# Cosmics Simulation Updates

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May 10, 2024
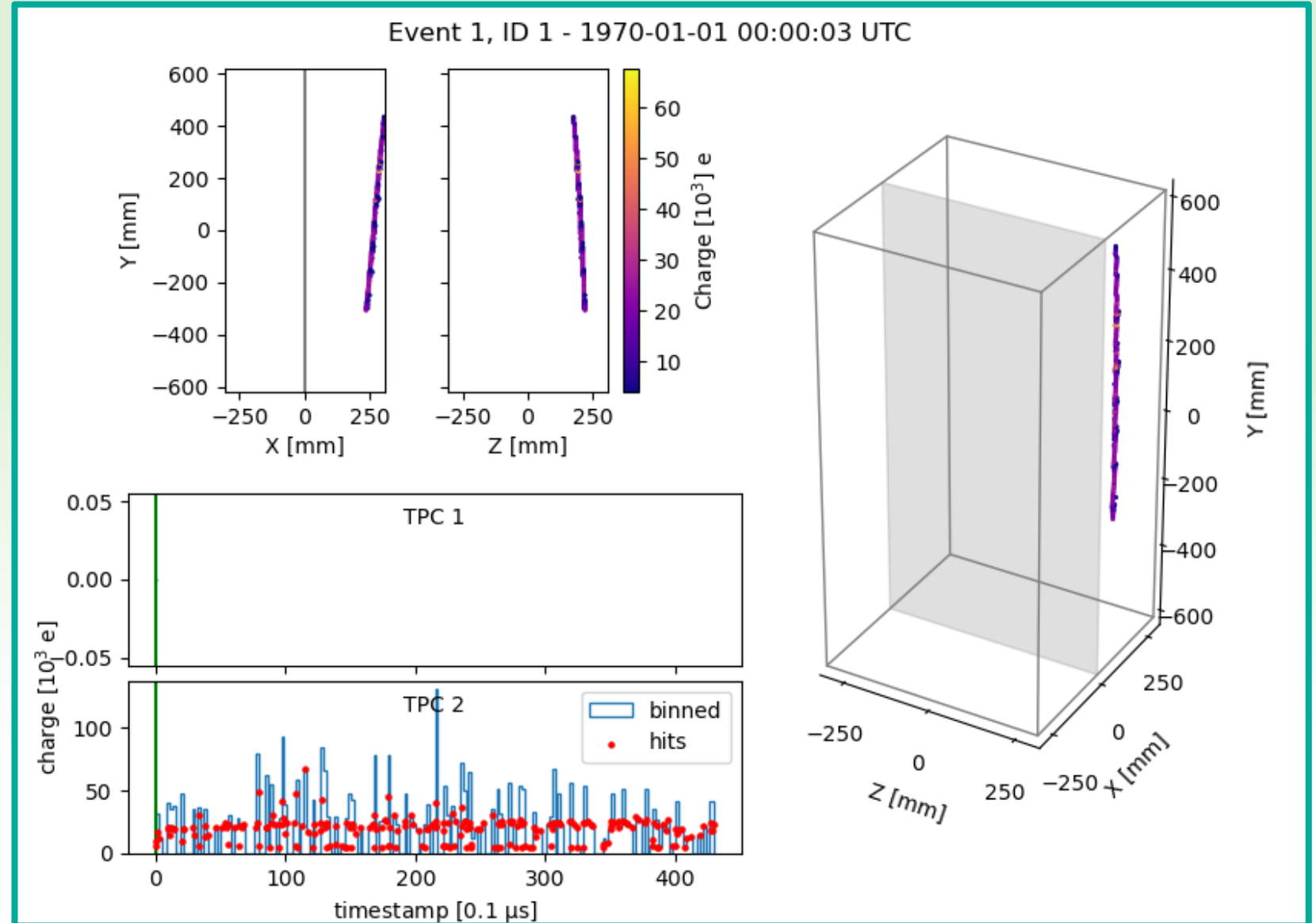
# Progress

- **Tile mapping broken track issue** is potentially more complicated than expected
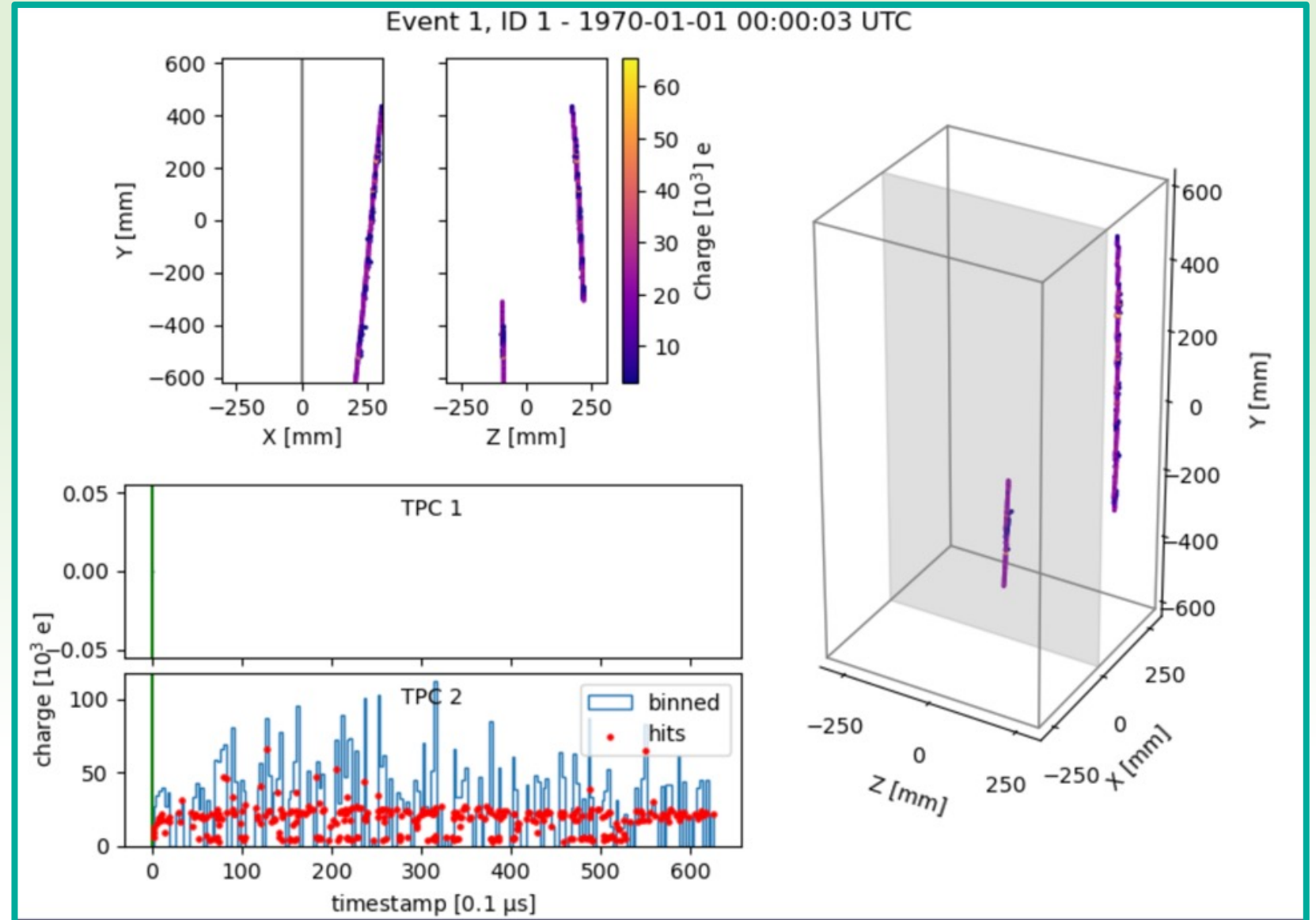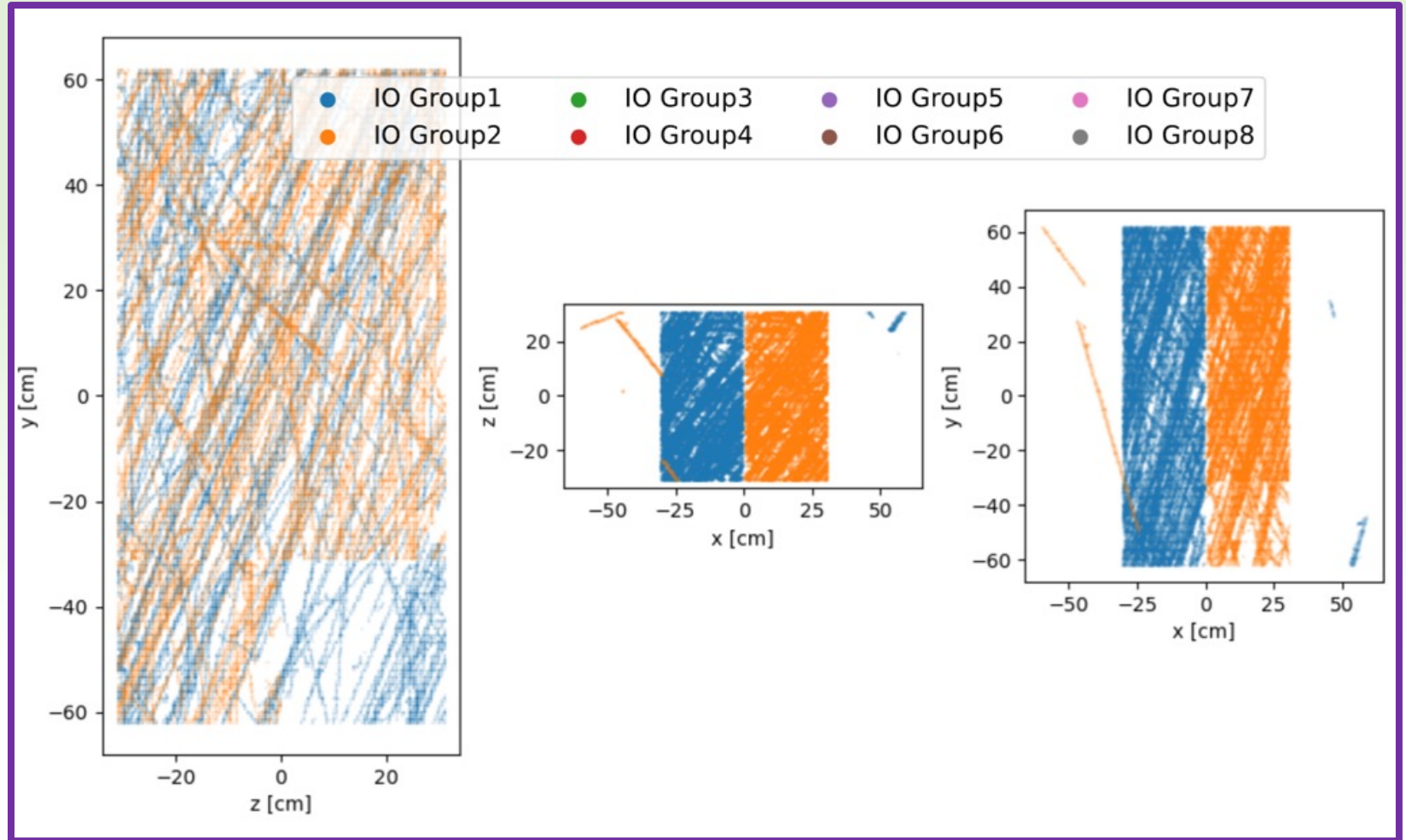
# Progress

- **Tile mapping broken track** issue is potentially more complicated than expected
    - Swapping tile 7/8 matching in geometry files doesn't help (**different TPC**)
    - Swapping tiles 15/16 **removes part of track** (expected due to tile 16 being disabled?)
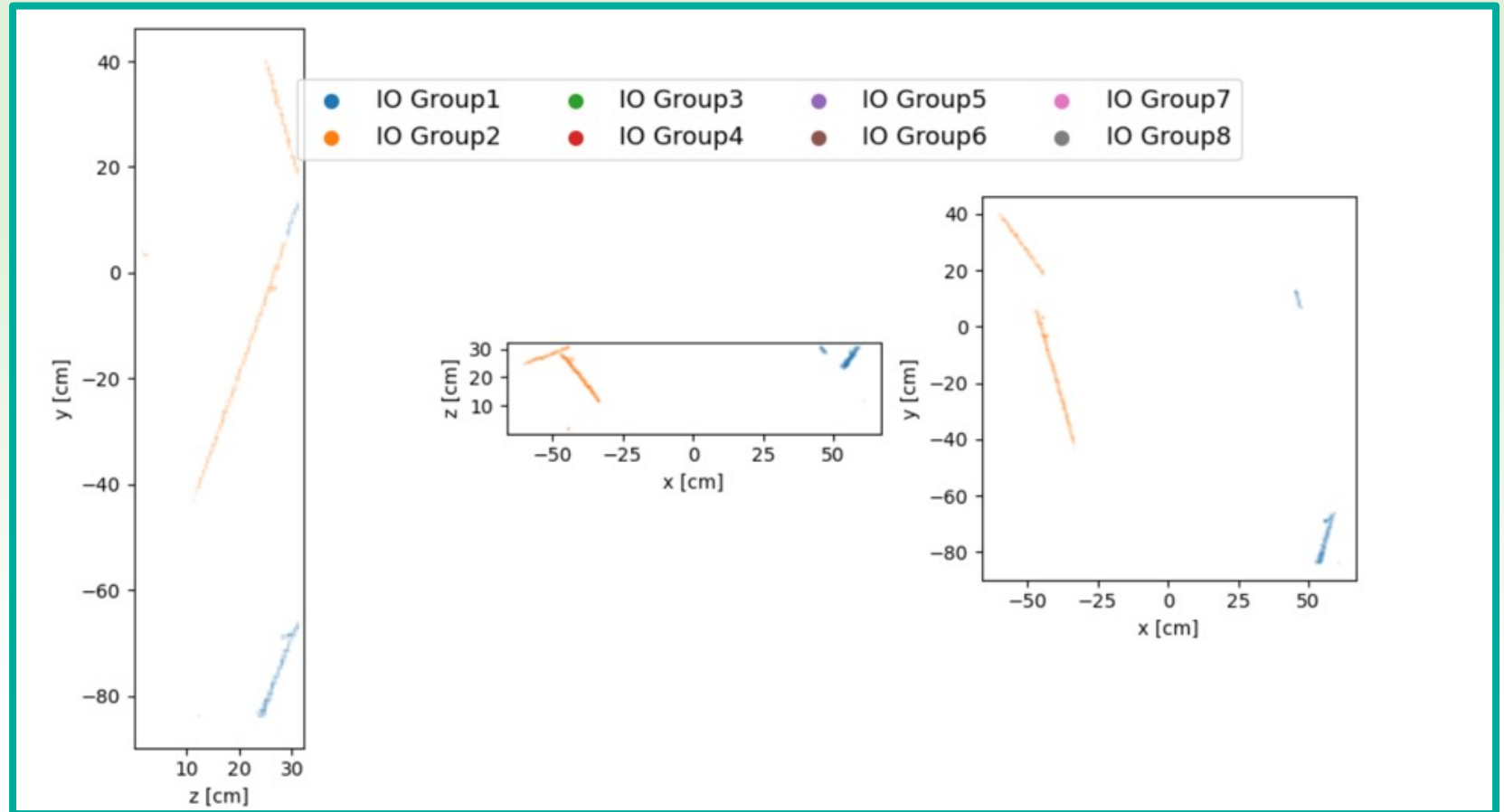
# Things I am looking into

- What is happening with these tracks in x?
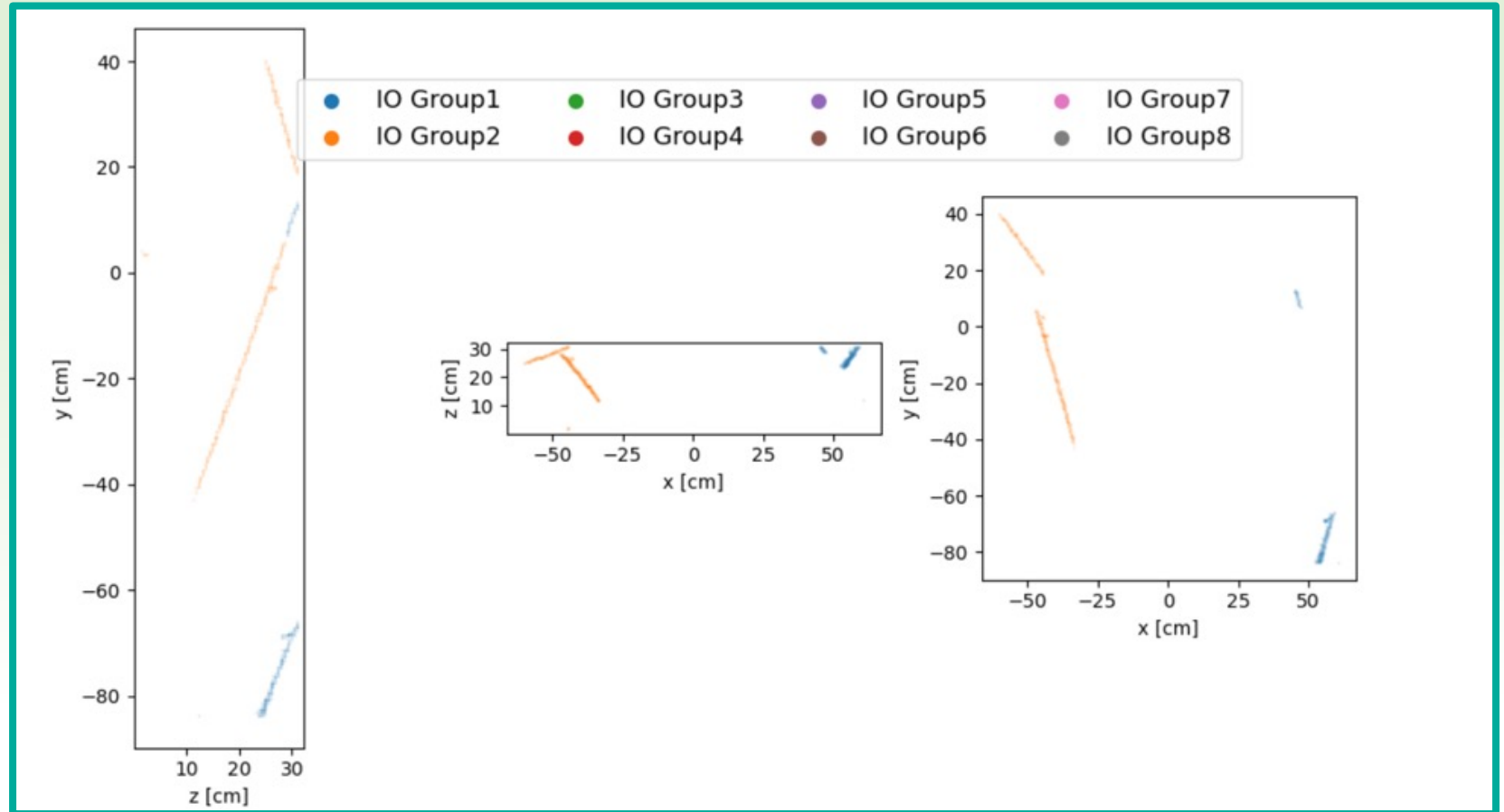
  - Last time, suggestion of event building issue

# Things I am looking into

- What is happening with these tracks in x?
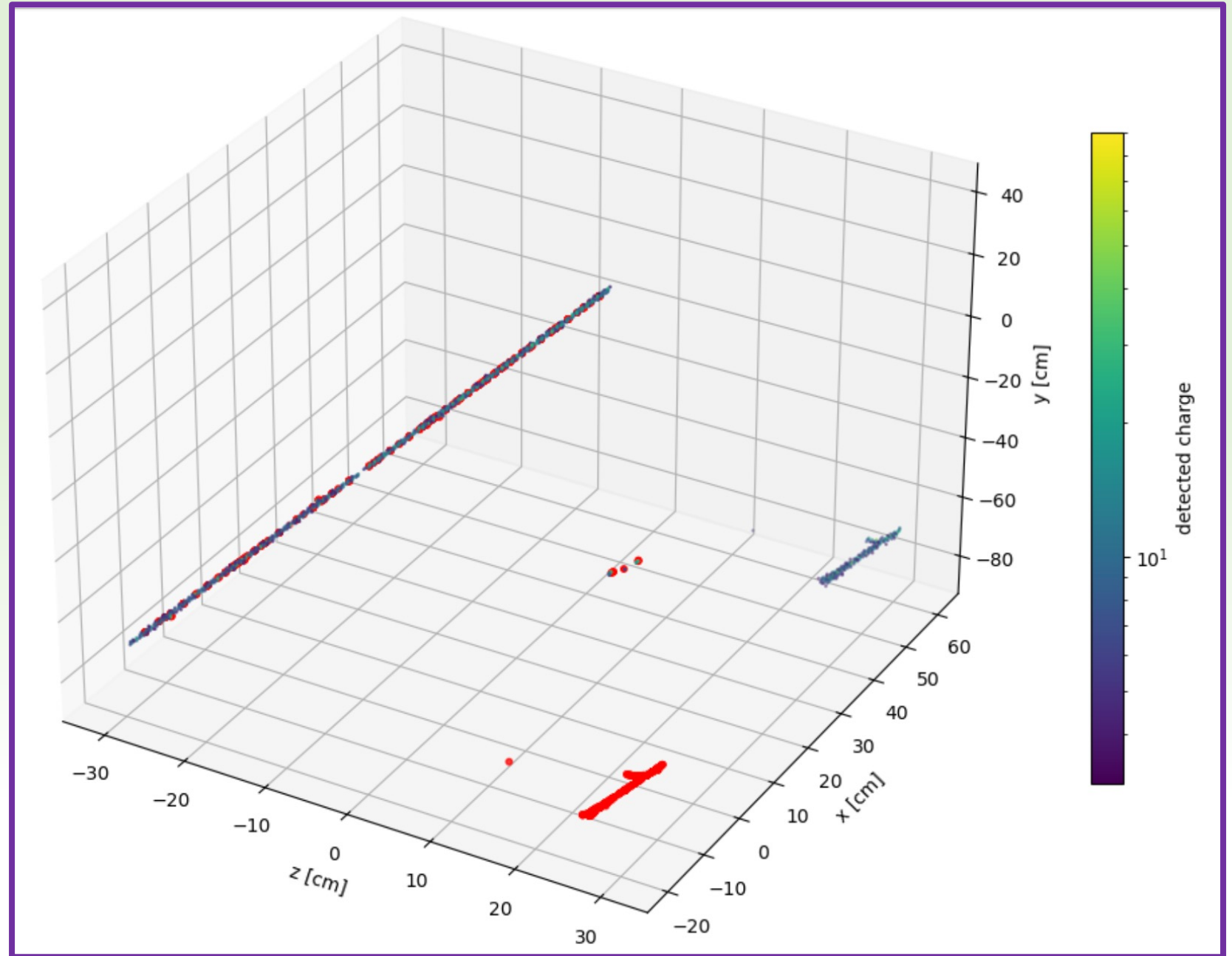  - **First, how many tracks?**

# Things I am looking into

- What is happening with these tracks in x?
  - First, how many tracks?
  - **Second, how many events?**
    - **Answer = 3**

# Ex. #1

- What is happening with these tracks in x?
  - First, how many tracks?
  - Second, how many events?
  - **Third, look at event true vs. reco info**

# Ex. #1

- What is happening with these tracks in x?
  - First, how many tracks?
  - Second, how many events?
  - **Third, look at event true vs. reco info**

# Ex. #2

- What is happening with these tracks in x?
  - First, how many tracks?
  - Second, how many events?
  - **Third, look at event true vs. reco info**
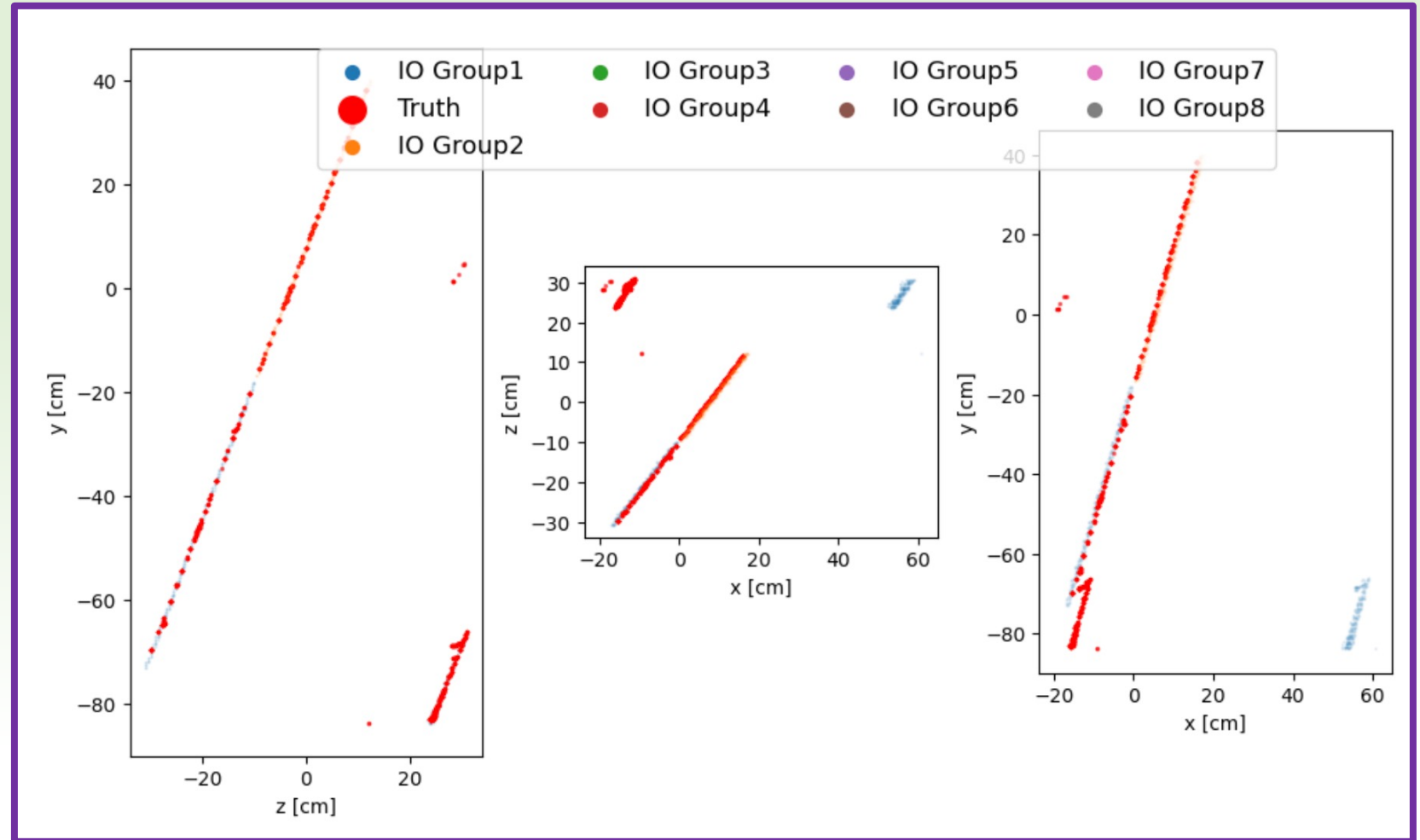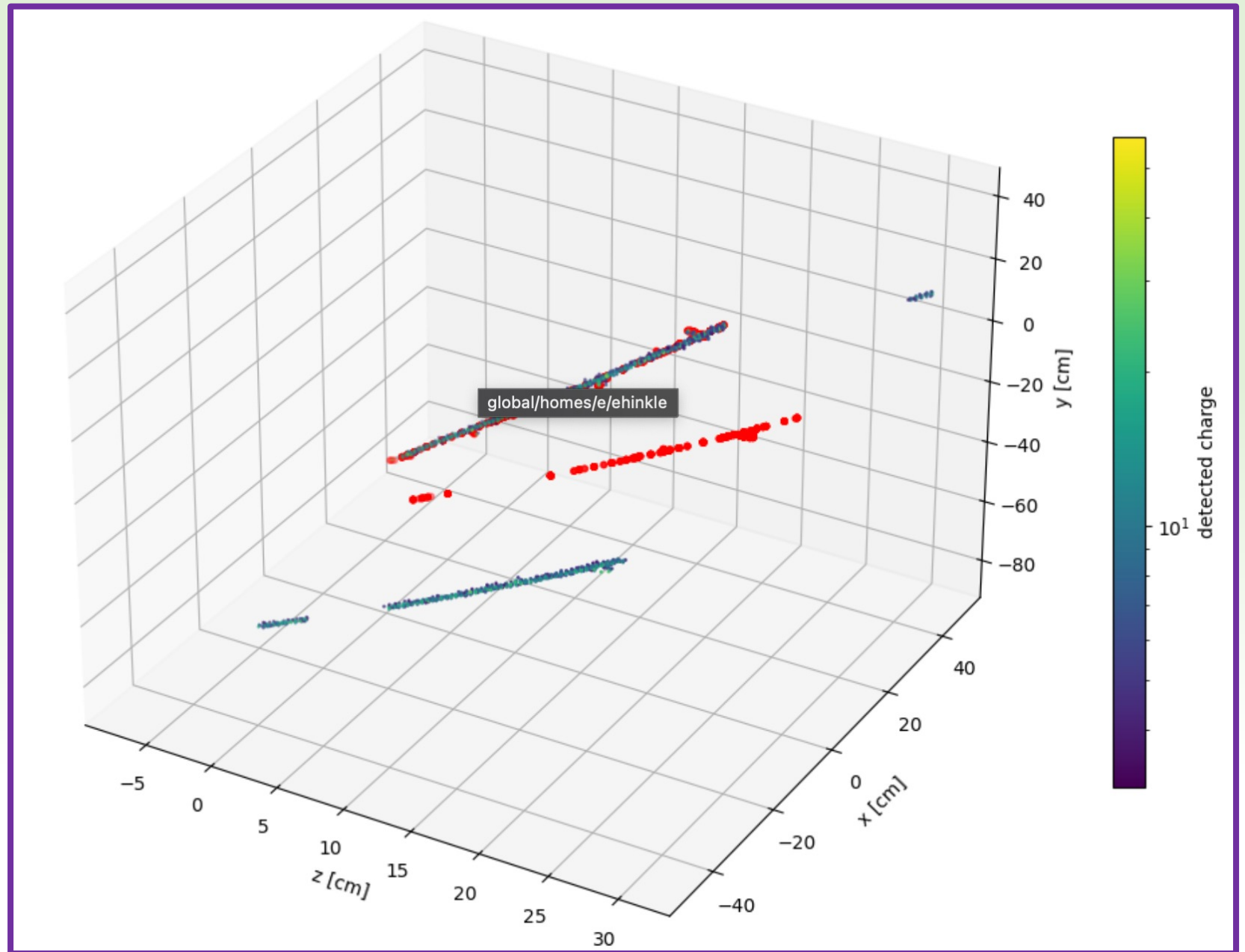


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# Ex. #2

- What is happening with these tracks in x?
  - First, how many tracks?
  - Second, how many events?
  - **Third, look at event true vs. reco info**

# Ex. #3

- What is happening with these tracks in x?
  - First, how many tracks?
  - Second, how many events?
  - **Third, look at event true vs. reco info**

# Ex. #3

- What is happening with these tracks in x?
  - First, how many tracks?
  - Second, how many events?
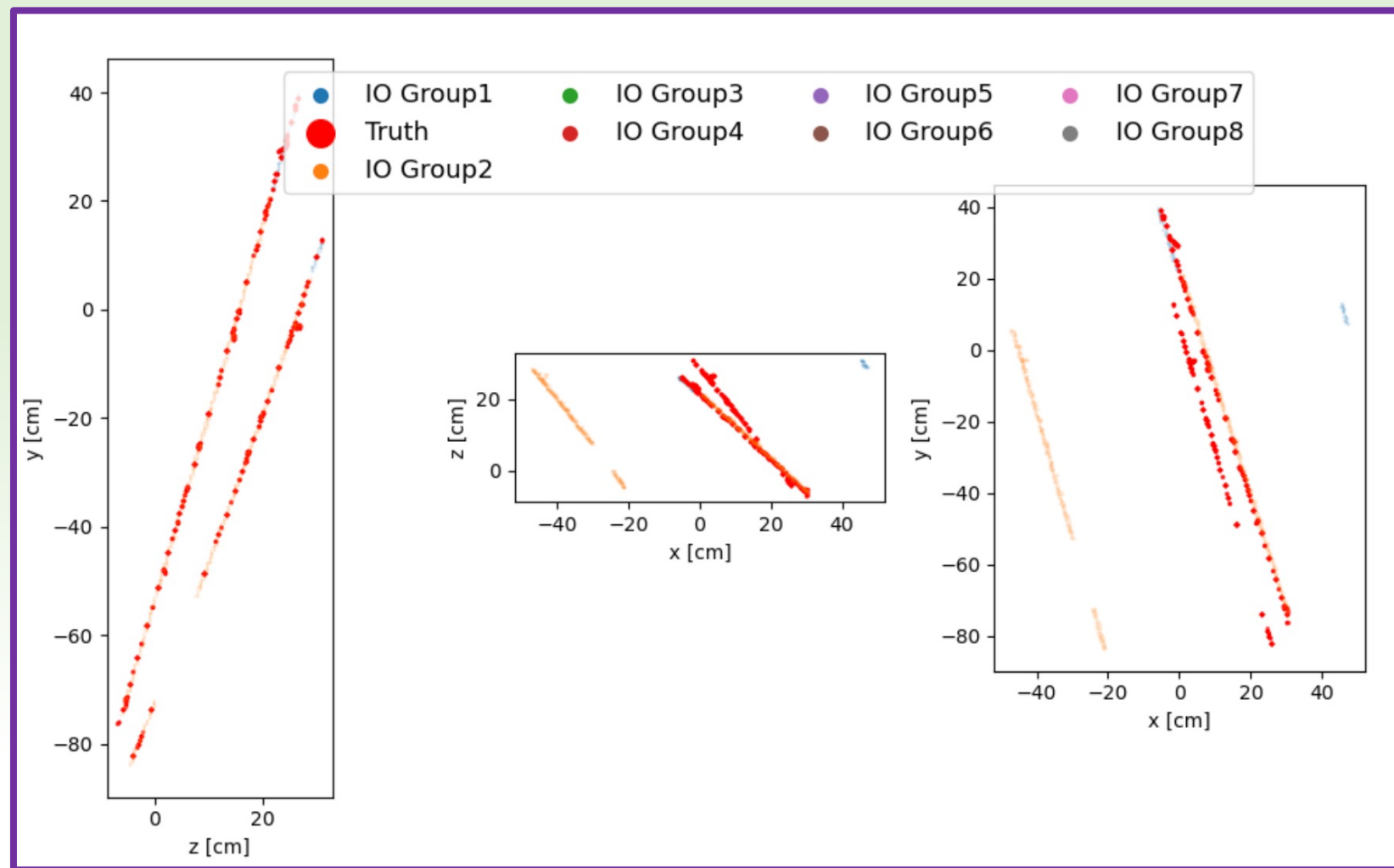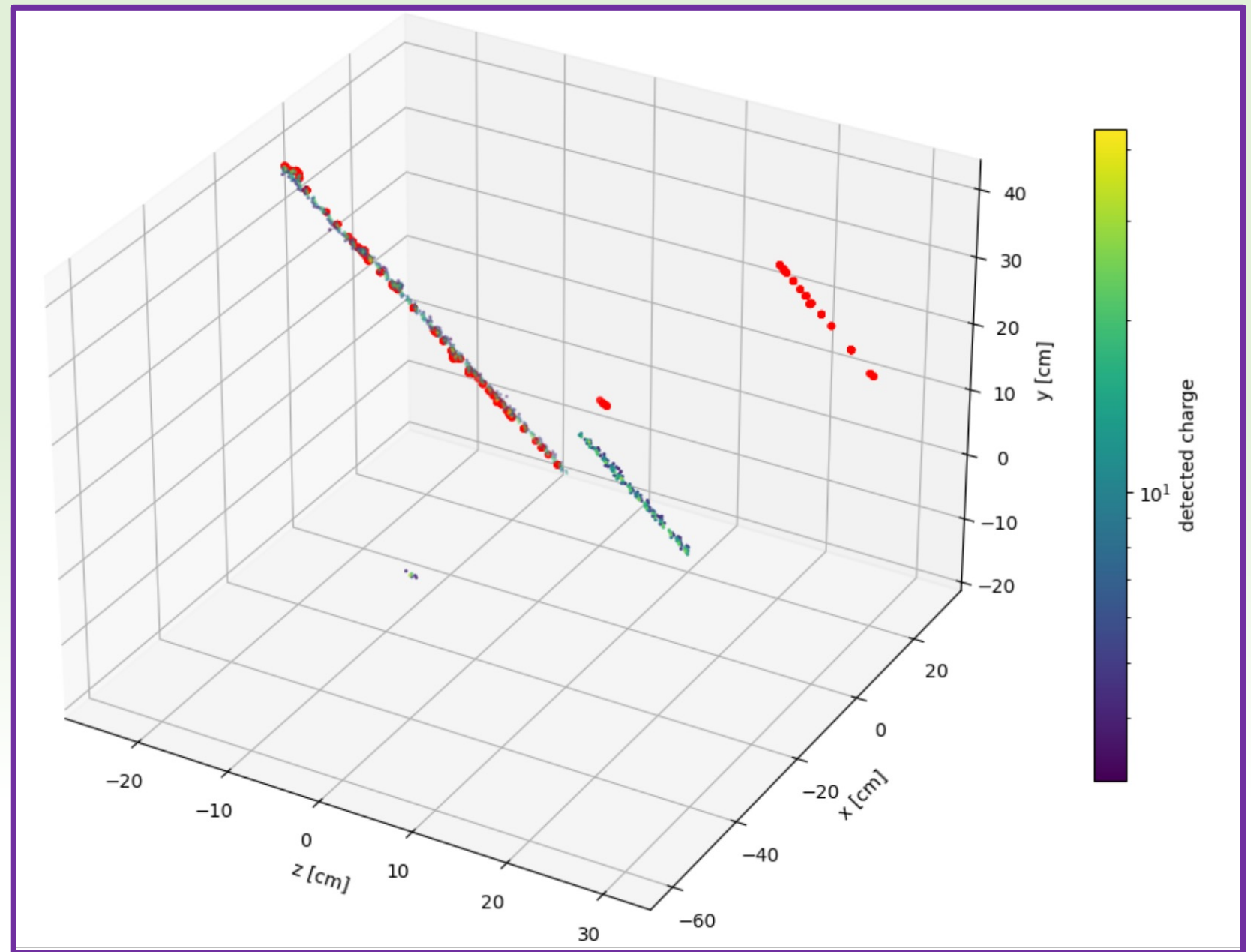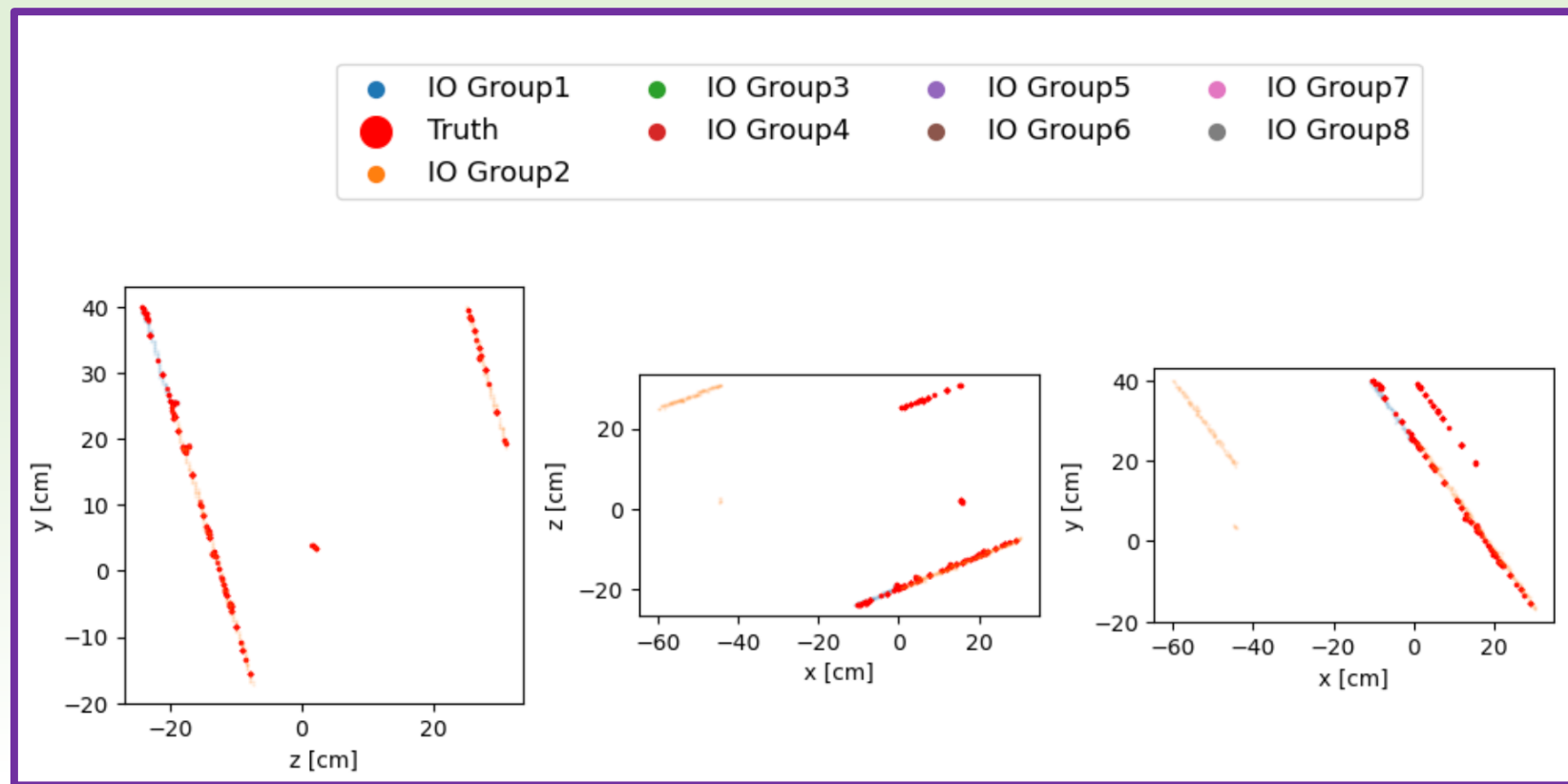  - **Third, look at event true vs. reco info**

# Initial Thoughts on Drift Direction Reco Issue

- **Different x-displacements of true vs. reco** for each affected event (observed displacements are approximately 45, 50, and 60 cm i.e. 281.25, 312.5, and 375 microseconds)
  - As a reminder, drift is ~30 cm = ~187.5 us
- Issue is **not isolated to a single IO Group**
- Effect sometimes causes hits to be **reconstructed on the opposite side of the cathode** from their true TPC/IO Group
- **Things to look into:** true event timing, different event building methods

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# To-Dos

❑ **Look into event building/unexpected hit X values**

    ❑ Check event timing

    ❑ Check if/how event building method changes hit/event reconstruction

❑ **Double check tile mapping "fix"**

❑ Try increasing event rate further to see if we see more events with multiple tracks

❑ Decide if we want to **merge 2x2_cosmics repo (+ history) into general 2x2_sim repo**

# Fun Addendum

- Adding light to event display (seems like TPCs are swapped in each module?)