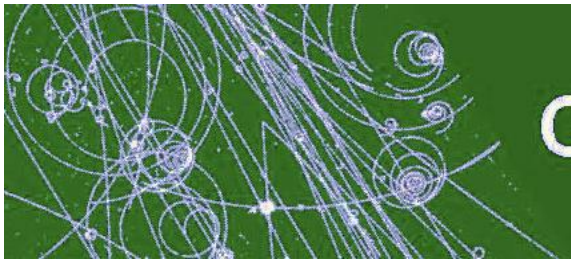


Center for High Energy Physics

Resolving Two Tracks in the KPiX Display by Eye
08/25/2014

Craig Gallagher, University of Oregon
csg@uoregon.edu

Quick Note:

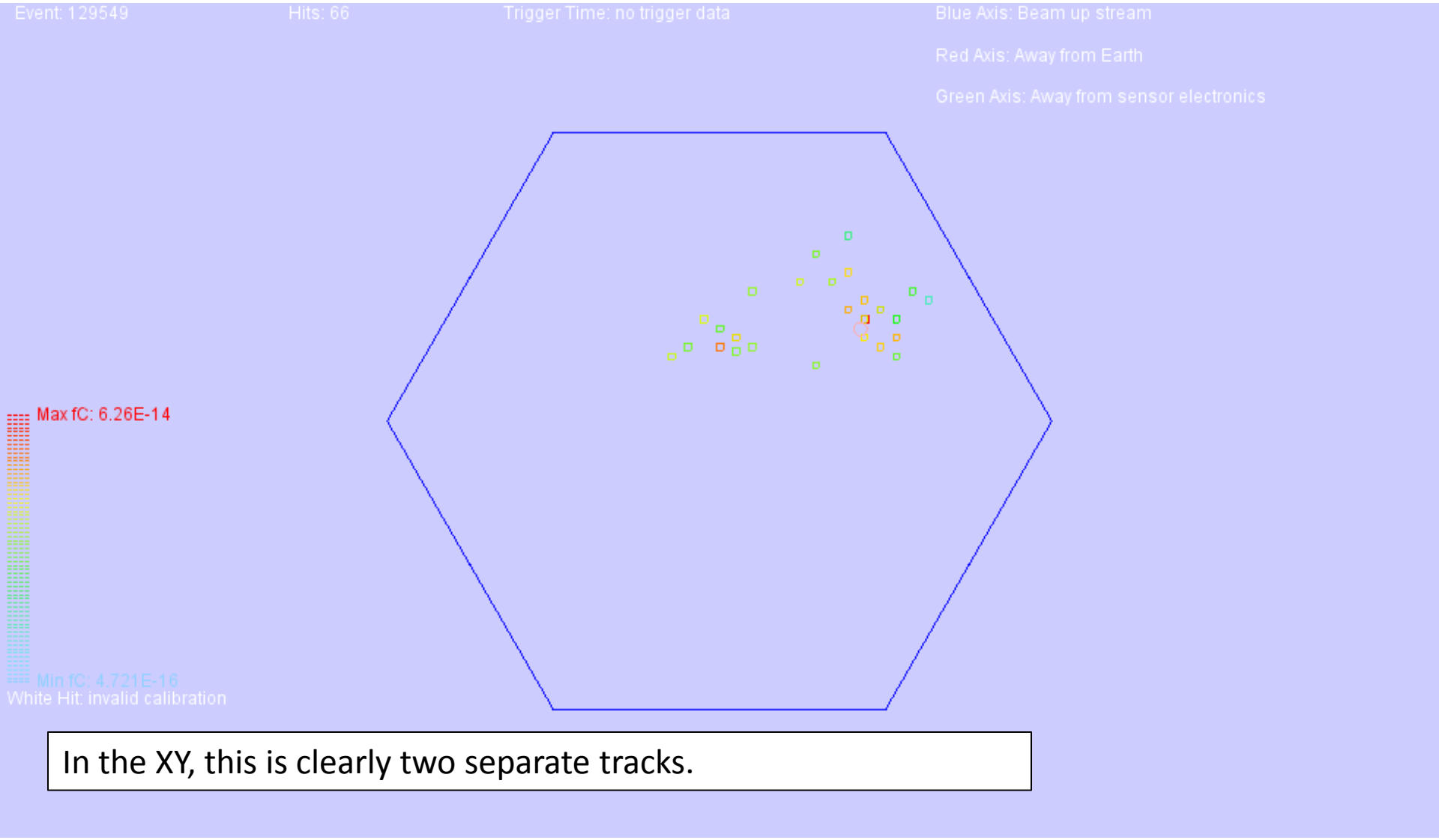
Ray had suggested curiosity about resolving two separate tracks in the display by eye, so I thought I'd look at some to see what I could come up with.

I kept in mind from the beginning that the closest two tracks can possibly be is in two adjacent pixels.

All events here are from SLAC Test Beam file "2013_07_25_20_48_49.bin".

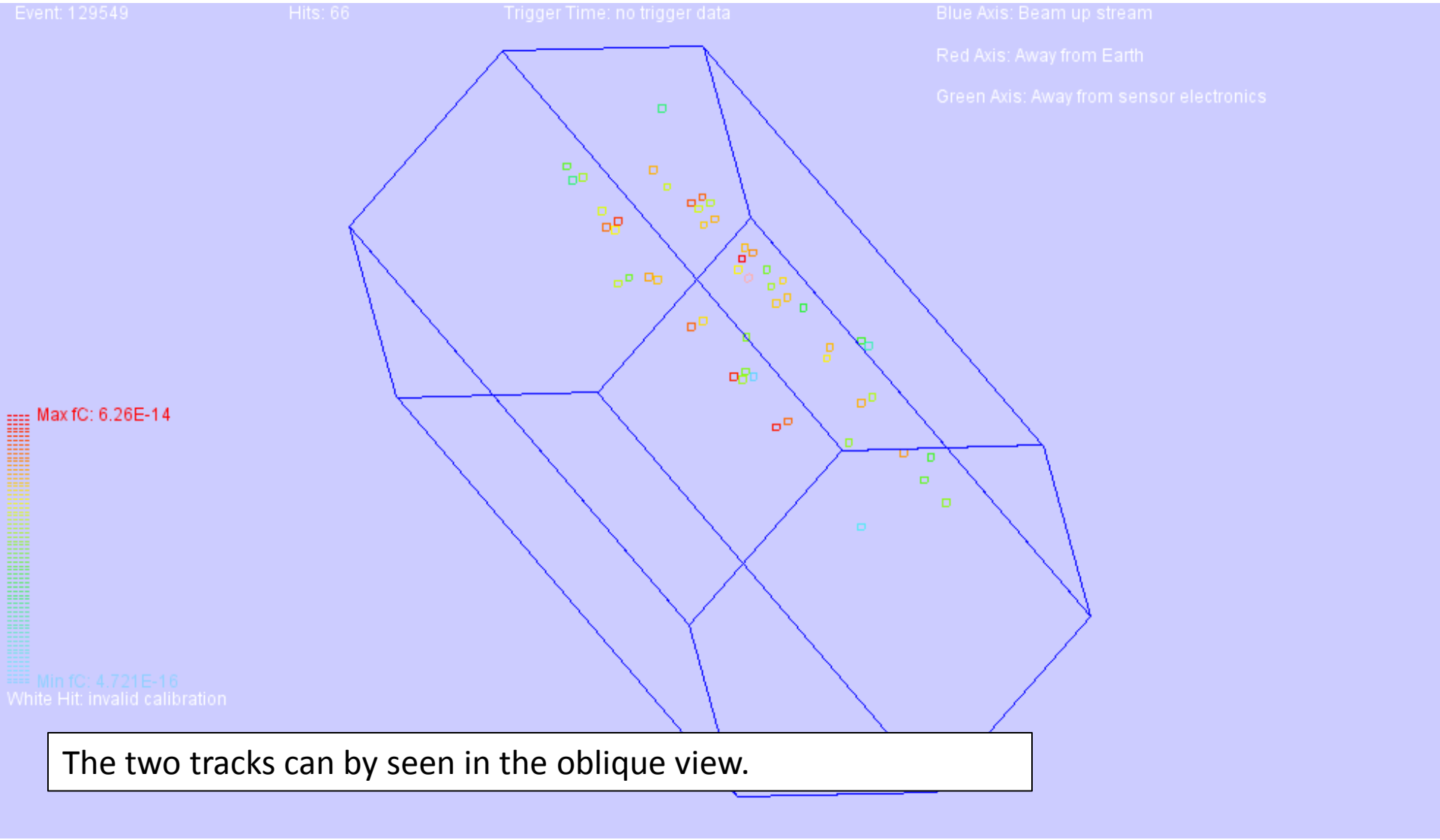
I started by looking at two clearly separated tracks (Slide 3), and going from there.

Event 129549



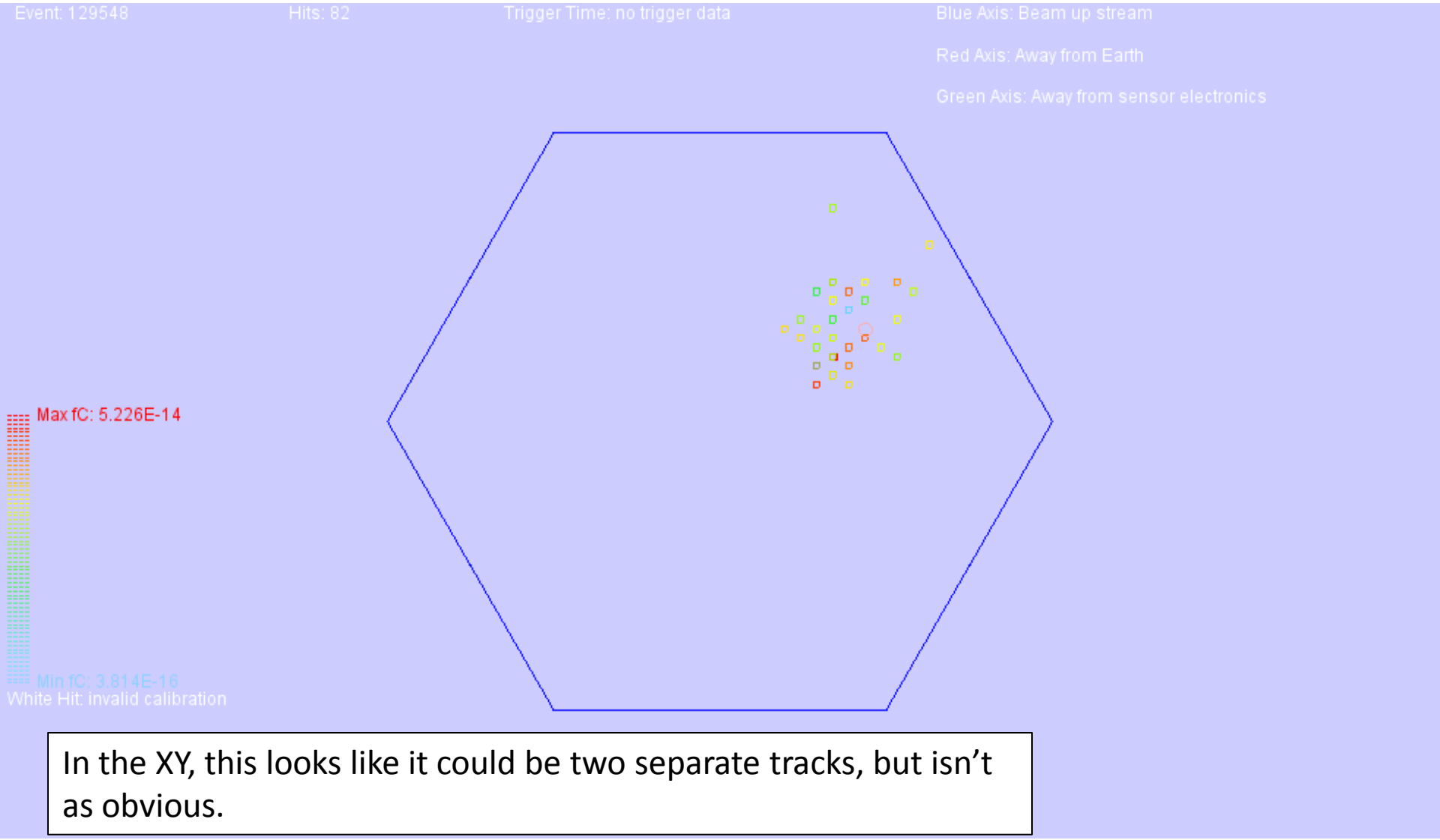
In the XY, this is clearly two separate tracks.

Event 129549



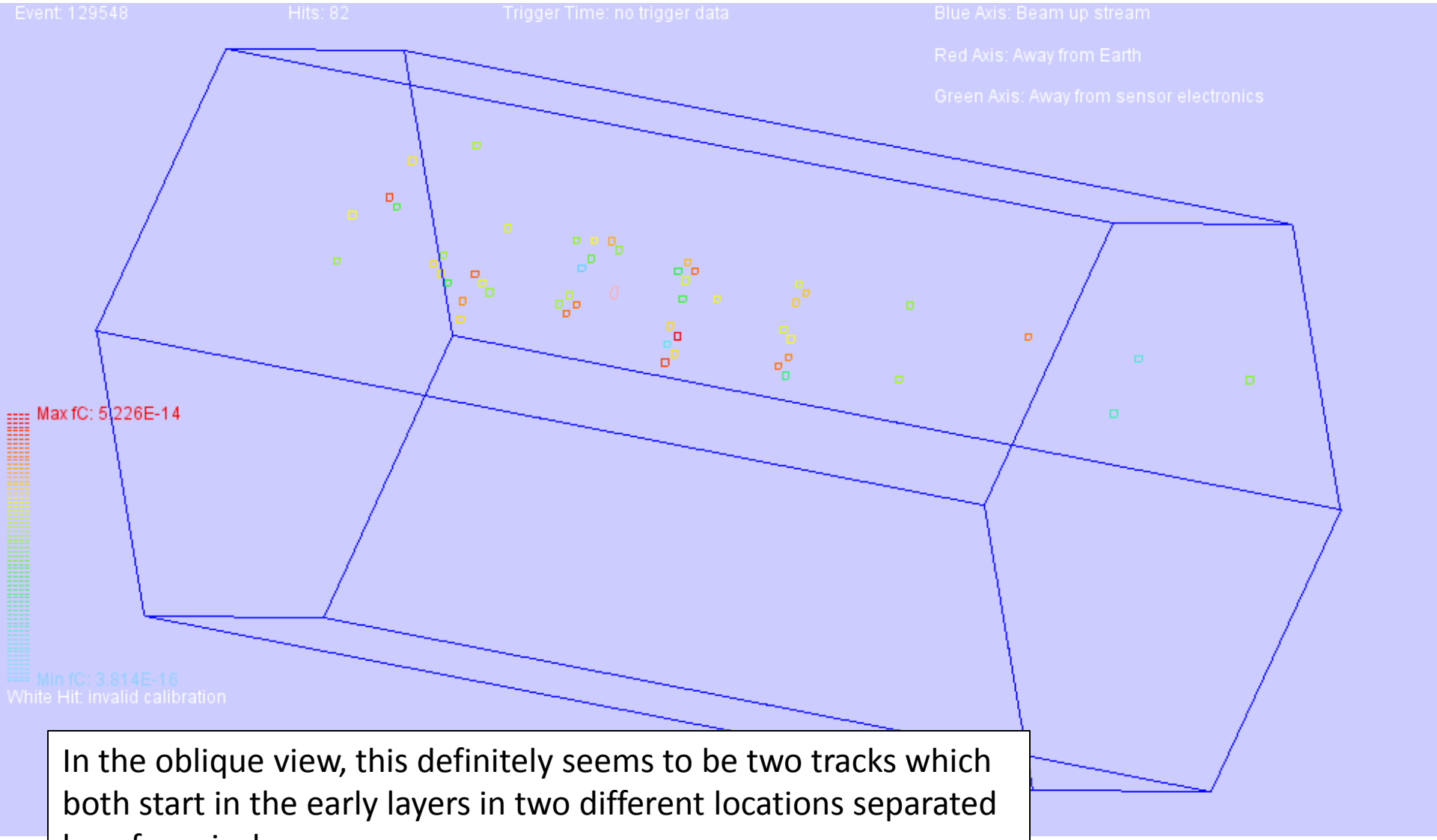
The two tracks can by seen in the oblique view.

Event 129548



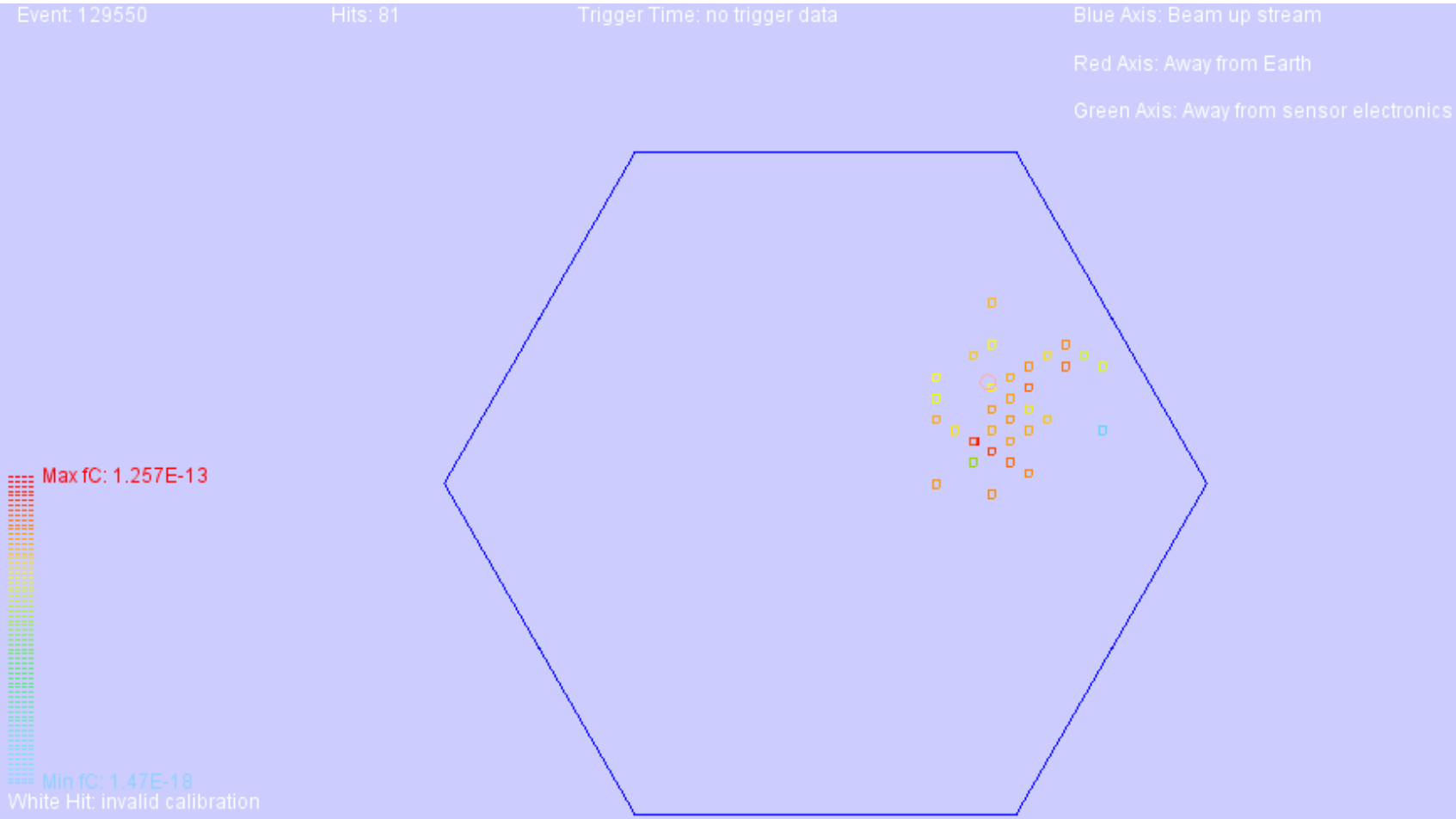
In the XY, this looks like it could be two separate tracks, but isn't as obvious.

Event 129548



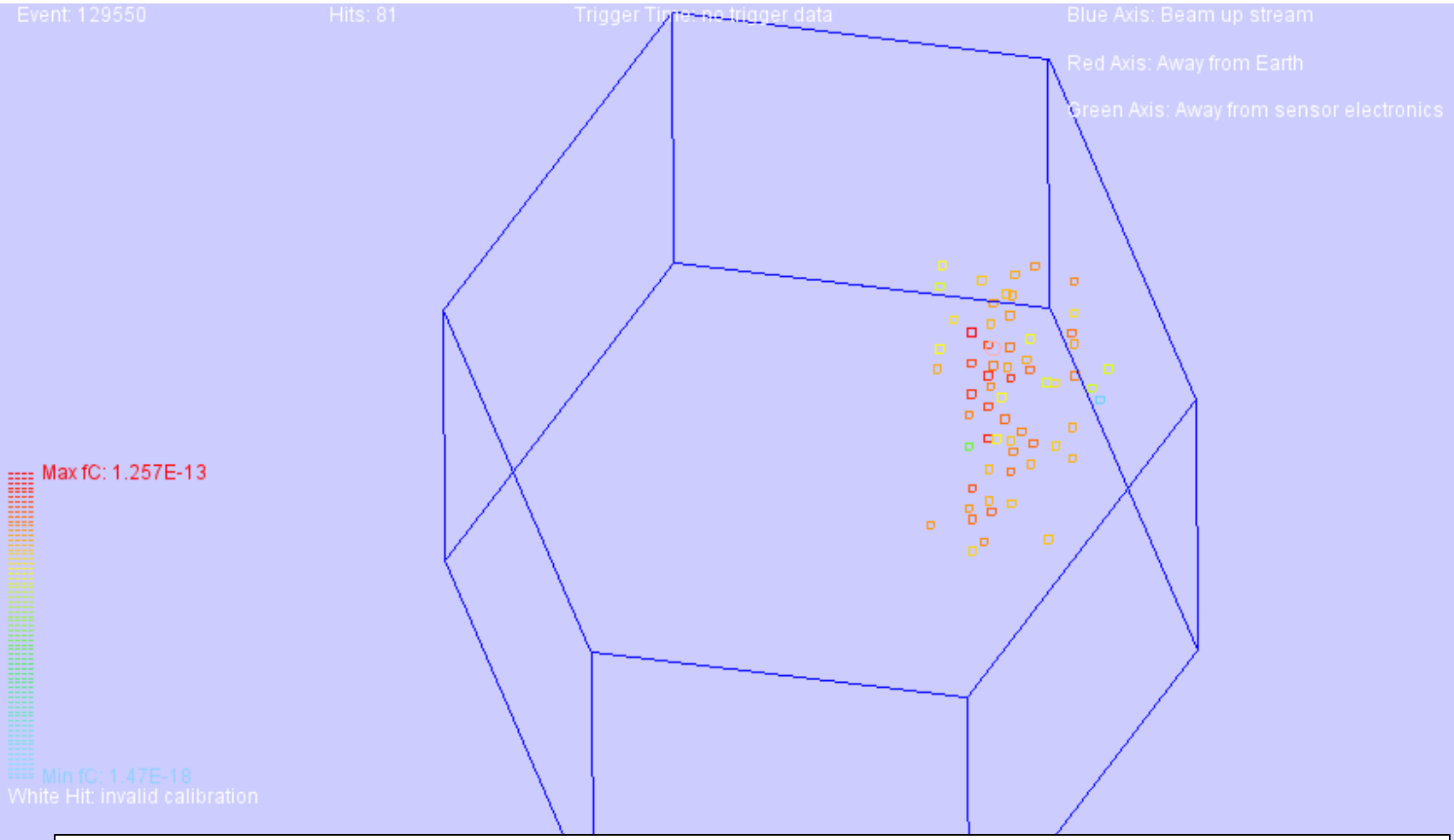
In the oblique view, this definitely seems to be two tracks which both start in the early layers in two different locations separated by a few pixels.

Event 129550



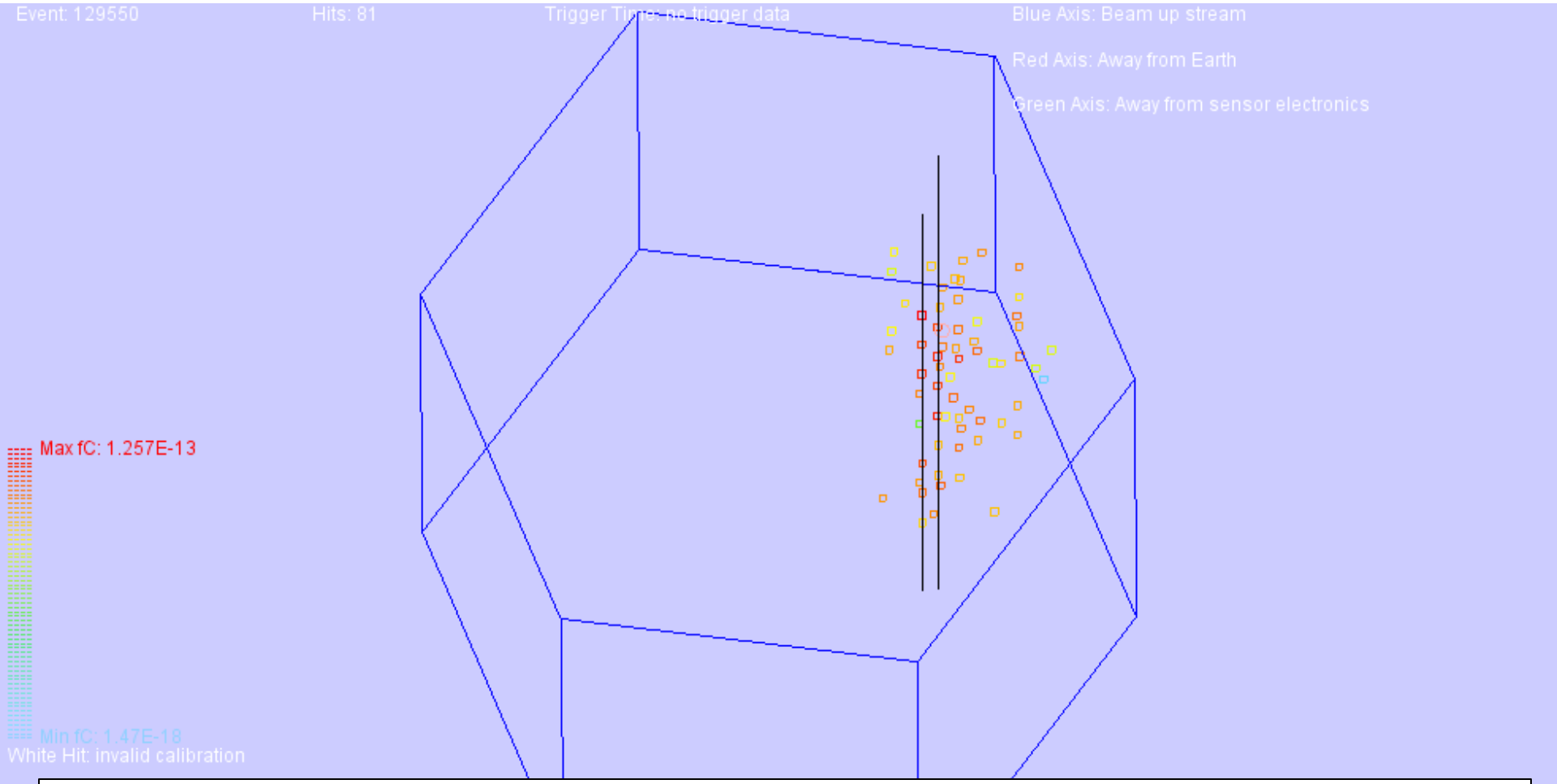
In the XY, this one looks like it is more than one electron, or is at least a very energetic shower. XY maps like this are quite common, so it would be interesting to get a handle on if they are multpiles or not. A software algorithm would have to decide what to do with this, and it's not even clear to my eye what it is.

Event 129550



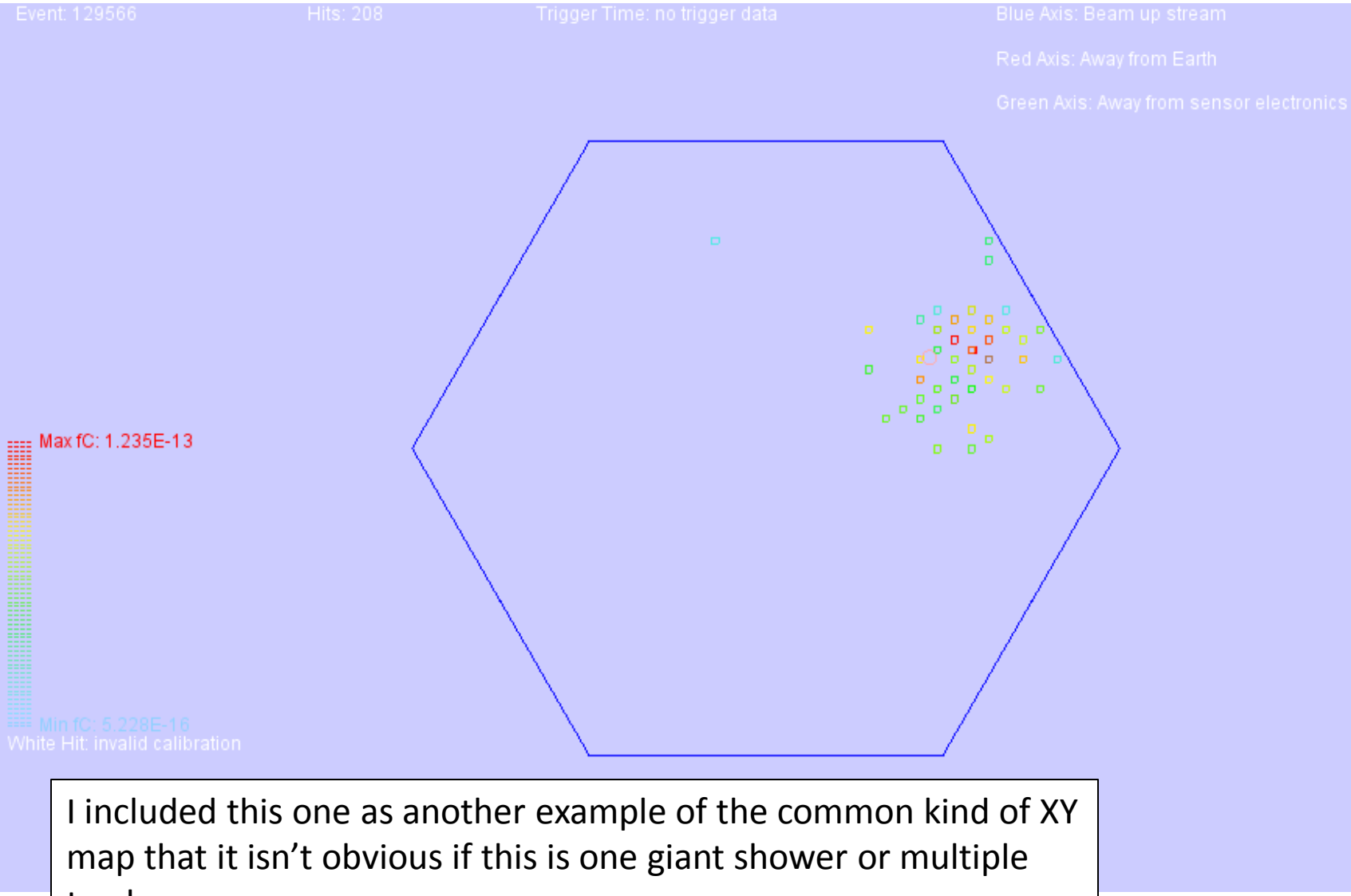
This is the oblique view of the same. It's hard to put this in 2D; it's much more illuminating to move the 3D display around in real time to see what your eye makes of it.

Event 129550



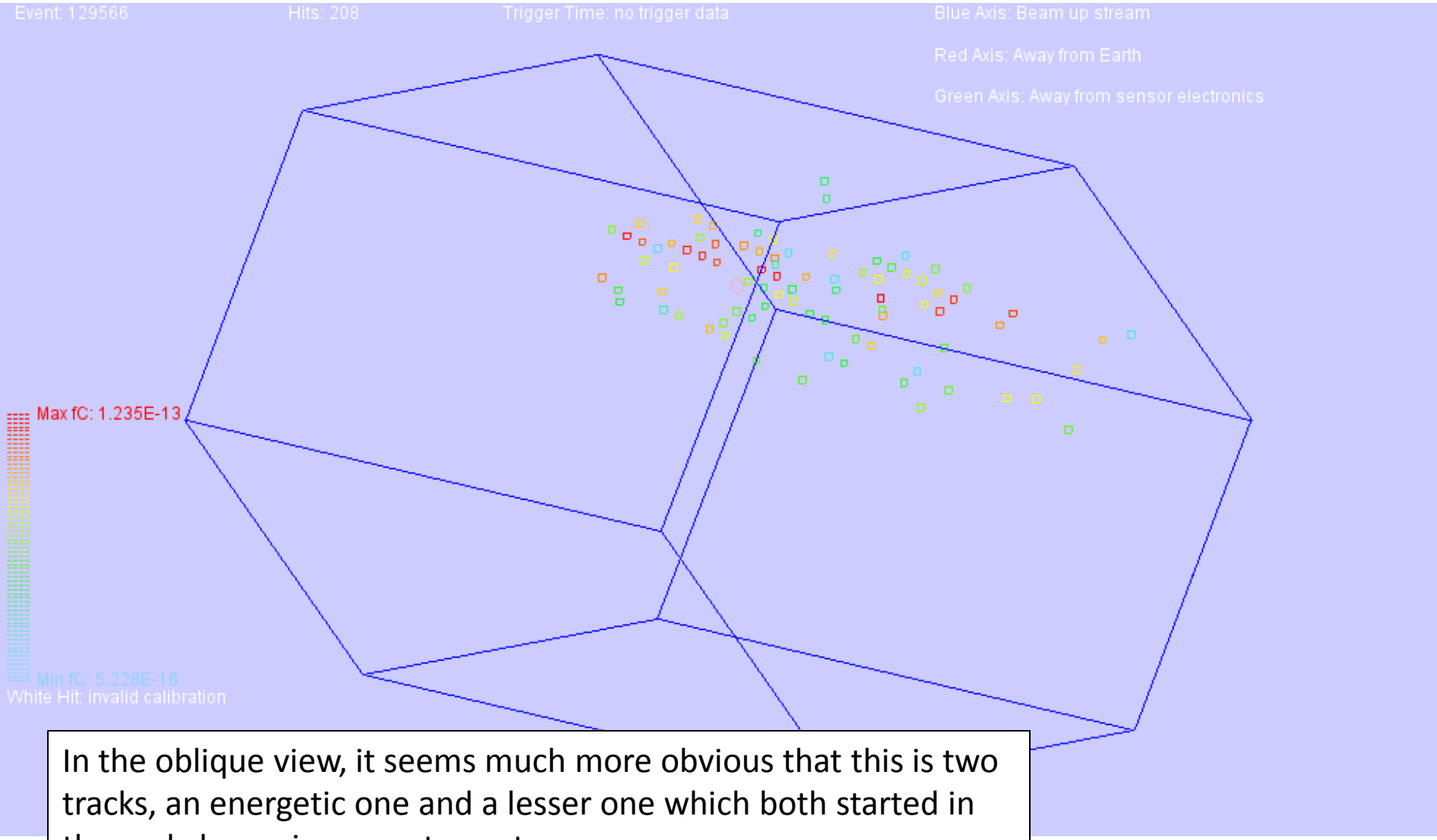
While rotating the display, it seemed possible to my eye that this was two tracks in adjacent pixels, with maybe a third out near the edge of the detector. If that's true, it's as close as two tracks can be. But I don't know that there's any way to know that this isn't just one large track that hit near the edge between two pixels. I think you would need a secondary way to count electrons to know how many are here exactly.

Event 129566



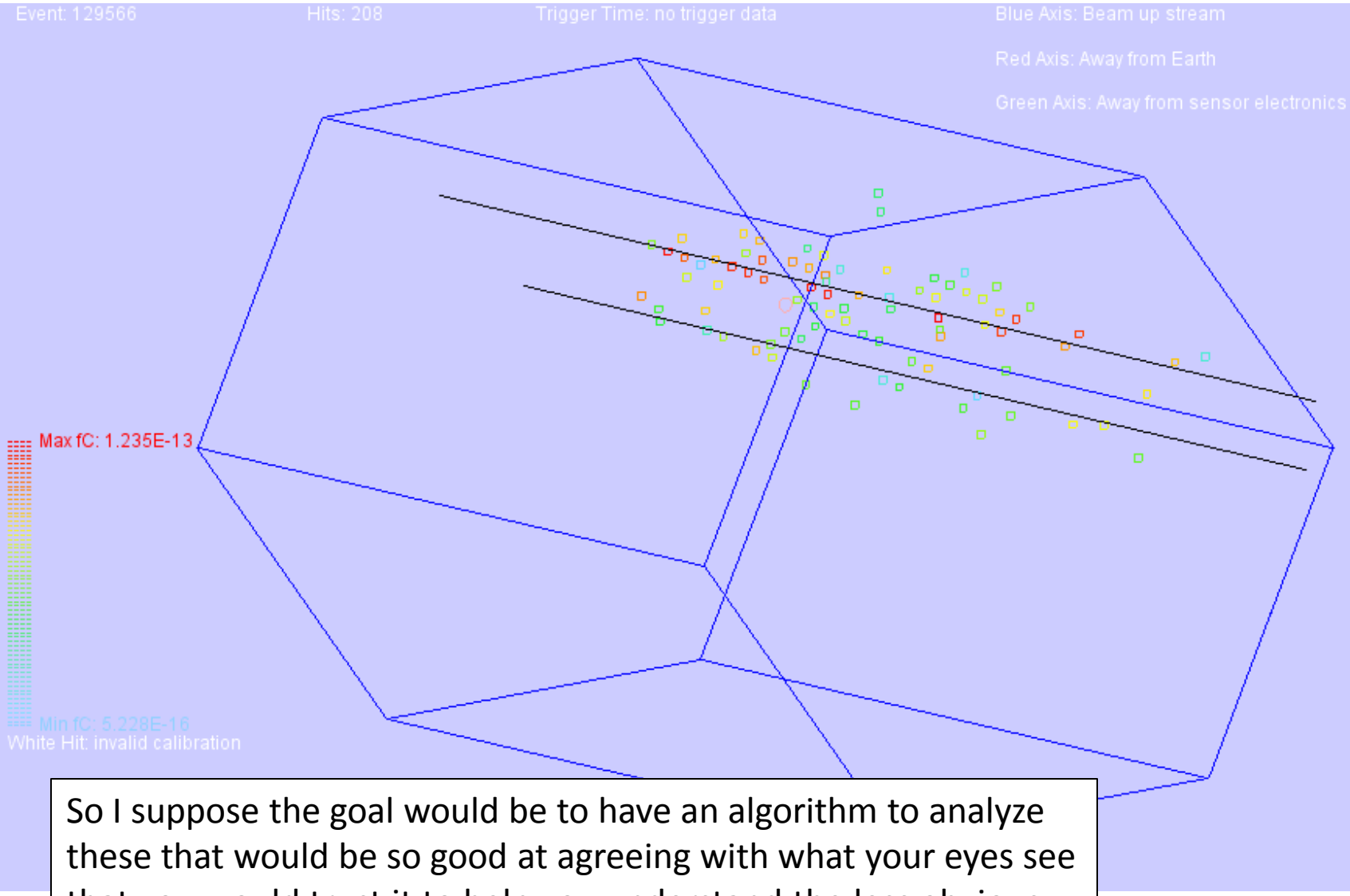
I included this one as another example of the common kind of XY map that it isn't obvious if this is one giant shower or multiple tracks.

Event 129566



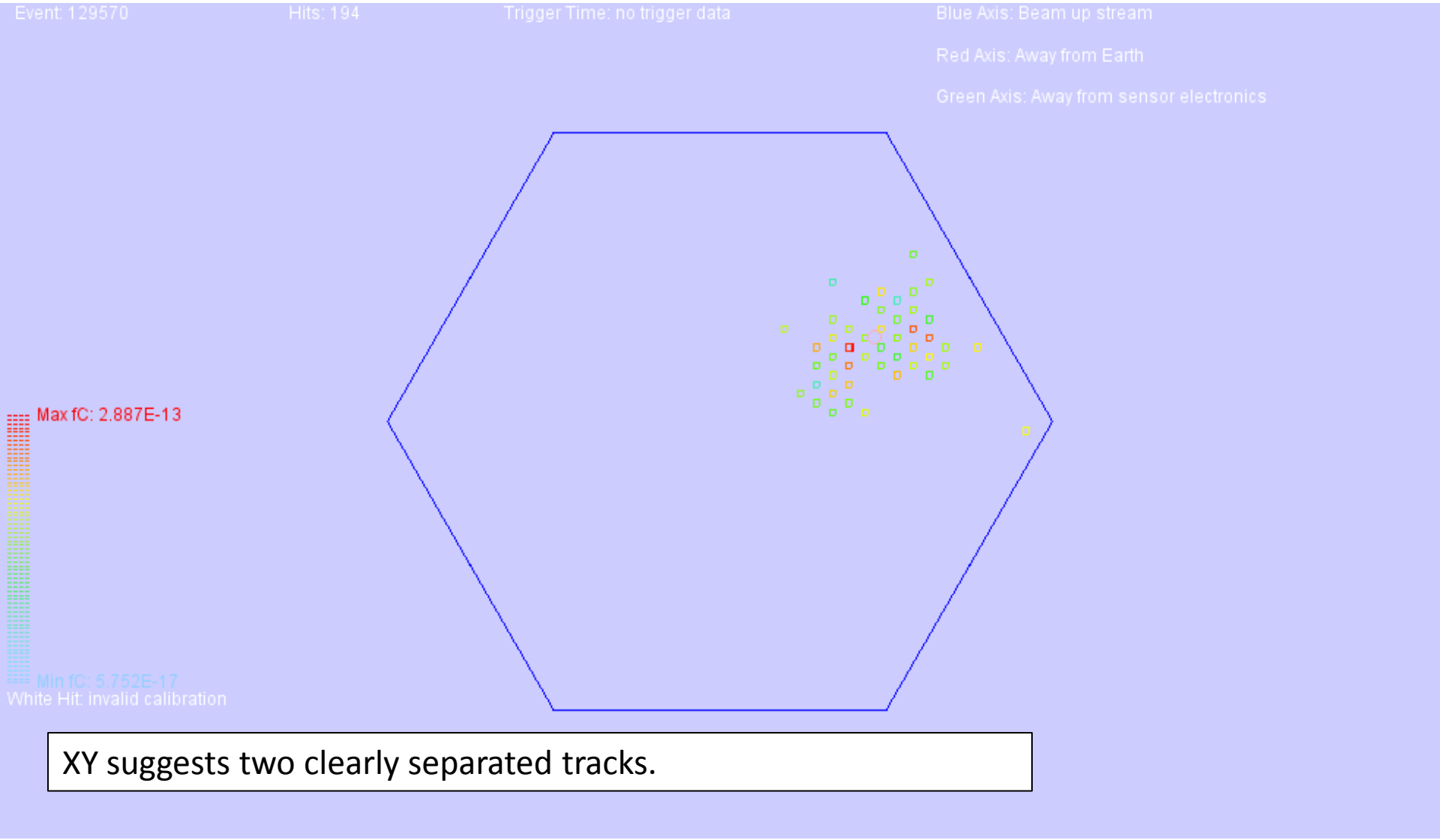
In the oblique view, it seems much more obvious that this is two tracks, an energetic one and a lesser one which both started in the early layers in separate spots.

Event 129566



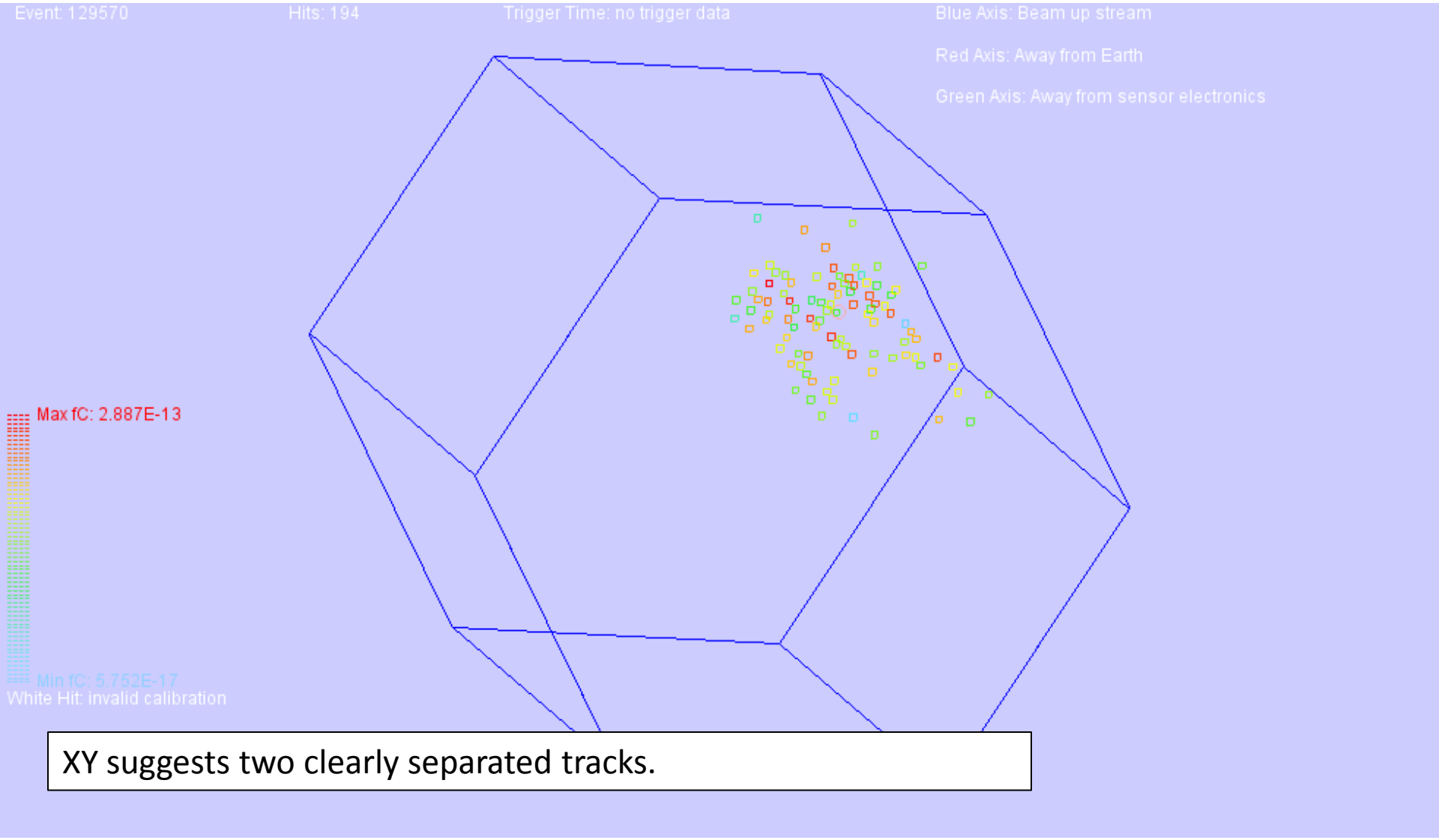
So I suppose the goal would be to have an algorithm to analyze these that would be so good at agreeing with what your eyes see that you would trust it to help you understand the less obvious ones.

Event 129570



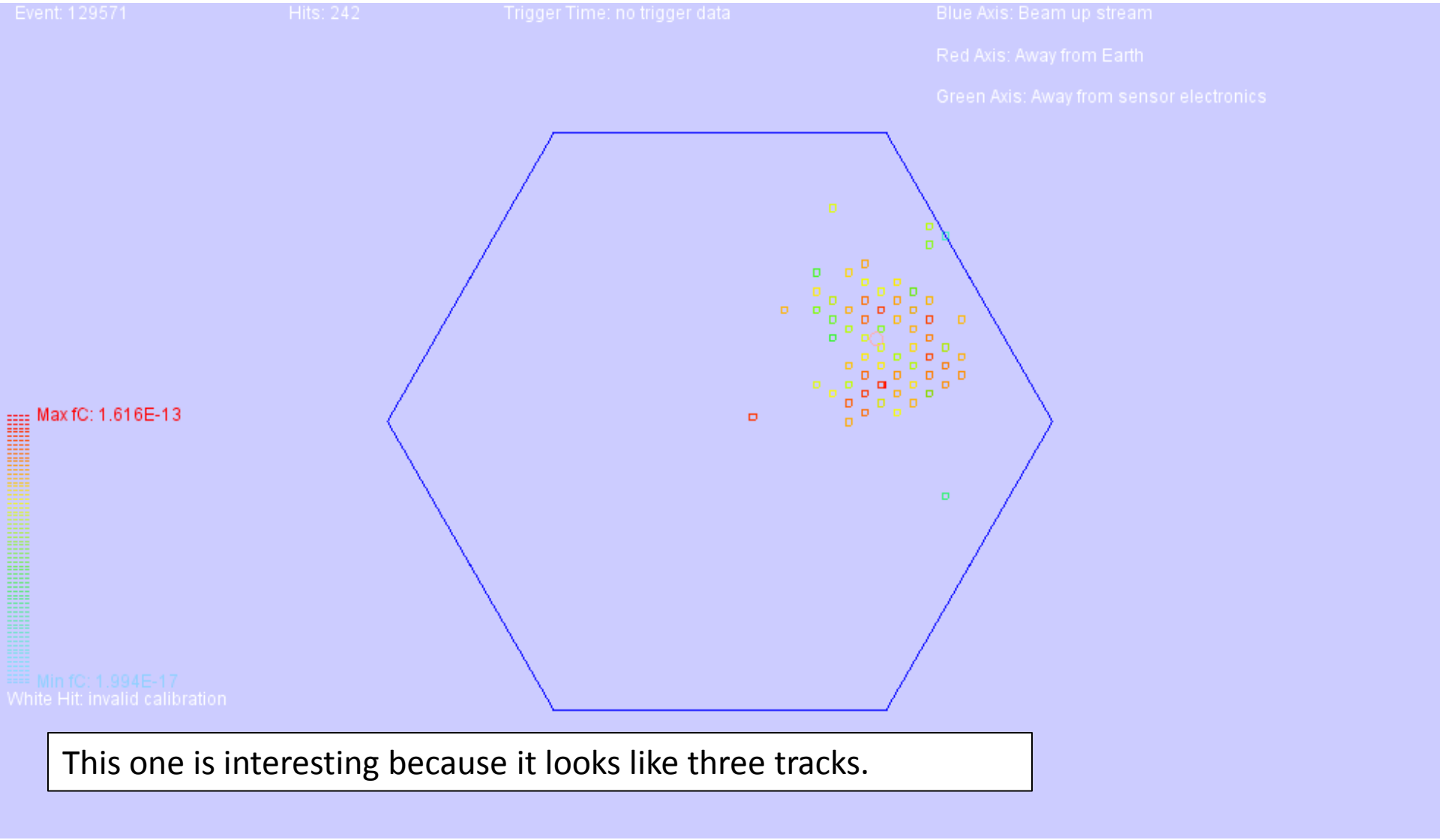
XY suggests two clearly separated tracks.

Event 129570



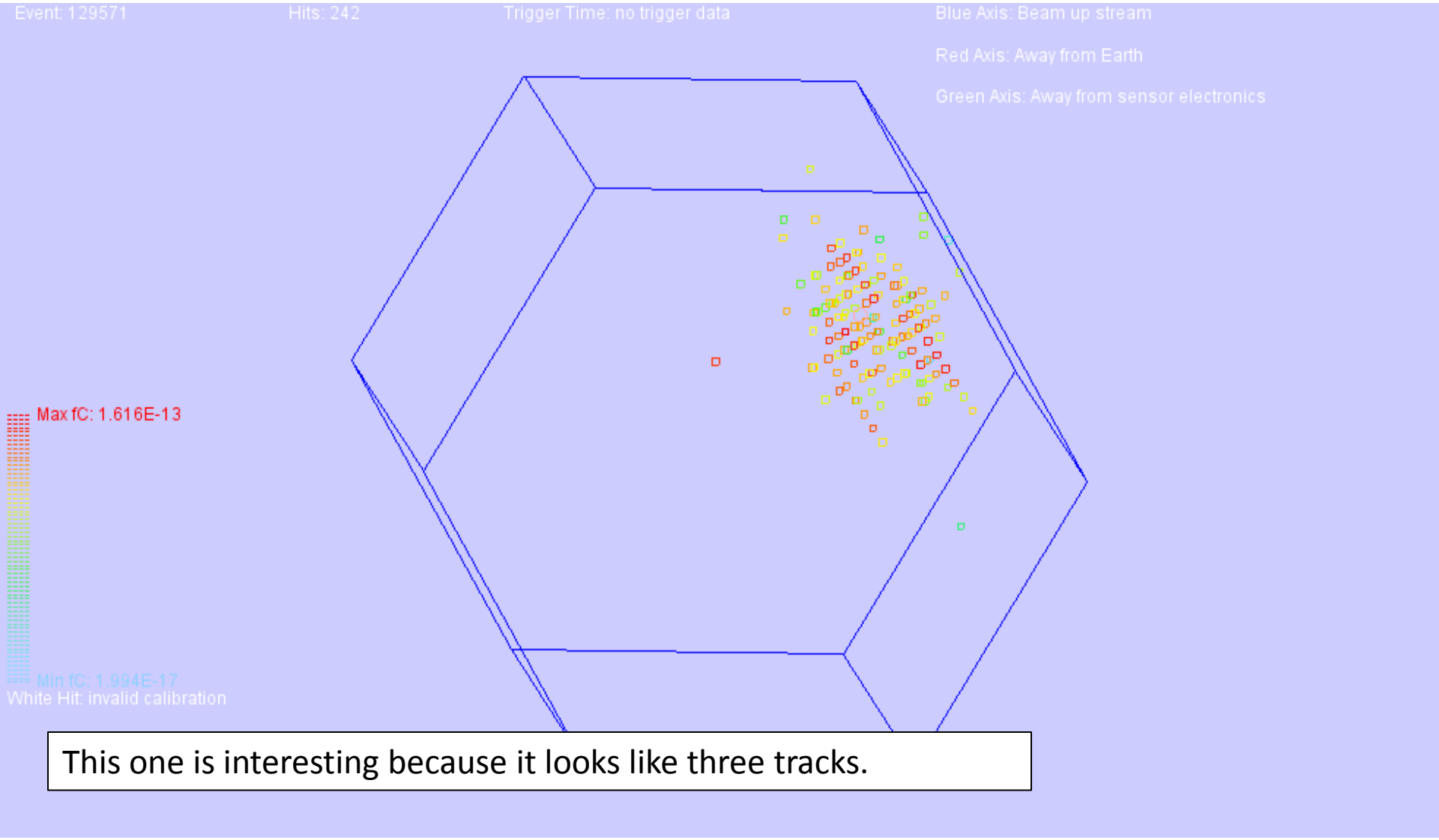
XY suggests two clearly separated tracks.

Event 129571



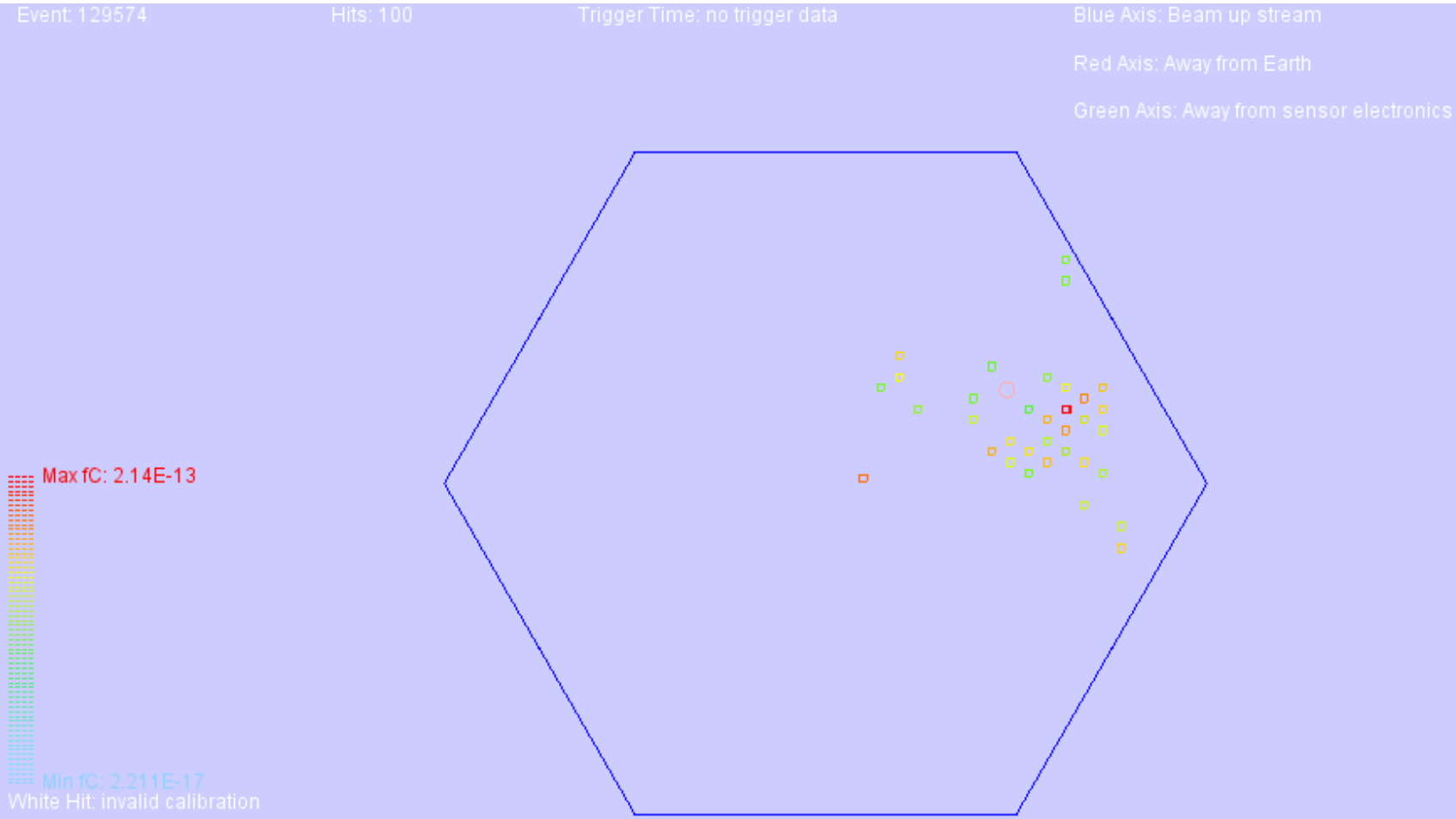
This one is interesting because it looks like three tracks.

Event 129571



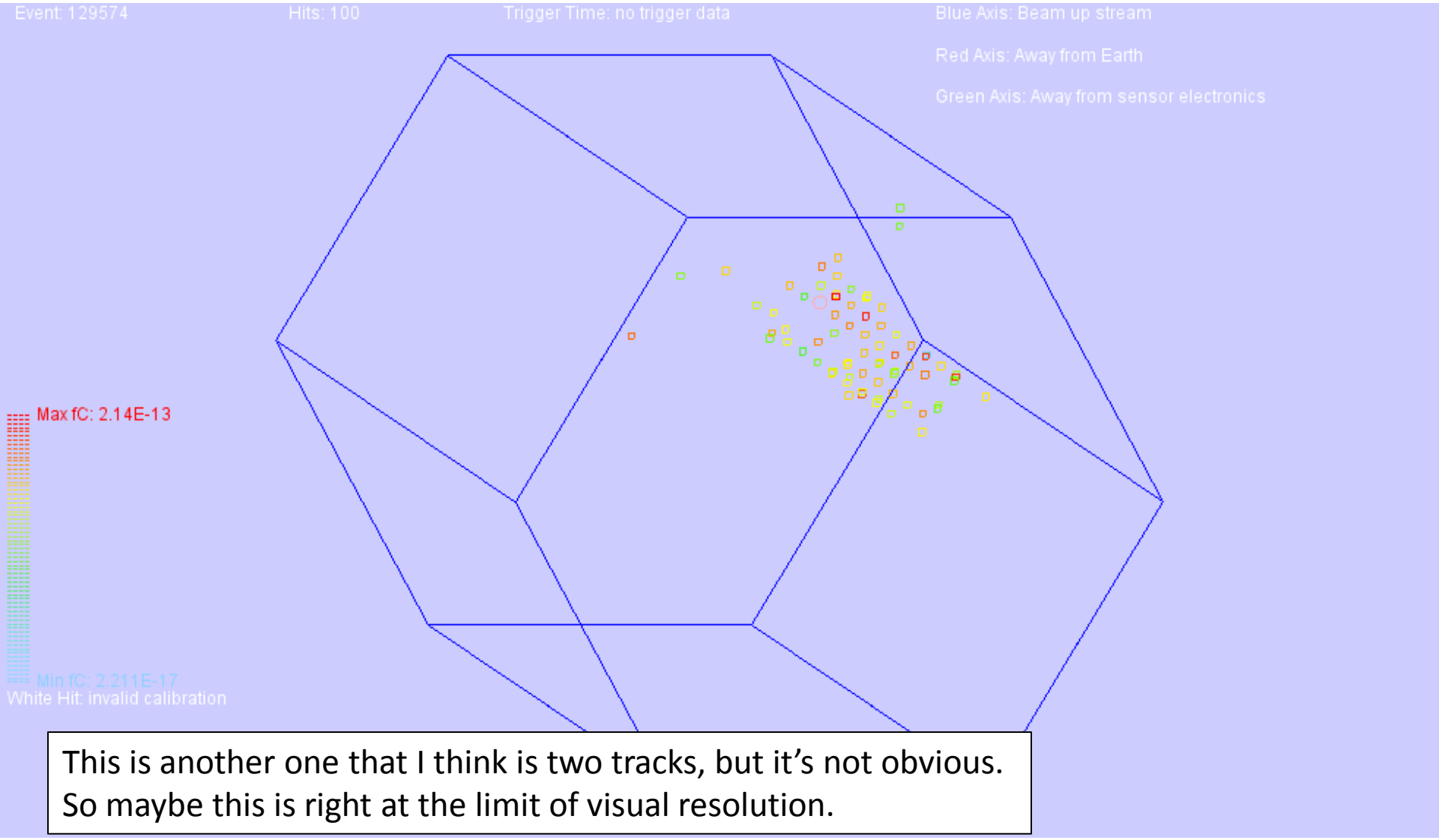
This one is interesting because it looks like three tracks.

Event 129574



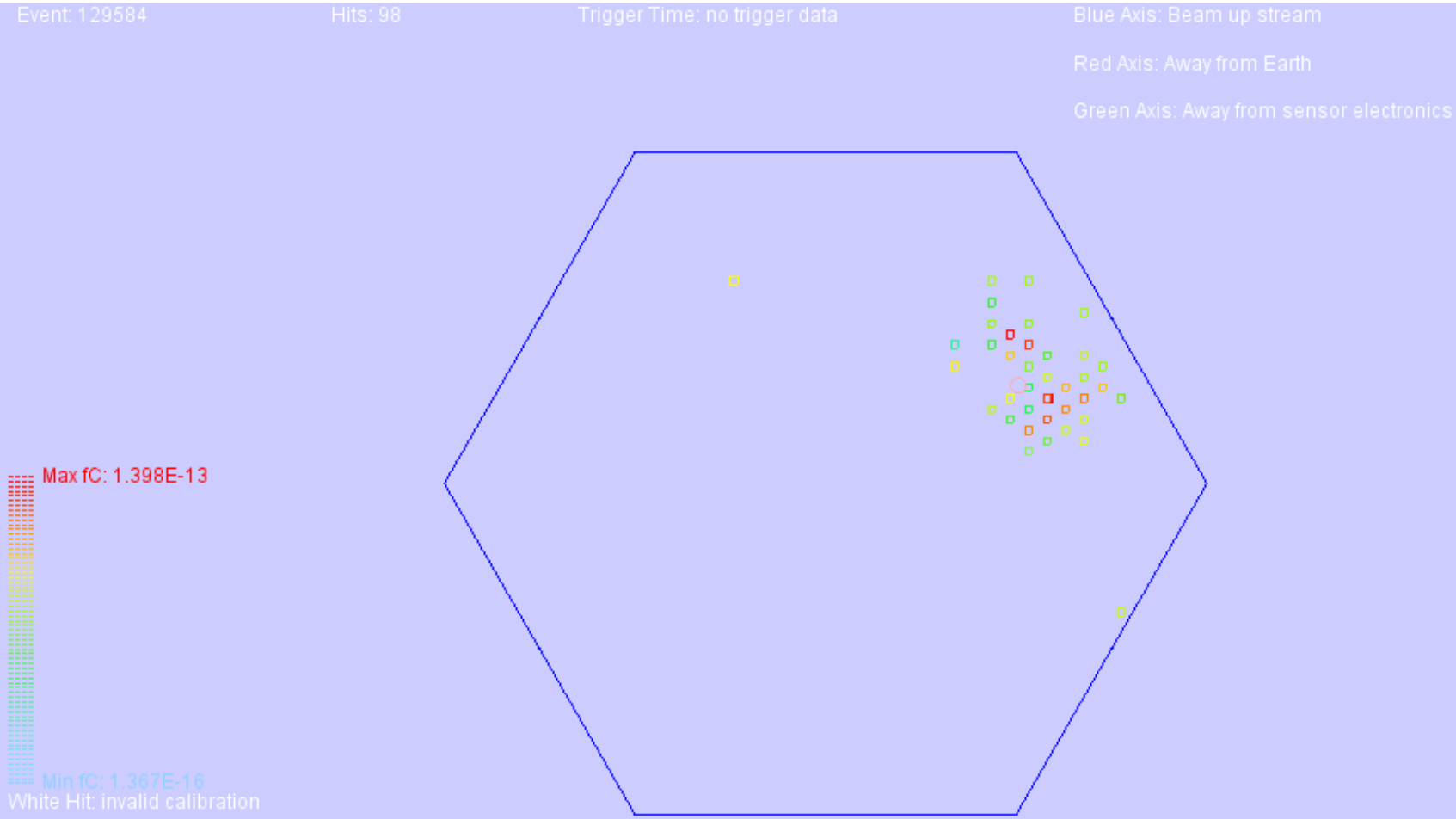
This is another one that I think is two tracks, but it's not obvious. So maybe this is right at the limit of visual resolution.

Event 129574



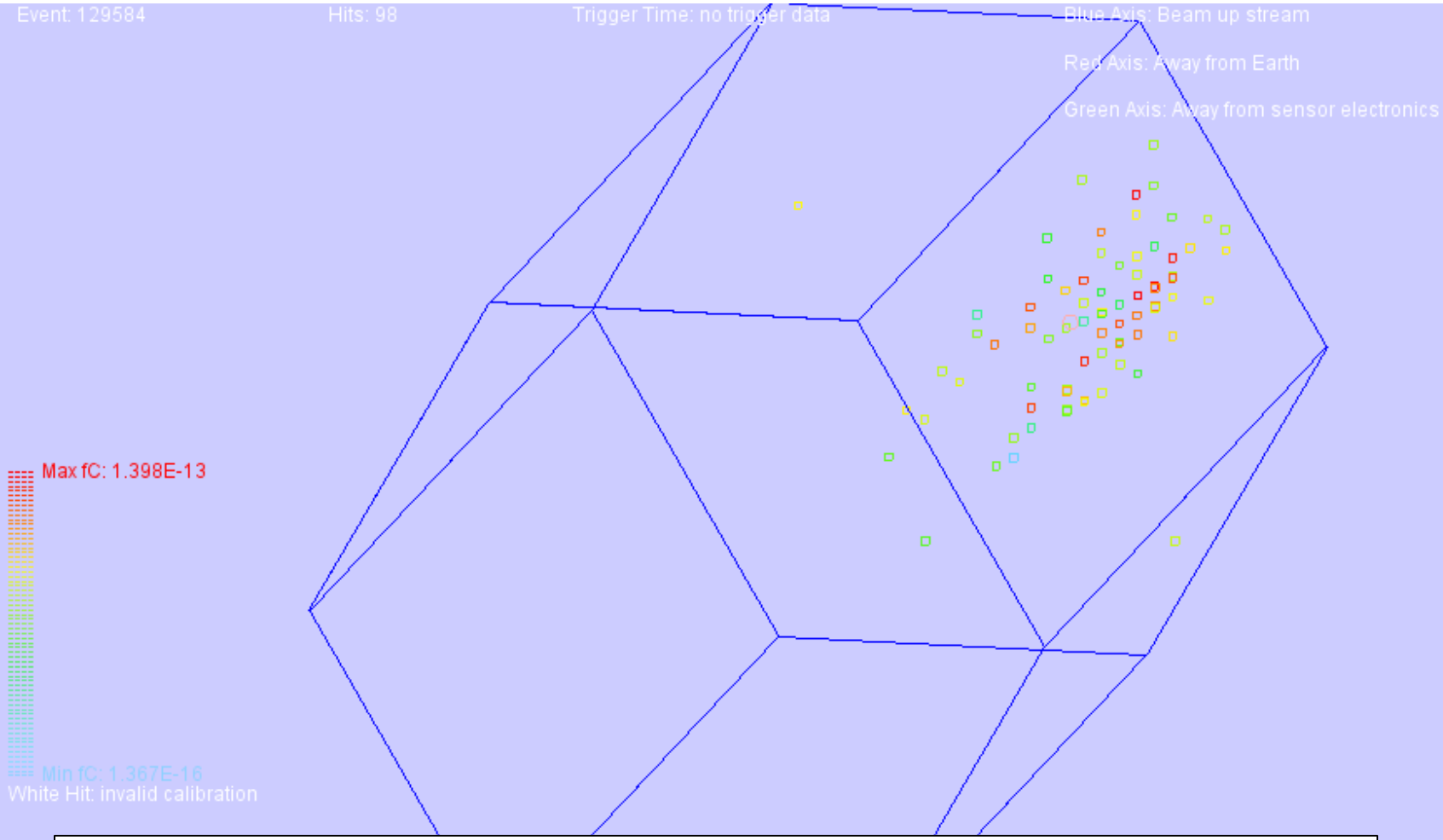
This is another one that I think is two tracks, but it's not obvious. So maybe this is right at the limit of visual resolution.

Event 129584



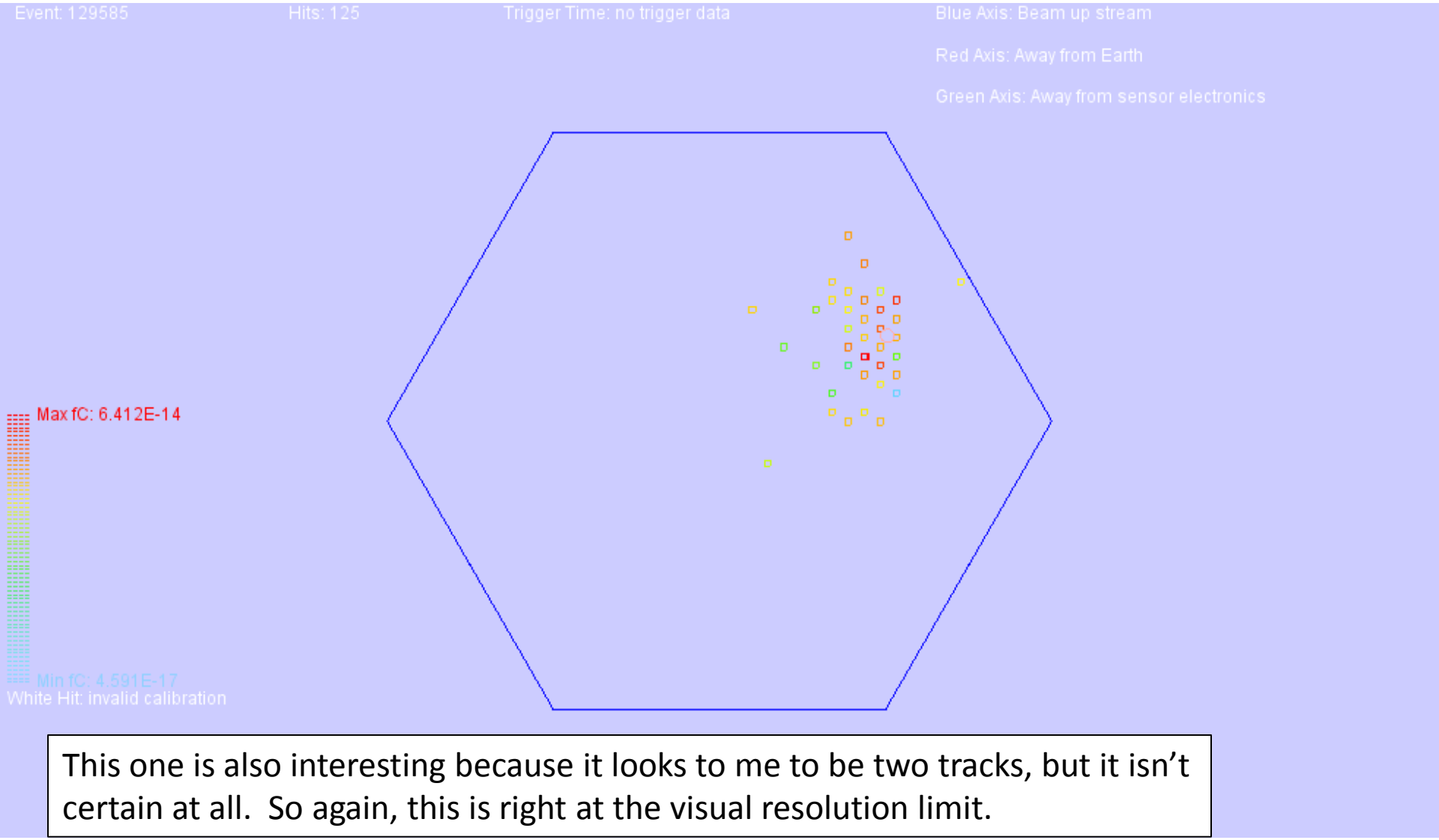
I like this one because it's pretty clear that this is two separate tracks, but they're still pretty close together. Because the centers of the tracks are so intense, it's still easy to see that it's two; one of them isn't washing out the other. And they each have a distinct beginning in an early layer.

Event 129584



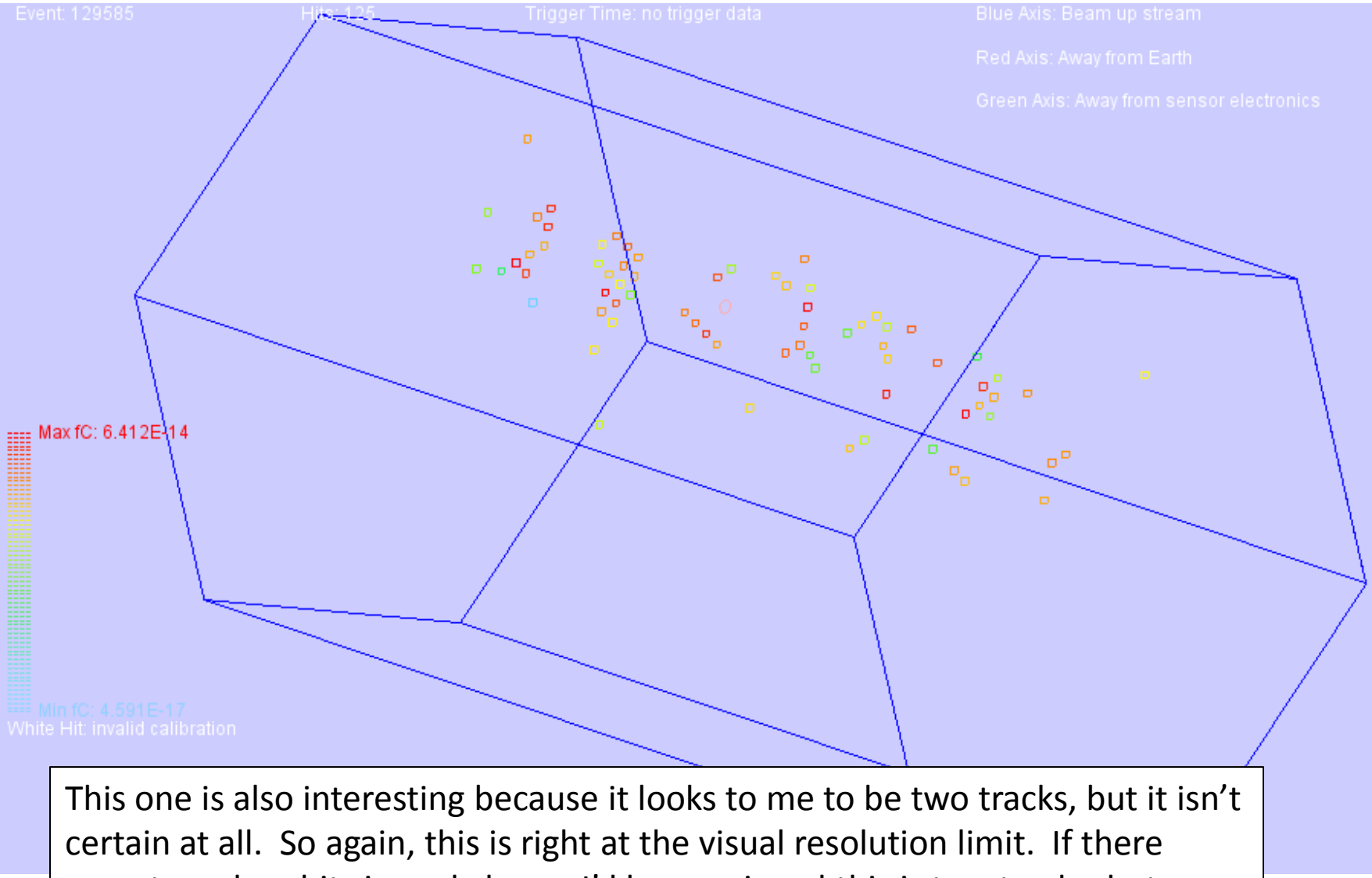
I like this one because it's pretty clear that this is two separate tracks, but they're still pretty close together. Because the centers of the tracks are so intense, it's still easy to see that it's two; one of them isn't washing out the other. And they each have a distinct beginning in an early layer.

Event 129585



This one is also interesting because it looks to me to be two tracks, but it isn't certain at all. So again, this is right at the visual resolution limit.

Event 129585



This one is also interesting because it looks to me to be two tracks, but it isn't certain at all. So again, this is right at the visual resolution limit. If there were two clear hits in early layers I'd be convinced this is two tracks, but because there aren't, I'm not sure. Maybe it's one track that spread out.

Thank you

END