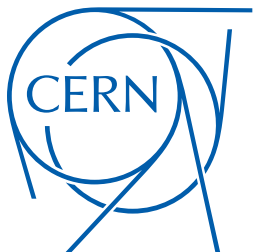# Pandora Beam ID

Leigh Whitehead

16/10/18

Introduction

- Pandora attempts to return a PFParticle identified as the primary beam particle

- Looked at 108 events from the 7 GeV beam run at 180kV
  - File: np04_raw_run005141_0016_dl2.root

- I processed this file with dunetpc v07_07_00

- Used two standard .fcl files:
 - RunRawDecoder.fcl
  - protoDUNE_reco_data.fcl

Statistics

- A total of 108 events were processed

No beam No beam ID	No beam Beam ID	Beam trigger No beam ID	Beam trigger Beam ID
30	1	11	66

- Pandora identified the beam particle in 66 of the 77 beam triggered events

- There was a single instance of a beam particle identified in a non-beam triggered event

- Will show all 11 missing beam id events and the sole non-beam triggered event with a beam particle
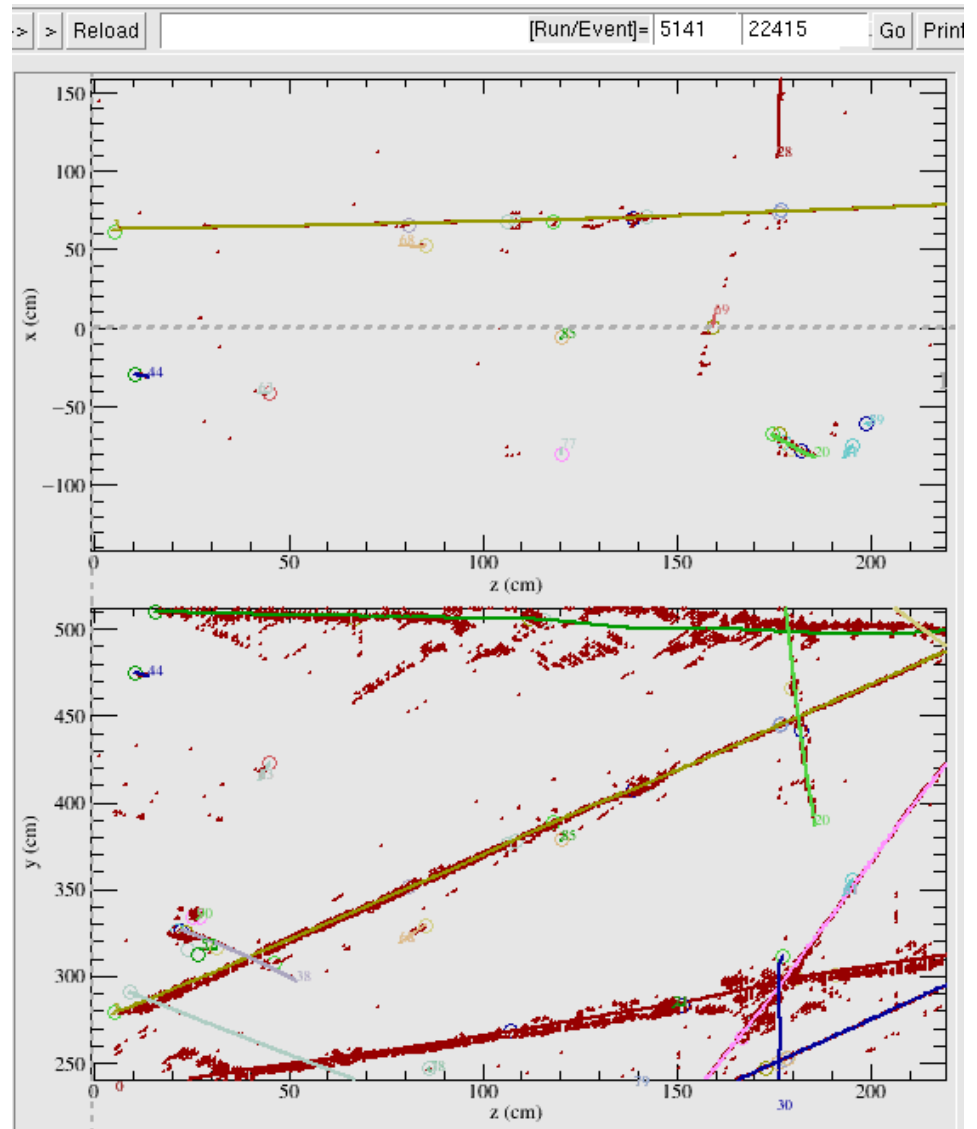
Comparison to MC

- Pandora selects a beam particle in 66 of 77 beam trigger events

- Compare to MCC10 (thanks Steve):
  - Integrated efficiency = (79.6±0.4)%

- Data value appears higher, but MC efficiency has extra criteria such as ensuring low contamination from cosmic ray hits etc
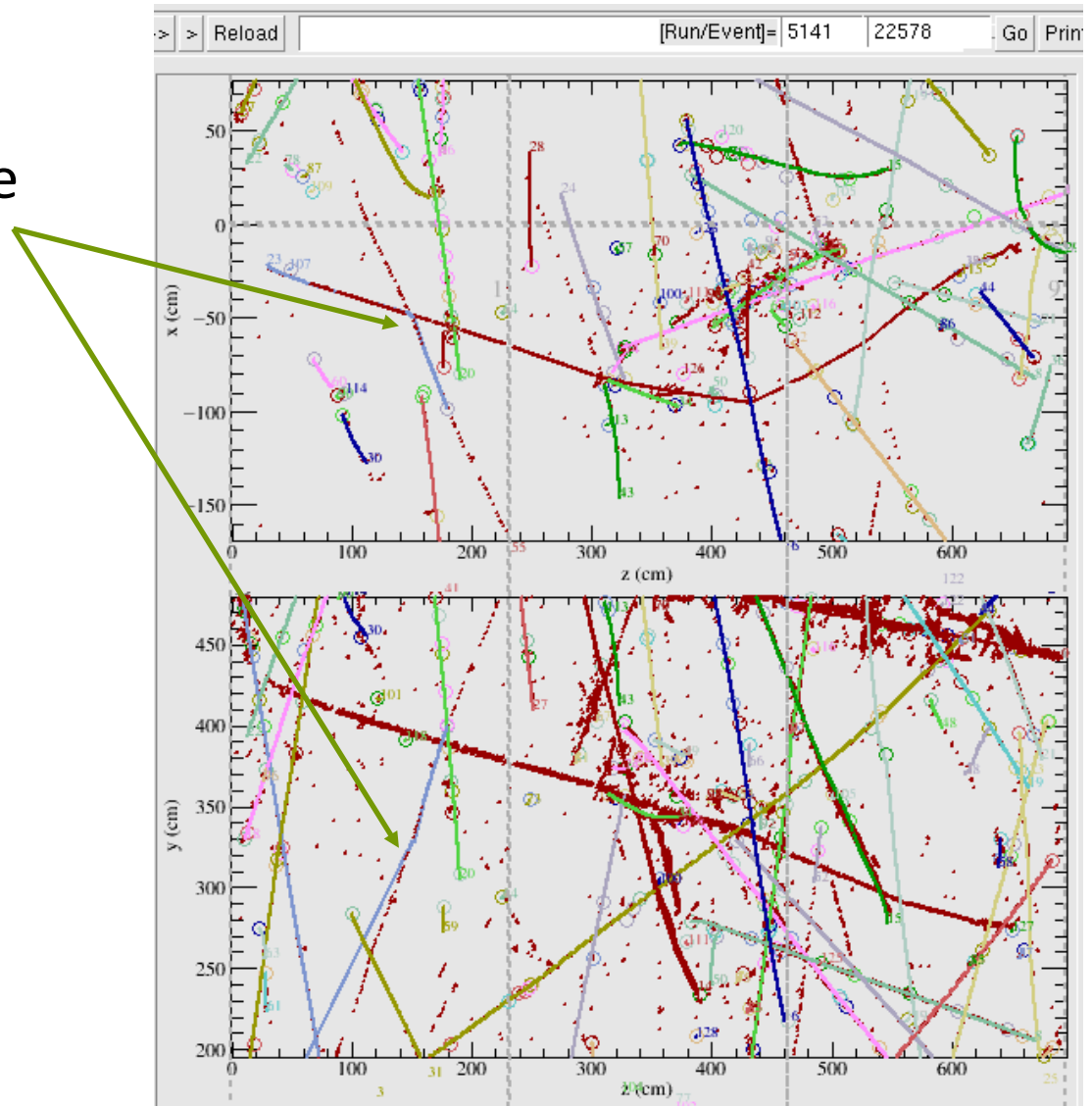
- Appears consistent
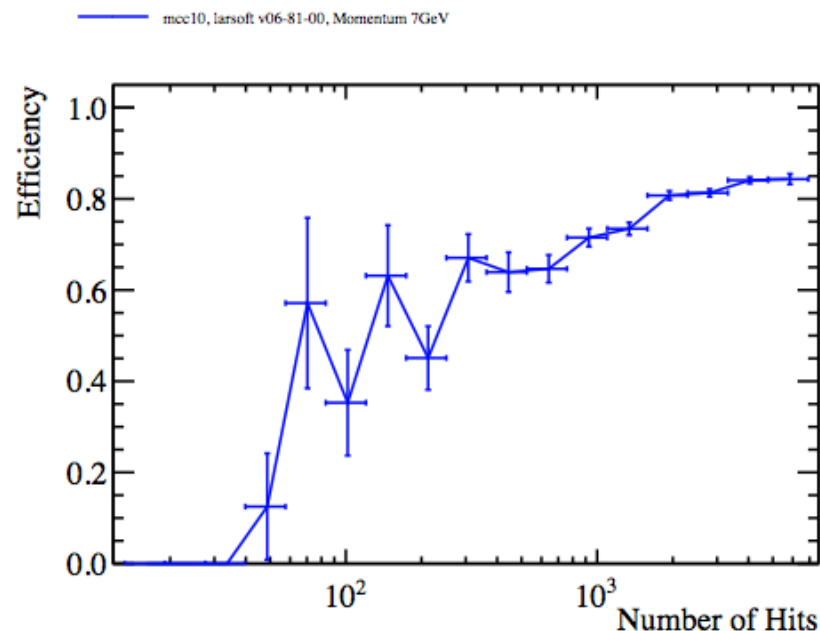
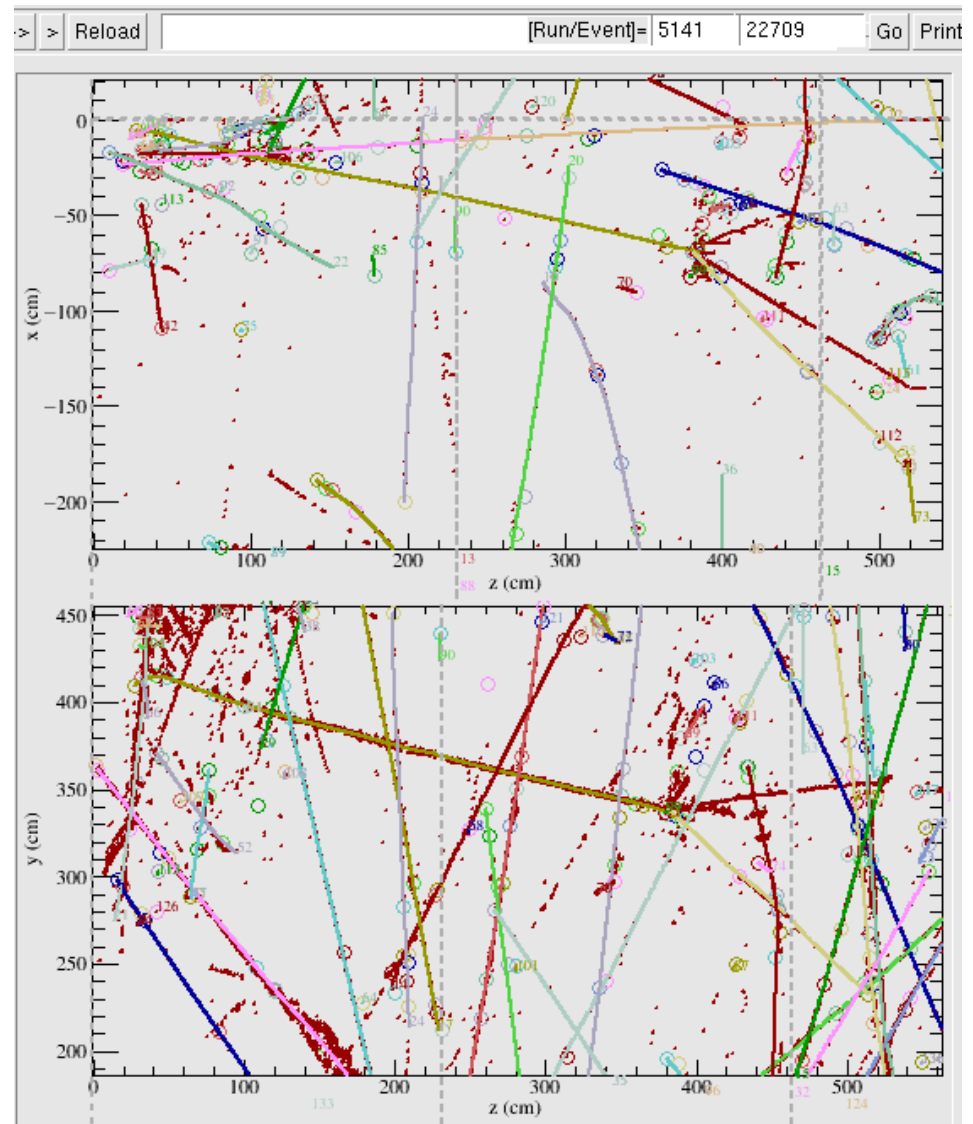# No Beam ID: Event 22415

- No obvious beam particle here

No Beam ID: Event 22578

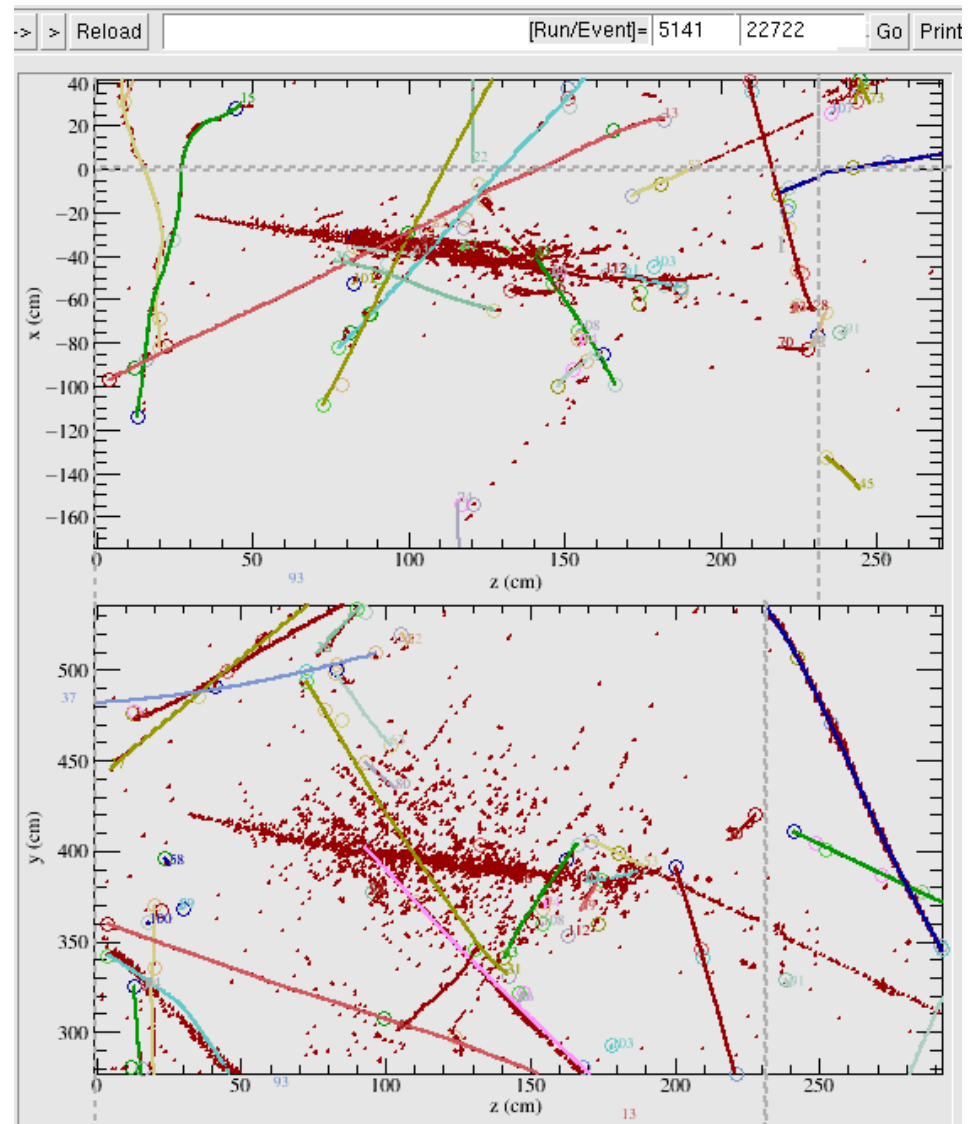- Looks like there could be a tracking issue here

No Beam ID: Event 22709

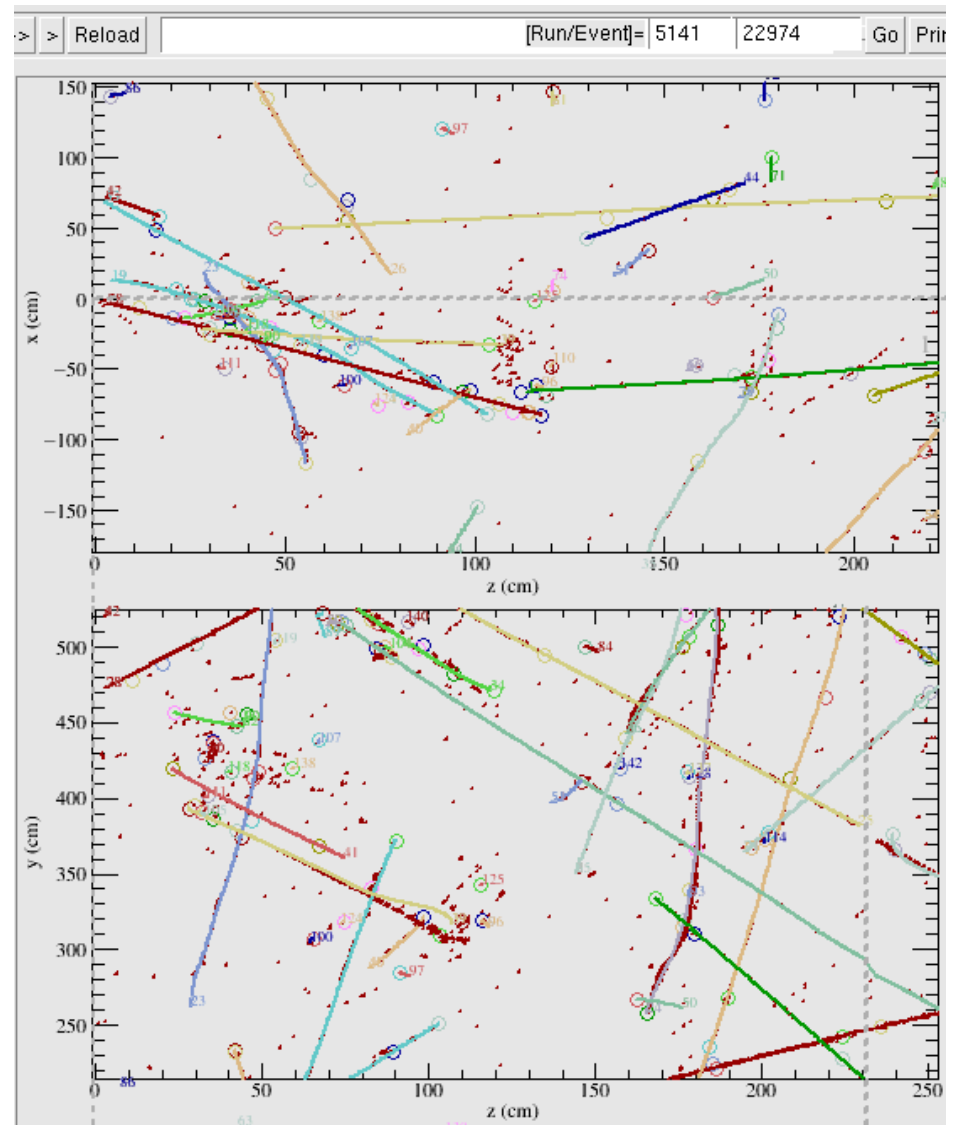- Nice long pion interaction but with a messy and congested beam window region

No Beam ID: Event 22722

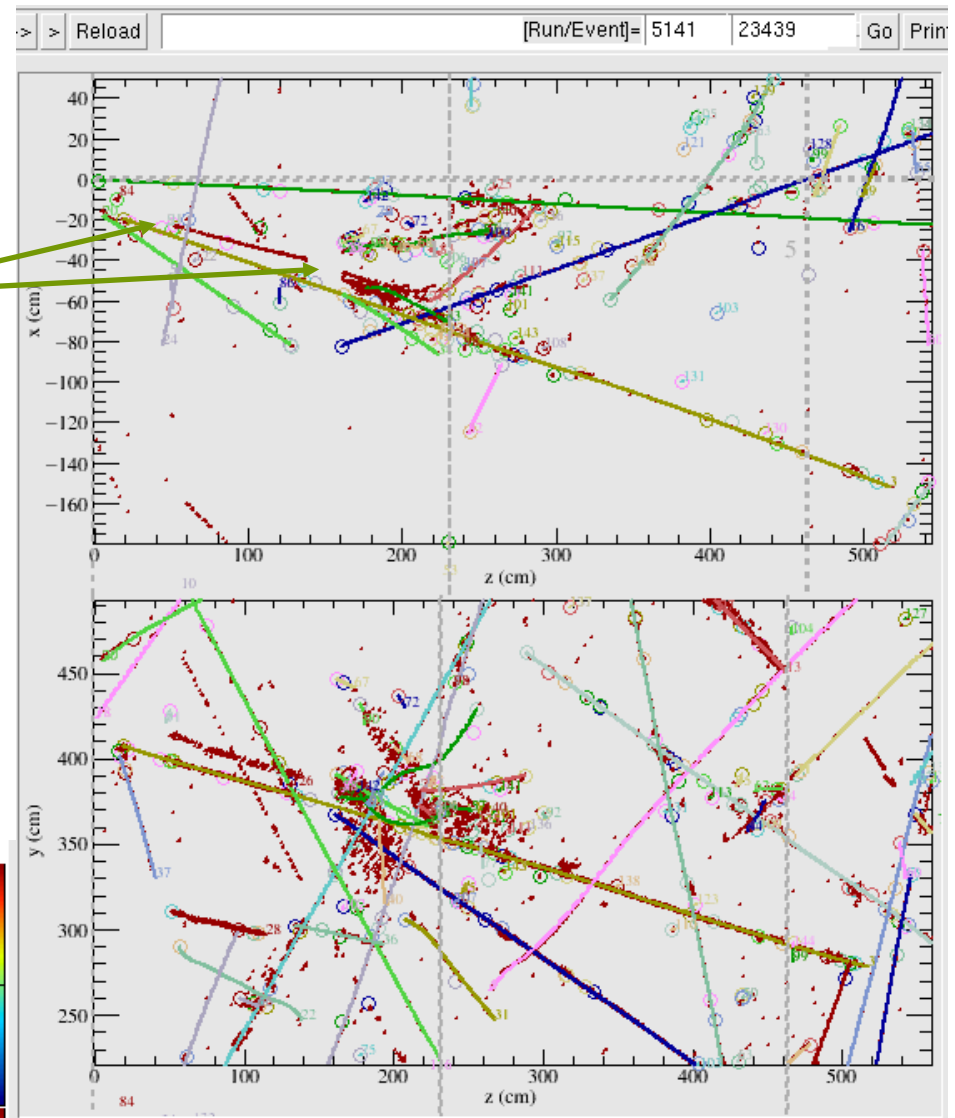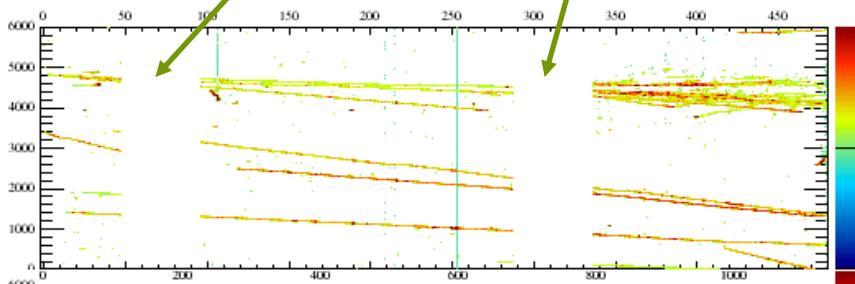- Nice electron shower with a few crossing cosmics

No Beam ID: Event 22974

- Not sure if there is a beam particle here... perhaps the mustard-colour track
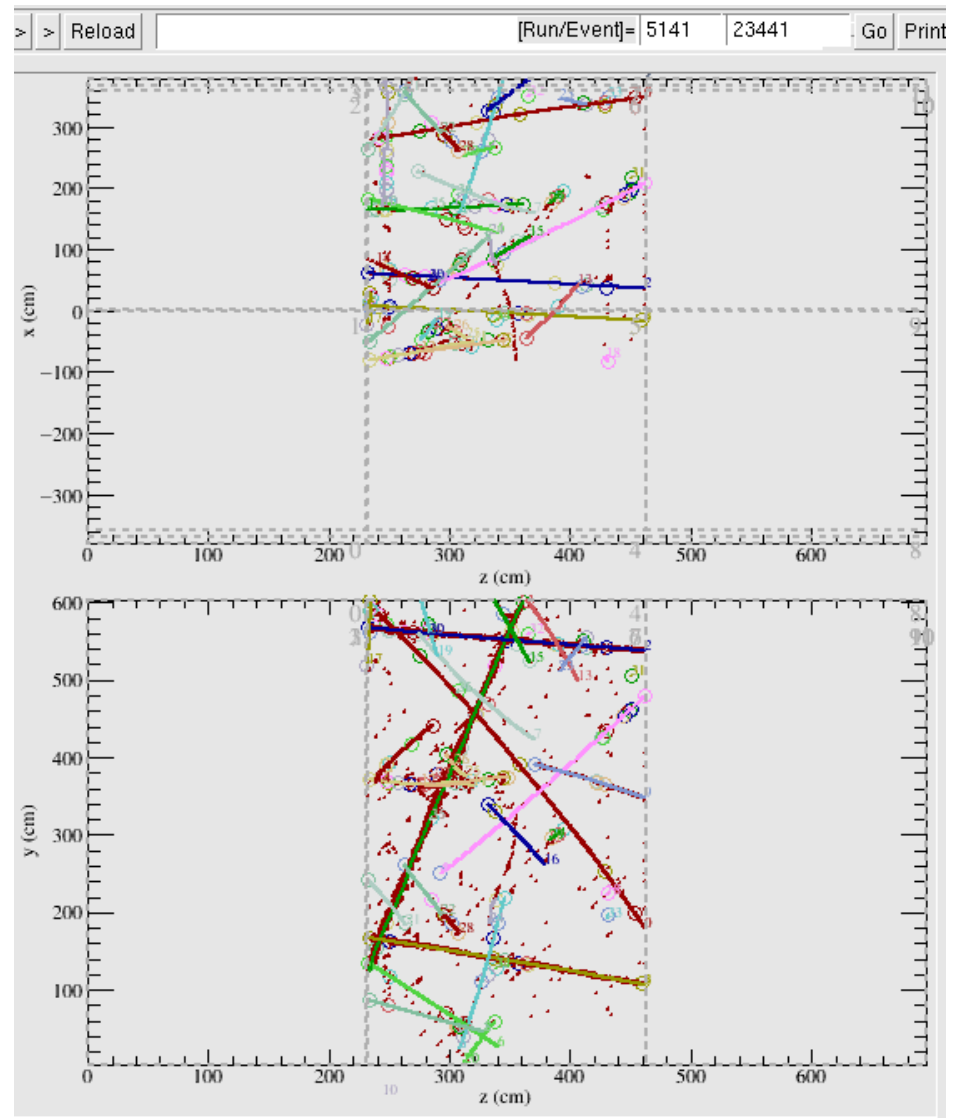
No Beam ID: Event 23439

- There are missing FEMBs in the front APA
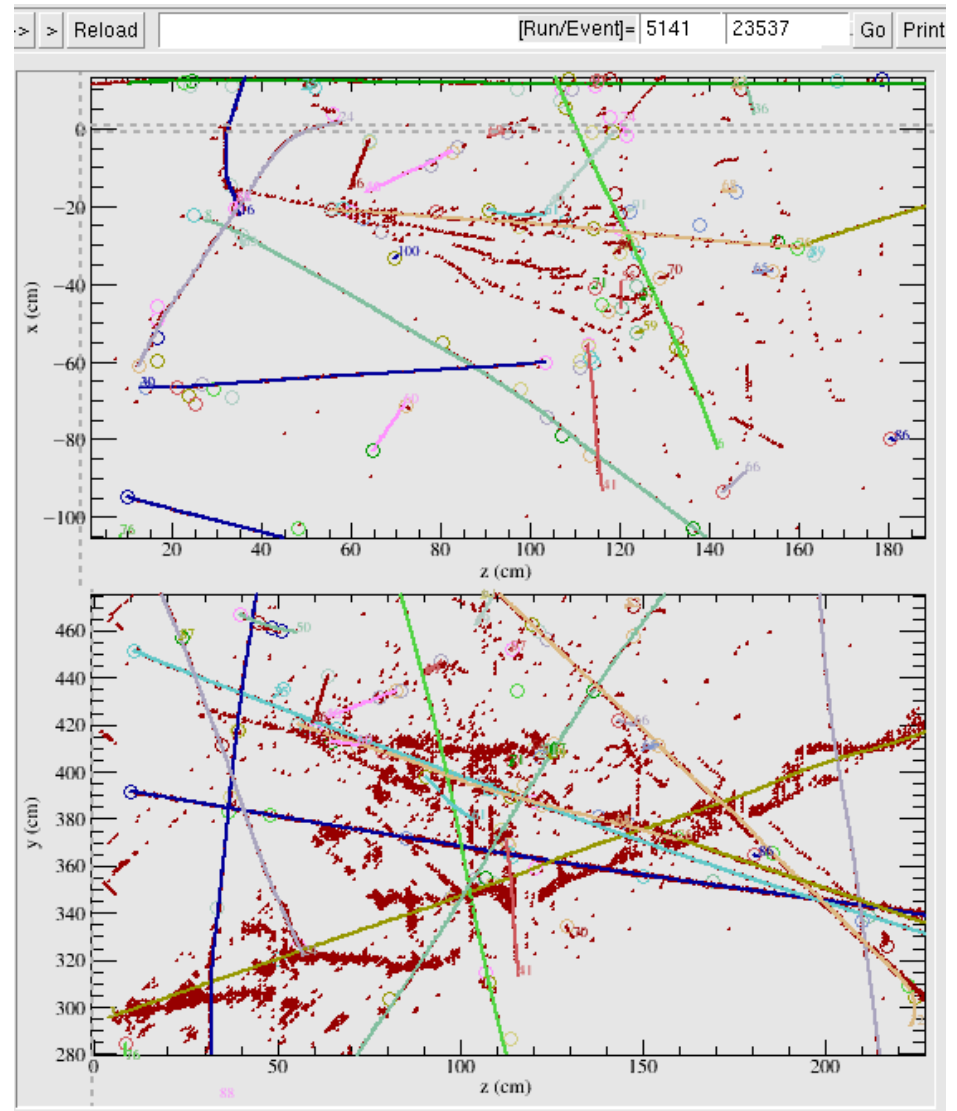
- See raw below

No Beam ID: Event 23441

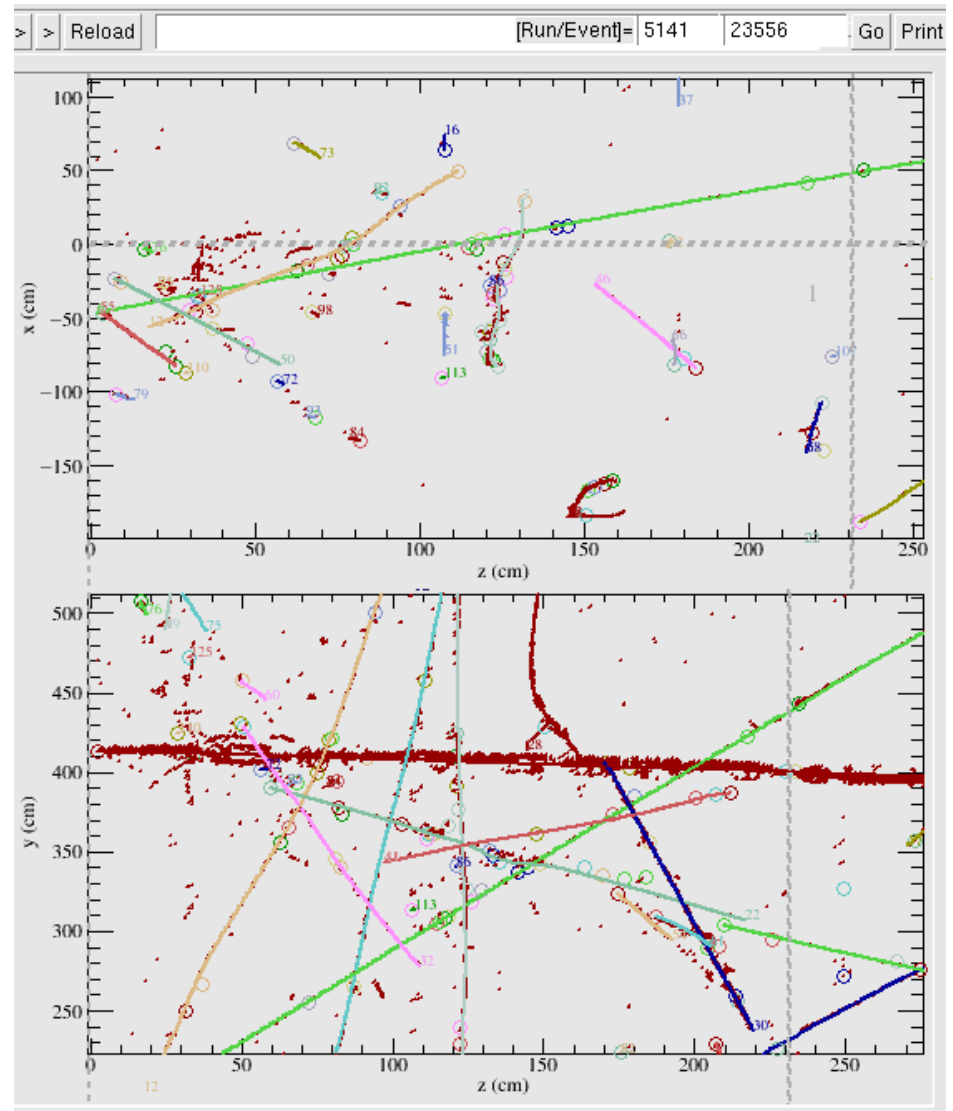- Only one APA decided to record this event

No Beam ID: Event 23537

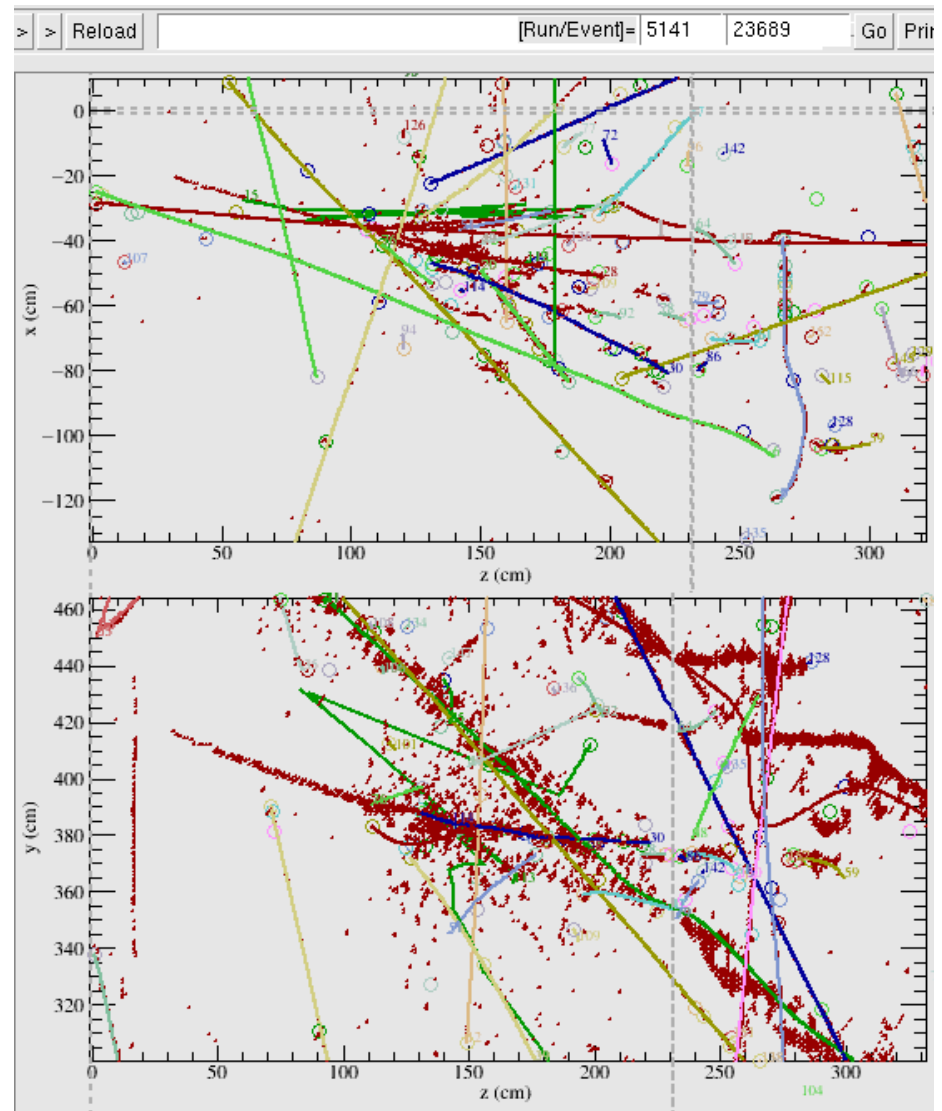- Looks like a nice pion in a bit of a messy environment

No Beam ID: Event 23556
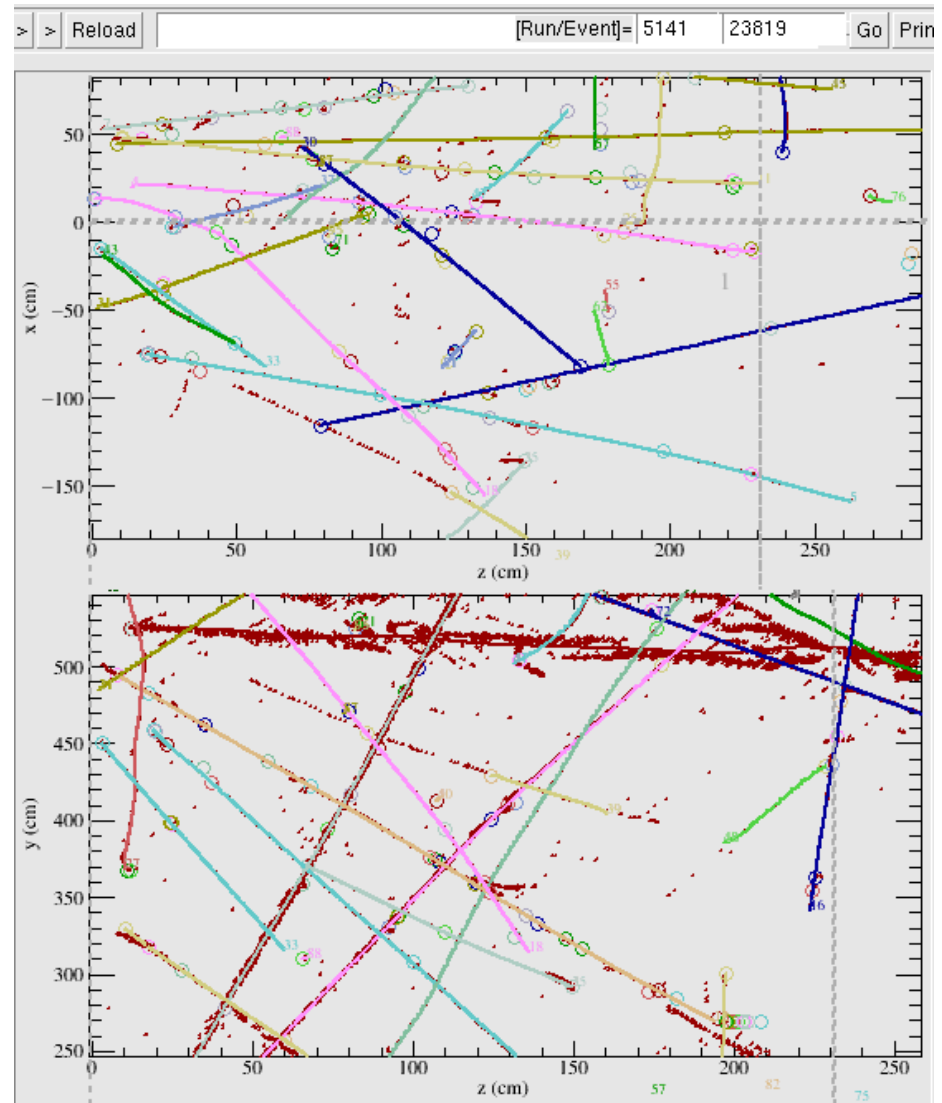
- No clear beam particle by my eye

No Beam ID: Event 23689

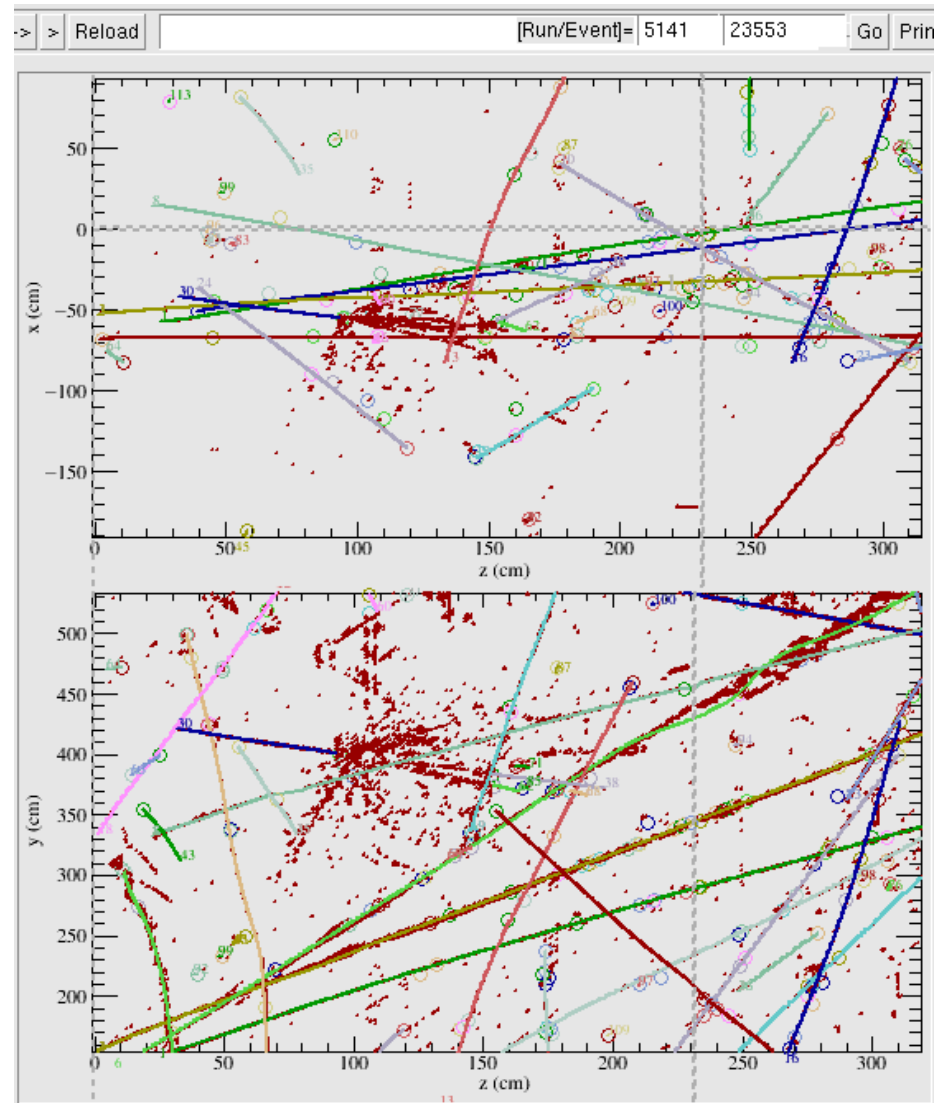- Beam track passes through quite a bit messy region

No Beam ID: Event 23553

- Not sure that I see a beam particle here

Non-Beam Trigger: Event 23553

- This event had no beam trigger but looks like a perfectly normal beam particle to me

Summary

- A total of 108 events were processed

- Pandora identified the beam particle in 66 of the 77 beam triggered events
  - Good for out-of-the-box performance!

- Two of the missed events were due to detector problems, and another four events didn't appear to have a clear beam particle

- Perhaps one could then say Pandora got 66 of 71 correct?