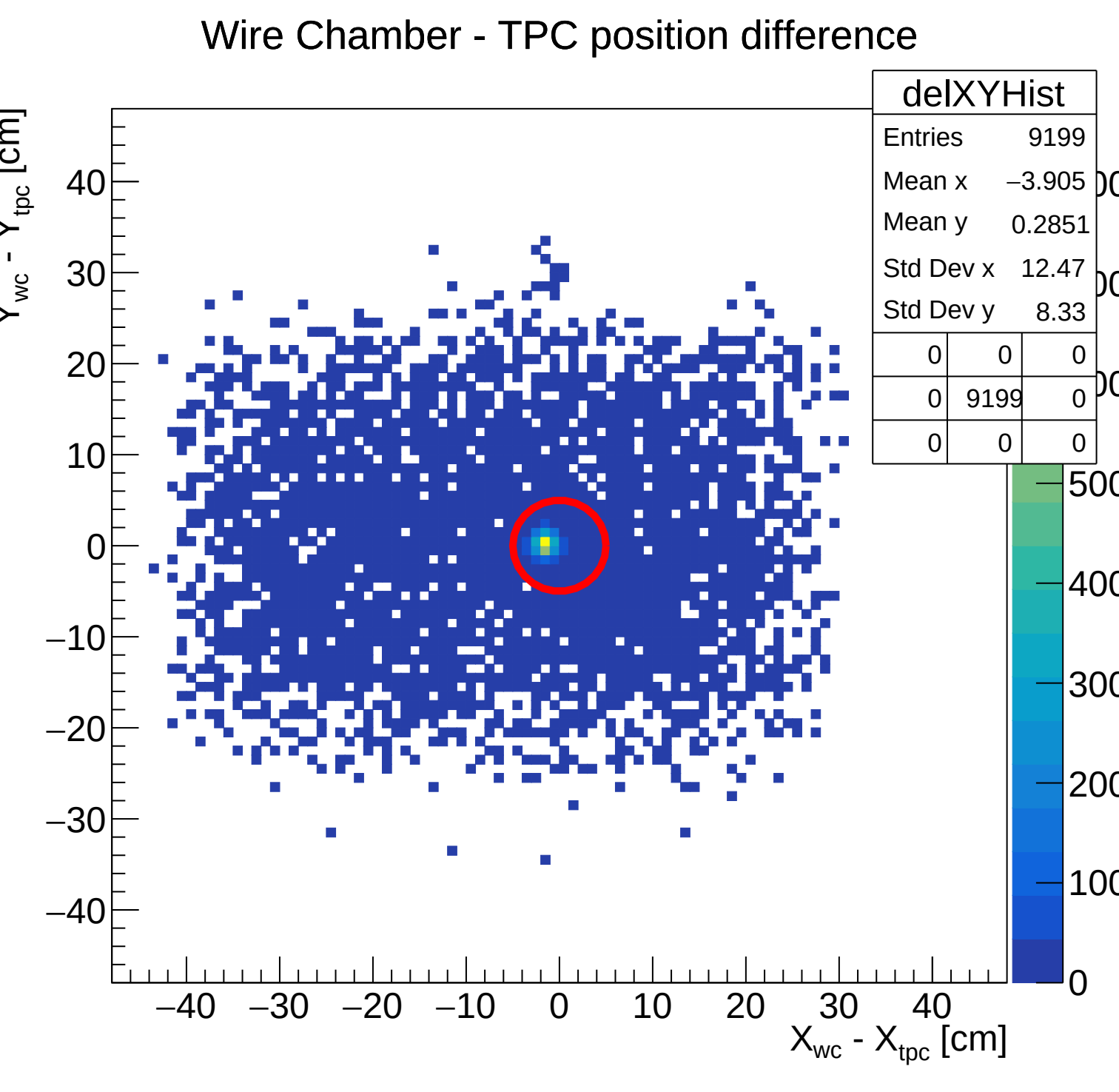
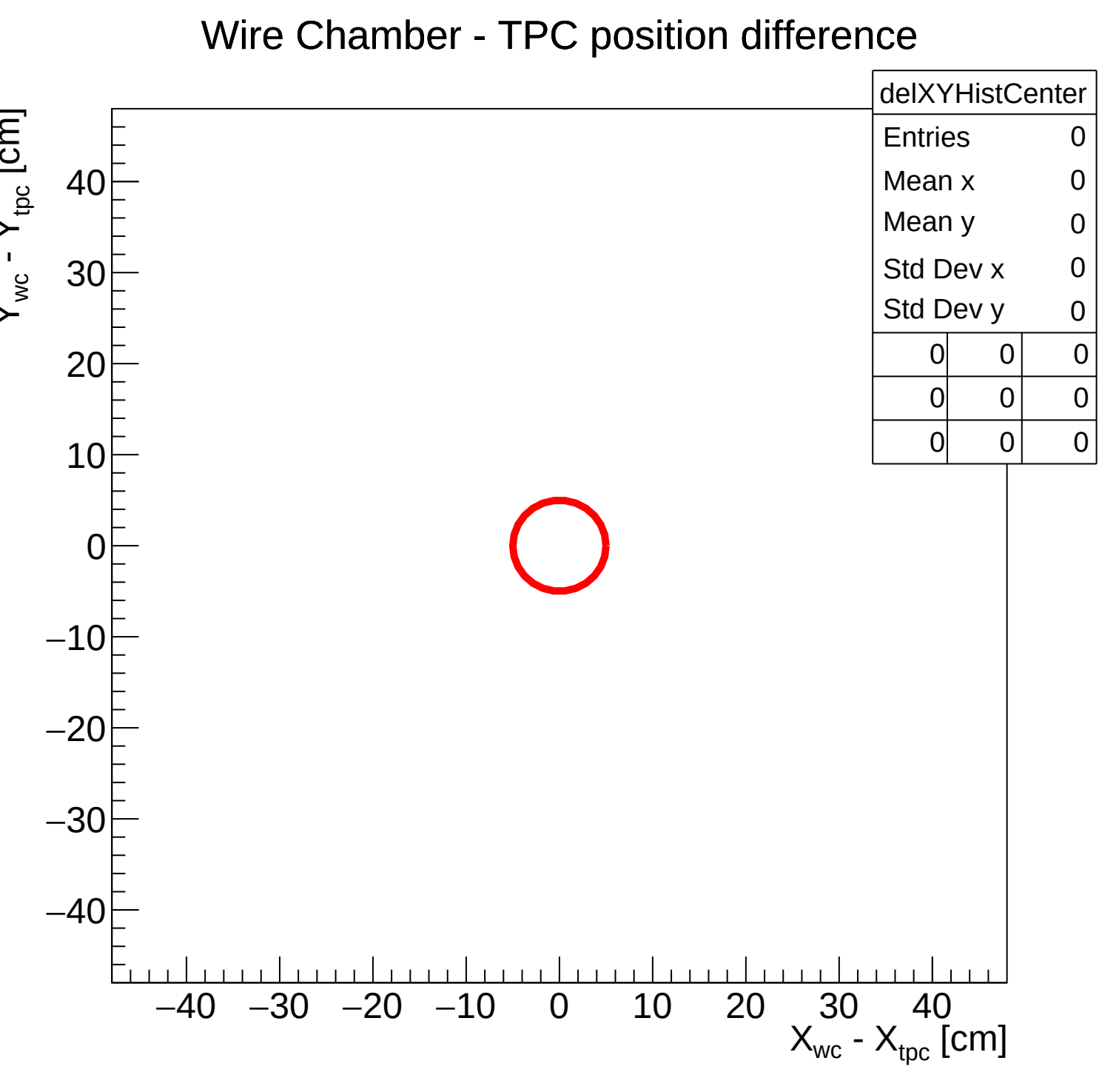
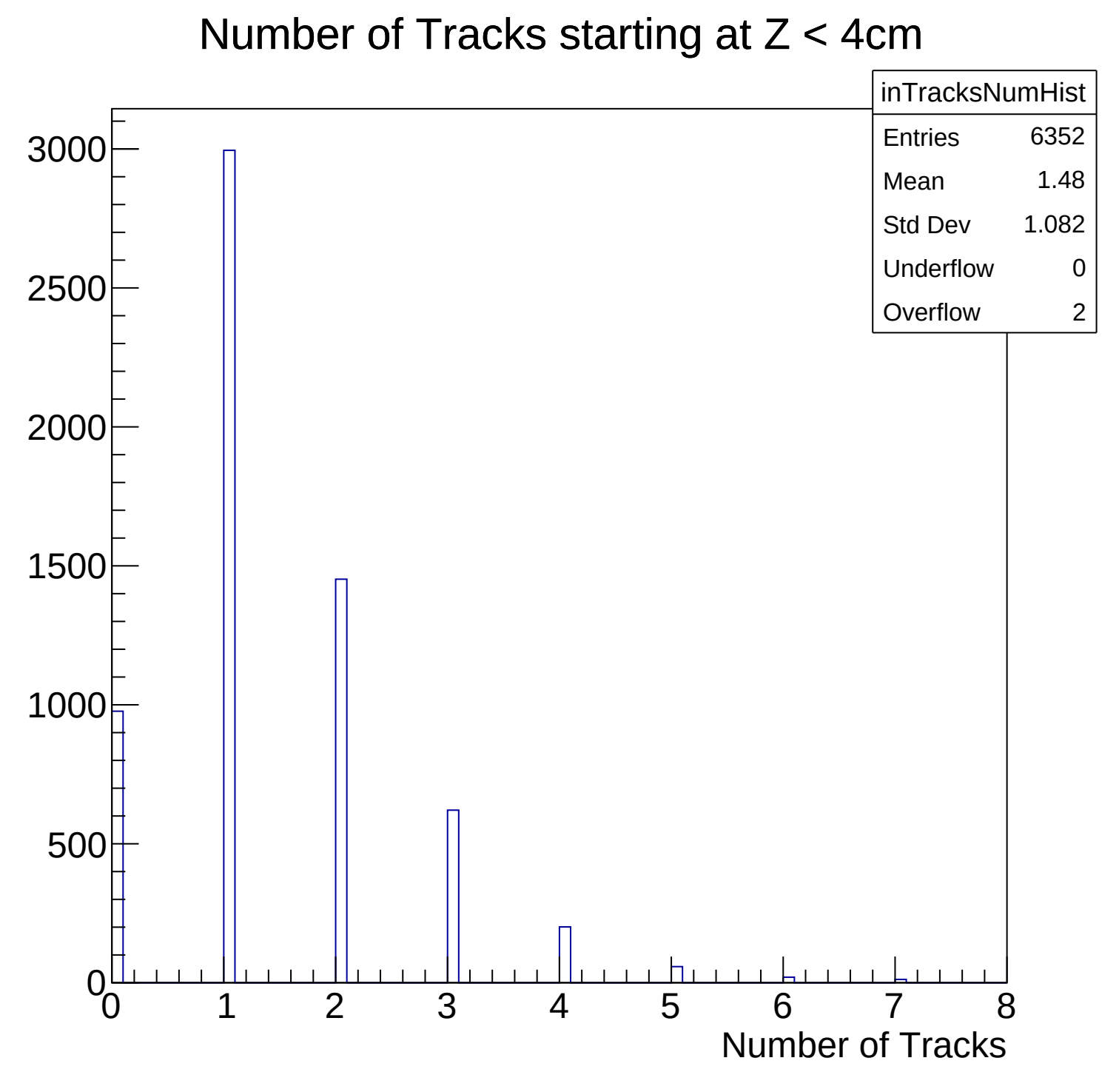
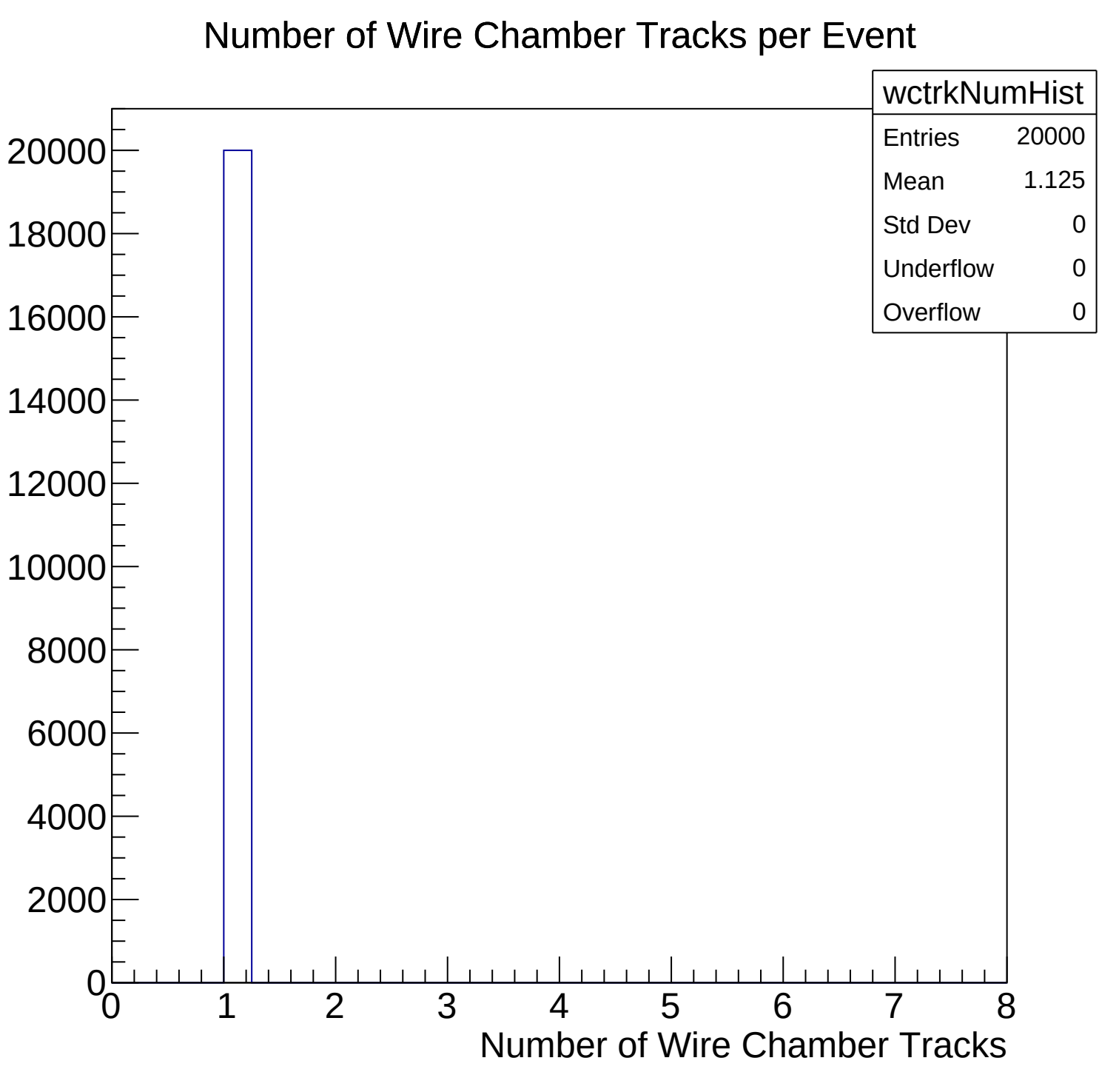
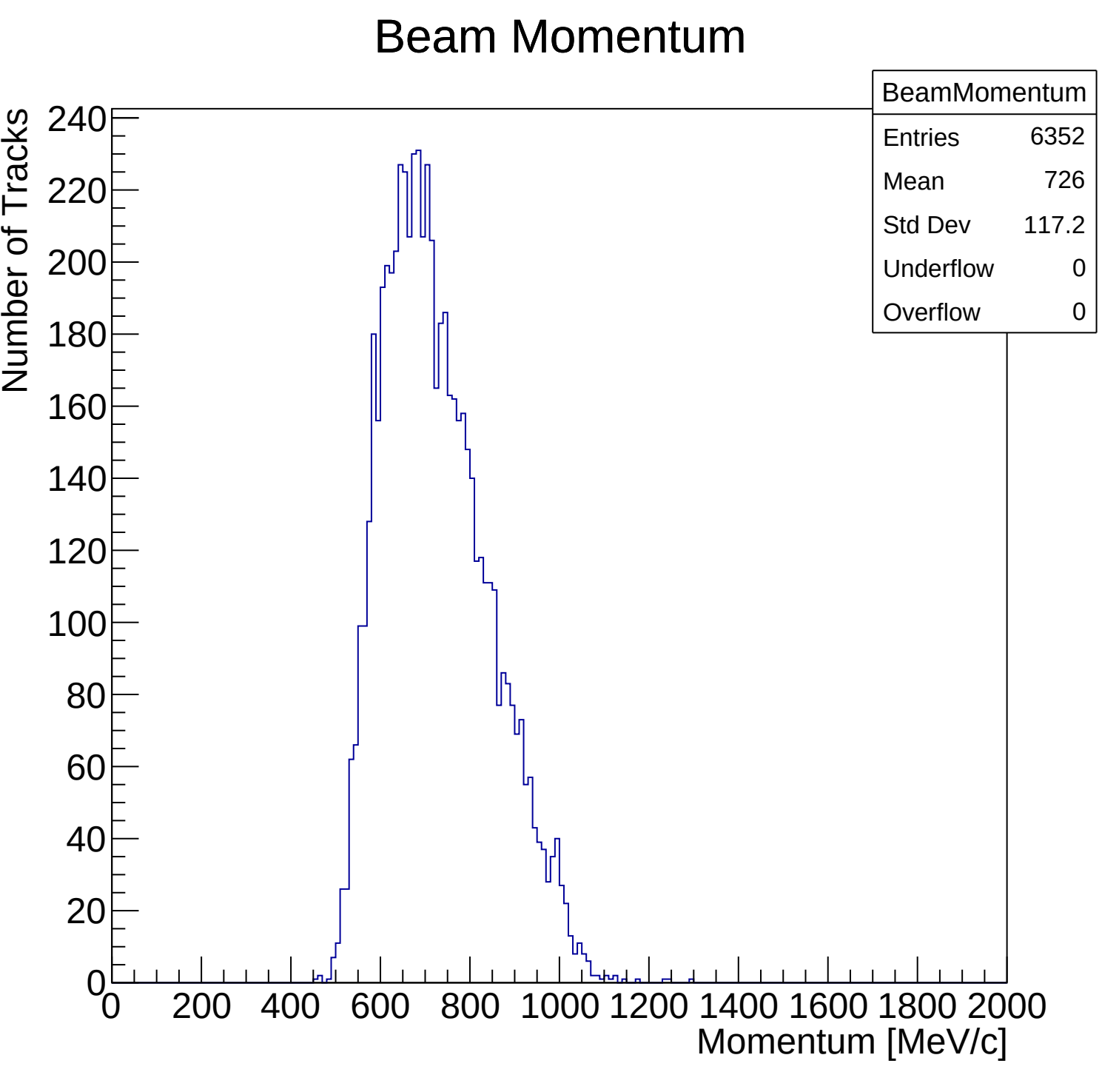
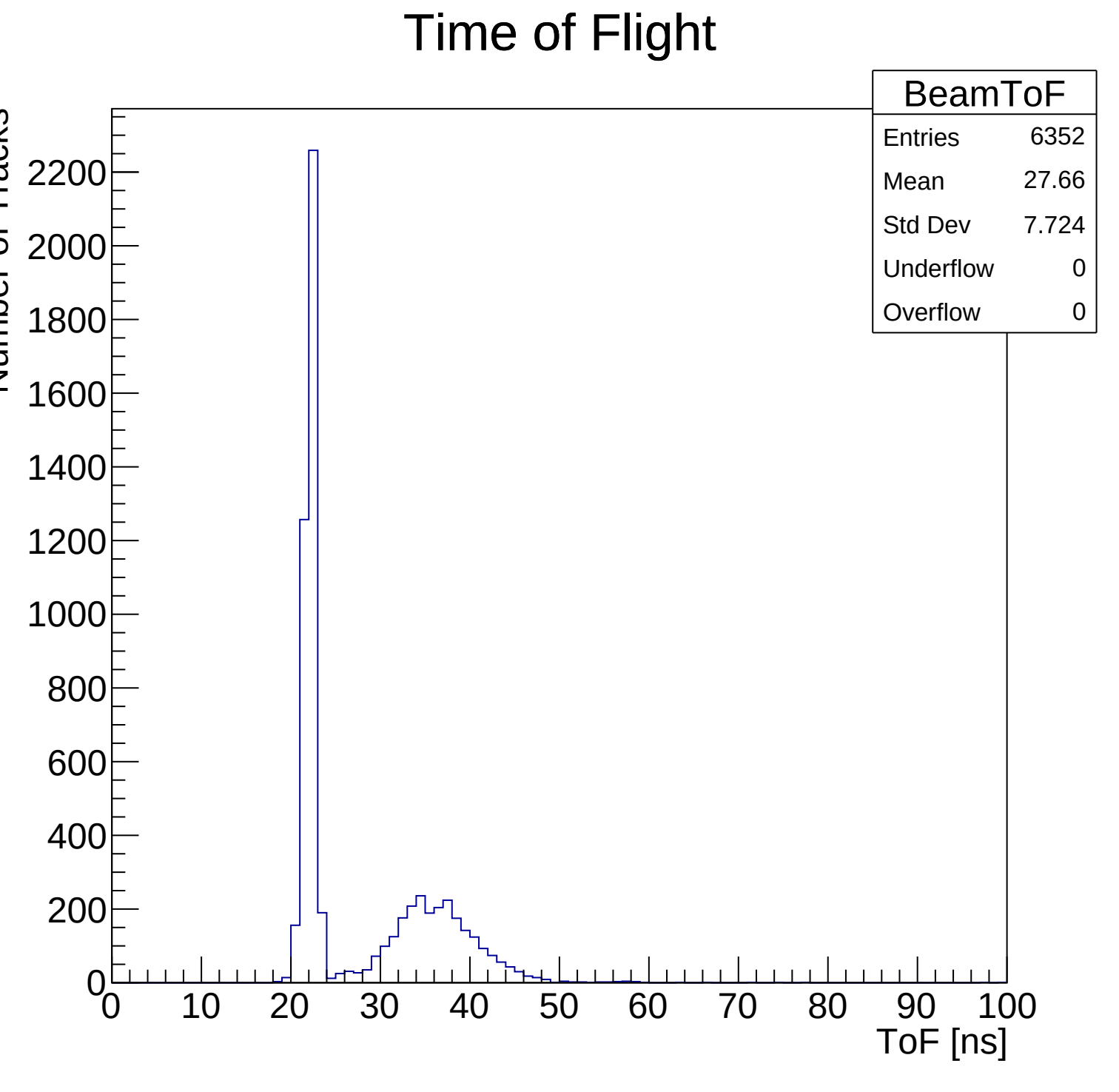

Wire Chamber - TPC position difference
delXYHist
Entries 9199
Mean x −3.905
Mean y 0.2851
Std Dev x 12.47
Std Dev y 8.33
0 0 0
0 9199 0
0 0 0
Y_{wc} - Y_{tpc} [cm]
X_{wc} - X_{tpc} [cm]
40
30
20
10
0
−10
−20
−30
−40
500
400
300
200
100
0

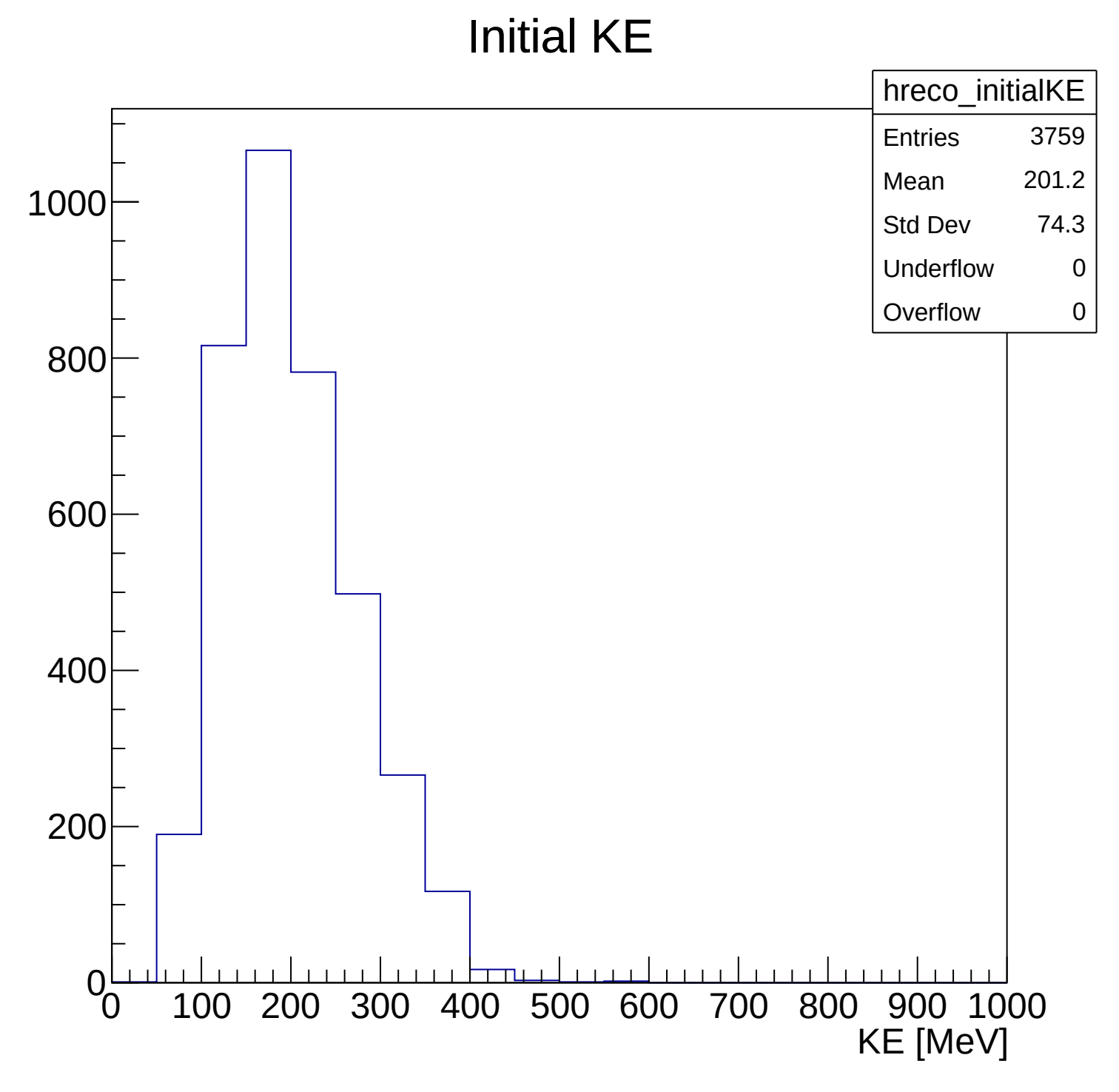

Wire Chamber - TPC position difference
delXYHistCenter
Entries 0
Mean x 0
Mean y 0
Std Dev x 0
Std Dev y 0
0 0 0
0 0 0
0 0 0
$Y_{wc} - Y_{tpc}$ [cm]
40
30
20
10
0
−10
−20
−30
−40
−40 −30 −20 −10 0 10 20 30 40
$X_{wc} - X_{tpc}$ [cm]

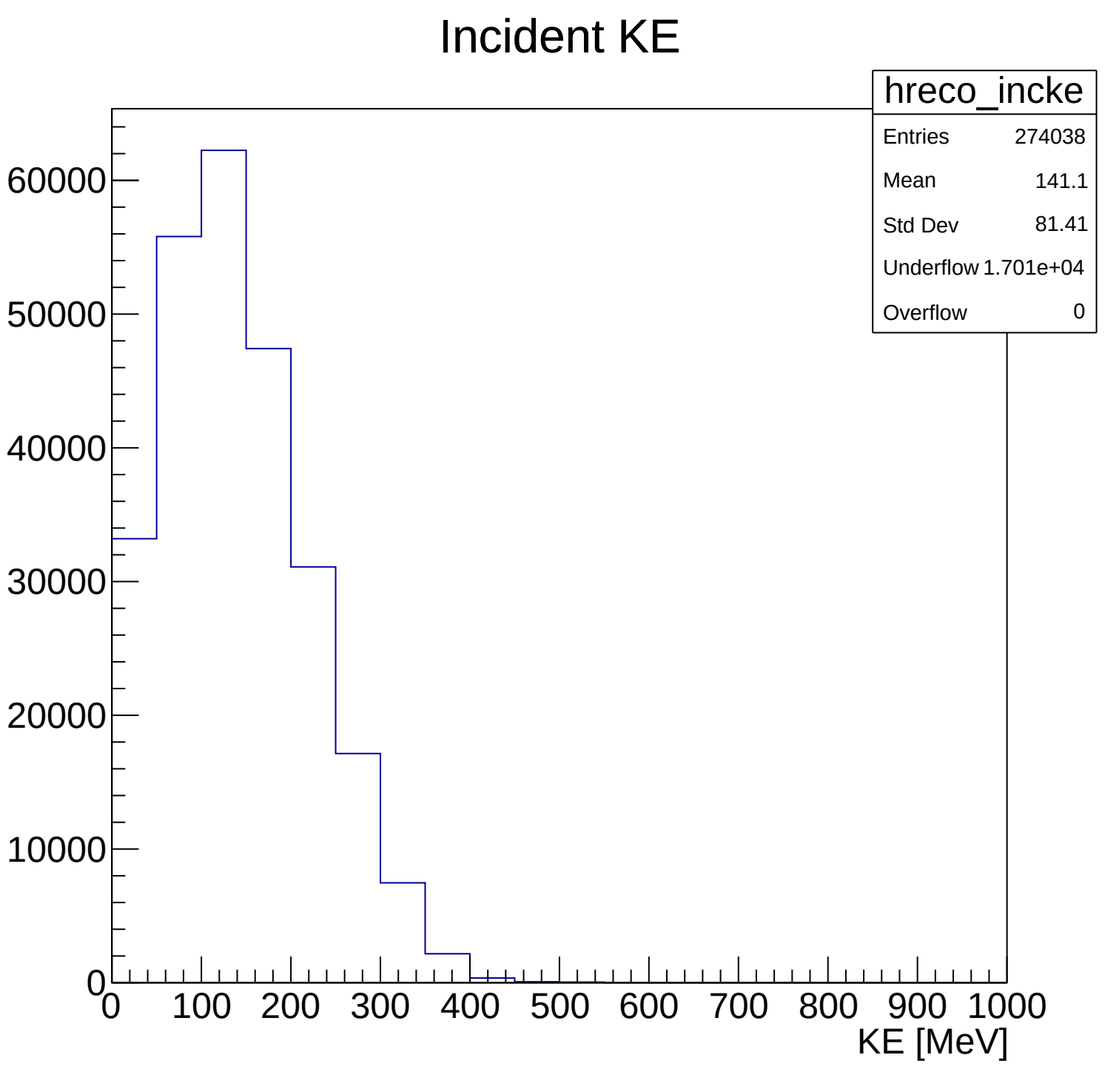

Number of Tracks starting at Z < 4cm
inTracksNumHist
Entries 6352
Mean 1.48
Std Dev 1.082
Underflow 0
Overflow 2
3000
2500
2000
1500
1000
500
0
0
1
2
3
4
5
6
7
8
Number of Tracks

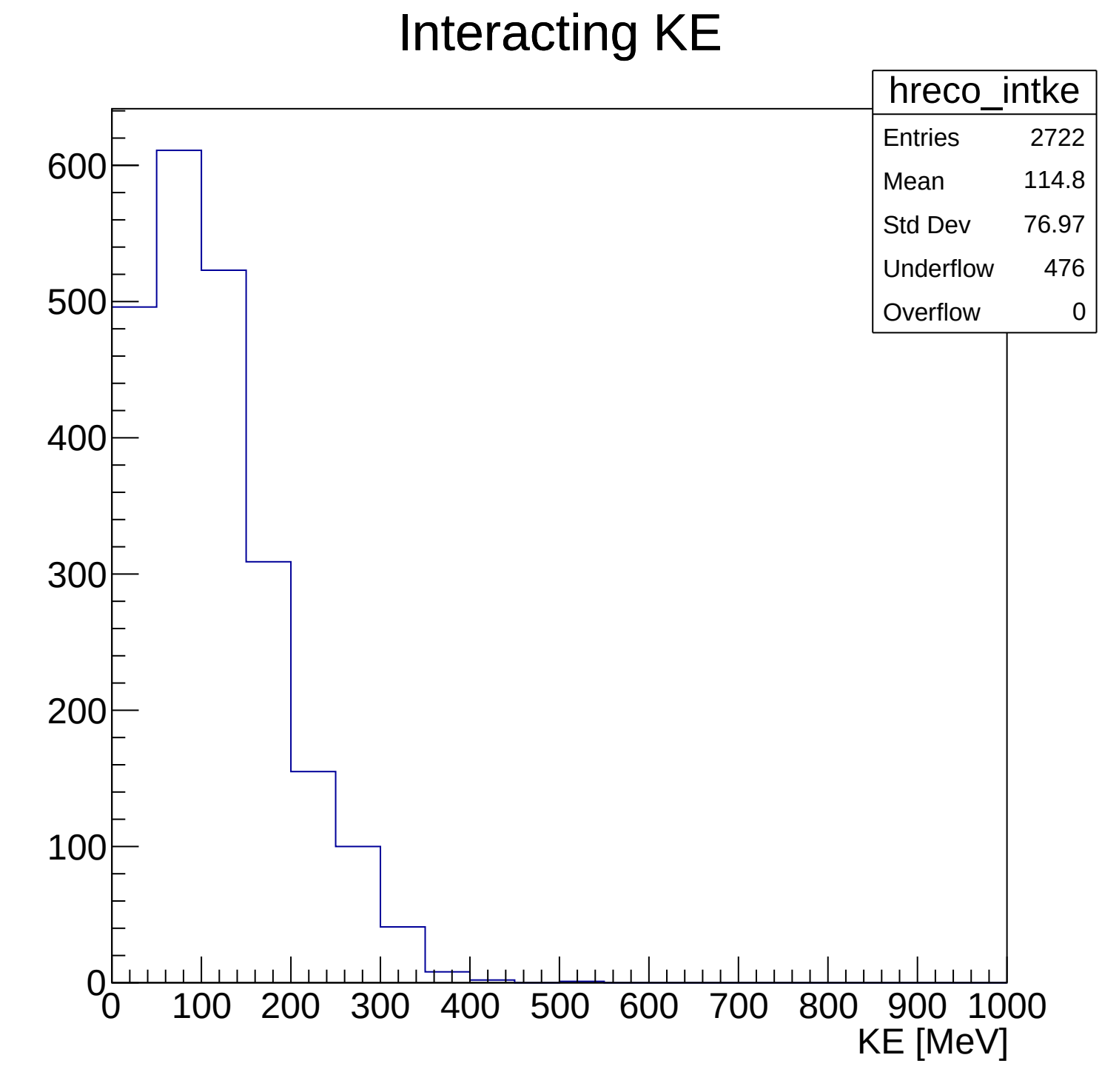

Number of Wire Chamber Tracks per Event
wctrkNumHist
Entries 20000
Mean 1.125
Std Dev 0
Underflow 0
Overflow 0
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
0 1 2 3 4 5 6 7 8
Number of Wire Chamber Tracks

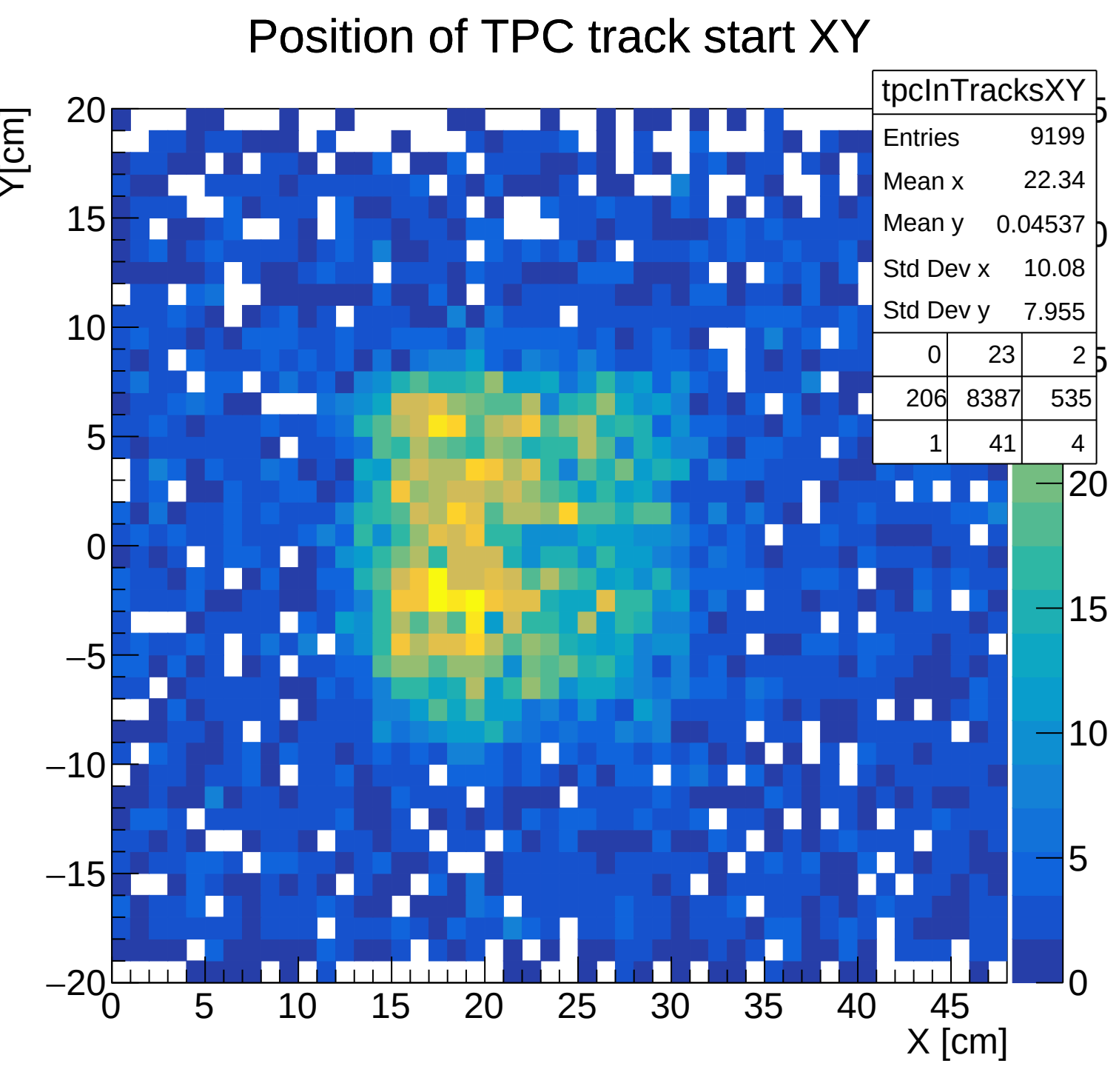

Beam Momentum
BeamMomentum
Entries 6352
Mean 726
Std Dev 117.2
Underflow 0
Overflow 0
Number of Tracks
0
20
40
60
80
100
120
140
160
180
200
220
240
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Momentum [MeV/c]

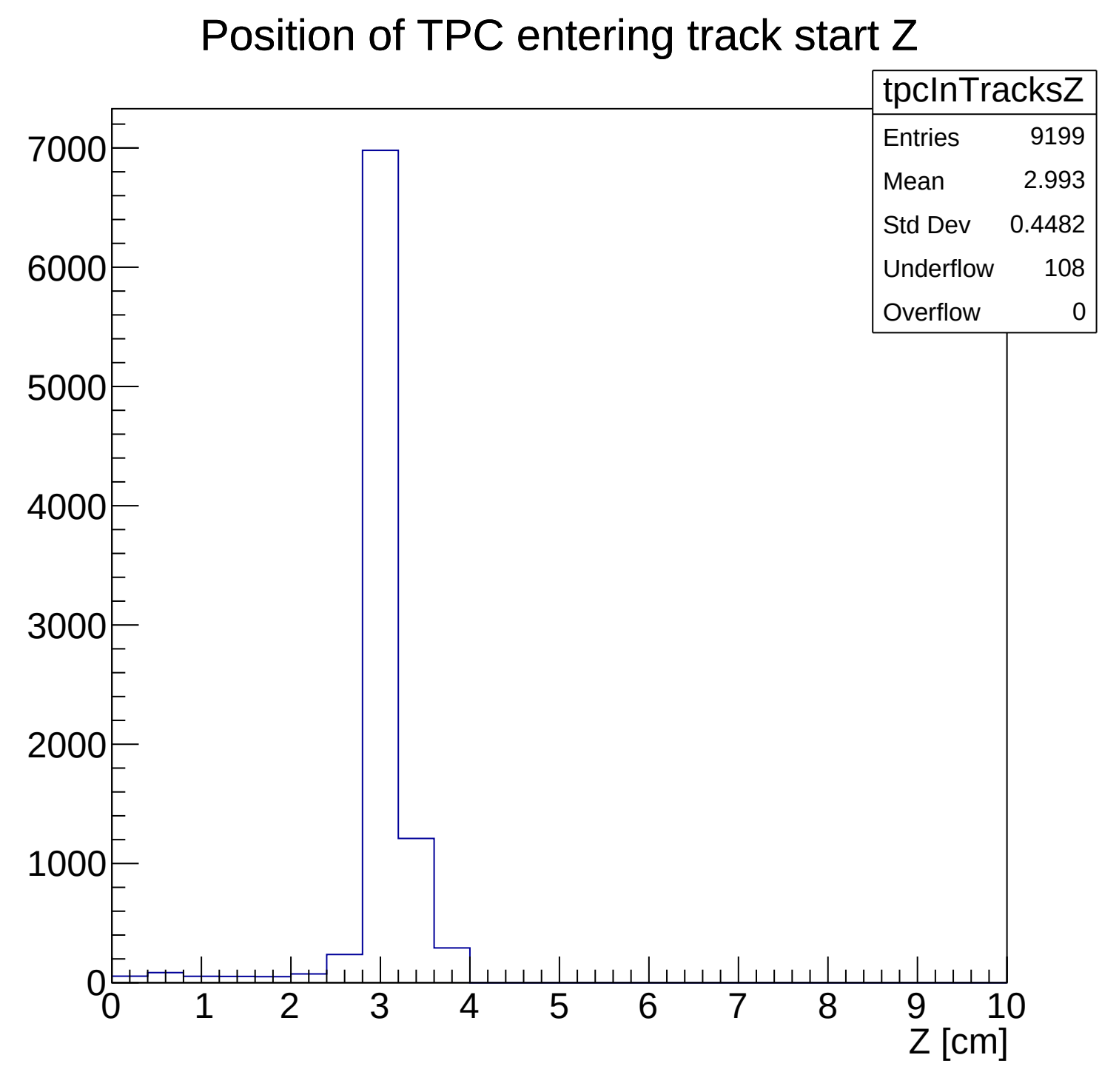

Time of Flight
BeamToF
Entries 6352
Mean 27.66
Std Dev 7.724
Underflow 0
Overflow 0
Number of Tracks
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
0
10
20
30
40
50
60
70
80
90
100
ToF [ns]

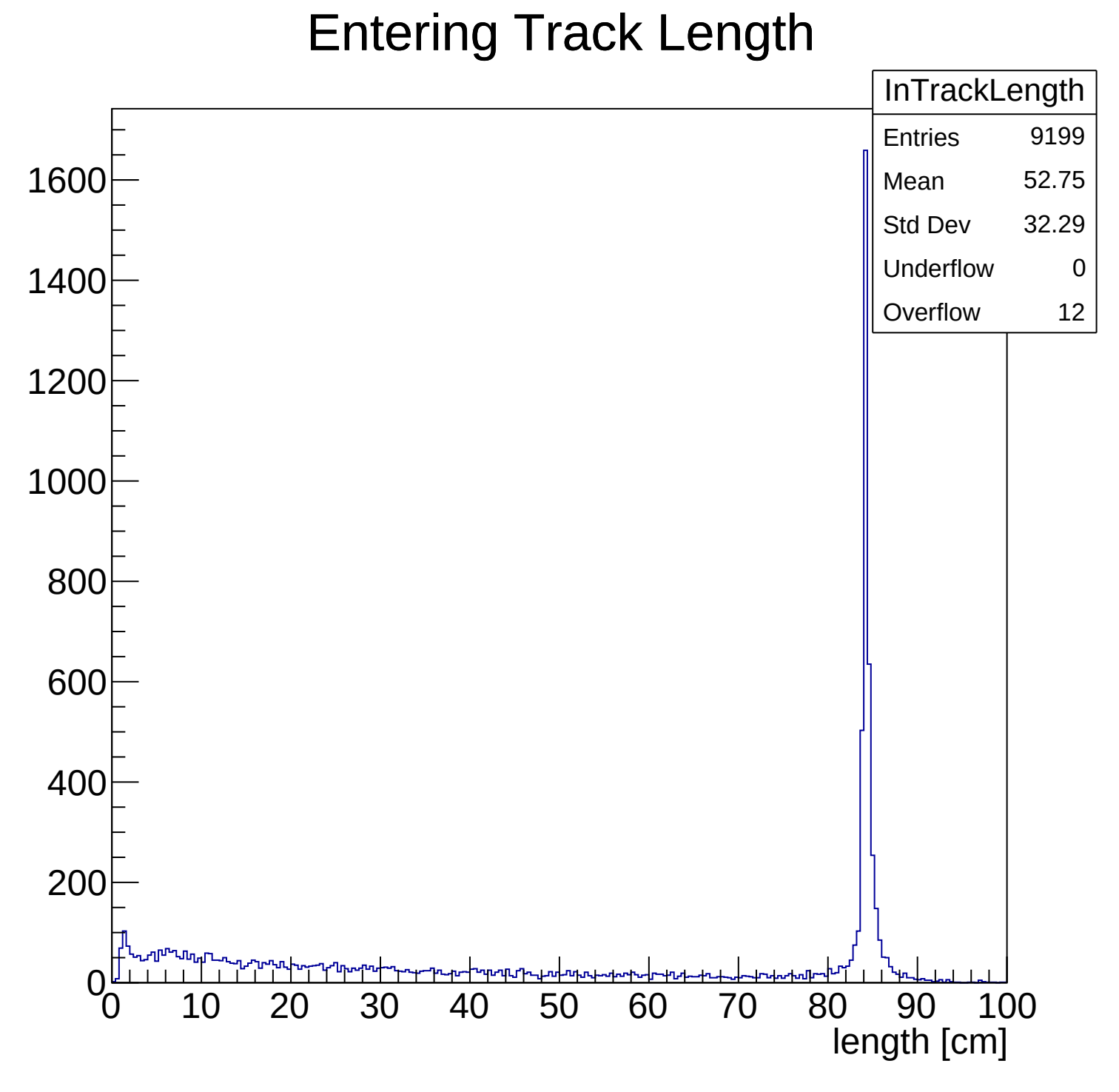

Initial KE
hreco_initialKE
Entries 3759
Mean 201.2
Std Dev 74.3
Underflow 0
Overflow 0
1000
800
600
400
200
0
0 100 200 300 400 500 600 700 800 900 1000
KE [MeV]

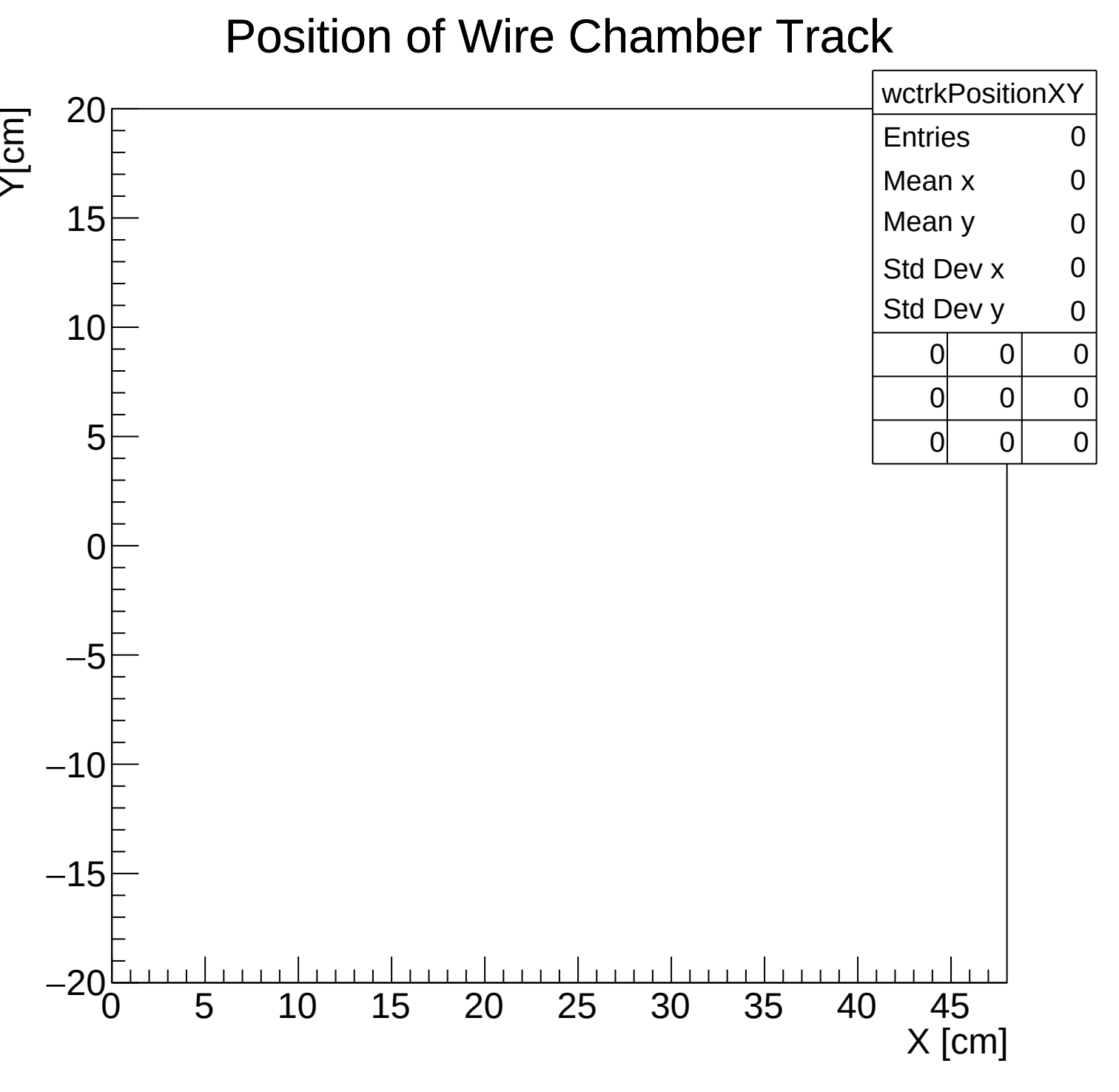

Incident KE
hreco_incke
Entries 274038
Mean 141.1
Std Dev 81.41
Underflow 1.701e+04
Overflow 0
60000
50000
40000
30000
20000
10000
0
0 100 200 300 400 500 600 700 800 900 1000
KE [MeV]

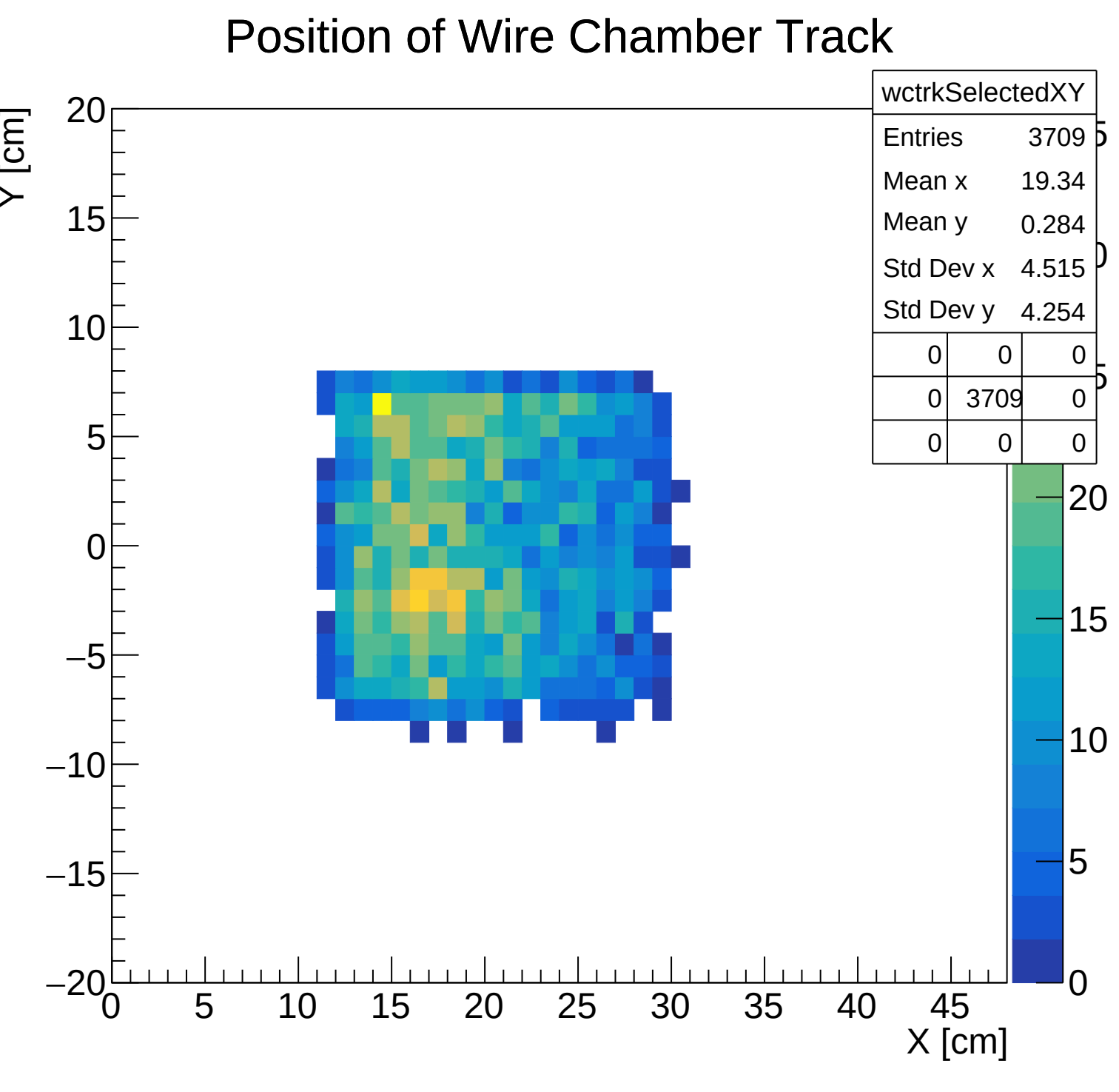

Interacting KE
hreco_intke
Entries 2722
Mean 114.8
Std Dev 76.97
Underflow 476
Overflow 0
600
500
400
300
200
100
0
0 100 200 300 400 500 600 700 800 900 1000
KE [MeV]

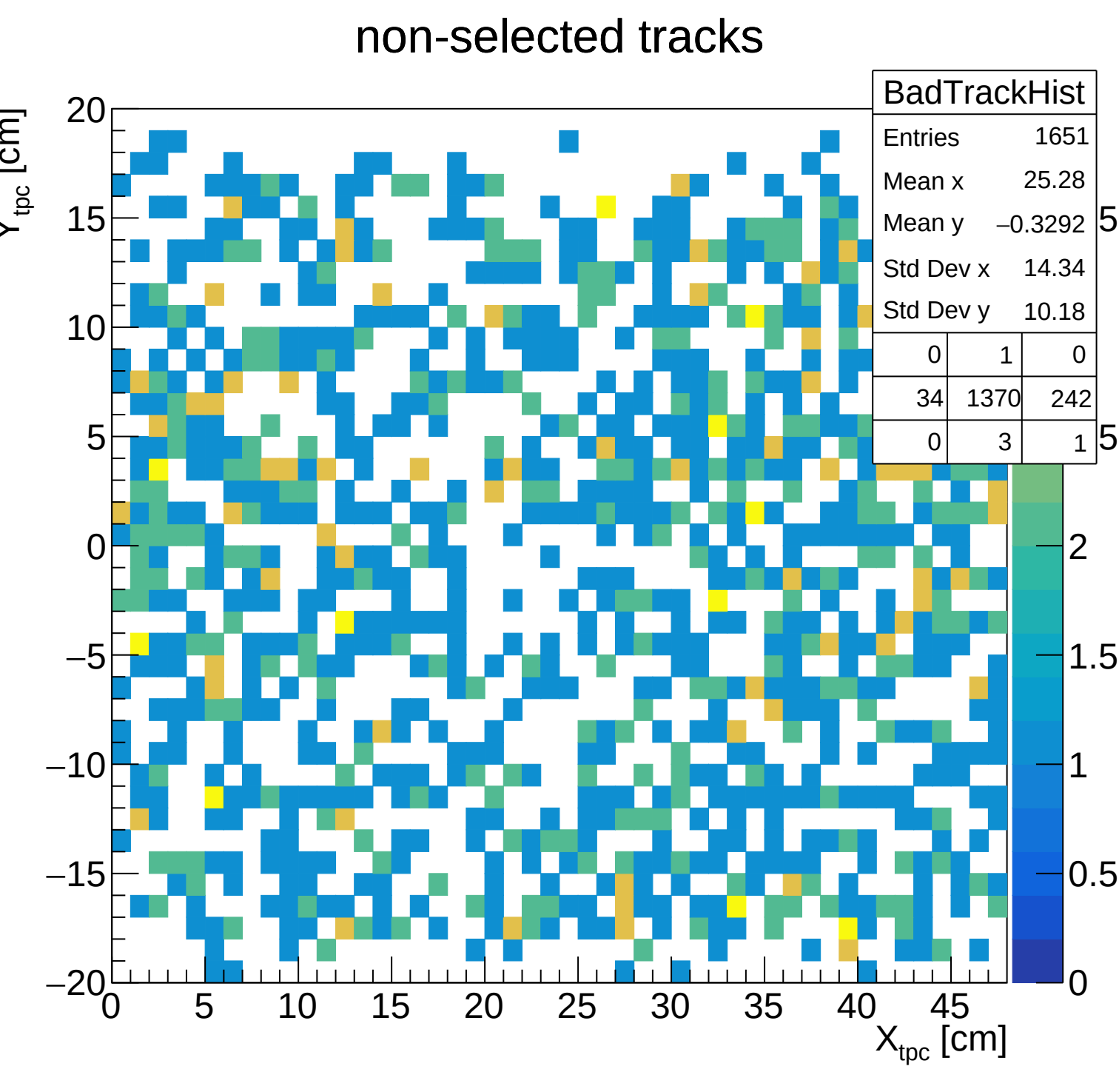

Position of TPC track start XY
tpcInTracksXY
Entries 9199
Mean x 22.34
Mean y 0.04537
Std Dev x 10.08
Std Dev y 7.955
0 23 2
206 8387 535
1 41 4
Y[cm]
X [cm]
20
15
10
5
0
−5
−10
−15
−20
0
5
10
15
20
25
30
35
40
45

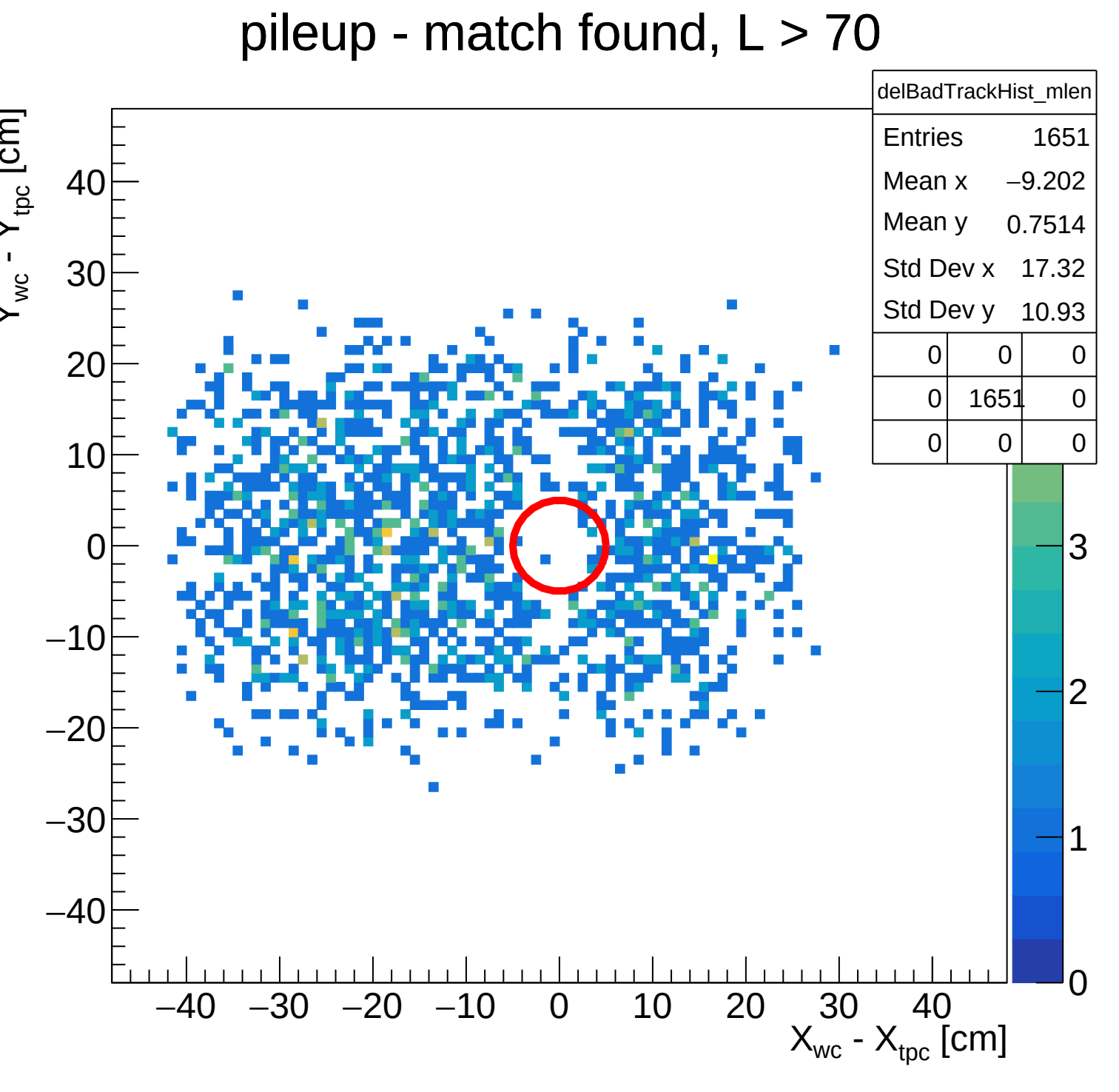

Position of TPC entering track start Z
tpcInTracksZ
Entries 9199
Mean 2.993
Std Dev 0.4482
Underflow 108
Overflow 0
7000
6000
5000
4000
3000
2000
1000
0
0 1 2 3 4 5 6 7 8 9 10
Z [cm]

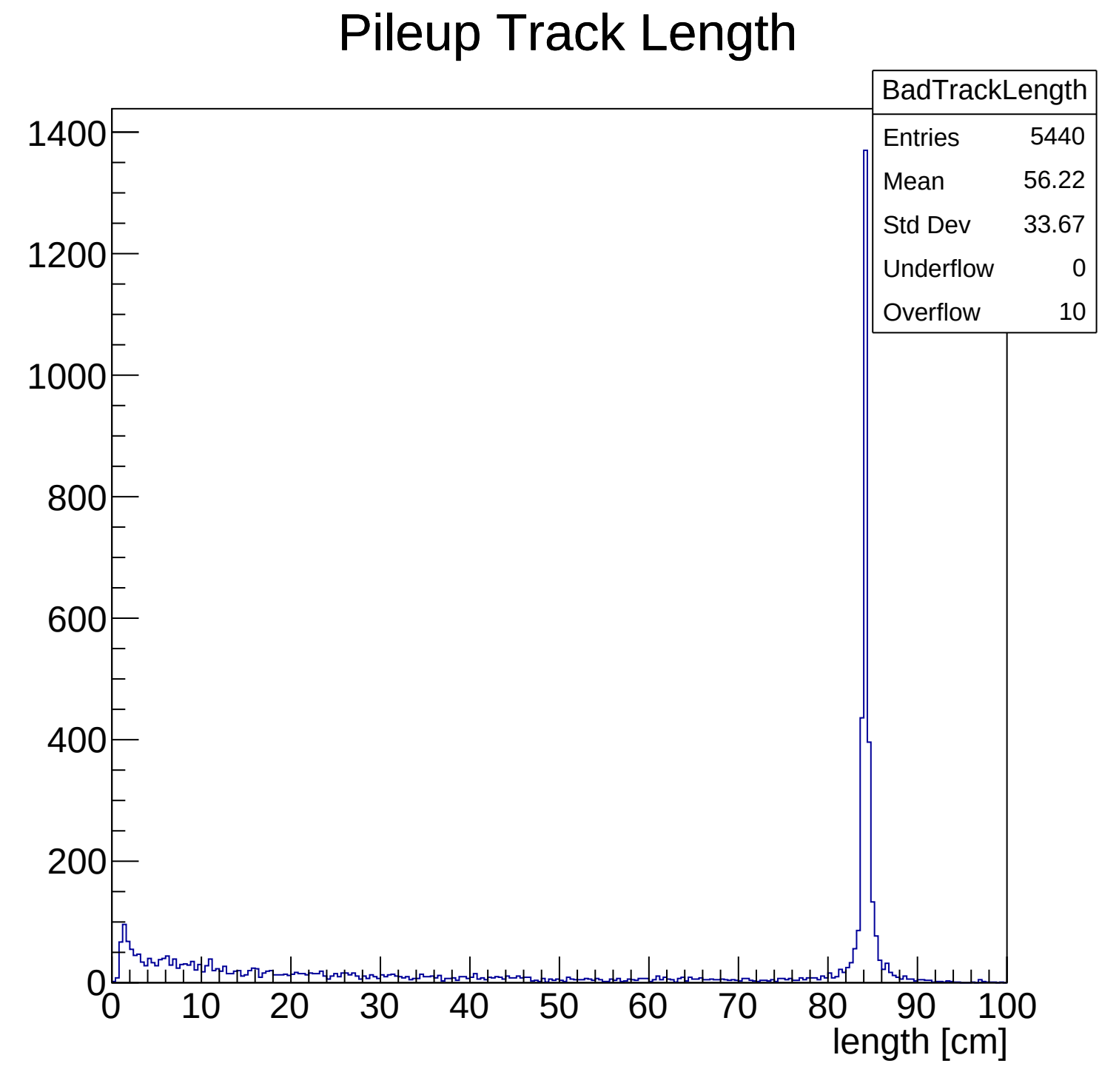

Entering Track Length
InTrackLength
Entries 9199
Mean 52.75
Std Dev 32.29
Underflow 0
Overflow 12
1600
1400
1200
1000
800
600
400
200
0
0 10 20 30 40 50 60 70 80 90 100
length [cm]

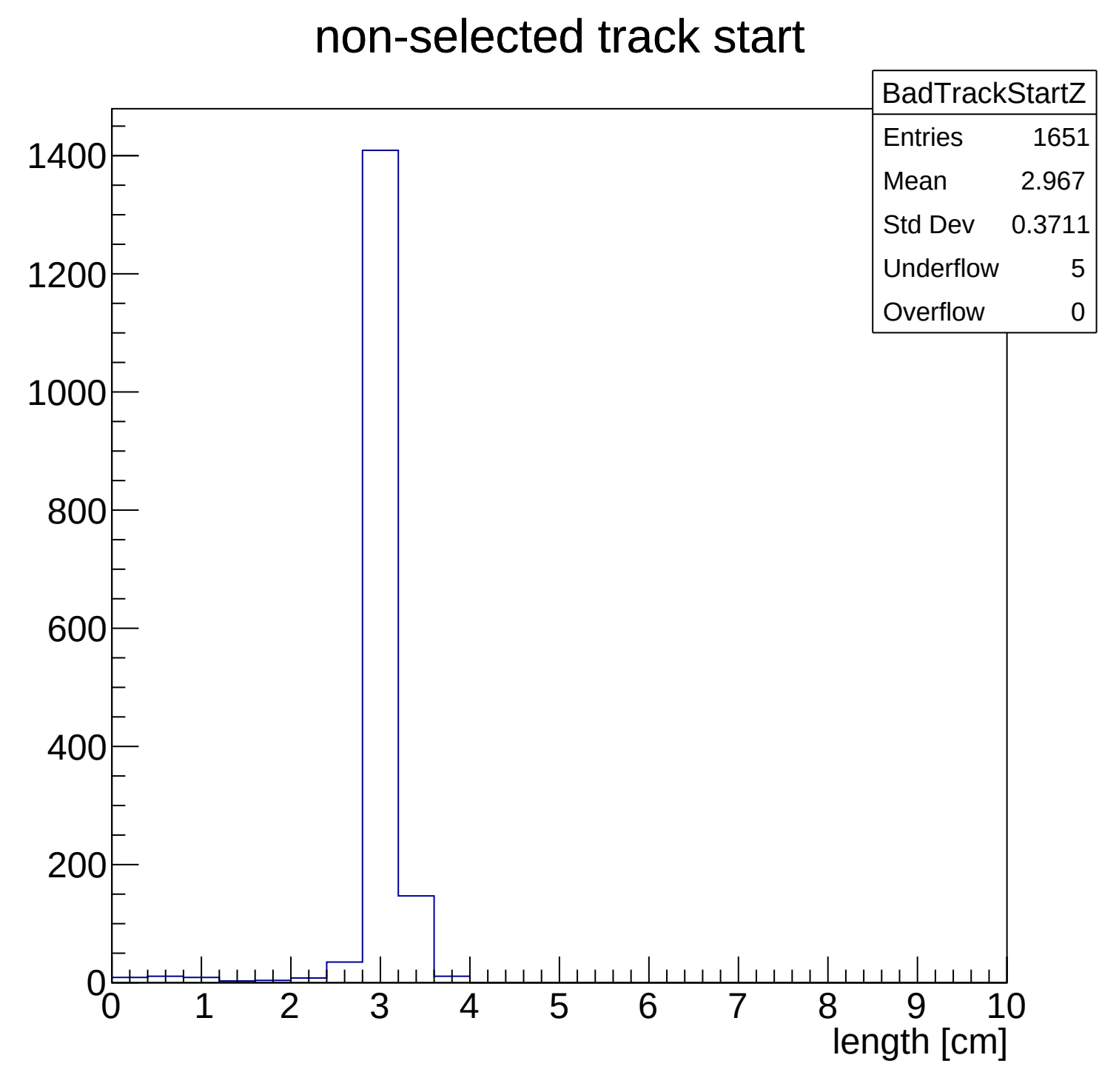

Position of Wire Chamber Track
wctrkPositionXY
Entries 0
Mean x 0
Mean y 0
Std Dev x 0
Std Dev y 0
0 0 0
0 0 0
0 0 0
Y[cm]
20
15
10
5
0
−5
−10
−15
−20
0
5
10
15
20
25
30
35
40
45
X [cm]

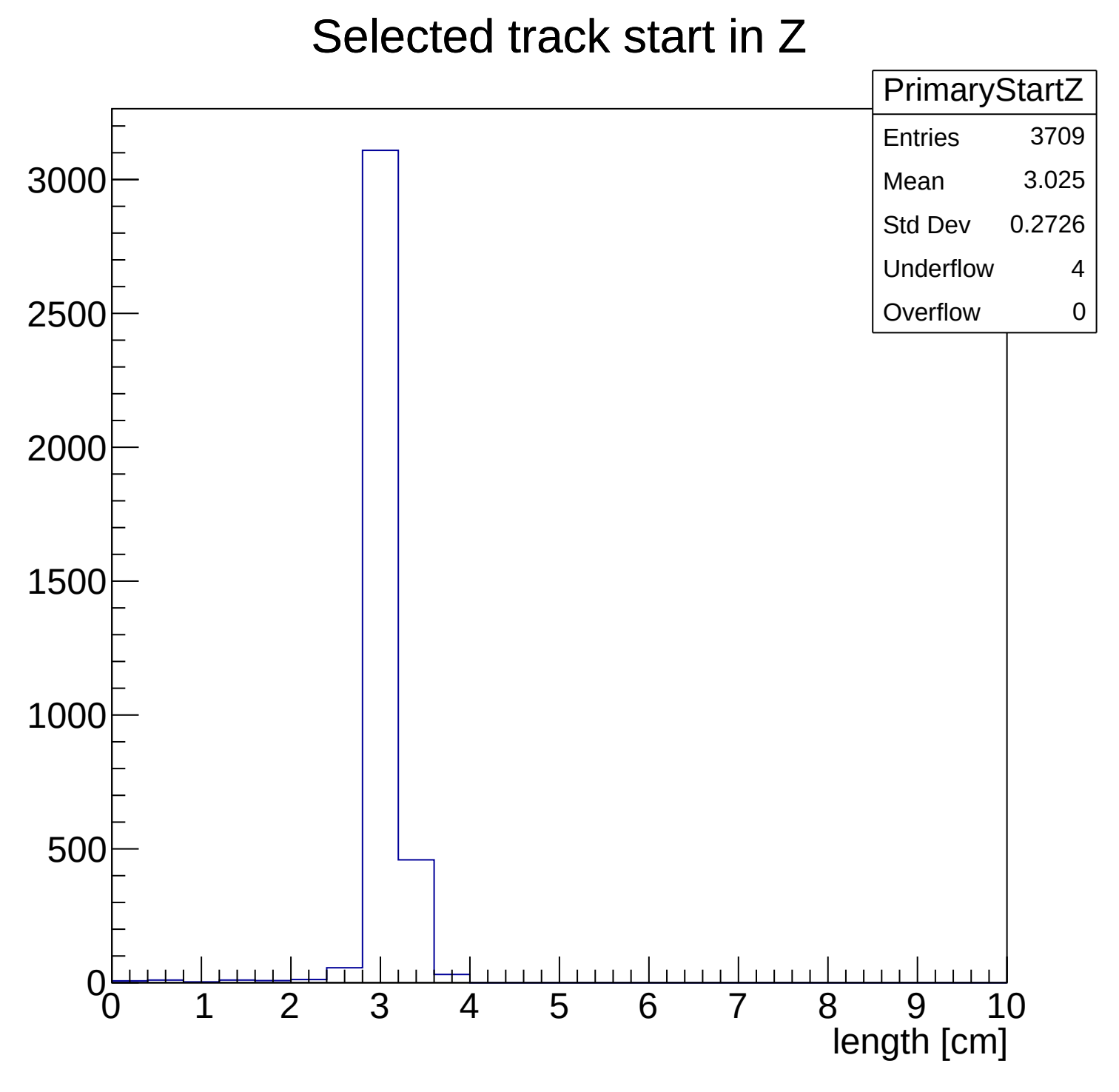

Position of Wire Chamber Track
wctrkSelectedXY
Entries 3709
Mean x 19.34
Mean y 0.284
Std Dev x 4.515
Std Dev y 4.254
0 0 0
0 3709 0
0 0 0
Y [cm]
X [cm]
20
15
10
5
0
−5
−10
−15
−20
0
5
10
15
20
25
30
35
40
45

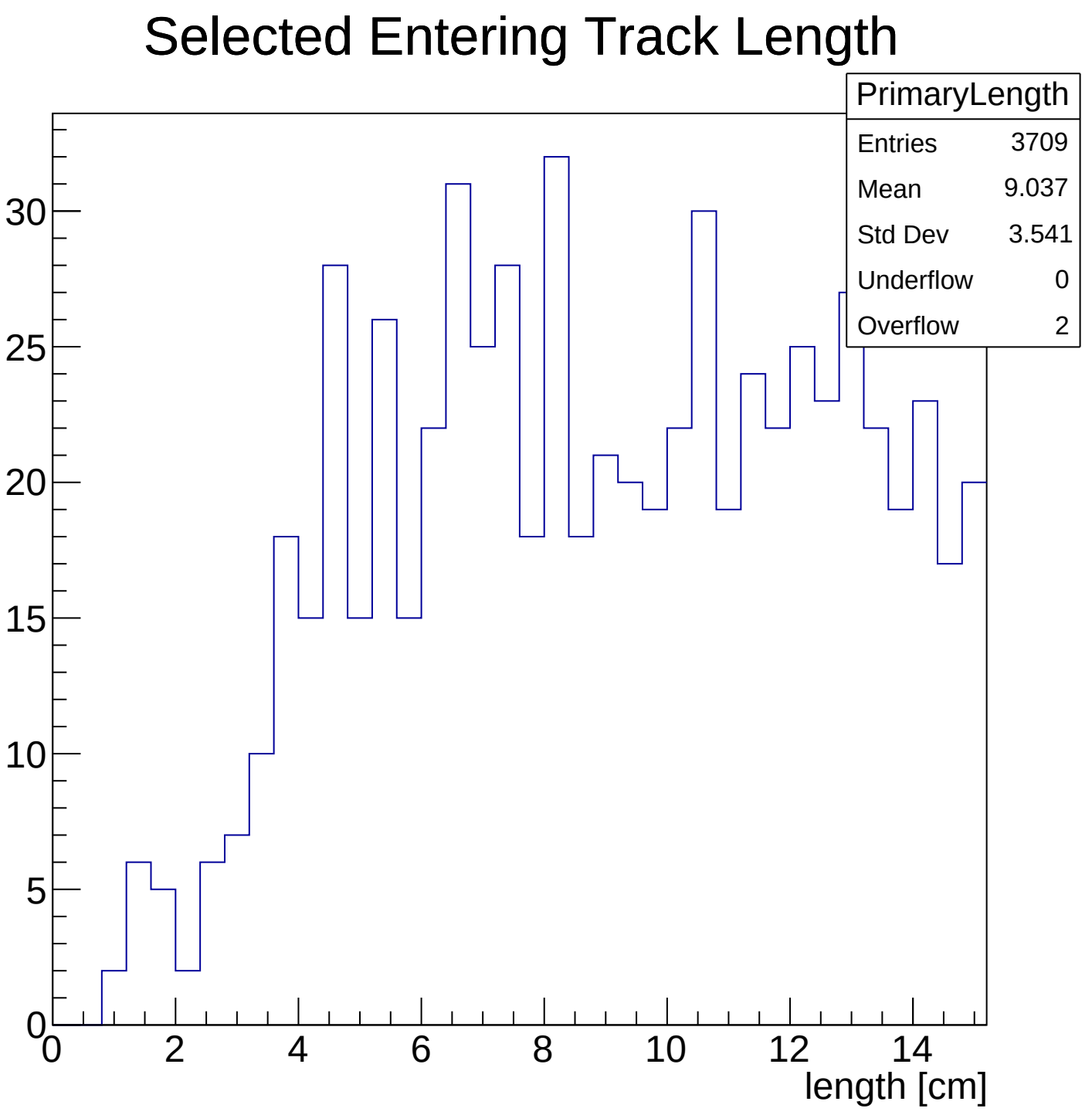

non-selected tracks
BadTrackHist
Entries 1651
Mean x 25.28
Mean y −0.3292
Std Dev x 14.34
Std Dev y 10.18
0 1 0
34 1370 242
0 3 1
Y_tpc [cm]
X_tpc [cm]
20
15
10
5
0
−5
−10
−15
−20
0
5
10
15
20
25
30
35
40
45
2
1.5
1
0.5
0

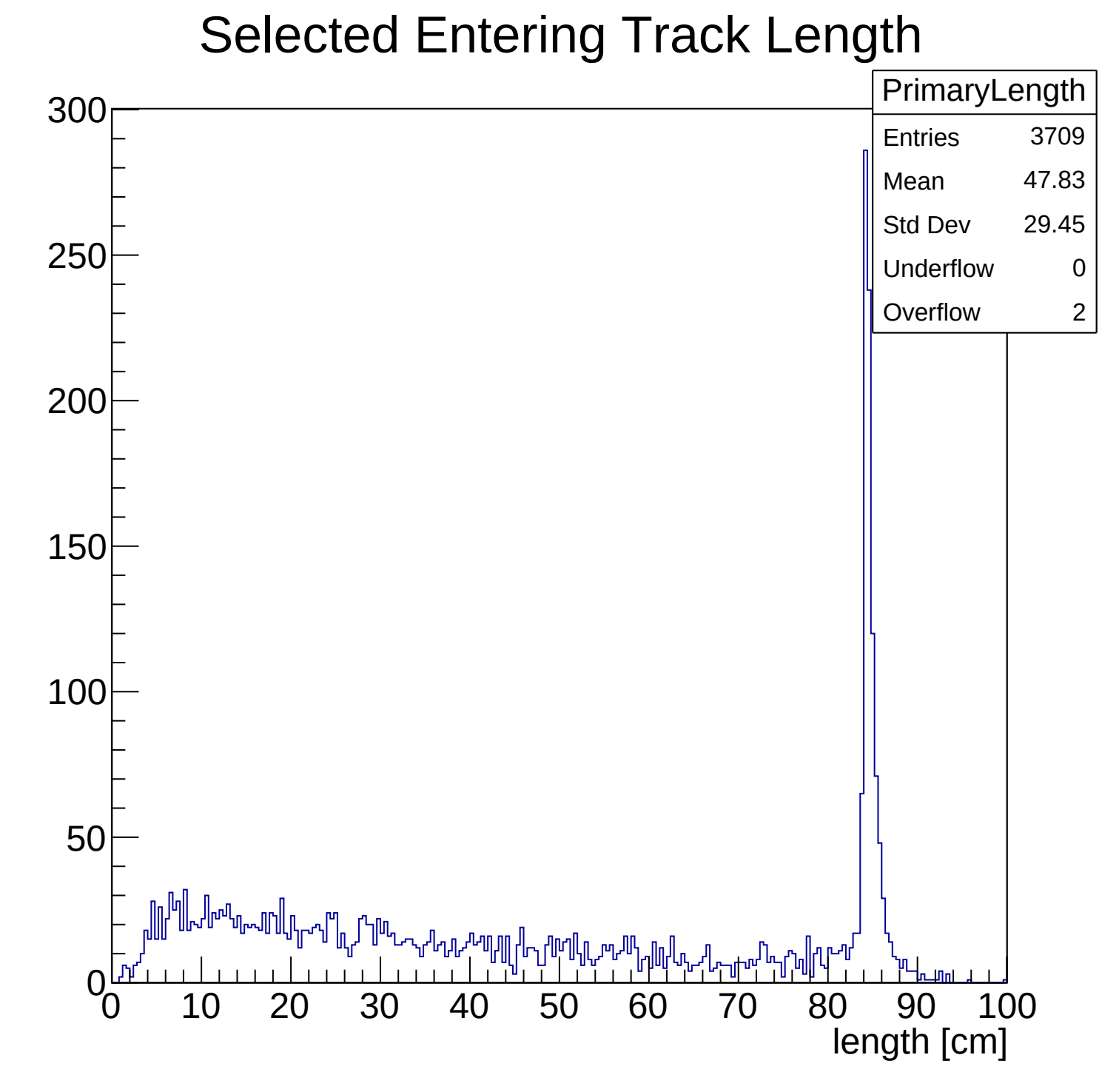

pileup - match found, L > 70
delBadTrackHist_mlen
Entries 1651
Mean x −9.202
Mean y 0.7514
Std Dev x 17.32
Std Dev y 10.93
0 0 0
0 1651 0
0 0 0
Y_wc - Y_tpc [cm]
X_wc - X_tpc [cm]
40
30
20
10
0
−10
−20
−30
−40
3
2
1
0


Pileup Track Length
BadTrackLength
Entries 5440
Mean 56.22
Std Dev 33.67
Underflow 0
Overflow 10
1400
1200
1000
800
600
400
200
0
0 10 20 30 40 50 60 70 80 90 100
length [cm]

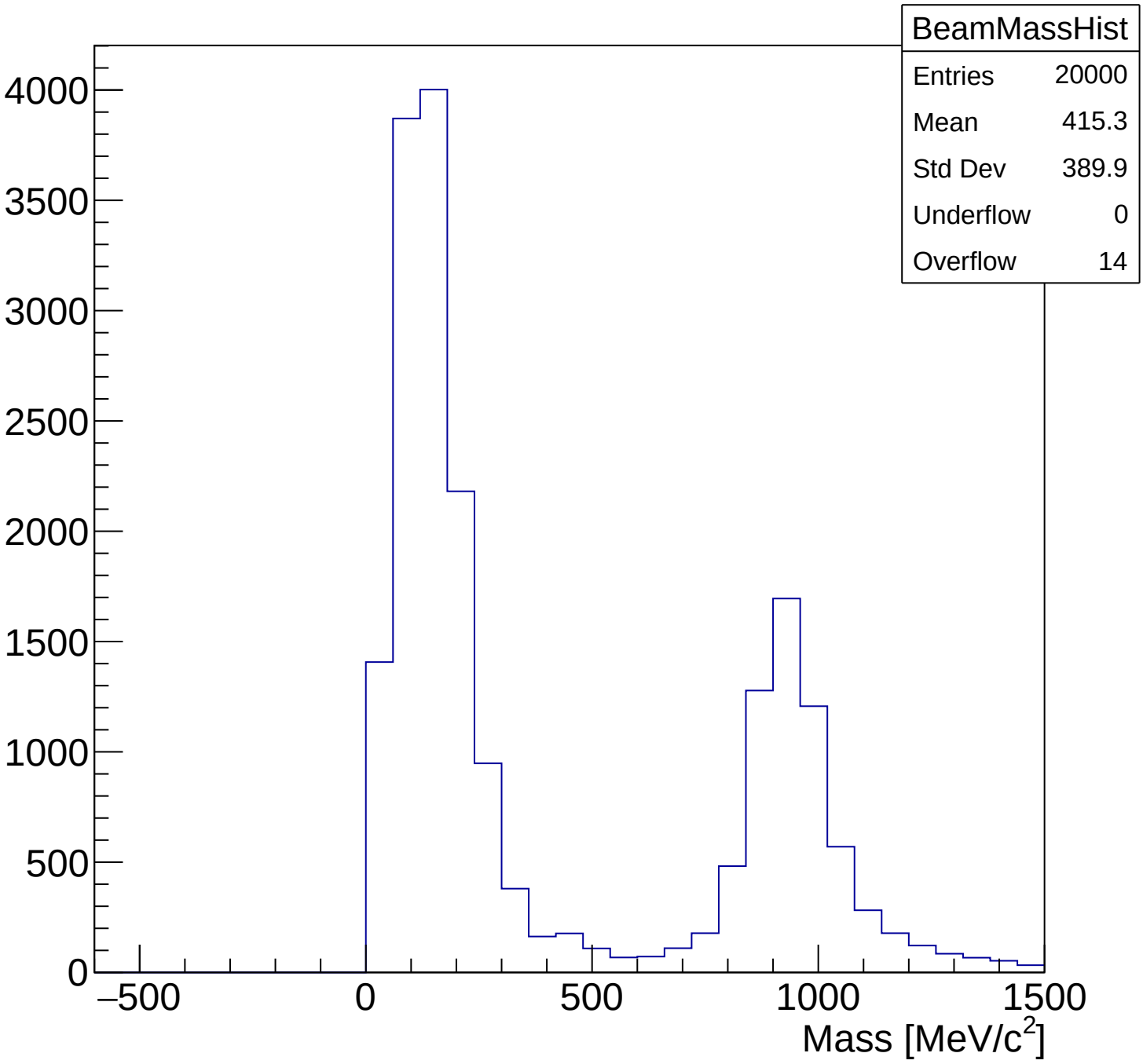

non-selected track start
BadTrackStartZ
Entries 1651
Mean 2.967
Std Dev 0.3711
Underflow 5
Overflow 0
1400
1200
1000
800
600
400
200
0
0 1 2 3 4 5 6 7 8 9 10
length [cm]

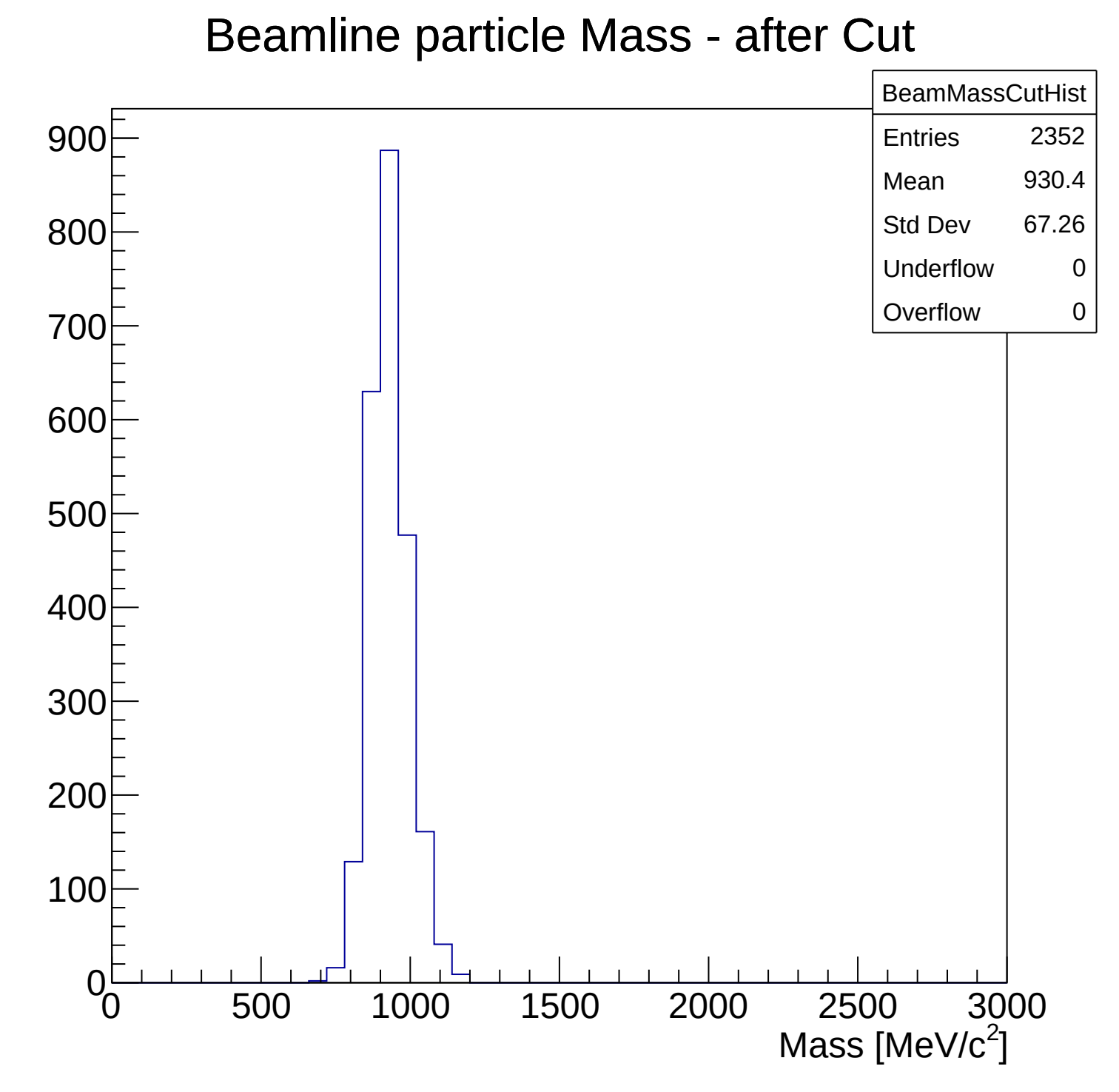

Selected track start in Z
PrimaryStartZ
Entries 3709
Mean 3.025
Std Dev 0.2726
Underflow 4
Overflow 0
3000
2500
2000
1500
1000
500
0
0 1 2 3 4 5 6 7 8 9 10
length [cm]

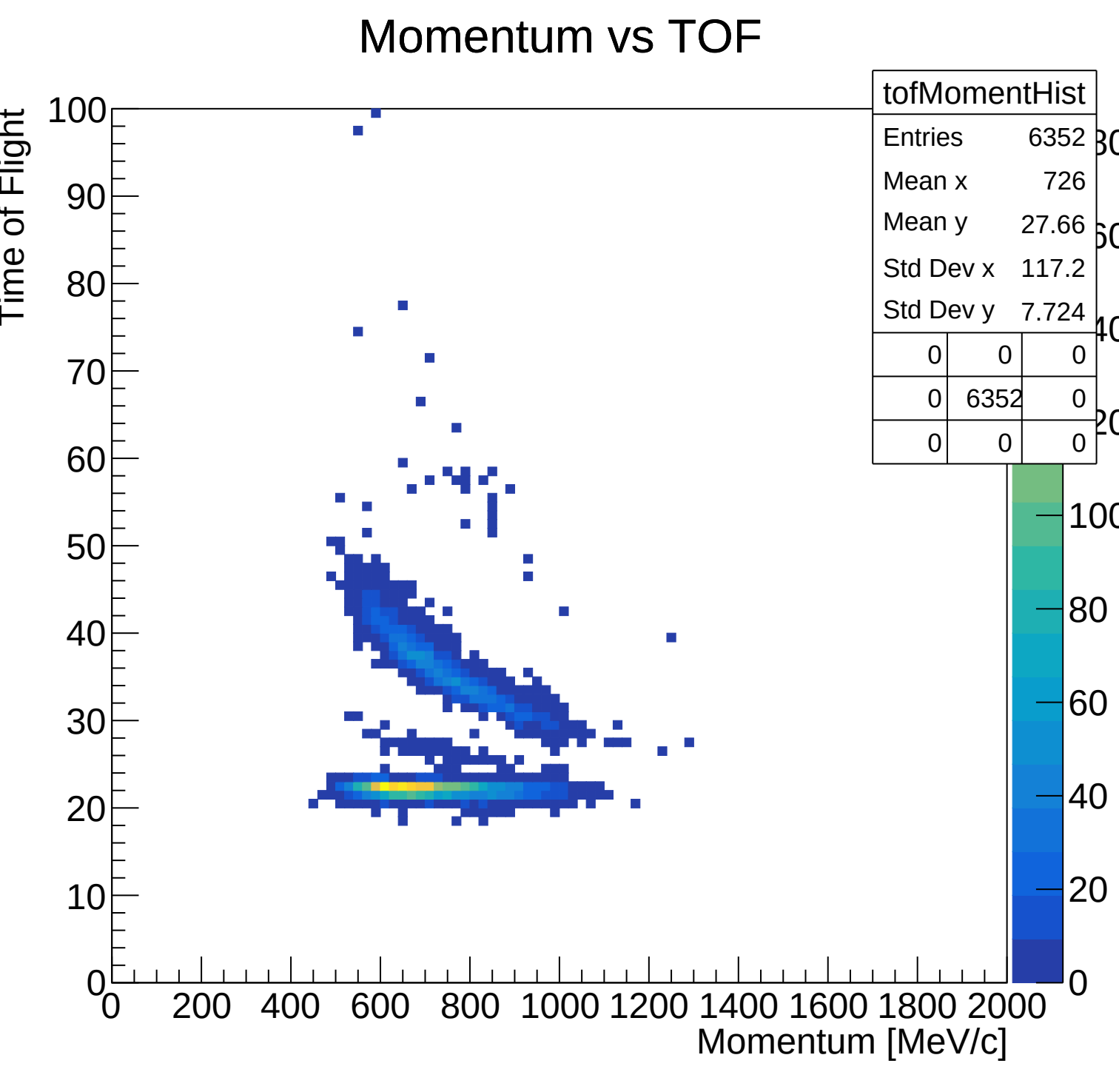

Selected Entering Track Length
PrimaryLength
Entries 3709
Mean 9.037
Std Dev 3.541
Underflow 0
Overflow 2
0
5
10
15
20
25
30
0
2
4
6
8
10
12
14
length [cm]

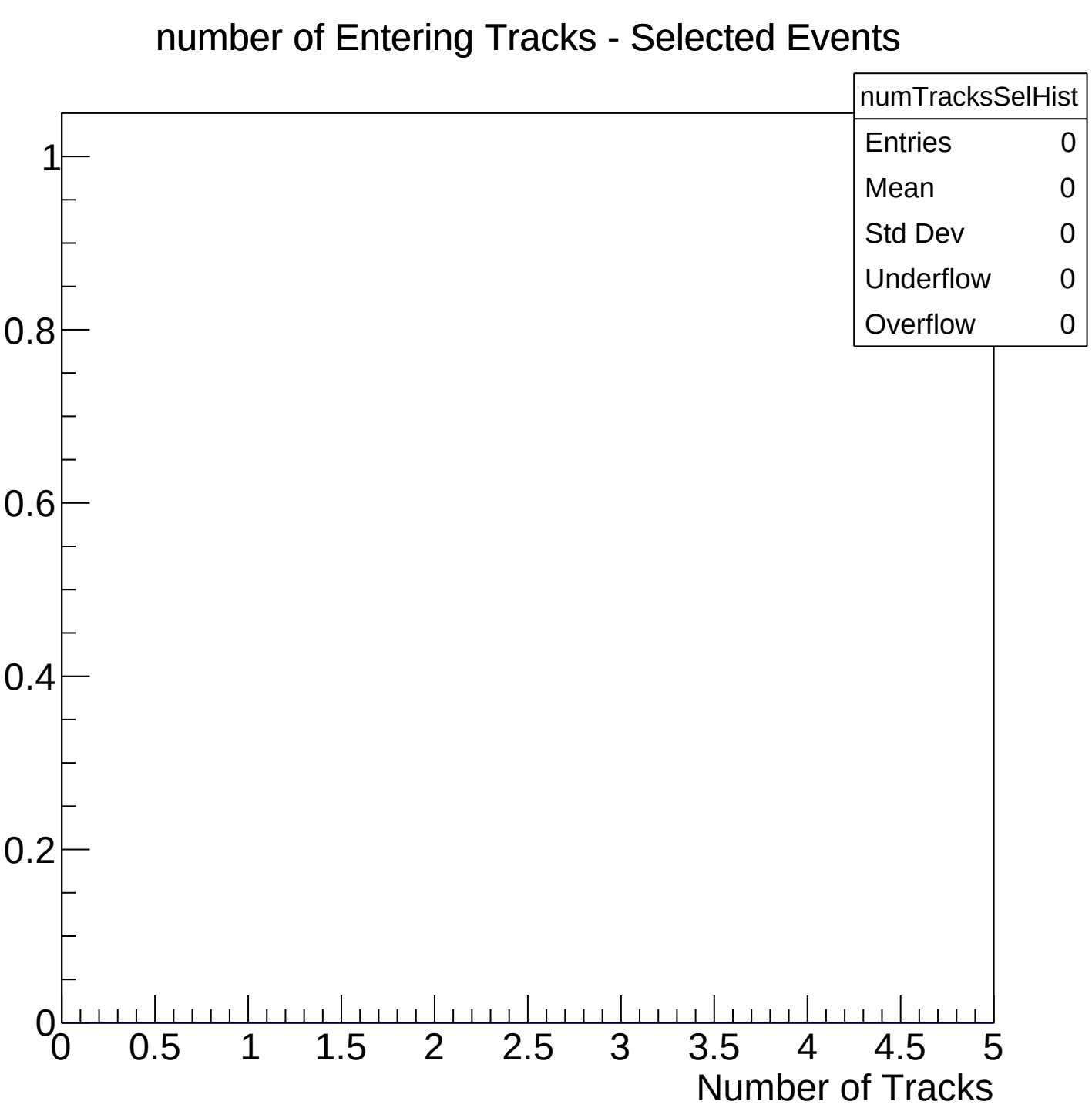

Selected Entering Track Length
PrimaryLength
Entries 3709
Mean 47.83
Std Dev 29.45
Underflow 0
Overflow 2
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
90
100
length [cm]

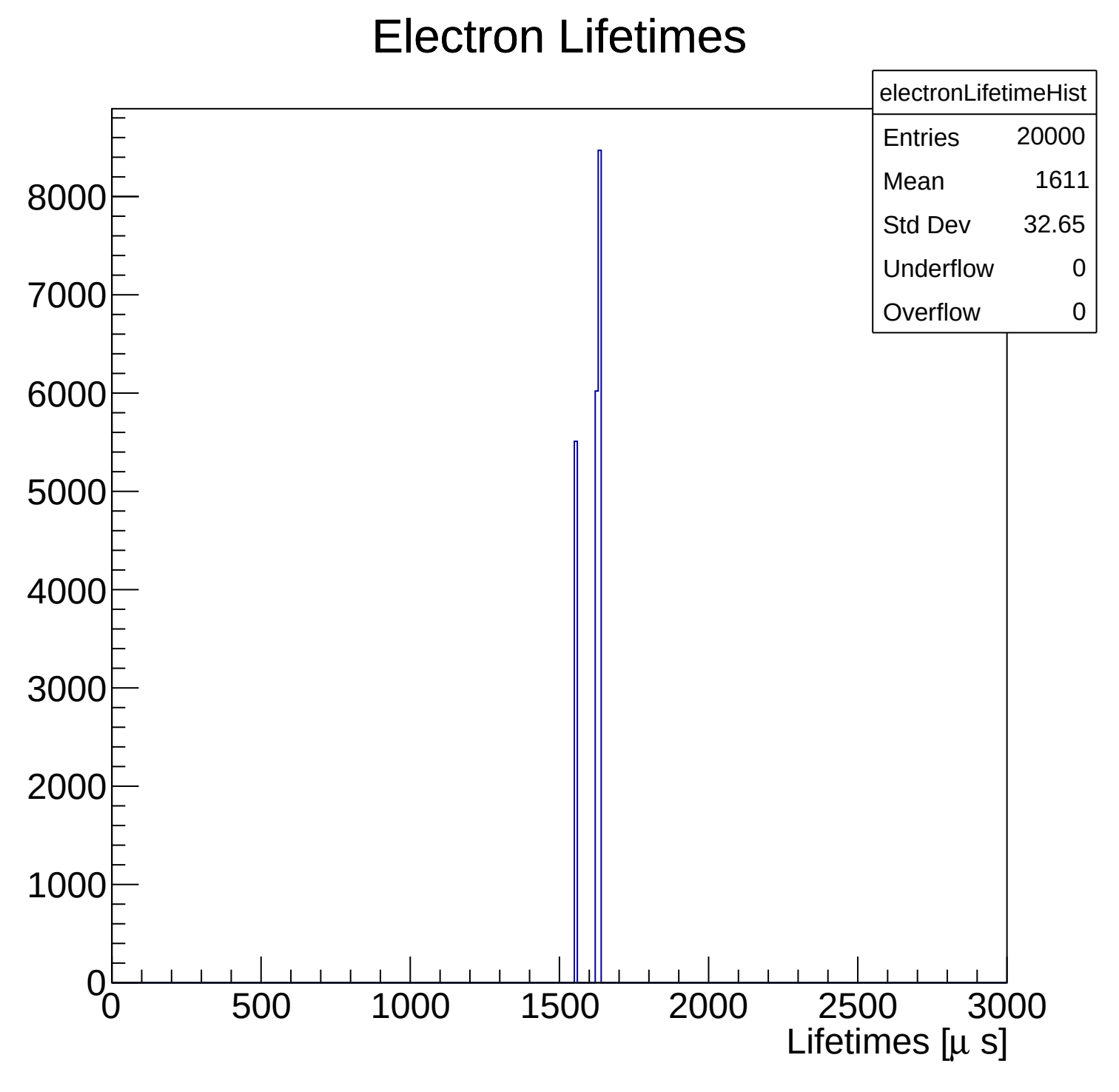
Beamline particle Mass



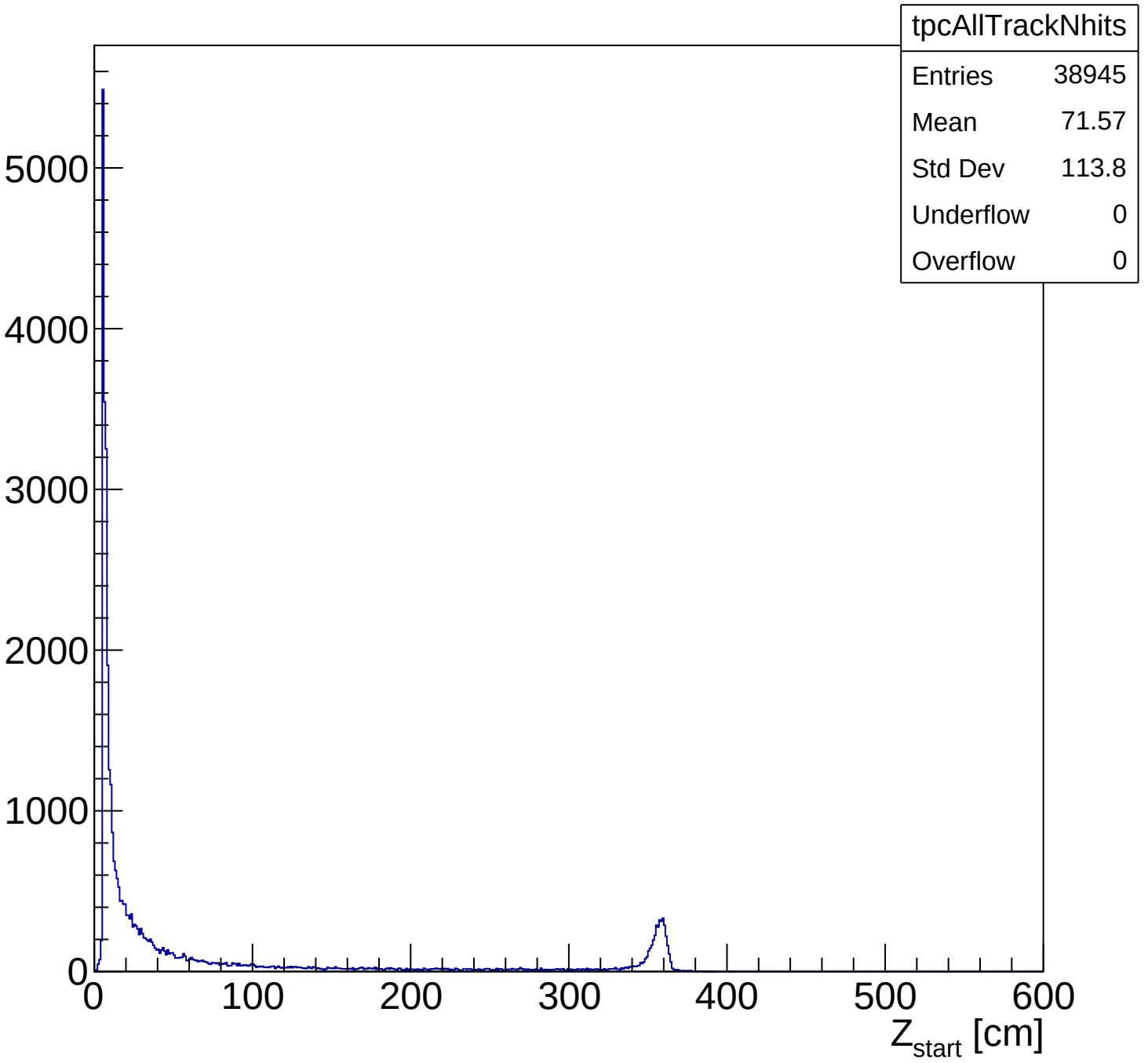

Beamline particle Mass - after Cut
BeamMassCutHist
Entries 2352
Mean 930.4
Std Dev 67.26
Underflow 0
Overflow 0
900
800
700
600
500
400
300
200
100
0
0
500
1000
1500
2000
2500
3000
Mass [MeV/c^2]

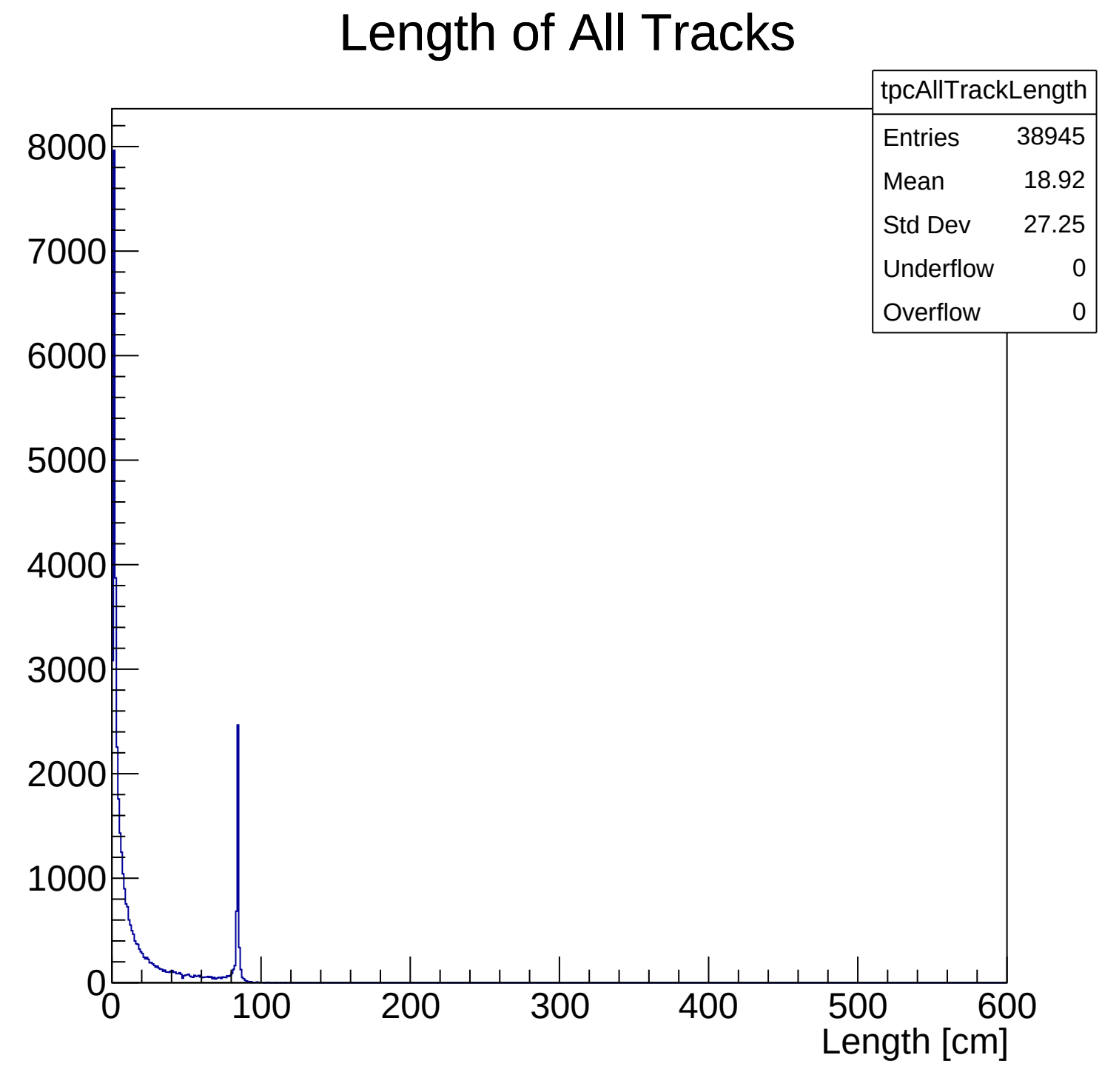

Momentum vs TOF
tofMomentHist
Entries 6352
Mean x 726
Mean y 27.66
Std Dev x 117.2
Std Dev y 7.724
0 0 0
0 6352 0
0 0 0
Time of Flight
Momentum [MeV/c]
0 200 400 600 800 1000 1200 1400 1600 1800 2000
0 10 20 30 40 50 60 70 80 90 100
0 20 40 60 80 100

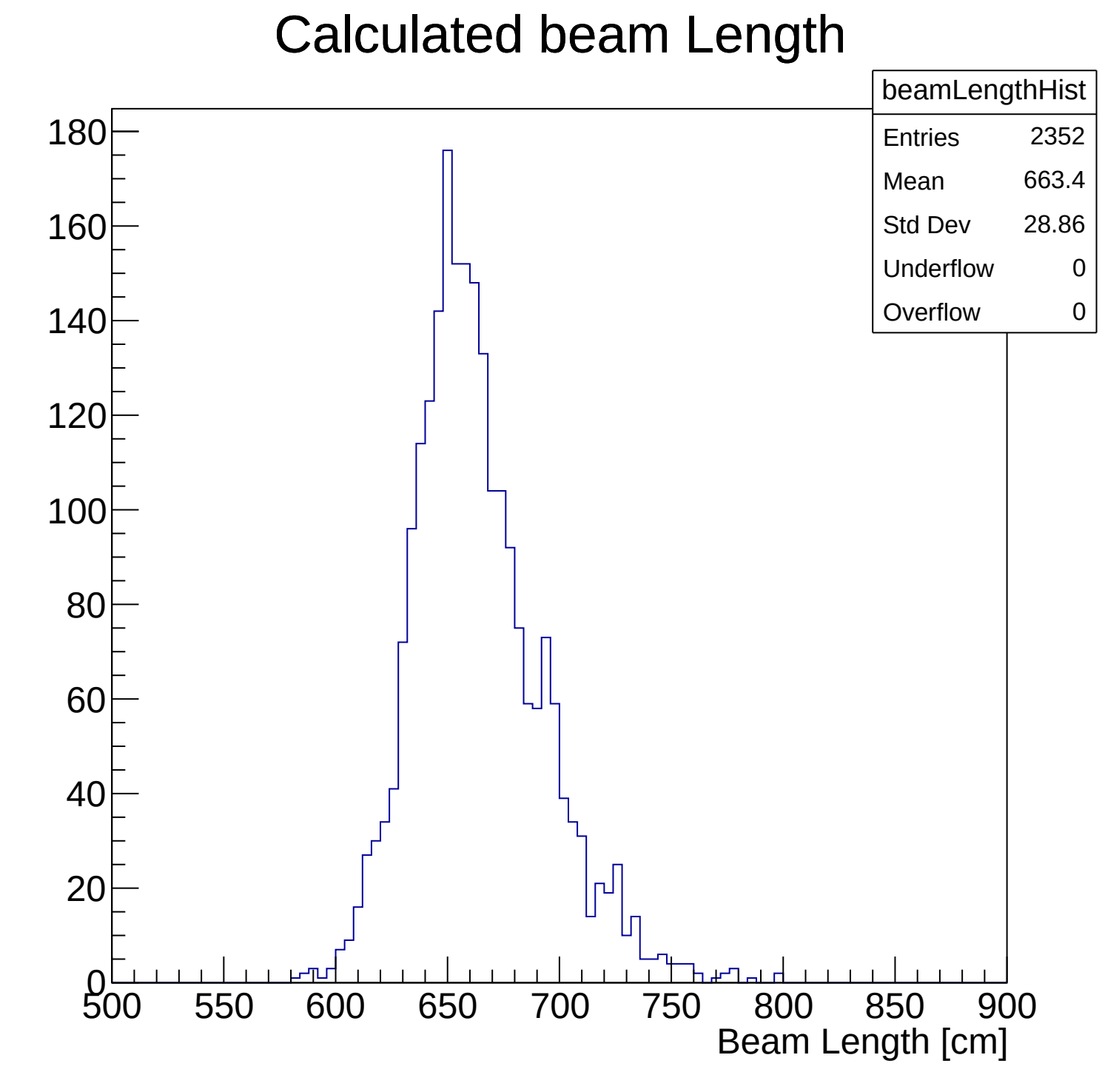

number of Entering Tracks - Selected Events
numTracksSelHist
Entries 0
Mean 0
Std Dev 0
Underflow 0
Overflow 0
1
0.8
0.6
0.4
0.2
0
0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 5
Number of Tracks

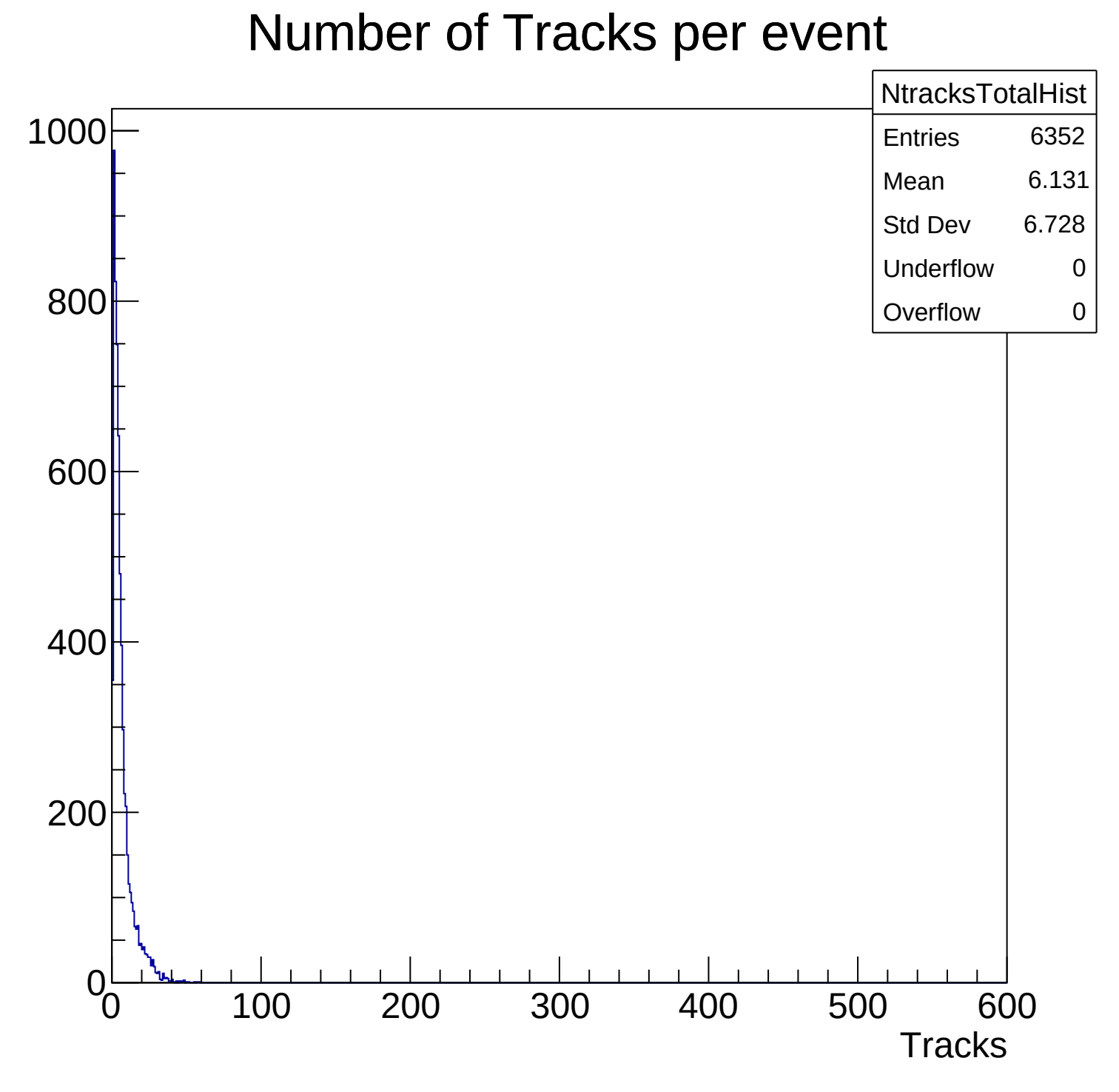

Electron Lifetimes
electronLifetimeHist
Entries 20000
Mean 1611
Std Dev 32.65
Underflow 0
Overflow 0
8000
7000
6000
5000
4000
3000
2000
1000
0
0
500
1000
1500
2000
2500
3000
Lifetimes [μ s]

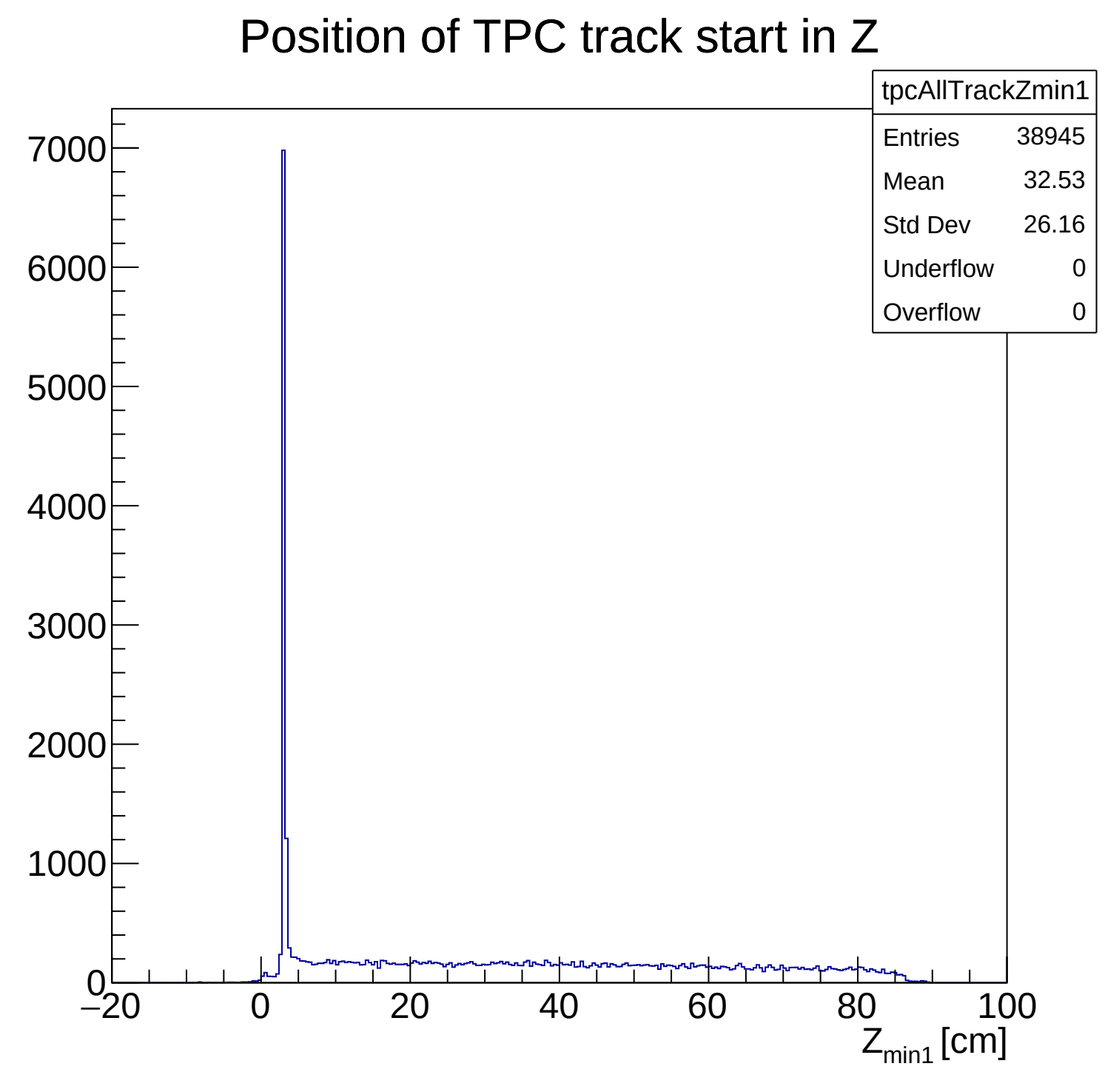
Number of Hits per Track

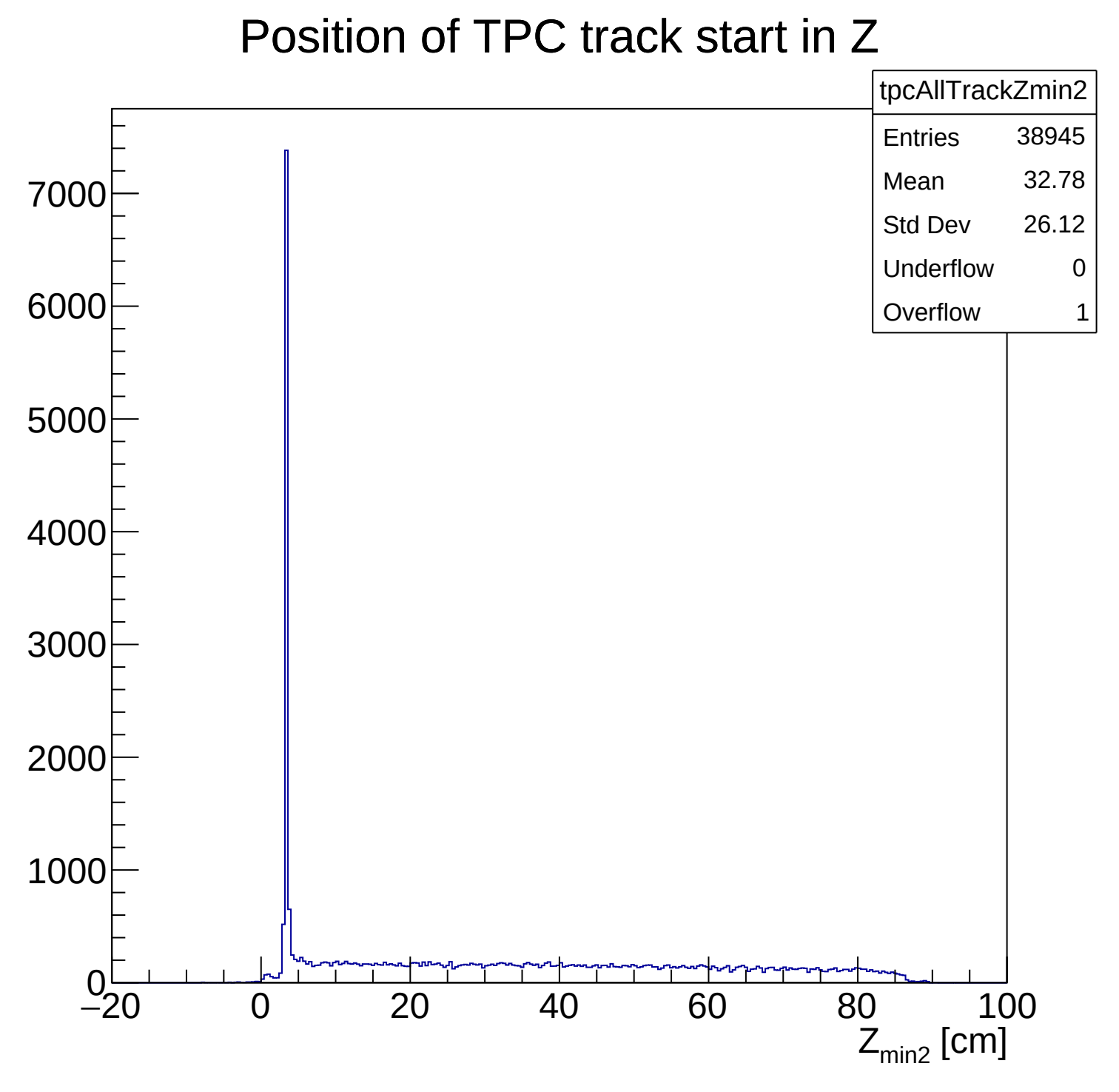


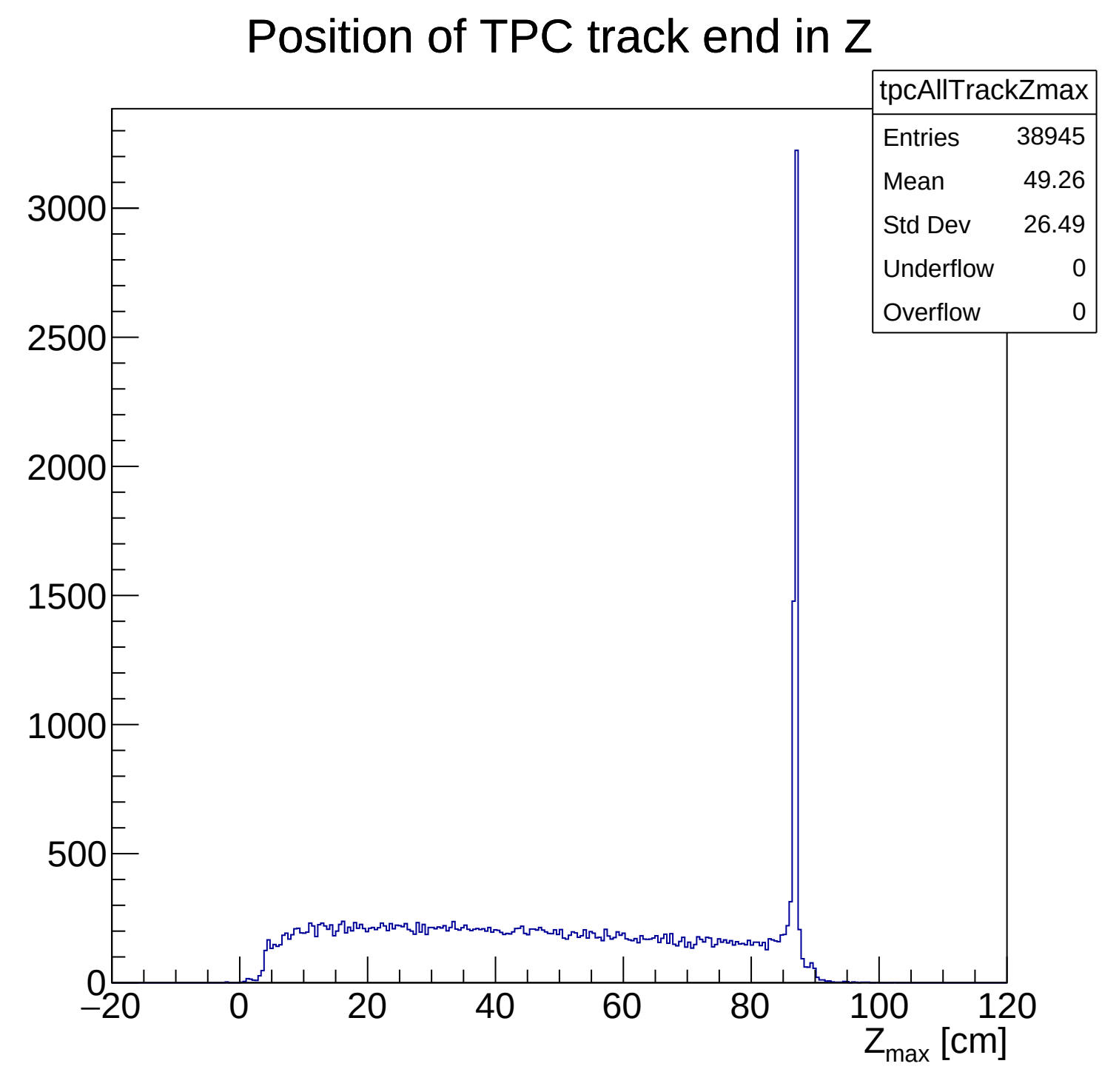

Length of All Tracks
tpcAllTrackLength
Entries 38945
Mean 18.92
Std Dev 27.25
Underflow 0
Overflow 0
8000
7000
6000
5000
4000
3000
2000
1000
0
0
100
200
300
400
500
600
Length [cm]

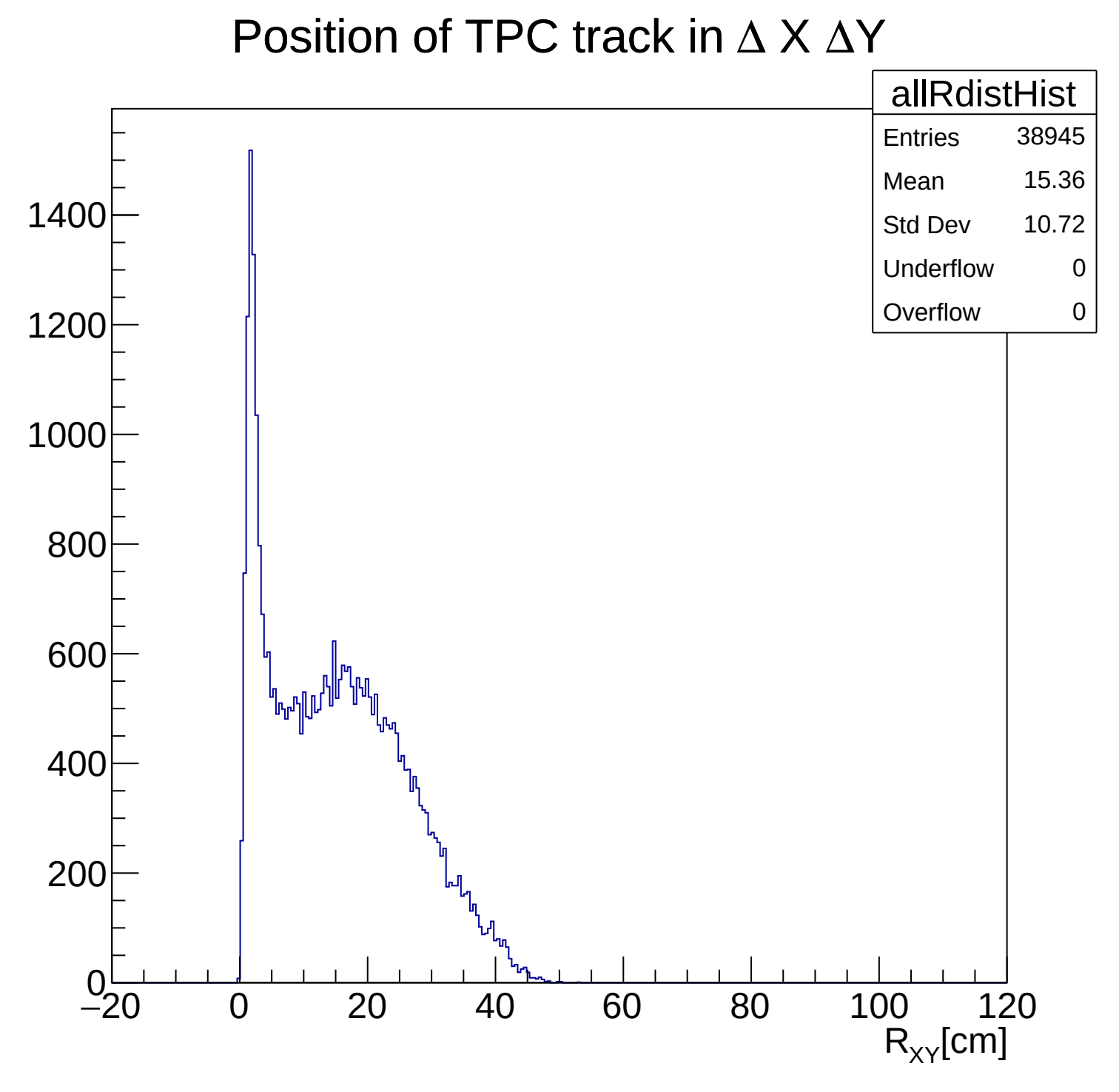

Calculated beam Length
beamLengthHist
Entries 2352
Mean 663.4
Std Dev 28.86
Underflow 0
Overflow 0
180
160
140
120
100
80
60
40
20
0
500
550
600
650
700
750
800
850
900
Beam Length [cm]

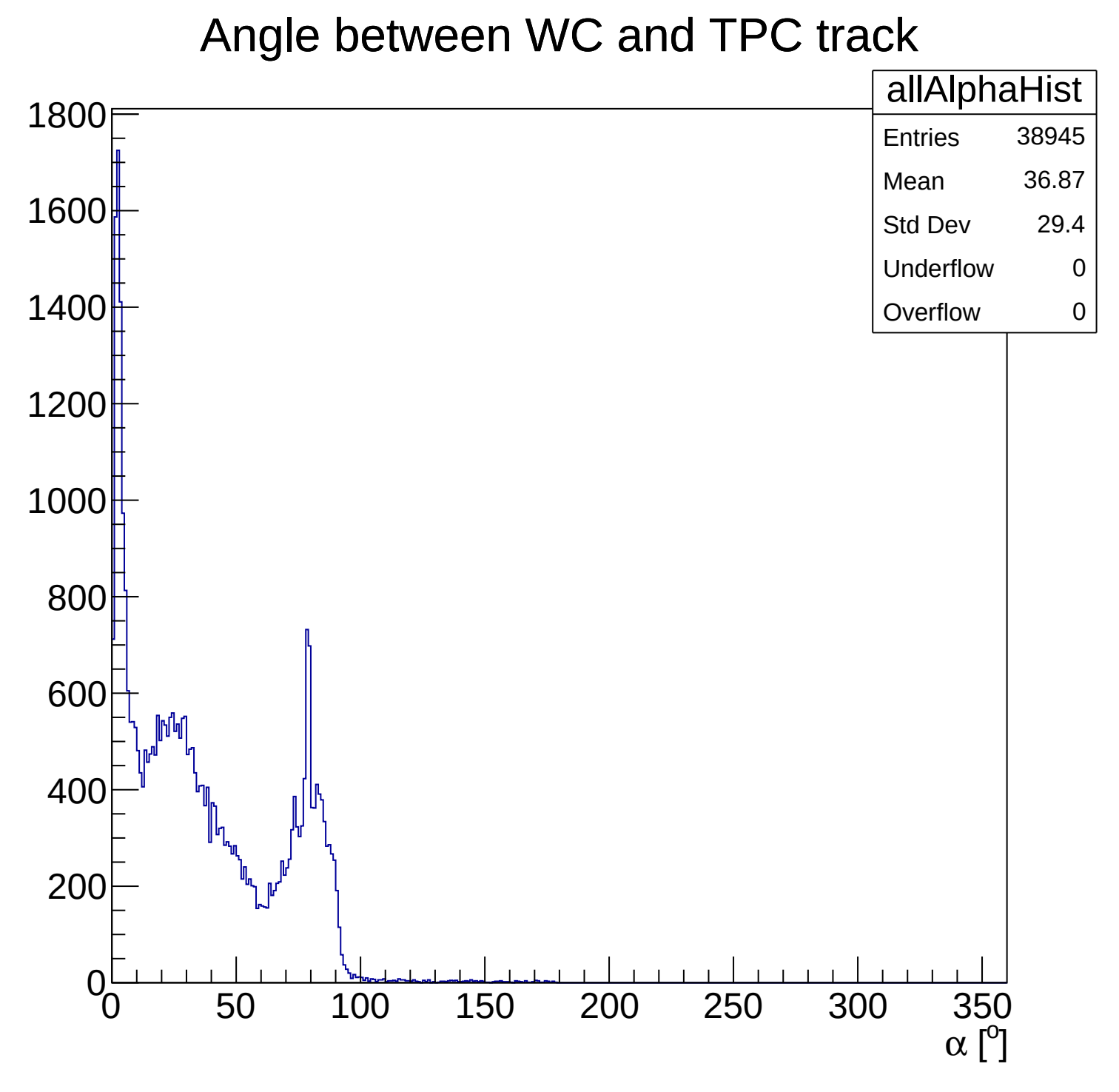

Number of Tracks per event
NtracksTotalHist
Entries 6352
Mean 6.131
Std Dev 6.728
Underflow 0
Overflow 0
1000
800
600
400
200
0
0
100
200
300
400
500
600
Tracks

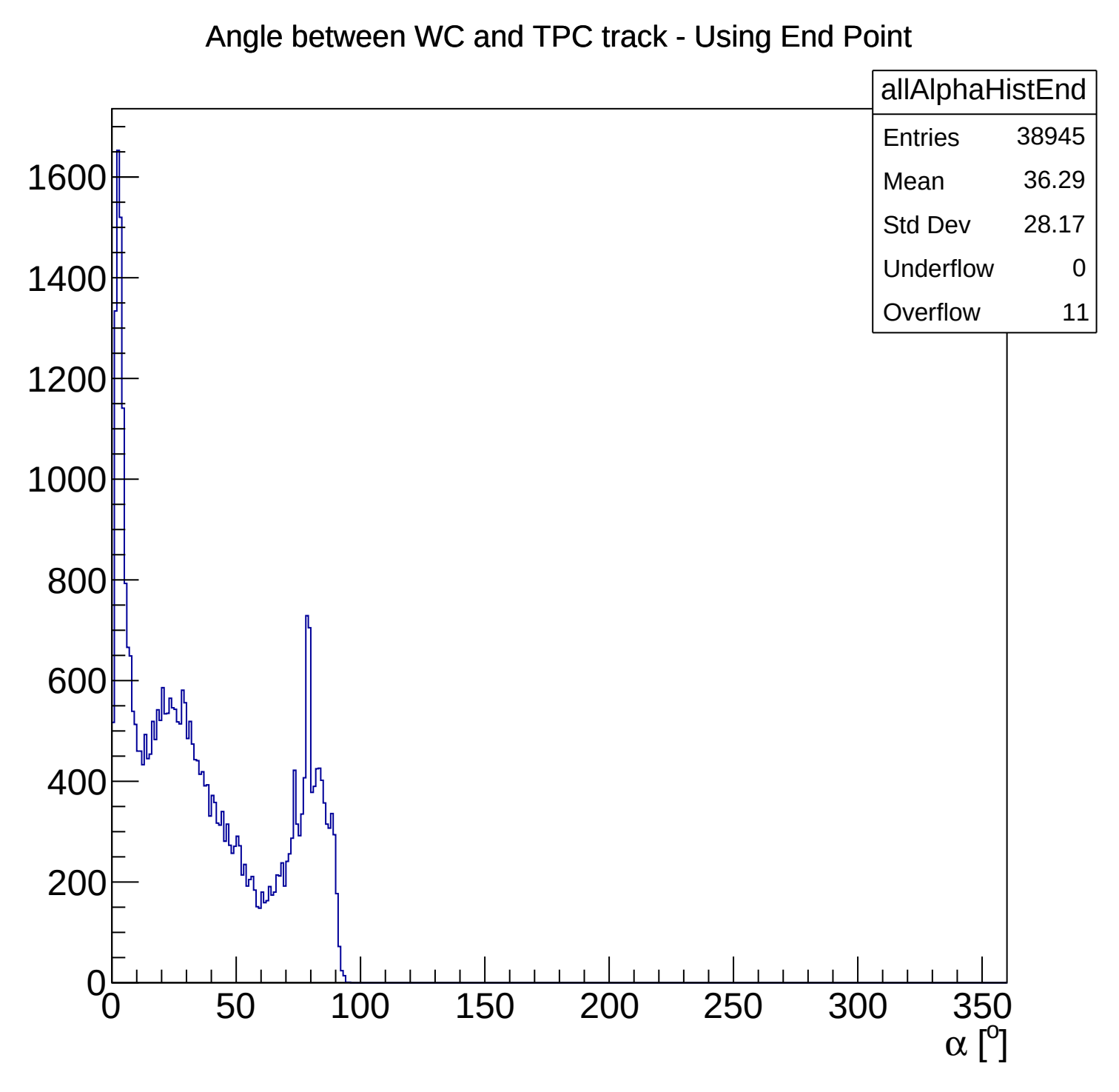

Position of TPC track start in Z
tpcAllTrackZmin1
Entries 38945
Mean 32.53
Std Dev 26.16
Underflow 0
Overflow 0
7000
6000
5000
4000
3000
2000
1000
0
−20
0
20
40
60
80
100
Z_{min1} [cm]

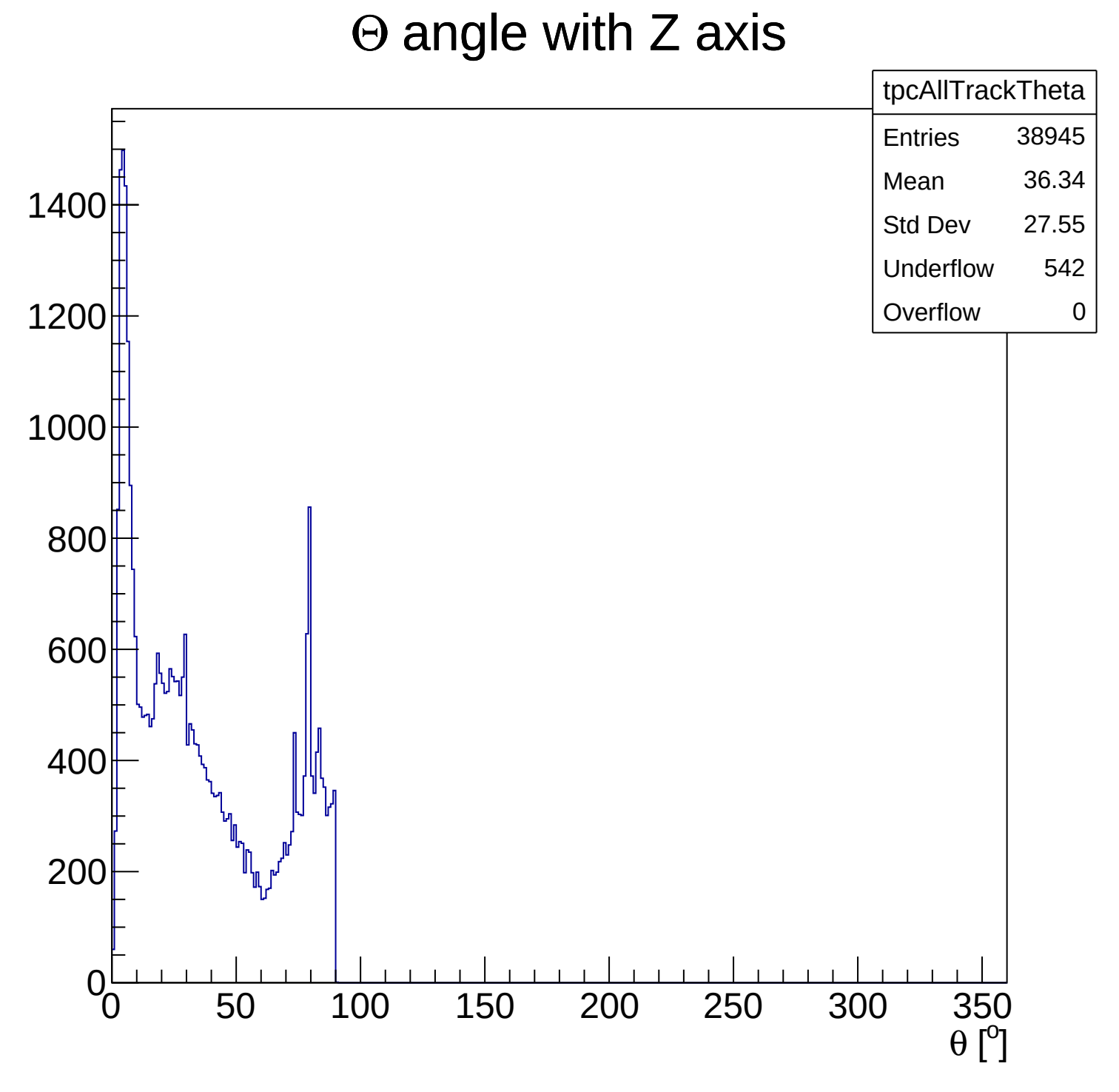

Position of TPC track start in Z
tpcAllTrackZmin2
Entries 38945
Mean 32.78
Std Dev 26.12
Underflow 0
Overflow 1
7000
6000
5000
4000
3000
2000
1000
0
−20
0
20
40
60
80
100
Z_min2 [cm]

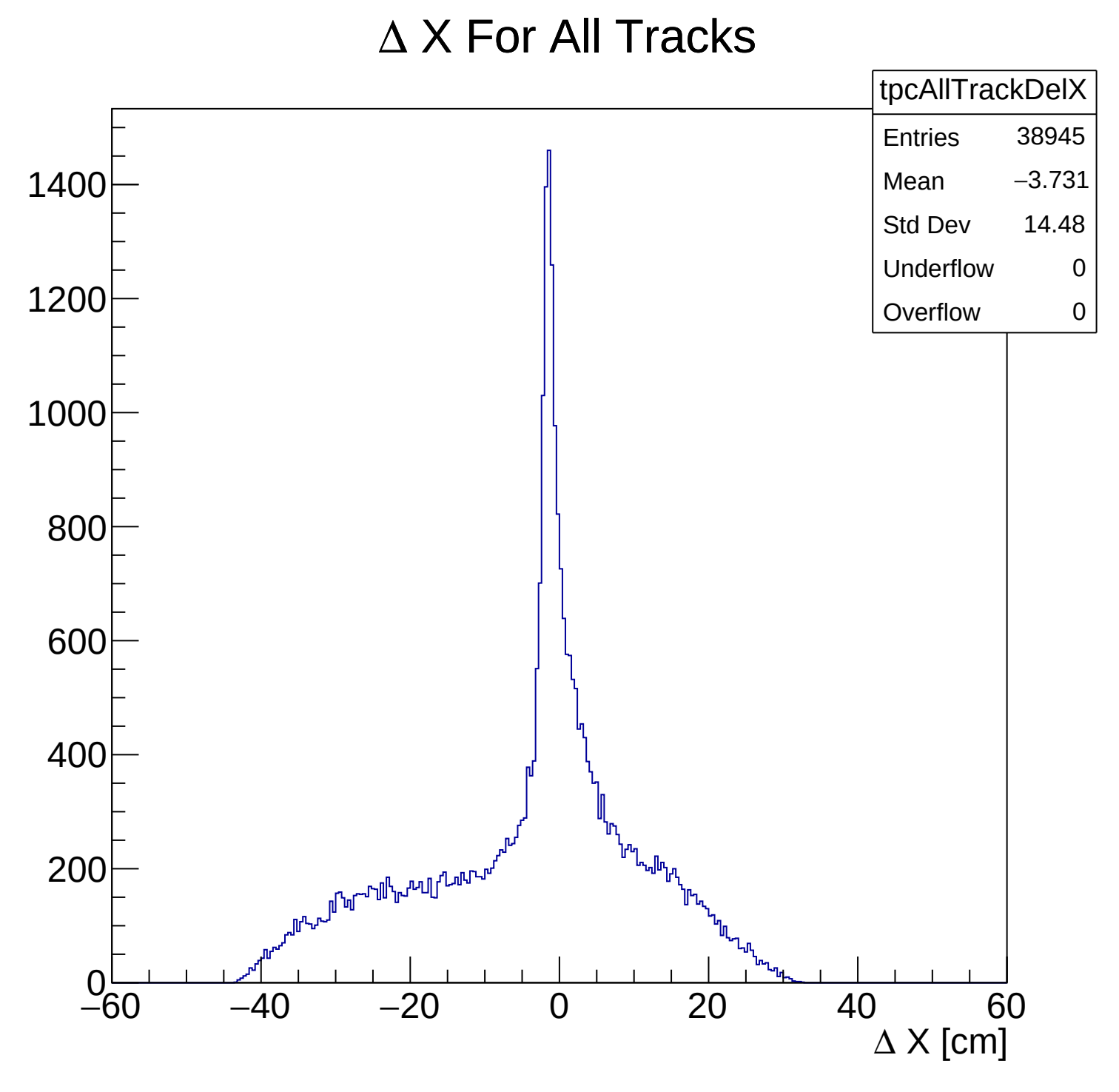

Position of TPC track end in Z
tpcAllTrackZmax
Entries 38945
Mean 49.26
Std Dev 26.49
Underflow 0
Overflow 0
3000
2500
2000
1500
1000
500
0
−20
0
20
40
60
80
100
120
Z_max [cm]

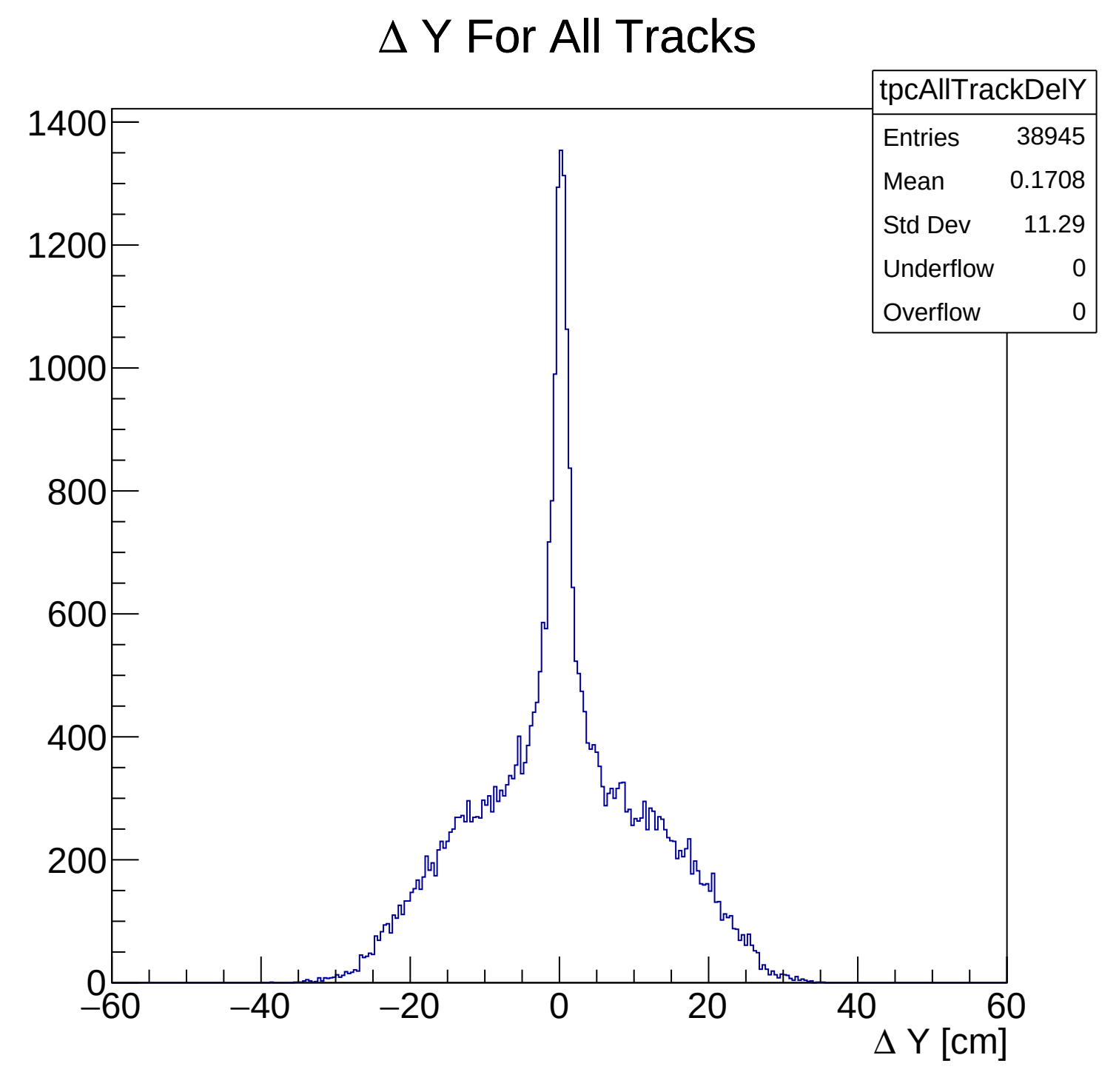

Position of TPC track in Δ X ΔY
allRdistHist
Entries 38945
Mean 15.36
Std Dev 10.72
Underflow 0
Overflow 0
1400
1200
1000
800
600
400
200
0
−20
0
20
40
60
80
100
120
R_XY[cm]

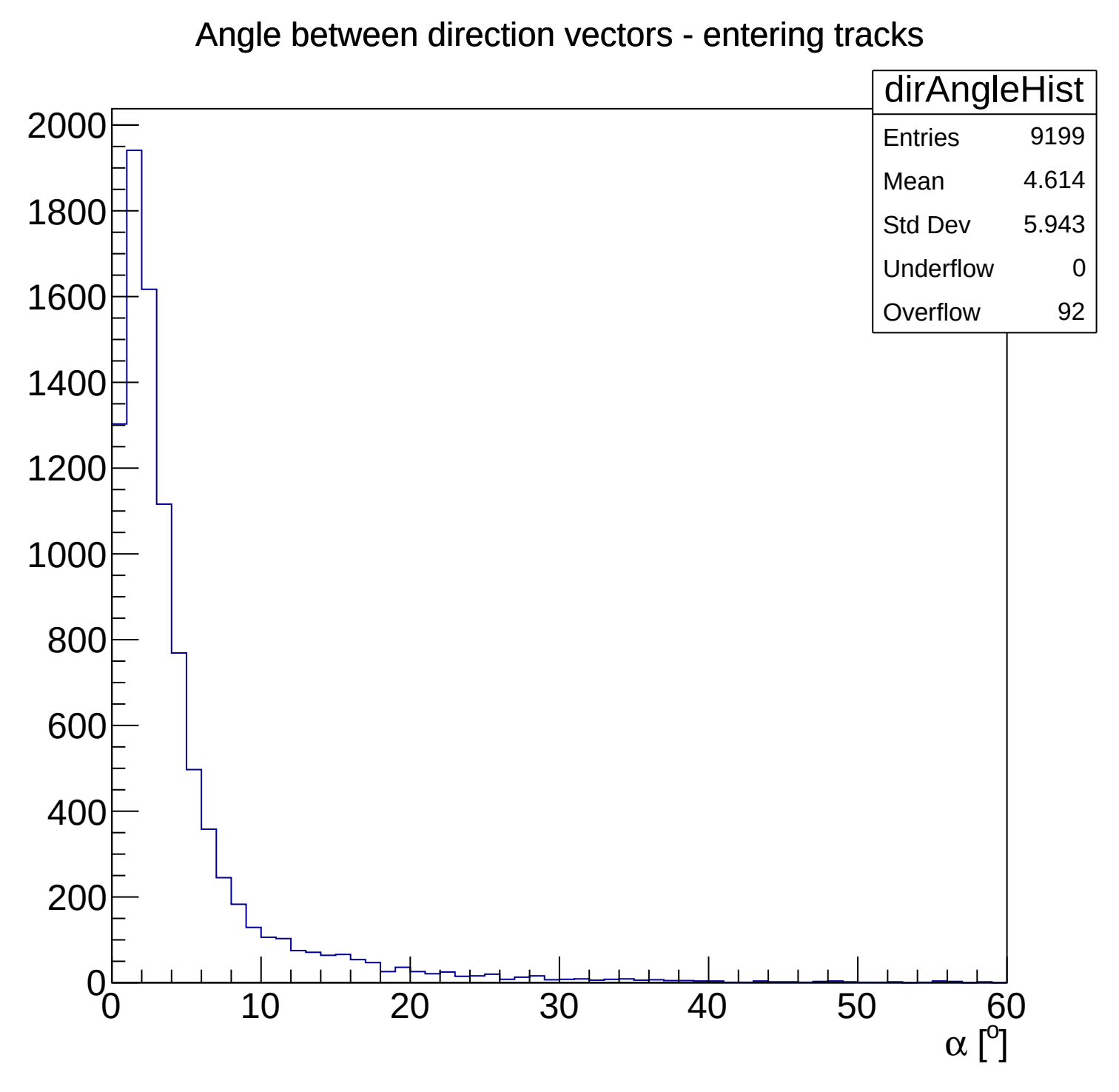

Angle between WC and TPC track
allAlphaHist
Entries 38945
Mean 36.87
Std Dev 29.4
Underflow 0
Overflow 0
1800
1600
1400
1200
1000
800
600
400
200
0
0
50
100
150
200
250
300
350
α [°]

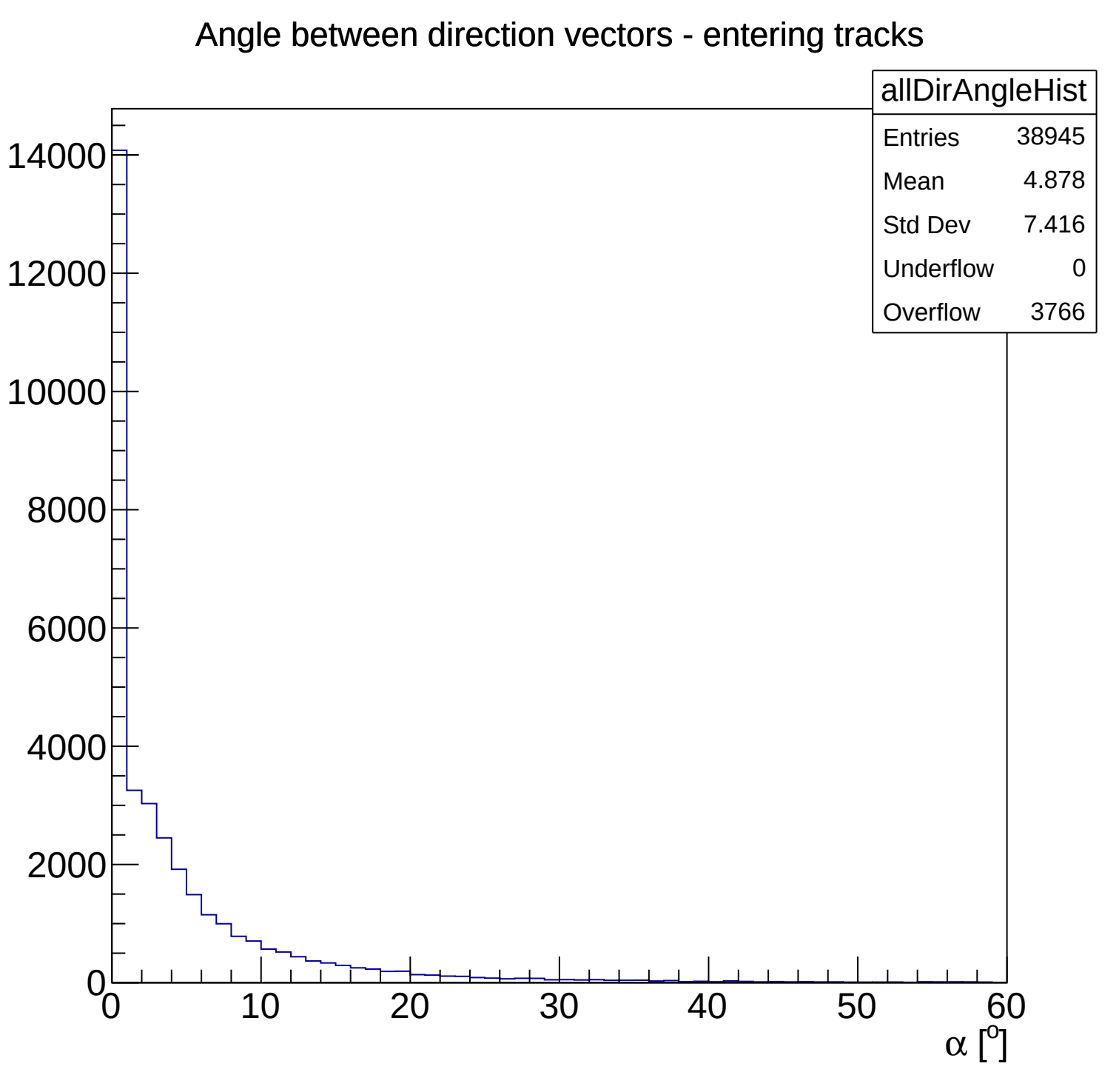

Angle between WC and TPC track - Using End Point
allAlphaHistEnd
Entries 38945
Mean 36.29
Std Dev 28.17
Underflow 0
Overflow 11
1600
1400
1200
1000
800
600
400
200
0
0
50
100
150
200
250
300
350
α [°]

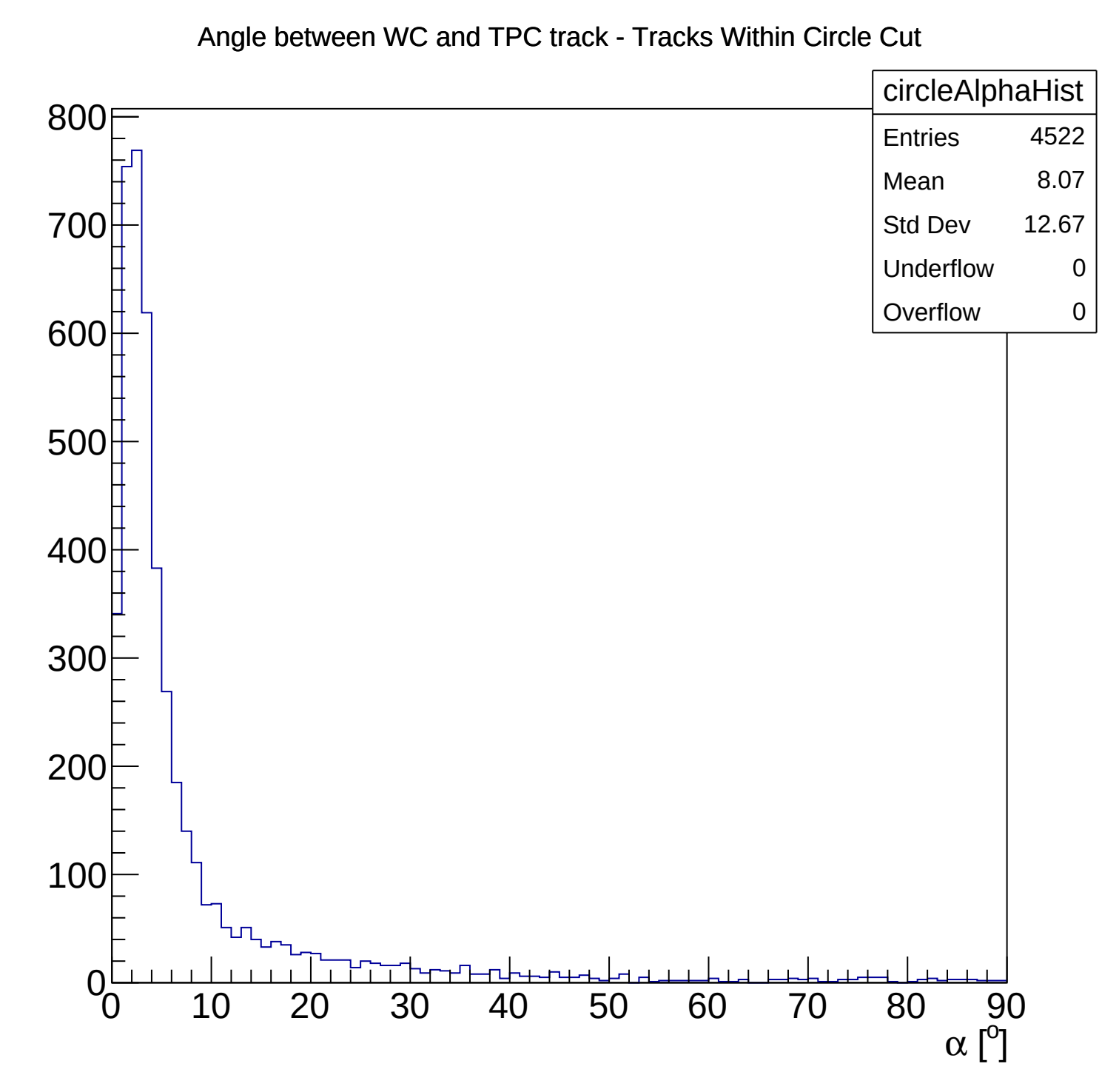

Θ angle with Z axis
tpcAllTrackTheta
Entries 38945
Mean 36.34
Std Dev 27.55
Underflow 542
Overflow 0
1400
1200
1000
800
600
400
200
0
0
50
100
150
200
250
300
350
θ [°]

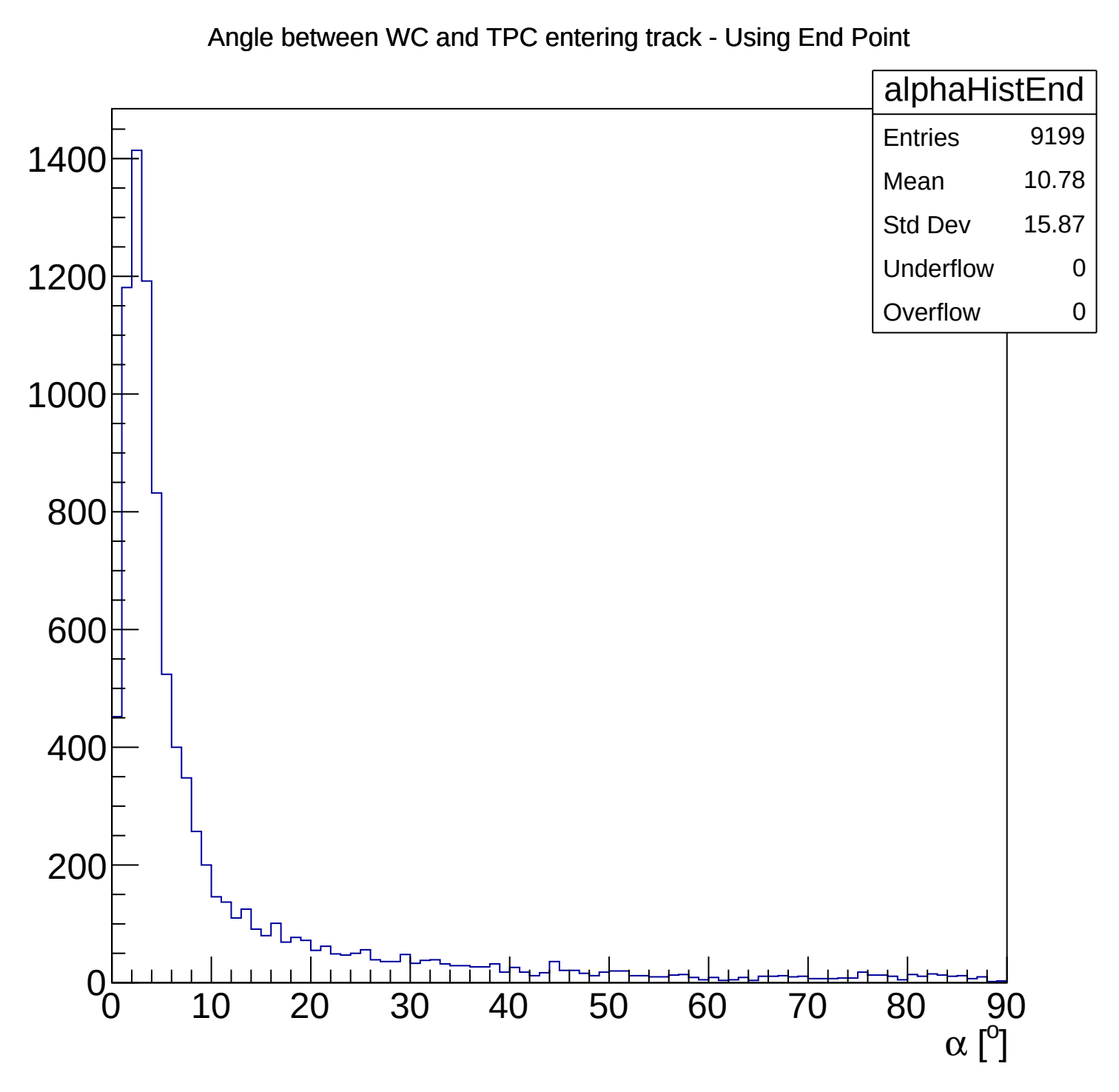

Δ X For All Tracks
tpcAllTrackDelX
Entries 38945
Mean –3.731
Std Dev 14.48
Underflow 0
Overflow 0
1400
1200
1000
800
600
400
200
0
–60
–40
–20
0
20
40
60
Δ X [cm]

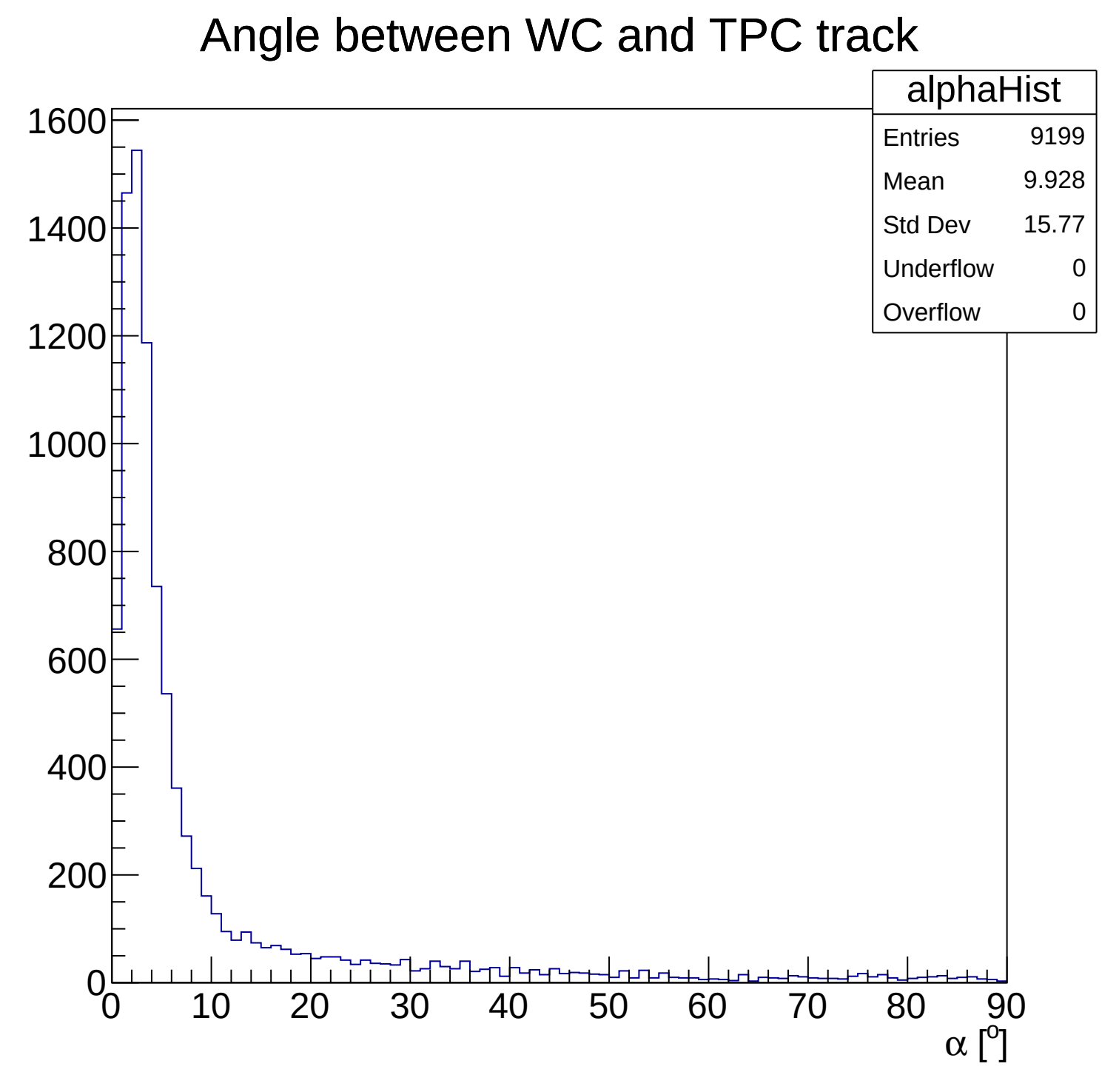

Δ Y For All Tracks
tpcAllTrackDelY
Entries 38945
Mean 0.1708
Std Dev 11.29
Underflow 0
Overflow 0
1400
1200
1000
800
600
400
200
0
–60
–40
–20
0
20
40
60
Δ Y [cm]

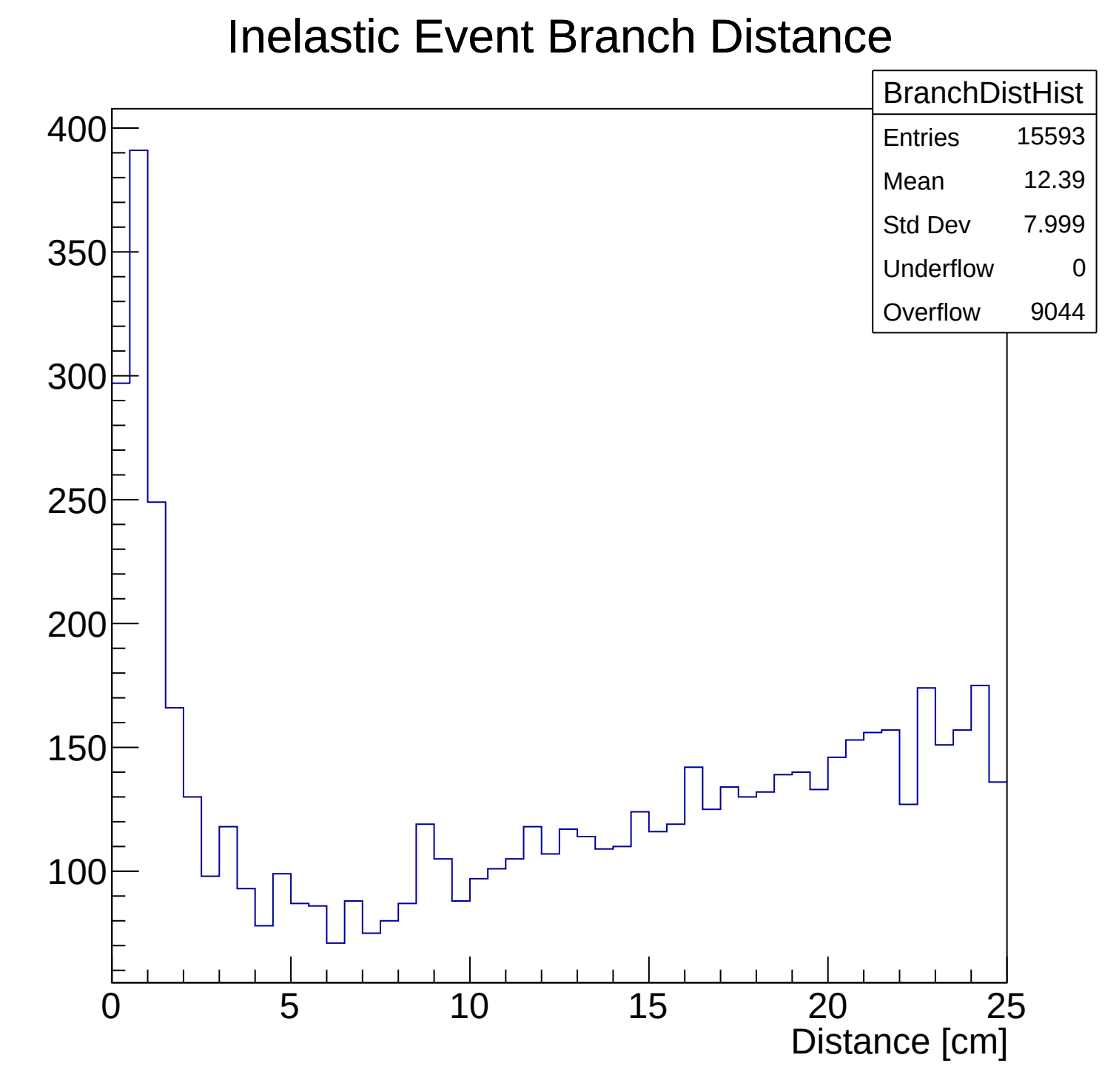

Angle between direction vectors - entering tracks
dirAngleHist
Entries 9199
Mean 4.614
Std Dev 5.943
Underflow 0
Overflow 92
2000
1800
1600
1400
1200
1000
800
600
400
200
0
0
10
20
30
40
50
60
α [°]

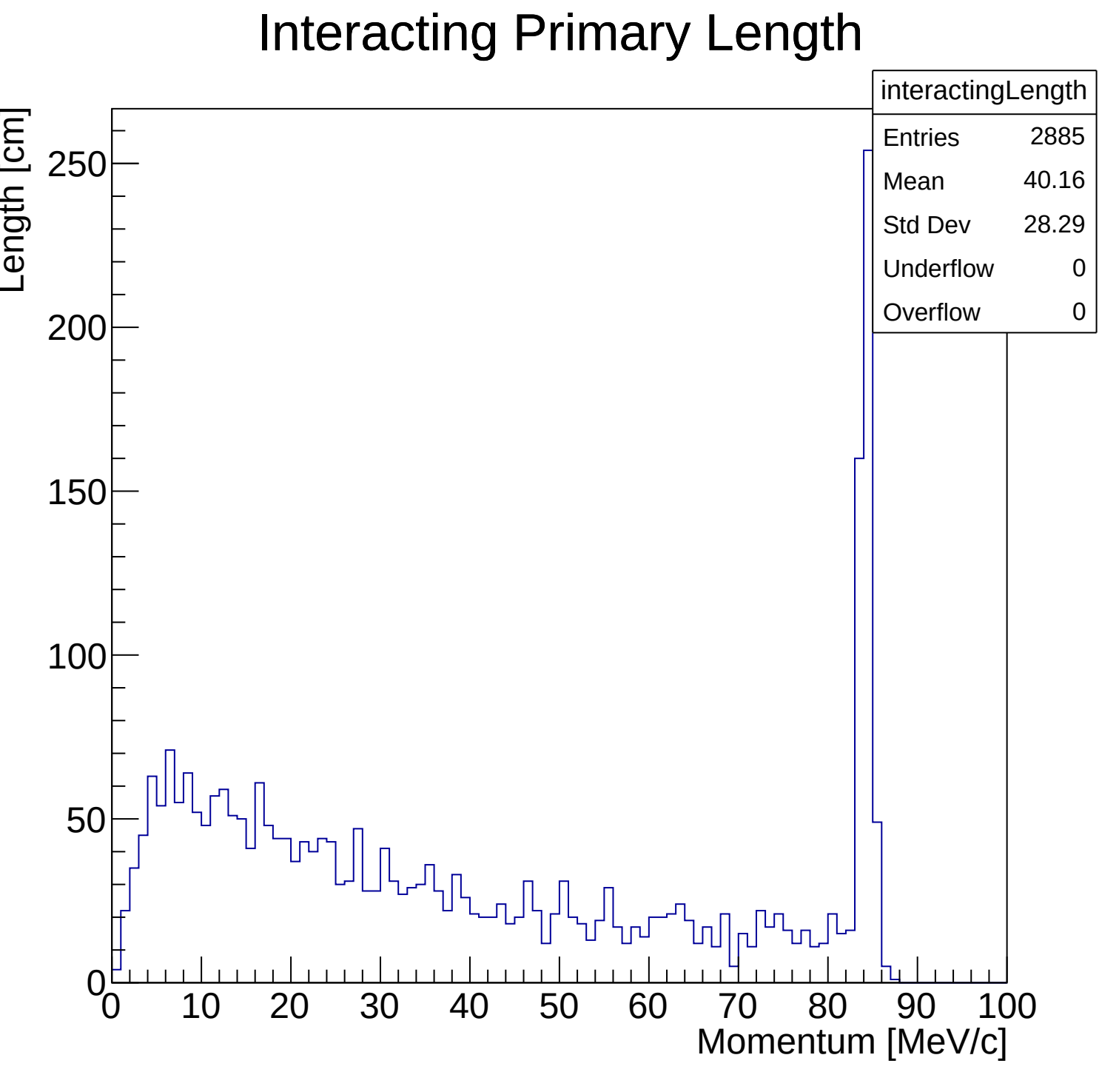

Angle between direction vectors - entering tracks
allDirAngleHist
Entries 38945
Mean 4.878
Std Dev 7.416
Underflow 0
Overflow 3766
14000
12000
10000
8000
6000
4000
2000
0
0
10
20
30
40
50
60
α [°]

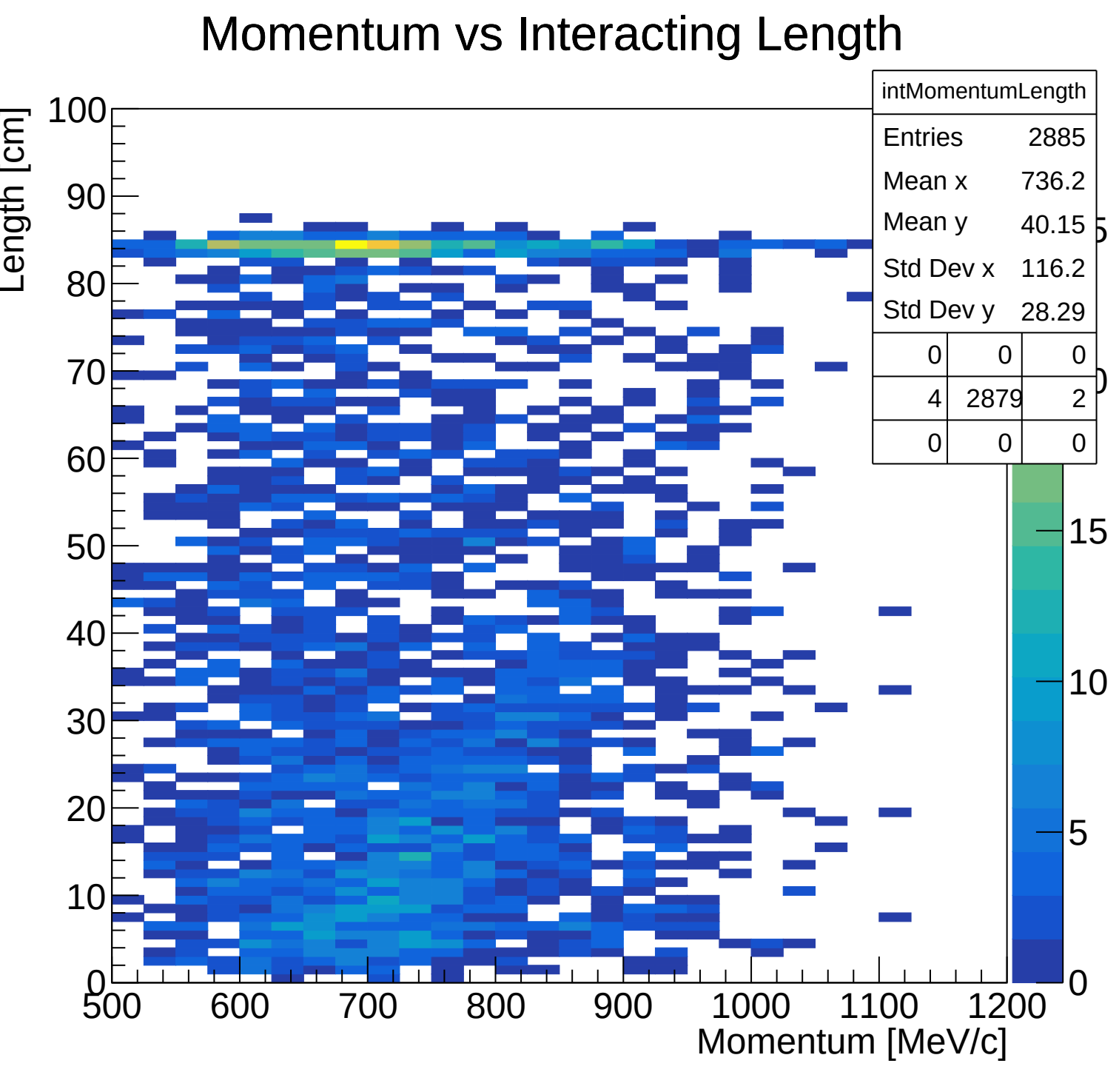

Angle between WC and TPC track - Tracks Within Circle Cut
circleAlphaHist
Entries 4522
Mean 8.07
Std Dev 12.67
Underflow 0
Overflow 0
800
700
600
500
400
300
200
100
0
0
10
20
30
40
50
60
70
80
90
α [°]

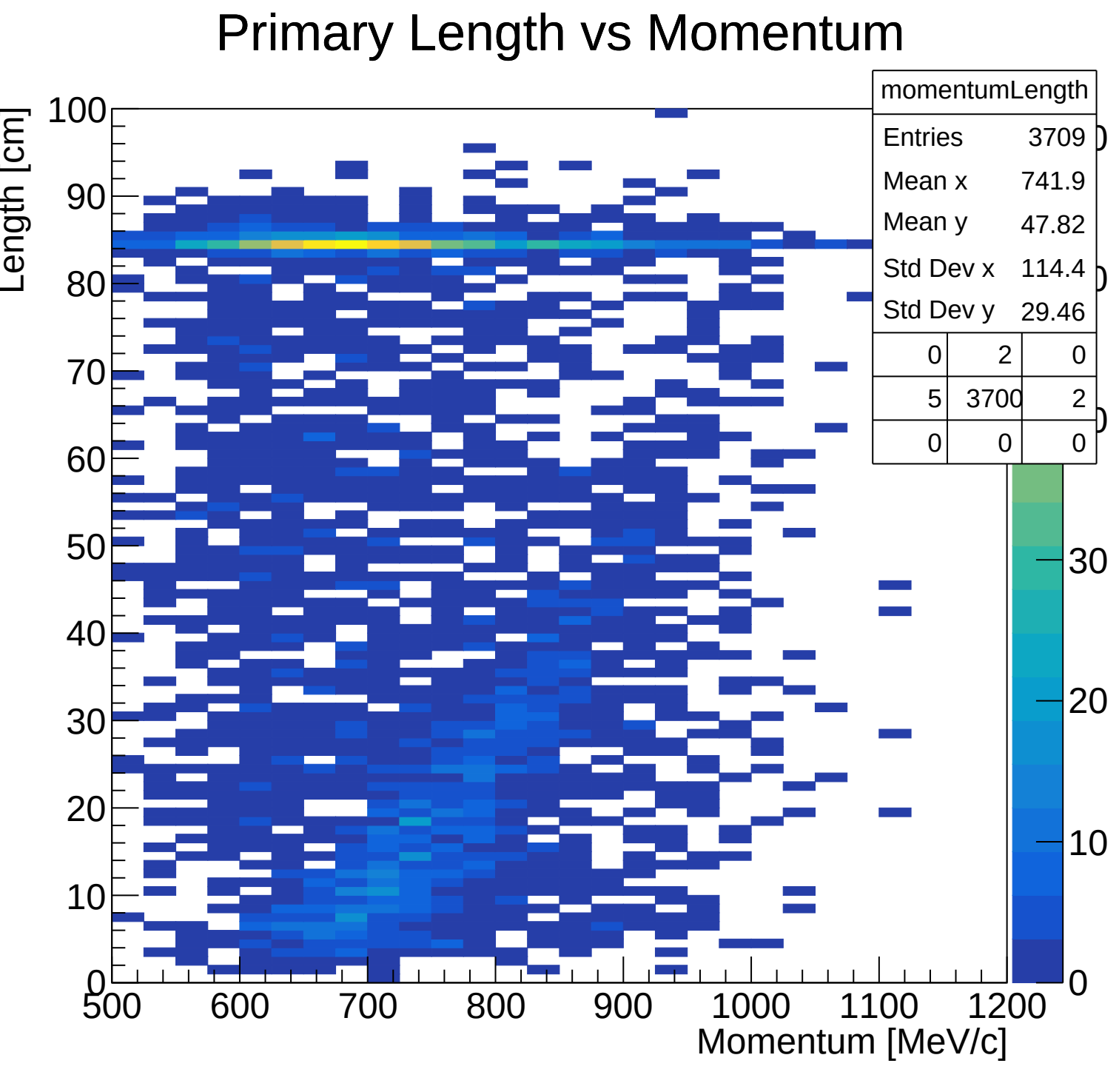

Angle between WC and TPC entering track - Using End Point
alphaHistEnd
Entries 9199
Mean 10.78
Std Dev 15.87
Underflow 0
Overflow 0
1400
1200
1000
800
600
400
200
0
0
10
20
30
40
50
60
70
80
90
α [°]

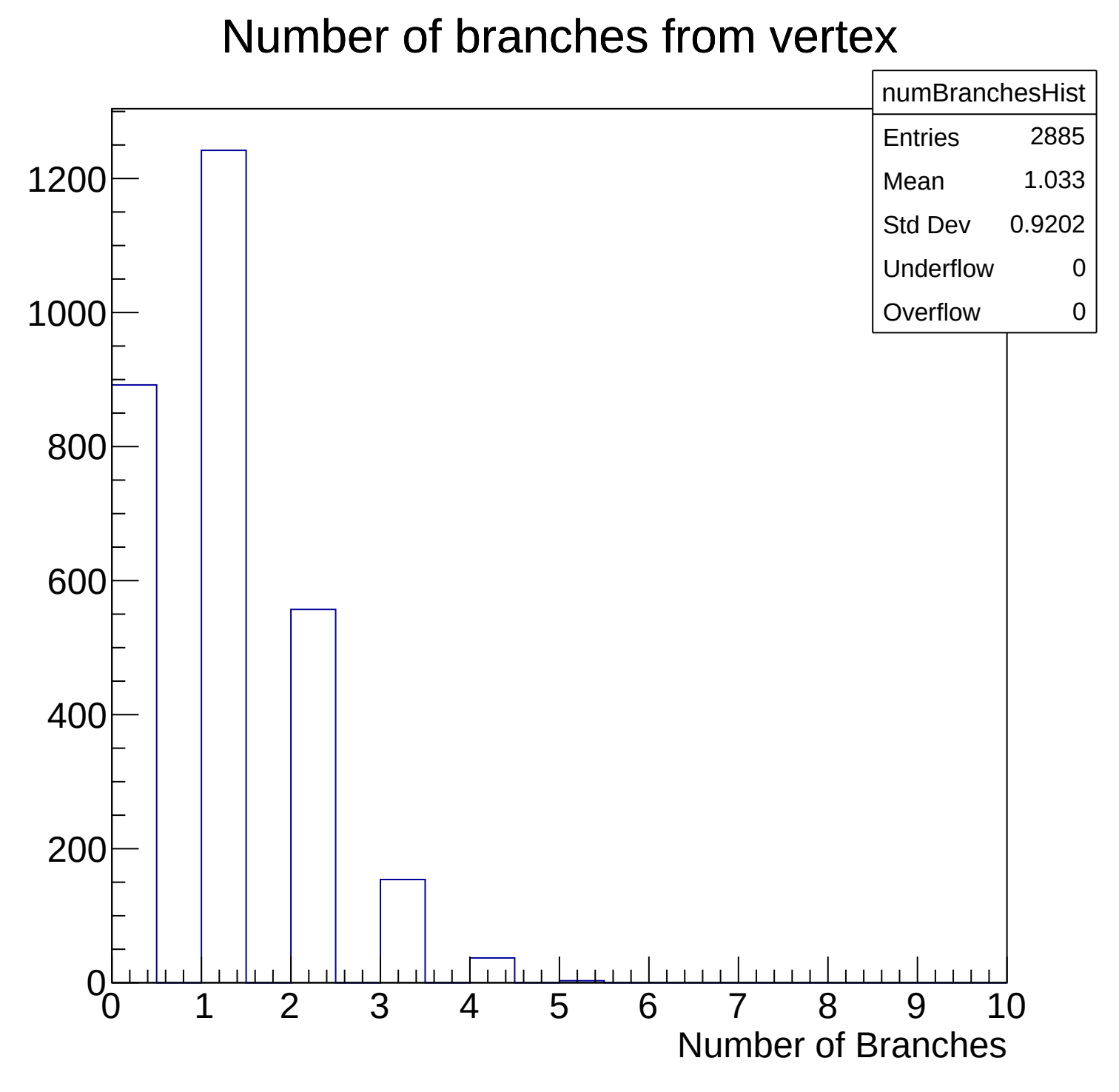

Angle between WC and TPC track
alphaHist
Entries 9199
Mean 9.928
Std Dev 15.77
Underflow 0
Overflow 0
1600
1400
1200
1000
800
600
400
200
0
0
10
20
30
40
50
60
70
80
90
α [°]

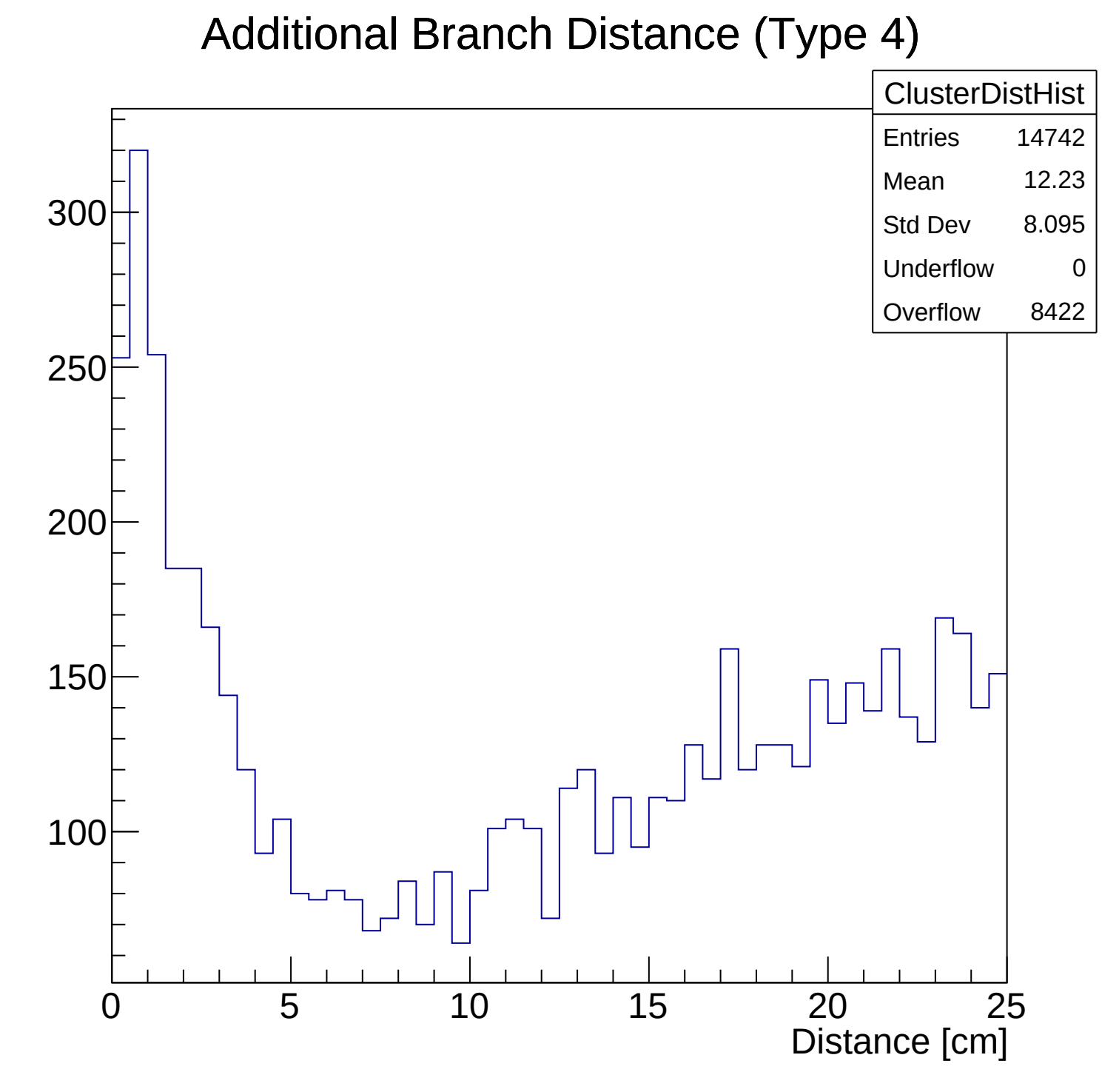

Inelastic Event Branch Distance
BranchDistHist
Entries 15593
Mean 12.39
Std Dev 7.999
Underflow 0
Overflow 9044
400
350
300
250
200
150
100
0
5
10
15
20
25
Distance [cm]

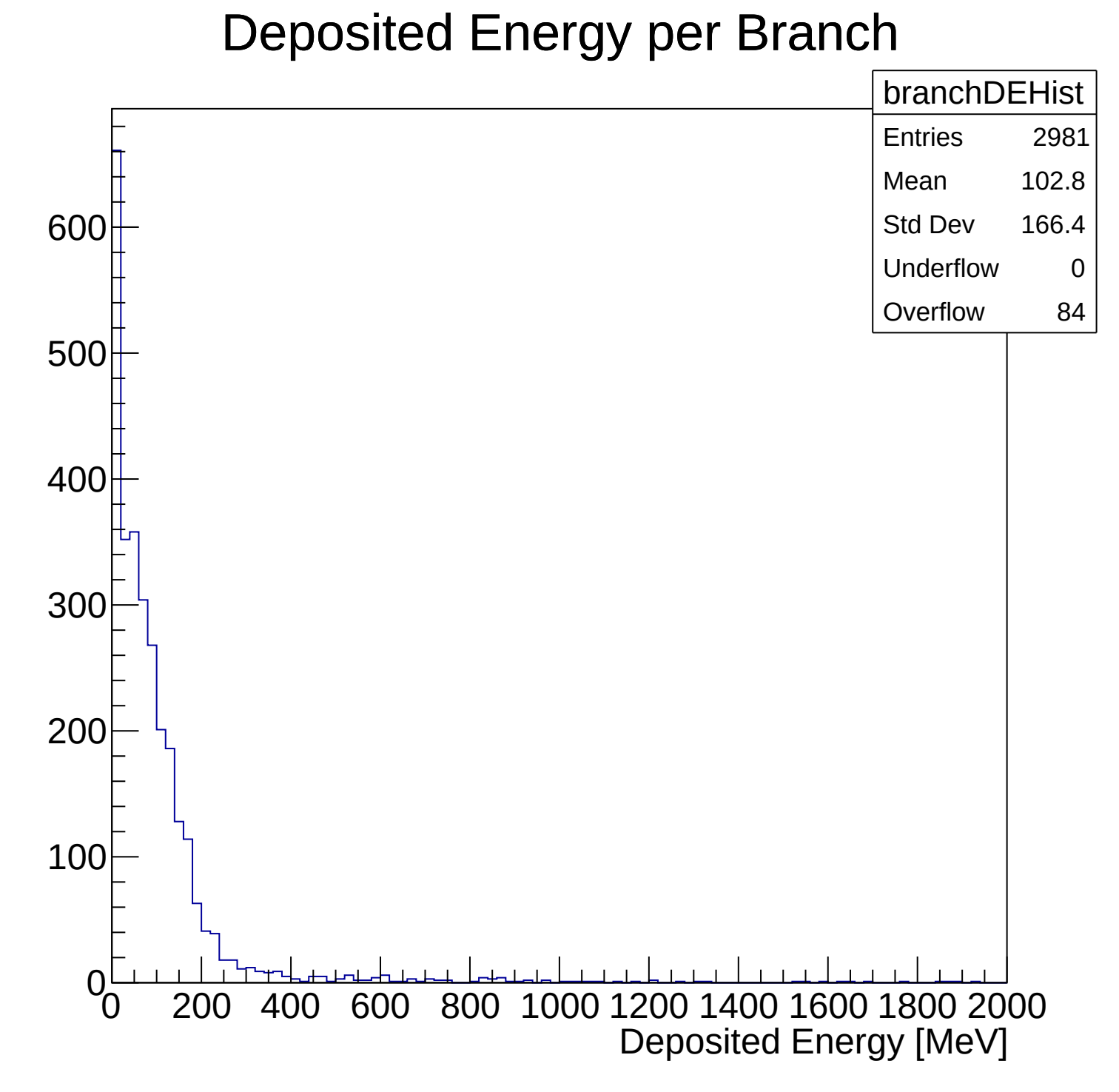

Interacting Primary Length
interactingLength
Entries 2885
Mean 40.16
Std Dev 28.29
Underflow 0
Overflow 0
Length [cm]
0
50
100
150
200
250
0
10
20
30
40
50
60
70
80
90
100
Momentum [MeV/c]

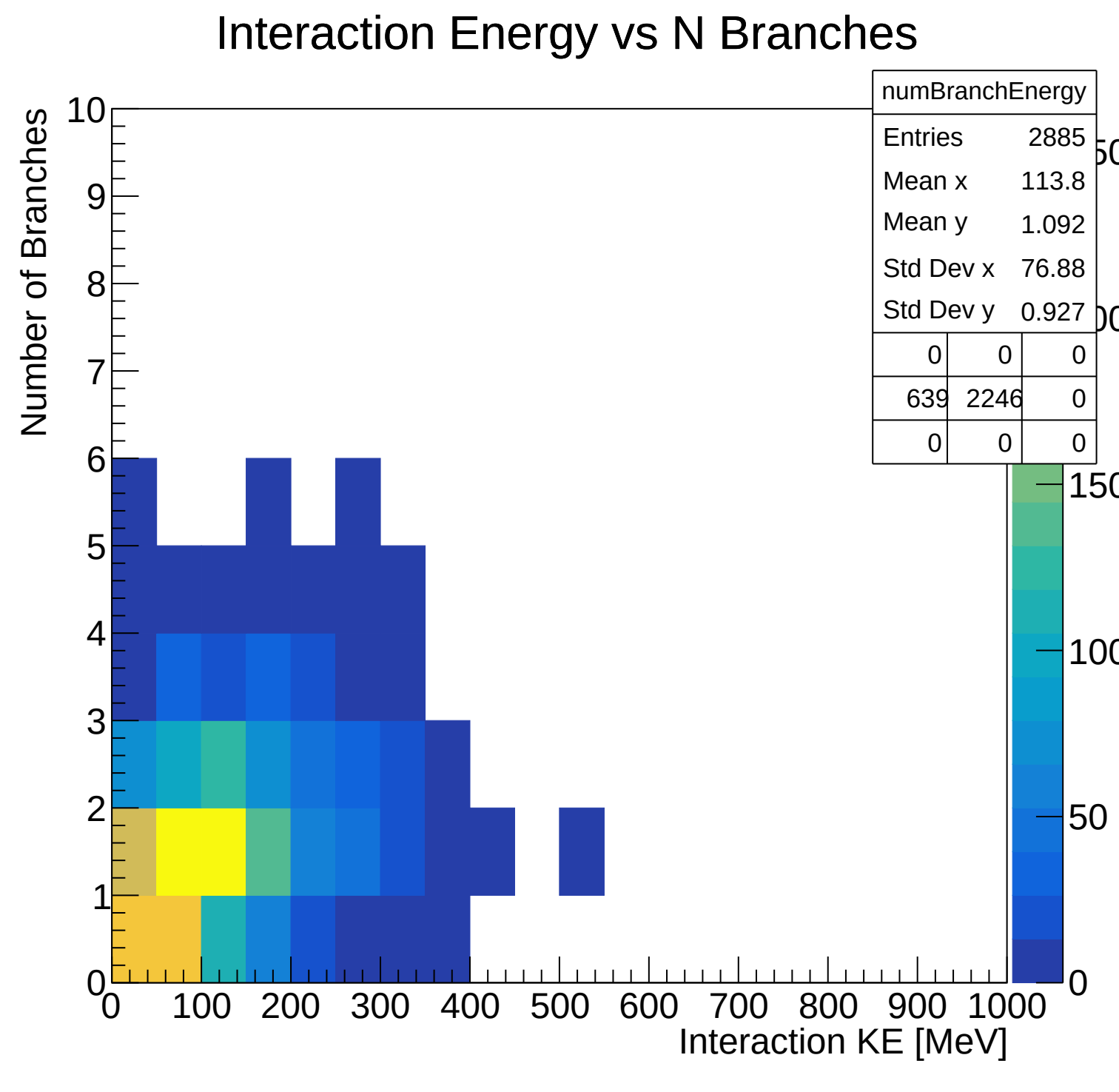

Momentum vs Interacting Length
intMomentumLength
Entries 2885
Mean x 736.2
Mean y 40.15
Std Dev x 116.2
Std Dev y 28.29
0 0 0
4 2879 2
0 0 0
Length [cm]
100
90
80
70
60
50
40
30
20
10
0
500
600
700
800
900
1000
1100
1200
Momentum [MeV/c]
15
10
5
0

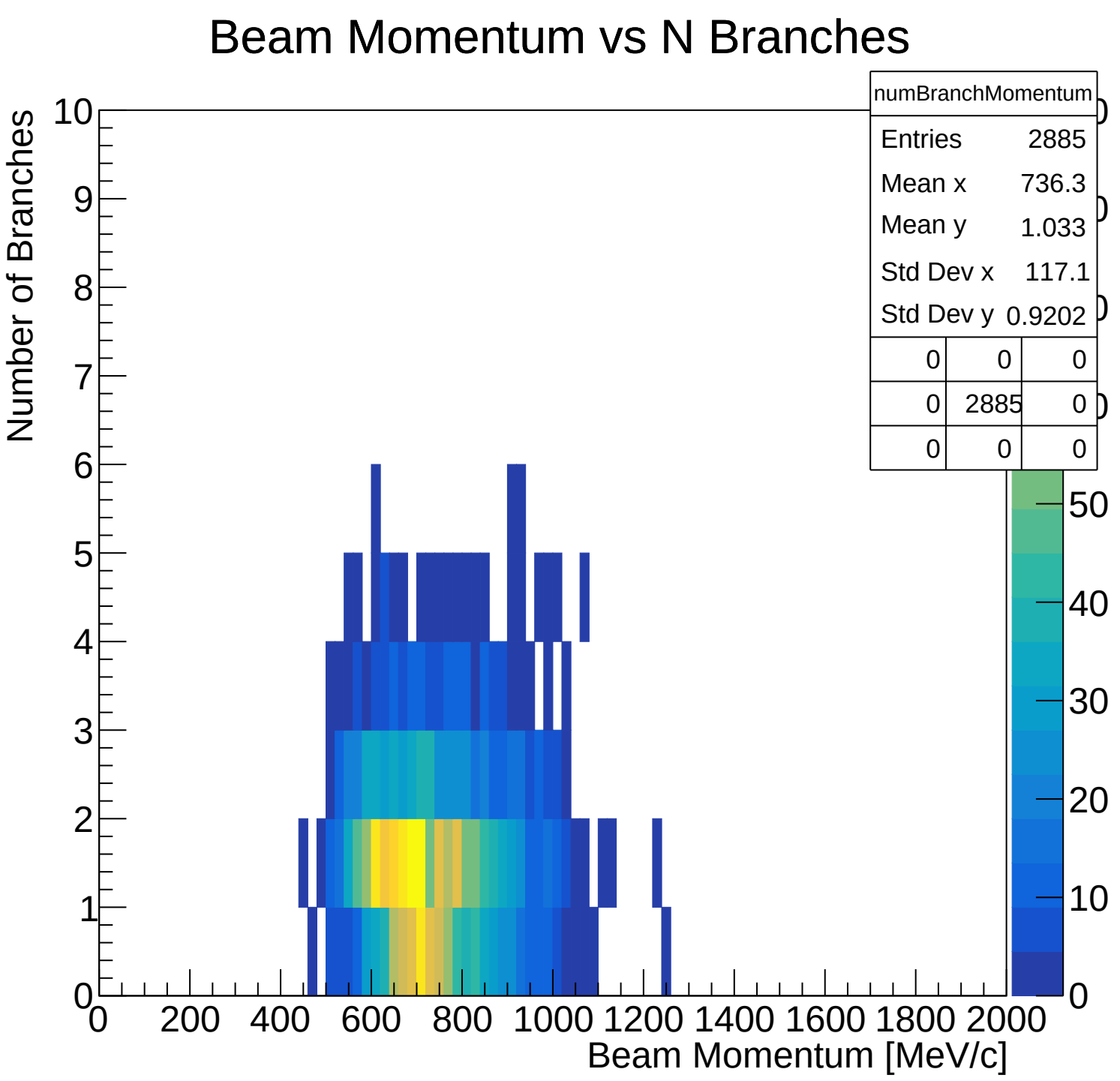

Primary Length vs Momentum
momentumLength
Entries 3709
Mean x 741.9
Mean y 47.82
Std Dev x 114.4
Std Dev y 29.46
0 2 0
5 3700 2
0 0 0
Length [cm]
100
90
80
70
60
50
40
30
20
10
0
500
600
700
800
900
1000
1100
1200
Momentum [MeV/c]
30
20
10
0

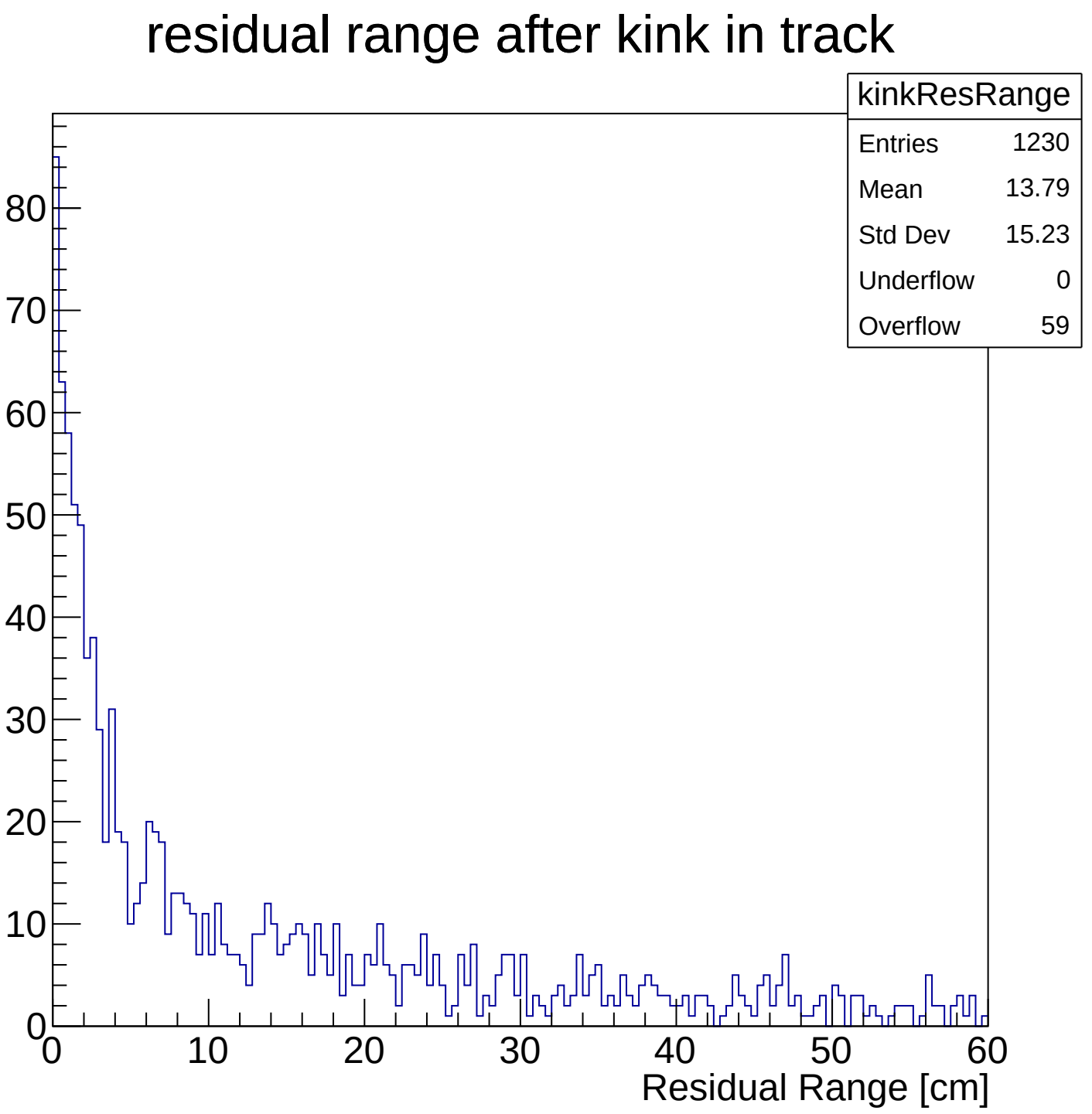

Number of branches from vertex
numBranchesHist
Entries 2885
Mean 1.033
Std Dev 0.9202
Underflow 0
Overflow 0
1200
1000
800
600
400
200
0
0 1 2 3 4 5 6 7 8 9 10
Number of Branches

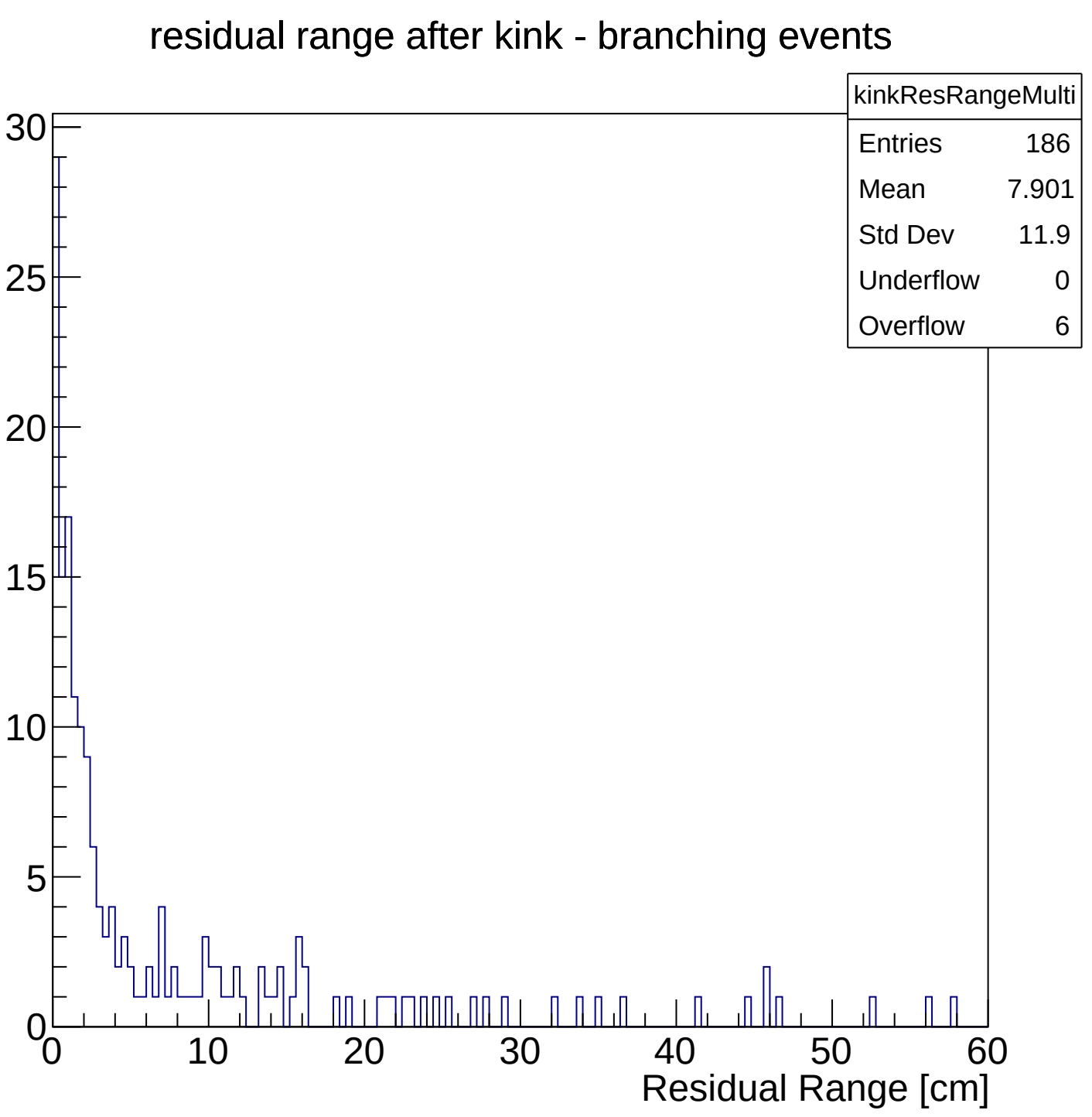

Additional Branch Distance (Type 4)
ClusterDistHist
Entries 14742
Mean 12.23
Std Dev 8.095
Underflow 0
Overflow 8422
300
250
200
150
100
0
5
10
15
20
25
Distance [cm]


Deposited Energy per Branch
branchDEHist
Entries 2981
Mean 102.8
Std Dev 166.4
Underflow 0
Overflow 84
600
500
400
300
200
100
0
0 200 400 600 800 1000 1200 1400 1600 1800 2000
Deposited Energy [MeV]


Interaction Energy vs N Branches
numBranchEnergy
Entries 2885
Mean x 113.8
Mean y 1.092
Std Dev x 76.88
Std Dev y 0.927
0 0 0
639 2246 0
0 0 0
Number of Branches
Interaction KE [MeV]
0
1
2
3
4
5
6
7
8
9
10
0
100
200
300
400
500
600
700
800
900
1000
0
50
100
150


Beam Momentum vs N Branches
numBranchMomentum
Entries 2885
Mean x 736.3
Mean y 1.033
Std Dev x 117.1
Std Dev y 0.9202
0 0 0
0 2885 0
0 0 0
Number of Branches
Beam Momentum [MeV/c]
0 200 400 600 800 1000 1200 1400 1600 1800 2000
0 1 2 3 4 5 6 7 8 9 10
0 10 20 30 40 50


residual range after kink in track
kinkResRange
Entries 1230
Mean 13.79
Std Dev 15.23
Underflow 0
Overflow 59
0
10
20
30
40
50
60
70
80
0
10
20
30
40
50
60
Residual Range [cm]


residual range after kink - branching events
kinkResRangeMulti
Entries 186
Mean 7.901
Std Dev 11.9
Underflow 0
Overflow 6
30
25
20
15
10
5
0
0
10
20
30
40
50
60
Residual Range [cm]