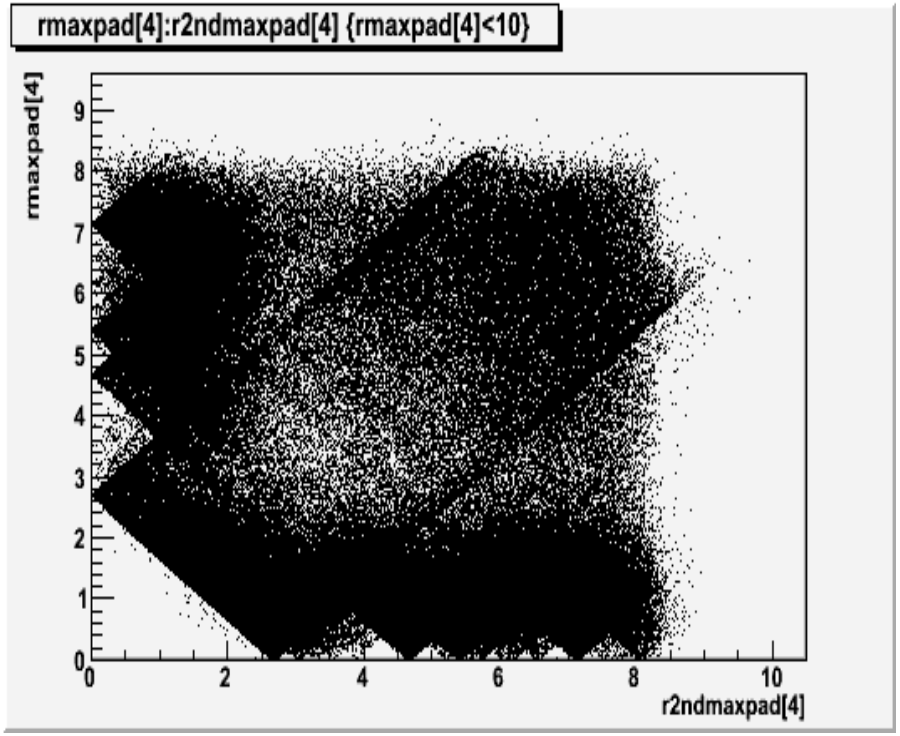


Central Events

D(1stMaxPad) vs. D(2ndMaxPad)

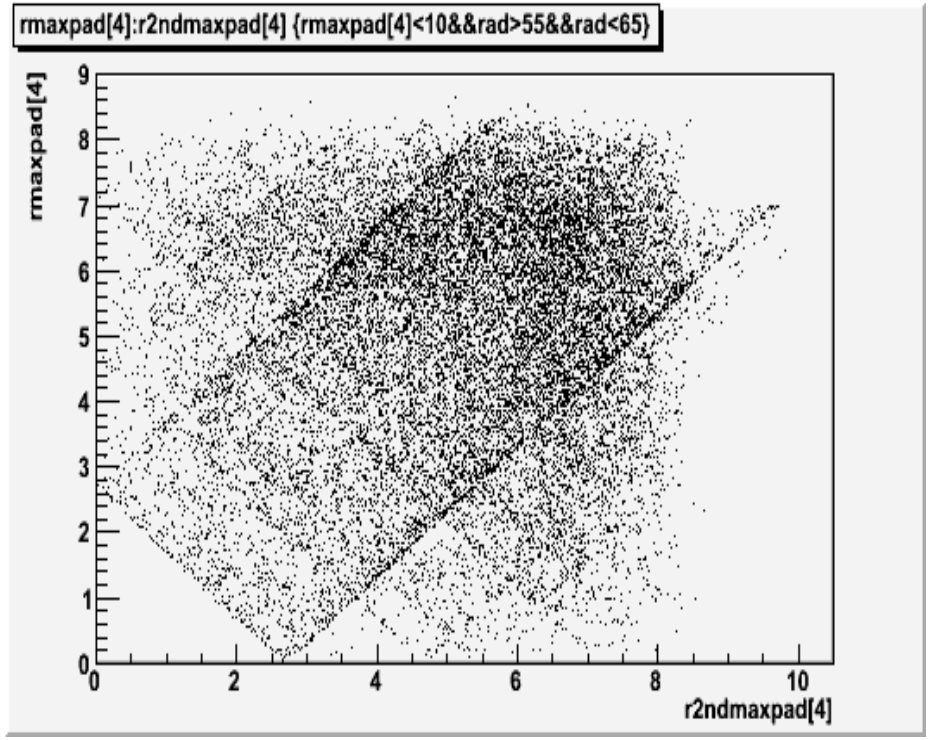
Single electrons

omega → ee



Background

Pi0 → gg



Min Bias

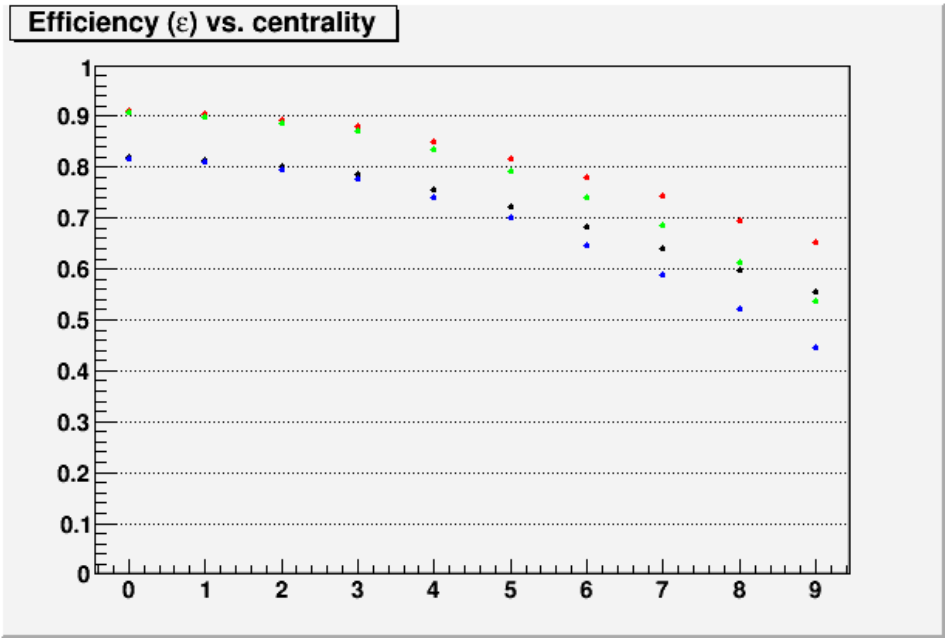
choosing cut:

D(1stMaxPad) < 2.5 || D(2ndMaxPad) < 2.5

Signal efficiency (embedding)

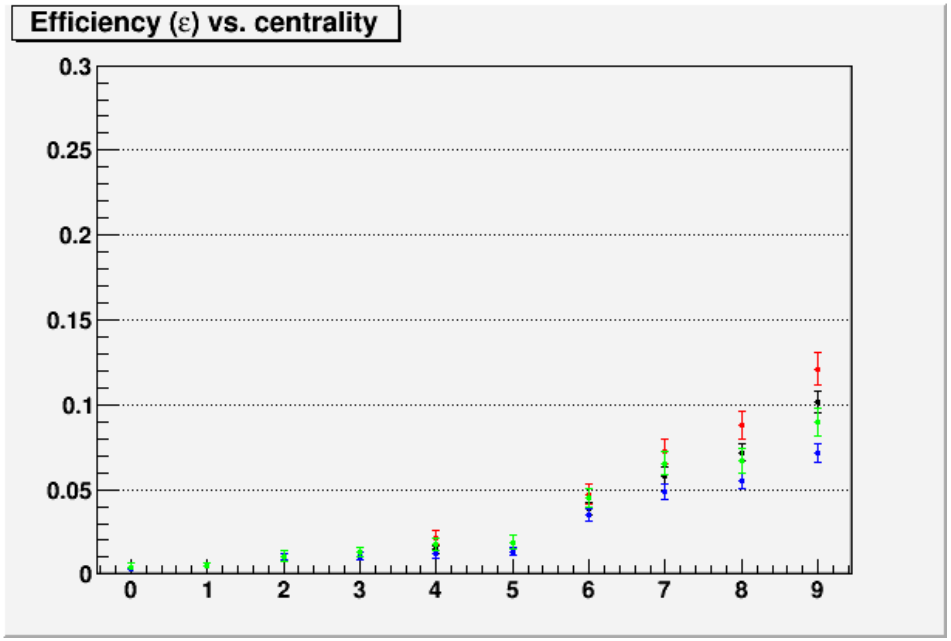
Single electrons

Omega → ee



Background efficiency (embedding)

Pi0 → γγ



Black: hbdq>10

Red: hbdq>10 && w/o edge

Blue: hbdq>10 && max pad cut

Green: hbdq > 10 && max pad cut && w/o edge

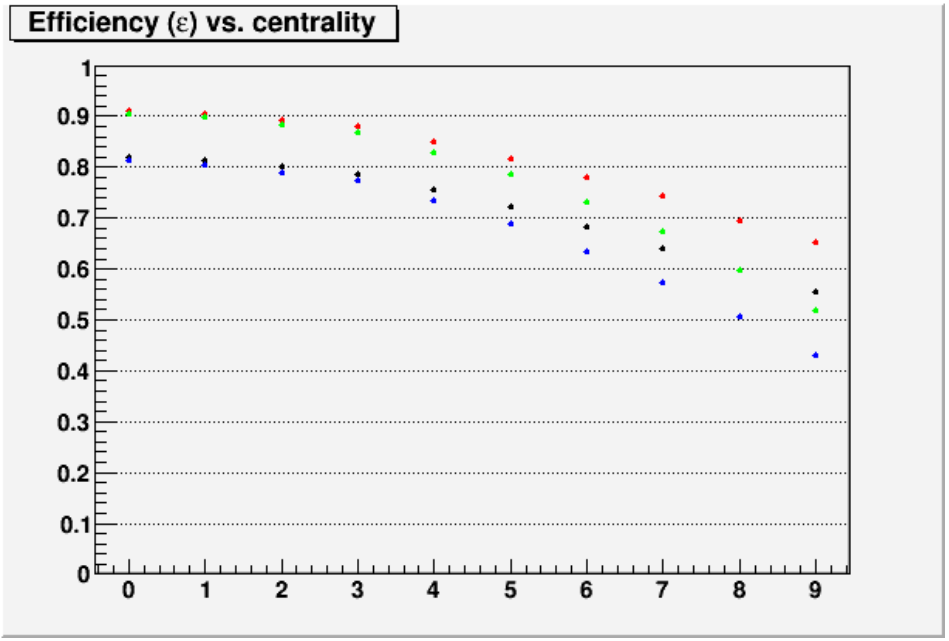
choosing cut: (tighter)

D(1stMaxPad) < 2.0 || D(2ndMaxPad) < 2.0

Signal efficiency (embedding)

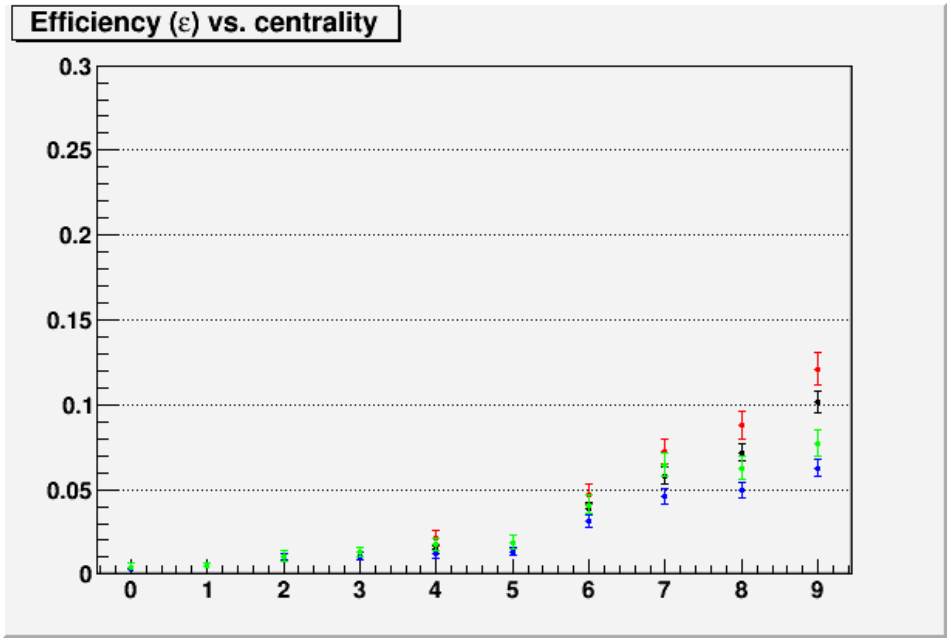
Single electrons

Omega → ee



Background efficiency (embedding)

Pi0 → γγ



Black: hbdq>10

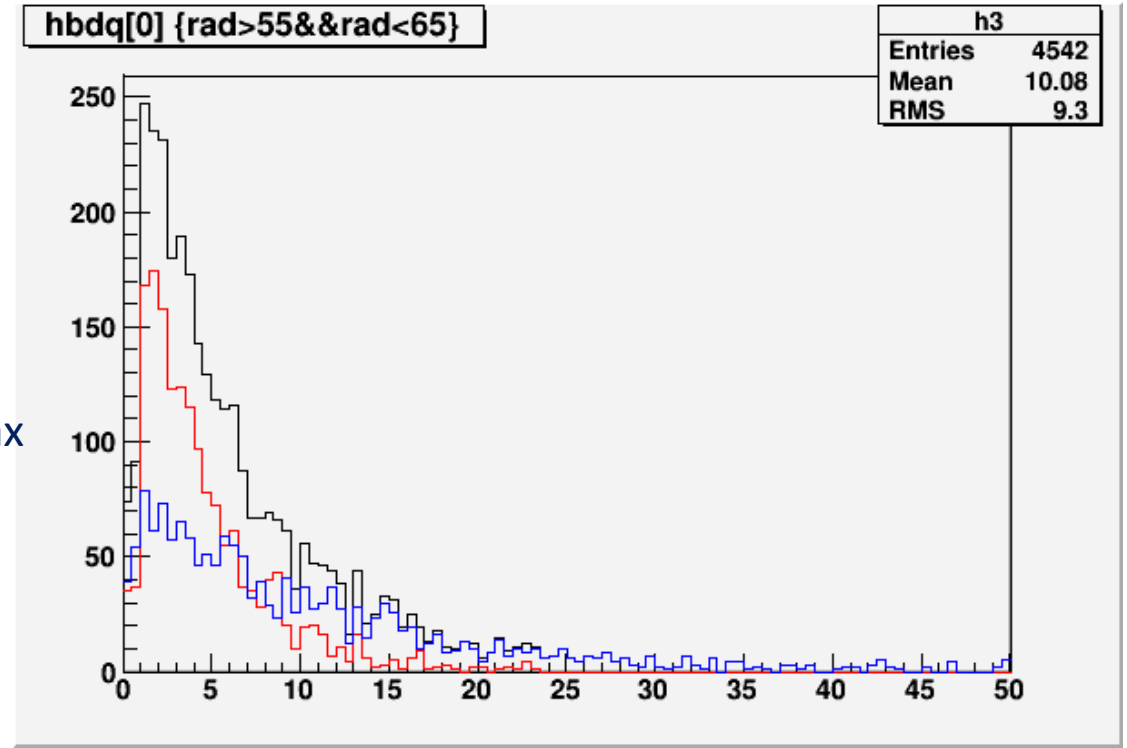
Red: hbdq>10 && w/o edge

Blue: hbdq>10 && max pad cut

Green: hbdq > 10 && max pad cut && w/o edge

discussion

- Distance to the max pad seems to be strongly correlated with cluster charge.
  - Long distance ←→ small HBD charge
  - Short distance ←→ big HBD charge

Conversions:

Hbdq (all)
Hbdq (fail max pad cut)
Hbdq (pass max pad cut)