Improved cuts update

B+ -> K+ tau- mu+

1 M signal events
3 Streams of generic MC

07 Sep. 2023

Cuts used in the reco. program

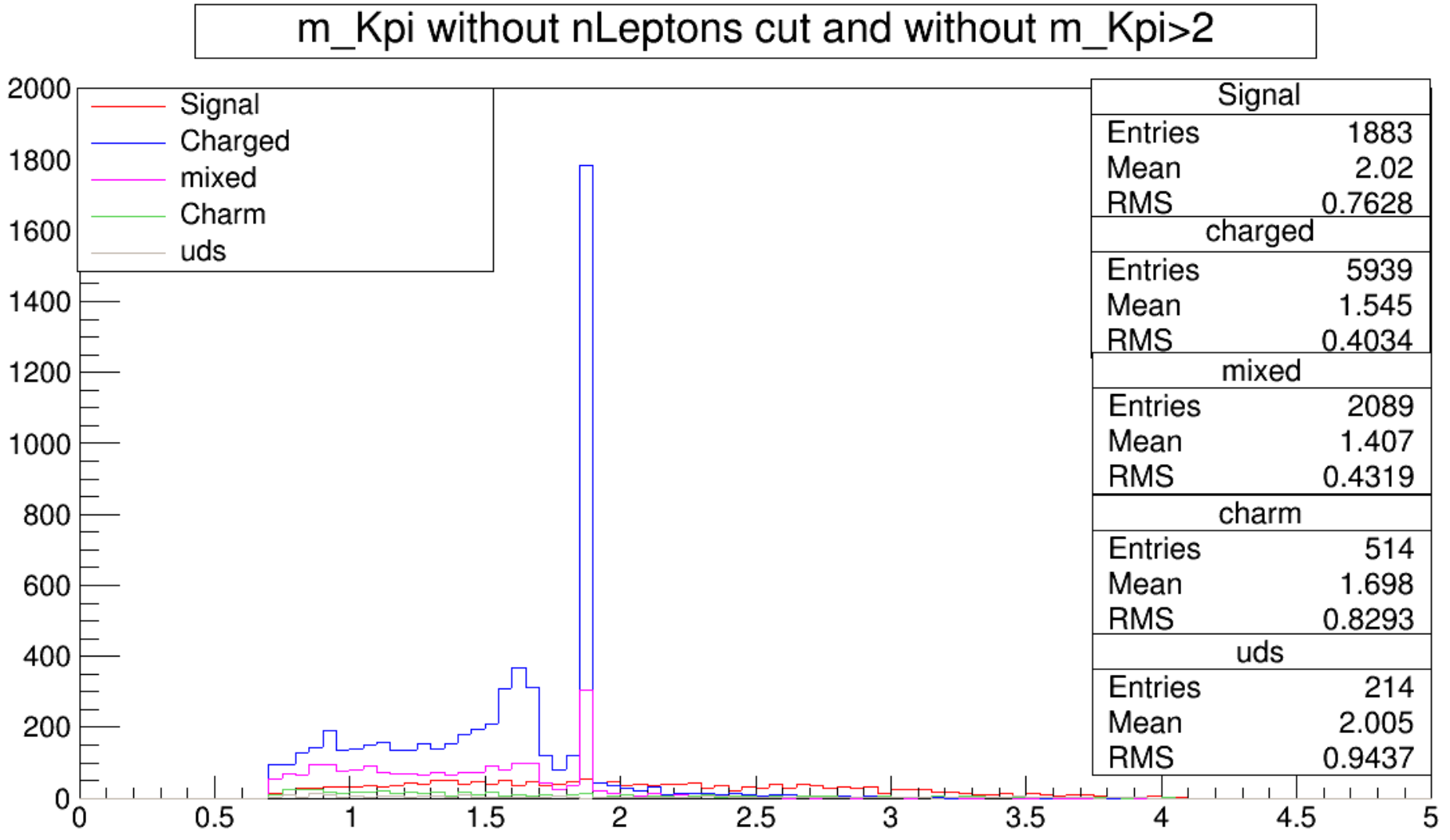
- abs(sin_phi)<1.5 (changed from < 1.2)
- abs(m_lpi-3.1)>0.015
- m_Kpi>0.7 (changed from > 2)
- abs(cos_pBtag_Dltag)<2 (changed from < 1.2)
- 1.6 < m_D <2.4

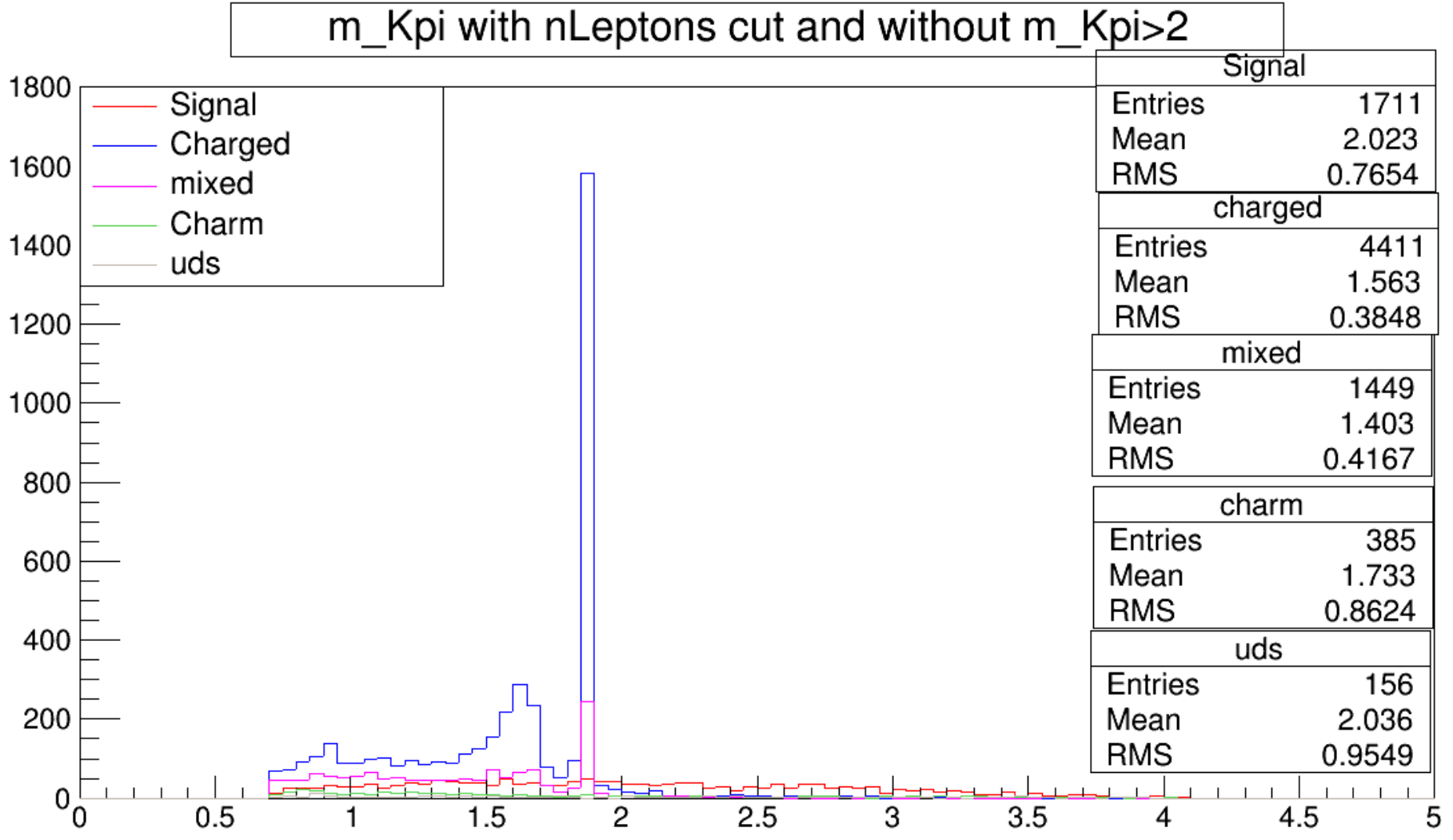
Cuts on the root level files

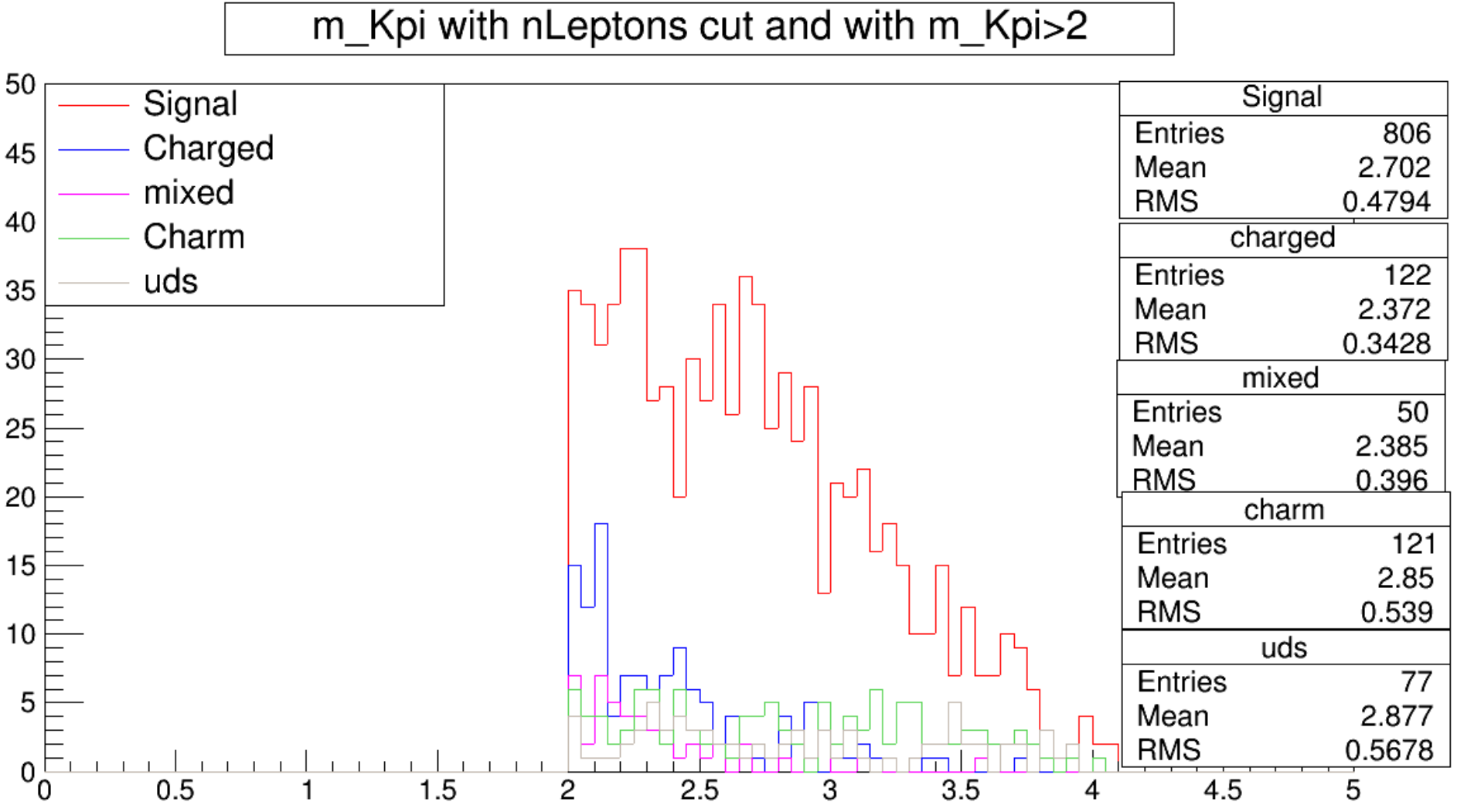
- abs(m_D-1.865)<0.015
- Yincl_rank_all==1
- abs(best_soln)<2
- nLepton==2
- m_Kpi>2

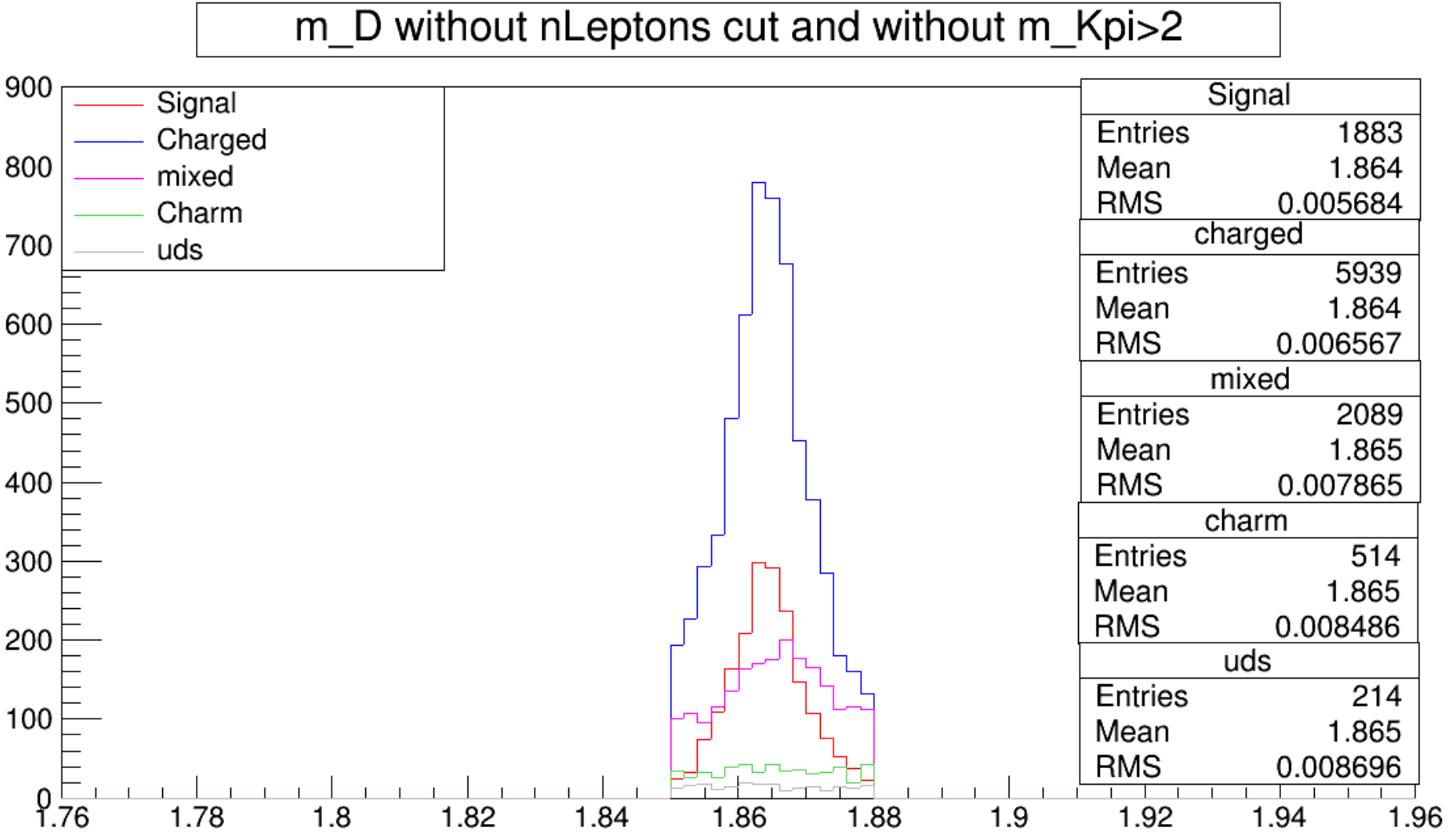
Variables

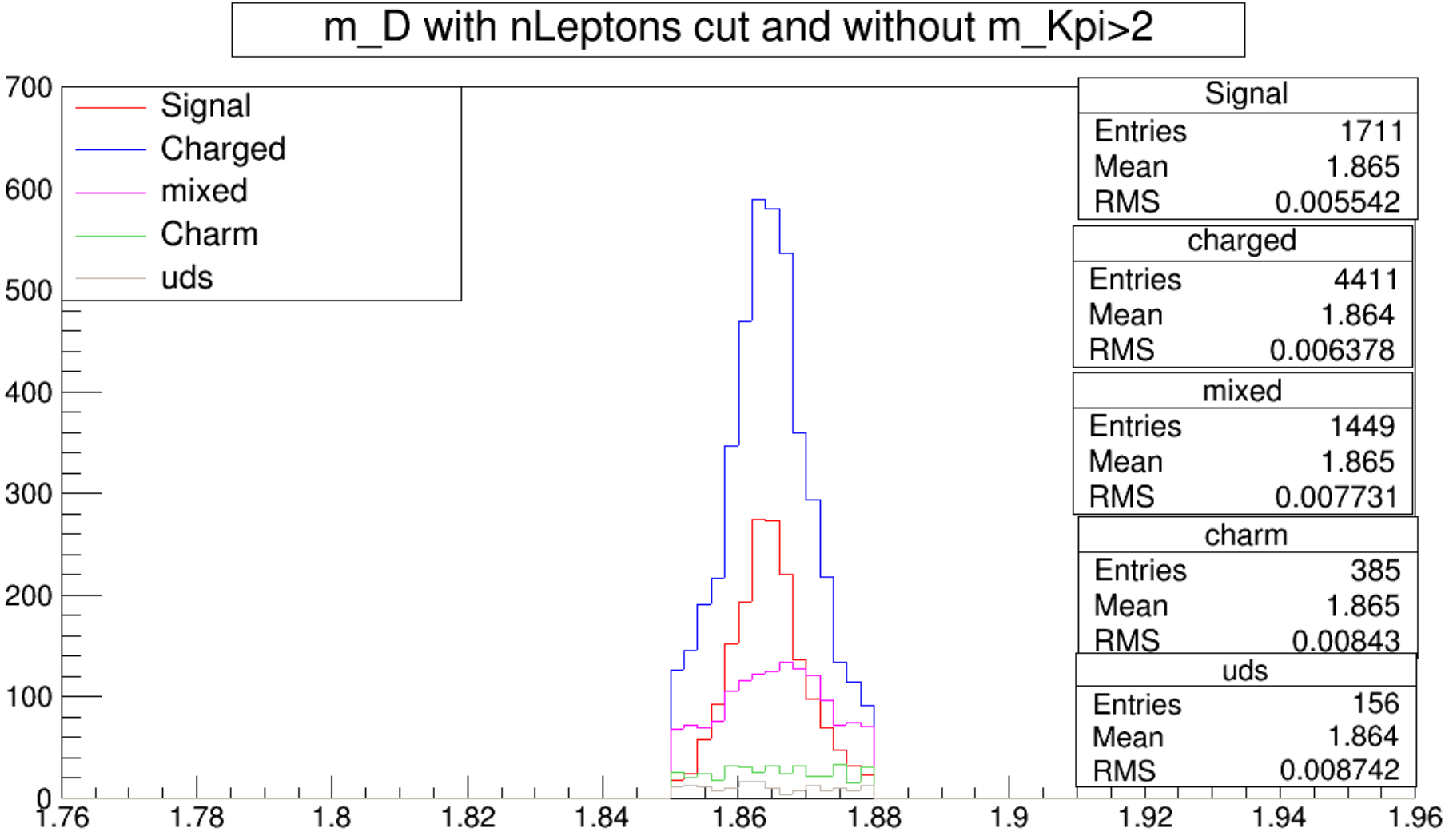
- m_Kpi
- m_D
- Cos_pBtag_pDl
- Best sum of cosine angles
- Sin_phi

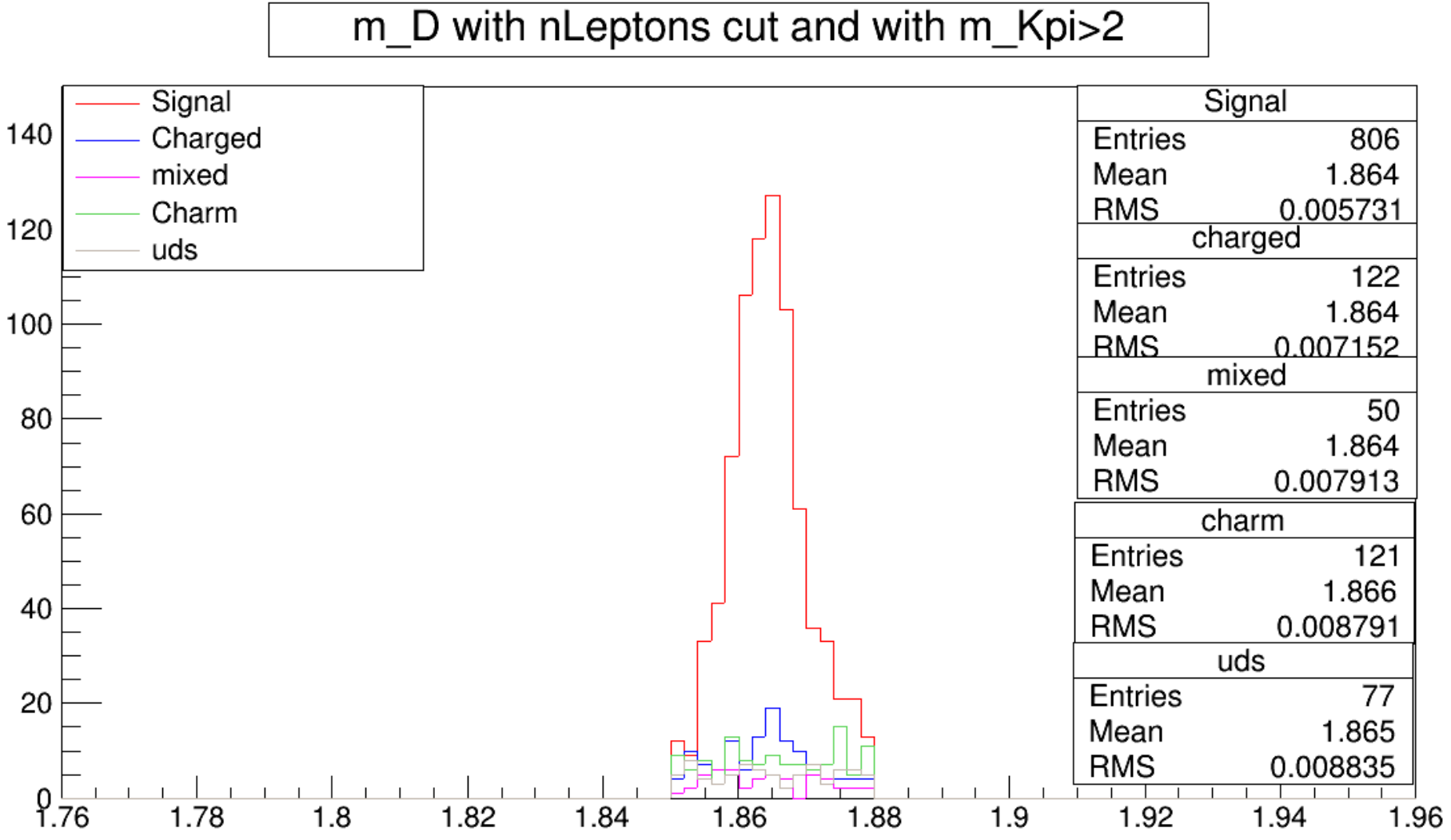

m_Kpi without nLeptons cut and without m_Kpi>2
Signal
Charged
mixed
Charm
uds
Signal
Entries 1883
Mean 2.02
RMS 0.7628
charged
Entries 5939
Mean 1.545
RMS 0.4034
mixed
Entries 2089
Mean 1.407
RMS 0.4319
charm
Entries 514
Mean 1.698
RMS 0.8293
uds
Entries 214
Mean 2.005
RMS 0.9437
2000
1800
1600
1400
1200
1000
800
600
400
200
0
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5

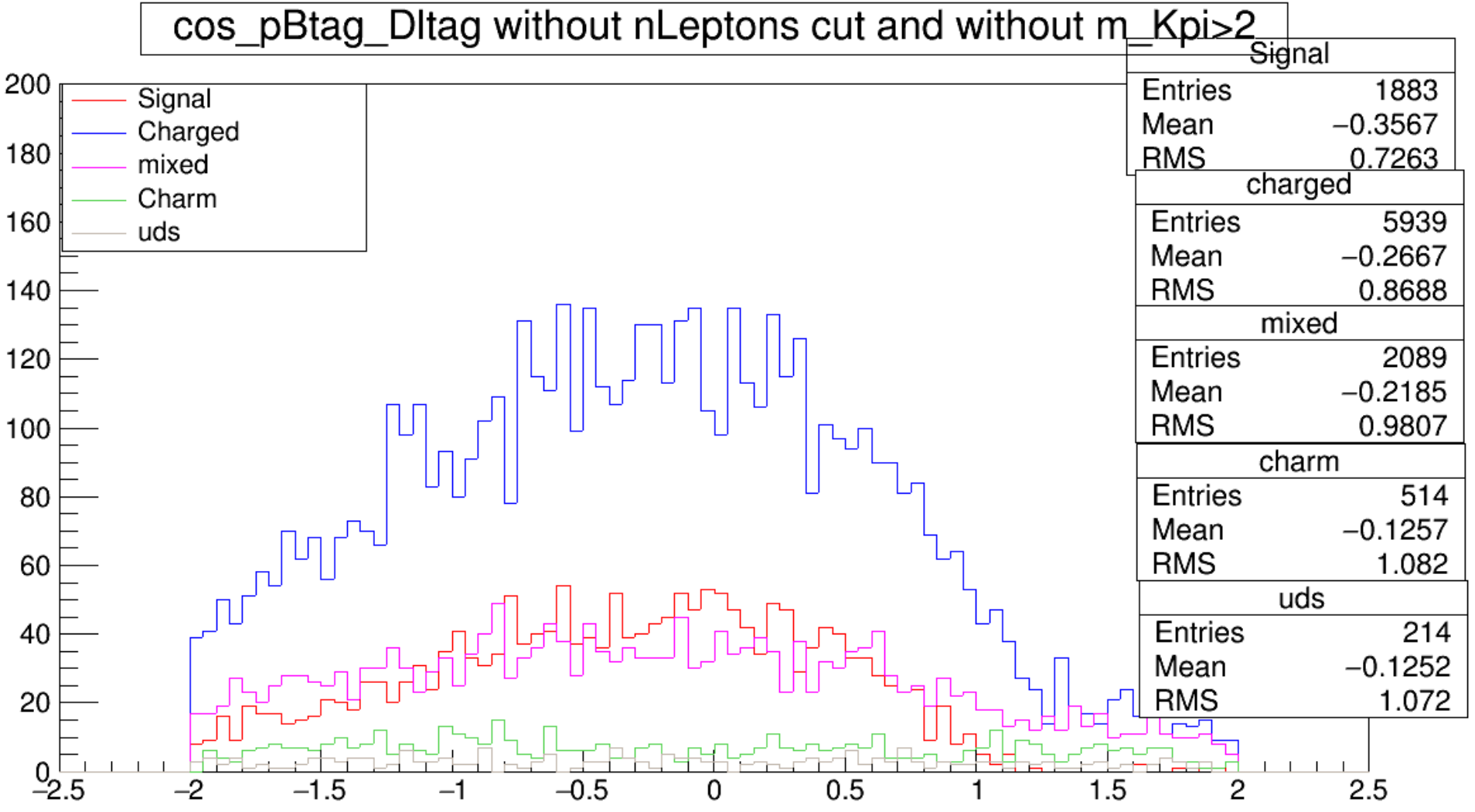

m_Kpi with nLeptons cut and without m_Kpi>2
Signal
Charged
mixed
Charm
uds
Signal
Entries 1711
Mean 2.023
RMS 0.7654
charged
Entries 4411
Mean 1.563
RMS 0.3848
mixed
Entries 1449
Mean 1.403
RMS 0.4167
charm
Entries 385
Mean 1.733
RMS 0.8624
uds
Entries 156
Mean 2.036
RMS 0.9549
0
200
400
600
800
1000
1200
1400
1600
1800
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5

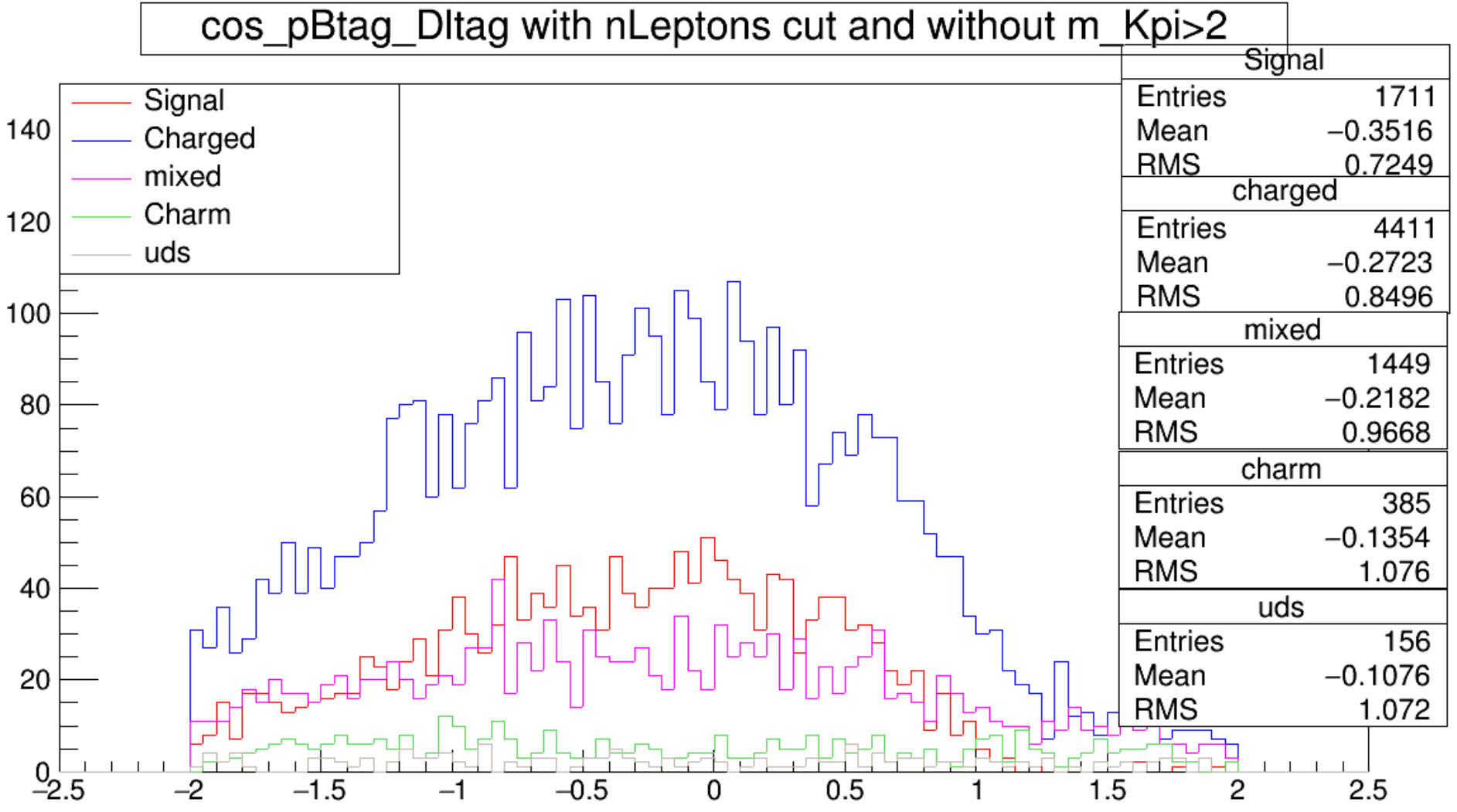

m_Kpi with nLeptons cut and with m_Kpi>2
Signal
Charged
mixed
Charm
uds
Signal
Entries 806
Mean 2.702
RMS 0.4794
charged
Entries 122
Mean 2.372
RMS 0.3428
mixed
Entries 50
Mean 2.385
RMS 0.396
charm
Entries 121
Mean 2.85
RMS 0.539
uds
Entries 77
Mean 2.877
RMS 0.5678
0 5 10 15 20 25 30 35 40 45 50
0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 5

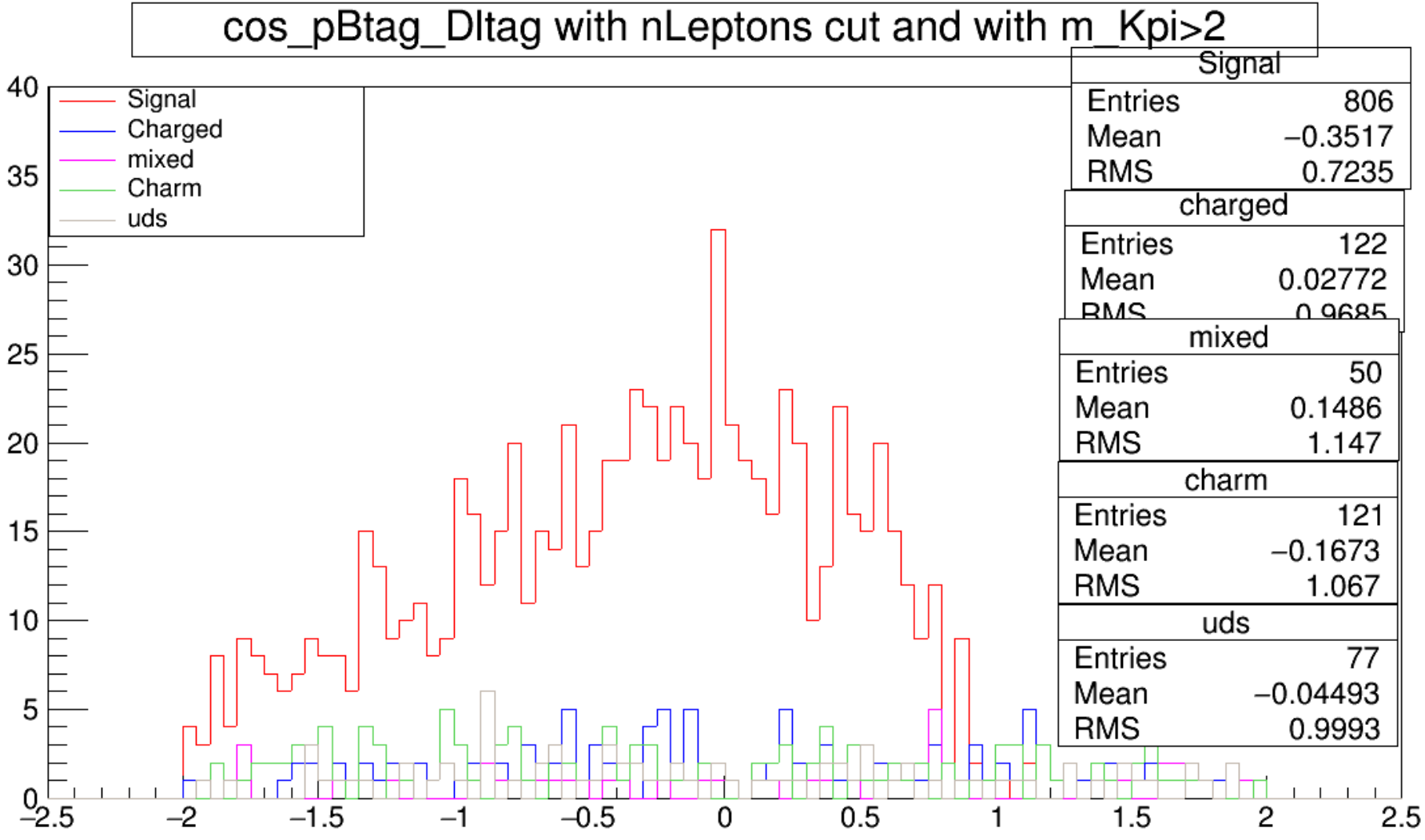

m_D without nLeptons cut and without m_Kpi>2
Signal
Charged
mixed
Charm
uds
Signal
Entries 1883
Mean 1.864
RMS 0.005684
charged
Entries 5939
Mean 1.864
RMS 0.006567
mixed
Entries 2089
Mean 1.865
RMS 0.007865
charm
Entries 514
Mean 1.865
RMS 0.008486
uds
Entries 214
Mean 1.865
RMS 0.008696
900
800
700
600
500
400
300
200
100
0
1.76
1.78
1.8
1.82
1.84
1.86
1.88
1.9
1.92
1.94
1.96

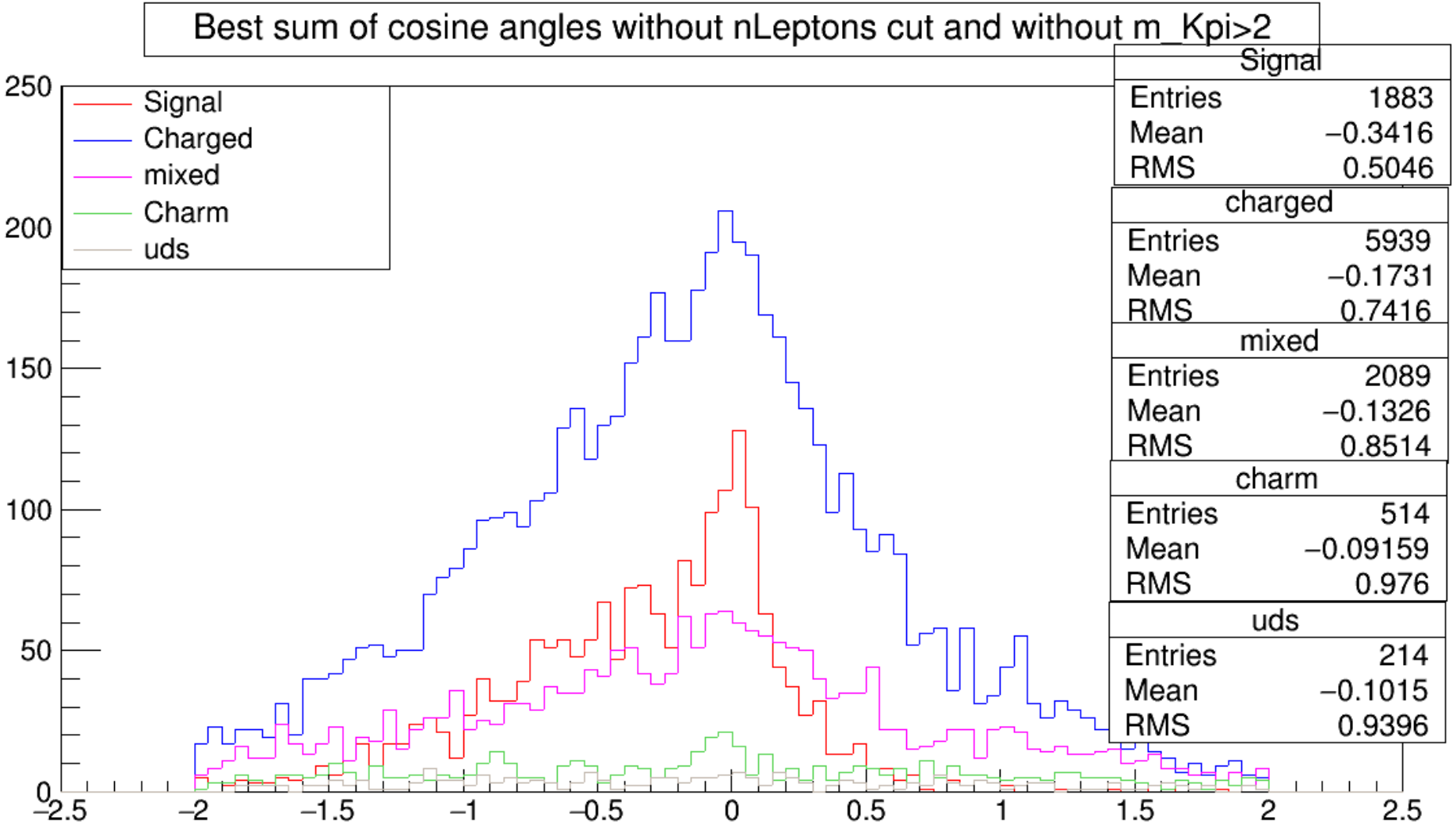

m_D with nLeptons cut and without m_Kpi>2
Signal
Charged
mixed
Charm
uds
700
600
500
400
300
200
100
0
1.76
1.78
1.8
1.82
1.84
1.86
1.88
1.9
1.92
1.94
1.96
Signal
Entries 1711
Mean 1.865
RMS 0.005542
charged
Entries 4411
Mean 1.864
RMS 0.006378
mixed
Entries 1449
Mean 1.865
RMS 0.007731
charm
Entries 385
Mean 1.865
RMS 0.00843
uds
Entries 156
Mean 1.864
RMS 0.008742

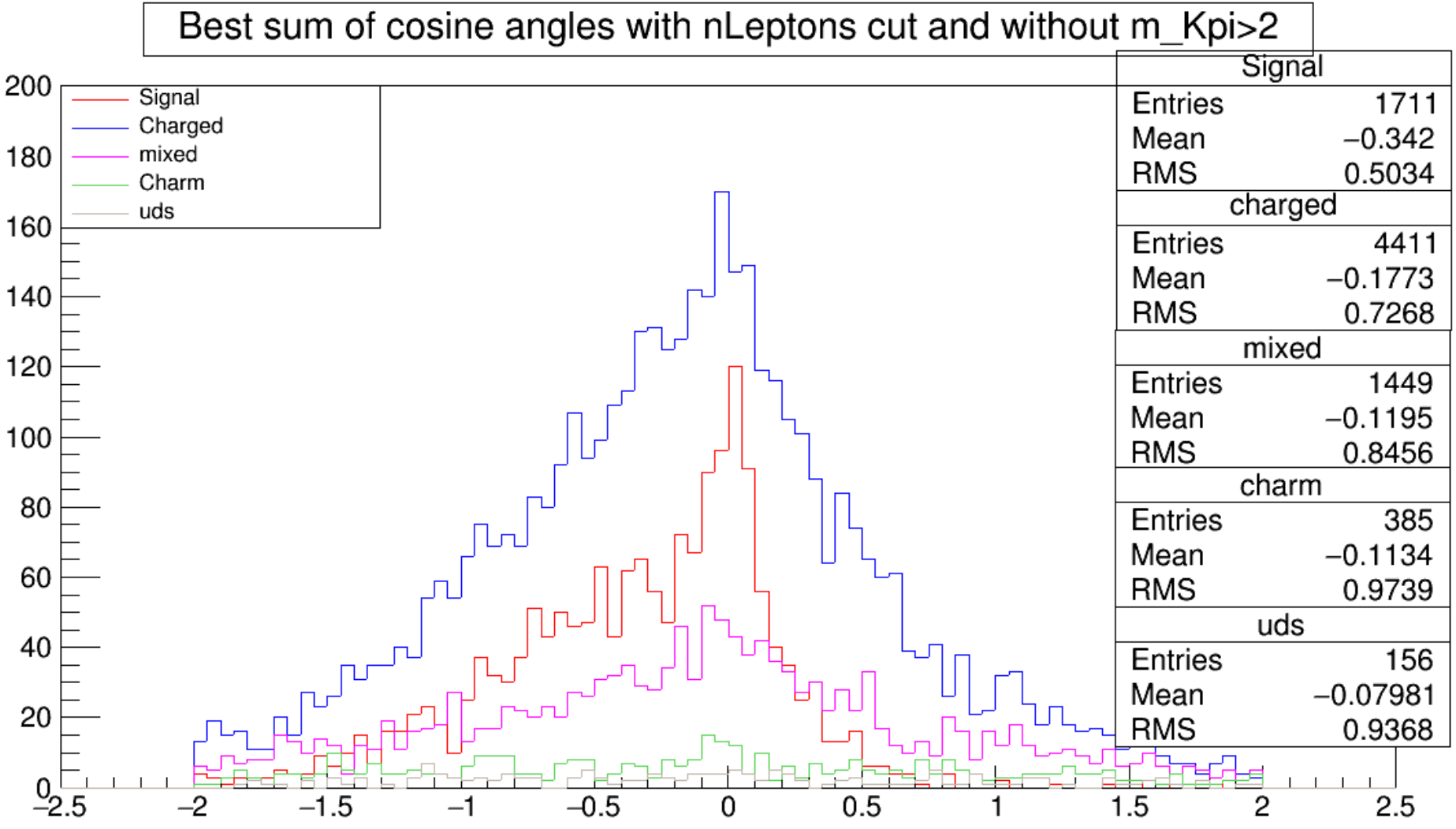

m_D with nLeptons cut and with m_Kpi>2
Signal
Charged
mixed
Charm
uds
140
120
100
80
60
40
20
0
1.76
1.78
1.8
1.82
1.84
1.86
1.88
1.9
1.92
1.94
1.96
Signal
Entries 806
Mean 1.864
RMS 0.005731
charged
Entries 122
Mean 1.864
RMS 0.007152
mixed
Entries 50
Mean 1.864
RMS 0.007913
charm
Entries 121
Mean 1.866
RMS 0.008791
uds
Entries 77
Mean 1.865
RMS 0.008835

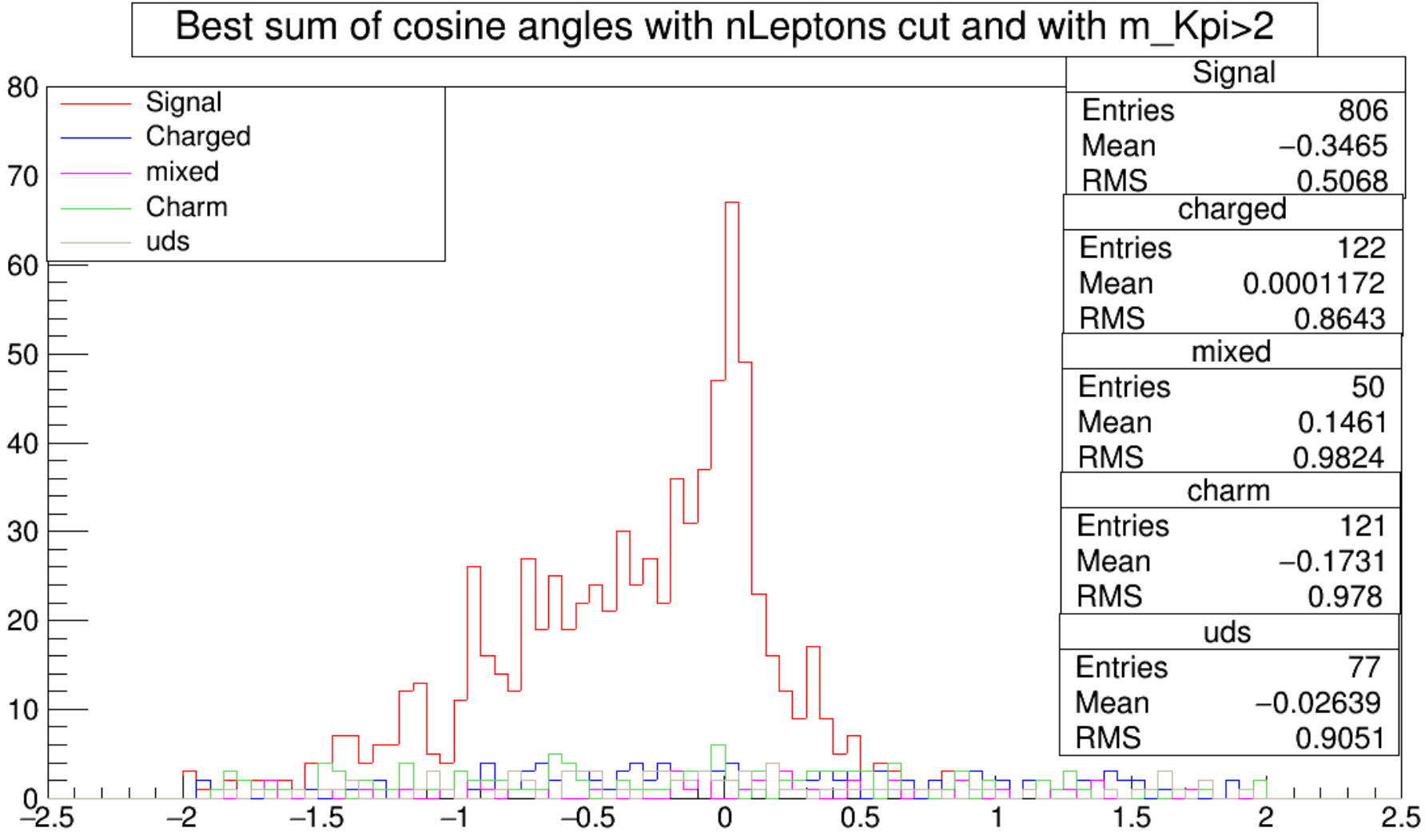

cos_pBtag_Dltag without nLeptons cut and without m_Kpi>2
Signal
Charged
mixed
Charm
uds
Signal
Entries 1883
Mean −0.3567
RMS 0.7263
charged
Entries 5939
Mean −0.2667
RMS 0.8688
mixed
Entries 2089
Mean −0.2185
RMS 0.9807
charm
Entries 514
Mean −0.1257
RMS 1.082
uds
Entries 214
Mean −0.1252
RMS 1.072
200
180
160
140
120
100
80
60
40
20
0
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
2.5

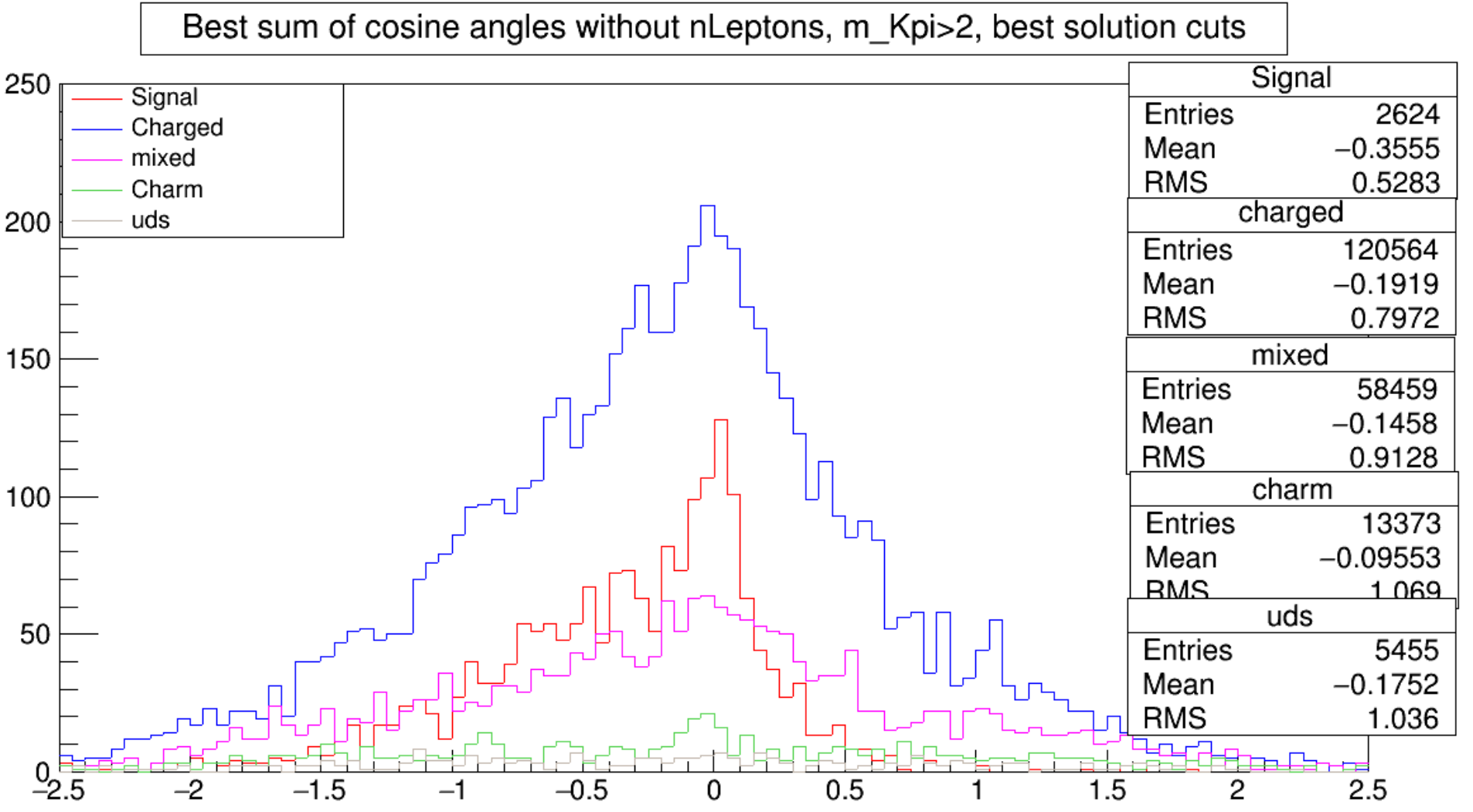

cos_pBtag_Dltag with nLeptons cut and without m_Kpi>2
Signal
Charged
mixed
Charm
uds
Signal
Entries 1711
Mean −0.3516
RMS 0.7249
charged
Entries 4411
Mean −0.2723
RMS 0.8496
mixed
Entries 1449
Mean −0.2182
RMS 0.9668
charm
Entries 385
Mean −0.1354
RMS 1.076
uds
Entries 156
Mean −0.1076
RMS 1.072
0
20
40
60
80
100
120
140
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
2.5

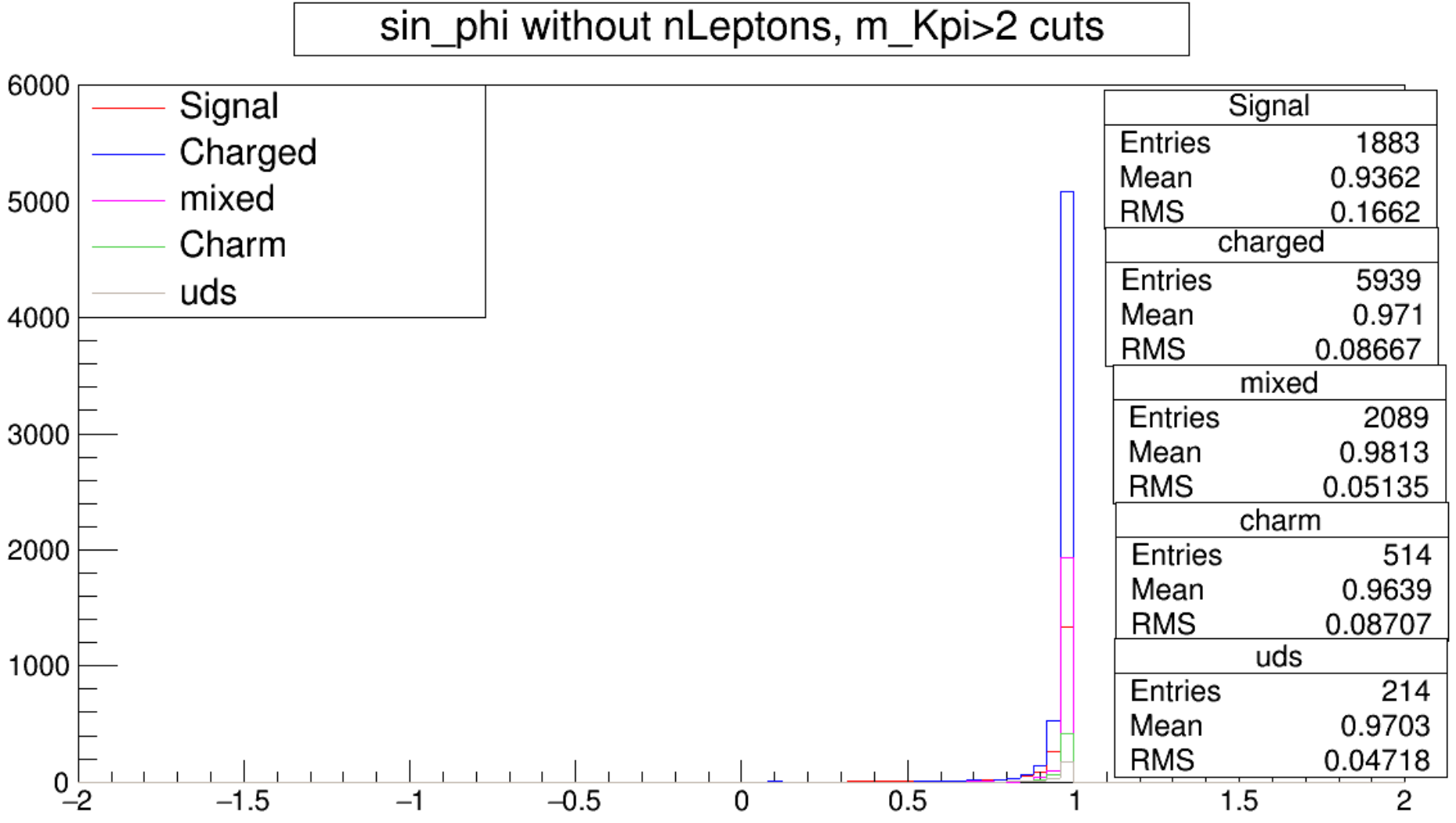

cos_pBtag_Dltag with nLeptons cut and with m_Kpi>2
Signal
Charged
mixed
Charm
uds
Signal
Entries 806
Mean −0.3517
RMS 0.7235
charged
Entries 122
Mean 0.02772
mixed
Entries 50
Mean 0.1486
RMS 1.147
charm
Entries 121
Mean −0.1673
RMS 1.067
uds
Entries 77
Mean −0.04493
RMS 0.9993
40
35
30
25
20
15
10
5
0
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
2.5

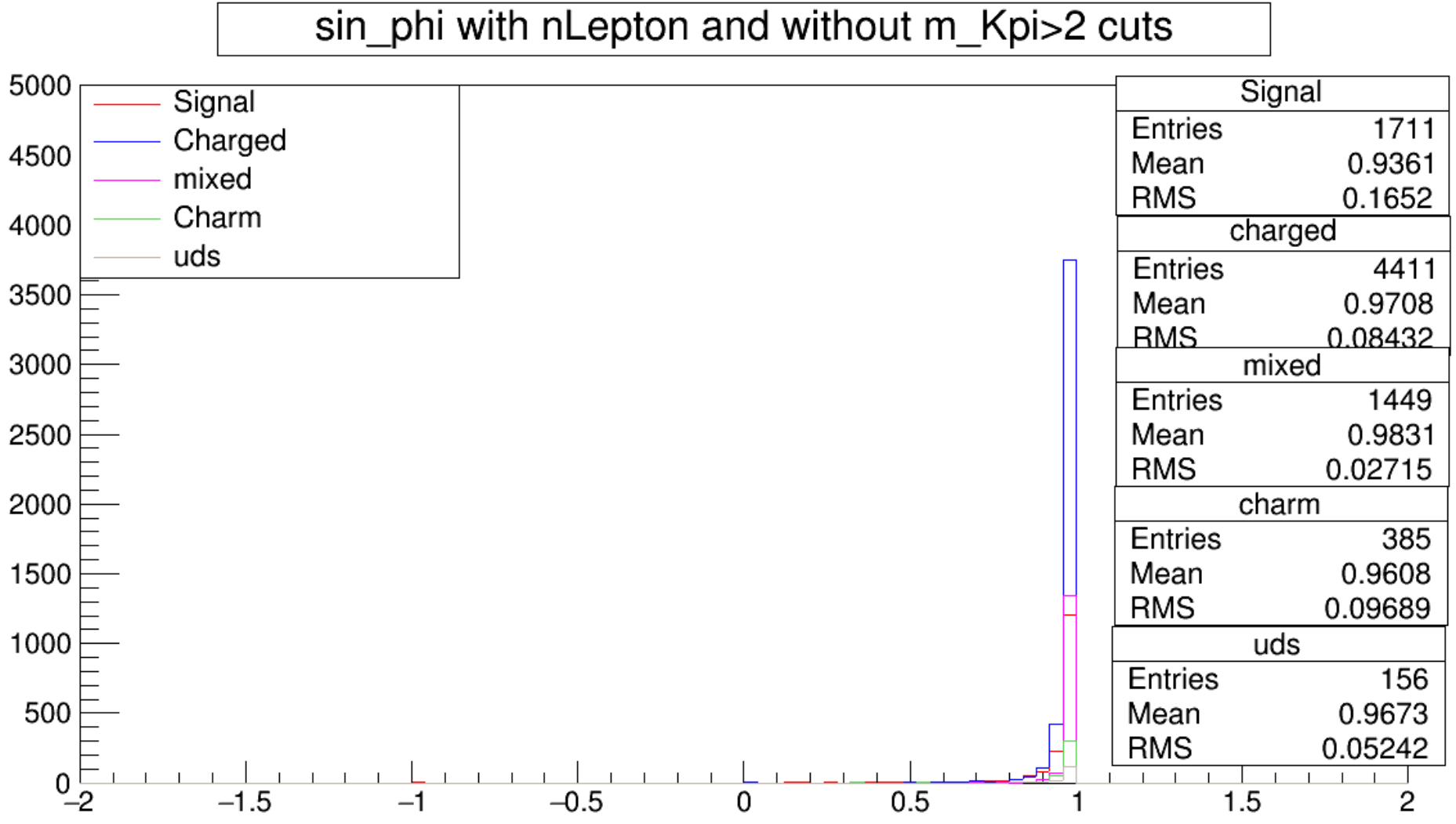

Best sum of cosine angles without nLeptons cut and without m_Kpi>2
Signal
Charged
mixed
Charm
uds
Signal
Entries 1883
Mean −0.3416
RMS 0.5046
charged
Entries 5939
Mean −0.1731
RMS 0.7416
mixed
Entries 2089
Mean −0.1326
RMS 0.8514
charm
Entries 514
Mean −0.09159
RMS 0.976
uds
Entries 214
Mean −0.1015
RMS 0.9396
250
200
150
100
50
0
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
2.5

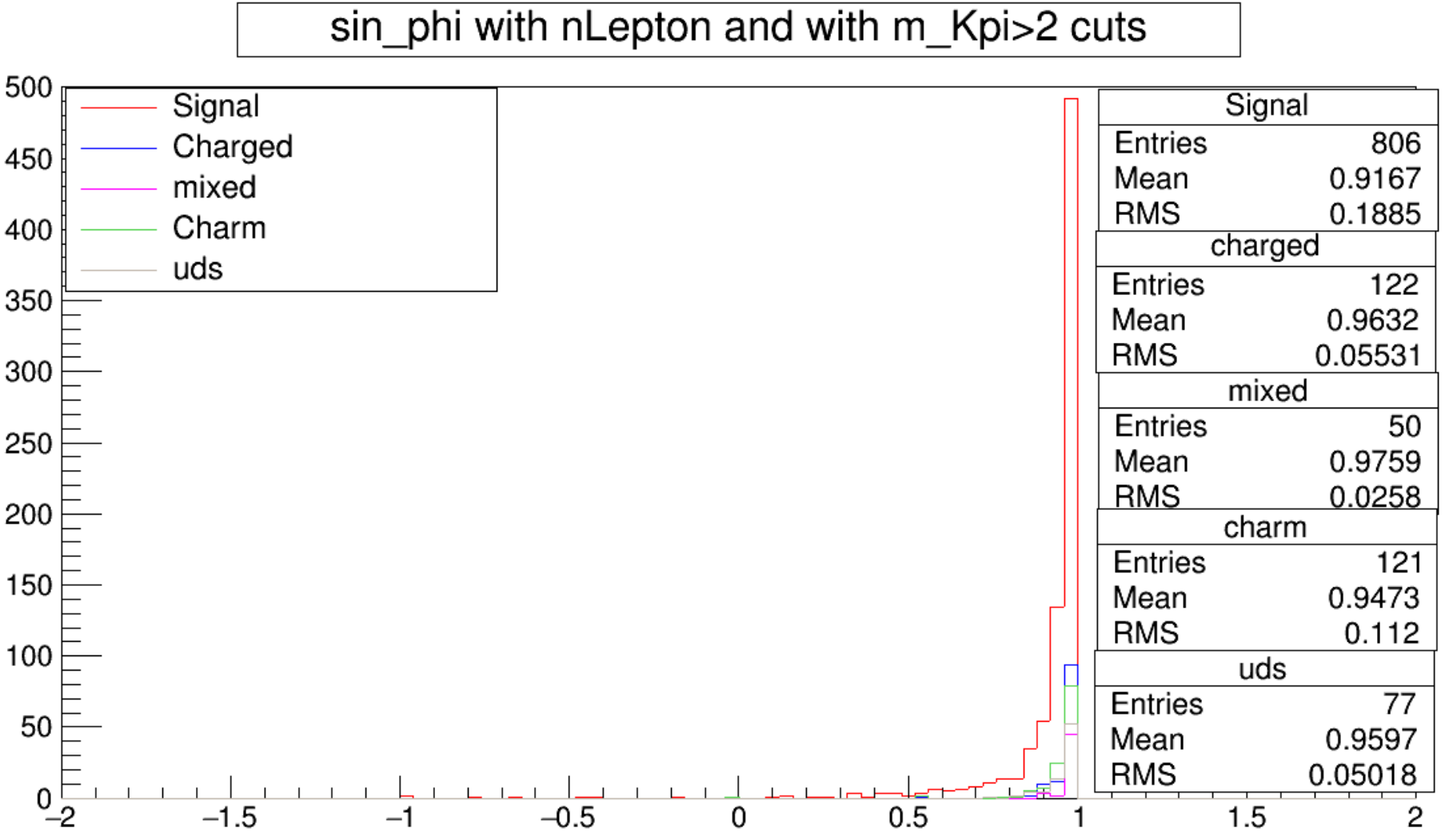

Best sum of cosine angles with nLeptons cut and without m_Kpi>2
Signal
Charged
mixed
Charm
uds
Signal
Entries 1711
Mean −0.342
RMS 0.5034
charged
Entries 4411
Mean −0.1773
RMS 0.7268
mixed
Entries 1449
Mean −0.1195
RMS 0.8456
charm
Entries 385
Mean −0.1134
RMS 0.9739
uds
Entries 156
Mean −0.07981
RMS 0.9368
200
180
160
140
120
100
80
60
40
20
0
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
2.5


Best sum of cosine angles with nLeptons cut and with m_Kpi>2
Signal
Charged
mixed
Charm
uds
Signal
Entries 806
Mean −0.3465
RMS 0.5068
charged
Entries 122
Mean 0.0001172
RMS 0.8643
mixed
Entries 50
Mean 0.1461
RMS 0.9824
charm
Entries 121
Mean −0.1731
RMS 0.978
uds
Entries 77
Mean −0.02639
RMS 0.9051
80
70
60
50
40
30
20
10
0
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
2.5


Best sum of cosine angles without nLeptons, m_Kpi>2, best solution cuts
Signal
Charged
mixed
Charm
uds
250
200
150
100
50
0
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
2.5
Signal
Entries 2624
Mean −0.3555
RMS 0.5283
charged
Entries 120564
Mean −0.1919
RMS 0.7972
mixed
Entries 58459
Mean −0.1458
RMS 0.9128
charm
Entries 13373
Mean −0.09553
RMS 1.069
uds
Entries 5455
Mean −0.1752
RMS 1.036


sin_phi without nLeptons, m_Kpi>2 cuts
Signal
Charged
mixed
Charm
uds
6000
5000
4000
3000
2000
1000
0
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Signal
Entries 1883
Mean 0.9362
RMS 0.1662
charged
Entries 5939
Mean 0.971
RMS 0.08667
mixed
Entries 2089
Mean 0.9813
RMS 0.05135
charm
Entries 514
Mean 0.9639
RMS 0.08707
uds
Entries 214
Mean 0.9703
RMS 0.04718


sin_phi with nLepton and without m_Kpi>2 cuts
Signal
Charged
mixed
Charm
uds
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Signal
Entries 1711
Mean 0.9361
RMS 0.1652
charged
Entries 4411
Mean 0.9708
RMS 0.08432
mixed
Entries 1449
Mean 0.9831
RMS 0.02715
charm
Entries 385
Mean 0.9608
RMS 0.09689
uds
Entries 156
Mean 0.9673
RMS 0.05242


sin_phi with nLepton and with m_Kpi>2 cuts
Signal
Charged
mixed
Charm
uds
Signal
Entries 806
Mean 0.9167
RMS 0.1885
charged
Entries 122
Mean 0.9632
RMS 0.05531
mixed
Entries 50
Mean 0.9759
RMS 0.0258
charm
Entries 121
Mean 0.9473
RMS 0.112
uds
Entries 77
Mean 0.9597
RMS 0.05018
500
450
400
350
300
250
200
150
100
50
0
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2

Thanks