Check on the incl. tag sample

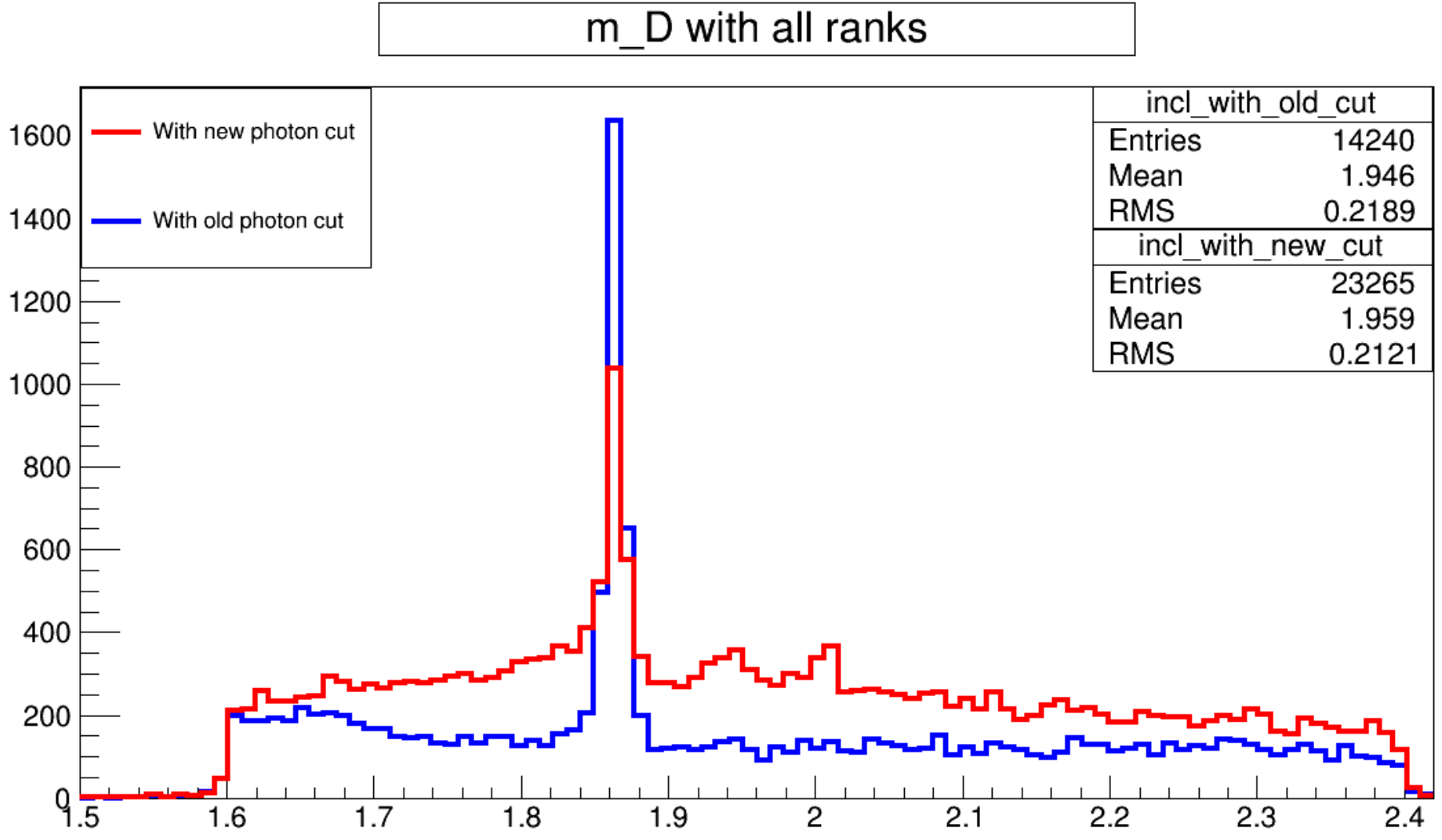
Sample of 1.0M events

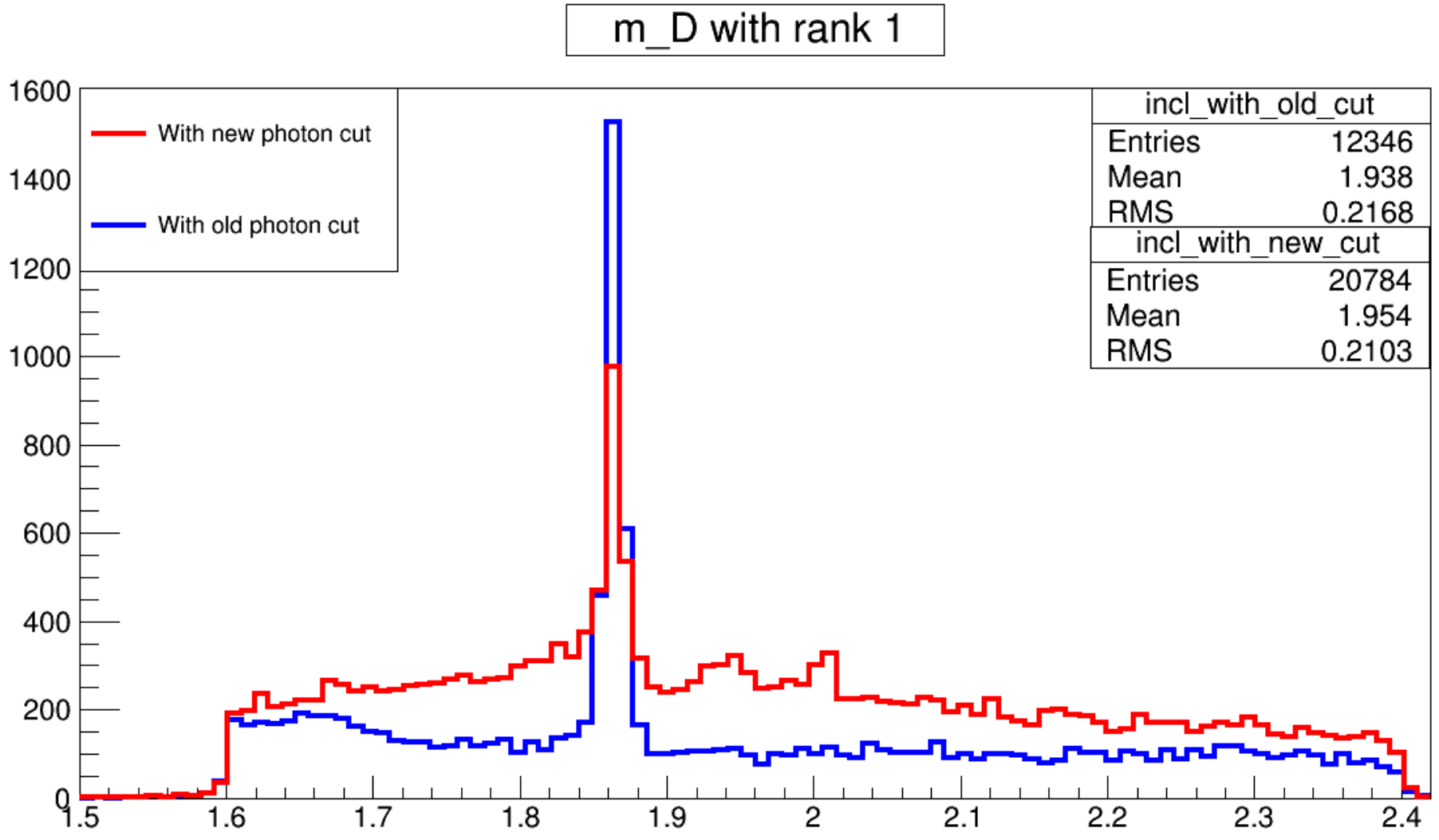
$B^+ \rightarrow K^+ \tau^- \mu^+$

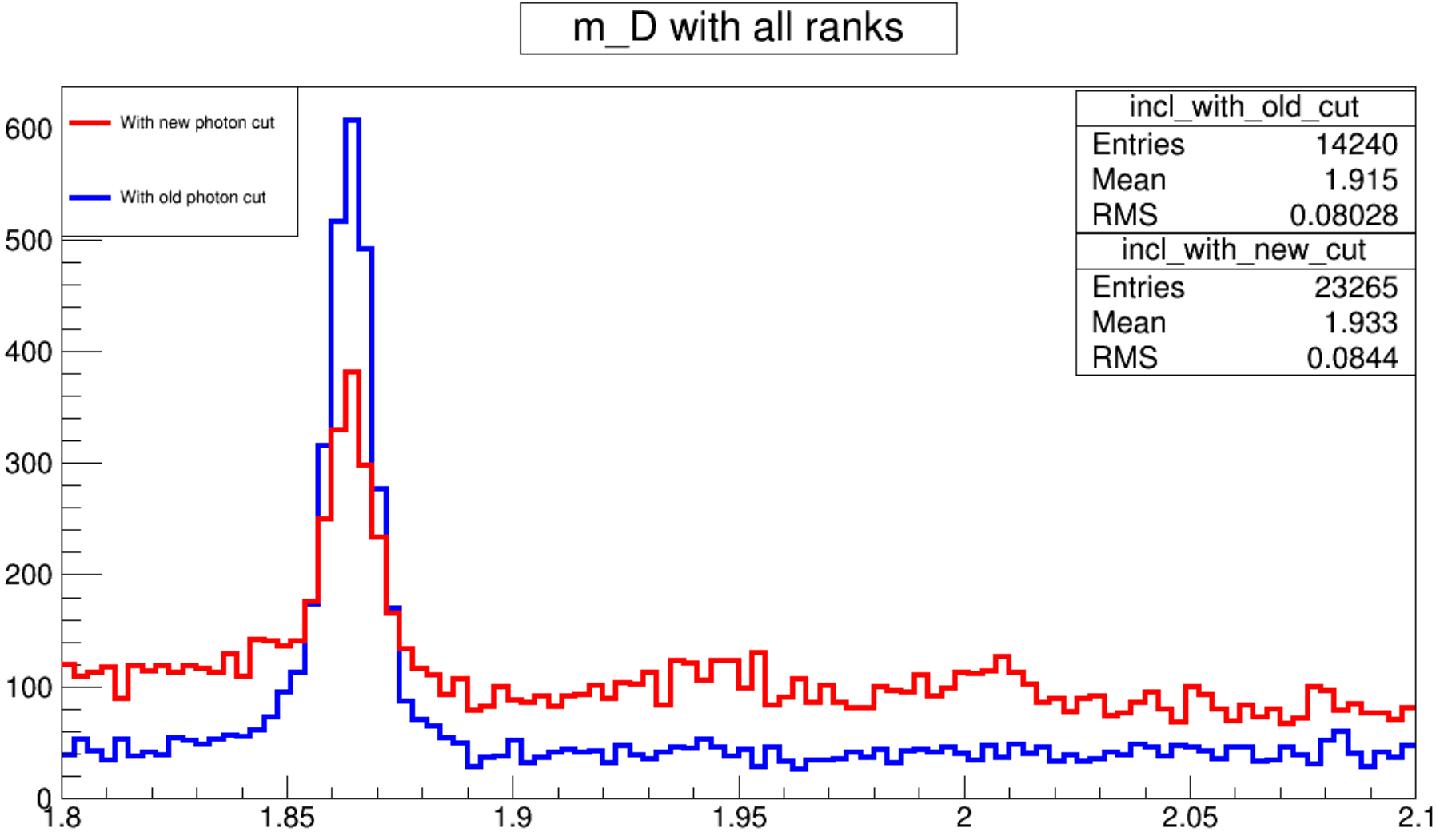
$\tau^- \rightarrow \pi^- \nu_\tau$

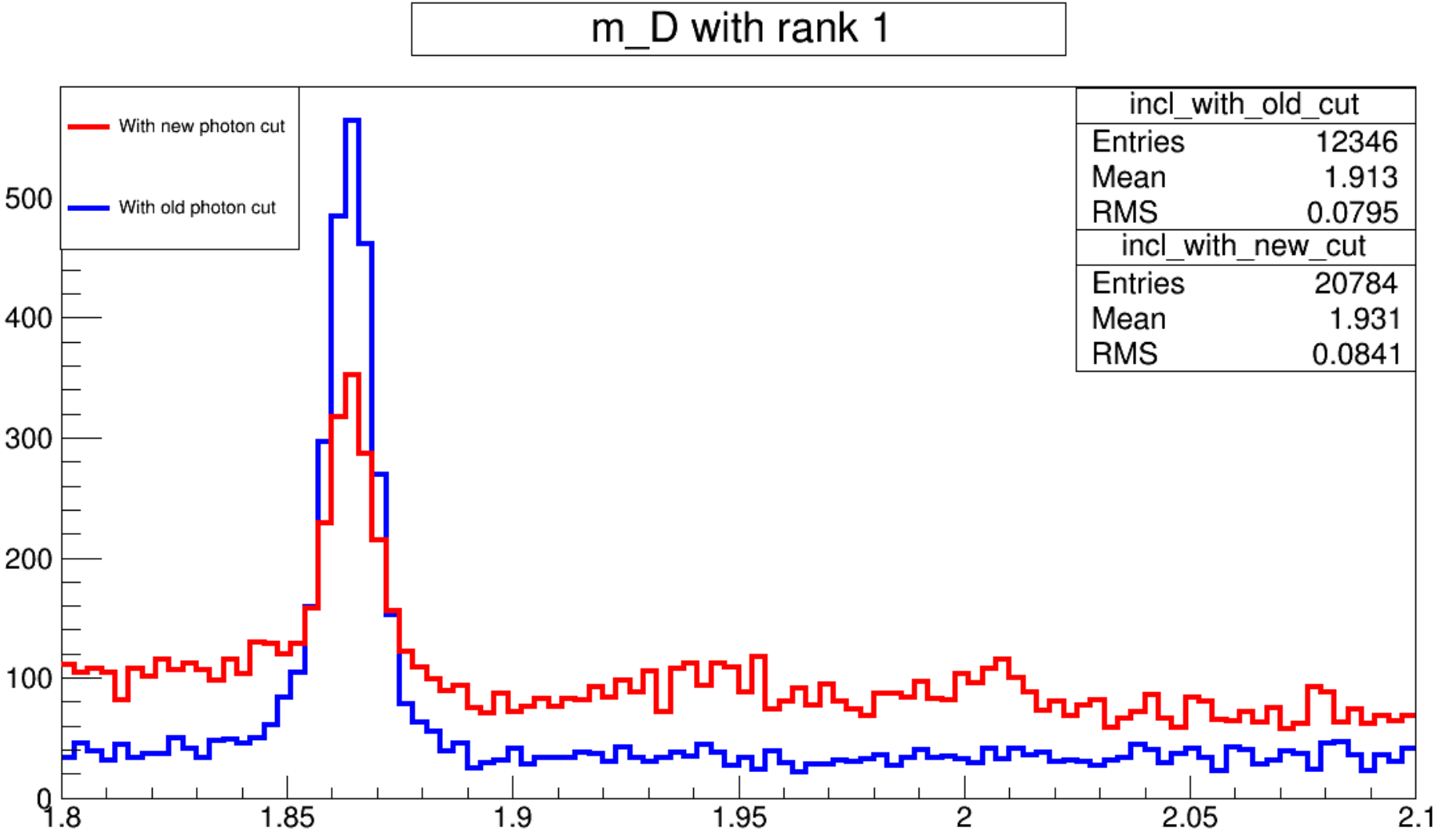
$B^- \rightarrow$ generic

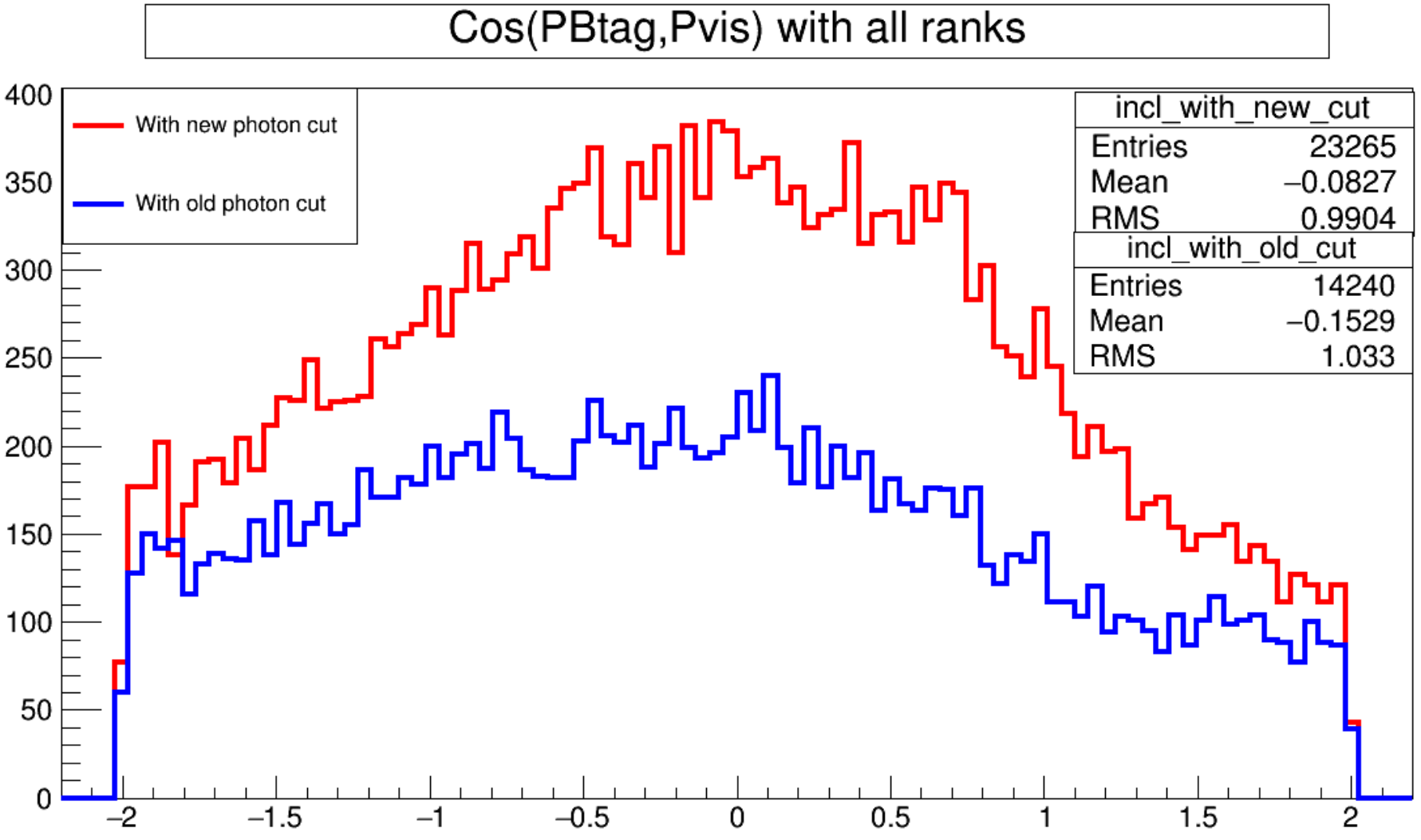
30/10/2023

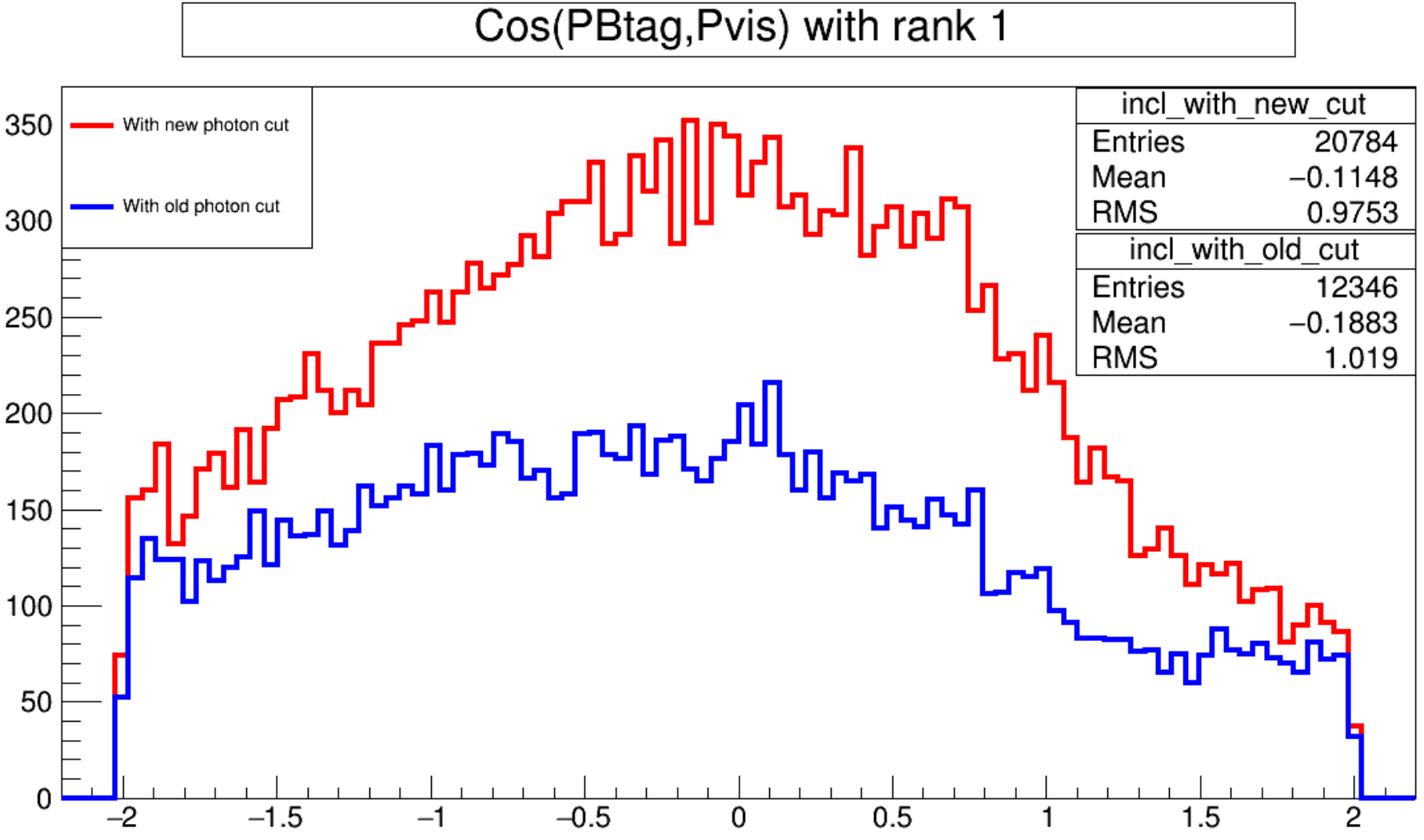

m_D with all ranks
With new photon cut
With old photon cut
incl_with_old_cut
Entries 14240
Mean 1.946
RMS 0.2189
incl_with_new_cut
Entries 23265
Mean 1.959
RMS 0.2121
1600
1400
1200
1000
800
600
400
200
0
1.5
1.6
1.7
1.8
1.9
2
2.1
2.2
2.3
2.4

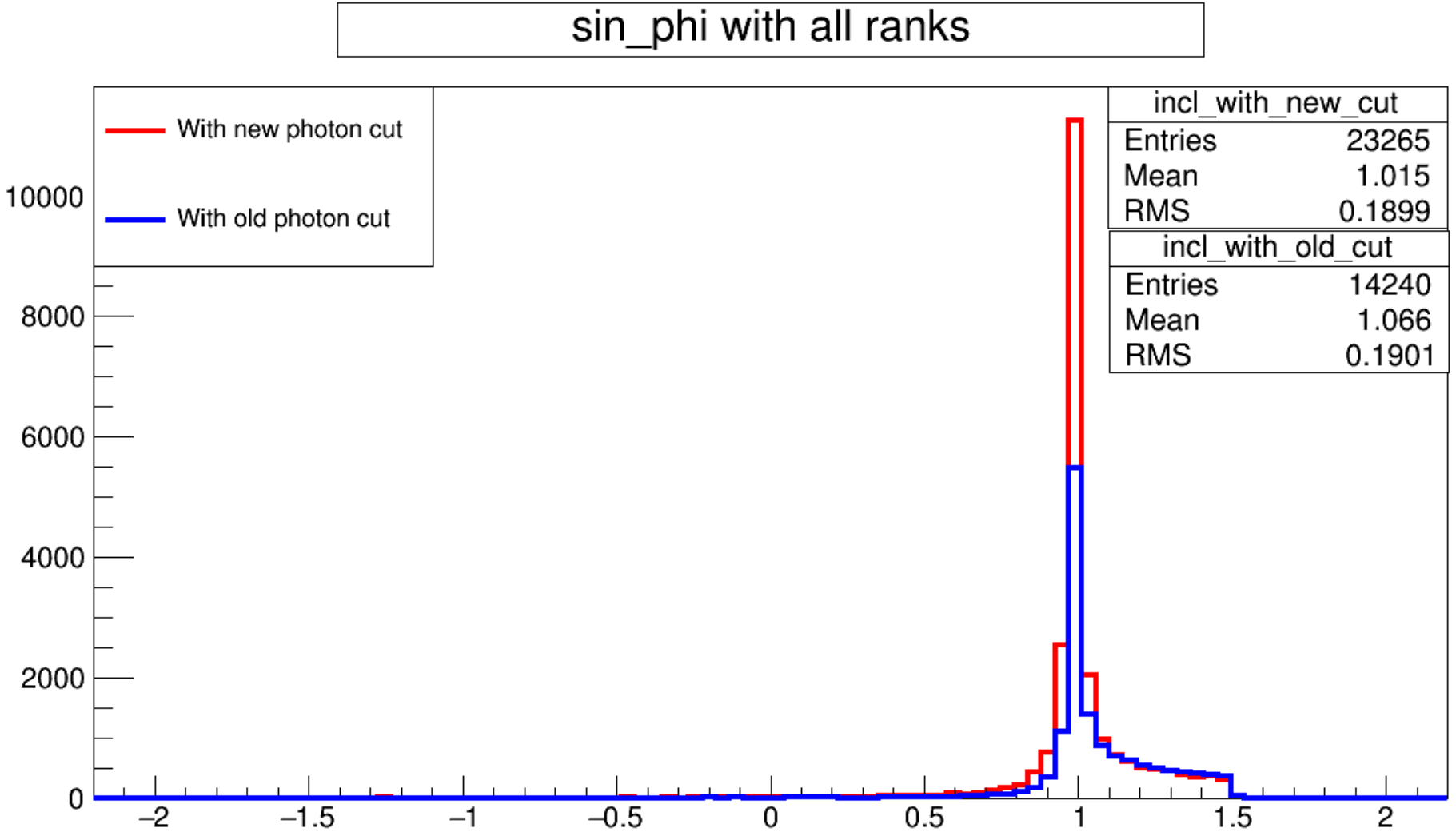

m_D with rank 1
With new photon cut
With old photon cut
incl_with_old_cut
Entries 12346
Mean 1.938
RMS 0.2168
incl_with_new_cut
Entries 20784
Mean 1.954
RMS 0.2103
1600
1400
1200
1000
800
600
400
200
0
1.5
1.6
1.7
1.8
1.9
2
2.1
2.2
2.3
2.4

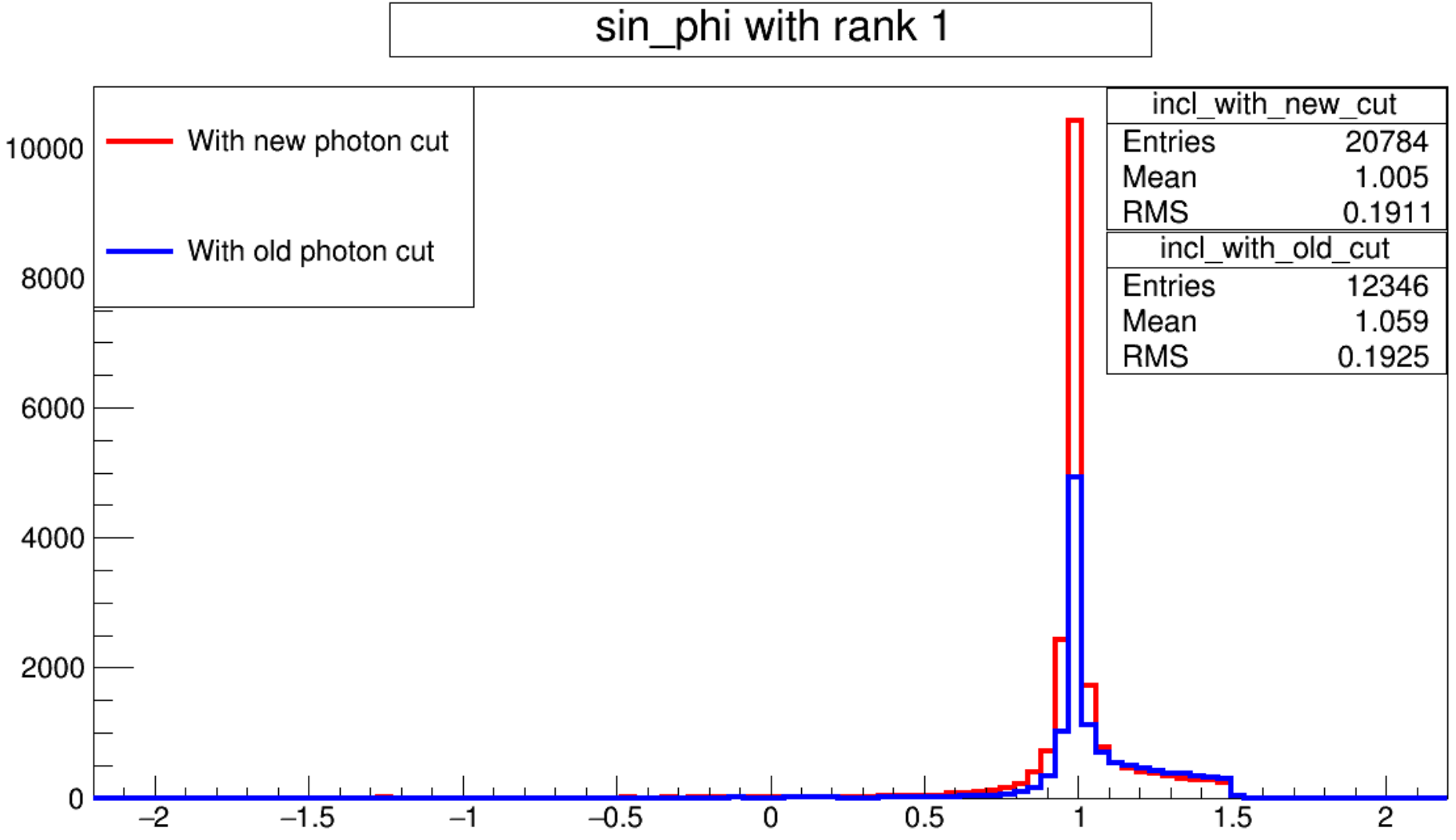

m_D with all ranks
With new photon cut
With old photon cut
incl_with_old_cut
Entries 14240
Mean 1.915
RMS 0.08028
incl_with_new_cut
Entries 23265
Mean 1.933
RMS 0.0844
600
500
400
300
200
100
0
1.8
1.85
1.9
1.95
2
2.05
2.1

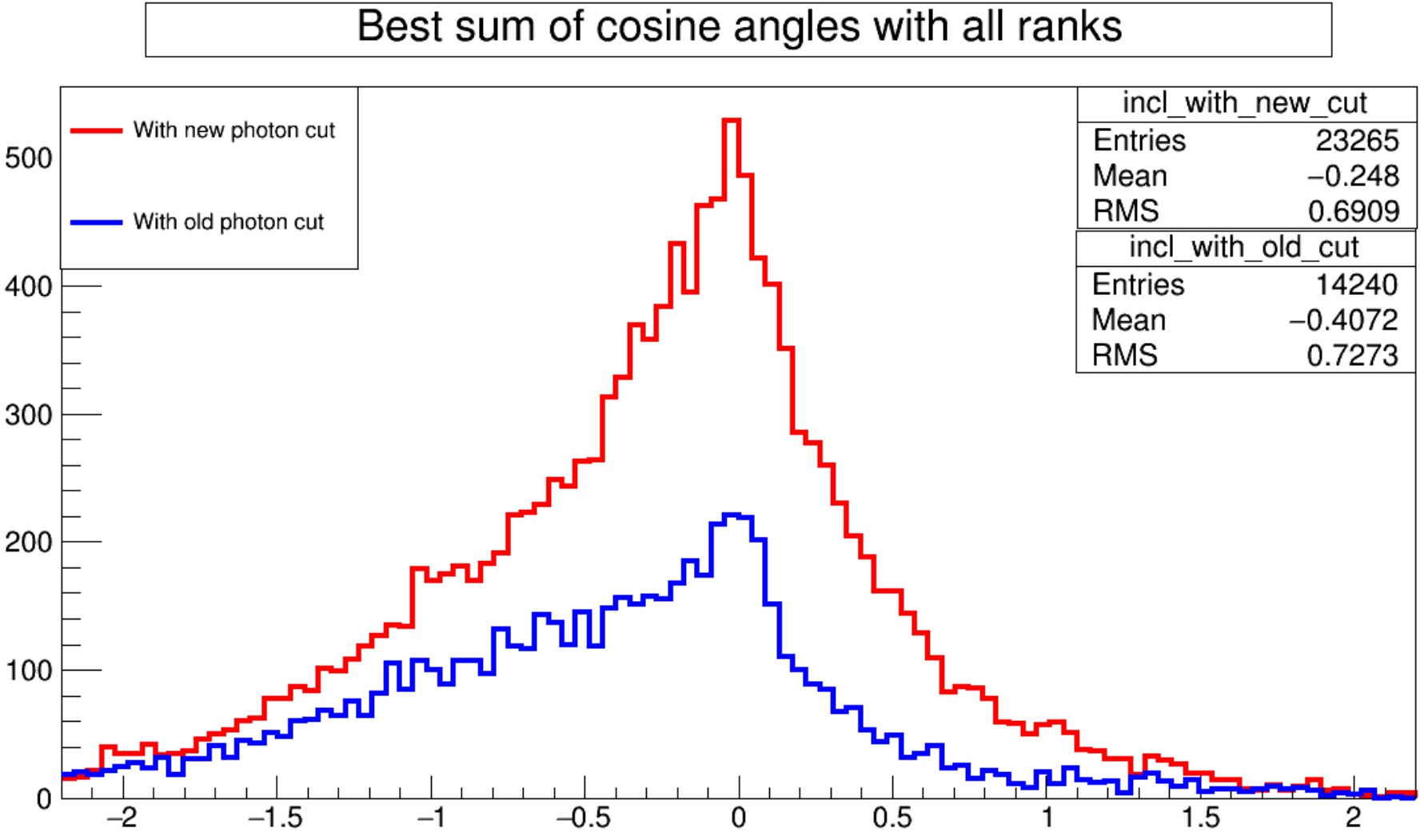

m_D with rank 1
With new photon cut
With old photon cut
incl_with_old_cut
Entries 12346
Mean 1.913
RMS 0.0795
incl_with_new_cut
Entries 20784
Mean 1.931
RMS 0.0841
0
100
200
300
400
500
1.8
1.85
1.9
1.95
2
2.05
2.1

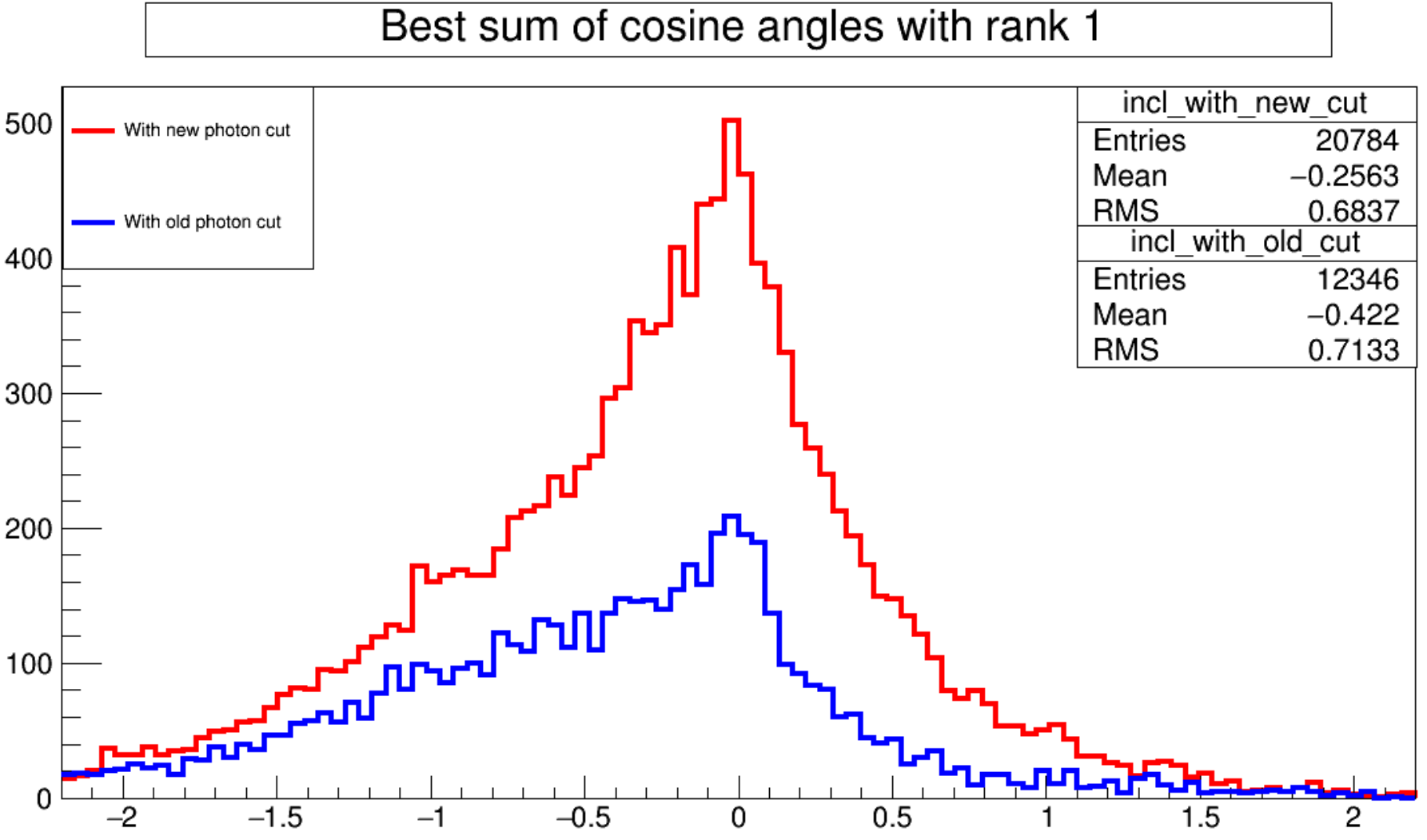

Cos(PBtag,Pvis) with all ranks
With new photon cut
With old photon cut
incl_with_new_cut
Entries 23265
Mean −0.0827
RMS 0.9904
incl_with_old_cut
Entries 14240
Mean −0.1529
RMS 1.033
400
350
300
250
200
150
100
50
0
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2

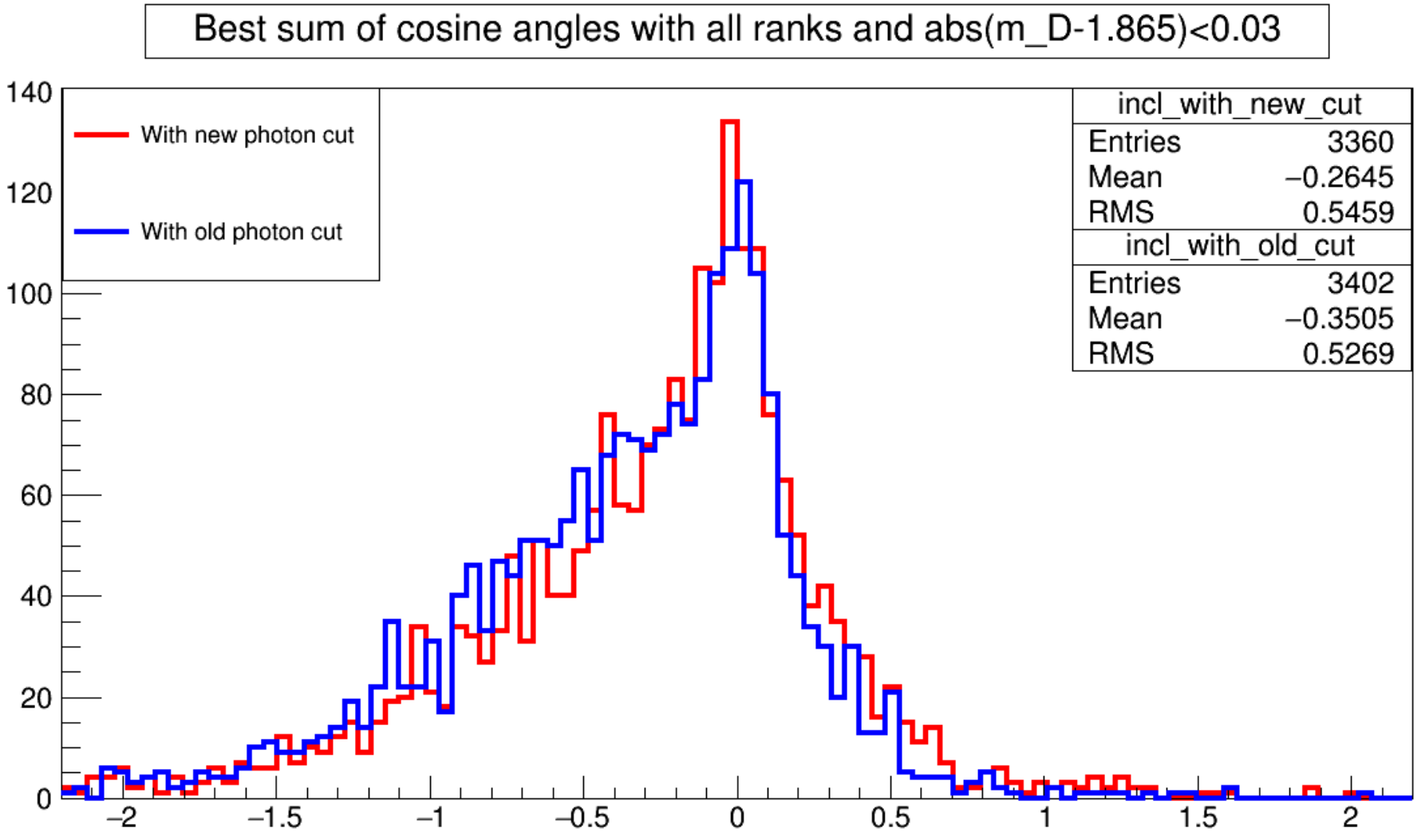

Cos(PBtag,Pvis) with rank 1
With new photon cut
With old photon cut
incl_with_new_cut
Entries 20784
Mean −0.1148
RMS 0.9753
incl_with_old_cut
Entries 12346
Mean −0.1883
RMS 1.019
350
300
250
200
150
100
50
0
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2

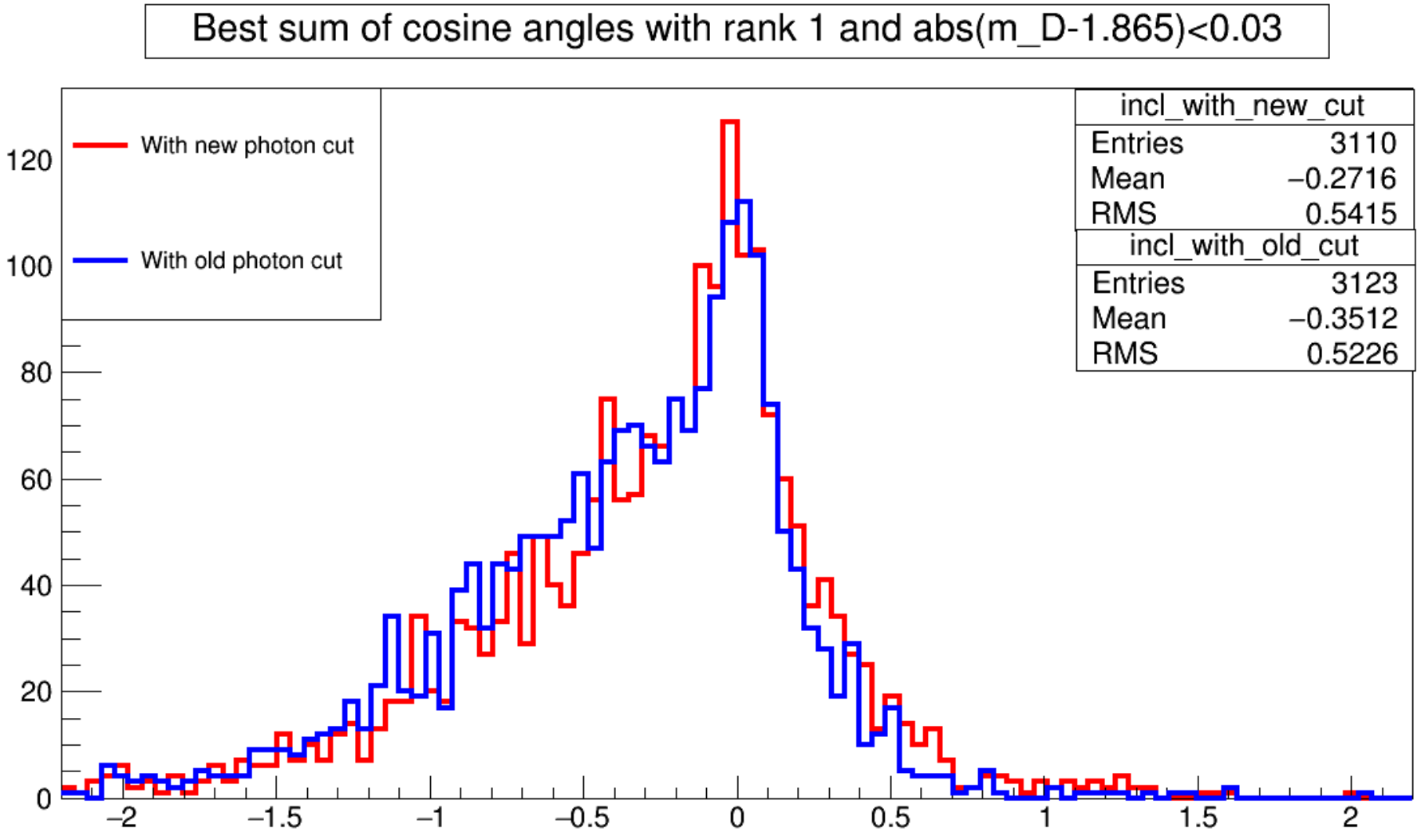

sin_phi with all ranks
With new photon cut
With old photon cut
incl_with_new_cut
Entries 23265
Mean 1.015
RMS 0.1899
incl_with_old_cut
Entries 14240
Mean 1.066
RMS 0.1901
10000
8000
6000
4000
2000
0
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2

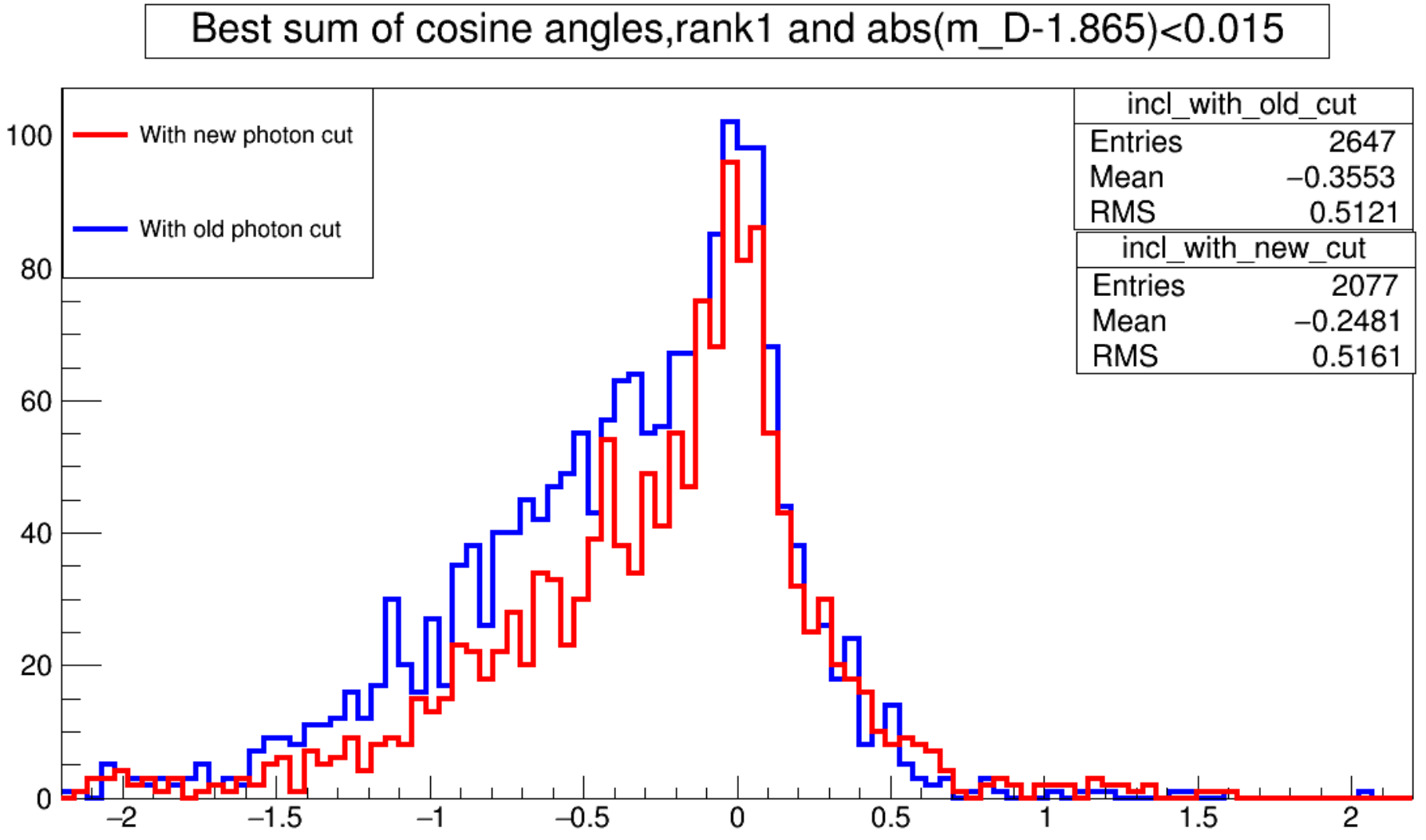

sin_phi with rank 1
With new photon cut
With old photon cut
incl_with_new_cut
Entries 20784
Mean 1.005
RMS 0.1911
incl_with_old_cut
Entries 12346
Mean 1.059
RMS 0.1925
10000
8000
6000
4000
2000
0
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2

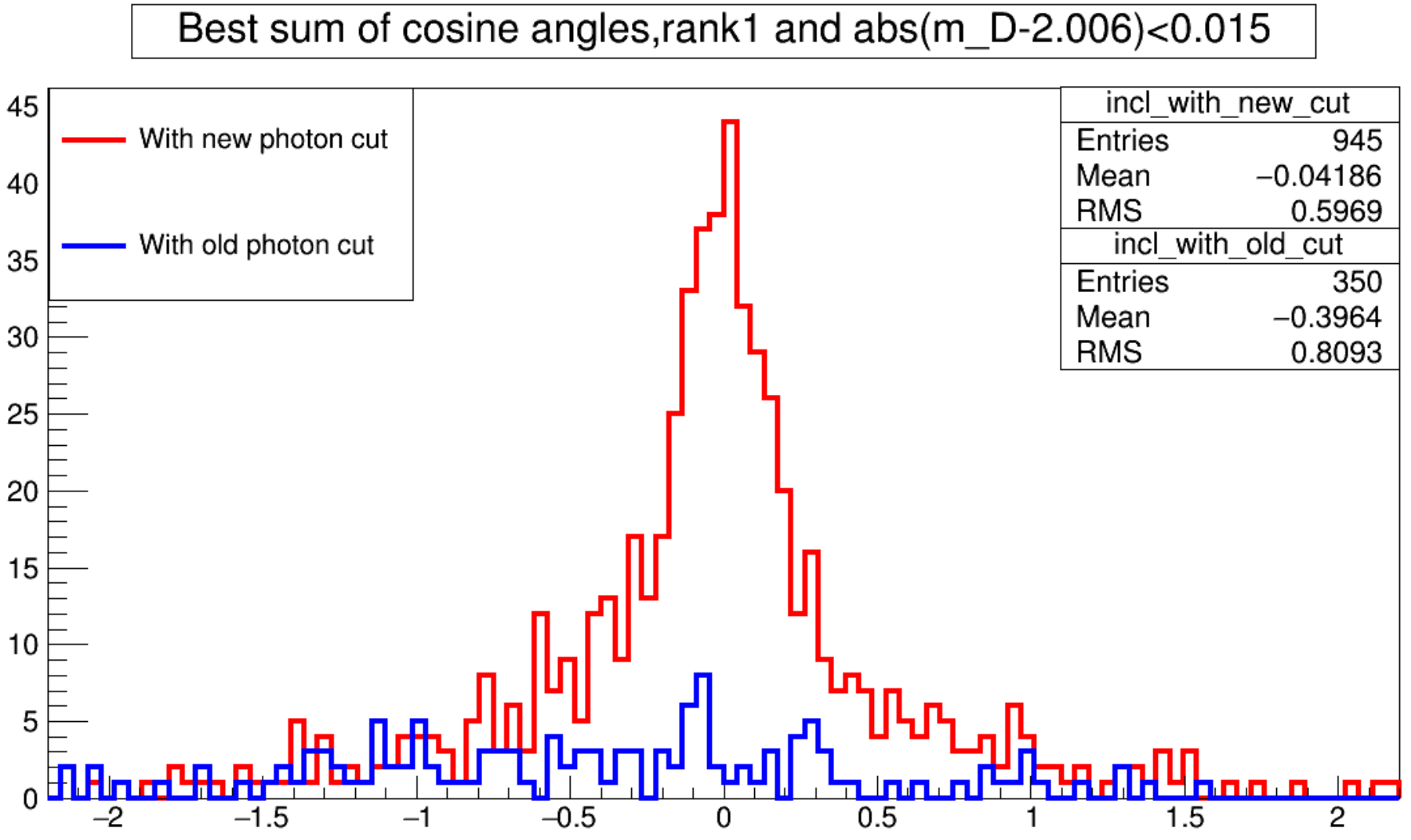

Best sum of cosine angles with all ranks
With new photon cut
With old photon cut
incl_with_new_cut
Entries 23265
Mean −0.248
RMS 0.6909
incl_with_old_cut
Entries 14240
Mean −0.4072
RMS 0.7273
500
400
300
200
100
0
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2

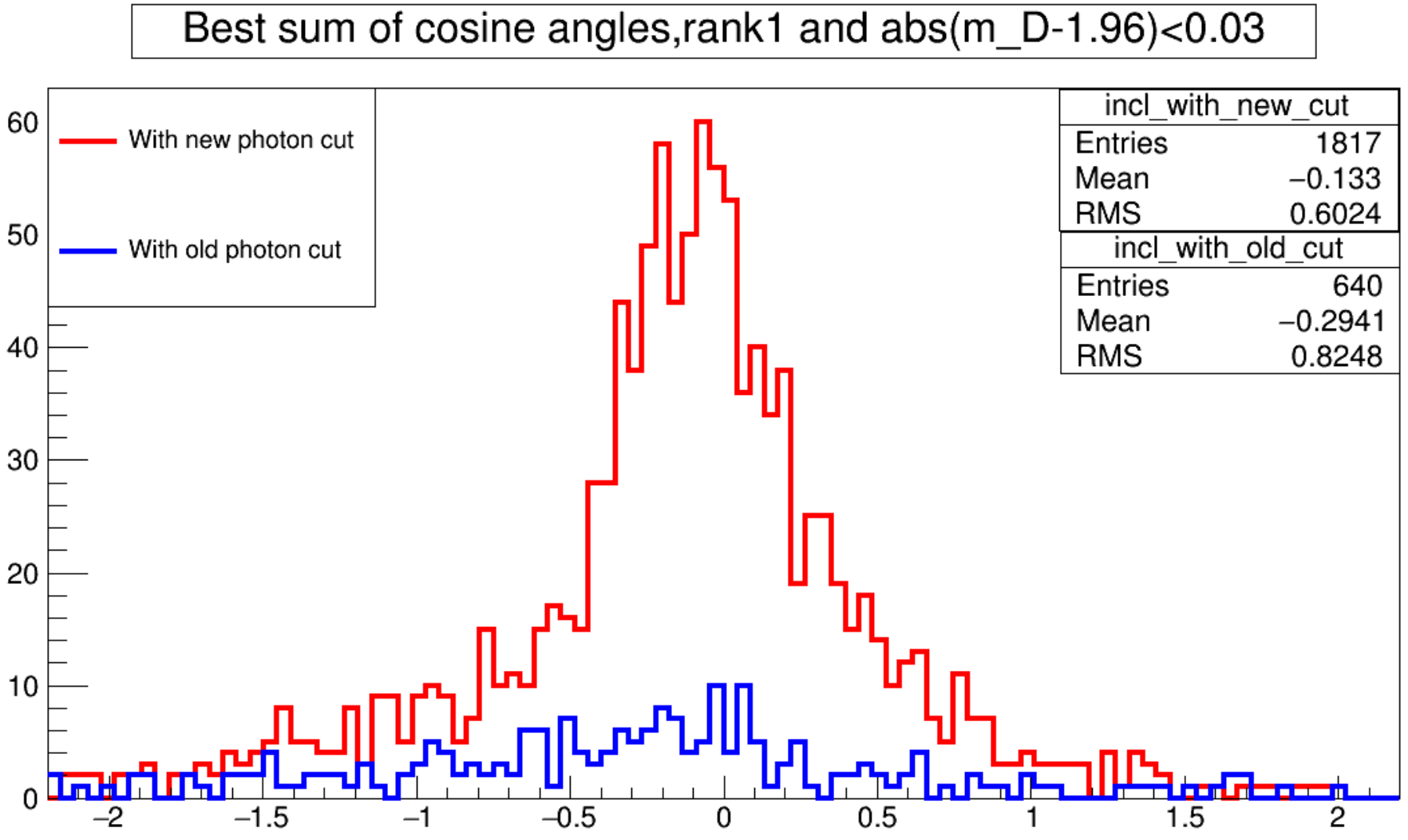

Best sum of cosine angles with rank 1
With new photon cut
With old photon cut
incl_with_new_cut
Entries 20784
Mean −0.2563
RMS 0.6837
incl_with_old_cut
Entries 12346
Mean −0.422
RMS 0.7133
500
400
300
200
100
0
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2

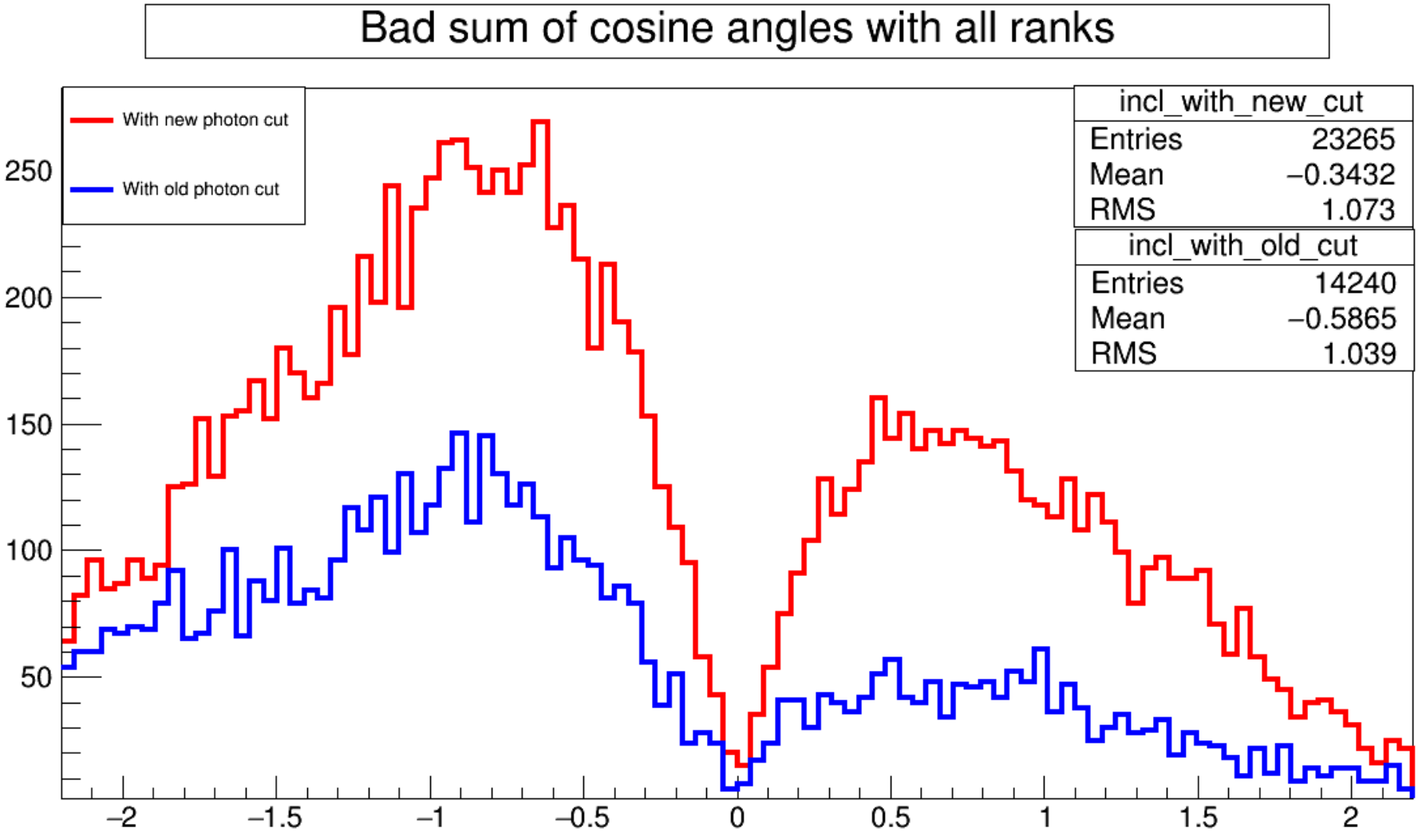

Best sum of cosine angles with all ranks and abs(m_D-1.865)<0.03
With new photon cut
With old photon cut
incl_with_new_cut
Entries 3360
Mean −0.2645
RMS 0.5459
incl_with_old_cut
Entries 3402
Mean −0.3505
RMS 0.5269
140
120
100
80
60
40
20
0
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2

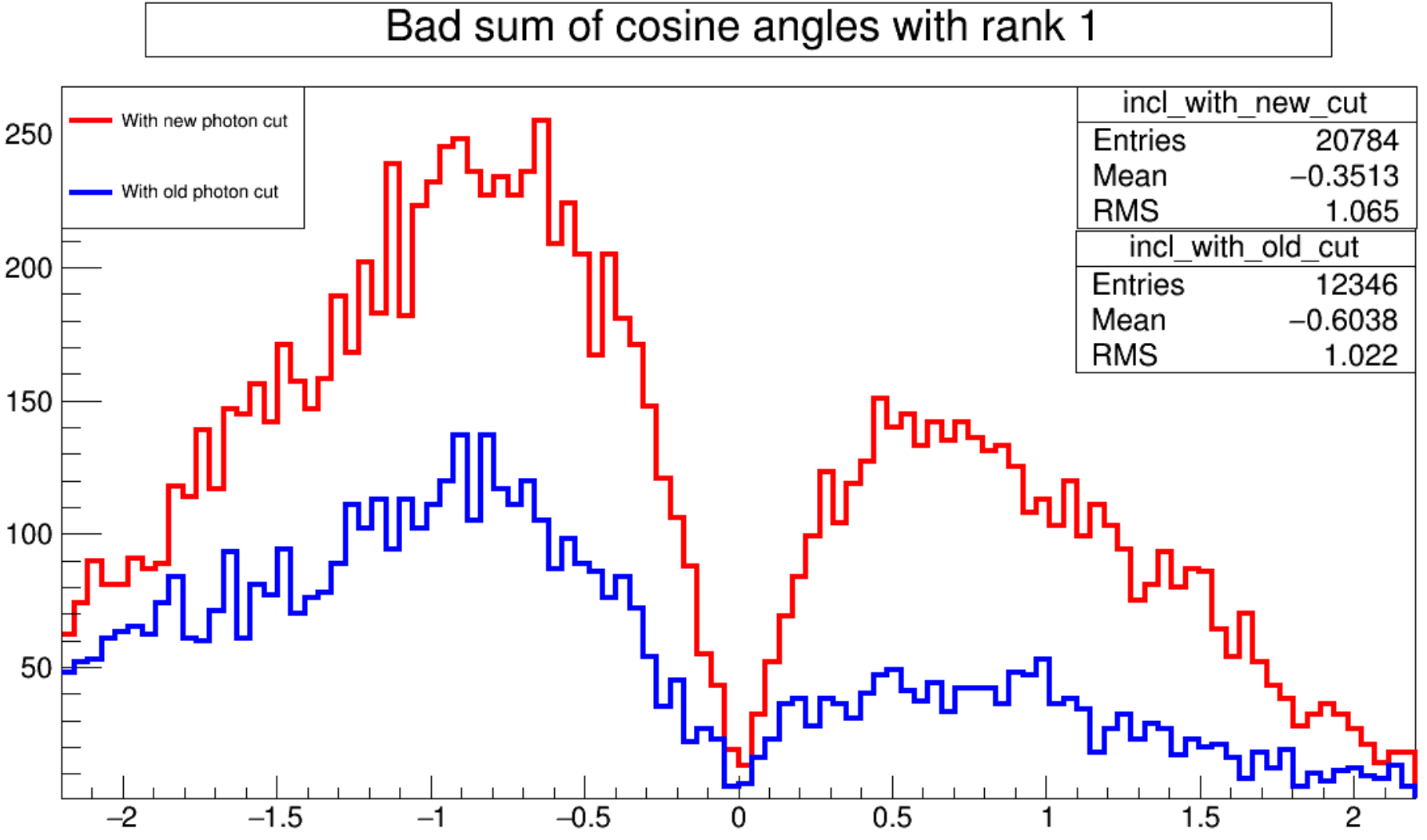

Best sum of cosine angles with rank 1 and abs(m_D-1.865)<0.03
With new photon cut
With old photon cut
incl_with_new_cut
Entries 3110
Mean −0.2716
RMS 0.5415
incl_with_old_cut
Entries 3123
Mean −0.3512
RMS 0.5226
120
100
80
60
40
20
0
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2

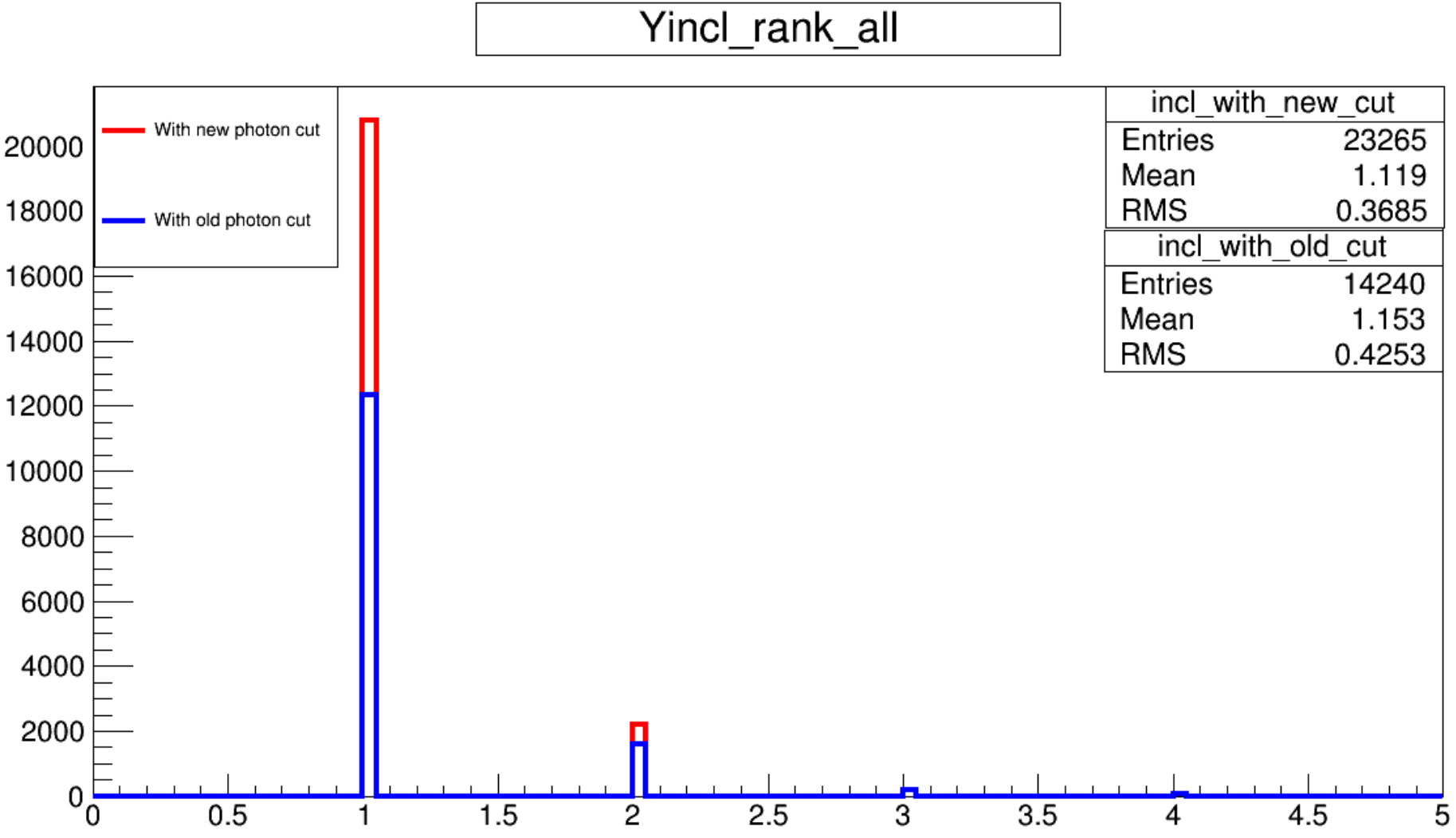

Best sum of cosine angles,rank1 and abs(m_D-1.865)<0.015
With new photon cut
With old photon cut
incl_with_old_cut
Entries 2647
Mean −0.3553
RMS 0.5121
incl_with_new_cut
Entries 2077
Mean −0.2481
RMS 0.5161
100
80
60
40
20
0
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2


Best sum of cosine angles,rank1 and abs(m_D-2.006)<0.015
With new photon cut
With old photon cut
incl_with_new_cut
Entries 945
Mean −0.04186
RMS 0.5969
incl_with_old_cut
Entries 350
Mean −0.3964
RMS 0.8093
45
40
35
30
25
20
15
10
5
0
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2


Best sum of cosine angles,rank1 and abs(m_D-1.96)<0.03
With new photon cut
With old photon cut
incl_with_new_cut
Entries 1817
Mean −0.133
RMS 0.6024
incl_with_old_cut
Entries 640
Mean −0.2941
RMS 0.8248
60
50
40
30
20
10
0
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2


Bad sum of cosine angles with all ranks
With new photon cut
With old photon cut
incl_with_new_cut
Entries 23265
Mean −0.3432
RMS 1.073
incl_with_old_cut
Entries 14240
Mean −0.5865
RMS 1.039
250
200
150
100
50
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2


Bad sum of cosine angles with rank 1
With new photon cut
With old photon cut
incl_with_new_cut
Entries 20784
Mean −0.3513
RMS 1.065
incl_with_old_cut
Entries 12346
Mean −0.6038
RMS 1.022
250
200
150
100
50
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2


Yincl_rank_all
With new photon cut
With old photon cut
incl_with_new_cut
Entries 23265
Mean 1.119
RMS 0.3685
incl_with_old_cut
Entries 14240
Mean 1.153
RMS 0.4253
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5

Thanks

Pi zero cut

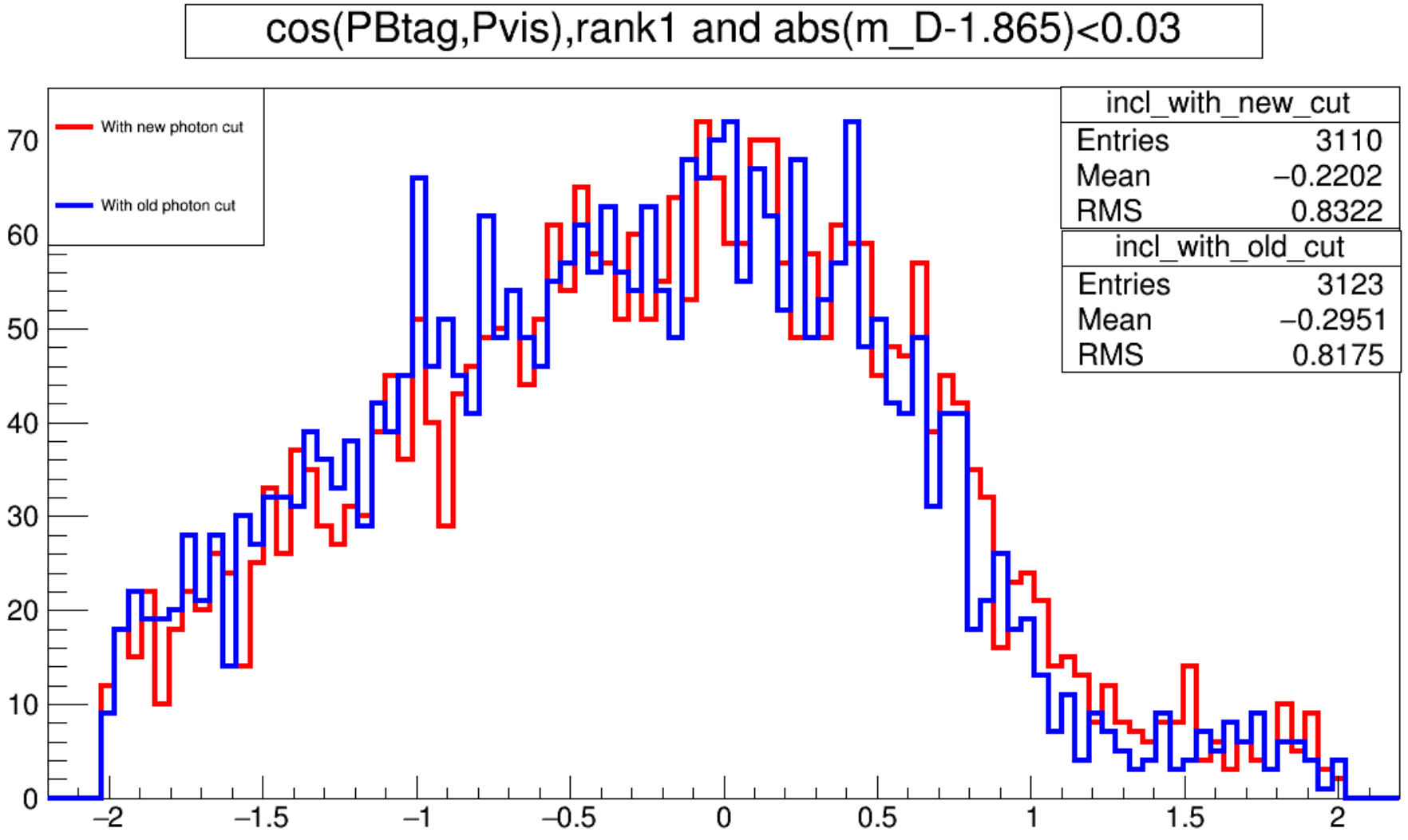
```
# pi0 selection

gamma1_cut = 'passesCut( -1.00 < daughter(0, cosTheta) <= -0.63 and daughter(0, E) > 0.100 ) \
          or  passesCut( -0.63 < daughter(0, cosTheta) <=  0.85 and daughter(0, E) > 0.060 ) \
          or  passesCut(  0.85 < daughter(0, cosTheta) <   1.00 and daughter(0, E) > 0.120 )'

gamma2_cut = 'passesCut( -1.00 < daughter(1, cosTheta) <= -0.63 and daughter(1, E) > 0.100 ) \
          or  passesCut( -0.63 < daughter(1, cosTheta) <=  0.85 and daughter(1, E) > 0.060 ) \
          or  passesCut(  0.85 < daughter(1, cosTheta) <   1.00 and daughter(1, E) > 0.120 )'

pi0_cut = 'passesCut( ' + gamma1_cut + ' ) and passesCut( ' + gamma2_cut + ' )'

applyCuts('pi0:mdst', cut=pi0_cut, path=mypath)
```

Photon cut

```
goodPhotons = 'passesCut( -0.75 < cosTheta <= 0.50 and E > 0.100) or \
 passesCut(  0.50 < cosTheta <= 0.60 and E > 0.060) or \
 passesCut(  0.60 < cosTheta <= 0.70 and E > 0.180) or \
 passesCut(  0.70 < cosTheta < 0.85 and E > 0.200)'
```

Old photon cut

```
goodPhotons = '[goodBelleGamma == 1] and E > 5'
```


cos(PBtag,Pvis),rank1 and abs(m_D-1.865)<0.03
With new photon cut
With old photon cut
incl_with_new_cut
Entries 3110
Mean −0.2202
RMS 0.8322
incl_with_old_cut
Entries 3123
Mean −0.2951
RMS 0.8175
70
60
50
40
30
20
10
0
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2