File : RG-A inbending with correction (veronique code on pi+ pi-)

Number of hipo file : 184

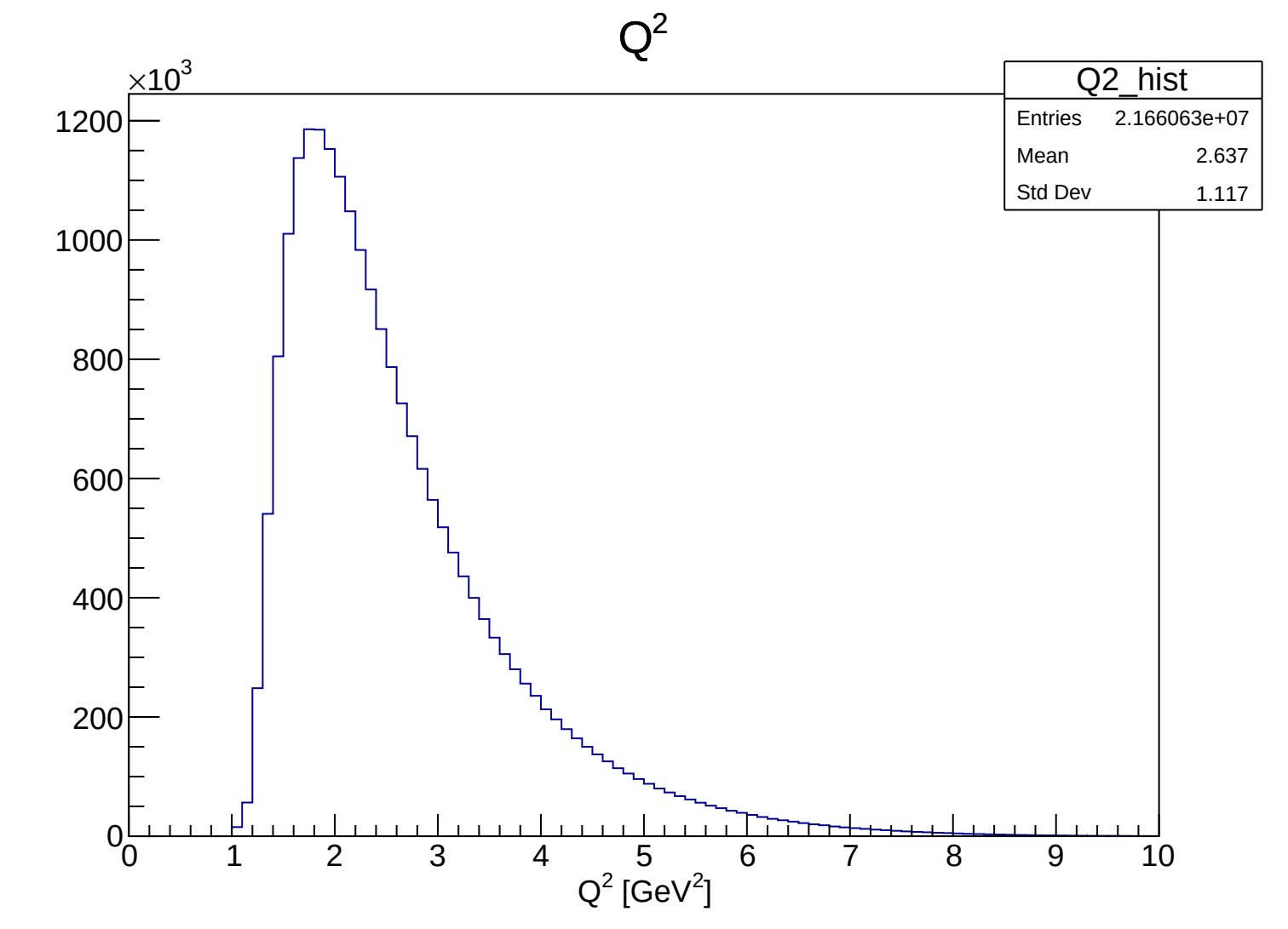
Summary of cuts for the next plots:

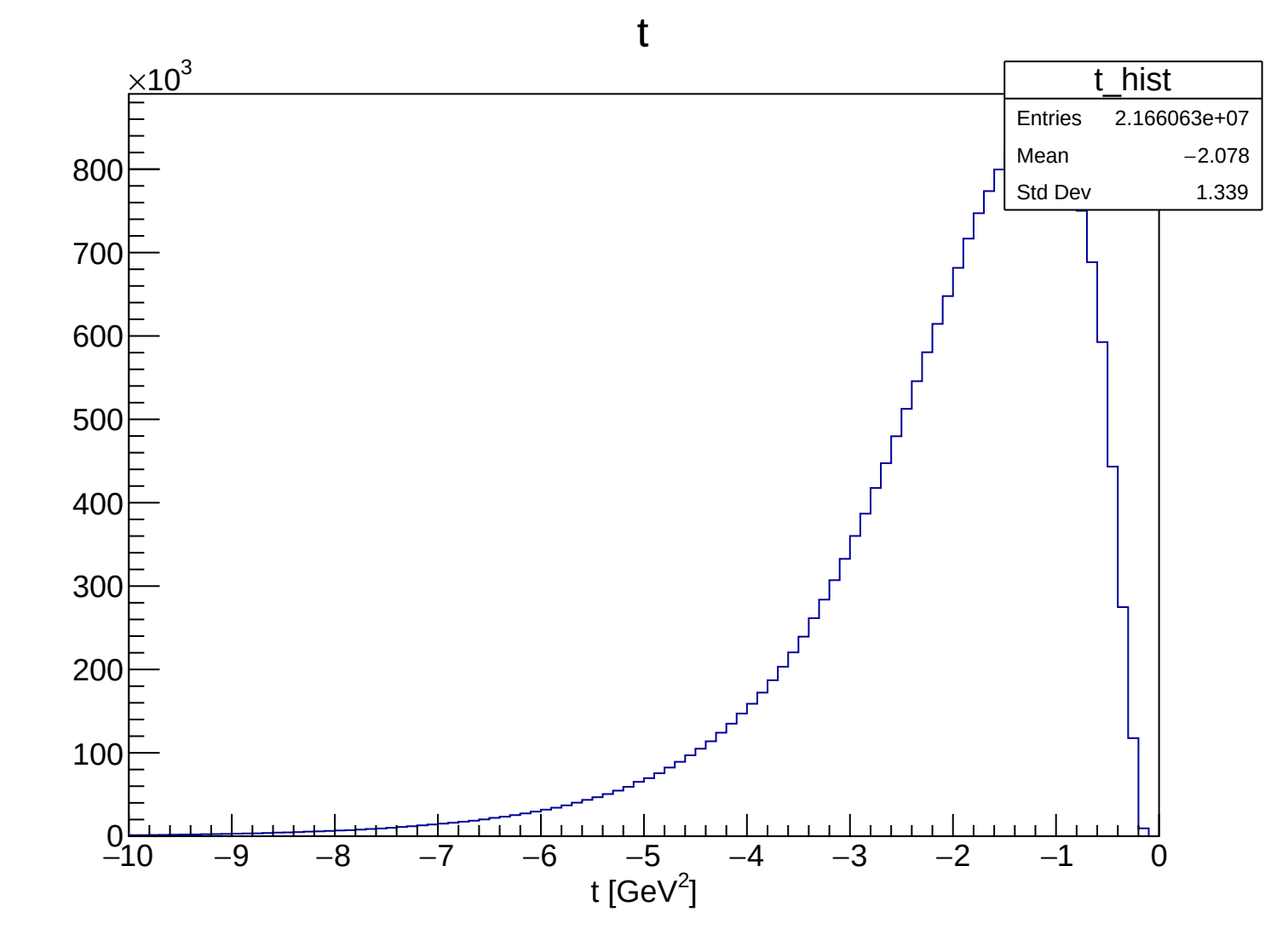
- Cut already present in nSidis files (like p_e^- > 2 GeV, Q^2 > 1 GeV)

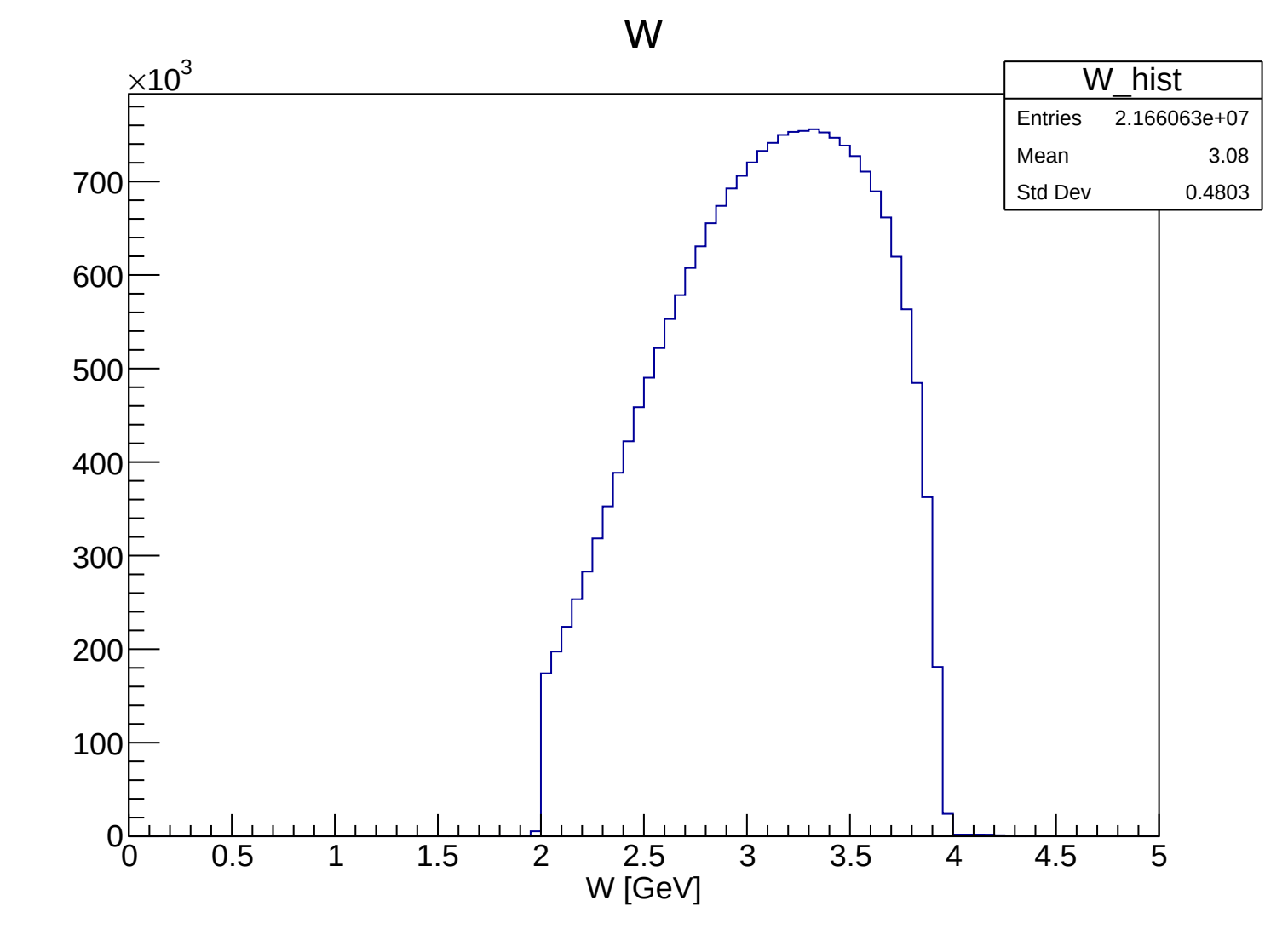
- Only 1 proton, π^+ >= 1, π^- >= 1, e^- >= 1

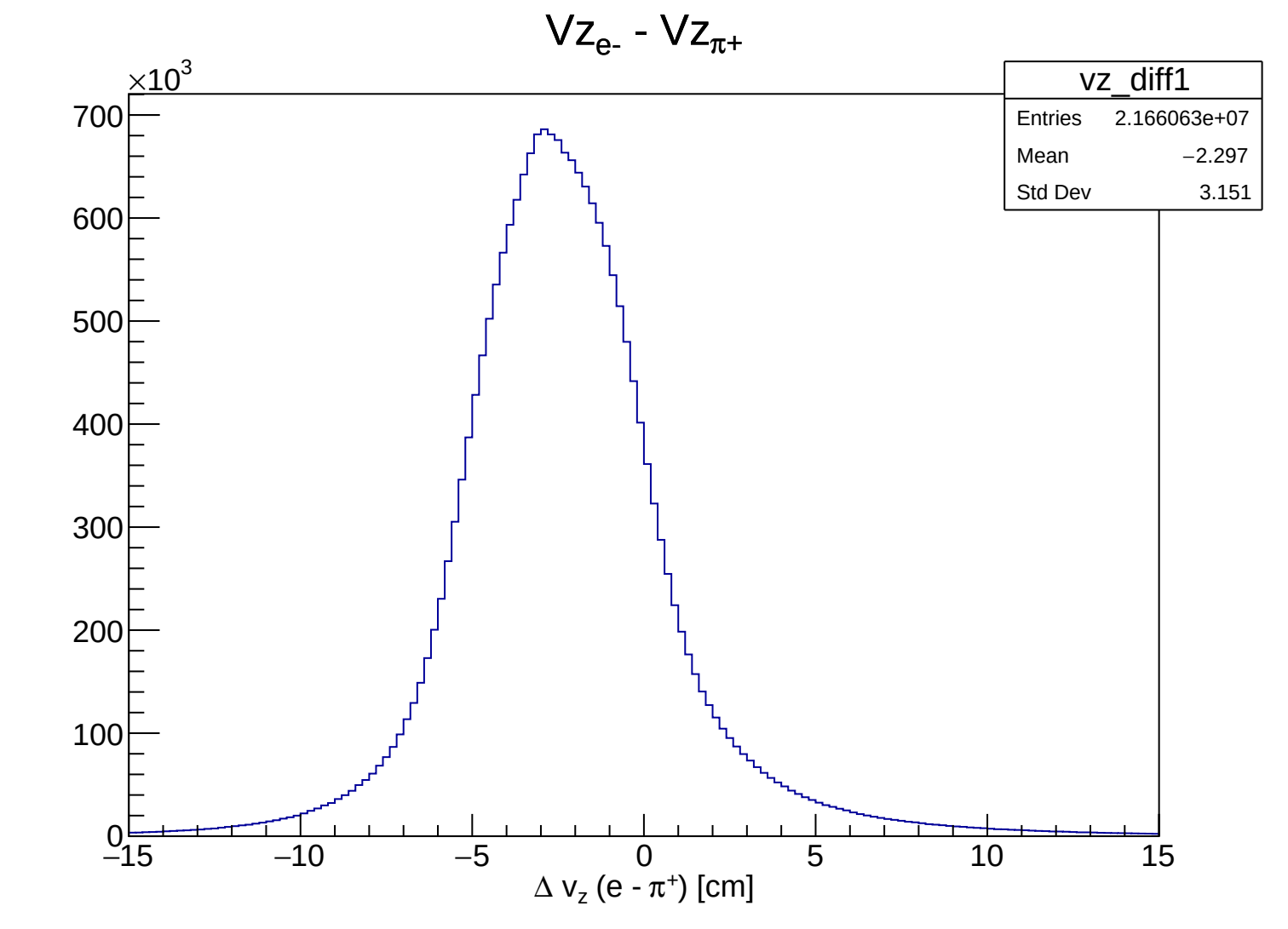
- Very large cut on Missing mass, Invariant mass π^+ π^-

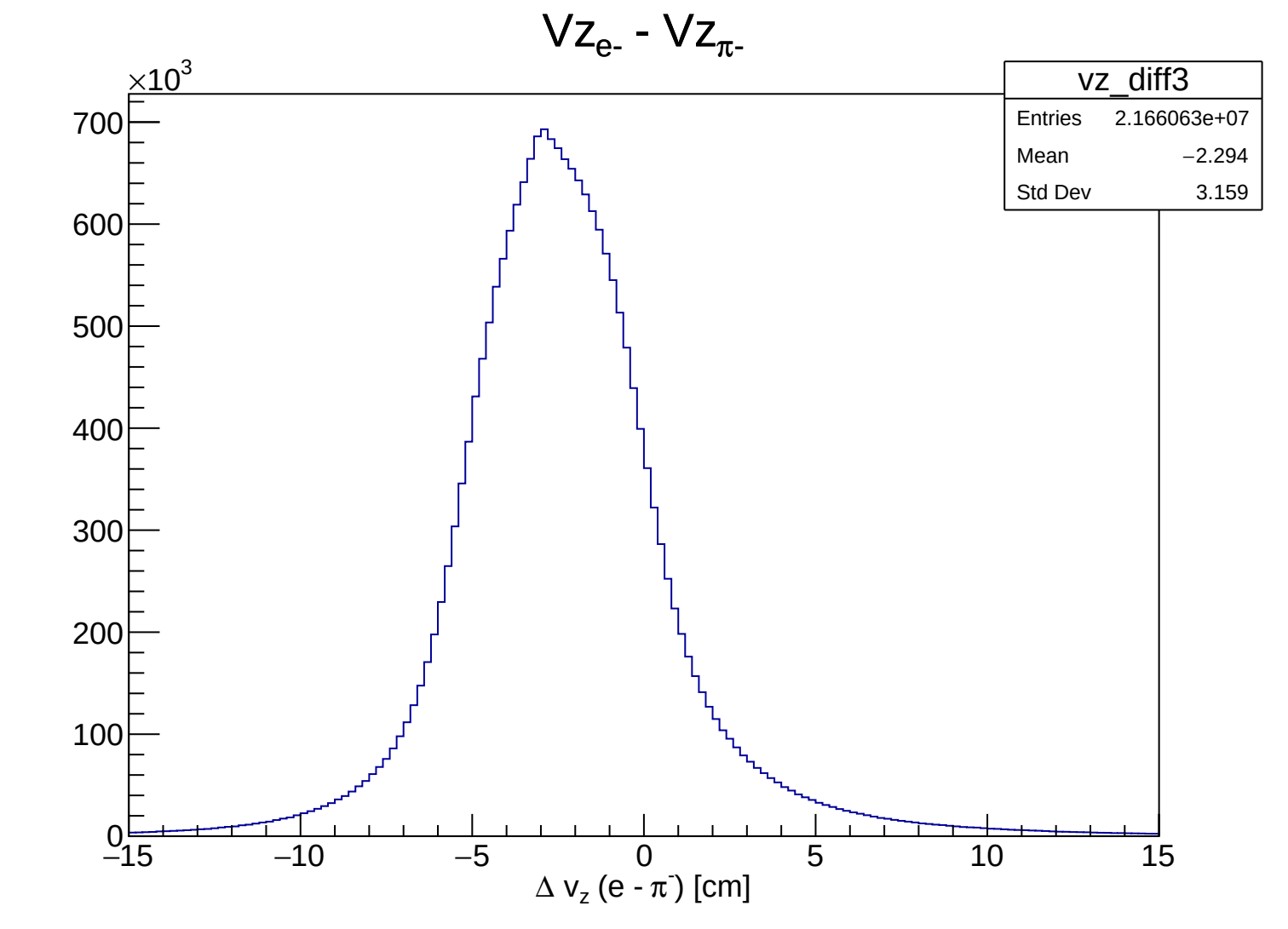
and Invariant mass Ks Kl (cut between 0 and 3 GeV)

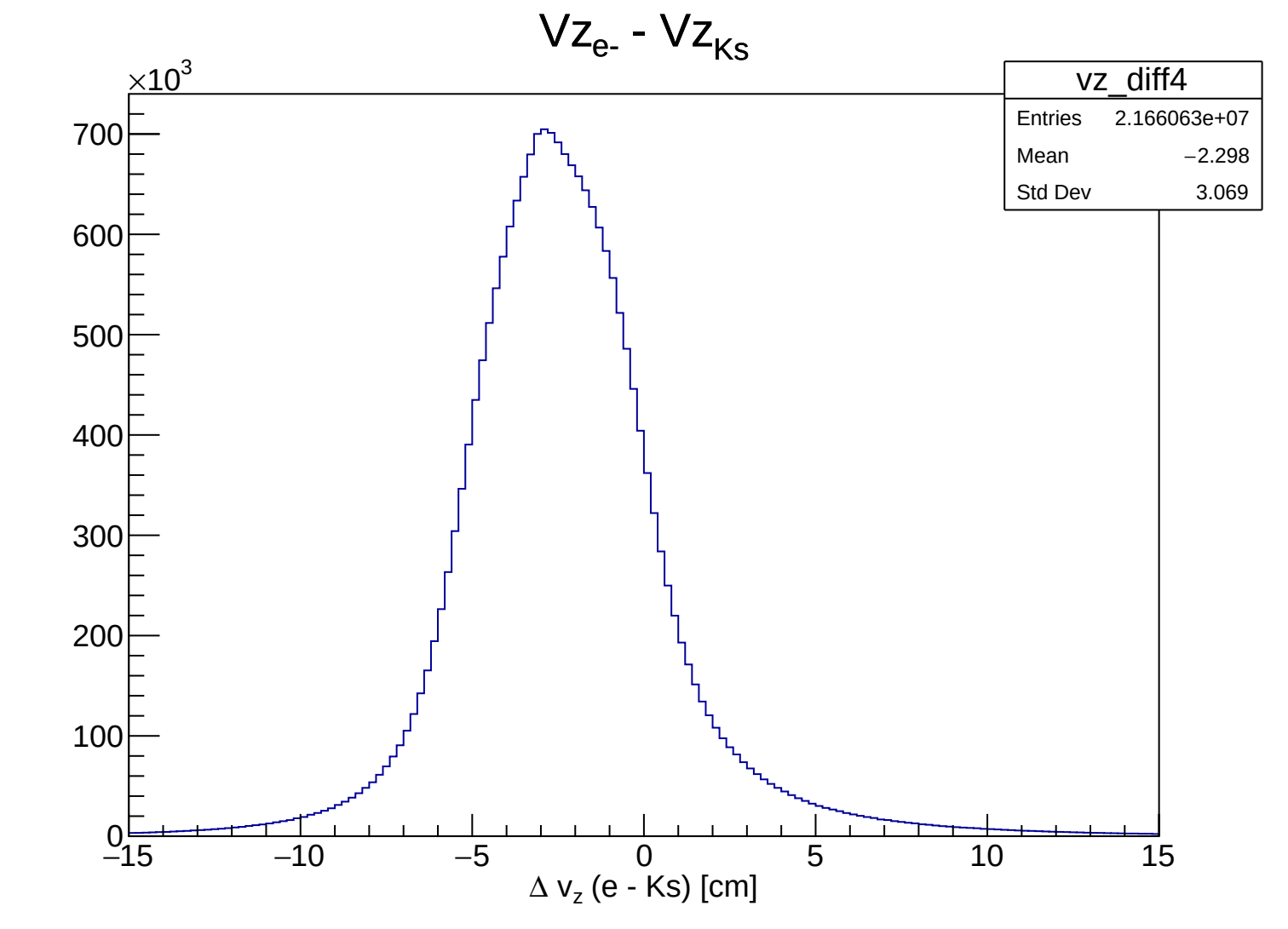

Q^2
$\times 10^3$
Q2_hist
Entries 2.166063e+07
Mean 2.637
Std Dev 1.117
1200
1000
800
600
400
200
0
0 1 2 3 4 5 6 7 8 9 10
Q^2 [GeV^2]

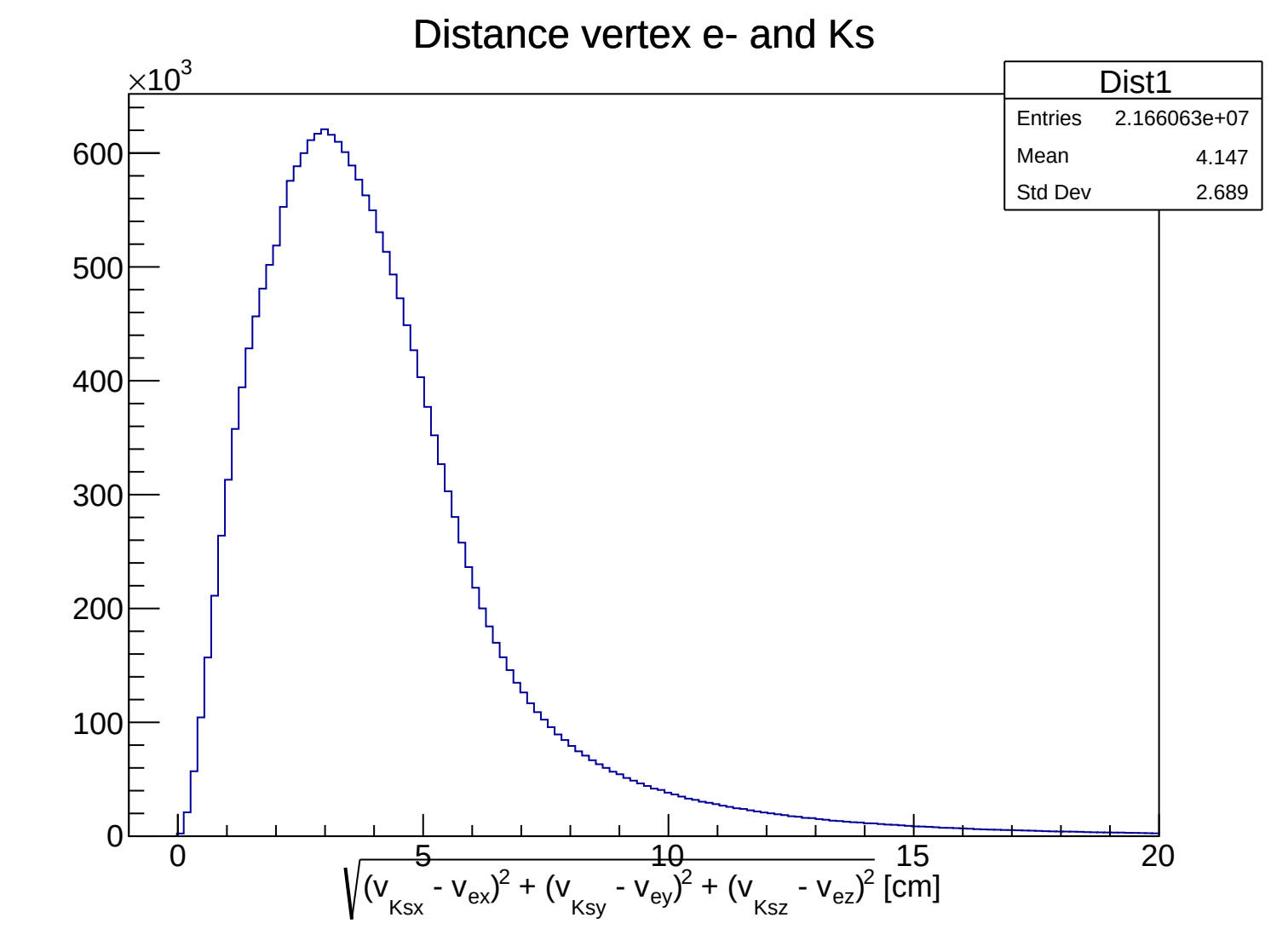

t
×10^3
800
700
600
500
400
300
200
100
0
t_hist
Entries 2.166063e+07
Mean −2.078
Std Dev 1.339
−10
−9
−8
−7
−6
−5
−4
−3
−2
−1
0
t [GeV^2]

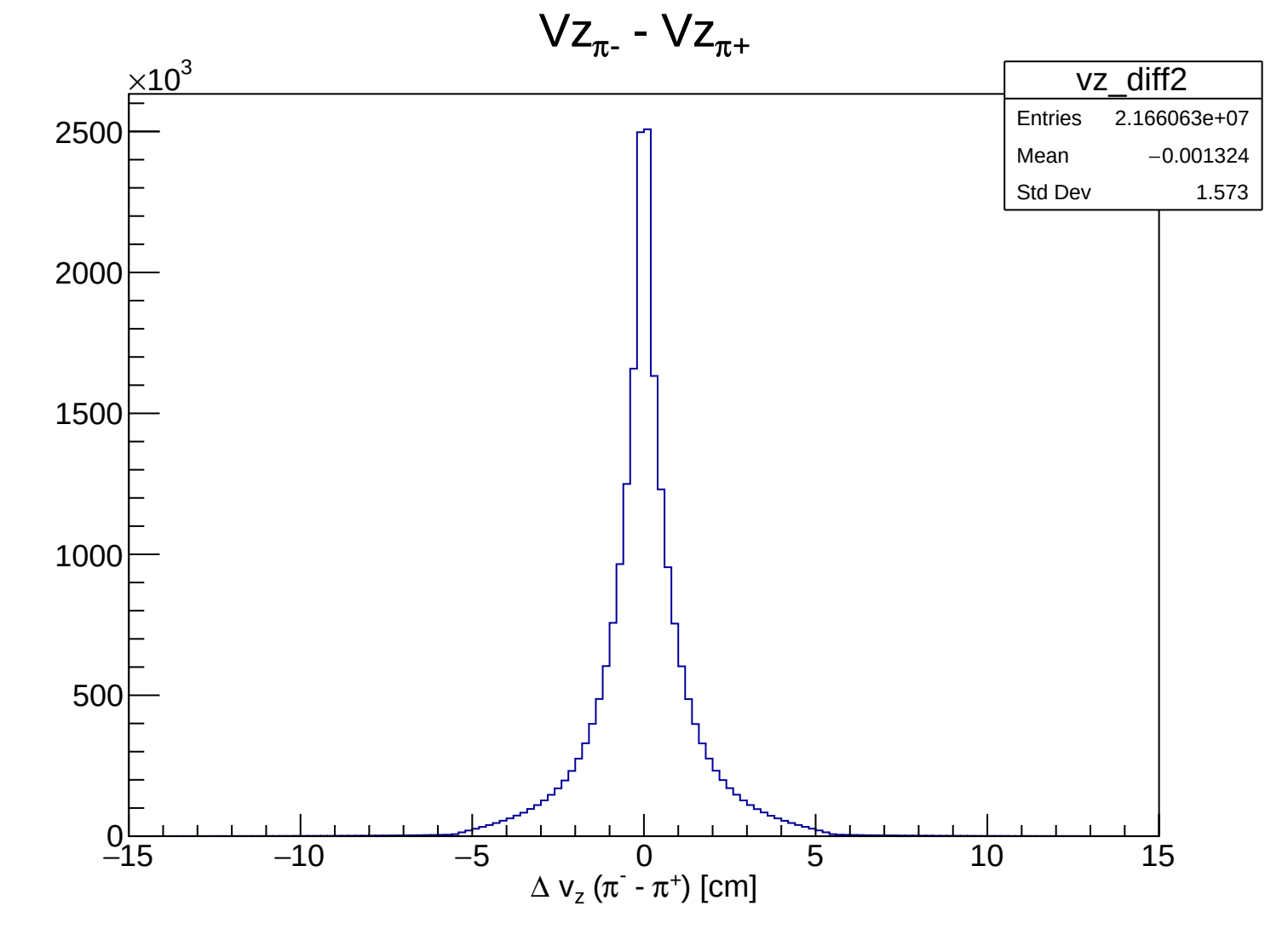

W
×10^3
W_hist
Entries 2.166063e+07
Mean 3.08
Std Dev 0.4803
700
600
500
400
300
200
100
0
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
W [GeV]

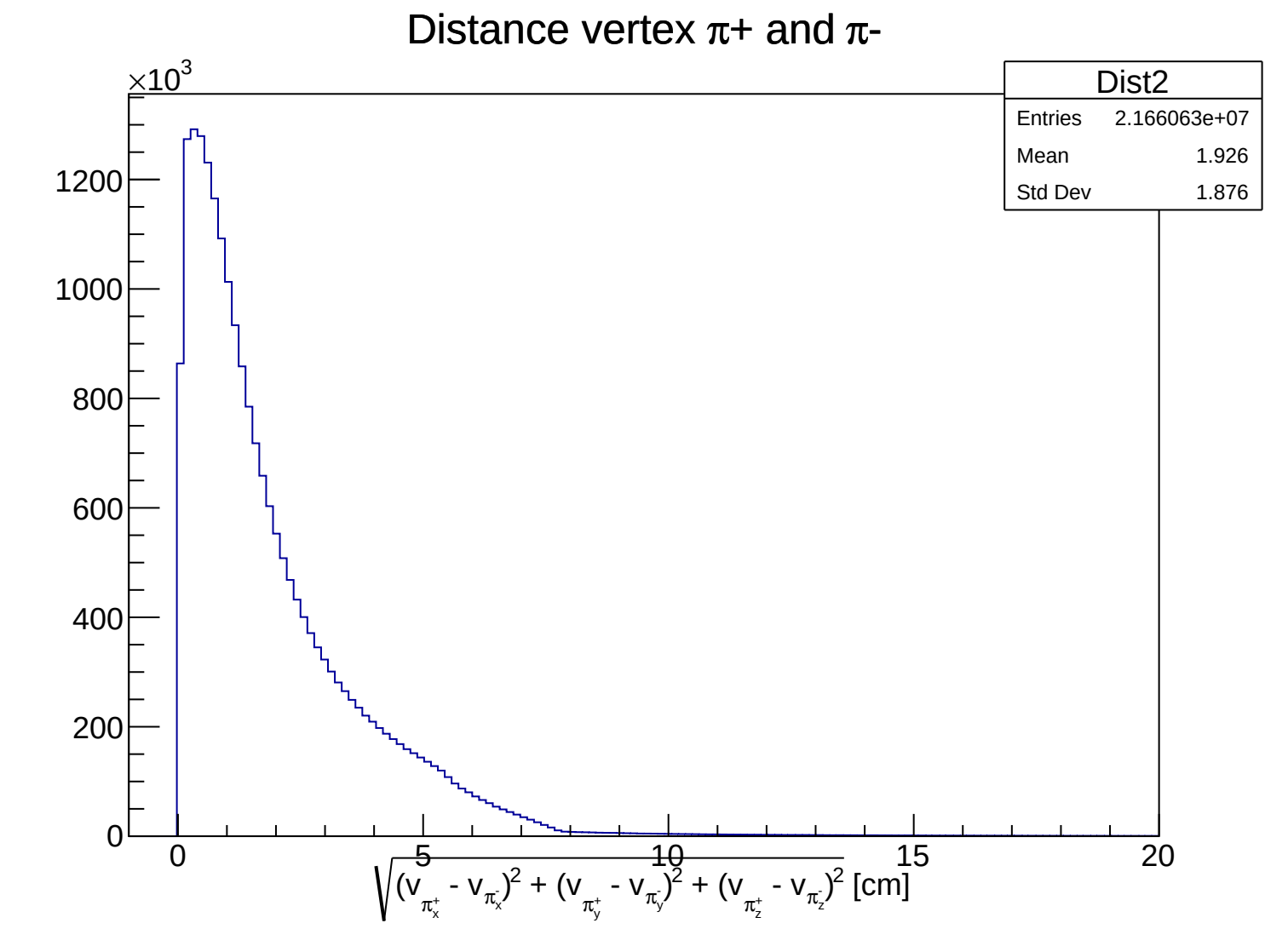

Vz$_{e-}$ - Vz$_{\pi+}$
×10^3
vz_diff1
Entries 2.166063e+07
Mean −2.297
Std Dev 3.151
700
600
500
400
300
200
100
0
−15
−10
−5
0
5
10
15
Δ v$_z$ (e - π$^+$) [cm]

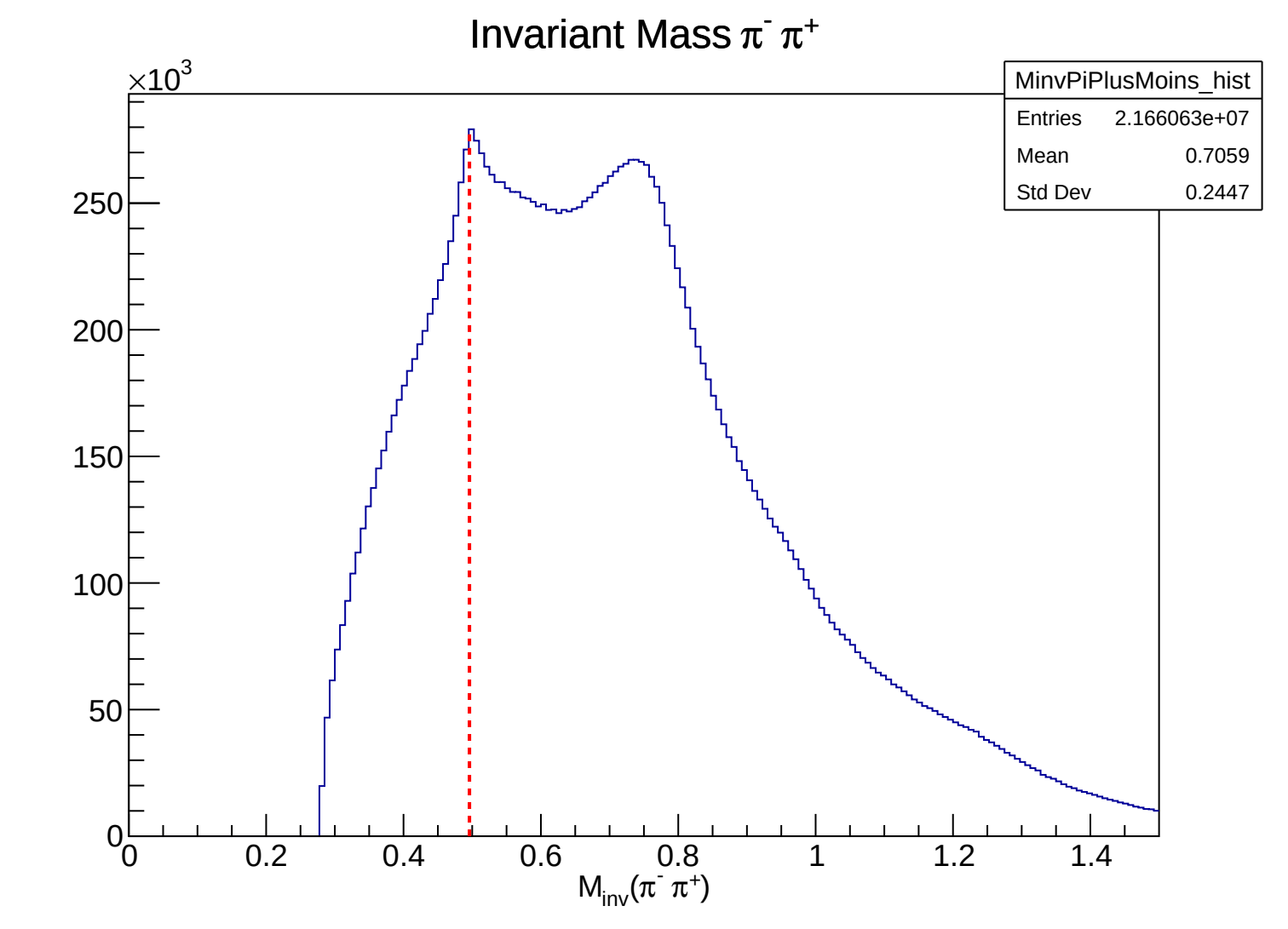

Vz_e- - Vz_π-
×10^3
700
600
500
400
300
200
100
0
−15
−10
−5
0
5
10
15
Δ v_z (e - π⁻) [cm]
vz_diff3
Entries 2.166063e+07
Mean −2.294
Std Dev 3.159

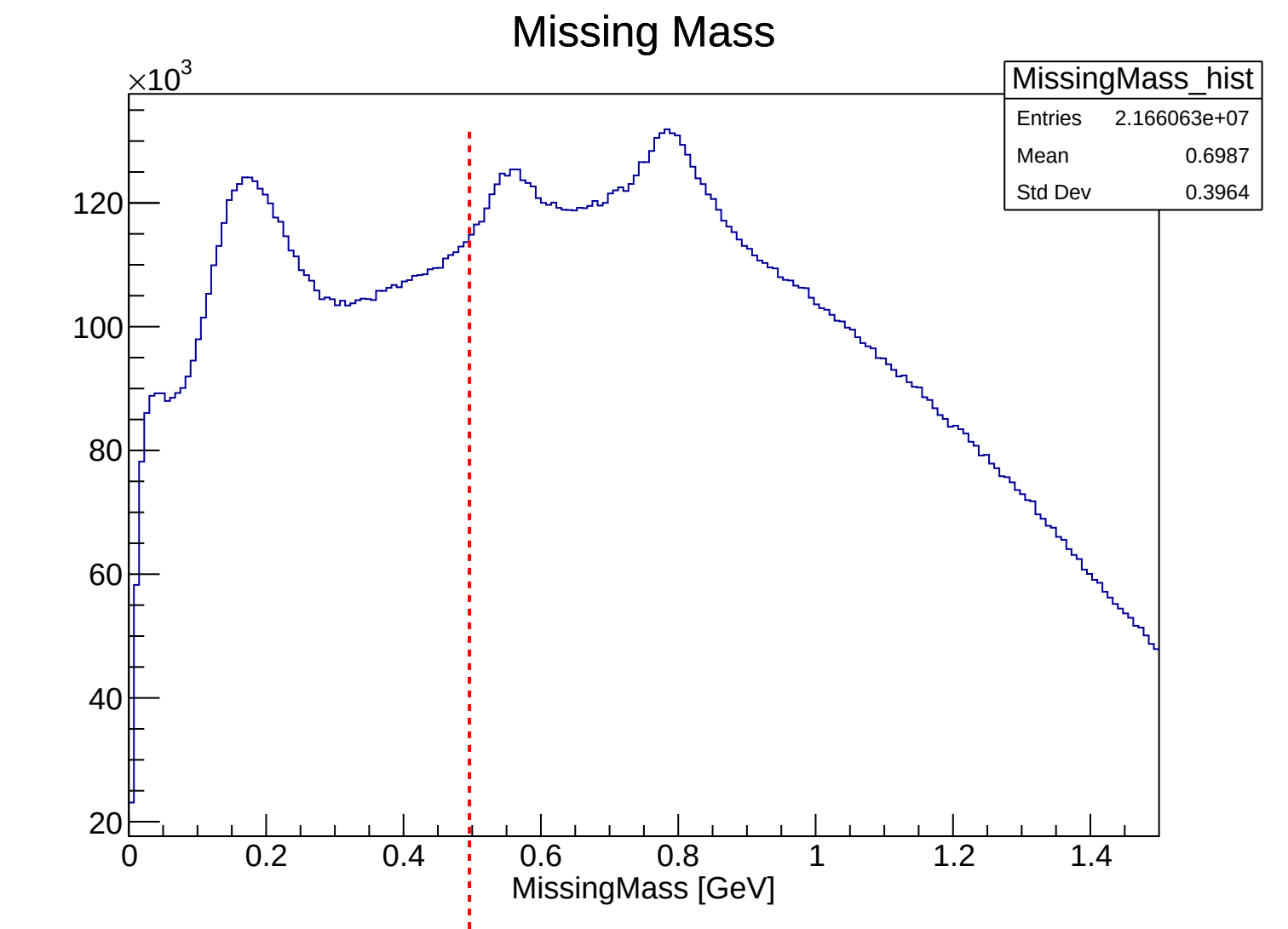

Vz_e- - Vz_Ks
×10^3
vz_diff4
Entries 2.166063e+07
Mean −2.298
Std Dev 3.069
700
600
500
400
300
200
100
0
−15
−10
−5
0
5
10
15
Δ v_z (e - Ks) [cm]

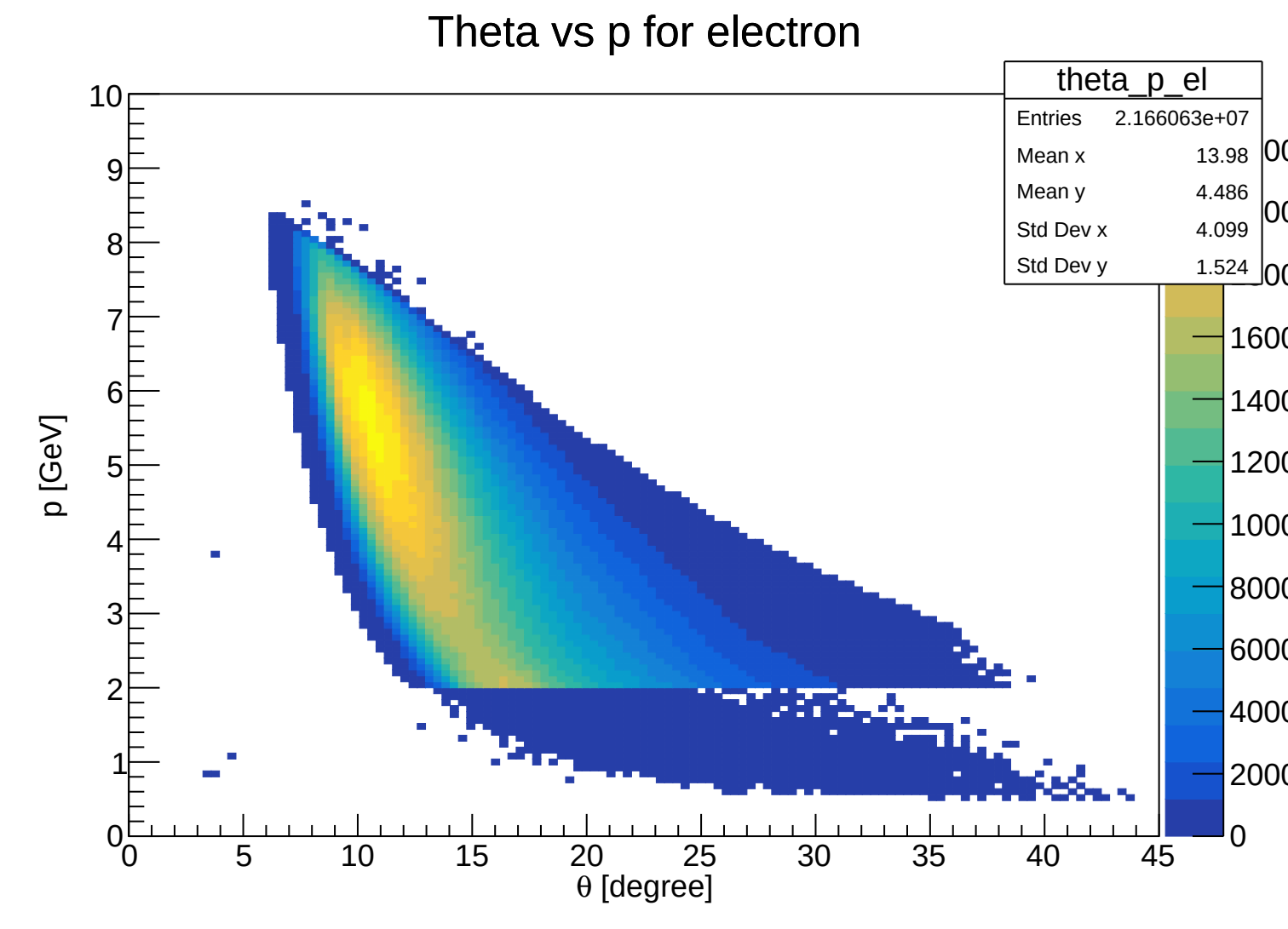

Distance vertex e- and Ks
Dist1
Entries 2.166063e+07
Mean 4.147
Std Dev 2.689
×10^3
600
500
400
300
200
100
0
0
5
10
15
20
√((v_Ksx - v_ex)^2 + (v_Ksy - v_ey)^2 + (v_Ksz - v_ez)^2 [cm]

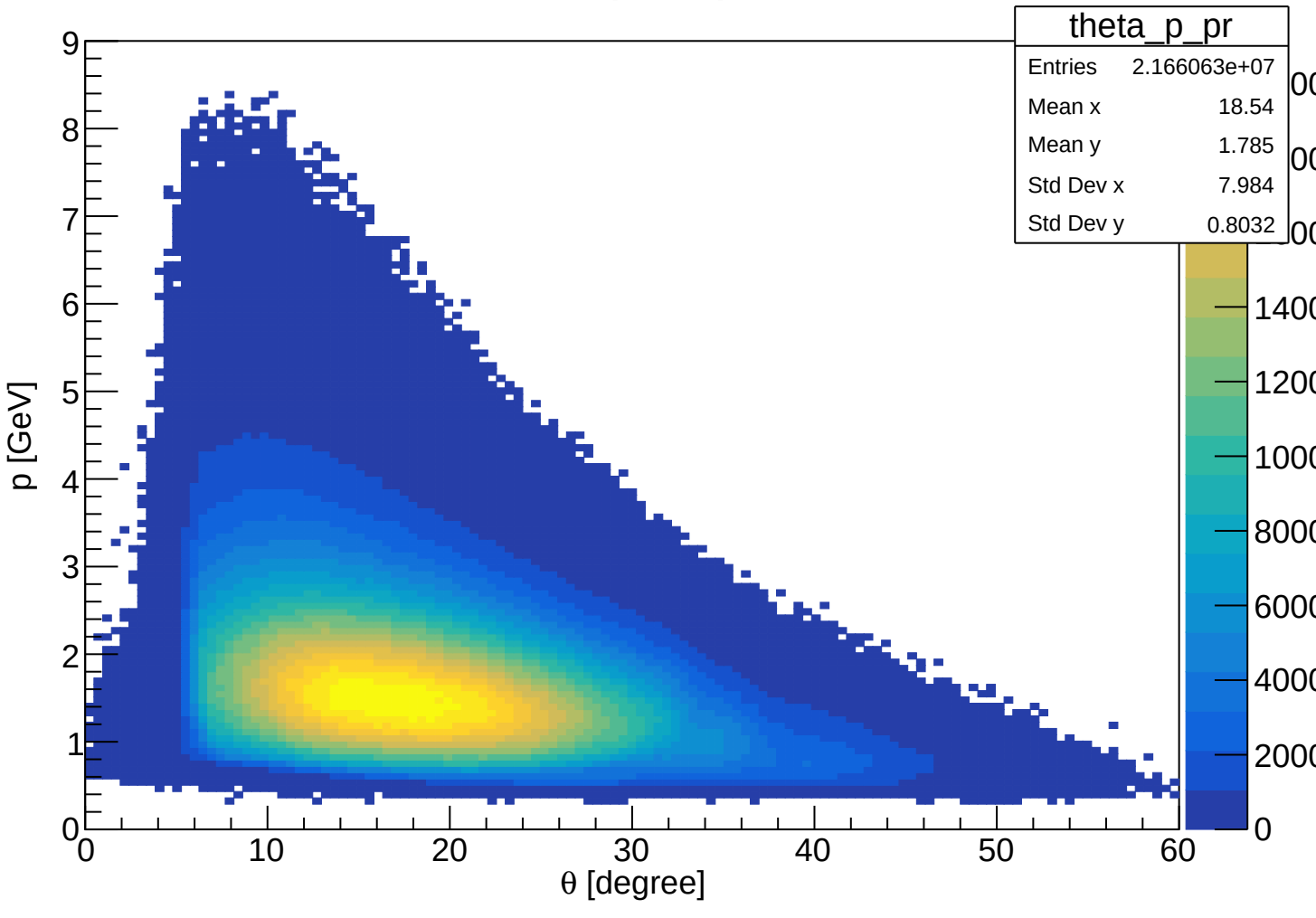

Vz$_{\pi-}$ - Vz$_{\pi+}$
×10^3
vz_diff2
Entries 2.166063e+07
Mean −0.001324
Std Dev 1.573
2500
2000
1500
1000
500
0
−15
−10
−5
0
5
10
15
Δ v$_z$ (π$^-$ - π$^+$) [cm]

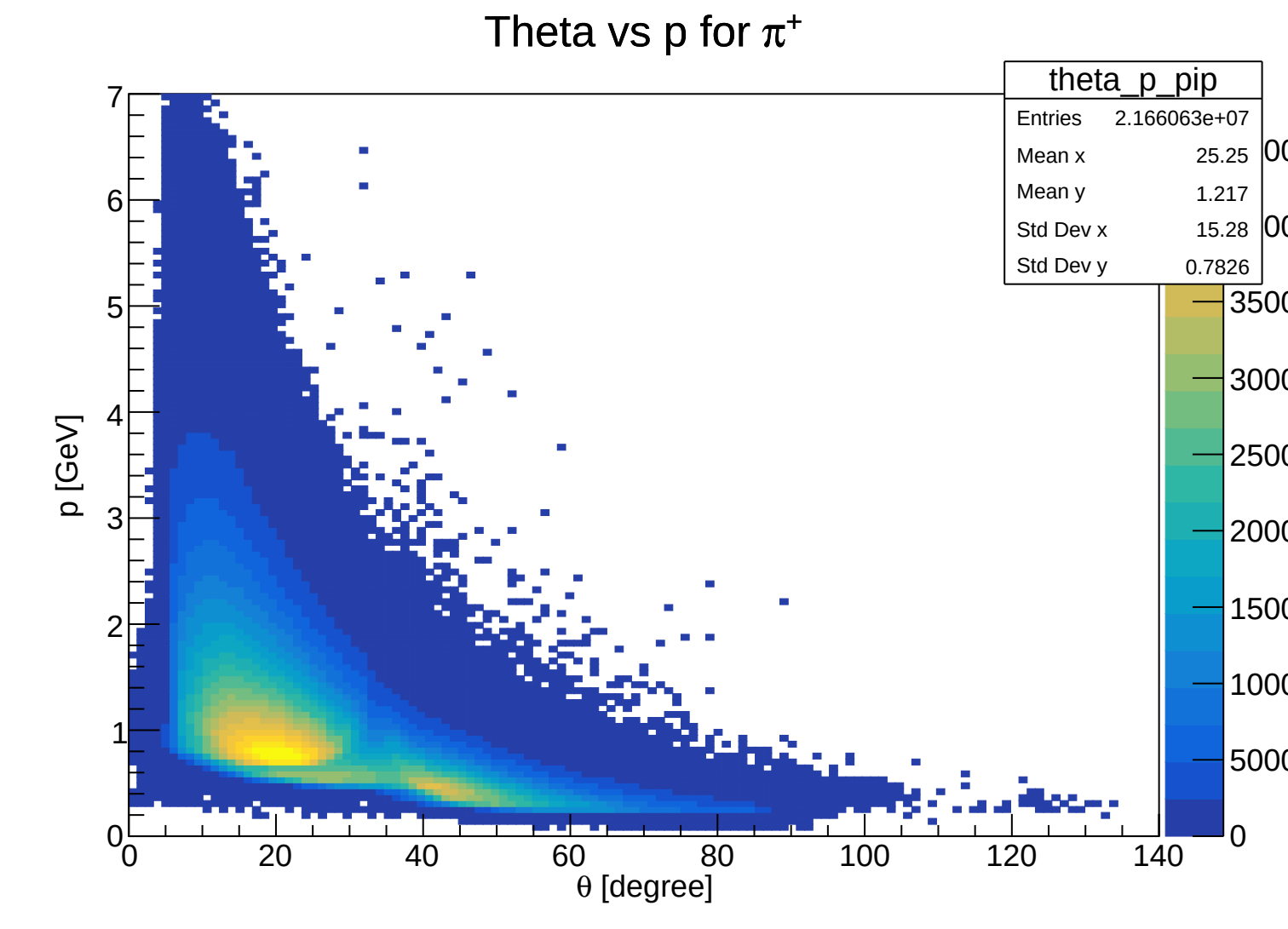

Distance vertex π+ and π-
Dist2
Entries 2.166063e+07
Mean 1.926
Std Dev 1.876
×10^3
1200
1000
800
600
400
200
0
0
5
10
15
20
√(v_π+x - v_π-x)^2 + (v_π+y - v_π-y)^2 + (v_π+z - v_π-z)^2 [cm]

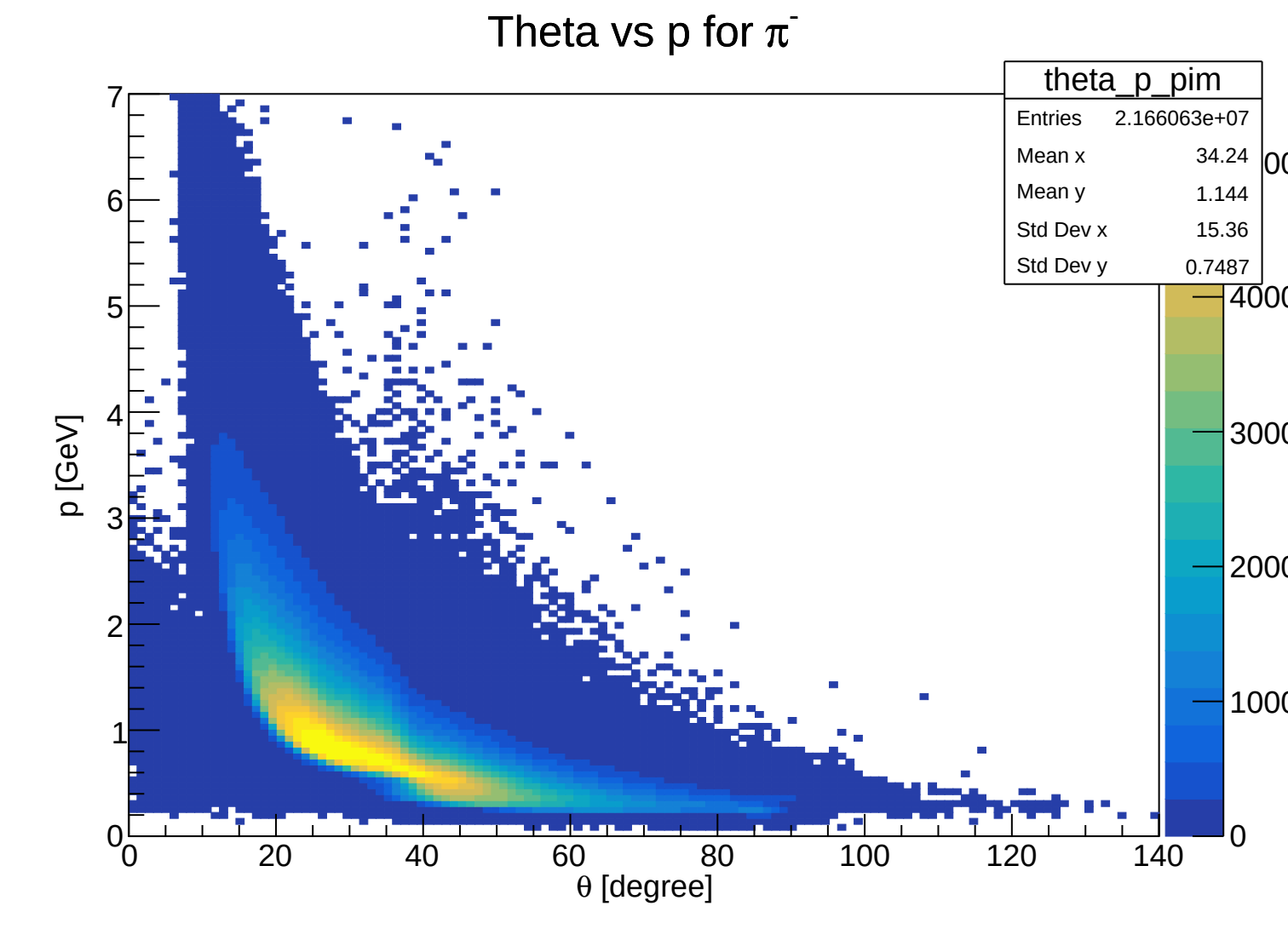

Invariant Mass π⁻ π⁺
×10³
MinvPiPlusMoins_hist
Entries 2.166063e+07
Mean 0.7059
Std Dev 0.2447
250
200
150
100
50
0
0
0.2
0.4
0.6
0.8
1
1.2
1.4
M_inv(π⁻ π⁺)

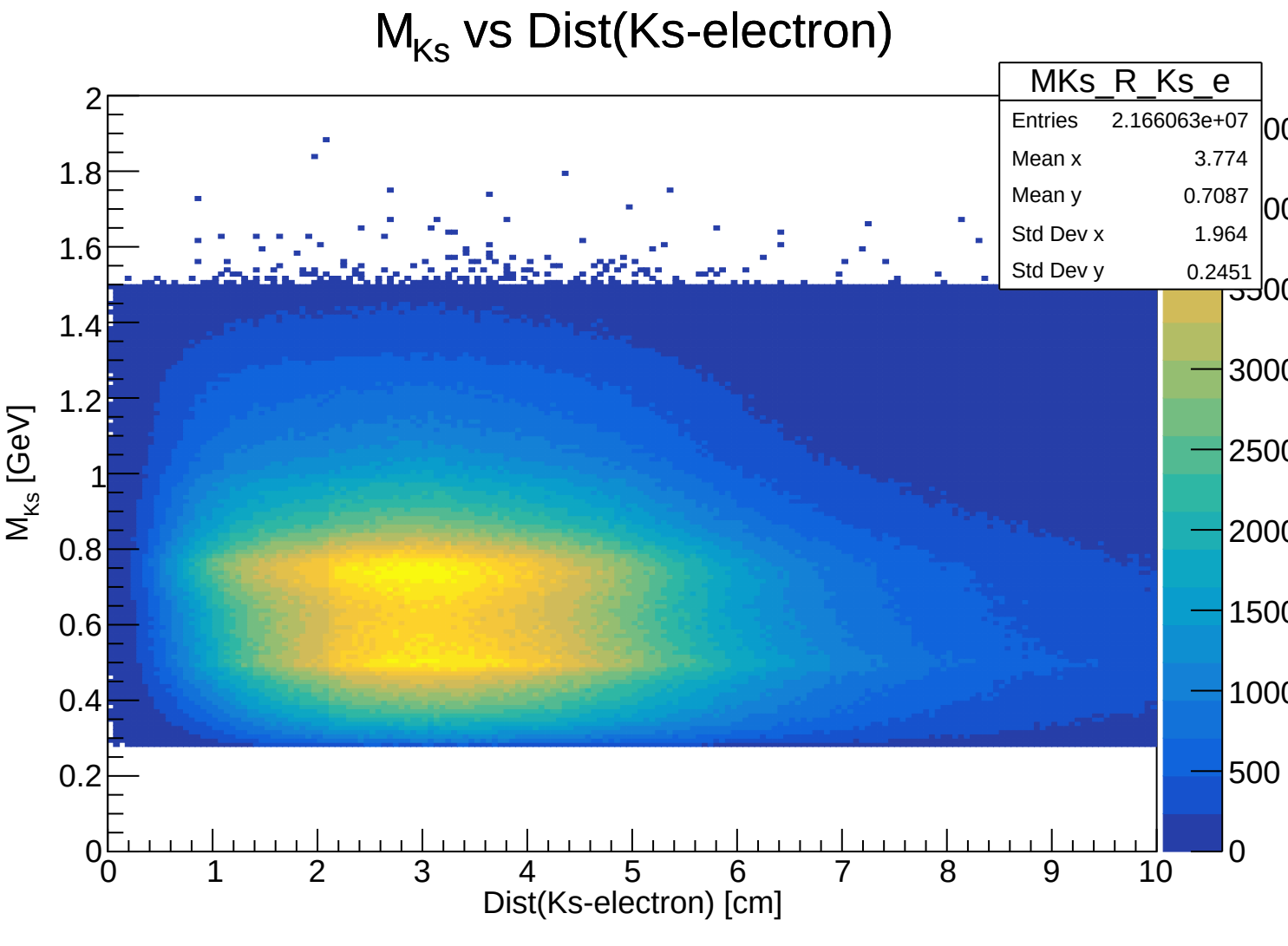

Missing Mass
×10^3
MissingMass_hist
Entries 2.166063e+07
Mean 0.6987
Std Dev 0.3964
120
100
80
60
40
20
0
0.2
0.4
0.6
0.8
1
1.2
1.4
MissingMass [GeV]

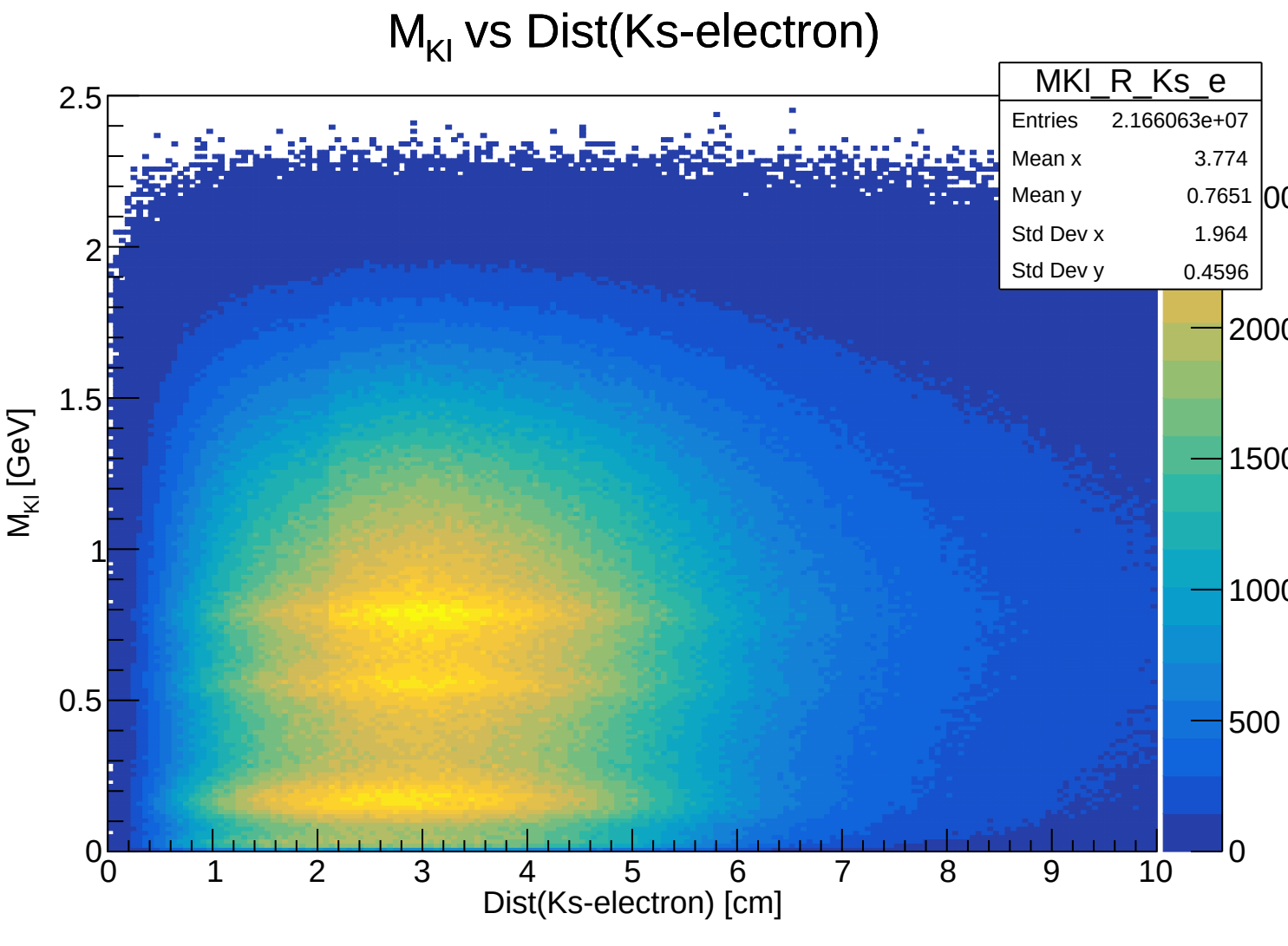

Theta vs p for electron
theta_p_el
Entries 2.166063e+07
Mean x 13.98
Mean y 4.486
Std Dev x 4.099
Std Dev y 1.524
p [GeV]
θ [degree]
0
1
2
3
4
5
6
7
8
9
10
0
5
10
15
20
25
30
35
40
45
0
2000
4000
6000
8000
1000
1200
1400
1600

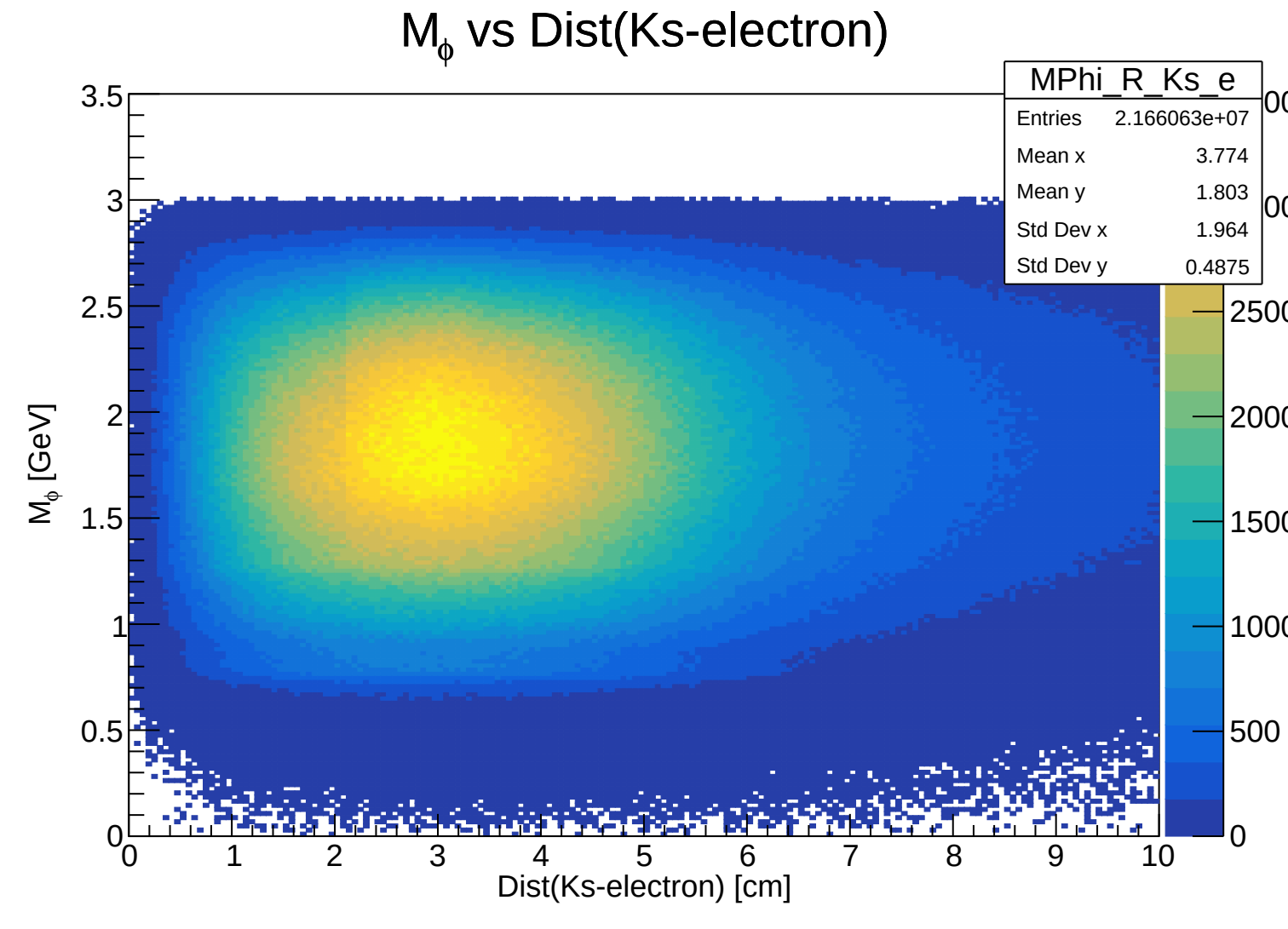

Theta vs p for proton
theta_p_pr
Entries 2.166063e+07
Mean x 18.54
Mean y 1.785
Std Dev x 7.984
Std Dev y 0.8032
p [GeV]
θ [degree]
0
10
20
30
40
50
60
1
2
3
4
5
6
7
8
9
1400
1200
1000
8000
6000
4000
2000

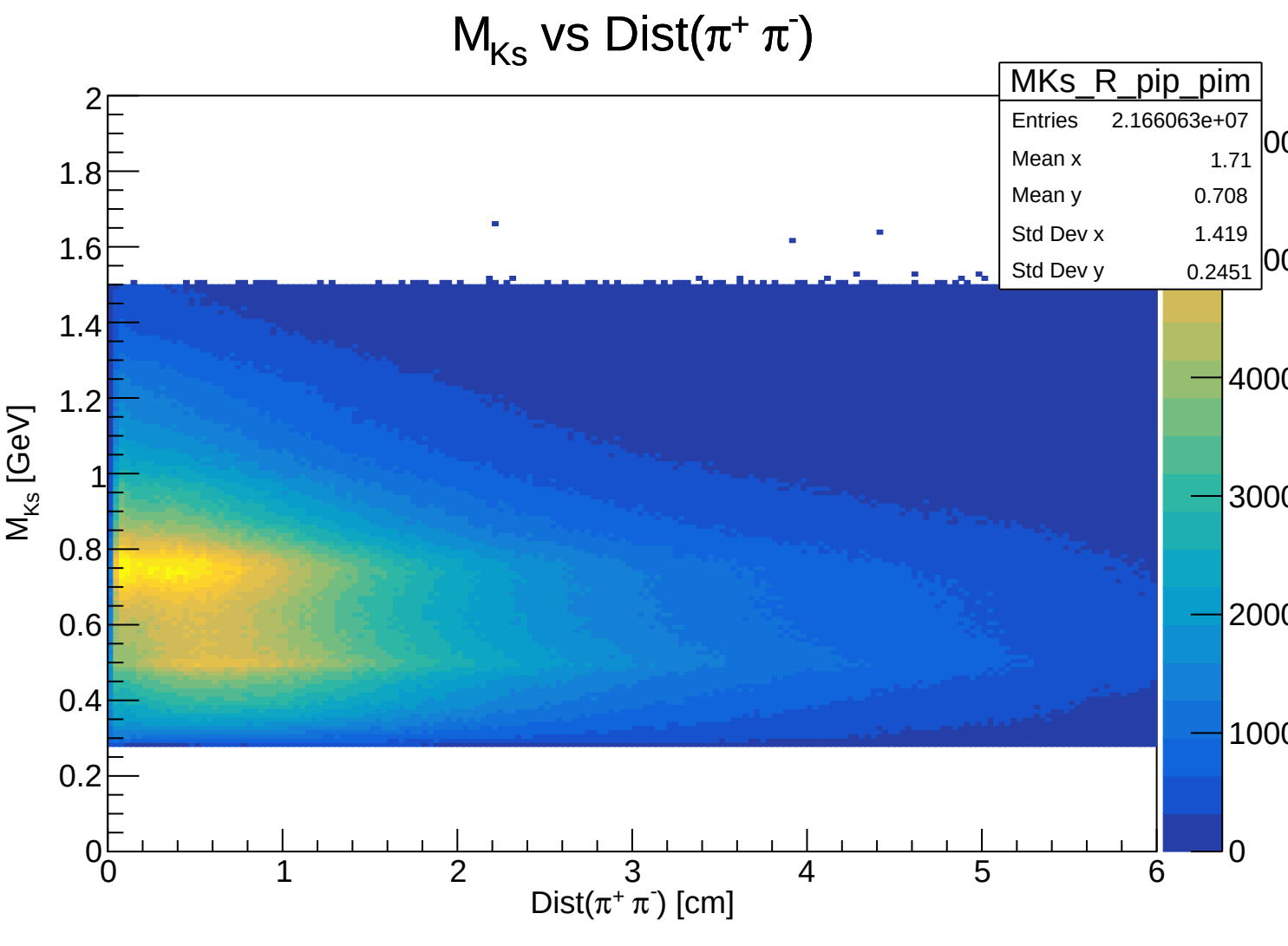

Theta vs p for π^+
theta_p_pip
Entries 2.166063e+07
Mean x 25.25
Mean y 1.217
Std Dev x 15.28
Std Dev y 0.7826
p [GeV]
θ [degree]
0
20
40
60
80
100
120
140
1
2
3
4
5
6
7
3500
3000
2500
2000
1500
1000
5000

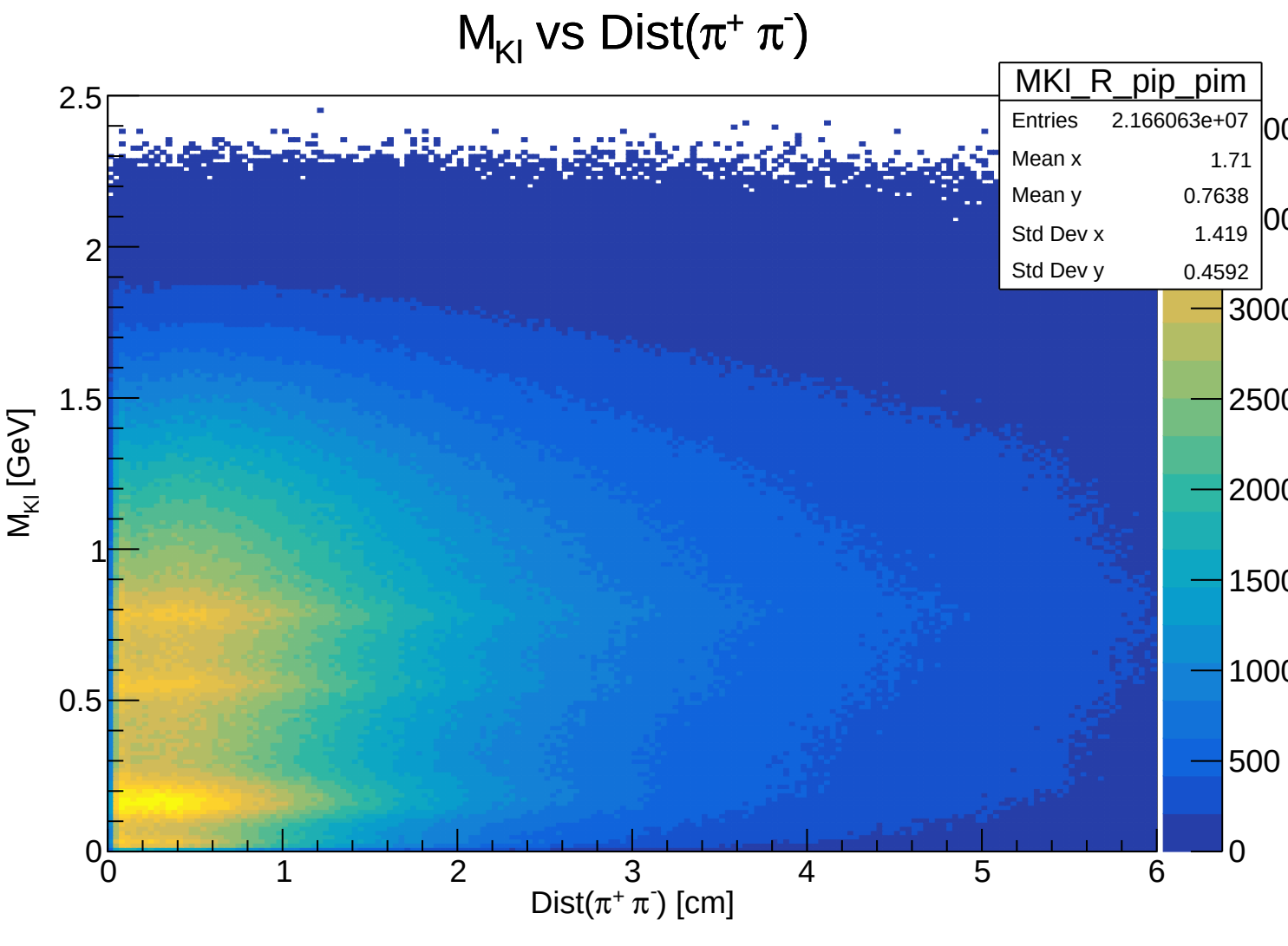

Theta vs p for π-
theta_p_pim
Entries 2.166063e+07
Mean x 34.24
Mean y 1.144
Std Dev x 15.36
Std Dev y 0.7487
p [GeV]
θ [degree]
0
20
40
60
80
100
120
140
1
2
3
4
5
6
7
1000
2000
3000
4000

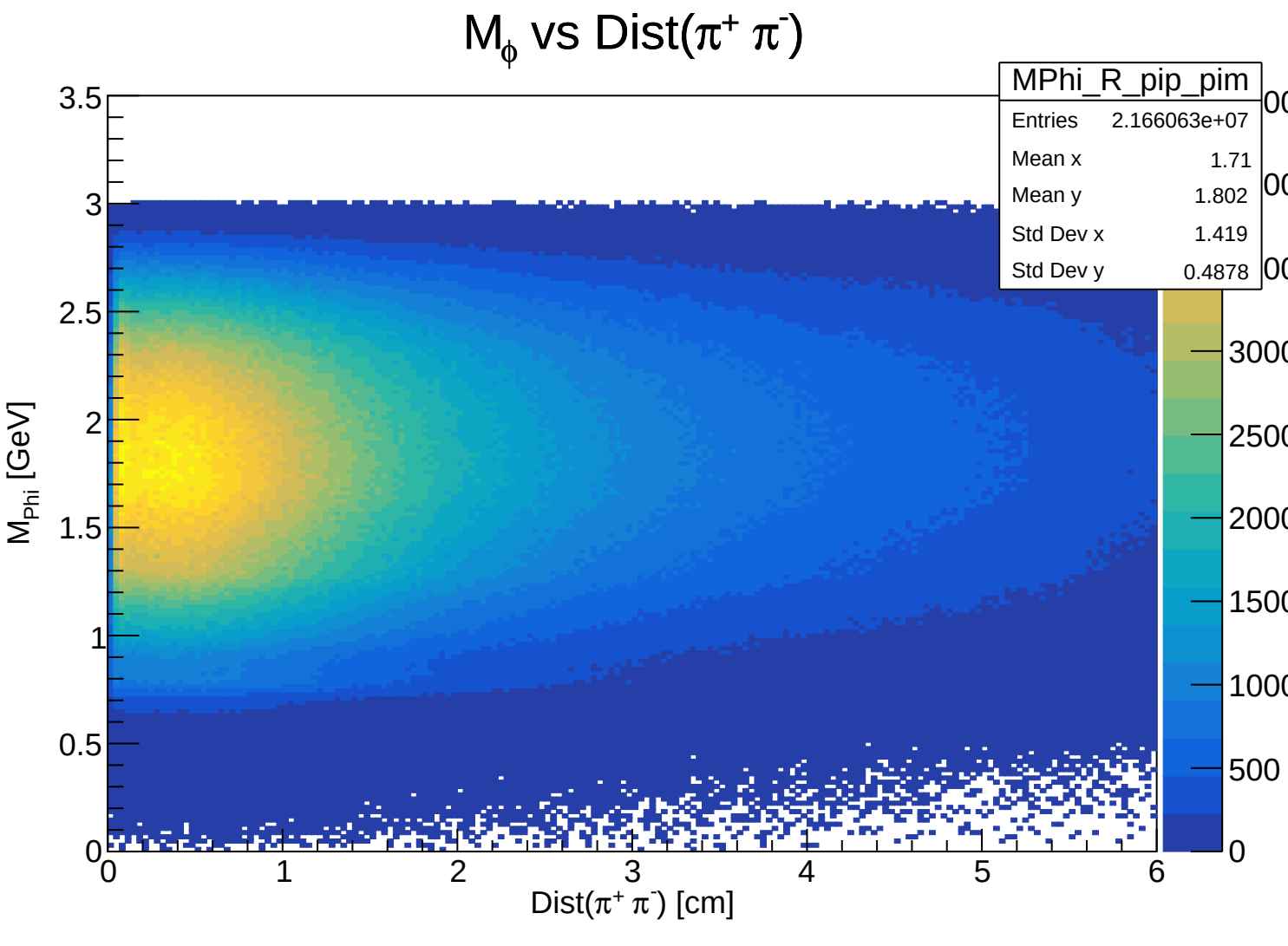

M_Ks vs Dist(Ks-electron)
MKs_R_Ks_e
Entries 2.166063e+07
Mean x 3.774
Mean y 0.7087
Std Dev x 1.964
Std Dev y 0.2451
M_Ks [GeV]
Dist(Ks-electron) [cm]
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
0
1
2
3
4
5
6
7
8
9
10
500
1000
1500
2000
2500
3000

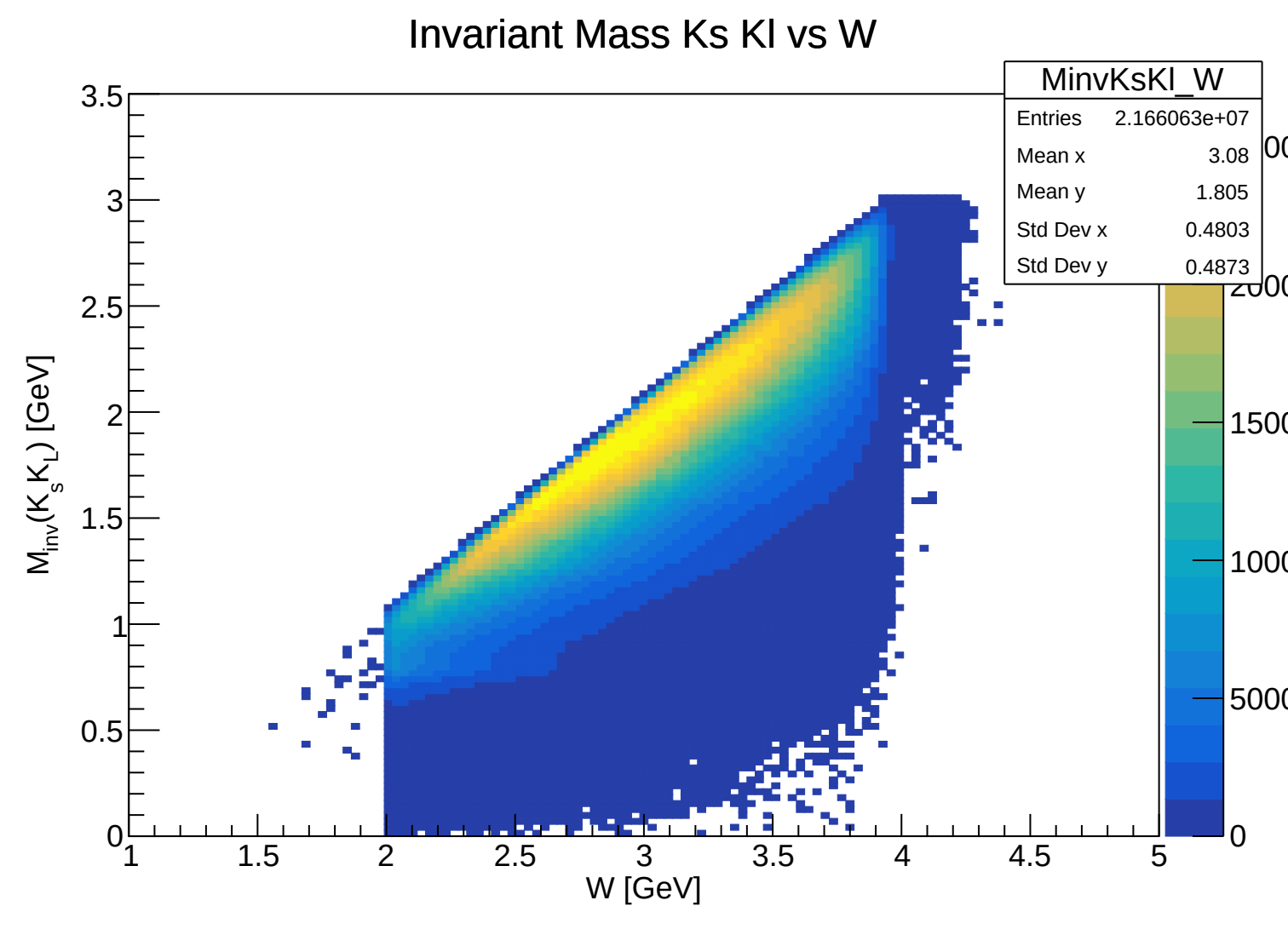

M_Kl vs Dist(Ks-electron)
MKl_R_Ks_e
Entries 2.166063e+07
Mean x 3.774
Mean y 0.7651
Std Dev x 1.964
Std Dev y 0.4596
M_Kl [GeV]
Dist(Ks-electron) [cm]
0
0.5
1
1.5
2
2.5
0
1
2
3
4
5
6
7
8
9
10
500
1000
1500
2000

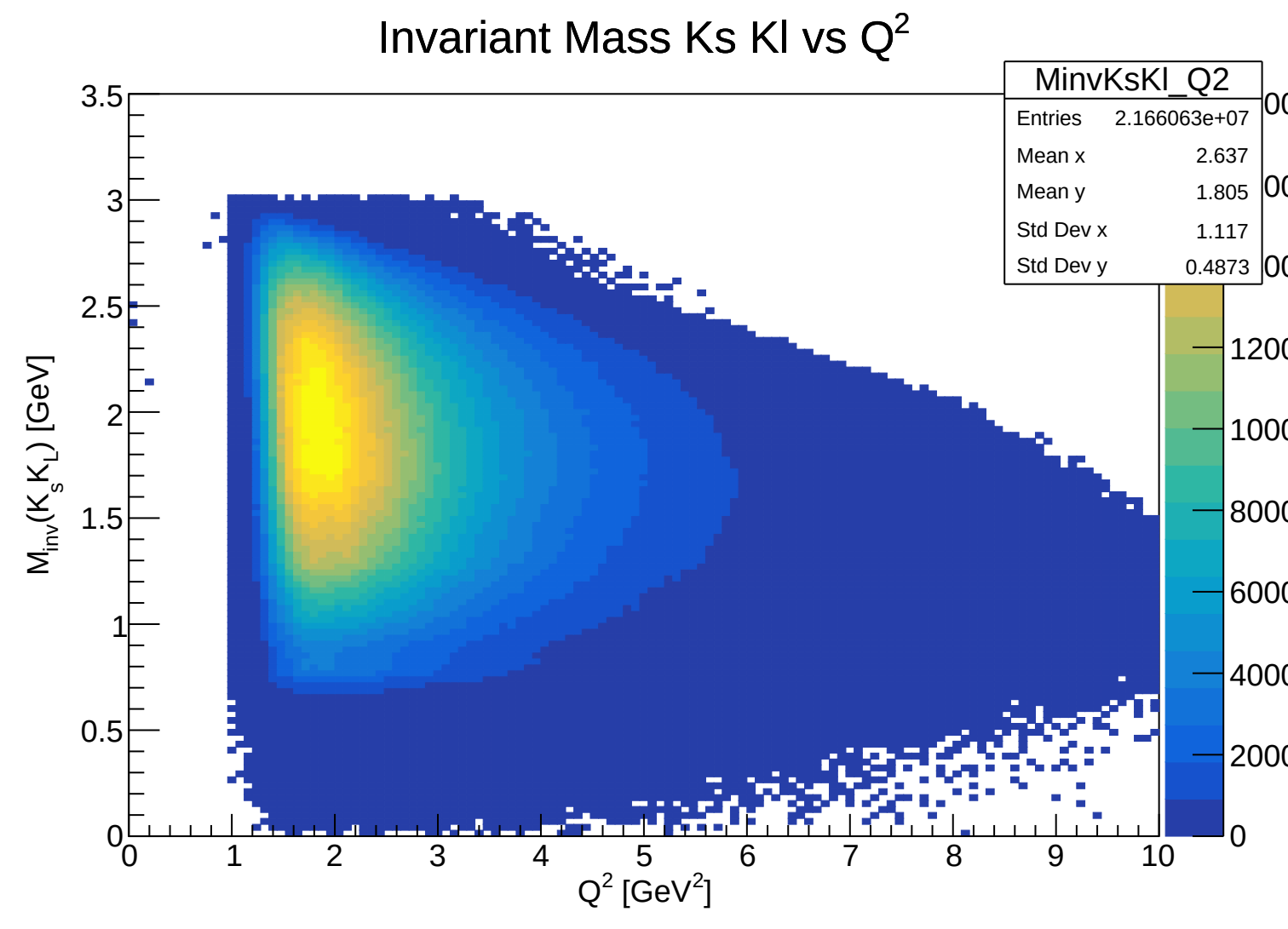

M$_\phi$ vs Dist(Ks-electron)
MPhi_R_Ks_e
Entries 2.166063e+07
Mean x 3.774
Mean y 1.803
Std Dev x 1.964
Std Dev y 0.4875
M$_\phi$ [GeV]
Dist(Ks-electron) [cm]
0
0.5
1
1.5
2
2.5
3
3.5
0
1
2
3
4
5
6
7
8
9
10
0
500
1000
1500
2000
2500

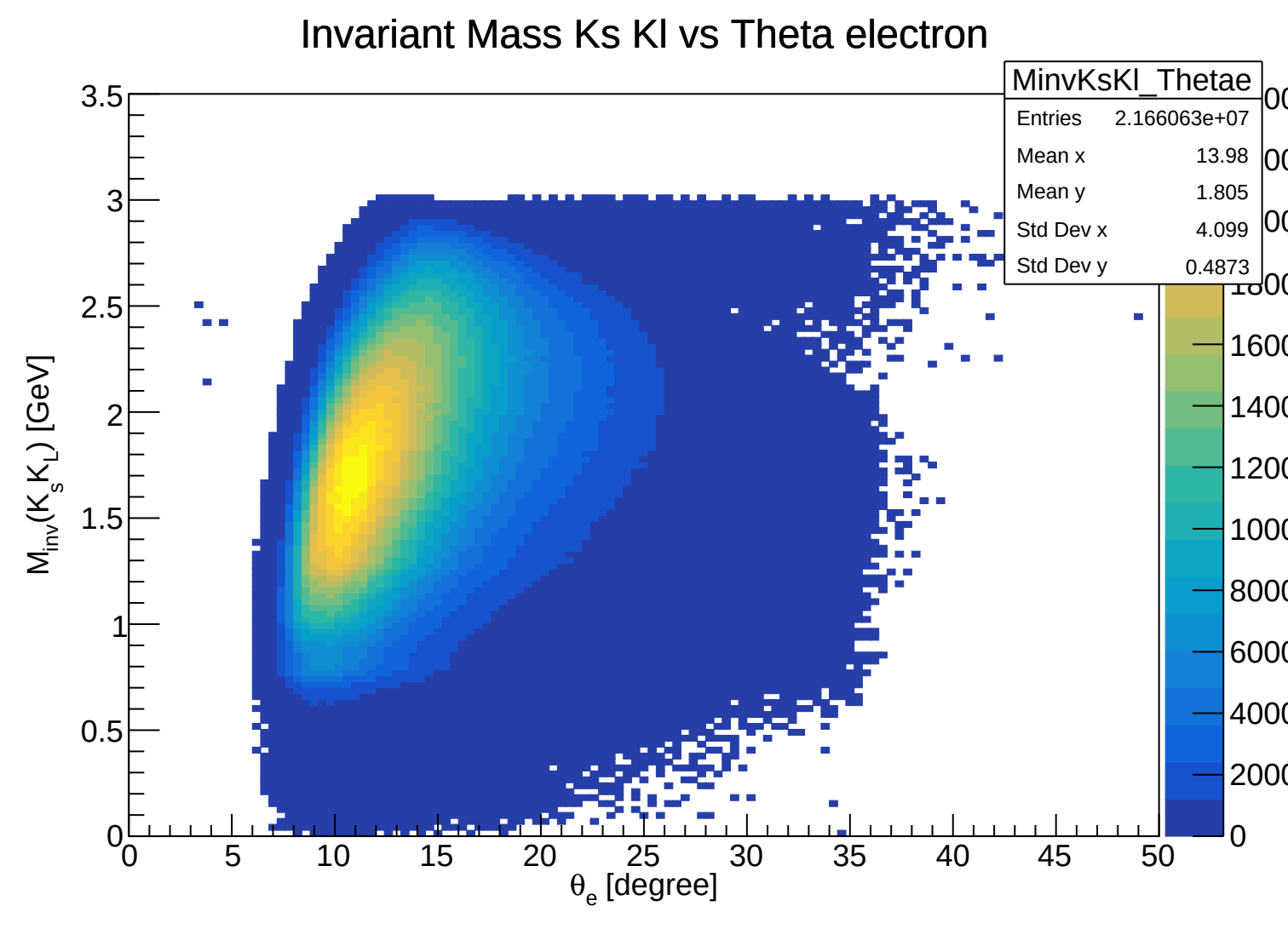

M_Ks vs Dist(π+ π-)
MKs_R_pip_pim
Entries 2.166063e+07
Mean x 1.71
Mean y 0.708
Std Dev x 1.419
Std Dev y 0.2451
M_Ks [GeV]
Dist(π+ π-) [cm]
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
0
1
2
3
4
5
6
0
1000
2000
3000
4000


M_{KI} vs Dist(π^+ π^-)
MKI_R_pip_pim
Entries 2.166063e+07
Mean x 1.71
Mean y 0.7638
Std Dev x 1.419
Std Dev y 0.4592
M_{KI} [GeV]
Dist(π^+ π^-) [cm]
0
0.5
1
1.5
2
2.5
0
1
2
3
4
5
6
3000
2500
2000
1500
1000
500
0


M_ϕ vs Dist(π^+ π^-)
MPhi_R_pip_pim
Entries 2.166063e+07
Mean x 1.71
Mean y 1.802
Std Dev x 1.419
Std Dev y 0.4878
M_{Phi} [GeV]
Dist(π^+ π^-) [cm]
0
0.5
1
1.5
2
2.5
3
3.5
0
1
2
3
4
5
6
500
1000
1500
2000
2500
3000


Invariant Mass Ks Kl vs W
MinvKsKl_W
Entries 2.166063e+07
Mean x 3.08
Mean y 1.805
Std Dev x 0.4803
Std Dev y 0.4873
M_inv(K_s K_L) [GeV]
W [GeV]
0
0.5
1
1.5
2
2.5
3
3.5
1
1.5
2
2.5
3
3.5
4
4.5
5
0
500
1000
1500
2000


Invariant Mass Ks Kl vs Q2
MinvKsKl_Q2
Entries 2.166063e+07
Mean x 2.637
Mean y 1.805
Std Dev x 1.117
Std Dev y 0.4873
M_inv(K_s K_L) [GeV]
Q2 [GeV2]
0
0.5
1
1.5
2
2.5
3
3.5
0
1
2
3
4
5
6
7
8
9
10
2000
4000
6000
8000
1000
1200


Invariant Mass Ks Kl vs Theta electron
MinvKsKl_Thetae
Entries 2.166063e+07
Mean x 13.98
Mean y 1.805
Std Dev x 4.099
Std Dev y 0.4873
$M_{inv}(K_S K_L)$ [GeV]
θ_e [degree]
0
0.5
1
1.5
2
2.5
3
3.5
0
5
10
15
20
25
30
35
40
45
50
0
2000
4000
6000
8000
1000
1200
1400
1600

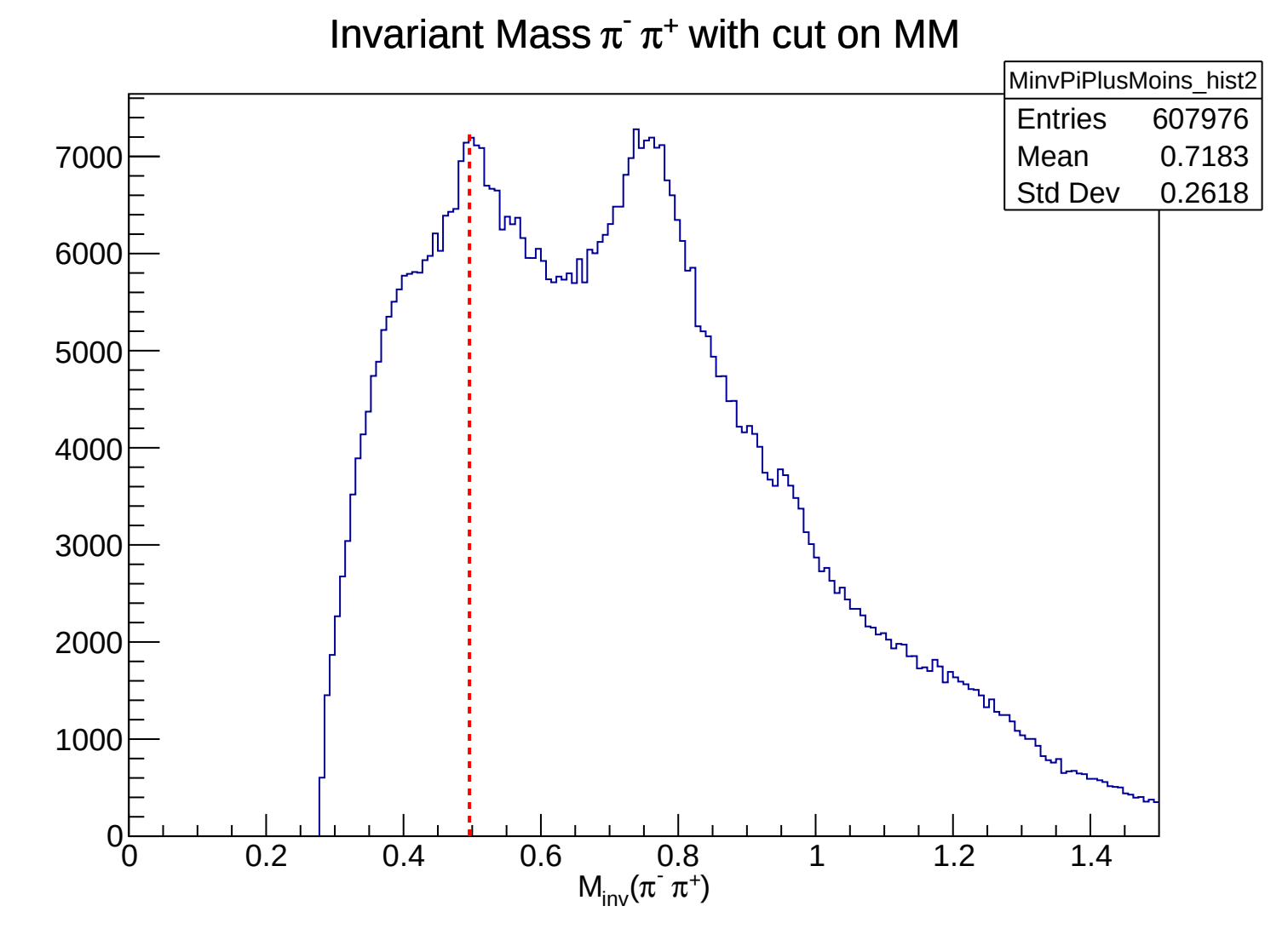
Summary of cuts for the next plots:

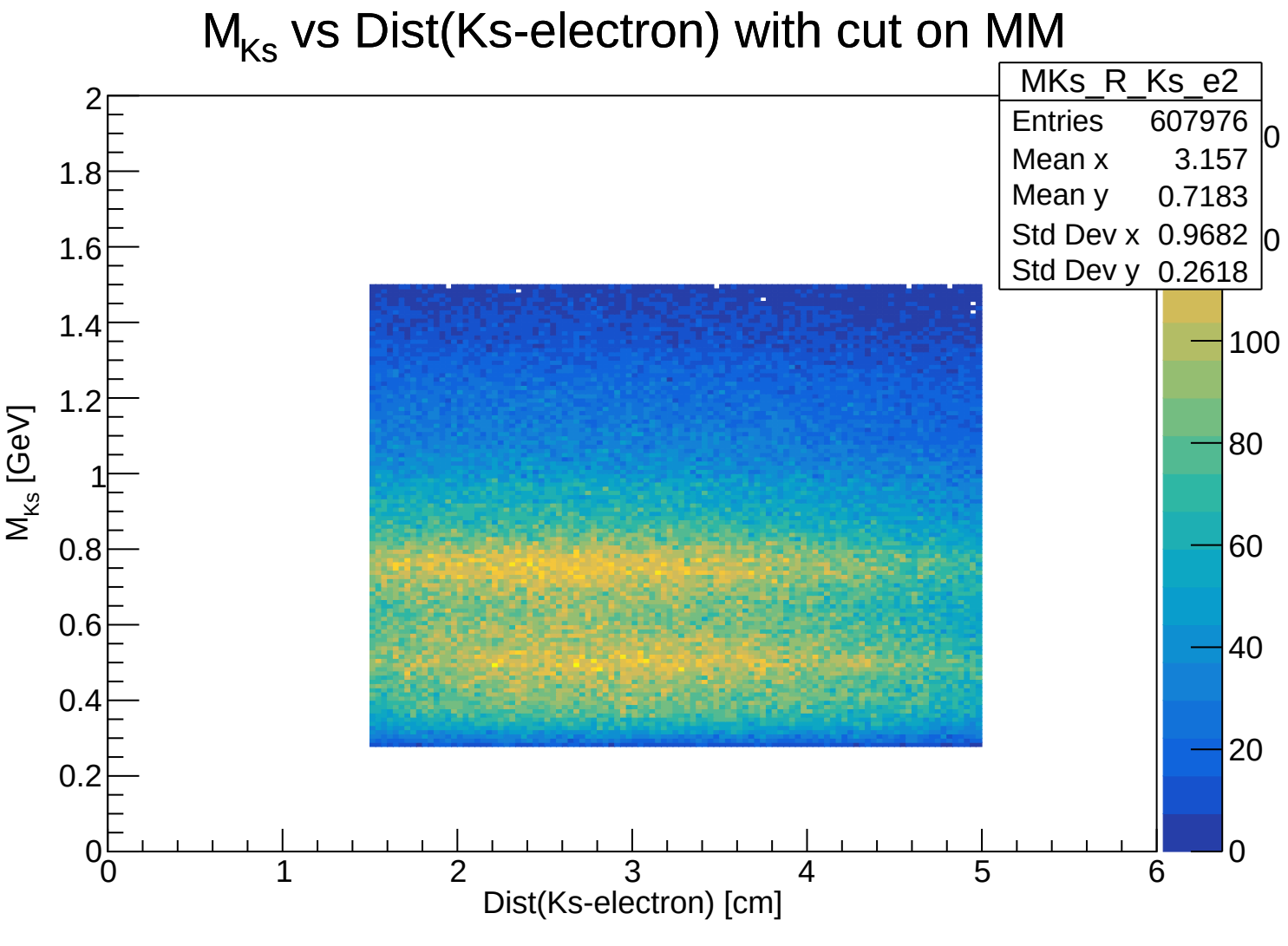
- Add a cut on missing mass : 0.4 < MM < 0.6 GeV

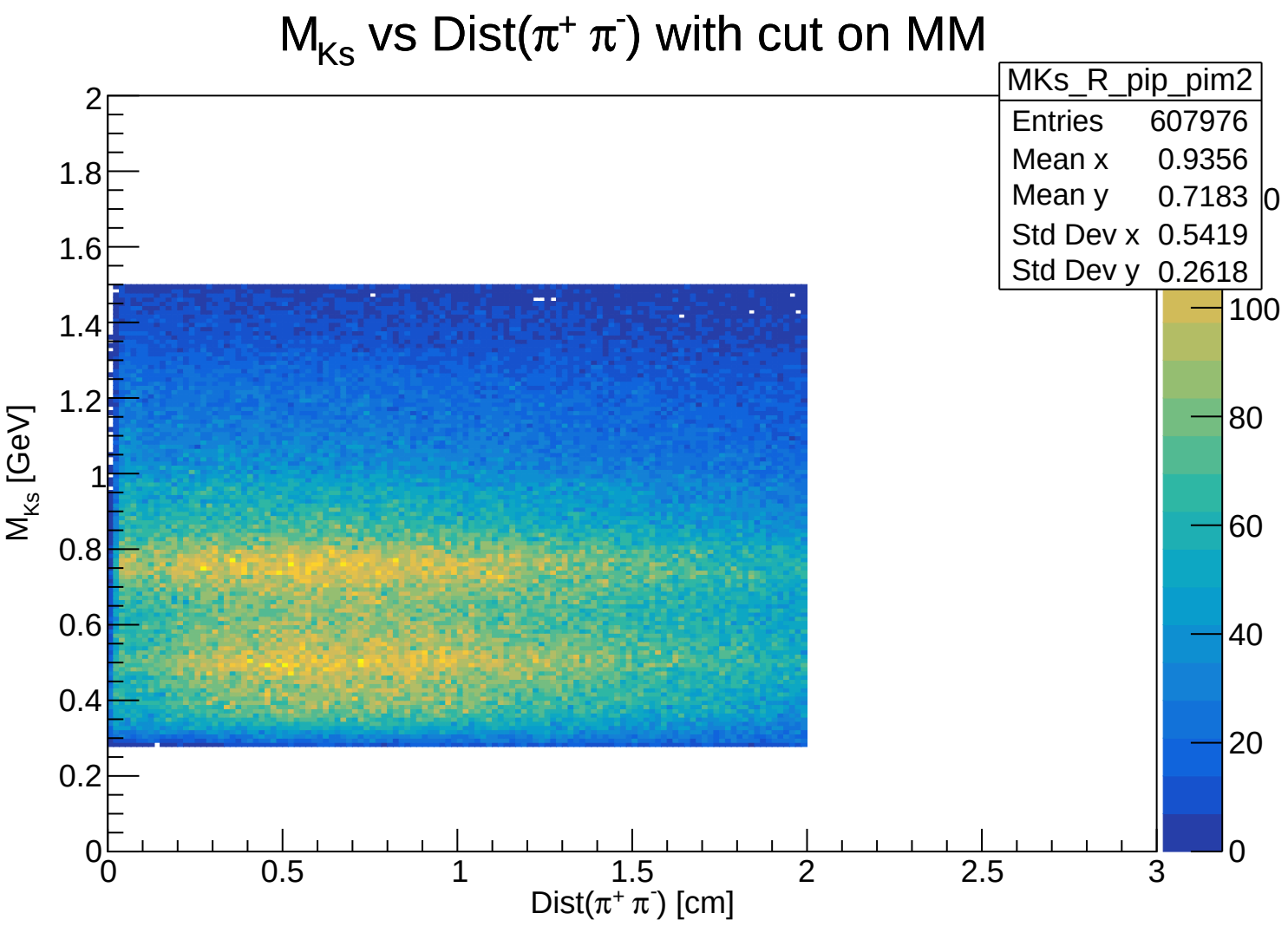
- Add a cut on distance (on x y z) of vertex e- and Ks : 1.5 < R_1 < 5.0 cm

- Add a cut on distance (on x y z) of vertex pi+ pi- : 0 < R_2 < 2 cm

- pi+ and pi- need to be in FD


Invariant Mass π⁻ π⁺ with cut on MM
MinvPiPlusMoins_hist2
Entries 607976
Mean 0.7183
Std Dev 0.2618
7000
6000
5000
4000
3000
2000
1000
0
0
0.2
0.4
0.6
0.8
1
1.2
1.4
M_inv(π⁻ π⁺)

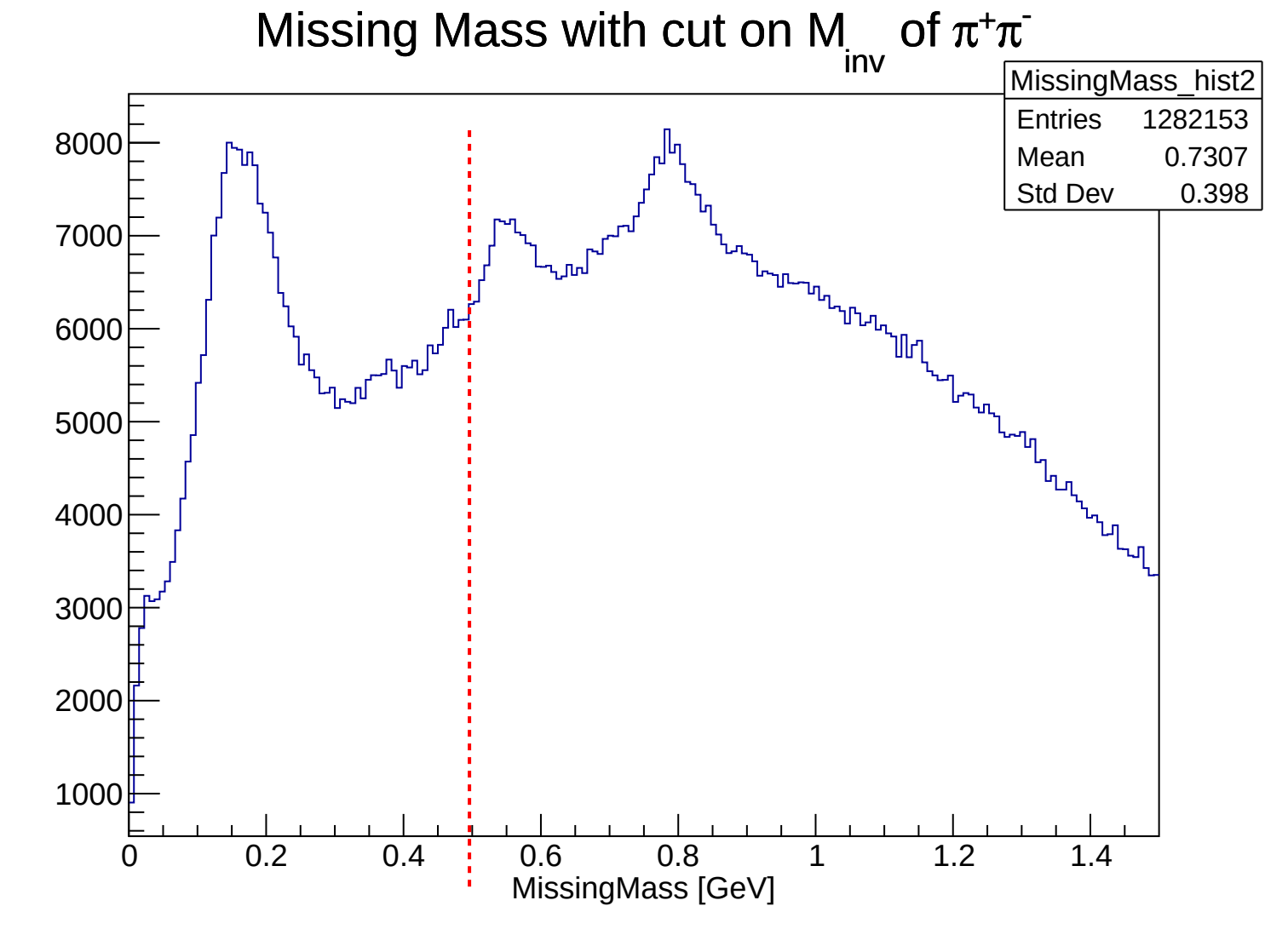

M_Ks vs Dist(Ks-electron) with cut on MM
MKs_R_Ks_e2
Entries 607976
Mean x 3.157
Mean y 0.7183
Std Dev x 0.9682
Std Dev y 0.2618
M_Ks [GeV]
Dist(Ks-electron) [cm]
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
0
1
2
3
4
5
6
0
20
40
60
80
100

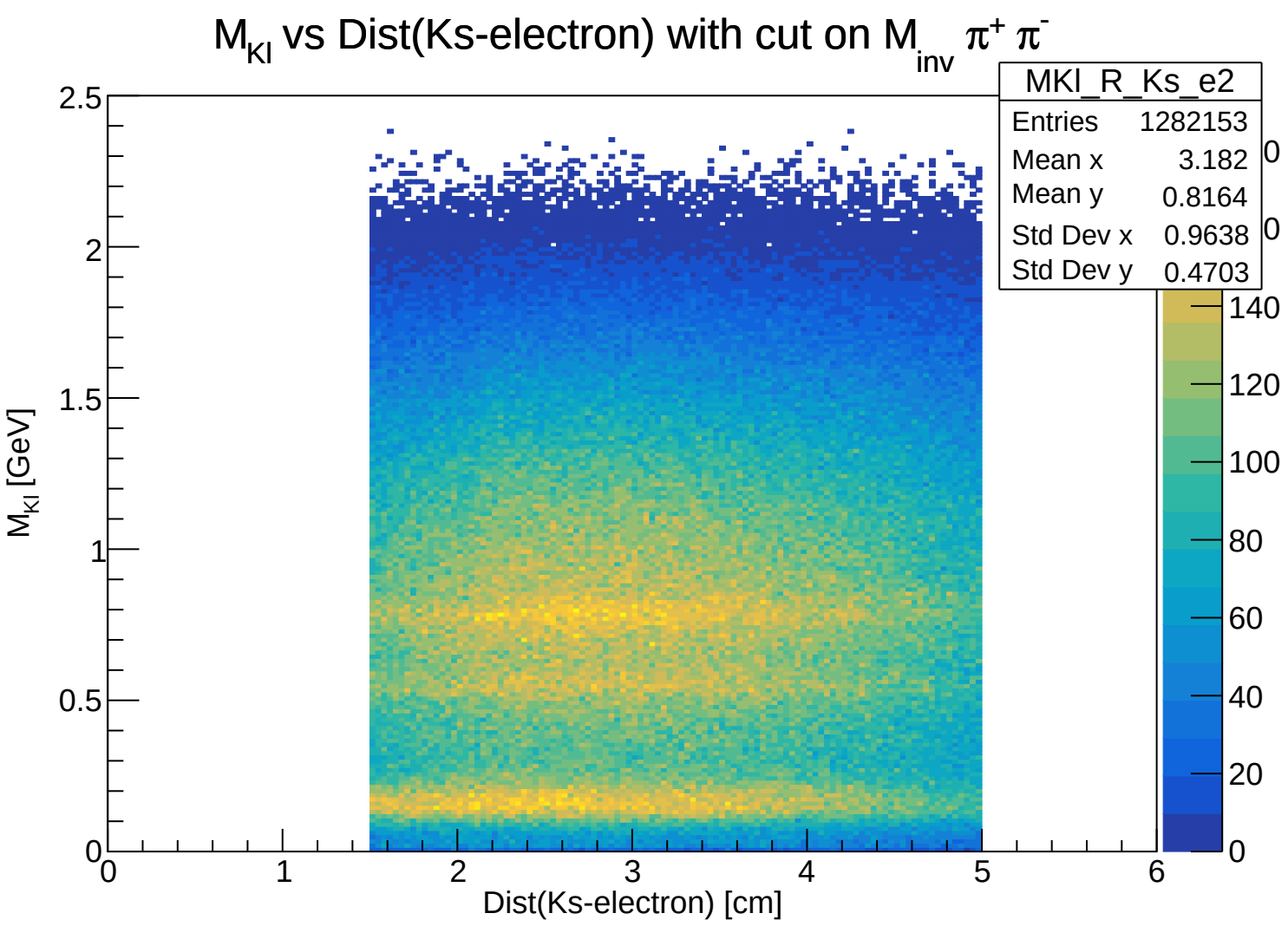

M_{Ks} vs Dist(π^+ π^-) with cut on MM
MKs_R_pip_pim2
Entries 607976
Mean x 0.9356
Mean y 0.7183
Std Dev x 0.5419
Std Dev y 0.2618
M_{Ks} [GeV]
Dist(π^+ π^-) [cm]
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
0.5
1.5
2.5
3
20
40
60
80
100

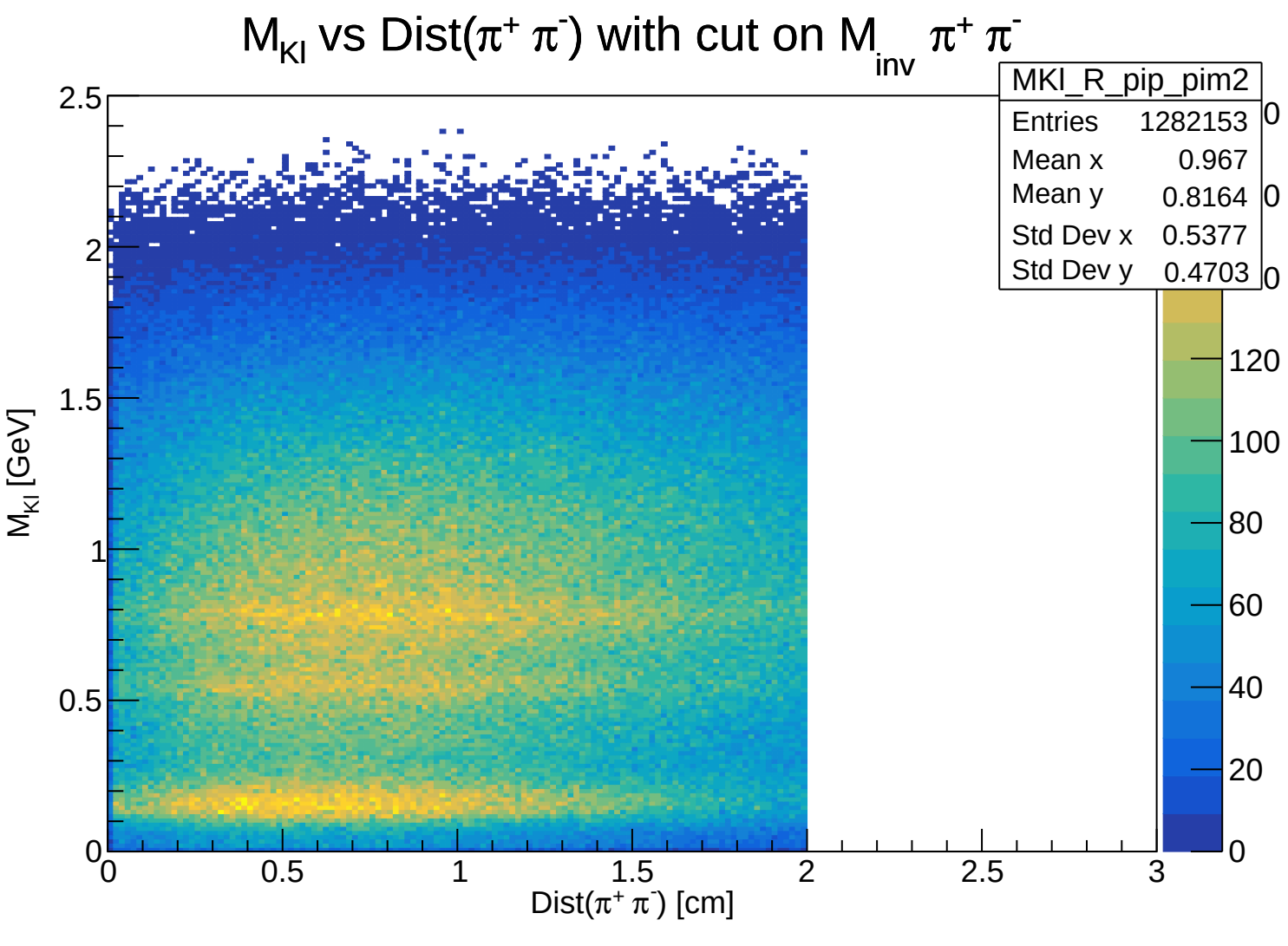
Summary of cuts for the next plots:

- Replace the cut on missing mass by the cut on invariant mass pi+ pi- :

$0.4 < M_{inv} < 0.6$ GeV

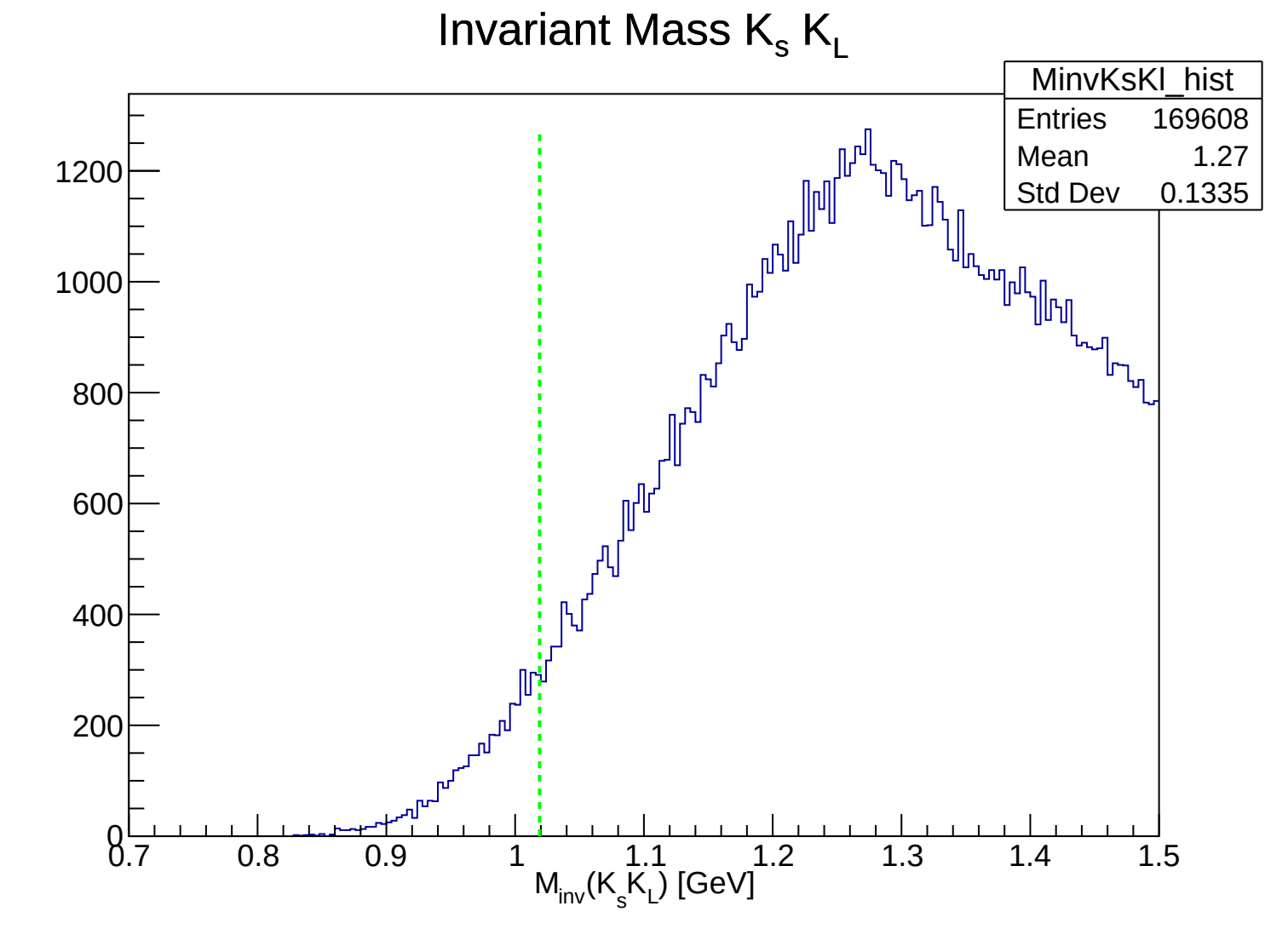

Missing Mass with cut on M inv of π+π-
MissingMass_hist2
Entries 1282153
Mean 0.7307
Std Dev 0.398
8000
7000
6000
5000
4000
3000
2000
1000
0
0.2
0.4
0.6
0.8
1
1.2
1.4
MissingMass [GeV]

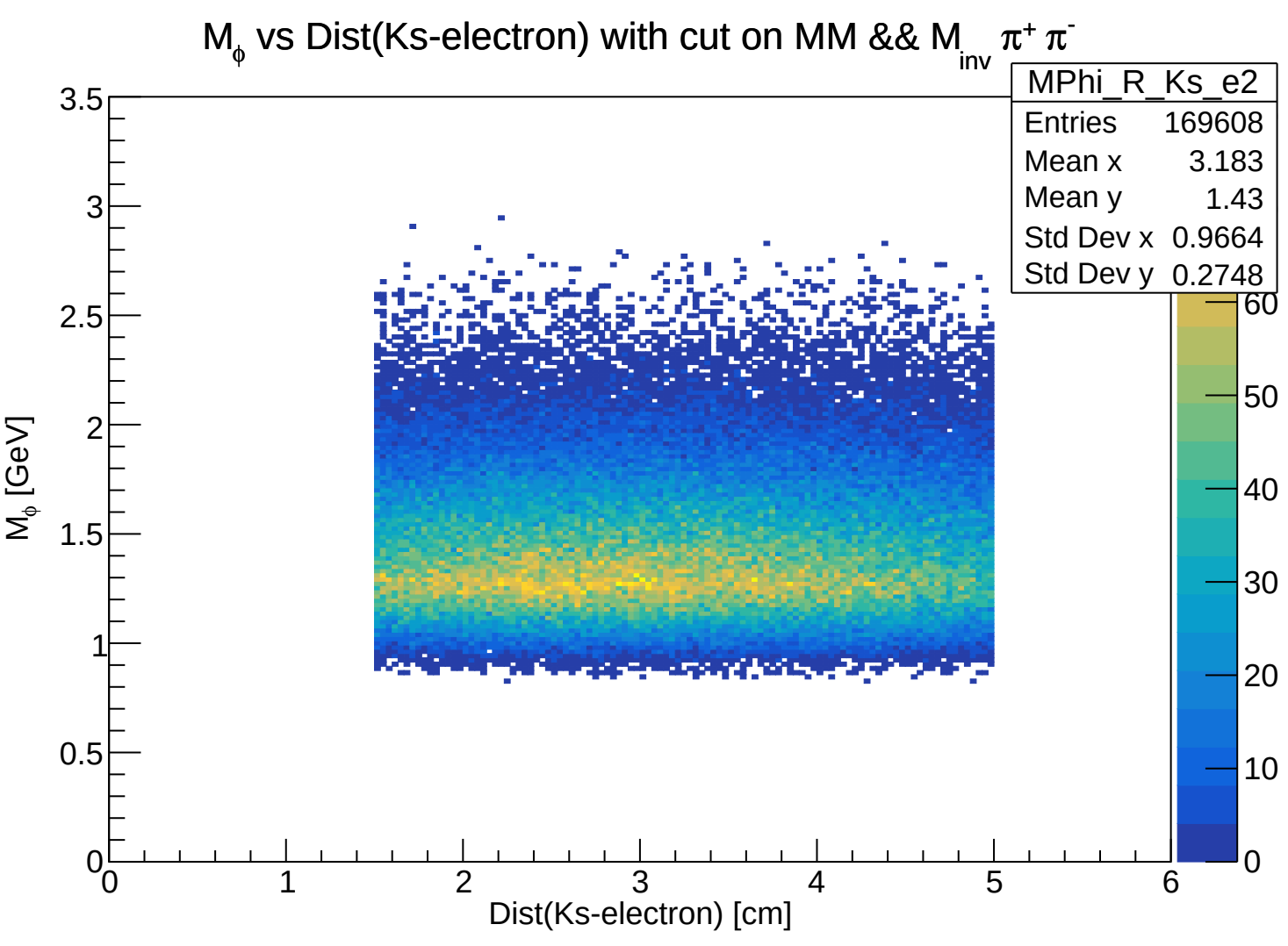

M_{Kl} vs Dist(Ks-electron) with cut on M_{inv} π^+ π^-
MKl_R_Ks_e2
Entries 1282153
Mean x 3.182
Mean y 0.8164
Std Dev x 0.9638
Std Dev y 0.4703
M_{Kl} [GeV]
Dist(Ks-electron) [cm]
0
0.5
1
1.5
2
2.5
0
1
2
3
4
5
6
0
20
40
60
80
100
120
140

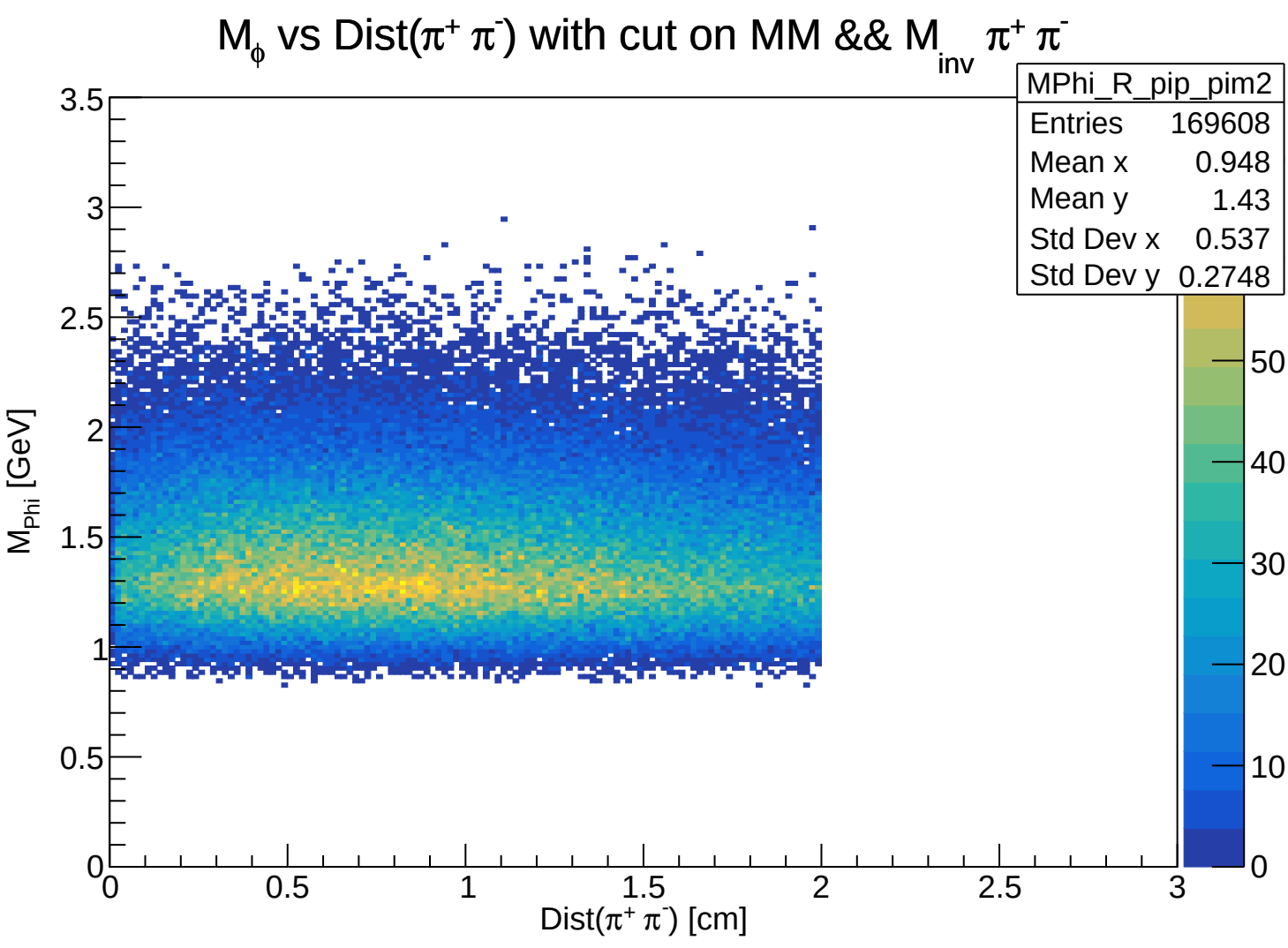

M_{Kl} vs Dist(π^+ π^-) with cut on M_{inv} π^+ π^-
MKl_R_pip_pim2
Entries 1282153
Mean x 0.967
Mean y 0.8164
Std Dev x 0.5377
Std Dev y 0.4703
M_{Kl} [GeV]
Dist(π^+ π^-) [cm]
0
0.5
1
1.5
2
2.5
3
20
40
60
80
100
120

Summary of cuts for the next plots:

- both cut are present (in invariant mass pi+ pi- and missing mass)

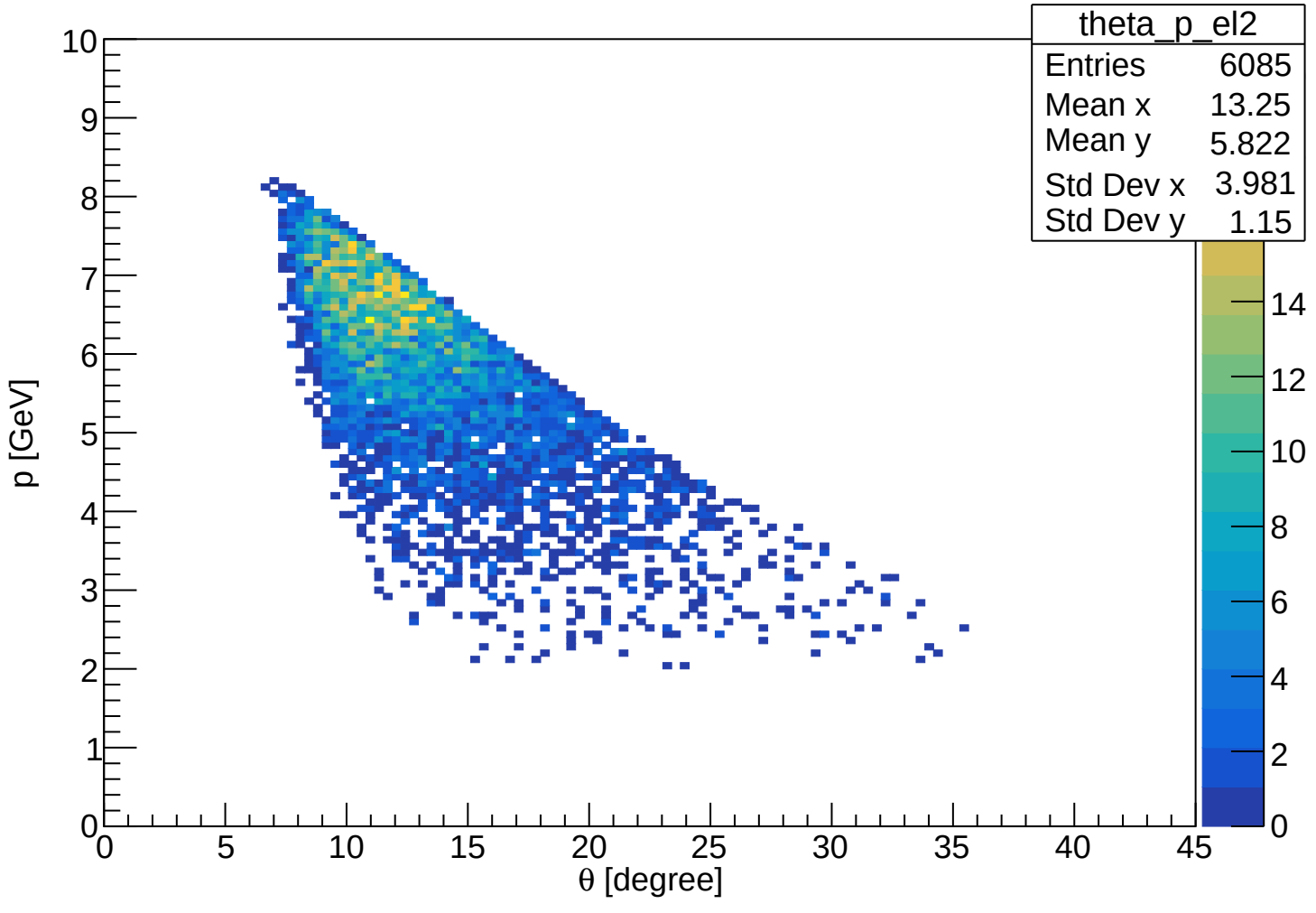

Invariant Mass K_s K_L
MinvKsKl_hist
Entries 169608
Mean 1.27
Std Dev 0.1335
1200
1000
800
600
400
200
0
0.7
0.8
0.9
1
1.1
1.2
1.3
1.4
1.5
$M_{inv}(K_s K_L)$ [GeV]

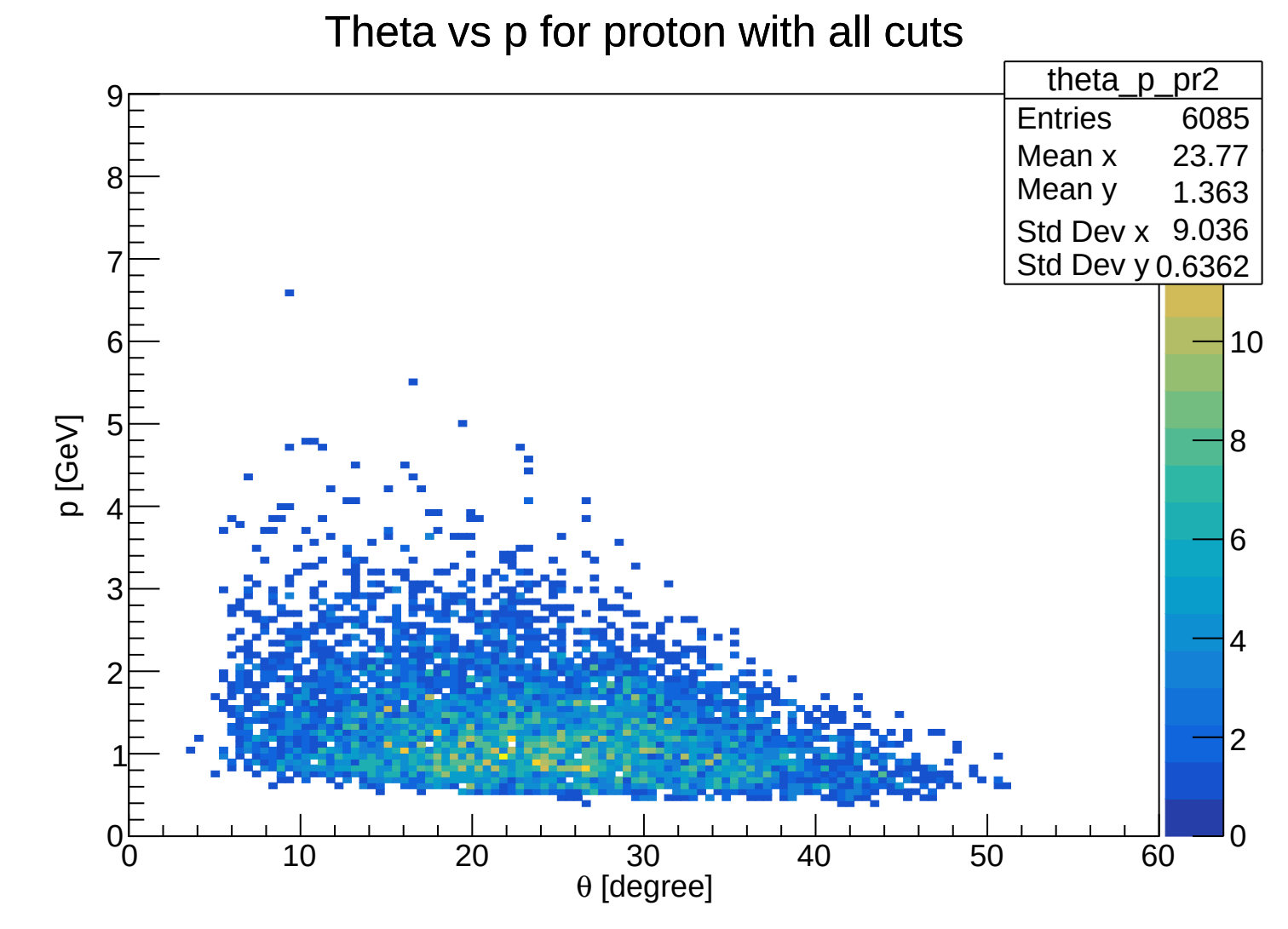

M$_\phi$ vs Dist(Ks-electron) with cut on MM && M$_{inv}$ π^+ π^-
MPhi_R_Ks_e2
Entries 169608
Mean x 3.183
Mean y 1.43
Std Dev x 0.9664
Std Dev y 0.2748
M$_\phi$ [GeV]
Dist(Ks-electron) [cm]
0
0.5
1
1.5
2
2.5
3
3.5
0
1
2
3
4
5
6
0
10
20
30
40
50
60

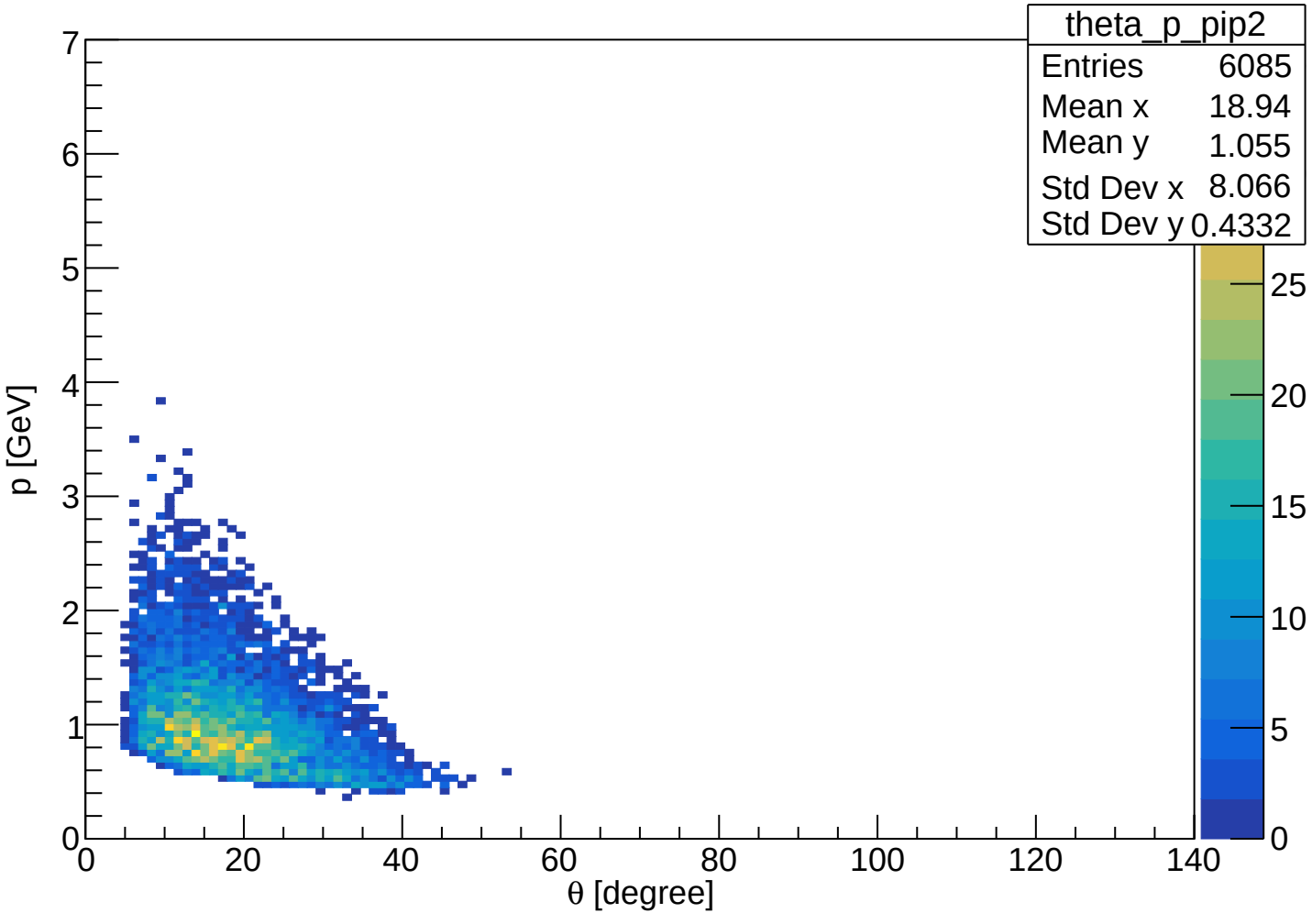

M_ϕ vs Dist(π^+ π^-) with cut on MM && M_{inv} π^+ π^-
MPhi_R_pip_pim2
Entries 169608
Mean x 0.948
Mean y 1.43
Std Dev x 0.537
Std Dev y 0.2748
M_{Phi} [GeV]
Dist(π^+ π^-) [cm]
0
0.5
1
1.5
2
2.5
3
3.5
0
10
20
30
40
50

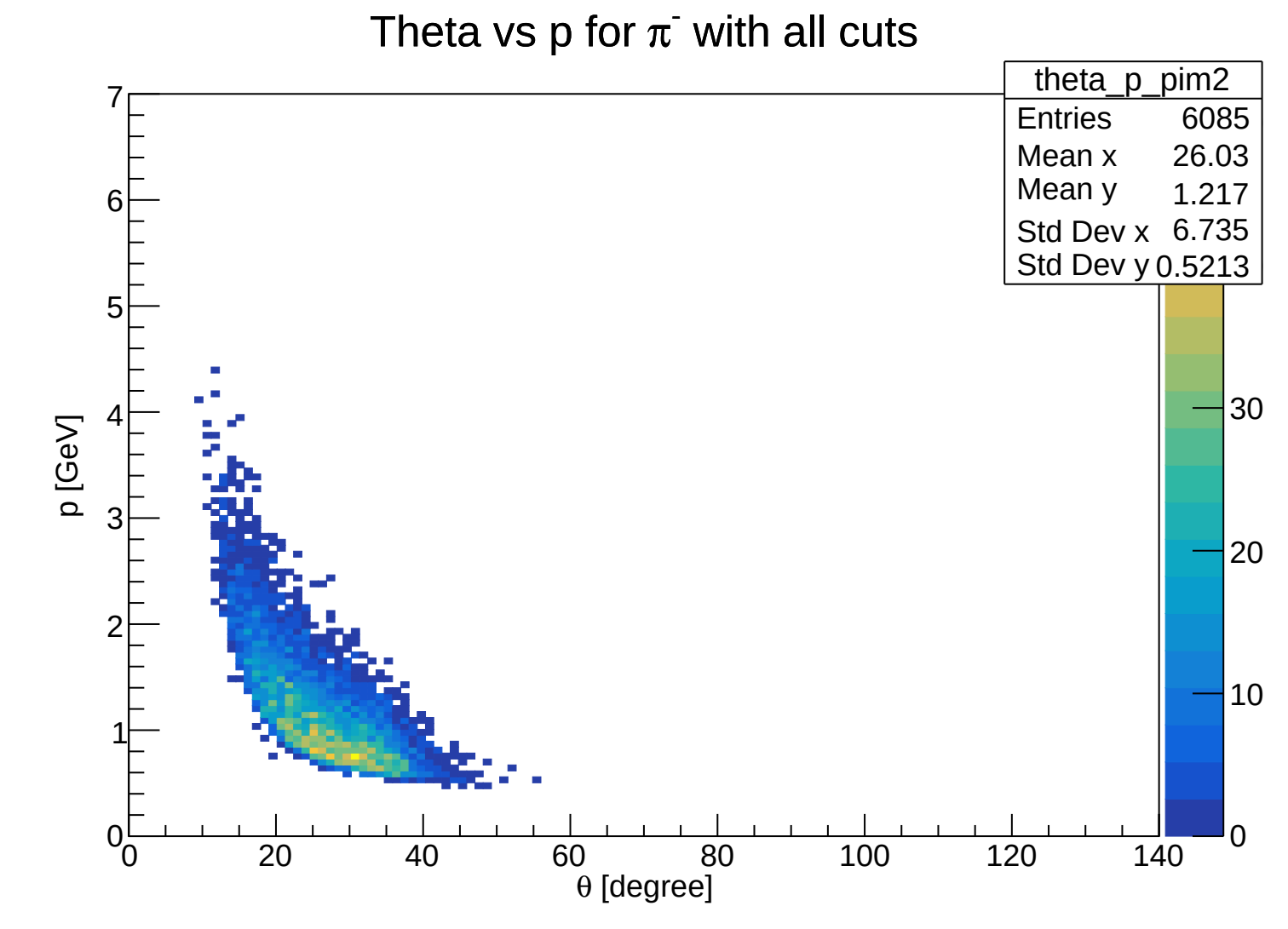
Test on p vs θ for all particle to see if the absence of signal comes from acceptance :

- All cuts + 0.8 < M_{ϕ} < 1.2 GeV


Theta vs p for electron with all cuts
theta_p_el2
Entries 6085
Mean x 13.25
Mean y 5.822
Std Dev x 3.981
Std Dev y 1.15
p [GeV]
θ [degree]
0
1
2
3
4
5
6
7
8
9
10
0
5
10
15
20
25
30
35
40
45
0
2
4
6
8
10
12
14


Theta vs p for proton with all cuts
theta_p_pr2
Entries 6085
Mean x 23.77
Mean y 1.363
Std Dev x 9.036
Std Dev y 0.6362
p [GeV]
θ [degree]
0
10
20
30
40
50
60
1
2
3
4
5
6
7
8
9


Theta vs p for π+ with all cuts
theta_p_pip2
Entries 6085
Mean x 18.94
Mean y 1.055
Std Dev x 8.066
Std Dev y 0.4332
p [GeV]
θ [degree]
0
1
2
3
4
5
6
7
0
20
40
60
80
100
120
140
0
5
10
15
20
25


Theta vs p for π⁻ with all cuts
theta_p_pim2
Entries 6085
Mean x 26.03
Mean y 1.217
Std Dev x 6.735
Std Dev y 0.5213
p [GeV]
θ [degree]
0
1
2
3
4
5
6
7
0
20
40
60
80
100
120
140
0
10
20
30