# 2021 FEE Calibration
# Run 14168 @ 3.74GeV

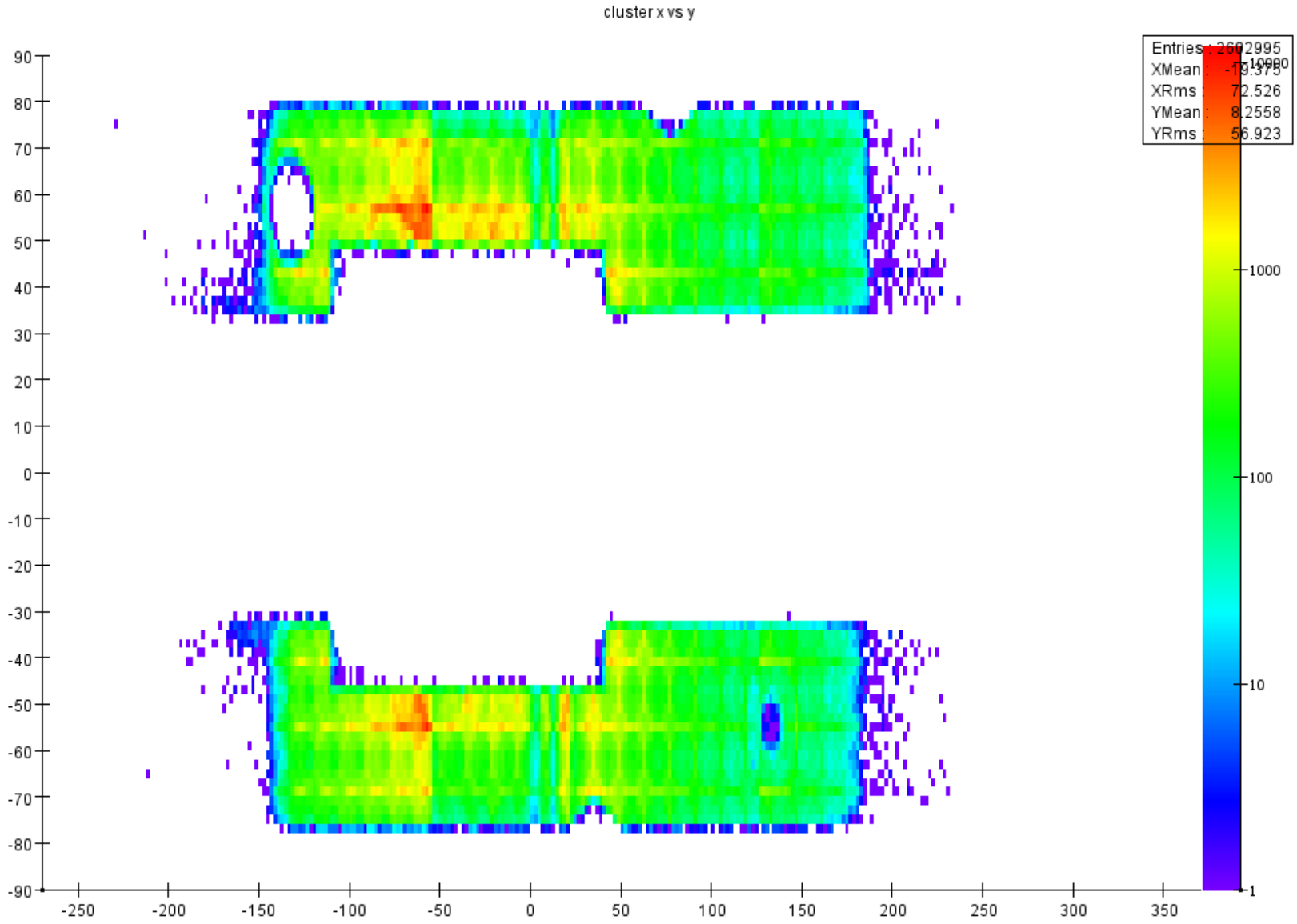
Norman Graf (SLAC)

November 18, 2022

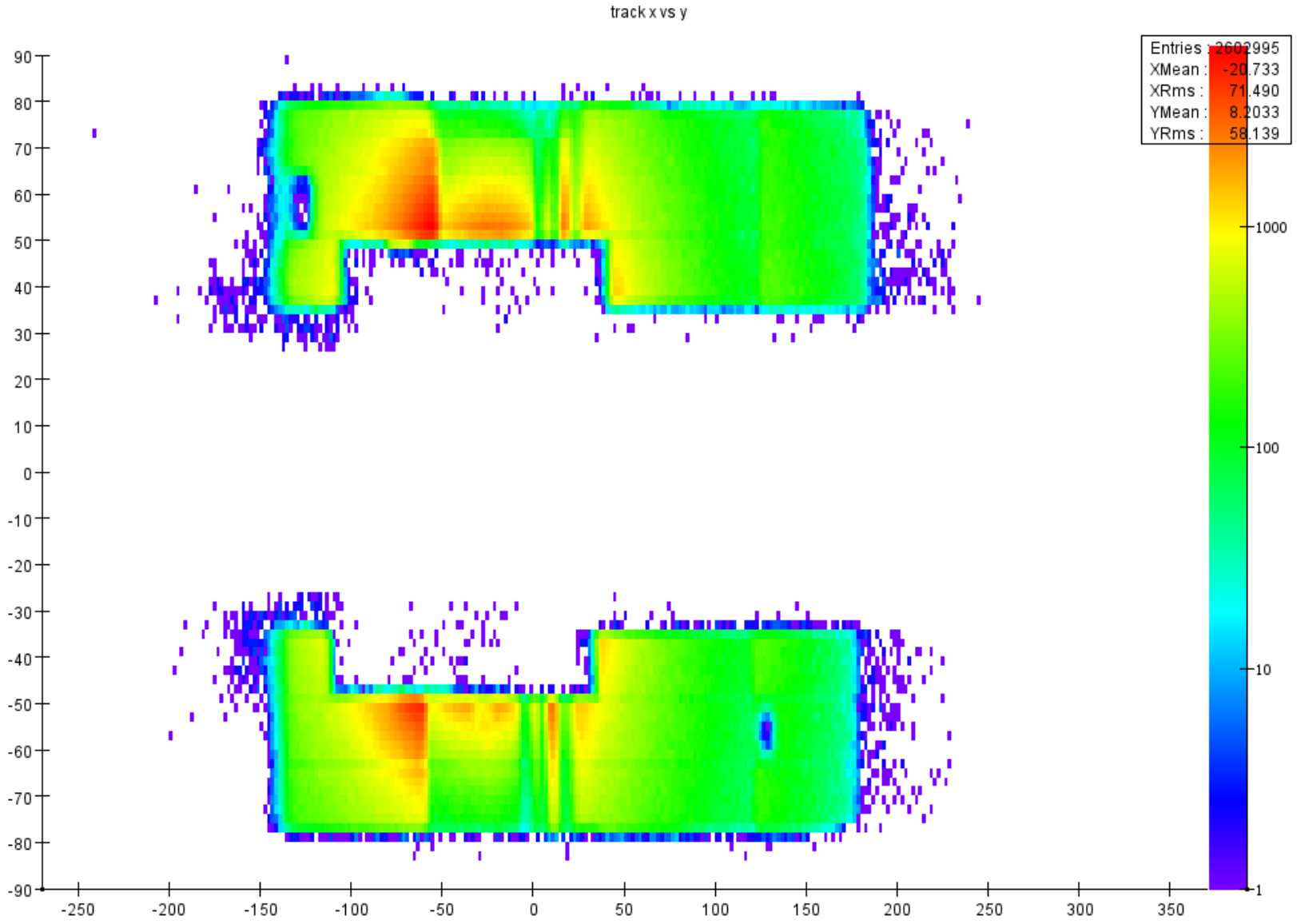
# Pass0 Reconstruction

- Analyze FEEs from the 2021dataset
  - Dedicated FEE run 14168
  - HPS_Run2021Pass0_v1
  - hps-java 5.2-SNAPSHOT

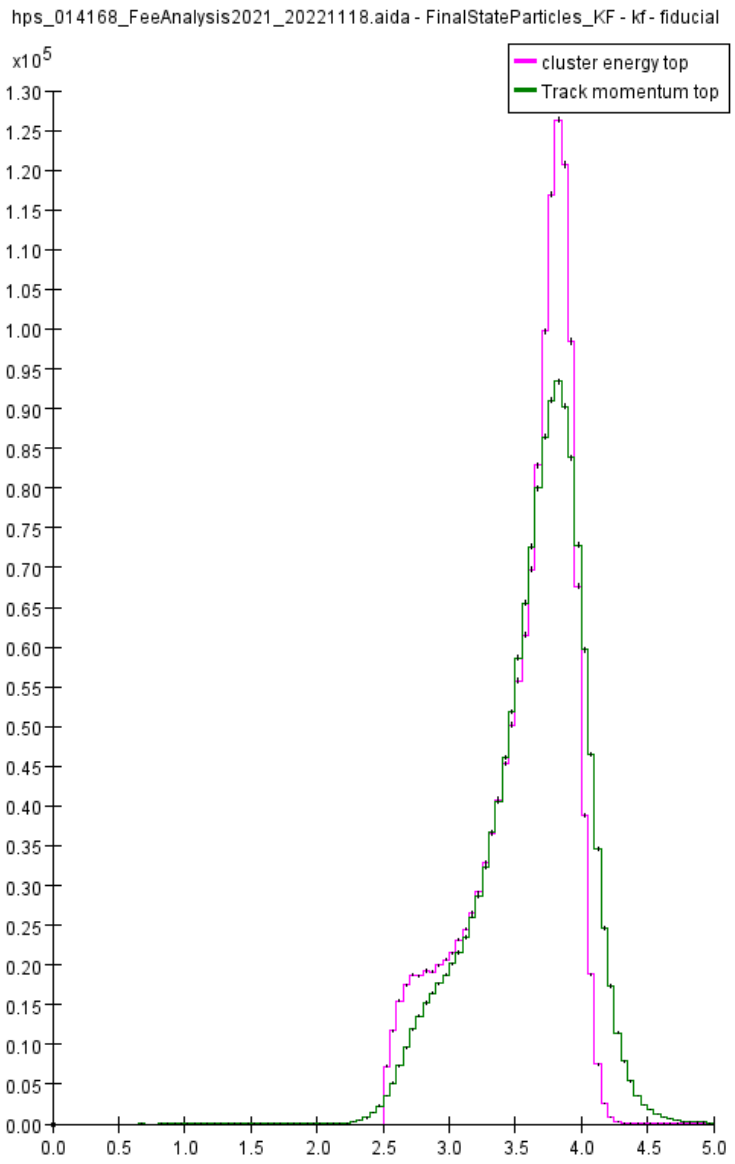
# Cluster X vs Y

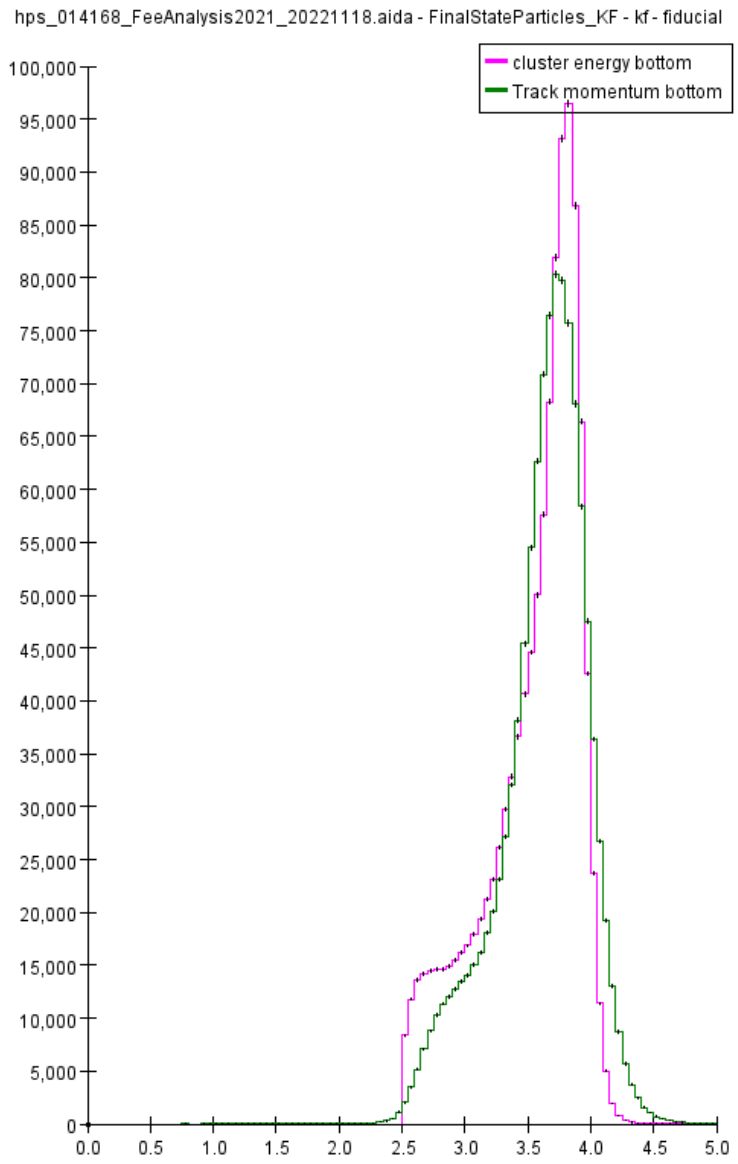


# Track X vs Y

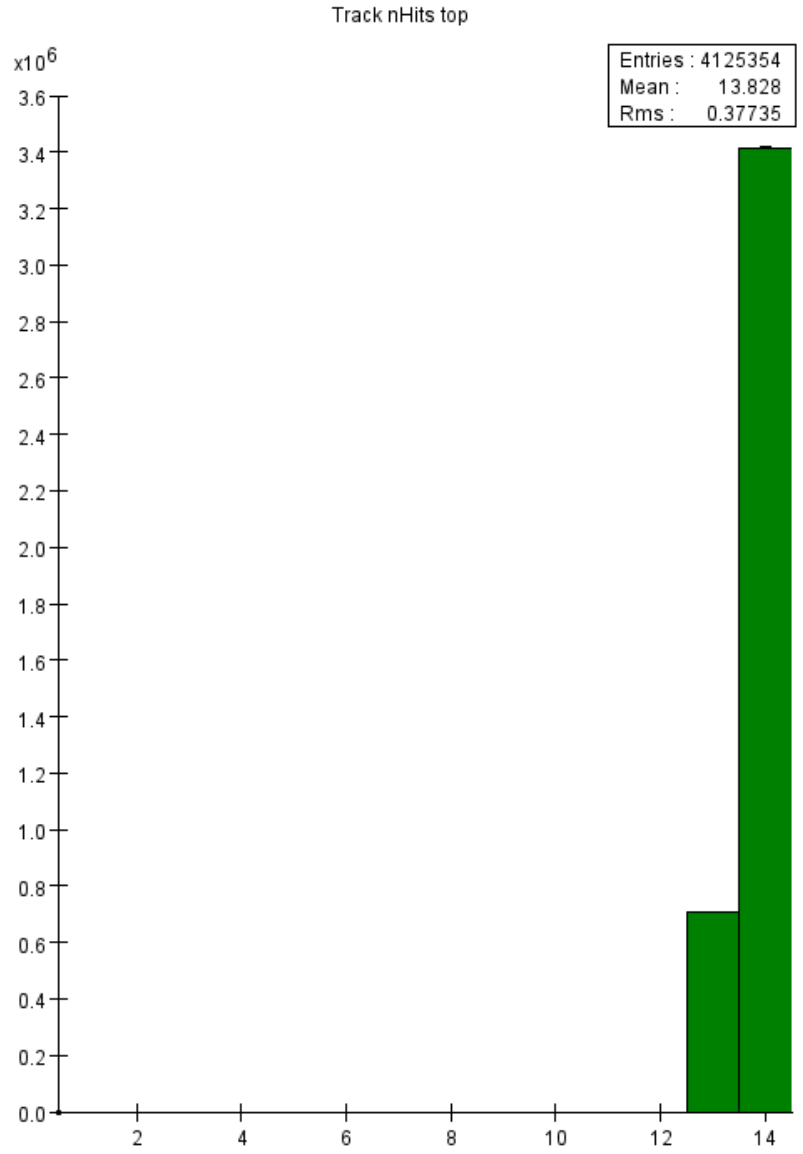

track x vs y
Entries : 2602995
XMean : -20.733
XRms : 71.490
YMean : 8.2033
YRms : 58.139
90
80
70
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-250
-200
-150
-100
-50
0
50
100
150
200
250
300
350
1000
100
10
1

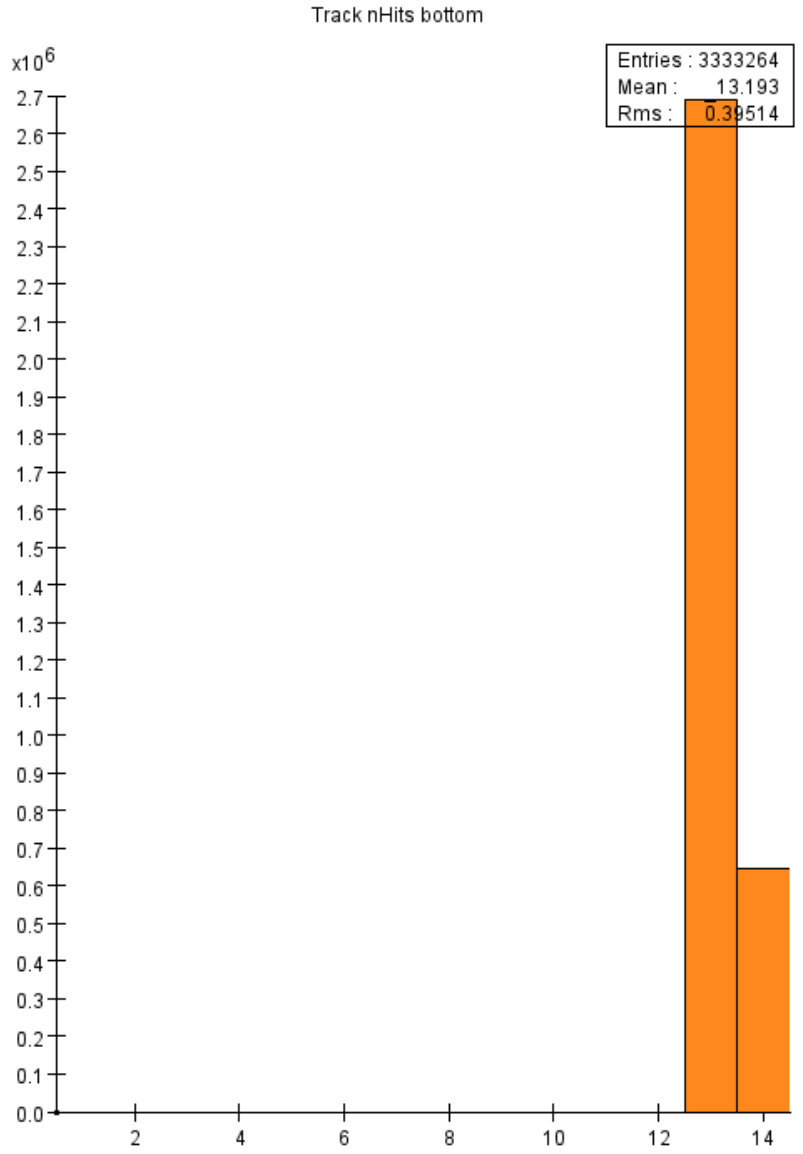
# Cluster Energy & Track Momentum



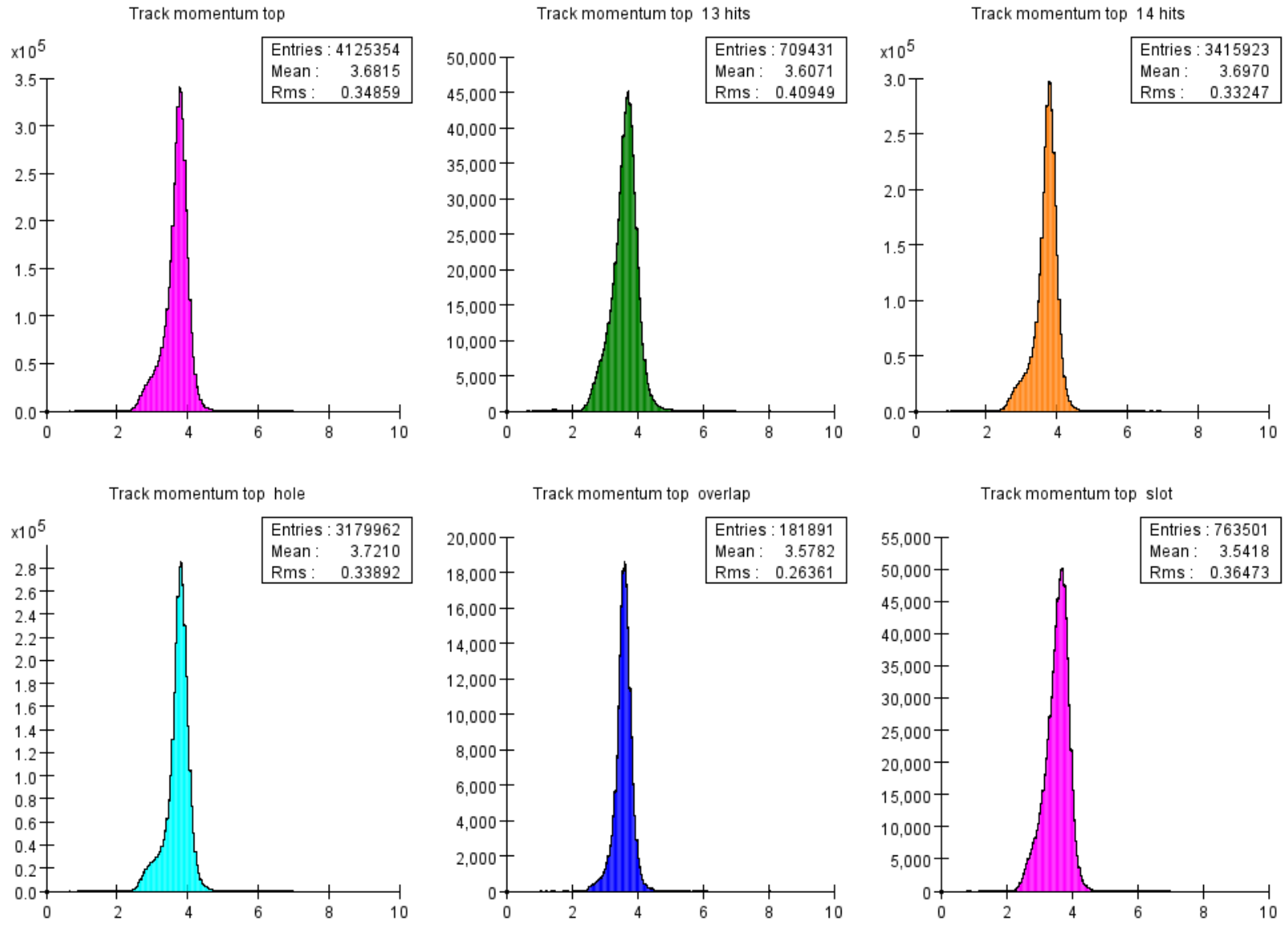



# Track Number of Hits

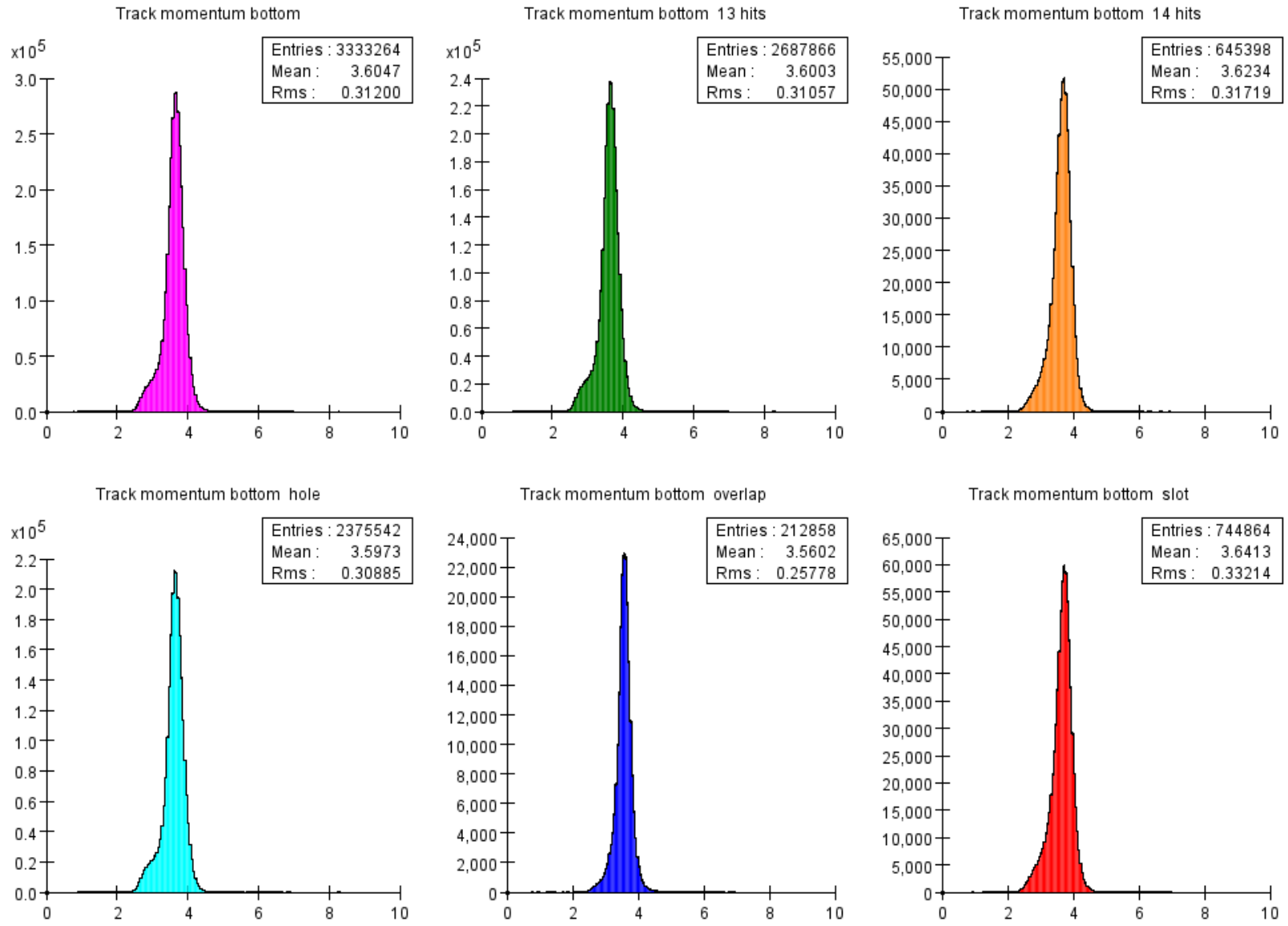


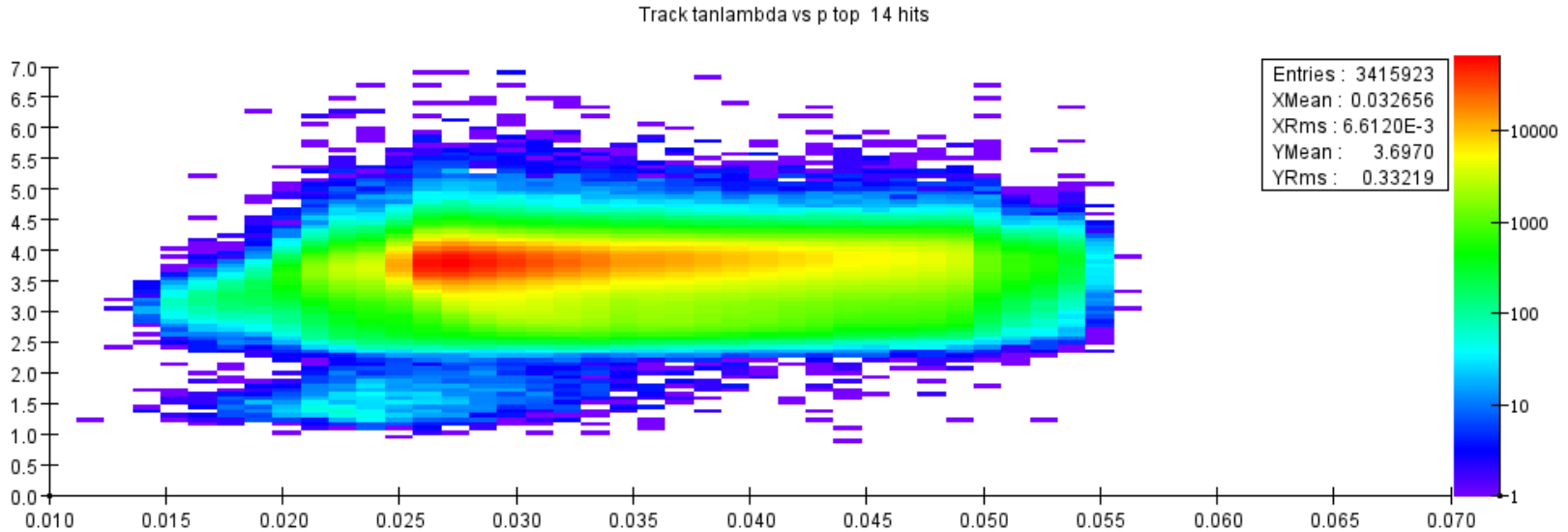
# Track Momentum by Track Type

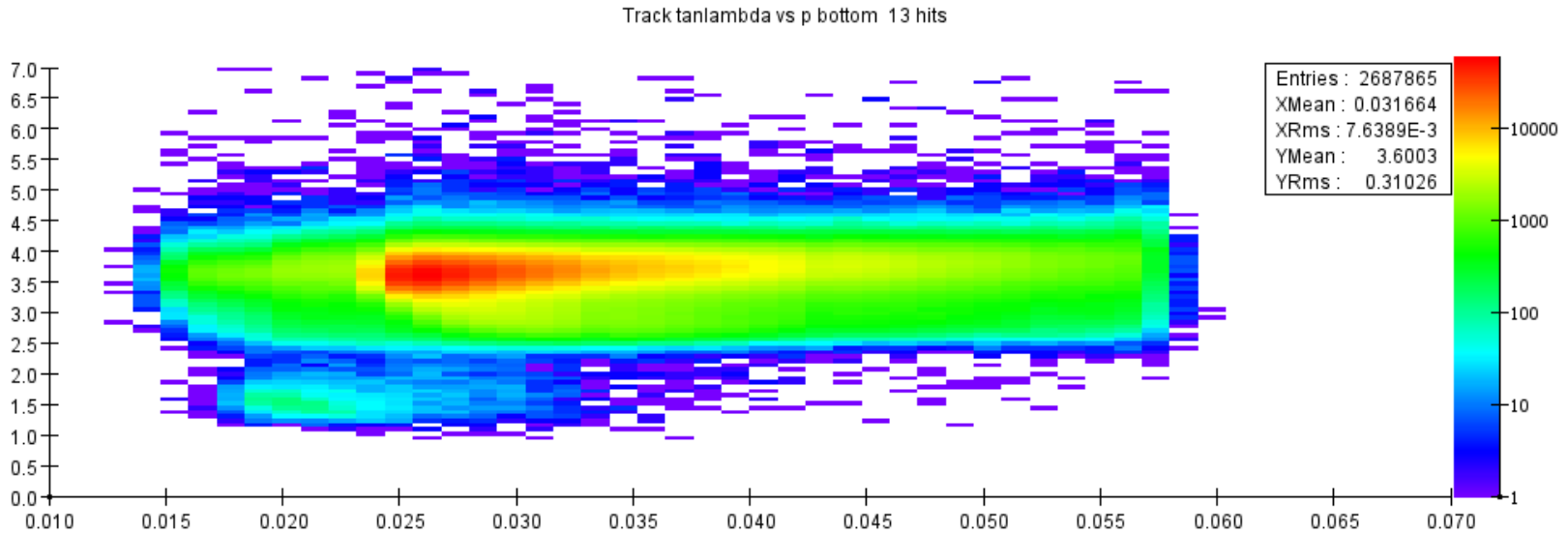


# Track Momentum by Track Type

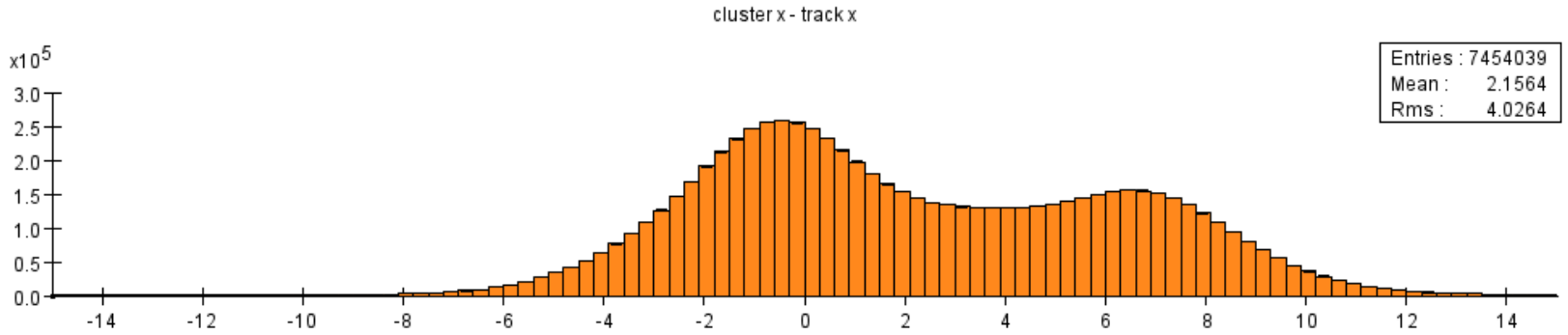


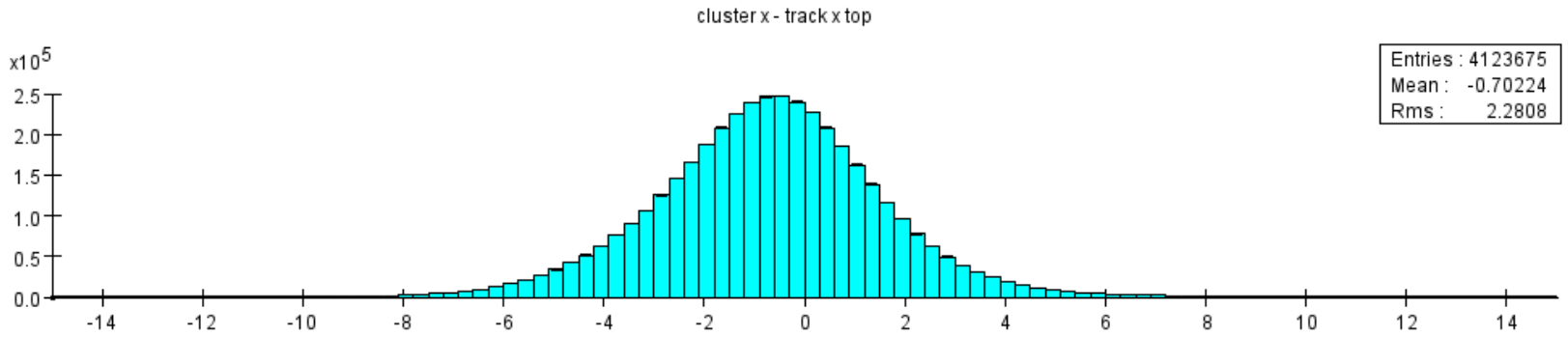
# Track Momentum vs tanλ

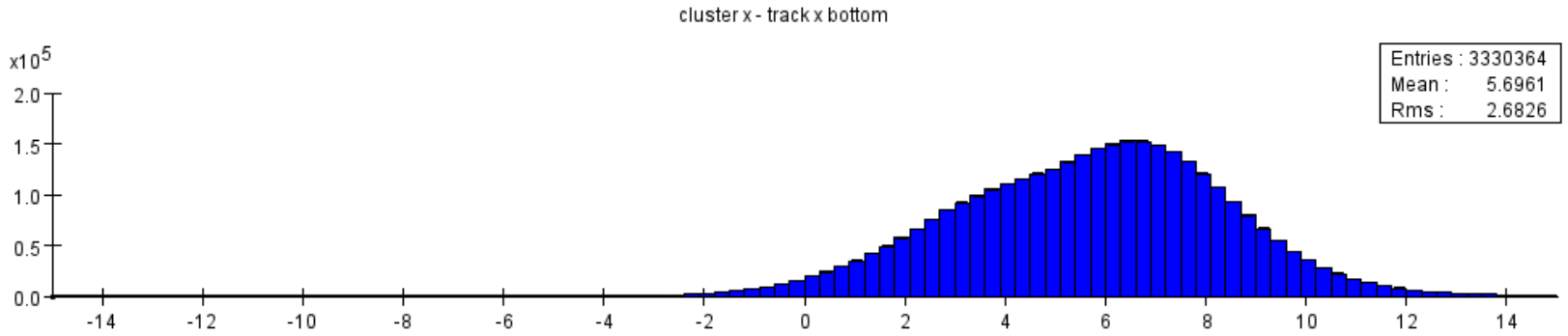


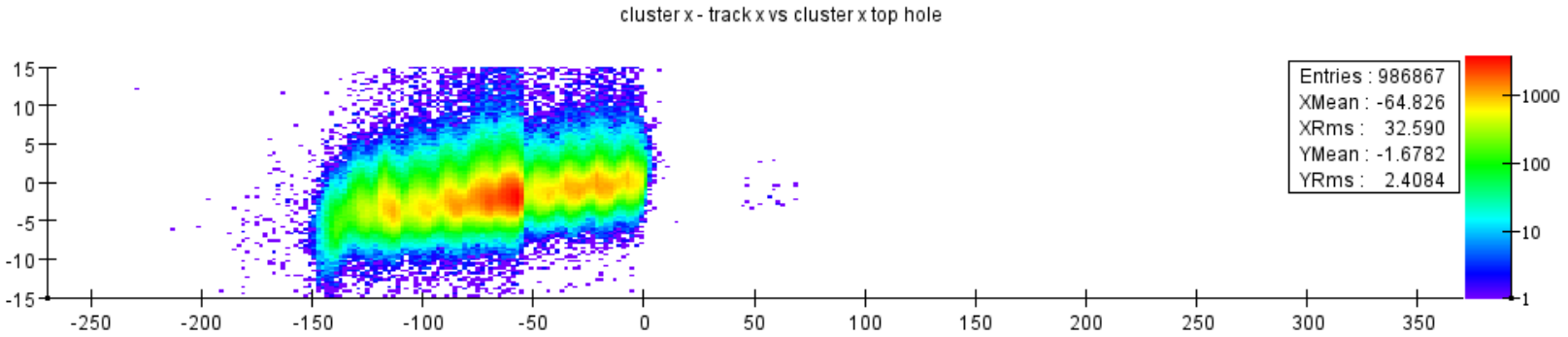
# Cluster X – Track X

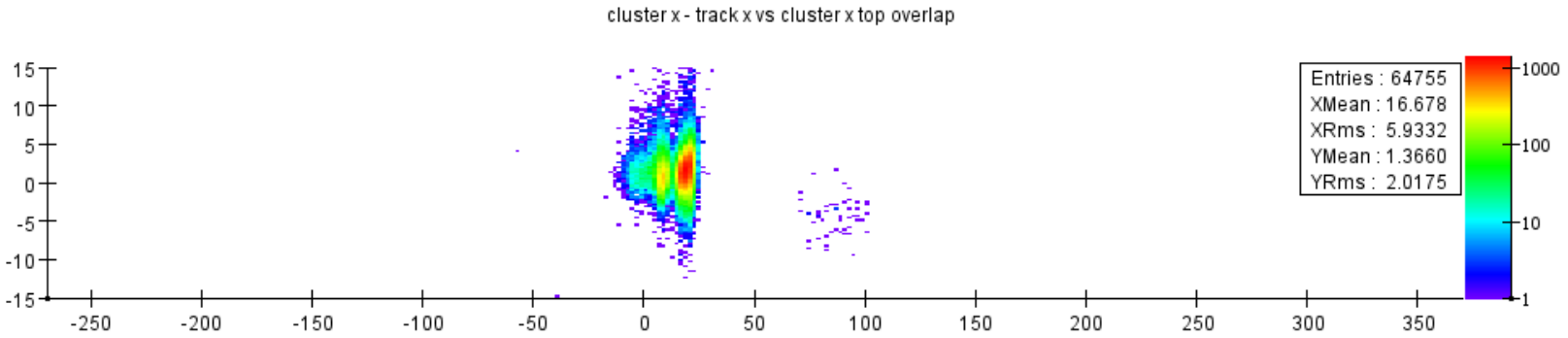


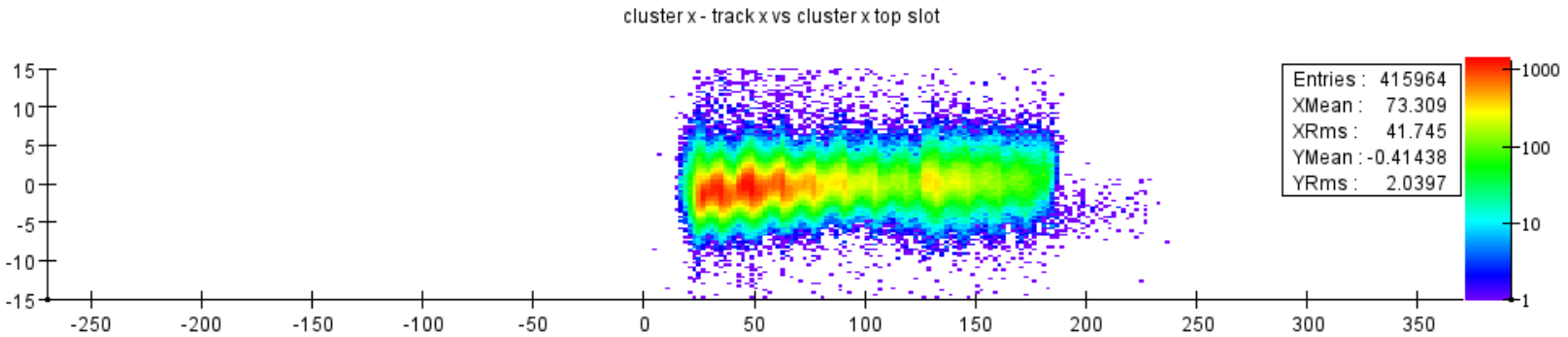



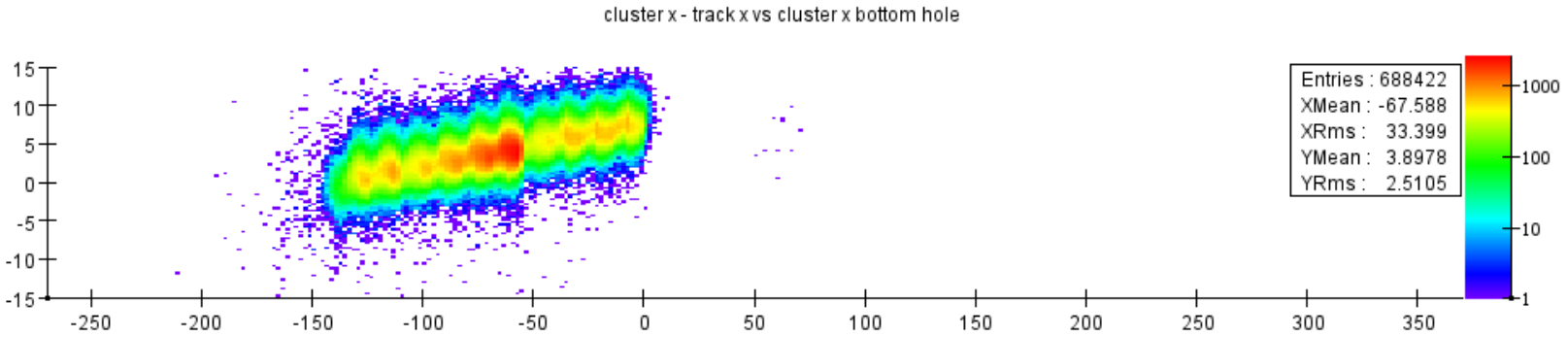
# Cluster X – Track X vs Cluster X

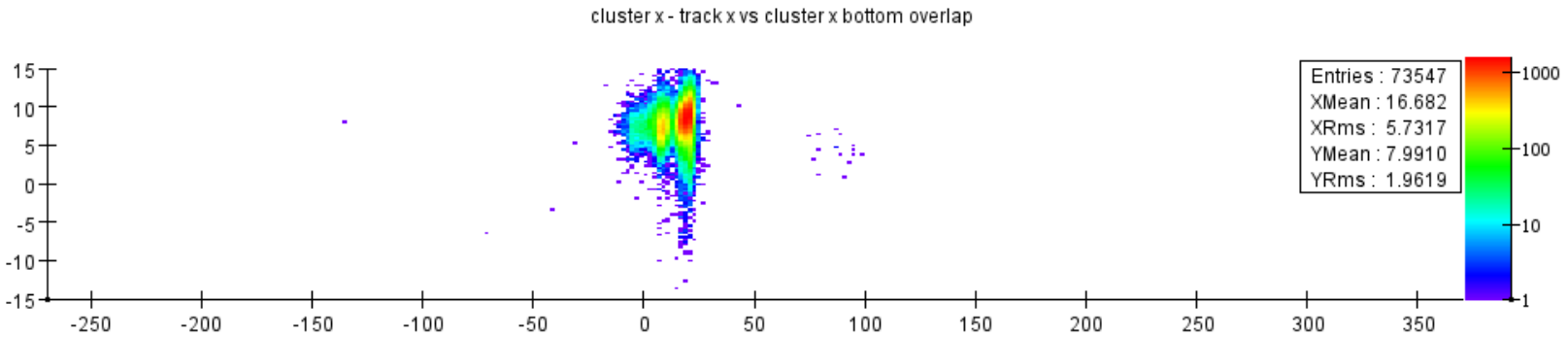


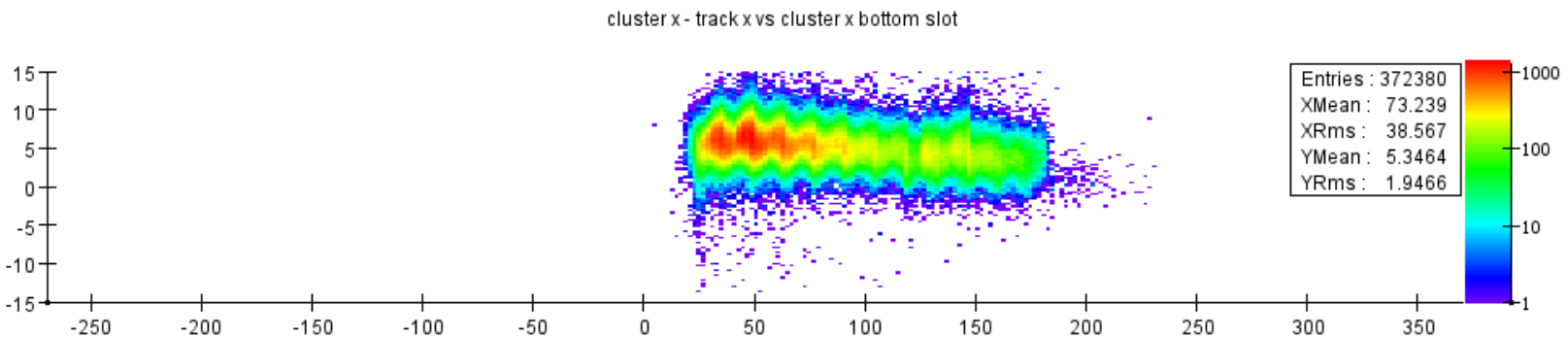



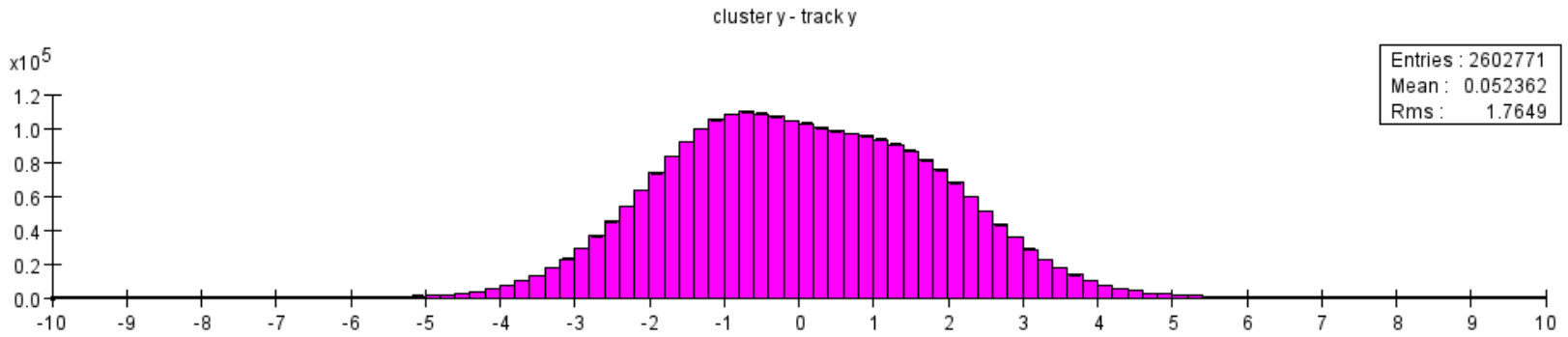
# Cluster X – Track X vs Cluster X

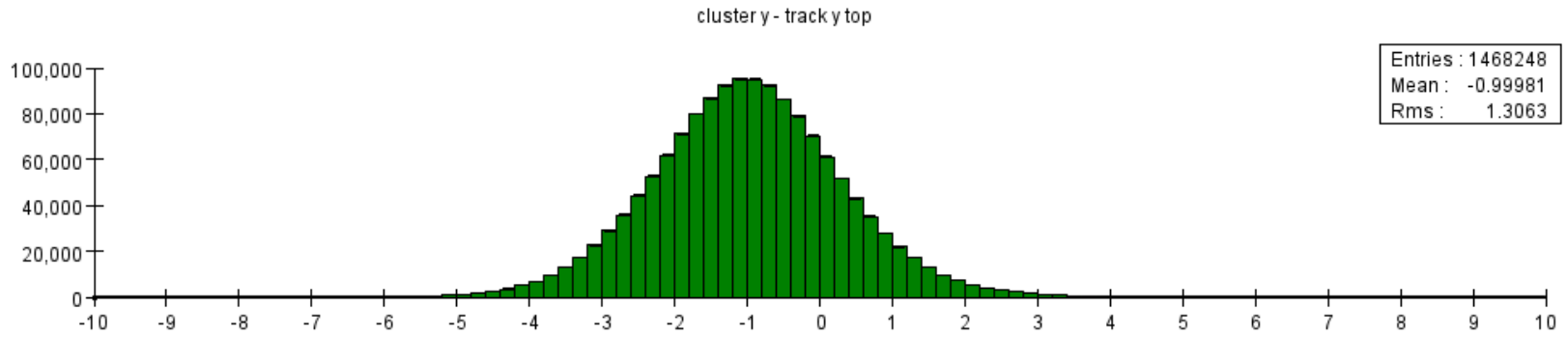


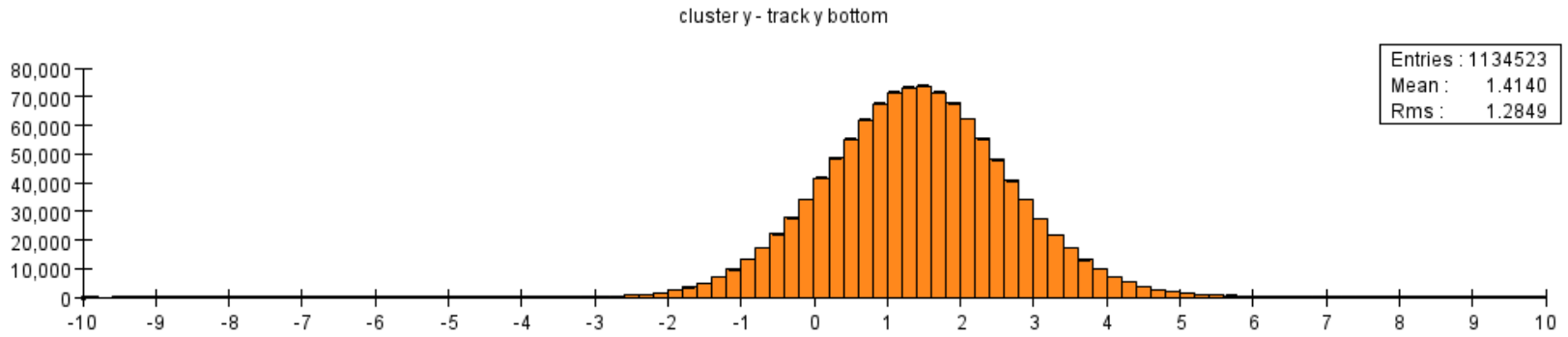



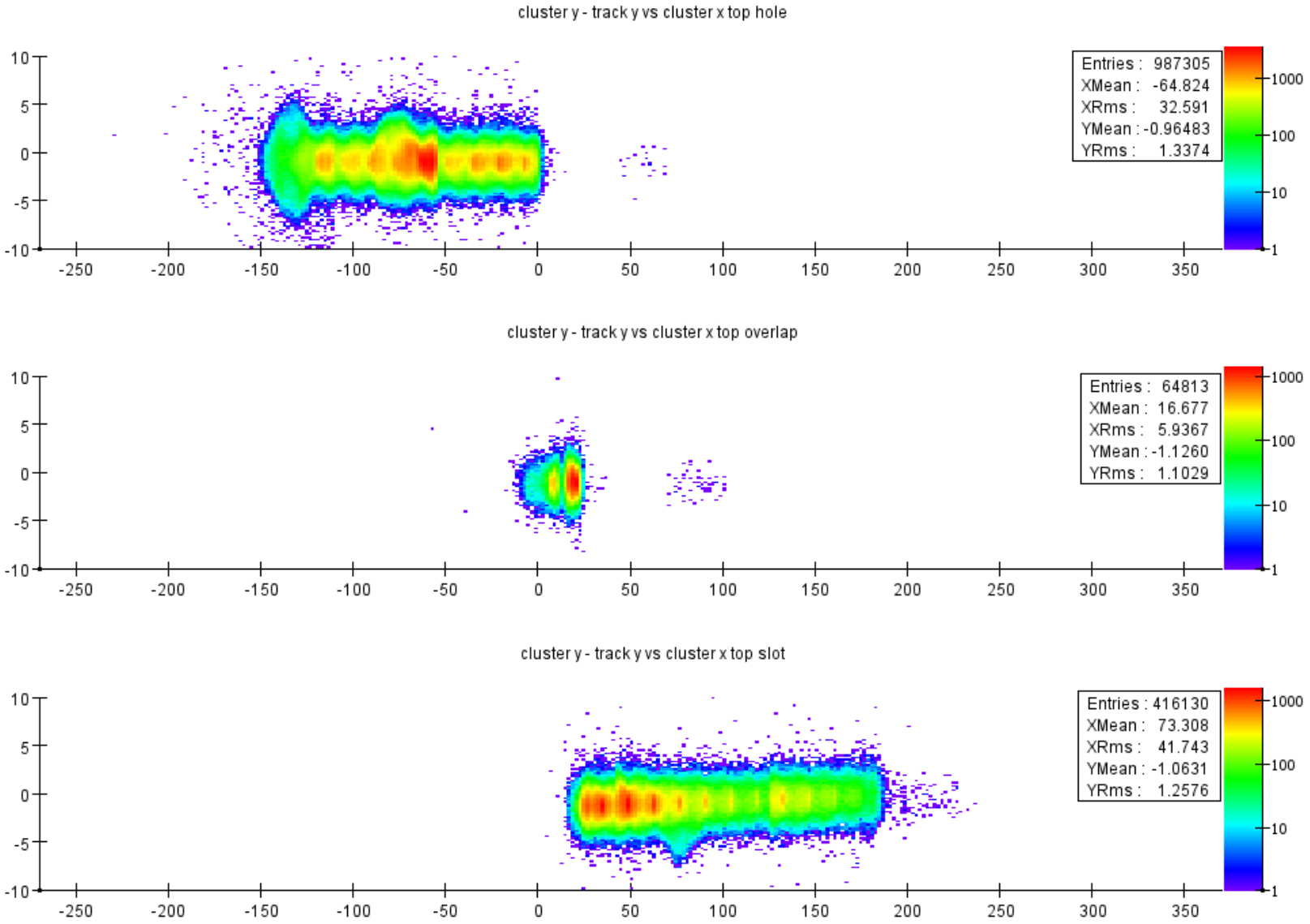
# Cluster Y – Track Y



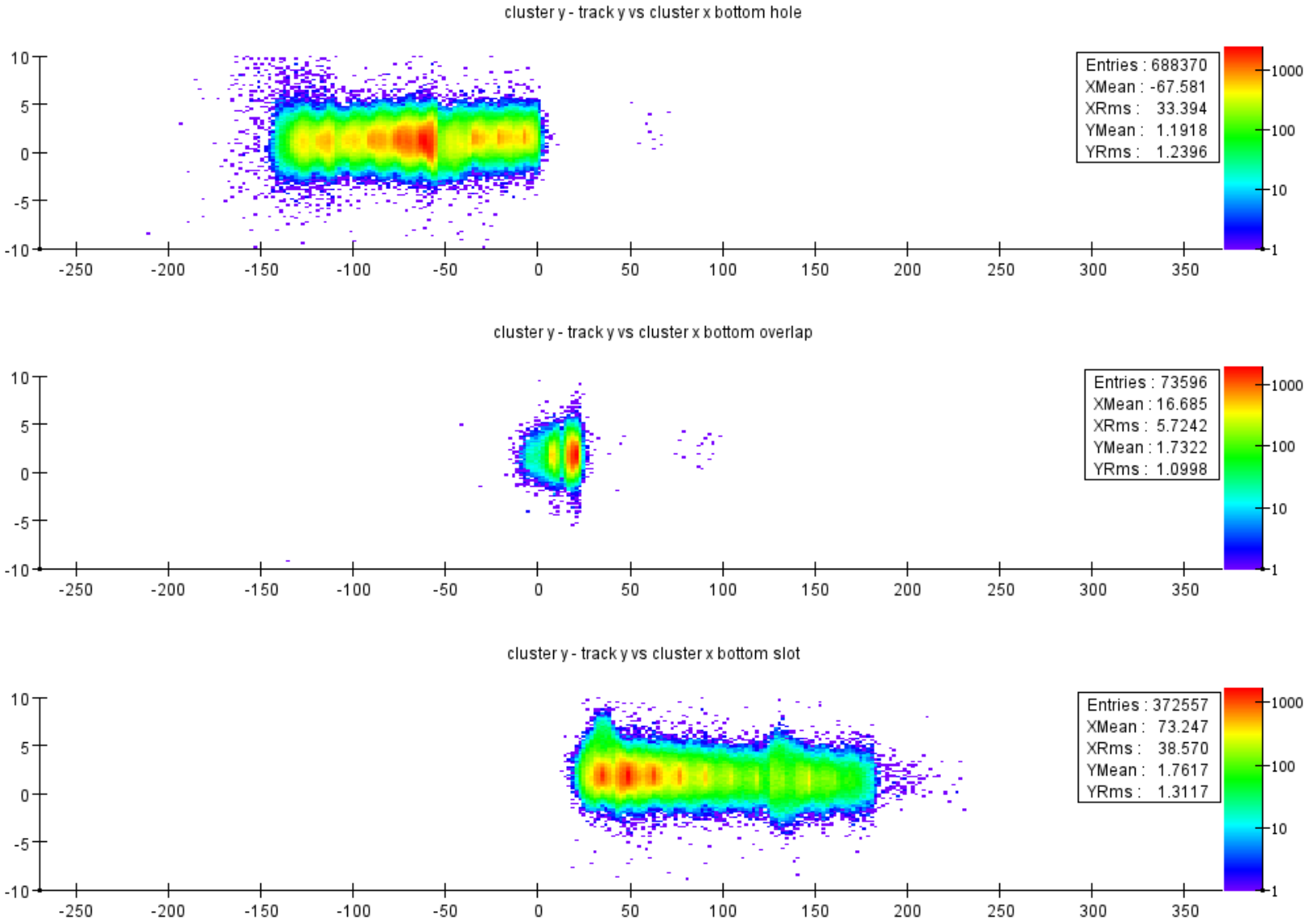



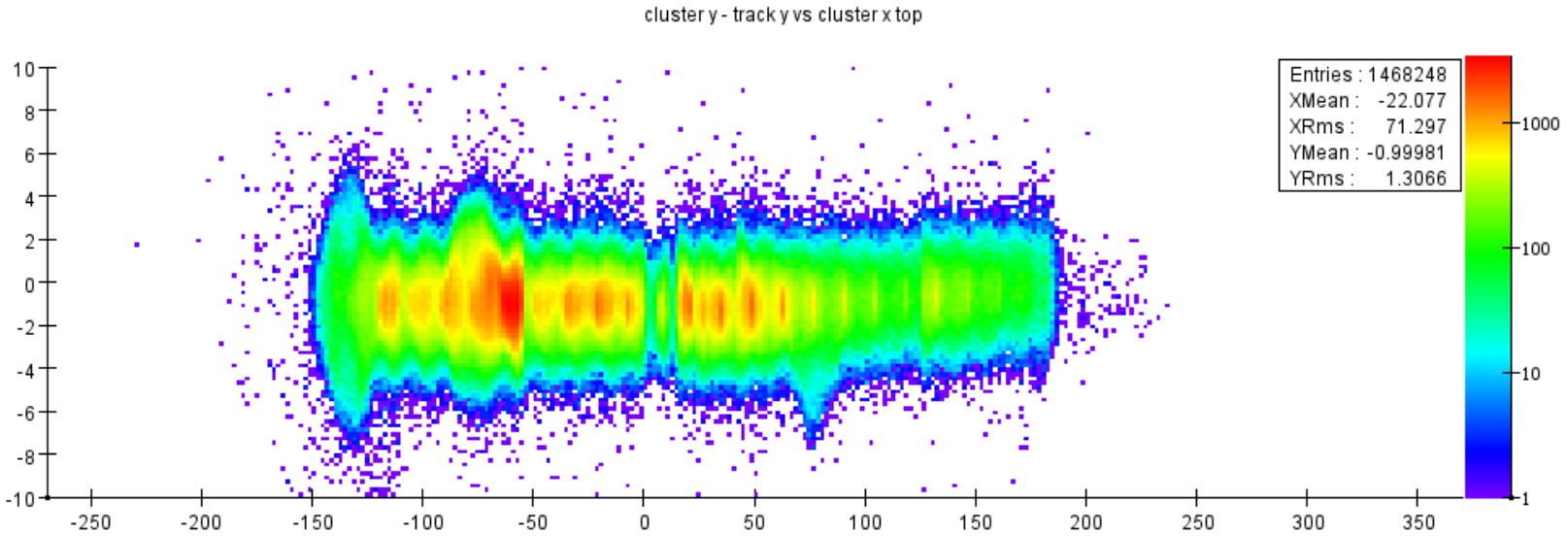
# Cluster Y – Track Y vs Cluster X

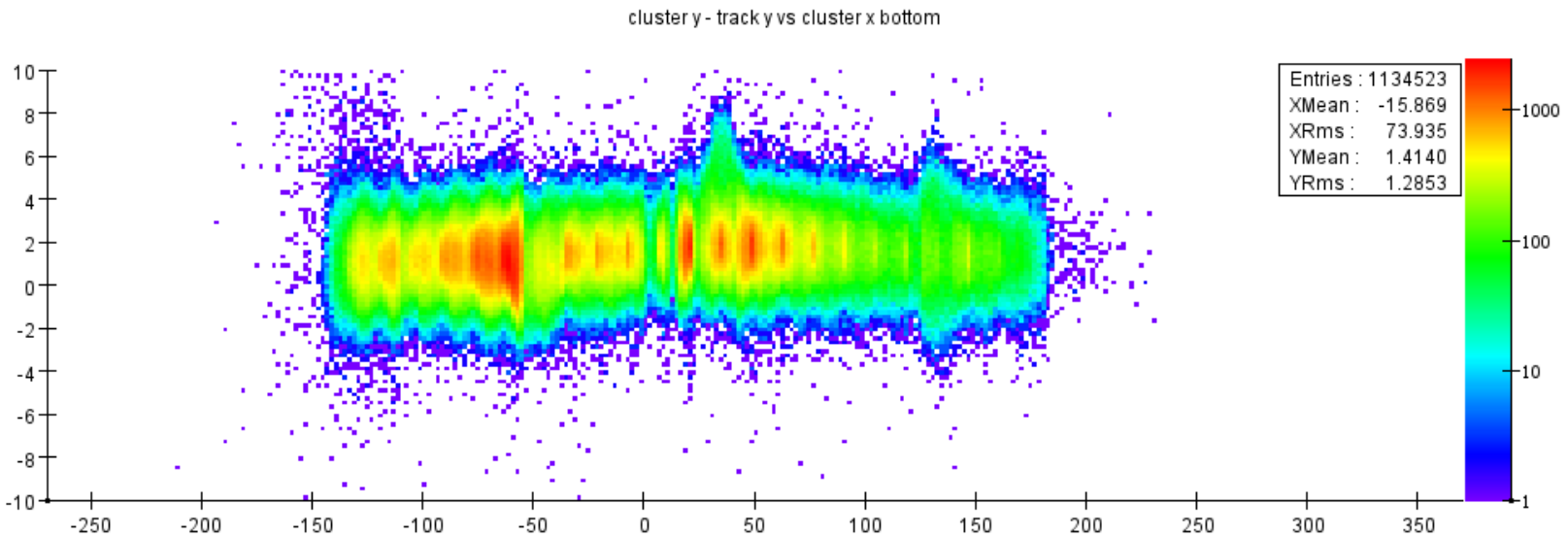


# Cluster Y – Track Y vs Cluster X

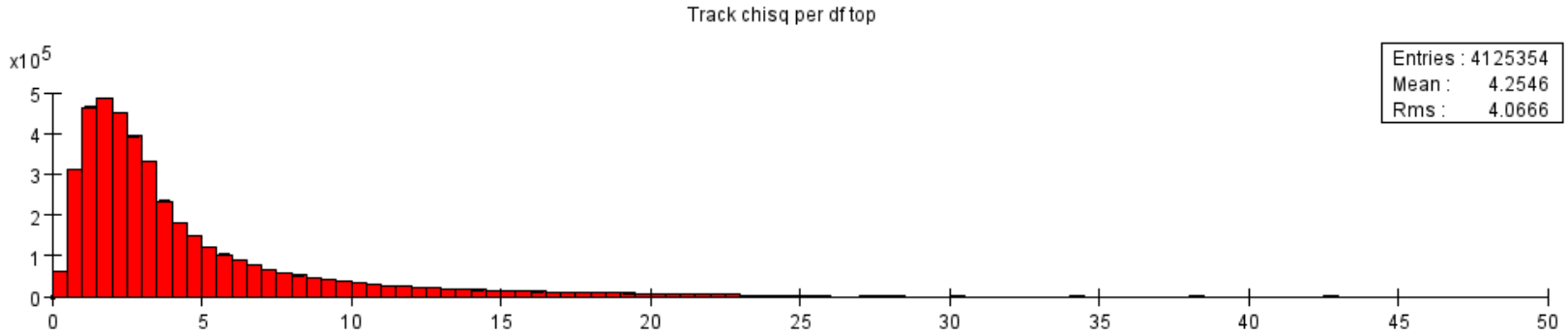


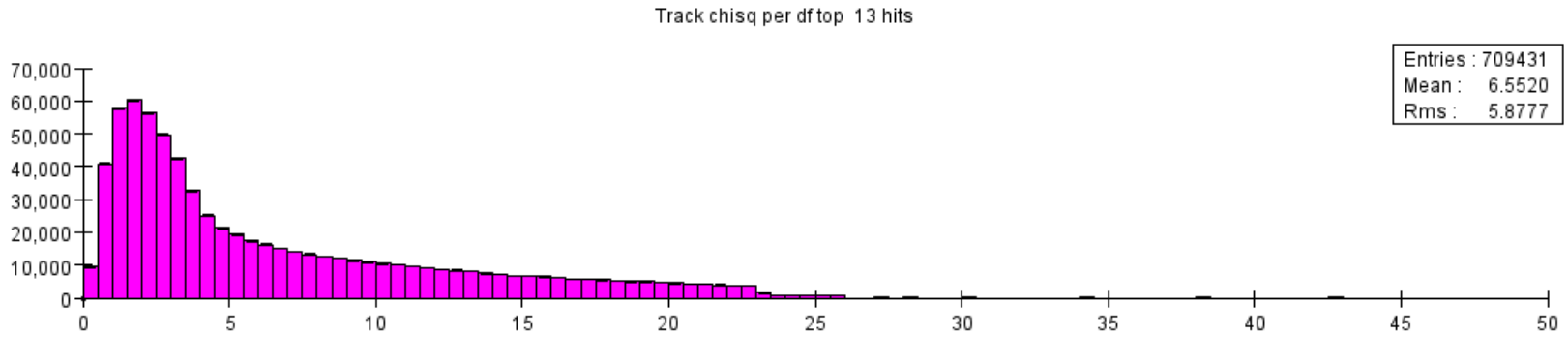
# Cluster Y – Track Y vs Cluster X

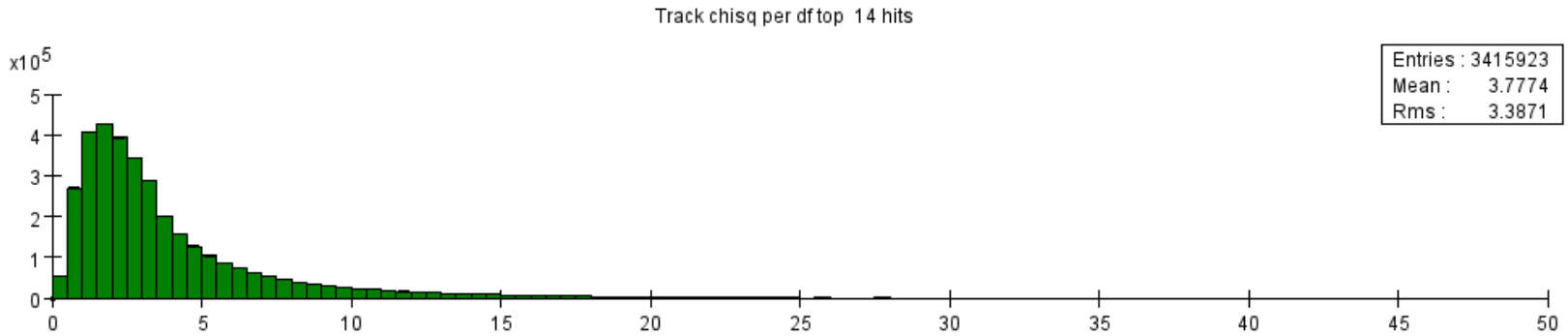


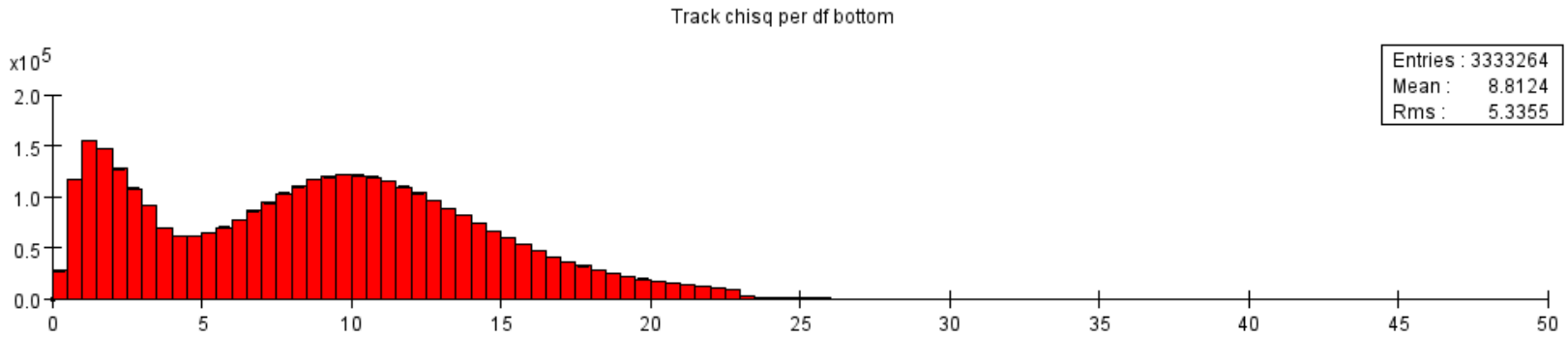
# Track $\chi^2$

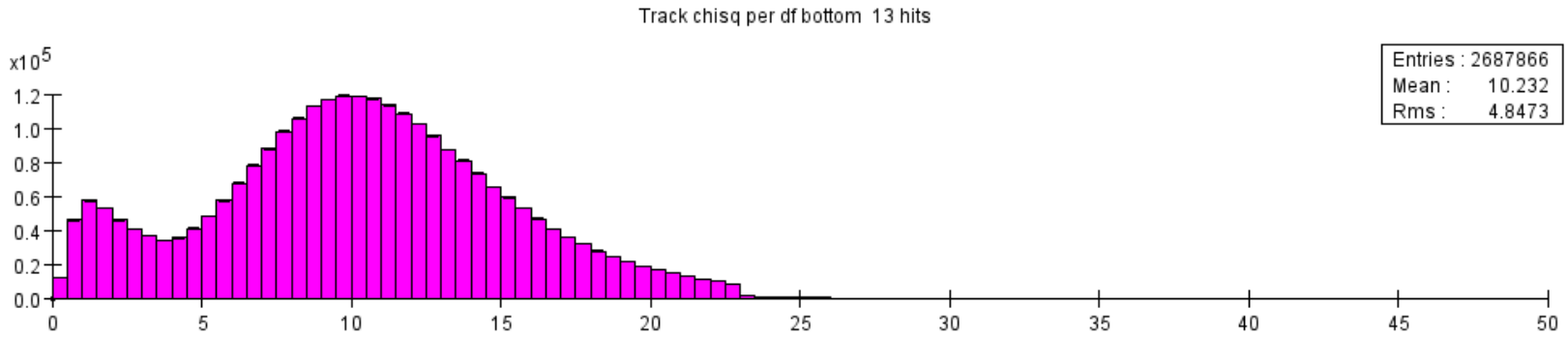

Track chisq per df top
x10^5
Entries : 4125354
Mean : 4.2546
Rms : 4.0666

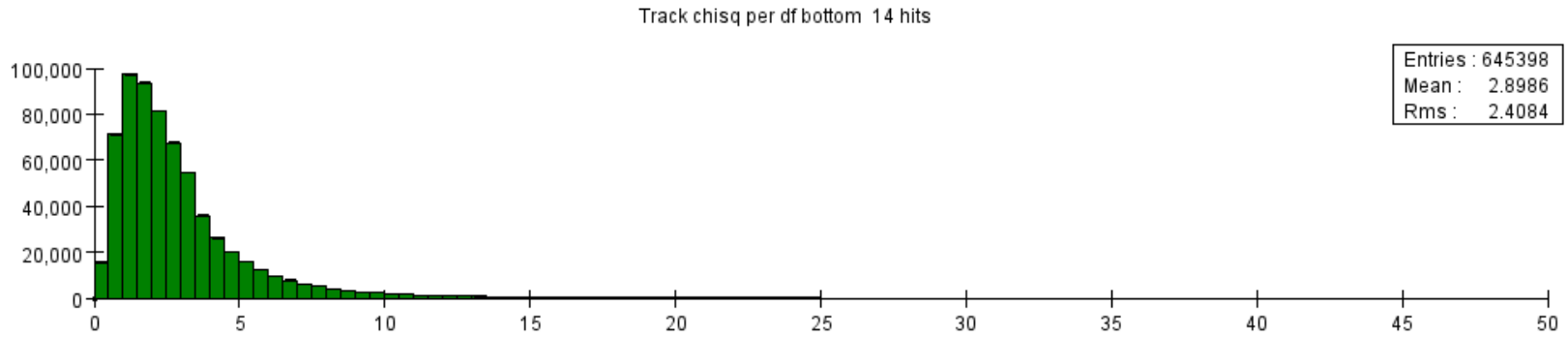

Track chisq per df top 13 hits
Entries : 709431
Mean : 6.5520
Rms : 5.8777


Track chisq per df top 14 hits
x10^5
Entries : 3415923
Mean : 3.7774
Rms : 3.3871

# Track $\chi^2$


Track chisq per df bottom
x10^5
2.0
1.5
1.0
0.5
0.0
0
5
10
15
20
25
30
35
40
45
50
Entries : 3333264
Mean : 8.8124
Rms : 5.3355


Track chisq per df bottom 13 hits
x10^5
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0
5
10
15
20
25
30
35
40
45
50
Entries : 2687866
Mean : 10.232
Rms : 4.8473


Track chisq per df bottom 14 hits
100,000
80,000
60,000
40,000
20,000
0
0
5
10
15
20
25
30
35
40
45
50
Entries : 645398
Mean : 2.8986
Rms : 2.4084

# Update of FEE analysis of Run 14168

- Cluster energy and track momenta appear to be OK at beam energy.
- Track momentum appears flat as a function of tan$\lambda$
- Track-cluster X positions show large (up to 5mm), excursions from zero, opposite in top and bottom
  - Clear dependence on x of cluster
- Track-cluster Y positions show substantial (~1.4mm) excursions from zero, opposite in top and bottom
  - Roughly flat in x of cluster position
- $\chi^2$ for bottom tracks with 13 hits anomalously large.