## 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 > 3.0GeV "super-fiducial"
- Provides 292464 clean FEE candidates

## FEE Cluster Distribution

-90

-250

-200

-150

-100

-50

0

50

100

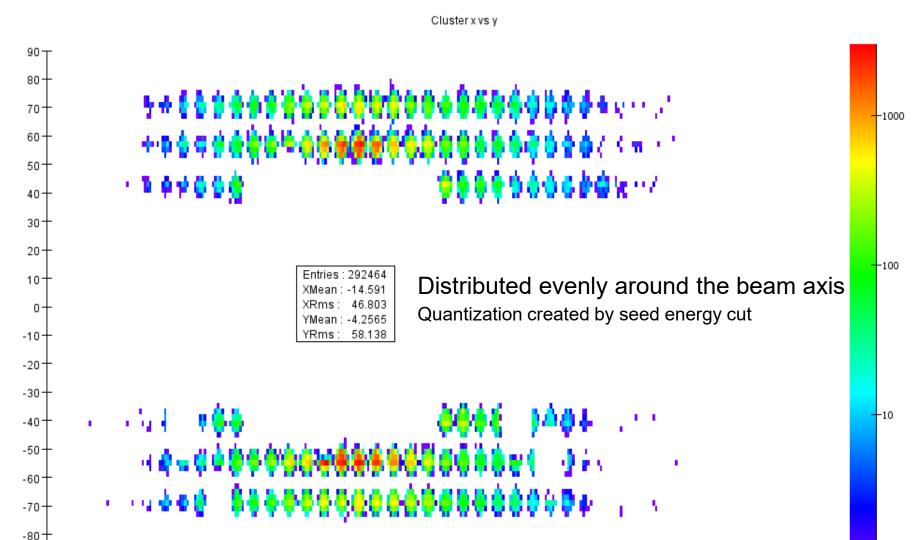
150

200

250

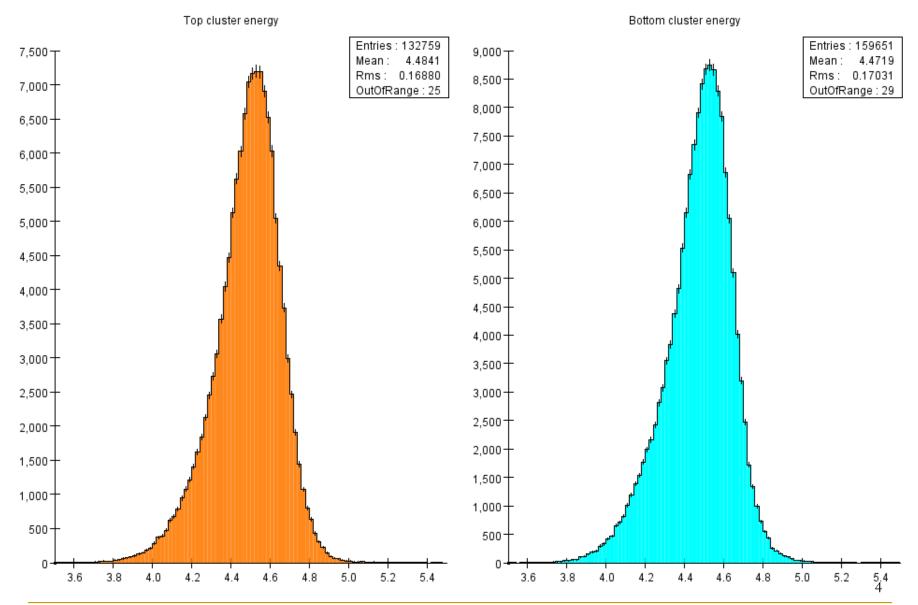
300

350

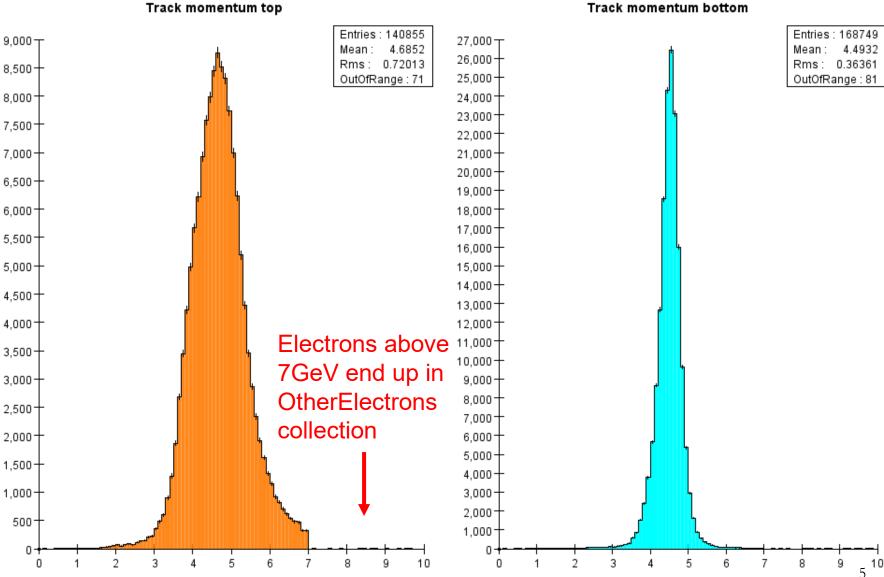


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## FEE Cluster Energy



## FEE Track Momenta (GBL)



### Track momentum bottom

## FEE Track Momenta (KF)

### Track momentum top Entries: 123179 Entries: 160063 27,000 -9,000 -Mean: 4.7165 4.4982 Mean: 26,000-0.72511 Rms : Rms : 0.43494 8,500 OutOfRange : 403 25,000-OutOfRange : 200 8,000-24,000 23,000 7,500 22,000<sup>.</sup> 7,000 21,000-20,000-6,500 19,000-6,000 18,000 17,000 5,500-16,000 15,000 5,000-14,000 4,500-13,000 4.000-12,000 Electrons above 11,000 3,500-10,000 7GeV end up in 9,000 3,000-**OtherElectrons** 8.000 2,500-7.000 collection 2,000 6.000-5,000-1,500 4.000-1.000-3.000-2,000-500-1.000-0 -0 0 2 3 5 6 7 8 q 10 0 2 3 5 6 8 9 4 10

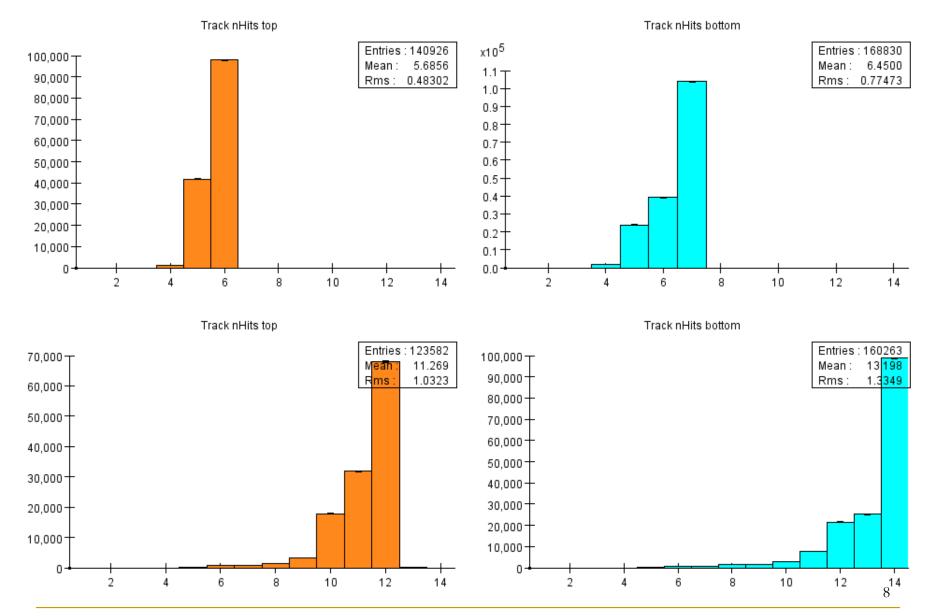
### Track momentum bottom

6

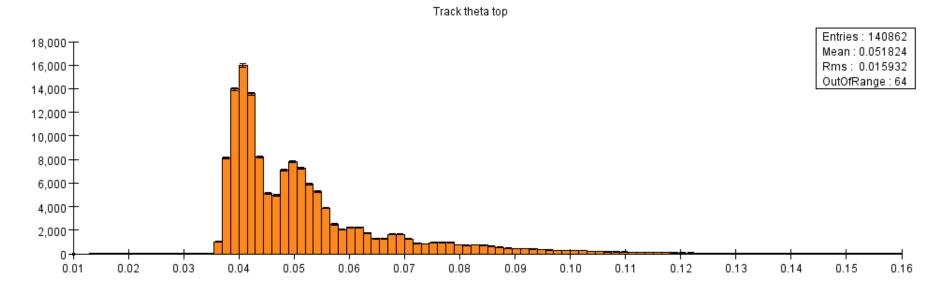
# What's up with the top SVT?

- 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?

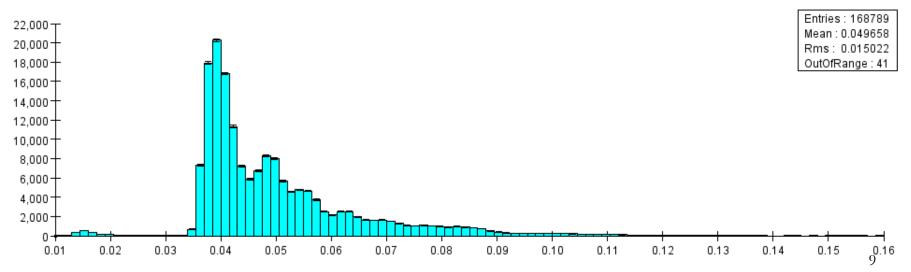
## Number of Hits on Tracks



## Track Theta

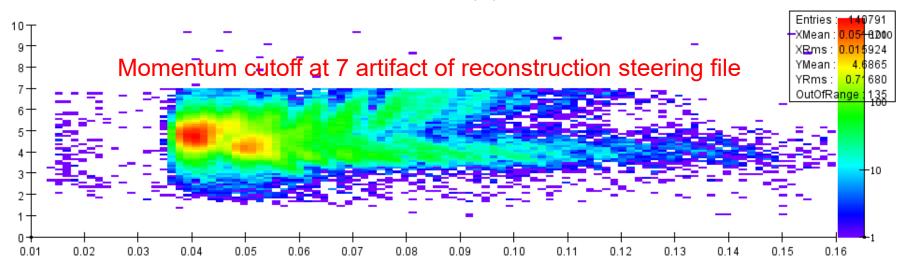


Track theta bottom

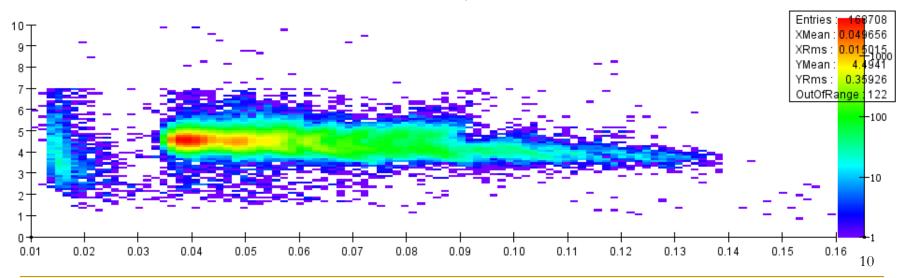


### Track Momentum vs Theta

Track theta vs p top



Track theta vs p bottom

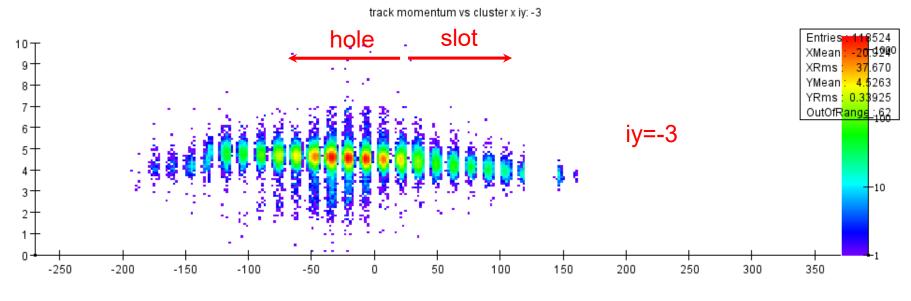


## Clusters With Track Seed Crystal ID

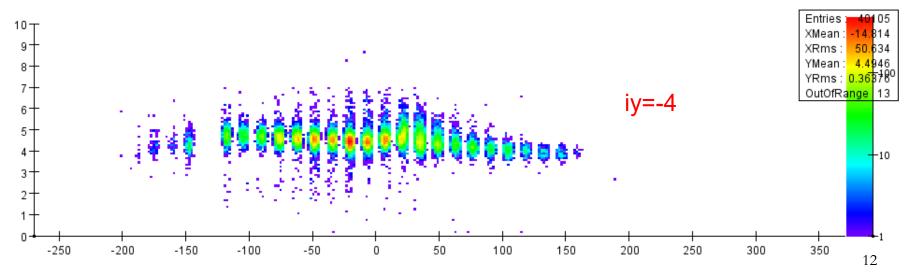
5.5 T 5.0--10000 4.5-4 4.0-3.5-3 3.0-2.5-2 1000 2.0iy 1.5-1.0-0.5 Entries: 309756 XMean: -4.4478 0.0-XRms: 3.5638 YMean : -0.27502 -100 -0.5 ix YRms: 3.2186 -1.0--1.5 -2 -2.0--2.5--3 -3.0--10 -3.5--4 -4.0--4.5--5.0--5.5--1 -22 -20 -18 -16 -12 -10 -8 -6 -2 0 2 6 8 10 12 16 18 20 22 -14 -4 14 11

cluster ix vs iy

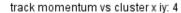
## Bottom Track Momentum vs Cluster

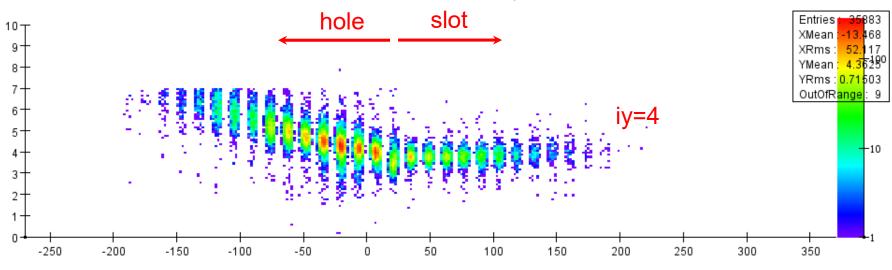


track momentum vs cluster x iy: -4

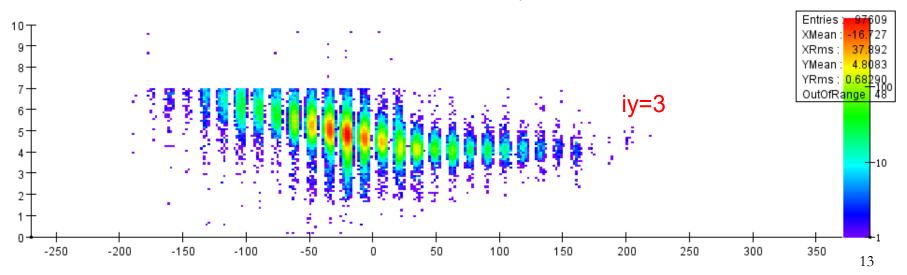


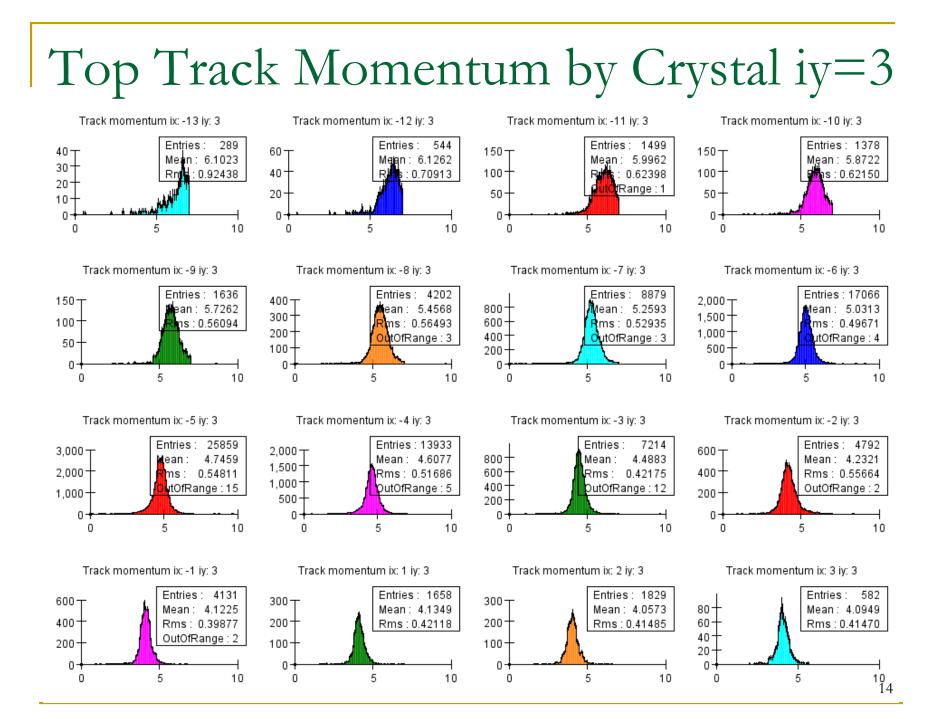
## Top Track Momentum vs Cluster x

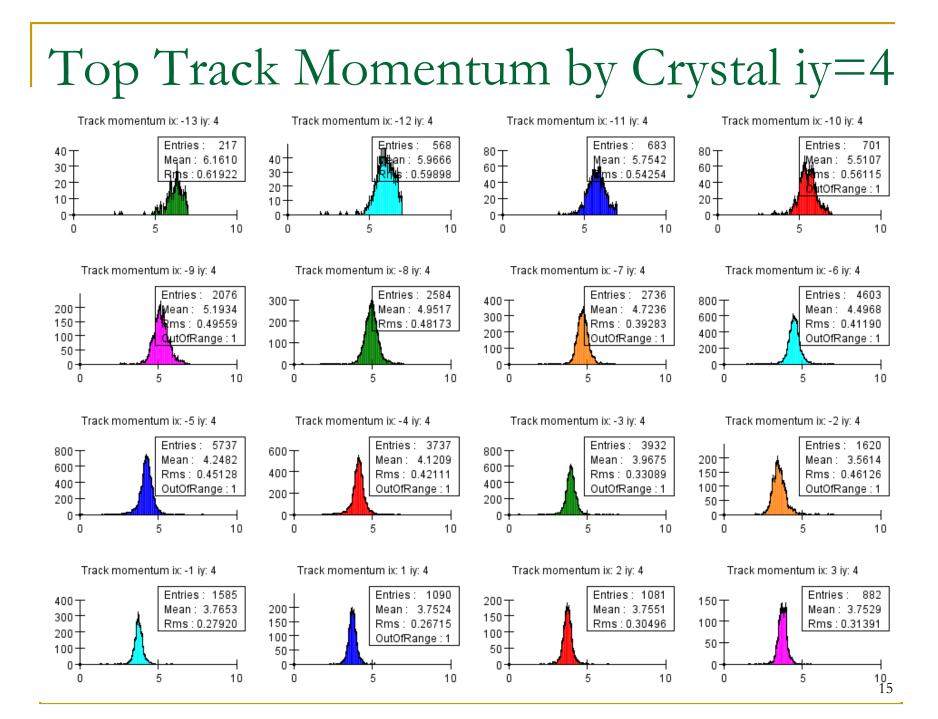




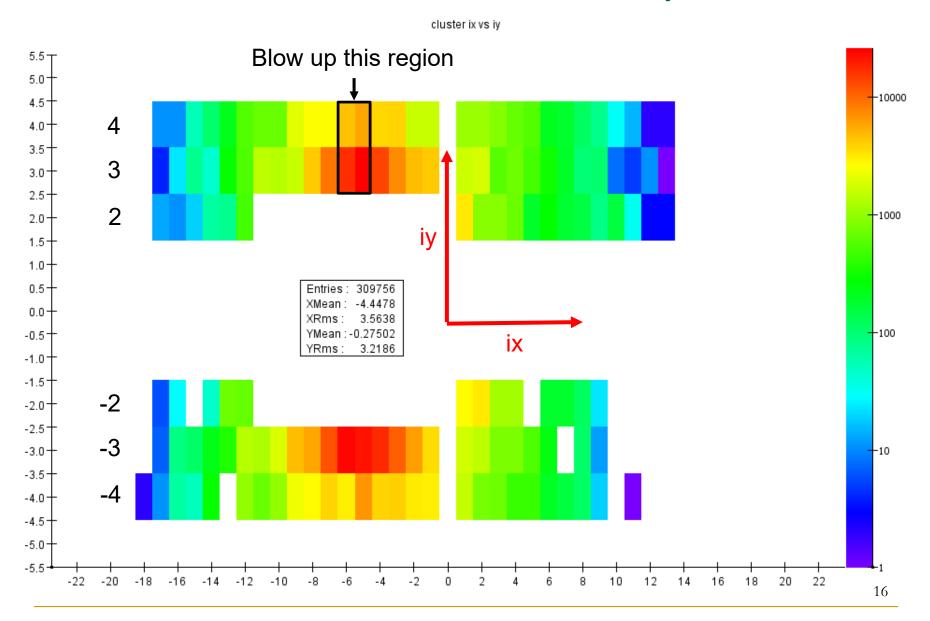
track momentum vs cluster x iy: 3

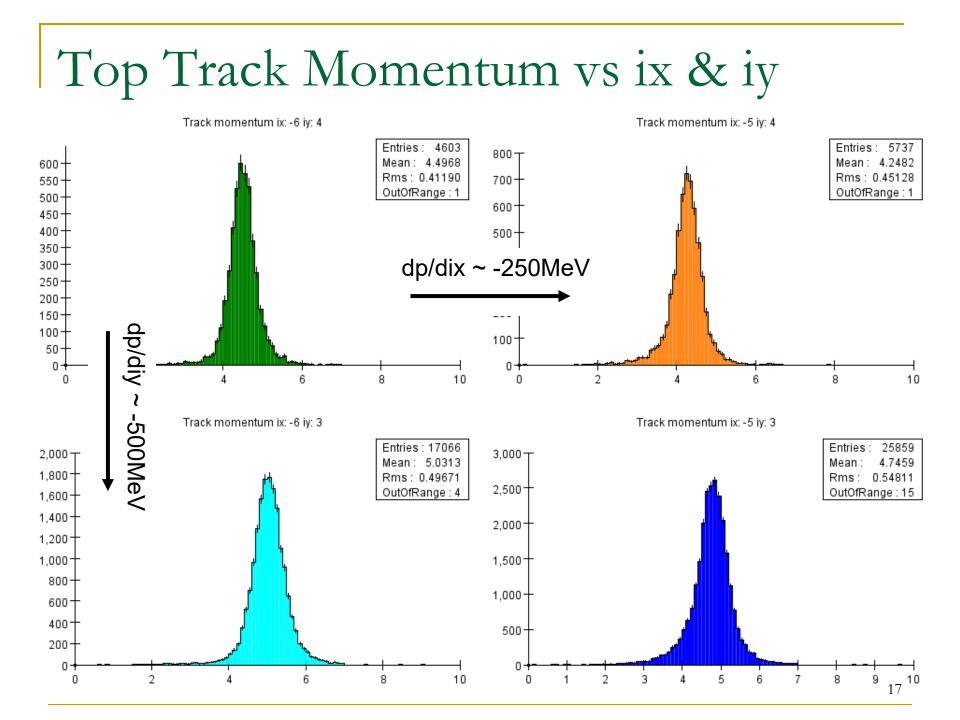






## Clusters With Track Seed Crystal ID





## 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 ~ -250MeV
  - momentum shifts as a function of y in Ecal
    - dp/diy ~ -500MeV
- Is there some common geometrical misalignment which can be causing this?