1 GeV Normal Gammas

Have a pile up of events with a Cal axis that is “wrong” by about 90° from incident photon direction.

850 events with angle > 1 radian

8.7% of events with poor recon

What is happening here?
Bad Axis Localization

It’s a gap problem – only on-axis problem?

Note the pile up of events near the gaps... but apparently only on one side of crystals!
Gap problem “easy” to see in Event Display:
• Restrict launch point to $x=400, y=400, z=1000$

Not hard to find example events with this source… (Event #6 in this example)

The problem with this event is that the “isolated” crystal has an energy consistent with those crystals along the main shower axis… and there is no hit “in the right place” for this layer. This crystal pulls the moments axis away from its true value.

Once a bad axis calculated, not much hope for recovery in the current iterative analysis as it throws out outliers based on distance from axis…
To really see that this crystal hit is isolated, turn back on full MC particle display…

Clearly this hit is “wrong” since it appears that “nothing” created it!

A possible hint?

Also notice that this hit is at the end of the crystal…

Berrie helps track down the problem: Bug in code which handles direct energy deposit in diodes. Basically, a logical \( == \) test is written with only one \( = \) (making it an assignment). Result is to always put the energy into the “positive” face of a crystal – always at the opposite end for this category of events!
Not complete solution to tail problem but does fix the pile up at 90°
Moments Analysis applies an axis signing convention with \( \cos(\theta) \) positive.

At large incoming photon angles it is “easy” to flip this axis (since \( \cos(\theta) \sim 0 \)), in some cases the cal axis will be 180° to the incoming photon (so, it “points” in exactly the wrong direction!)

This cannot happen for photons incident normally on the LAT, here the “worst” you can do is get the axis wrong by 90°

Final Cal axis signing needs to be thought about some more…