

# SVT Calibration with 2019 FEEs

---

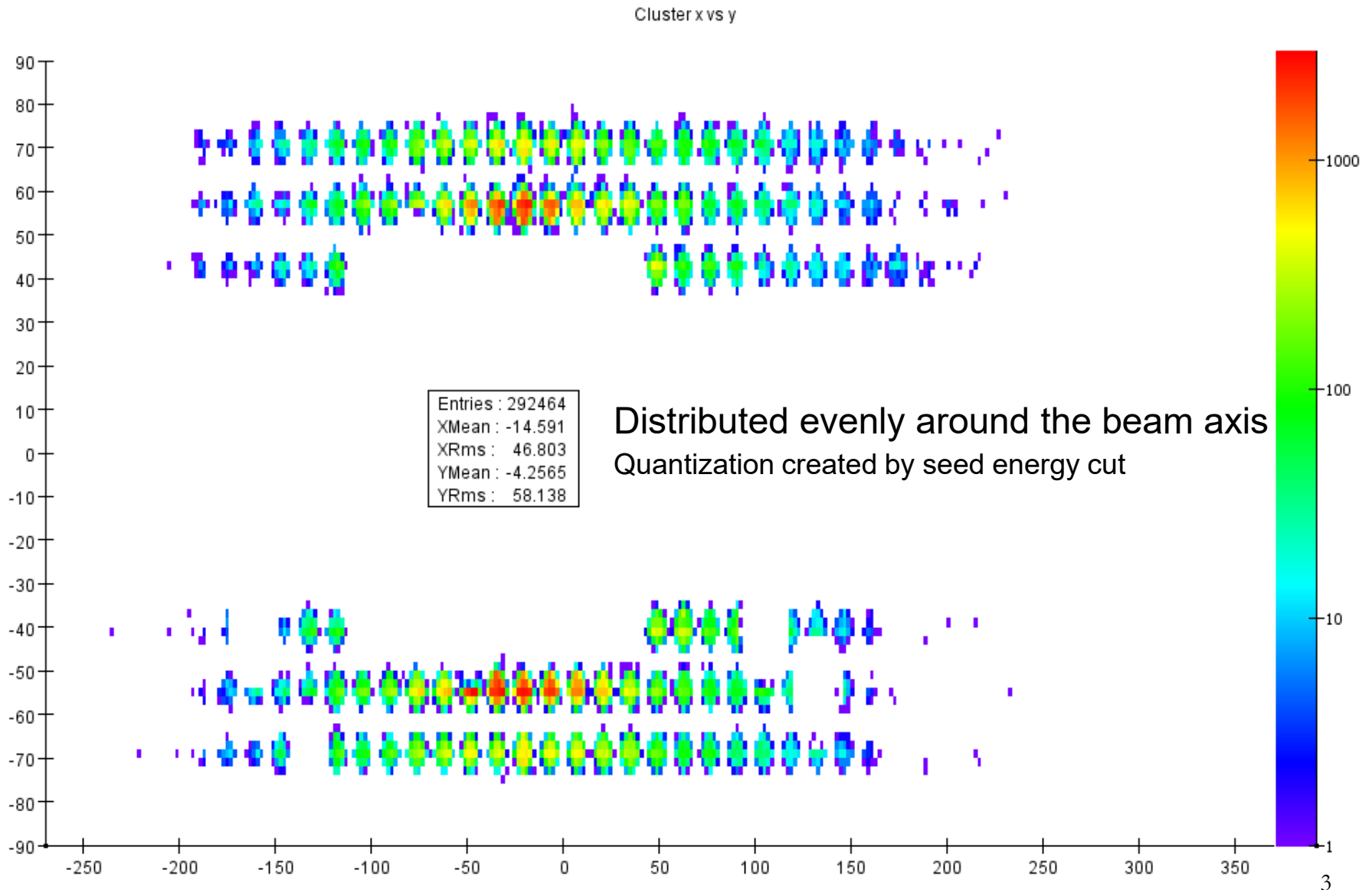
Norman Graf (SLAC)  
Data Reconstruction Meeting  
May 4, 2021

---

# SVT Calibration with Data

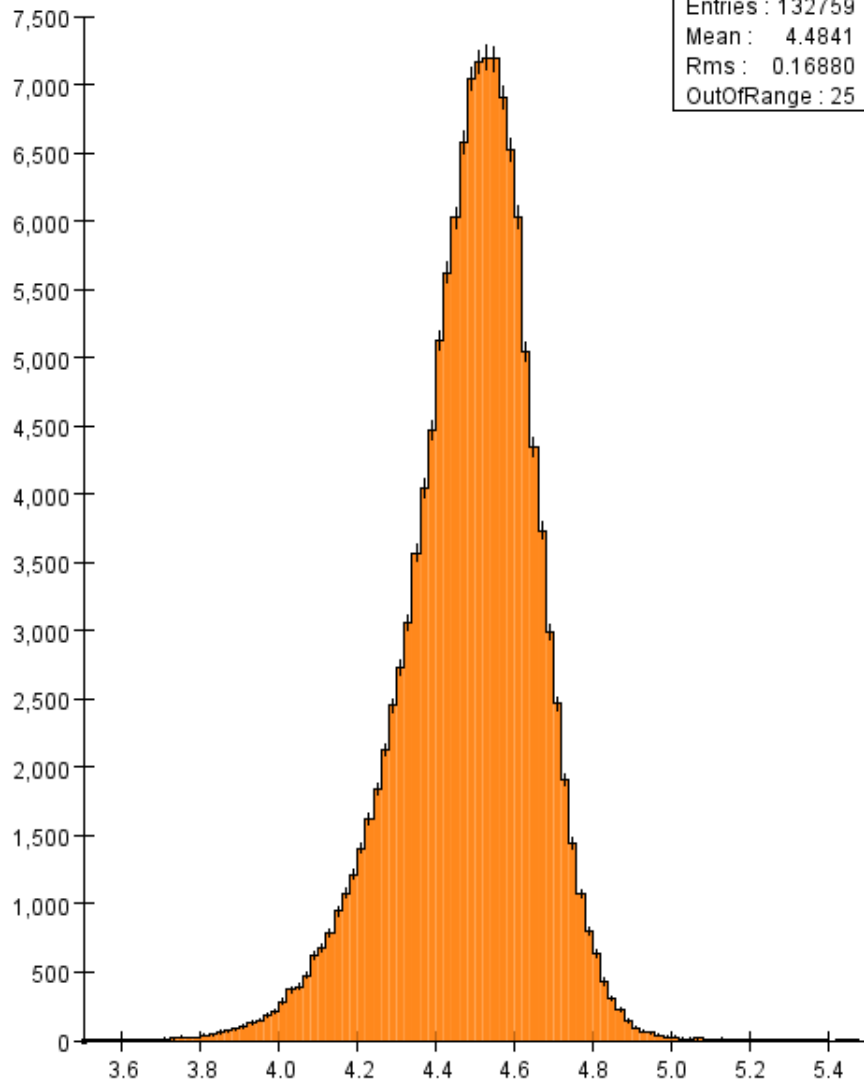
- Data Samples
  - FEE runs 103 & 104
- Reconstruction Version
  - hps-java 5.1 snapshot
- Detector
  - HPS\_PhysicsRun2019-v2-FEE-Pass0
- Skim events containing a single high-energy cluster in the fiducial region of the ECal with seed energy  $> 3.0\text{GeV}$  “super-fiducial”
- Provides 292464 clean FEE candidates

# FEE Cluster Distribution

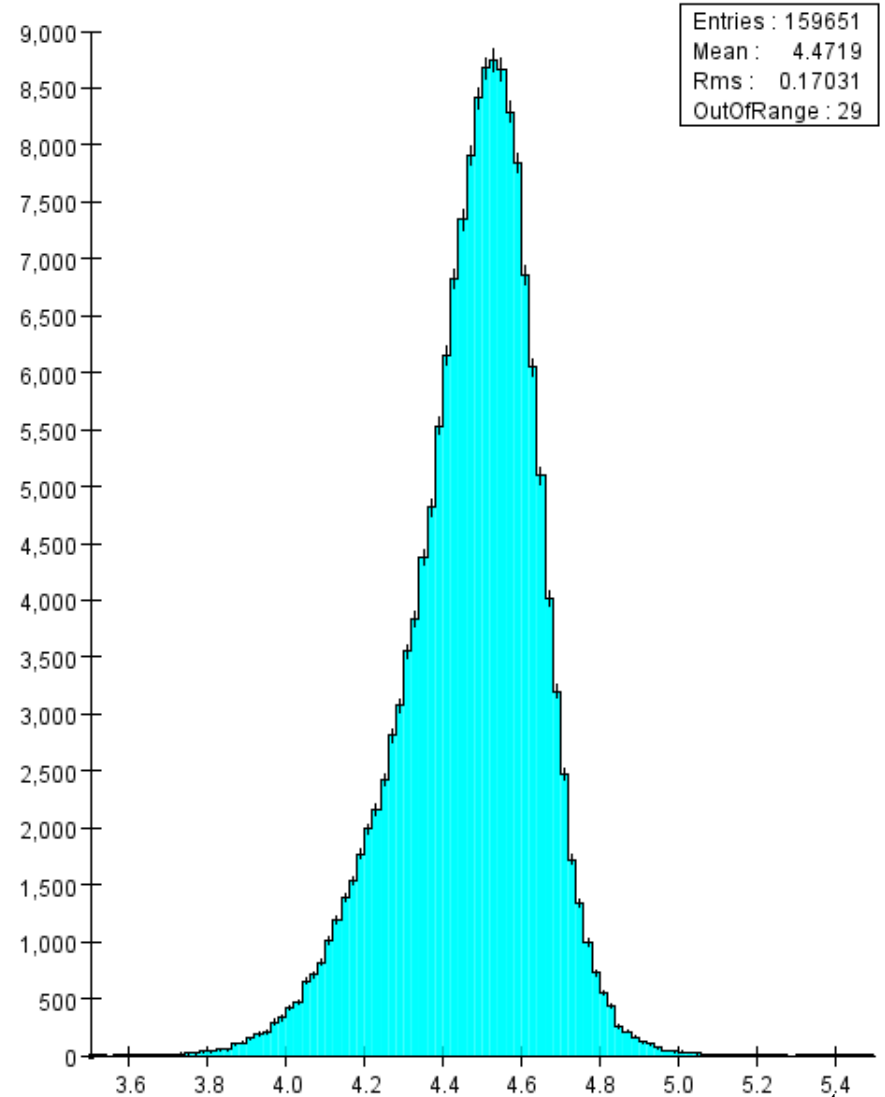


# FEE Cluster Energy

Top cluster energy

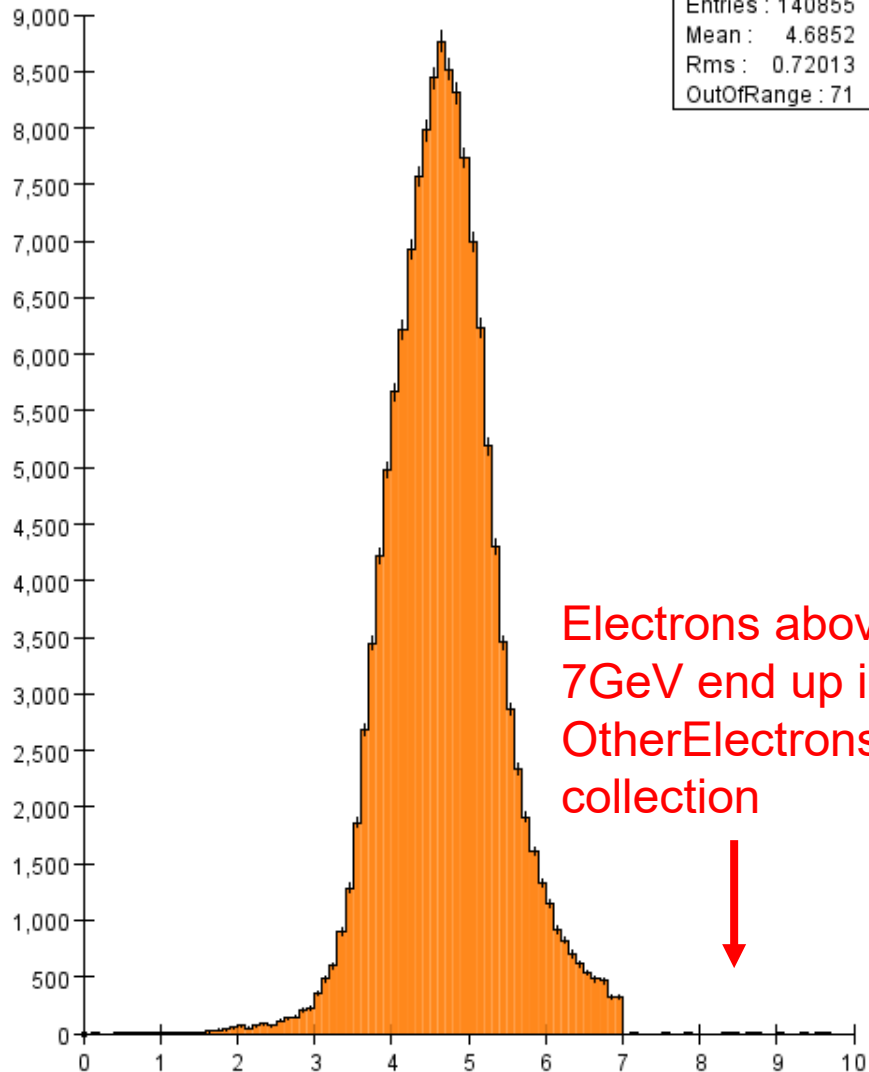


Bottom cluster energy

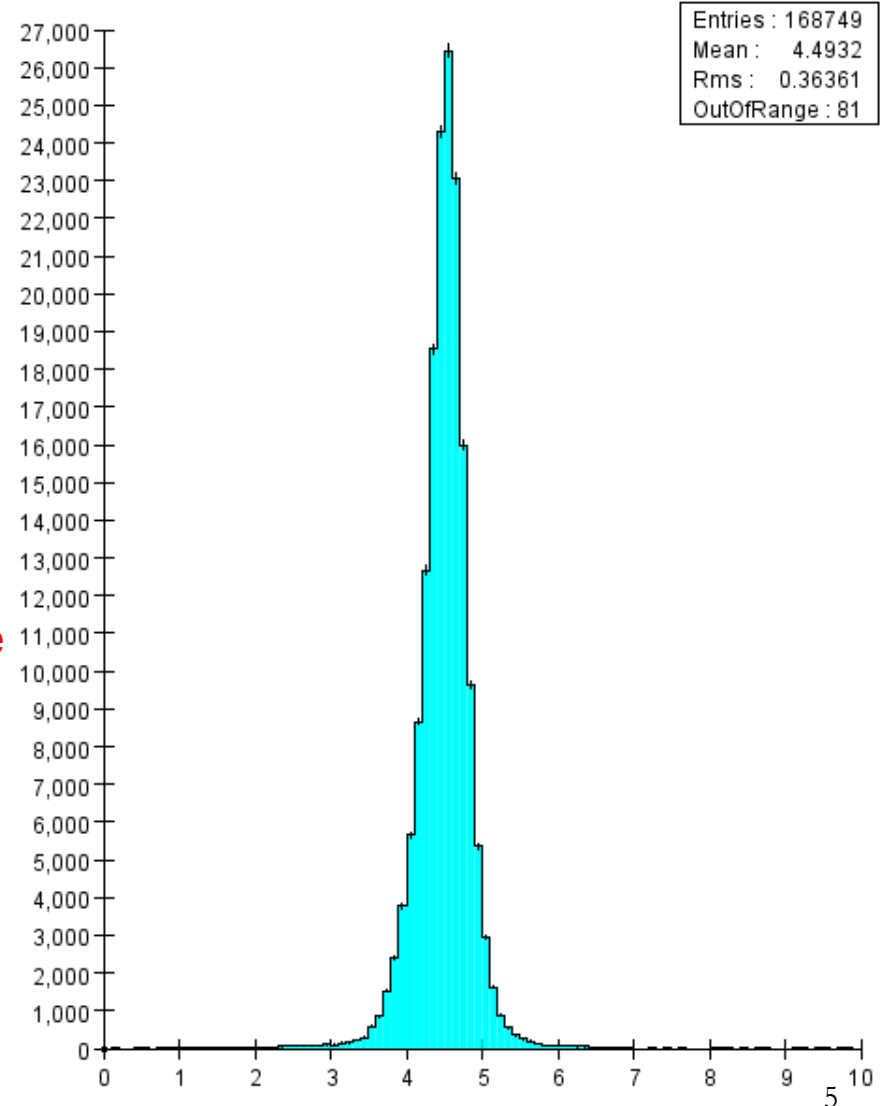


# FEE Track Momenta (GBL)

Track momentum top

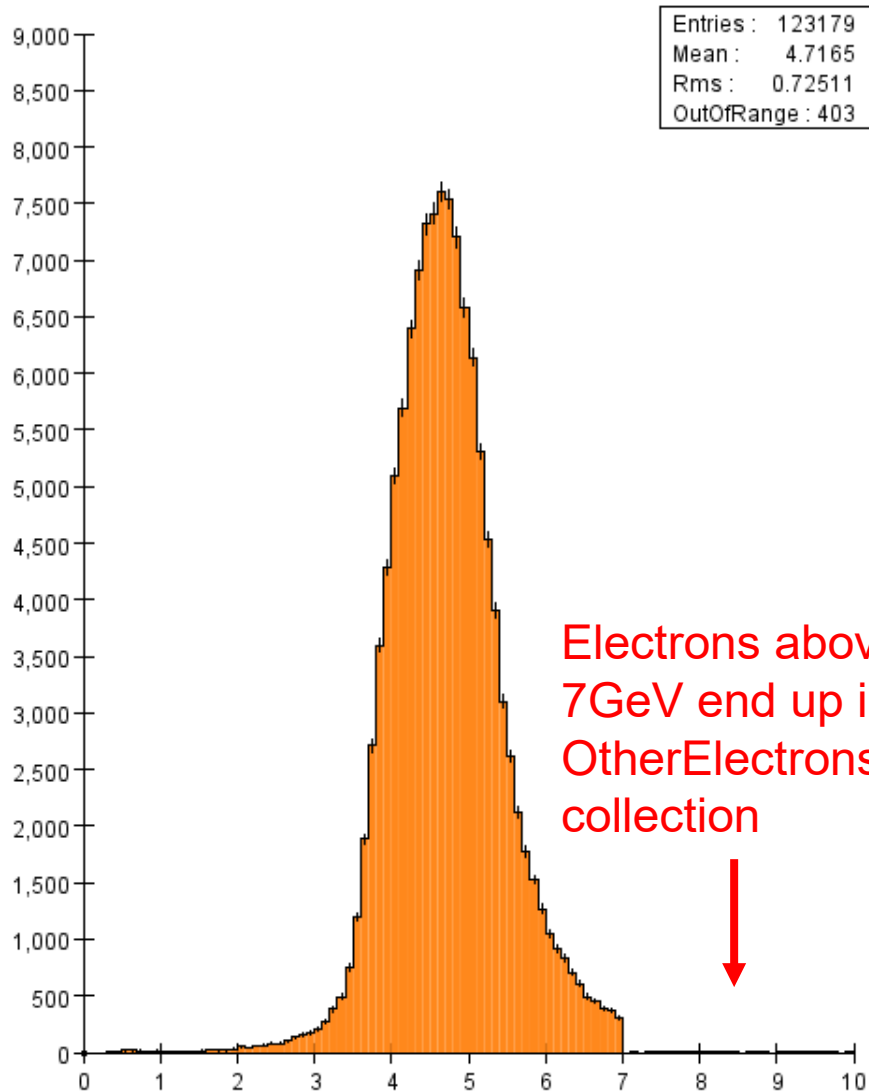


Track momentum bottom

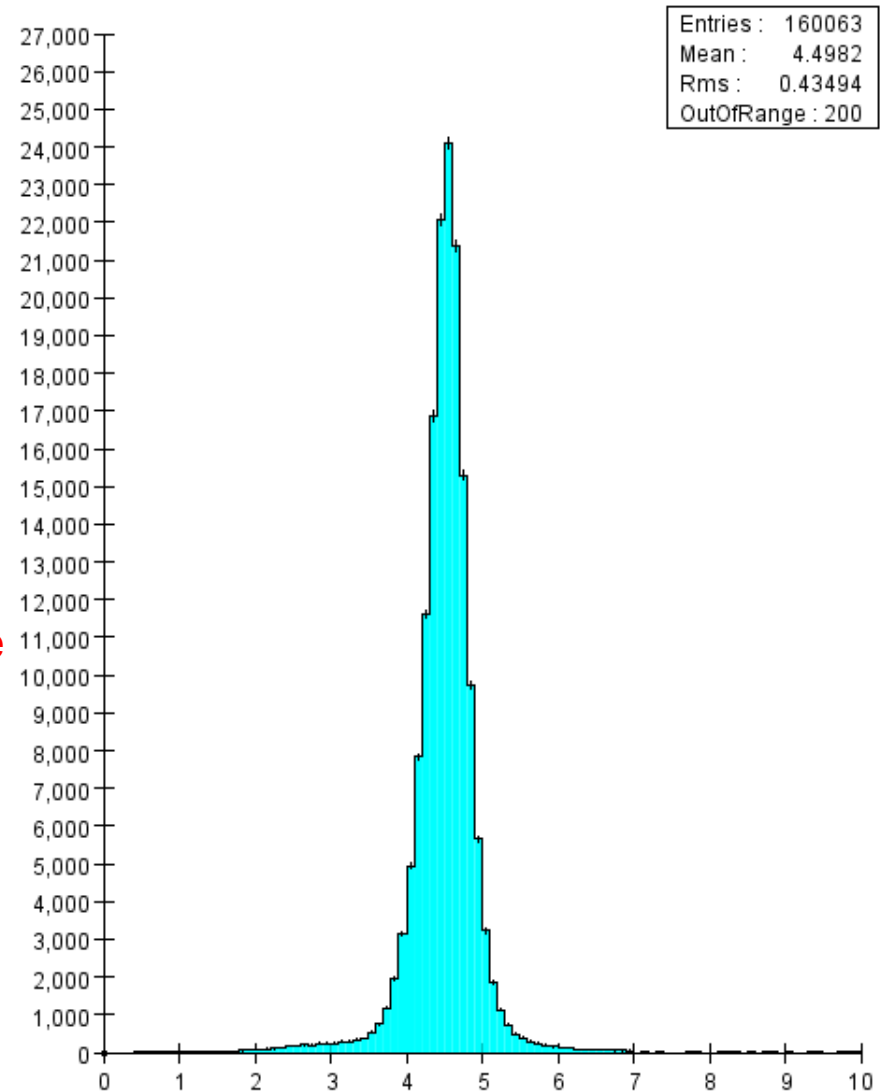


# FEE Track Momenta (KF)

Track momentum top



Track momentum bottom

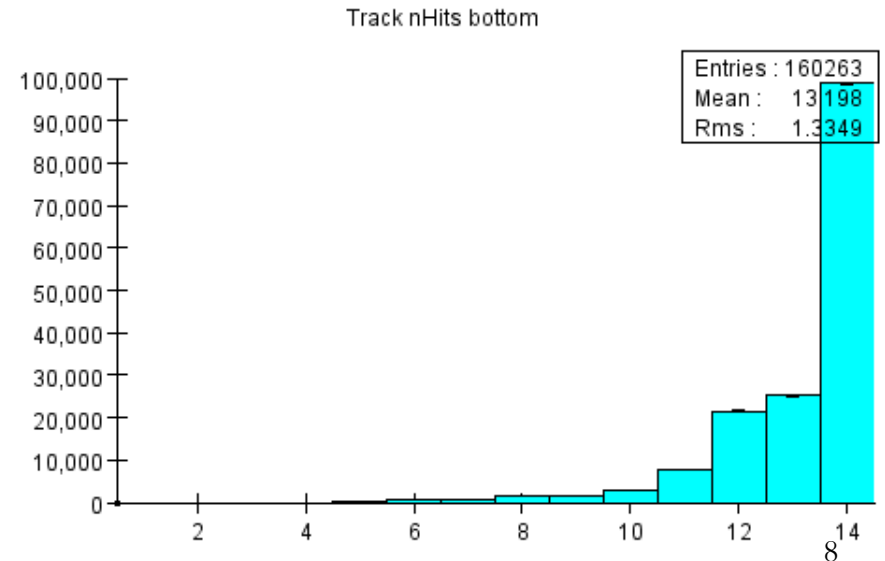
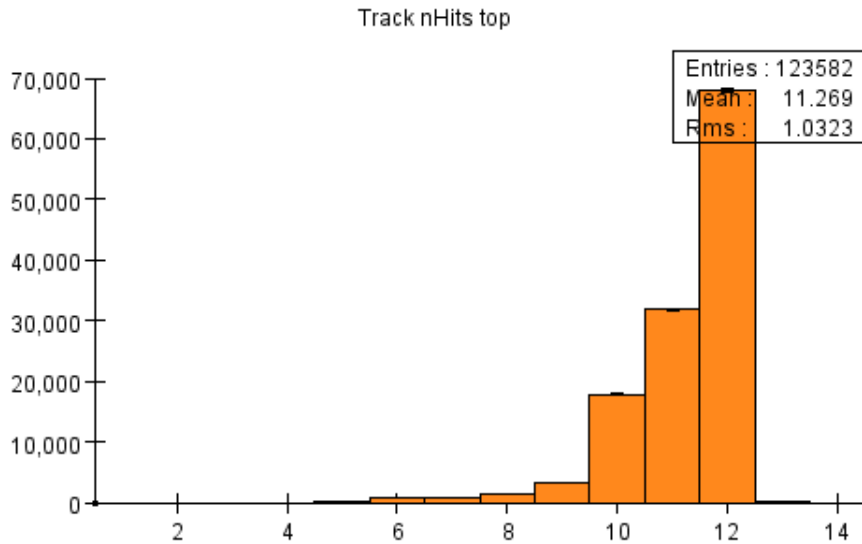
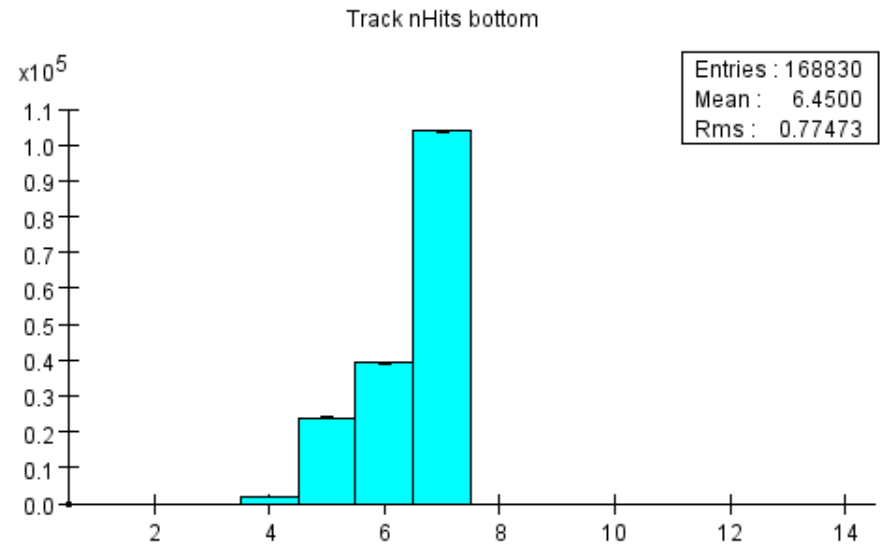
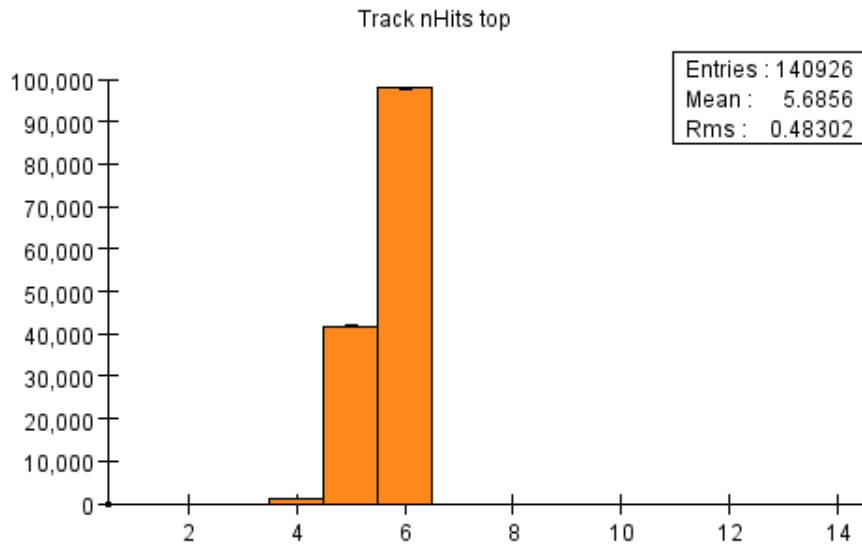


---

# What's up with the top SVT?

- SVT momentum is clearly being measured much more poorly in the top than the bottom.
- Are the sensors simply that much more misaligned?
- Are there some larger global issues that we are missing?
- Are there some systematics we are overlooking?

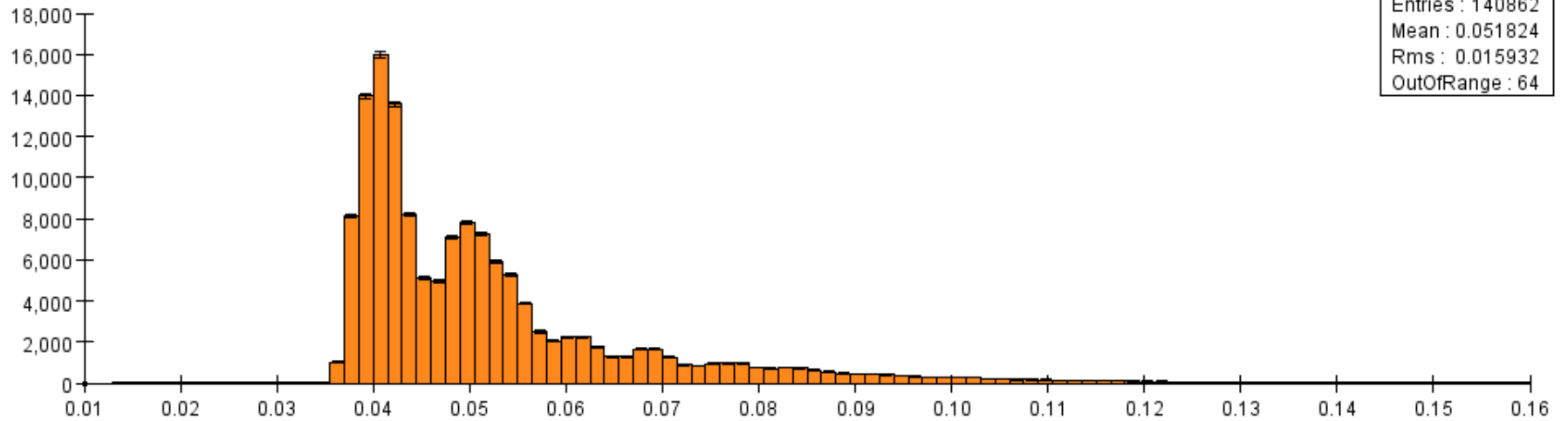
# Number of Hits on Tracks



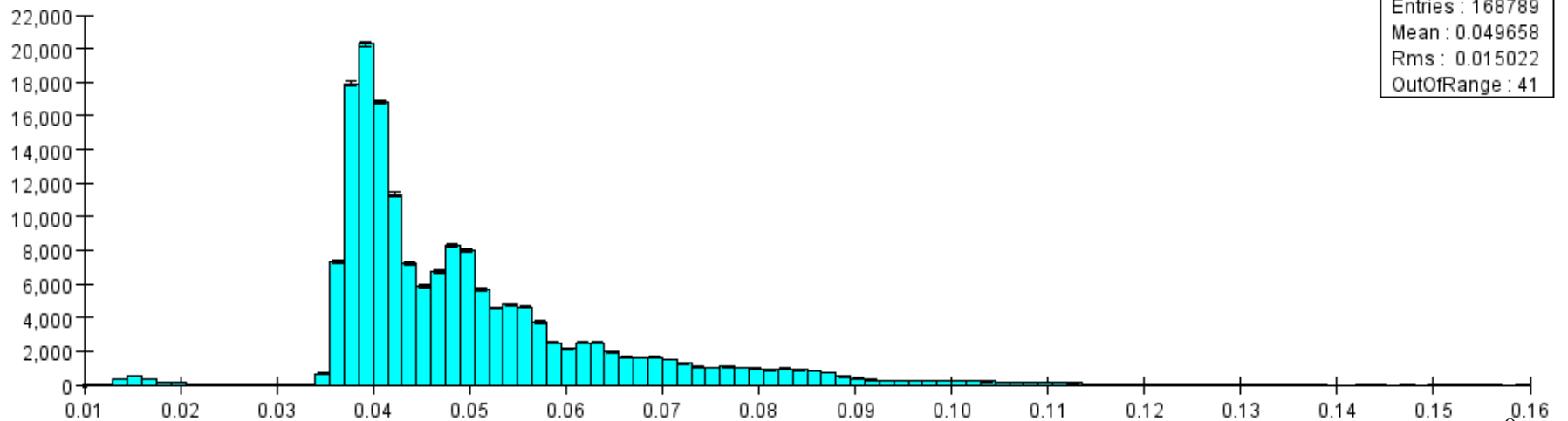


# Track Theta

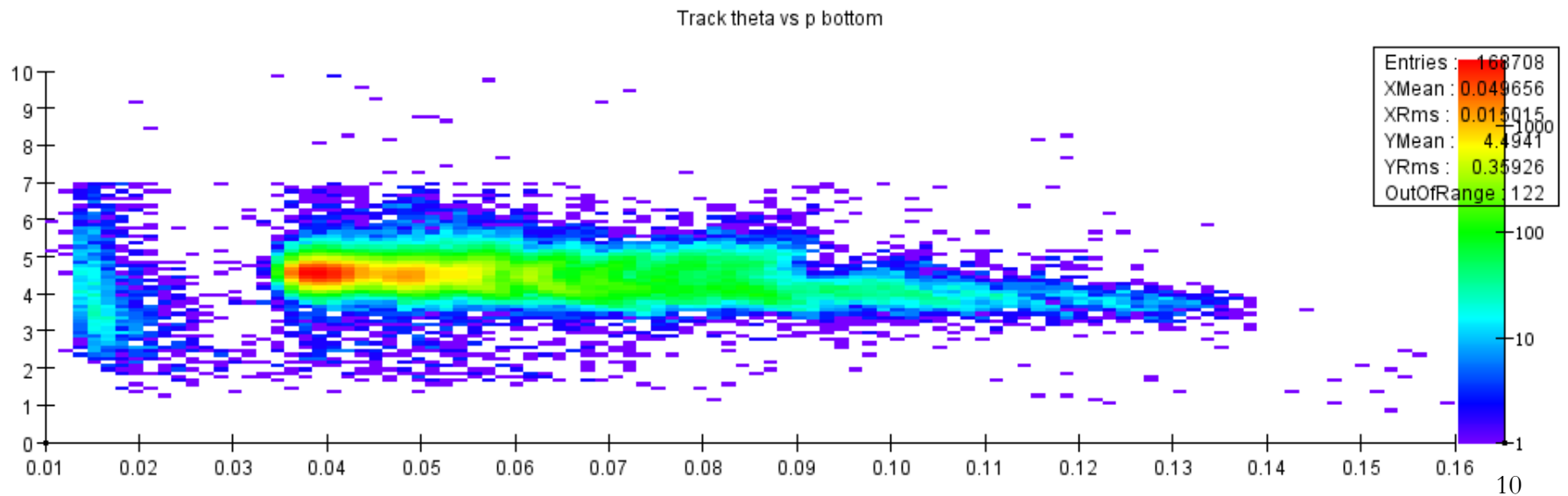
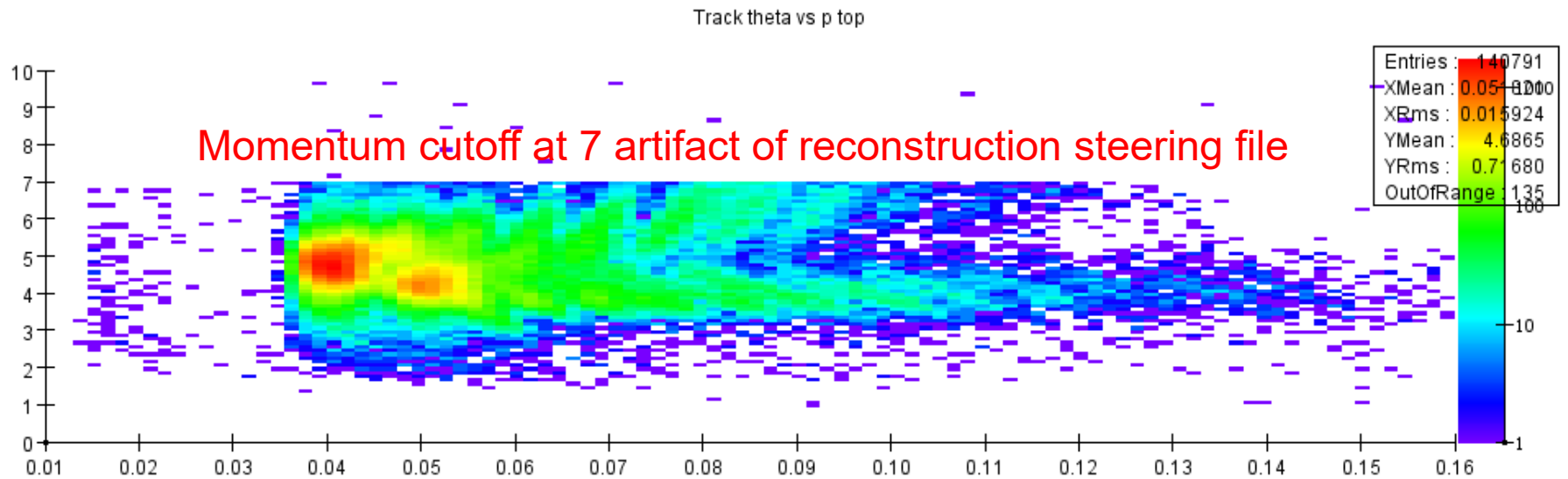
Track theta top



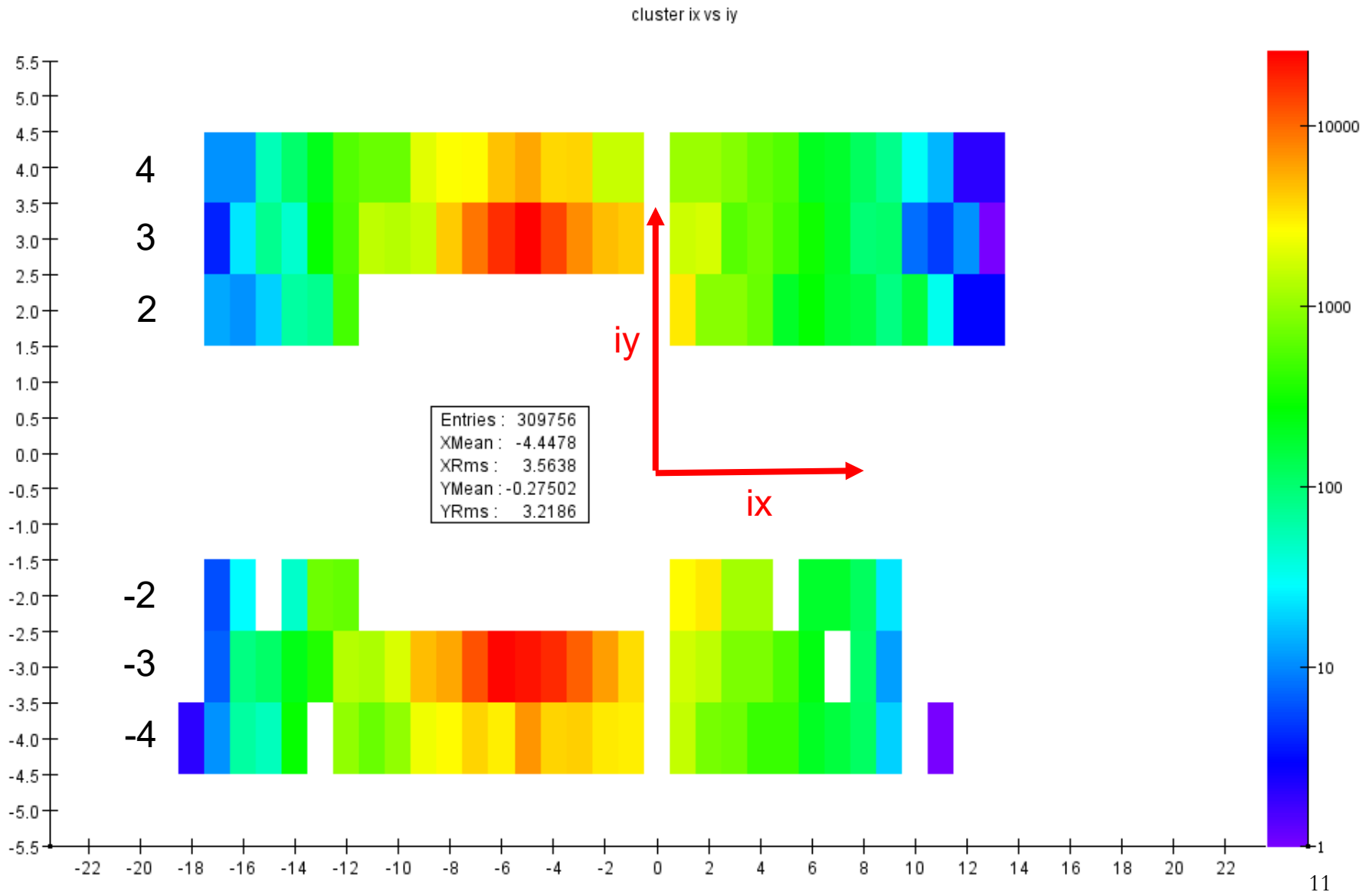
Track theta bottom



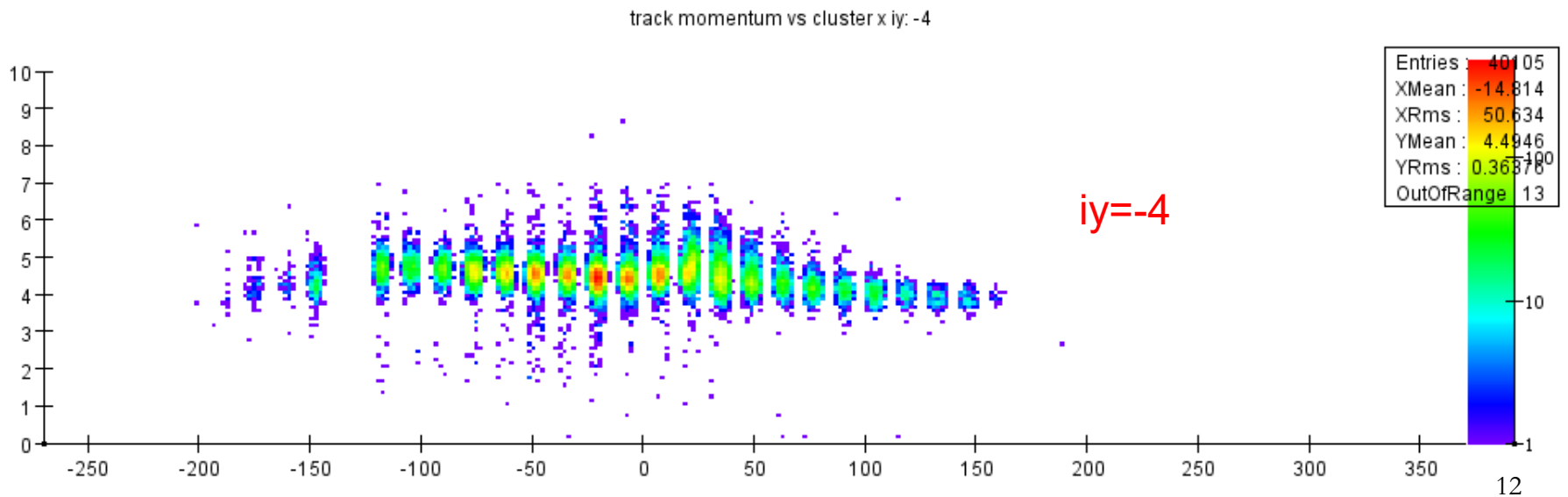
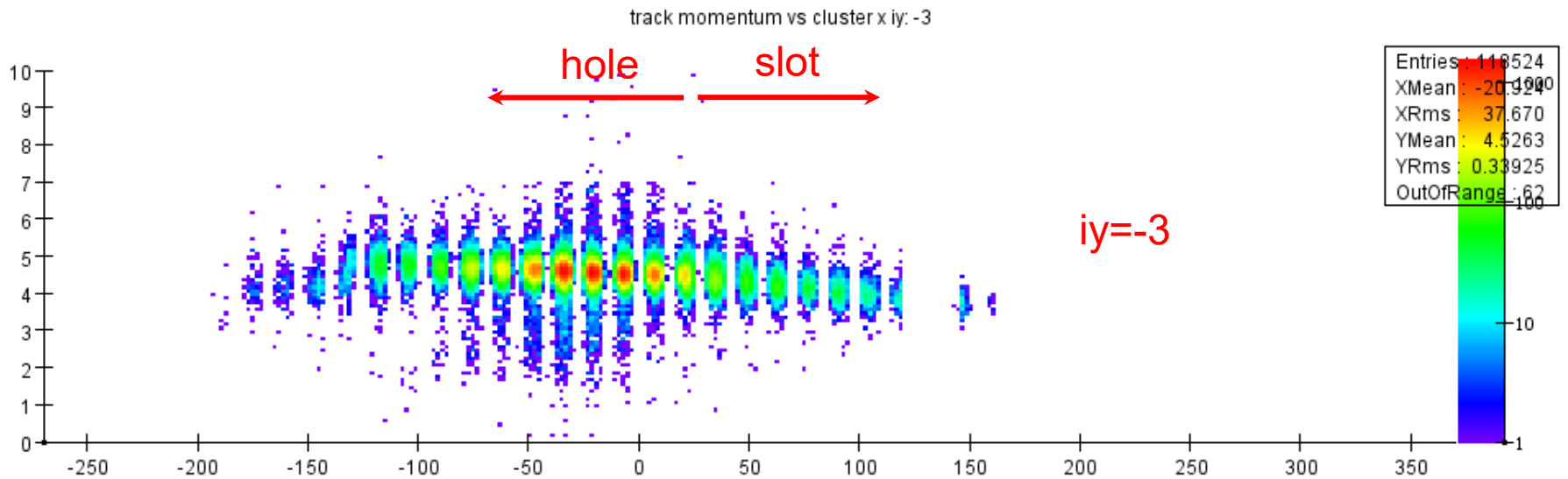
# Track Momentum vs Theta



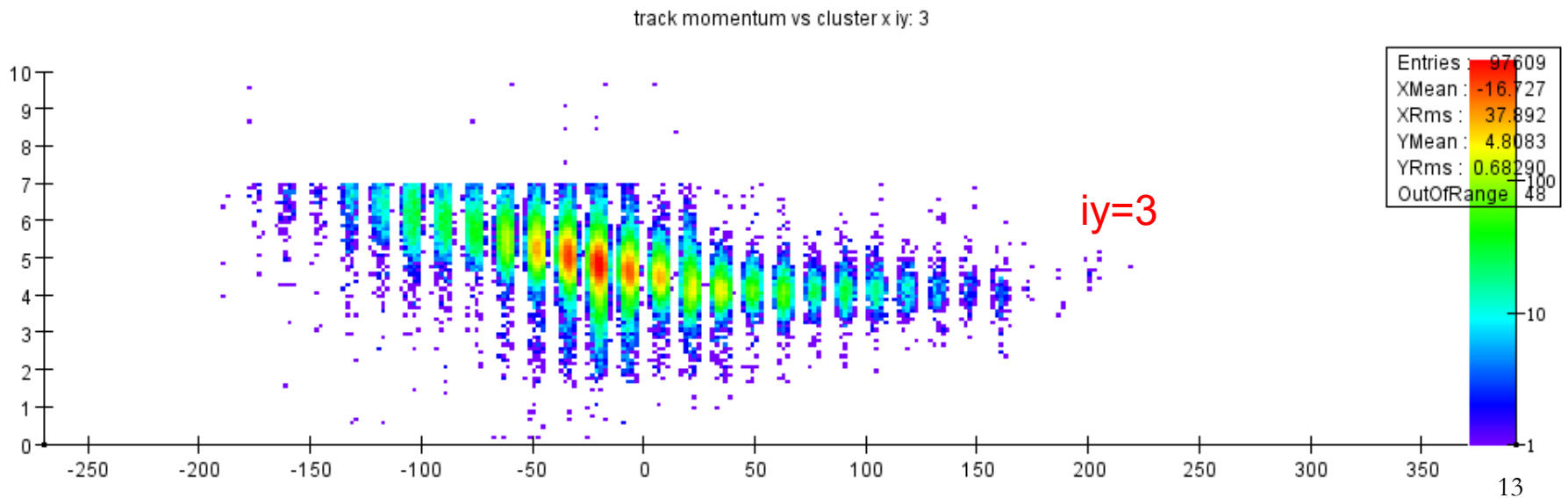
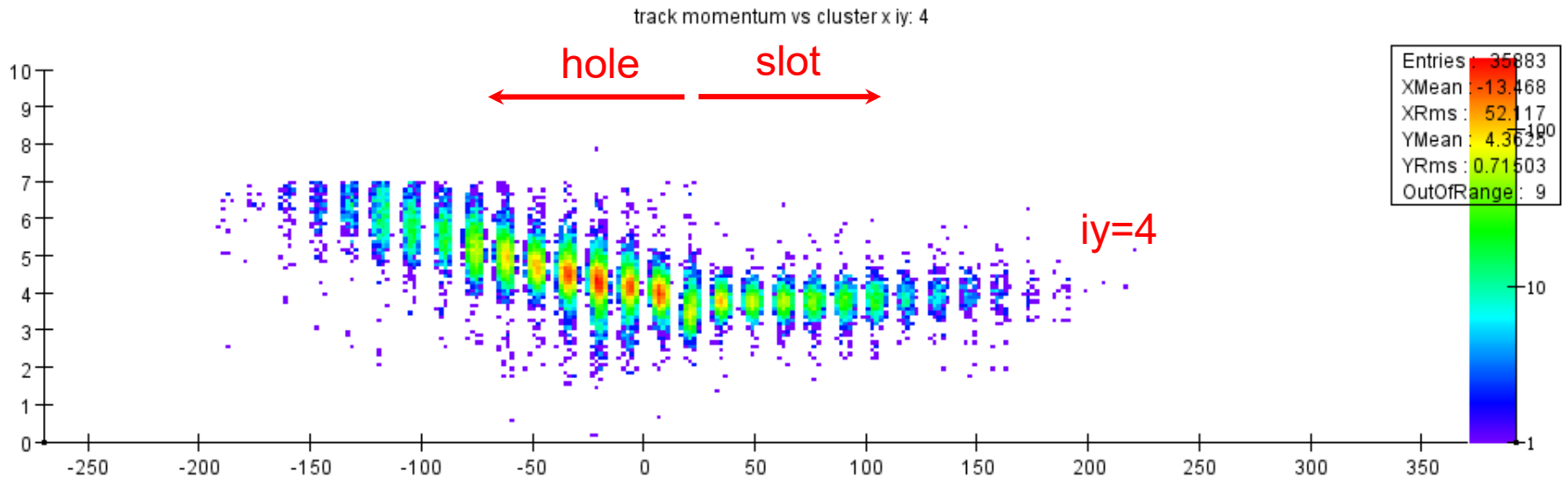
# Clusters With Track Seed Crystal ID



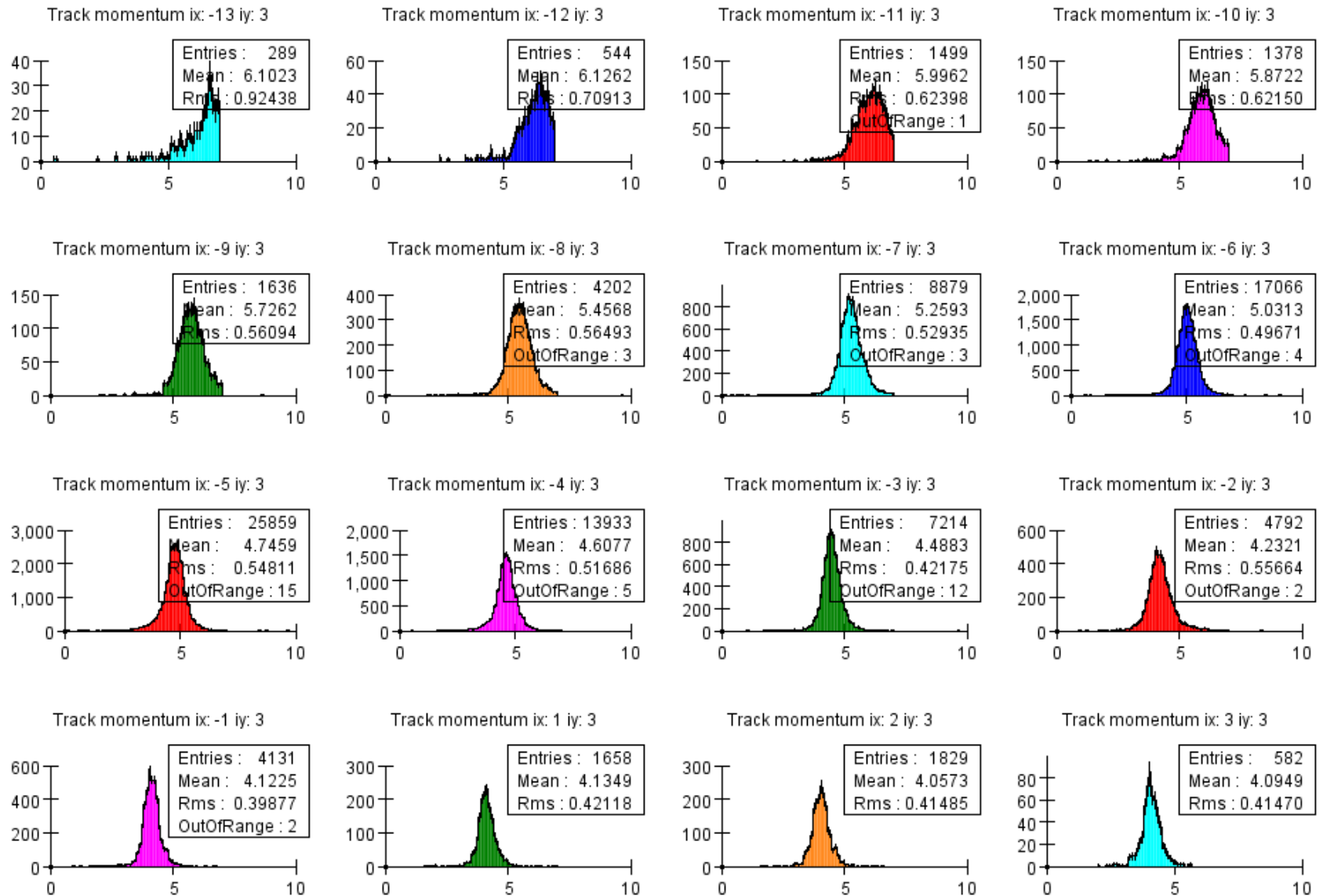
# Bottom Track Momentum vs Cluster



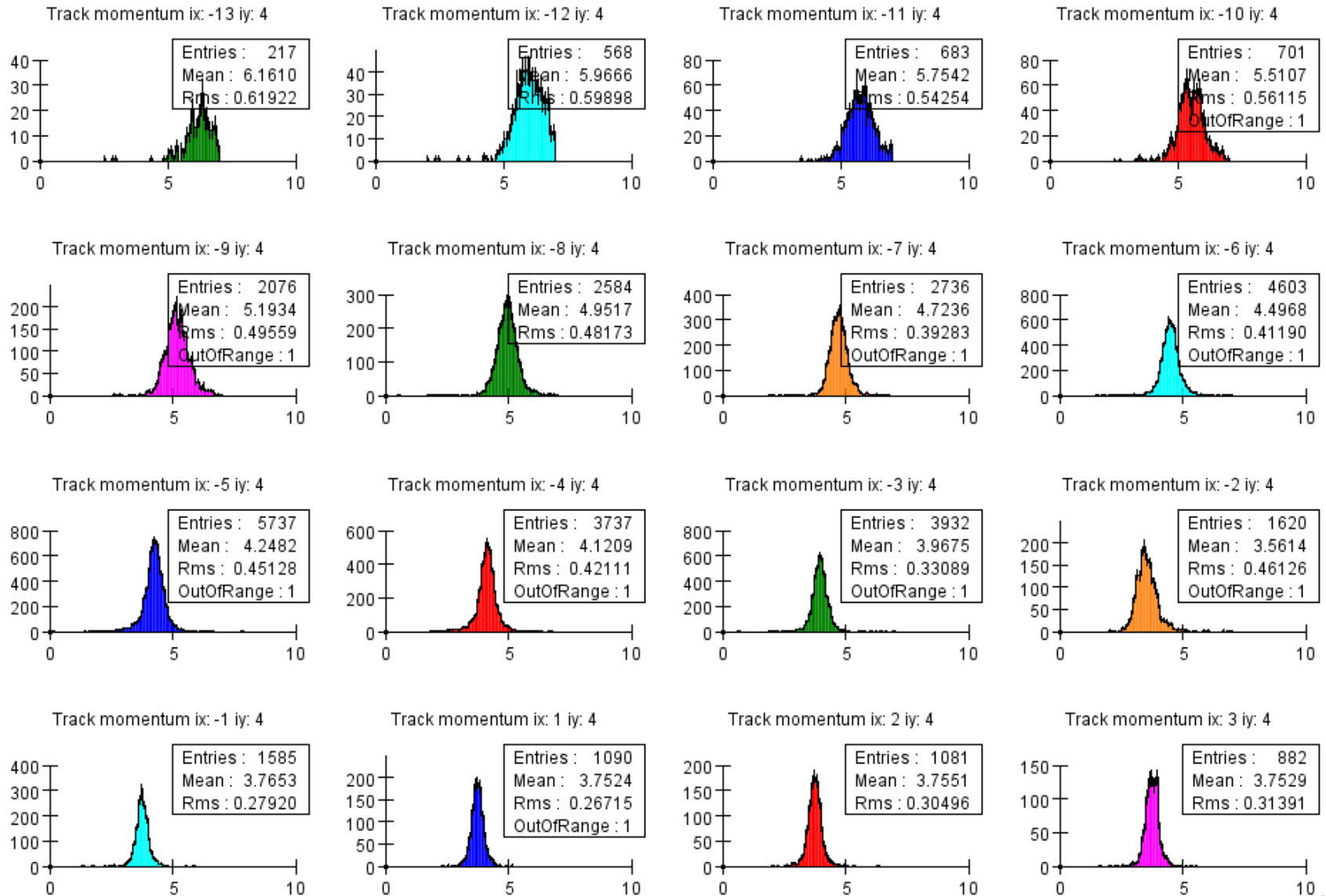
# Top Track Momentum vs Cluster x



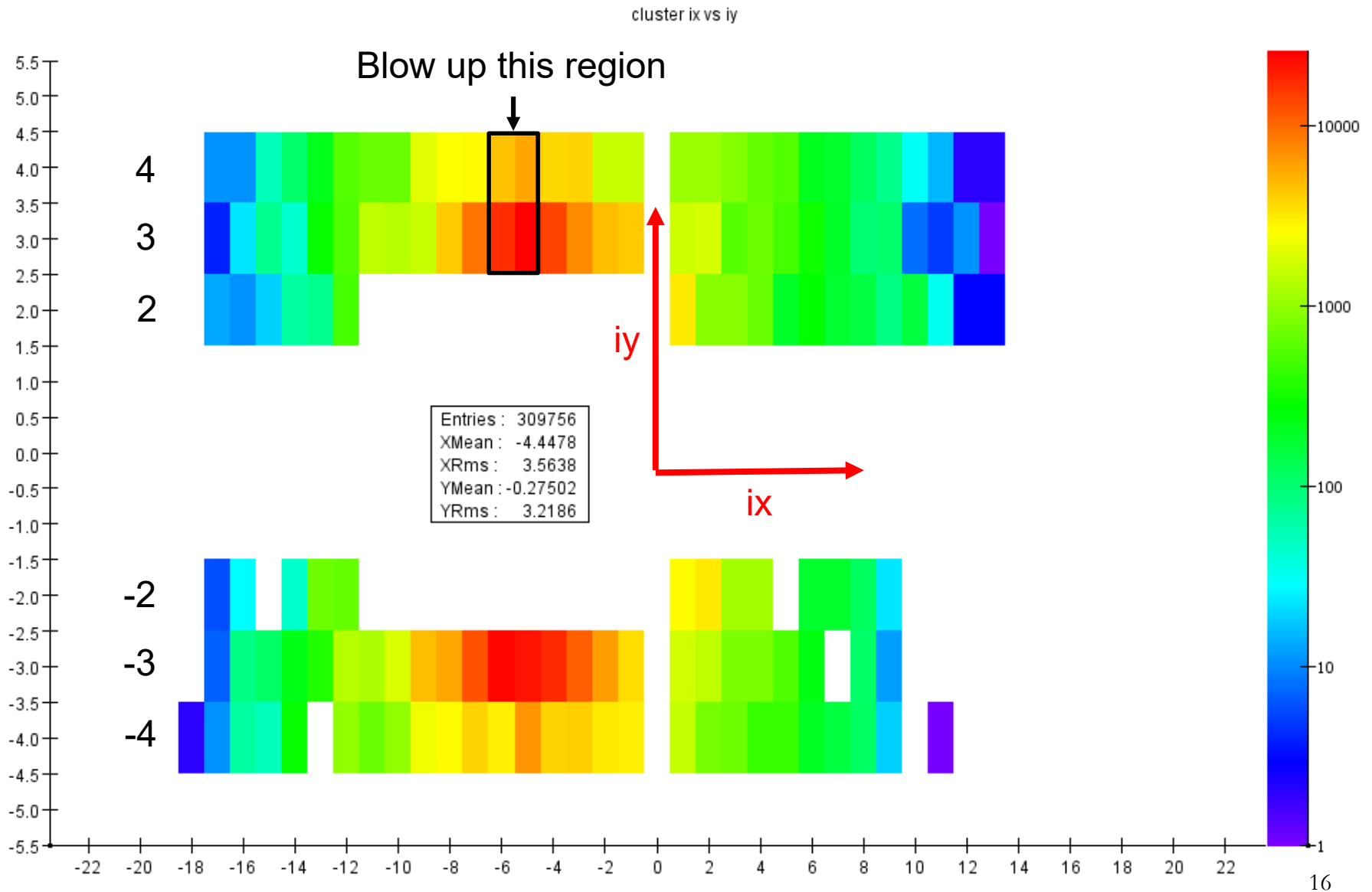
# Top Track Momentum by Crystal iy=3



# Top Track Momentum by Crystal $iy=4$

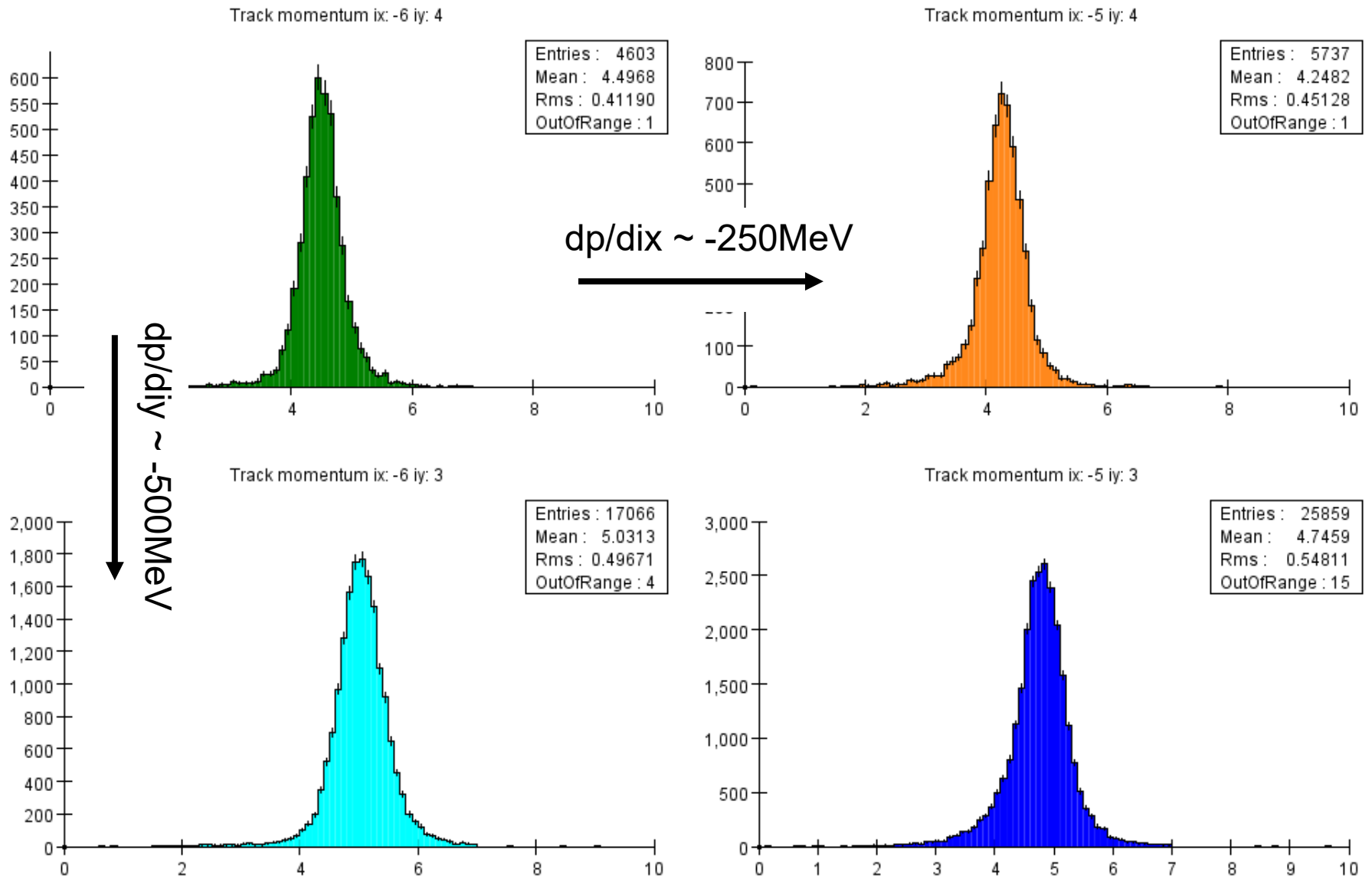


# Clusters With Track Seed Crystal ID





# Top Track Momentum vs ix & iy



# SVT Top Track Systematics

- Top SVT tracks appear to be afflicted with a number of rather severe systematic effects
  - “slot” appears disconnected from “hole”
  - momentum shifts as a function of  $x$  in Ecal
    - $dp/dix \sim -250\text{MeV}$
  - momentum shifts as a function of  $y$  in Ecal
    - $dp/diy \sim -500\text{MeV}$
- Is there some common geometrical misalignment which can be causing this?