Comparison Fatras vs Full ID Simulation

Nov. 13, 2008

Introduction

- Plots created with IDStandardPerformance InDetPerformanceRTT-00-00-37
- Input samples are **ttbar** ESD, tracks are refitted in 14.2.22 to get the hit information
- Results come from 1,600 events in both samples

Fatras sample

- ttbar Private production (Andi Salzburger)
- Release 14.2.21
- Geometry ATLAS-CSC-05-00-00

Fullsim sample

- Central prod (valid3.005200.T1_McAtNlo_Jimmy.recon.ESD.e322_a68)
- Release 14.2.20
- Geometry ATLAS-GEO-02-01-00

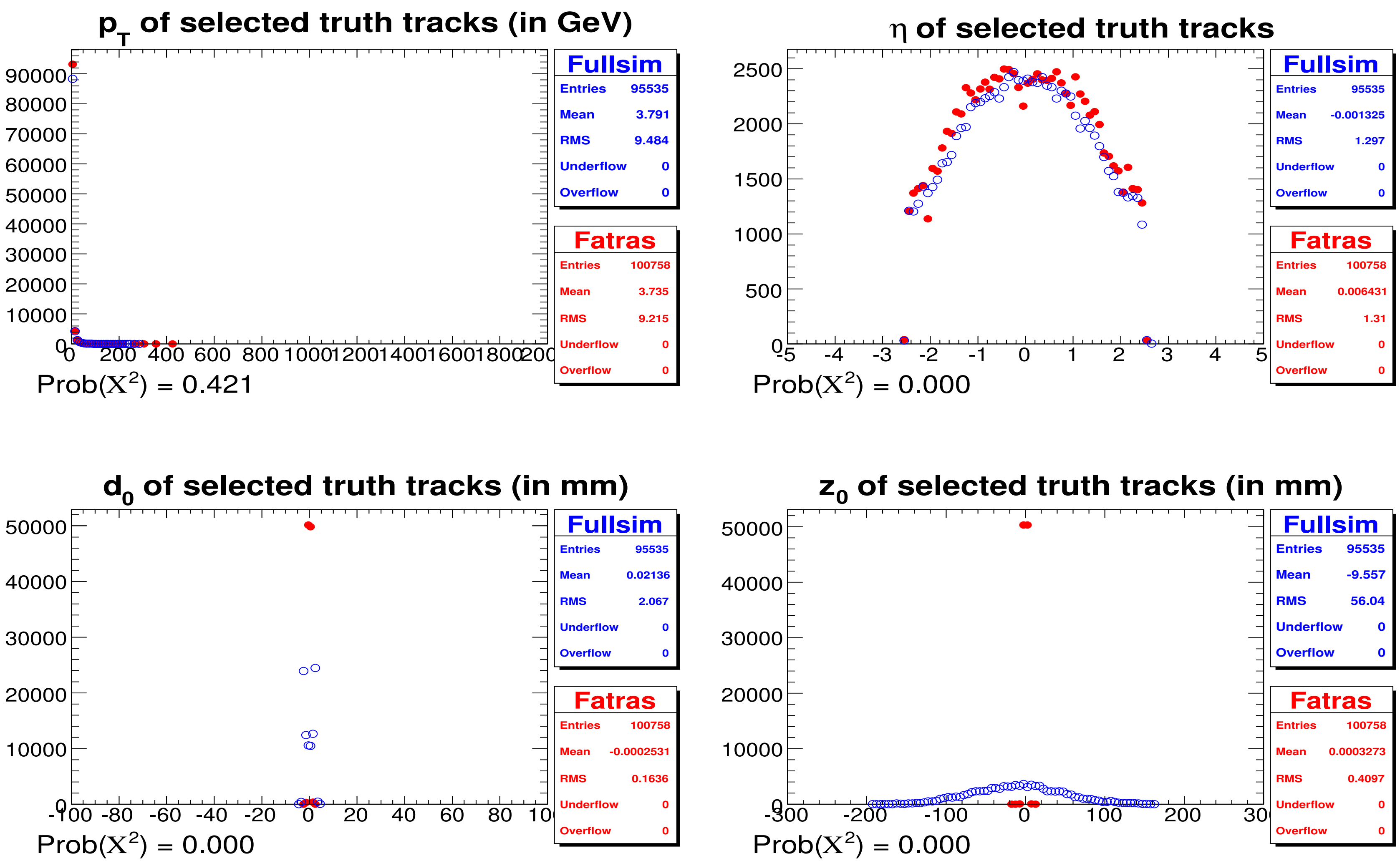
Track Selection

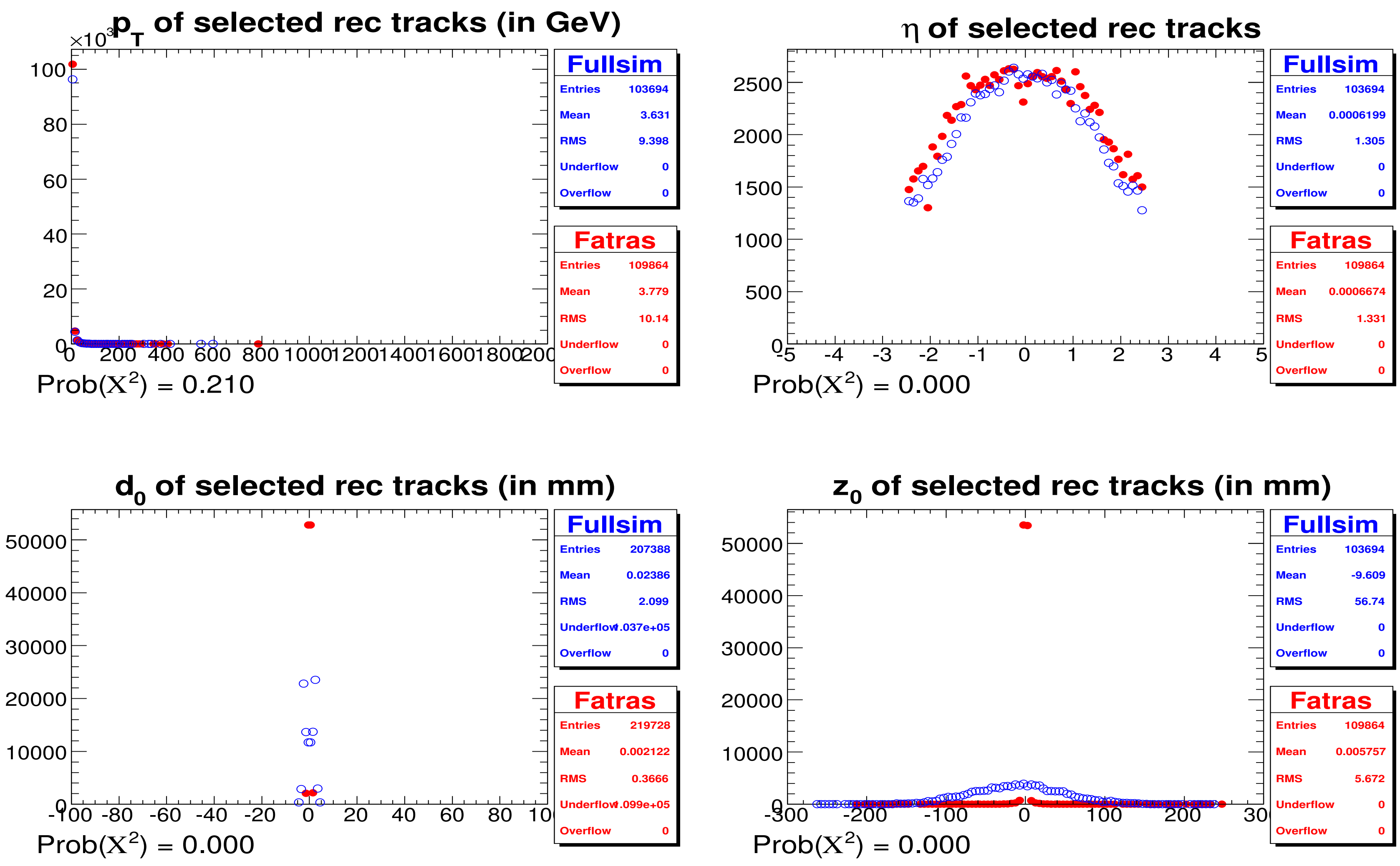
Use “Good Track” definition à la Detector Paper:

- $|d_0| < 10mm$, $|d_0 - IP| < 2mm$
- At least 7 silicon hits
- No p_T requirements
- Currently no requirements on z_0

Note: Fatras has 5% more tracks than fullsim for the same number of events

Basic Parameters: Truth and Reconstructed

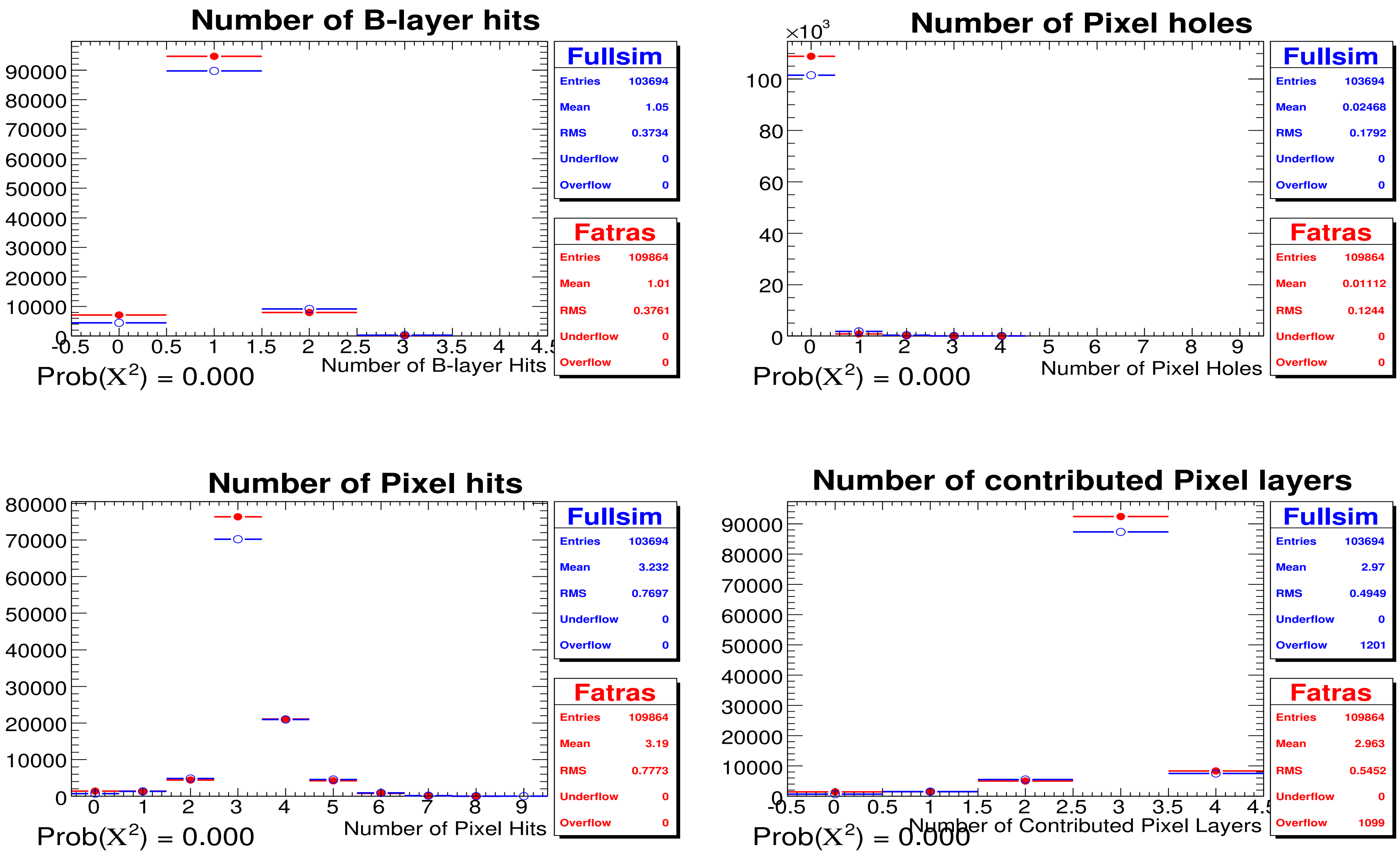

p_T of selected truth tracks (in GeV)
Fullsim
Entries 95535
Mean 3.791
RMS 9.484
Underflow 0
Overflow 0
Fatras
Entries 100758
Mean 3.735
RMS 9.215
Underflow 0
Overflow 0
Prob(X²) = 0.421
η of selected truth tracks
Fullsim
Entries 95535
Mean -0.001325
RMS 1.297
Underflow 0
Overflow 0
Fatras
Entries 100758
Mean 0.006431
RMS 1.31
Underflow 0
Overflow 0
Prob(X²) = 0.000
d_0 of selected truth tracks (in mm)
Fullsim
Entries 95535
Mean 0.02136
RMS 2.067
Underflow 0
Overflow 0
Fatras
Entries 100758
Mean -0.0002531
RMS 0.1636
Underflow 0
Overflow 0
Prob(X²) = 0.000
z_0 of selected truth tracks (in mm)
Fullsim
Entries 95535
Mean -9.557
RMS 56.04
Underflow 0
Overflow 0
Fatras
Entries 100758
Mean 0.0003273
RMS 0.4097
Underflow 0
Overflow 0
Prob(X²) = 0.000

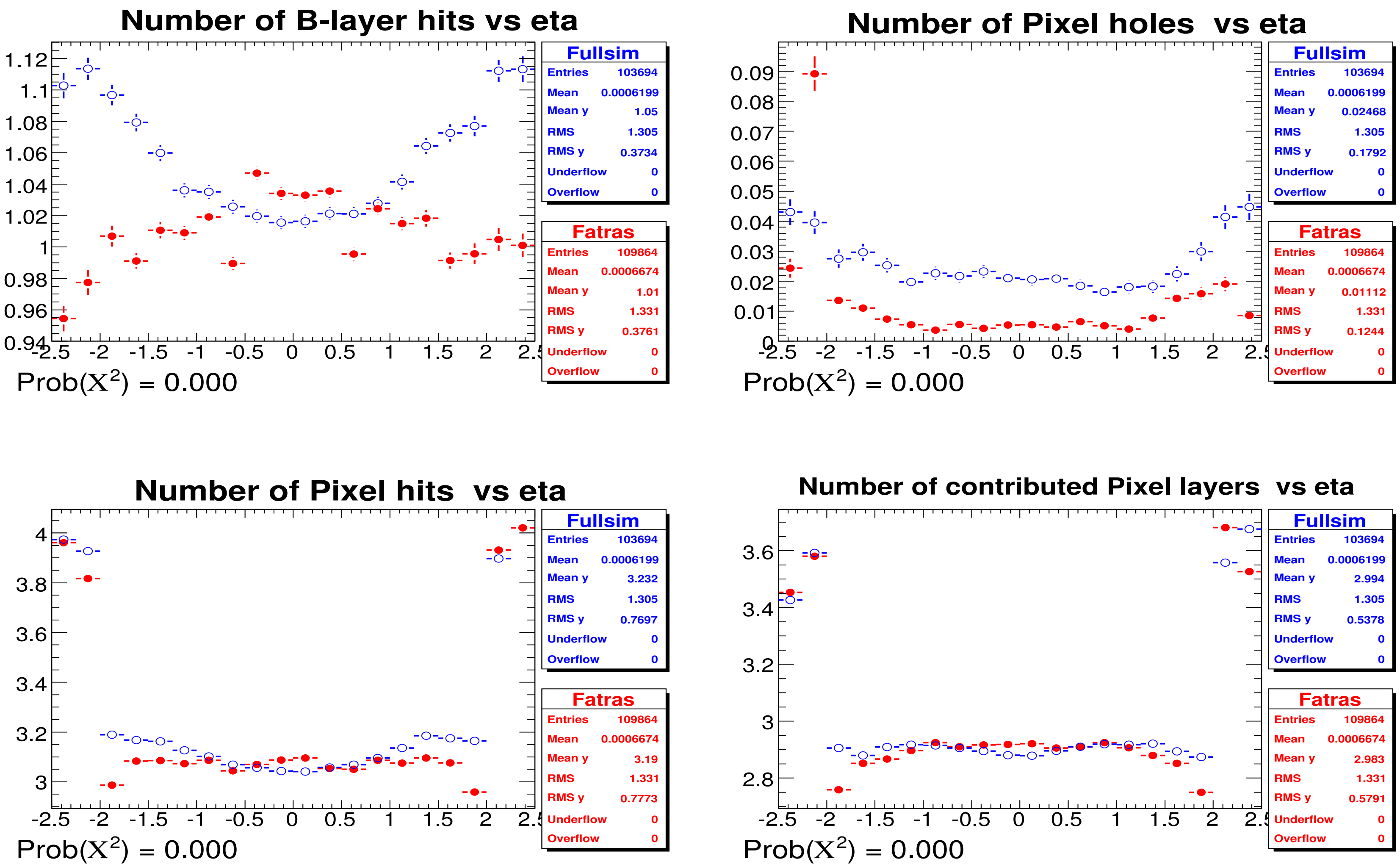

p_T of selected rec tracks (in GeV)
×10³
Fullsim
Entries 103694
Mean 3.631
RMS 9.398
Underflow 0
Overflow 0
Fatras
Entries 109864
Mean 3.779
RMS 10.14
Underflow 0
Overflow 0
Prob(X²) = 0.210
η of selected rec tracks
Fullsim
Entries 103694
Mean 0.0006199
RMS 1.305
Underflow 0
Overflow 0
Fatras
Entries 109864
Mean 0.0006674
RMS 1.331
Underflow 0
Overflow 0
Prob(X²) = 0.000
d_0 of selected rec tracks (in mm)
Fullsim
Entries 207388
Mean 0.02386
RMS 2.099
Underflow 1.037e+05
Overflow 0
Fatras
Entries 219728
Mean 0.002122
RMS 0.3666
Underflow 1.099e+05
Overflow 0
Prob(X²) = 0.000
z_0 of selected rec tracks (in mm)
Fullsim
Entries 103694
Mean -9.609
RMS 56.74
Underflow 0
Overflow 0
Fatras
Entries 109864
Mean 0.005757
RMS 5.672
Underflow 0
Overflow 0
Prob(X²) = 0.000

Comments

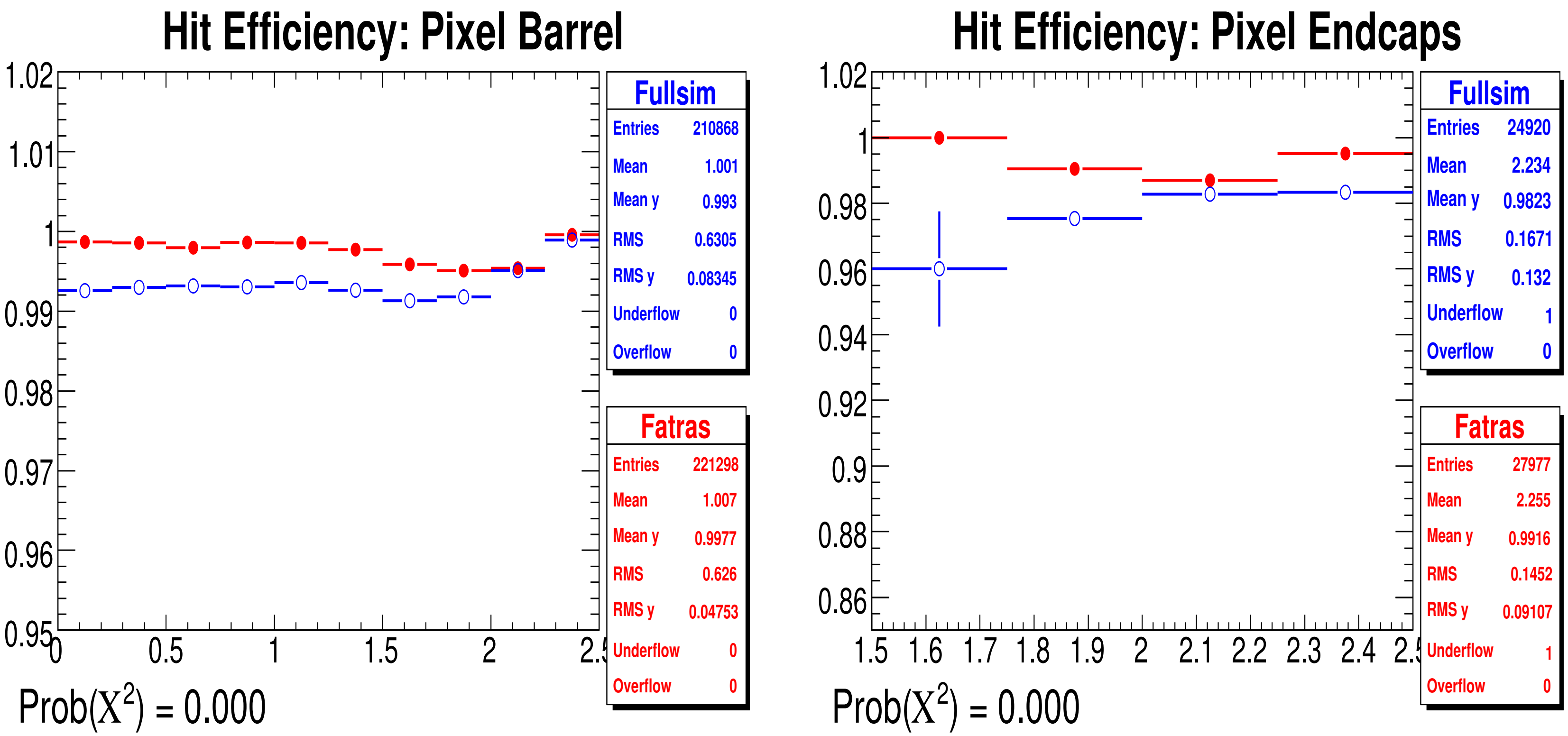
- Fatras generation has no IP smearing (reported in Savannah, see bug 43795)
- Will be fixed in the next round

Pixel Hit Information

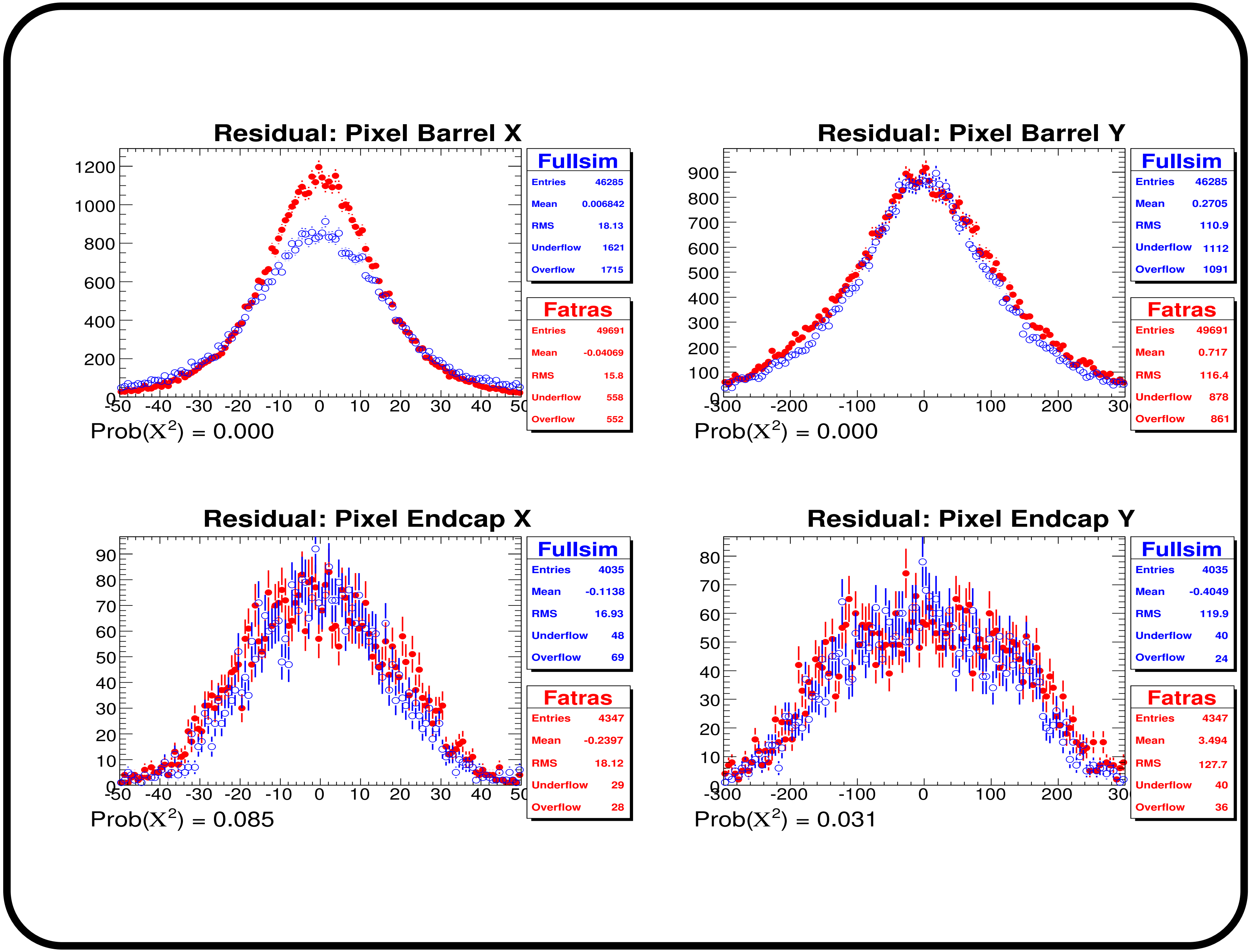

Number of B-layer hits
Fullsim
Entries 103694
Mean 1.05
RMS 0.3734
Underflow 0
Overflow 0
Fatras
Entries 109864
Mean 1.01
RMS 0.3761
Underflow 0
Overflow 0
Number of B-layer Hits
Prob(X²) = 0.000
Number of Pixel holes
×10³
Fullsim
Entries 103694
Mean 0.02468
RMS 0.1792
Underflow 0
Overflow 0
Fatras
Entries 109864
Mean 0.01112
RMS 0.1244
Underflow 0
Overflow 0
Number of Pixel Holes
Prob(X²) = 0.000
Number of Pixel hits
Fullsim
Entries 103694
Mean 3.232
RMS 0.7697
Underflow 0
Overflow 0
Fatras
Entries 109864
Mean 3.19
RMS 0.7773
Underflow 0
Overflow 0
Number of Pixel Hits
Prob(X²) = 0.000
Number of contributed Pixel layers
Fullsim
Entries 103694
Mean 2.97
RMS 0.4949
Underflow 0
Overflow 1201
Fatras
Entries 109864
Mean 2.963
RMS 0.5452
Underflow 0
Overflow 1099
Number of Contributed Pixel Layers
Prob(X²) = 0.000



Number of B-layer hits vs eta
Fullsim
Entries 103694
Mean 0.0006199
Mean y 1.05
RMS 1.305
RMS y 0.3734
Underflow 0
Overflow 0
Fatras
Entries 109864
Mean 0.0006674
Mean y 1.01
RMS 1.331
RMS y 0.3761
Underflow 0
Overflow 0
Prob(X²) = 0.000
Number of Pixel holes vs eta
Fullsim
Entries 103694
Mean 0.0006199
Mean y 0.02468
RMS 1.305
RMS y 0.1792
Underflow 0
Overflow 0
Fatras
Entries 109864
Mean 0.0006674
Mean y 0.01112
RMS 1.331
RMS y 0.1244
Underflow 0
Overflow 0
Prob(X²) = 0.000
Number of Pixel hits vs eta
Fullsim
Entries 103694
Mean 0.0006199
Mean y 3.232
RMS 1.305
RMS y 0.7697
Underflow 0
Overflow 0
Fatras
Entries 109864
Mean 0.0006674
Mean y 3.19
RMS 1.331
RMS y 0.7773
Underflow 0
Overflow 0
Prob(X²) = 0.000
Number of contributed Pixel layers vs eta
Fullsim
Entries 103694
Mean 0.0006199
Mean y 2.994
RMS 1.305
RMS y 0.5378
Underflow 0
Overflow 0
Fatras
Entries 109864
Mean 0.0006674
Mean y 2.983
RMS 1.331
RMS y 0.5791
Underflow 0
Overflow 0
Prob(X²) = 0.000



Hit Efficiency: Pixel Barrel
Fullsim
Entries 210868
Mean 1.001
Mean y 0.993
RMS 0.6305
RMS y 0.08345
Underflow 0
Overflow 0
Fatras
Entries 221298
Mean 1.007
Mean y 0.9977
RMS 0.626
RMS y 0.04753
Underflow 0
Overflow 0
Prob(X2) = 0.000
Hit Efficiency: Pixel Endcaps
Fullsim
Entries 24920
Mean 2.234
Mean y 0.9823
RMS 0.1671
RMS y 0.132
Underflow 1
Overflow 0
Fatras
Entries 27977
Mean 2.255
Mean y 0.9916
RMS 0.1452
RMS y 0.09107
Underflow 1
Overflow 0
Prob(X2) = 0.000


Residual: Pixel Barrel X
Fullsim
Entries 46285
Mean 0.006842
RMS 18.13
Underflow 1621
Overflow 1715
Fatras
Entries 49691
Mean -0.04069
RMS 15.8
Underflow 558
Overflow 552
Prob(X²) = 0.000
Residual: Pixel Barrel Y
Fullsim
Entries 46285
Mean 0.2705
RMS 110.9
Underflow 1112
Overflow 1091
Fatras
Entries 49691
Mean 0.717
RMS 116.4
Underflow 878
Overflow 861
Prob(X²) = 0.000
Residual: Pixel Endcap X
Fullsim
Entries 4035
Mean -0.1138
RMS 16.93
Underflow 48
Overflow 69
Fatras
Entries 4347
Mean -0.2397
RMS 18.12
Underflow 29
Overflow 28
Prob(X²) = 0.085
Residual: Pixel Endcap Y
Fullsim
Entries 4035
Mean -0.4049
RMS 119.9
Underflow 40
Overflow 24
Fatras
Entries 4347
Mean 3.494
RMS 127.7
Underflow 40
Overflow 36
Prob(X²) = 0.031

Comments Pixel Hits

Hit content:

- ESD seem to have no hits defined as "outliers" (both fullsim and Fatras)? Under investigation
- Fatras has no ganged pixels (not shown)
- Fatras has more single hits per layer

Hit content vs eta:

- Number of pixel hits vs eta is not bad (except dip for Fatras at $|\eta|$ 1.8?...
- **... but number of B-layer hits goes down at high eta?**

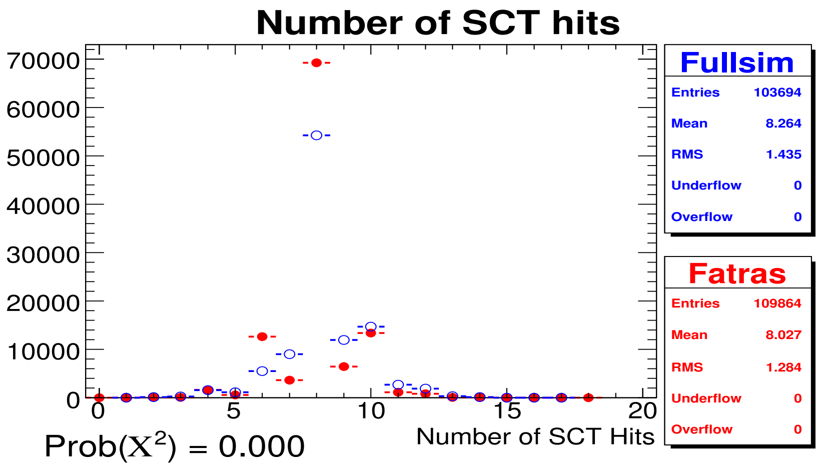
Hit efficiency:

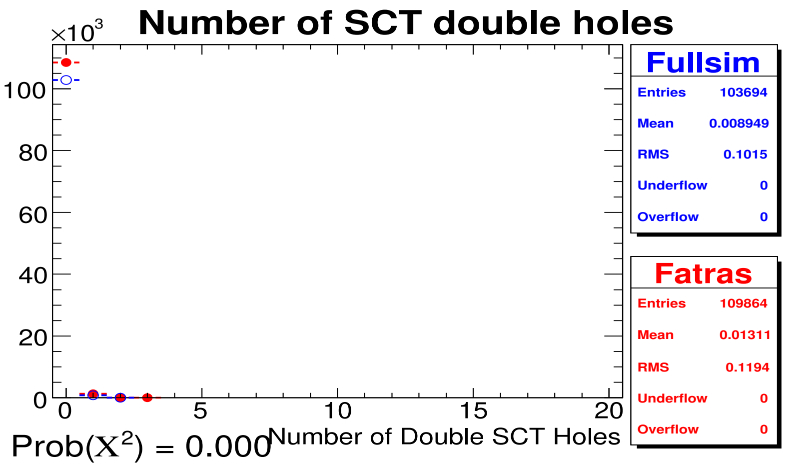
- Higher for Fatras both in barrel and end-cap

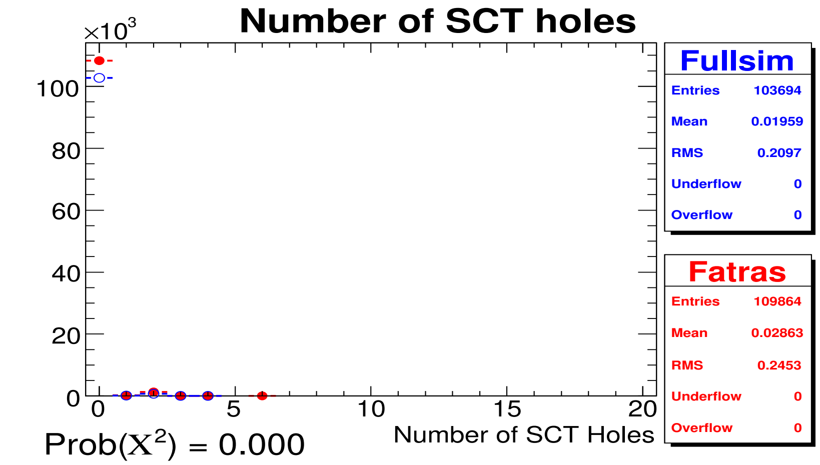
Residuals:

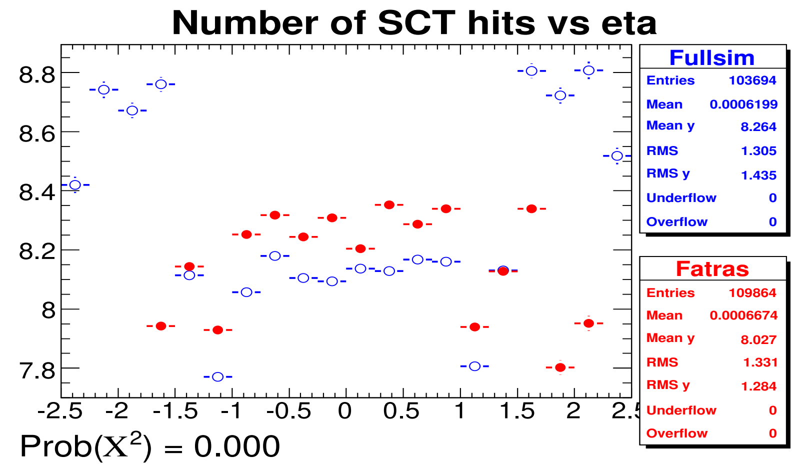
- Good agreement except residual X for pixel barrel

SCT Hit Information

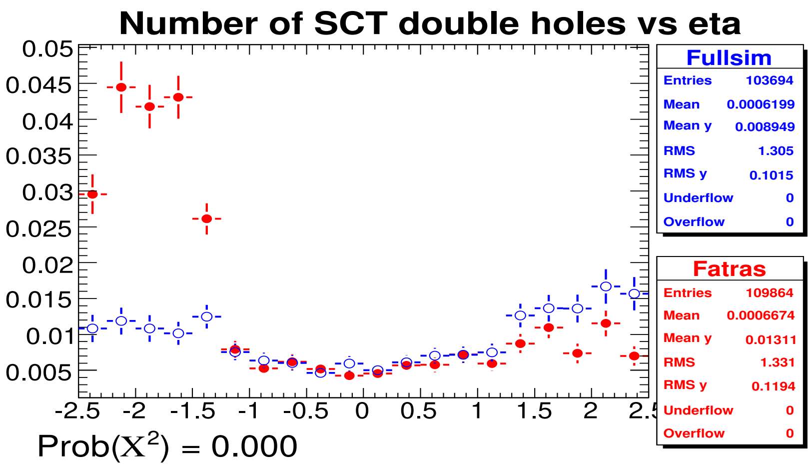

Number of SCT hits
70000
60000
50000
40000
30000
20000
10000
0
0
5
10
15
20
Number of SCT Hits
Prob(X^2) = 0.000
Fullsim
Entries 103694
Mean 8.264
RMS 1.435
Underflow 0
Overflow 0
Fatras
Entries 109864
Mean 8.027
RMS 1.284
Underflow 0
Overflow 0


Number of SCT double holes
×10^3
100
80
60
40
20
0
0
5
10
15
20
Number of Double SCT Holes
Prob(X^2) = 0.000
Fullsim
Entries 103694
Mean 0.008949
RMS 0.1015
Underflow 0
Overflow 0
Fatras
Entries 109864
Mean 0.01311
RMS 0.1194
Underflow 0
Overflow 0

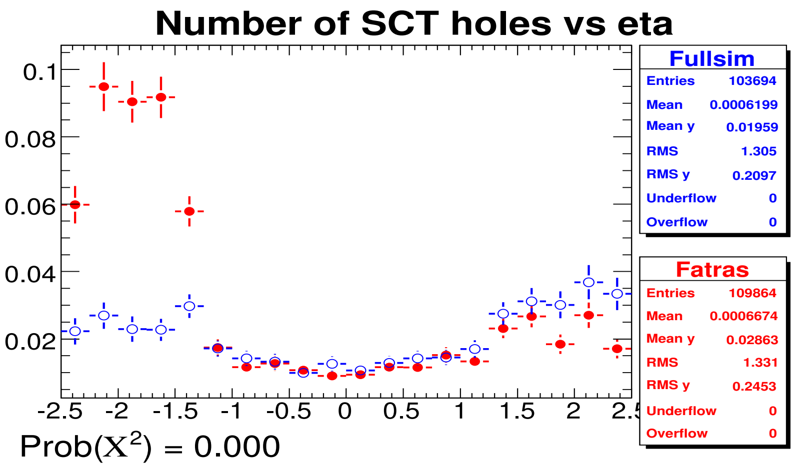

Number of SCT holes
×10^3
100
80
60
40
20
0
0
5
10
15
20
Number of SCT Holes
Prob(X^2) = 0.000
Fullsim
Entries 103694
Mean 0.01959
RMS 0.2097
Underflow 0
Overflow 0
Fatras
Entries 109864
Mean 0.02863
RMS 0.2453
Underflow 0
Overflow 0



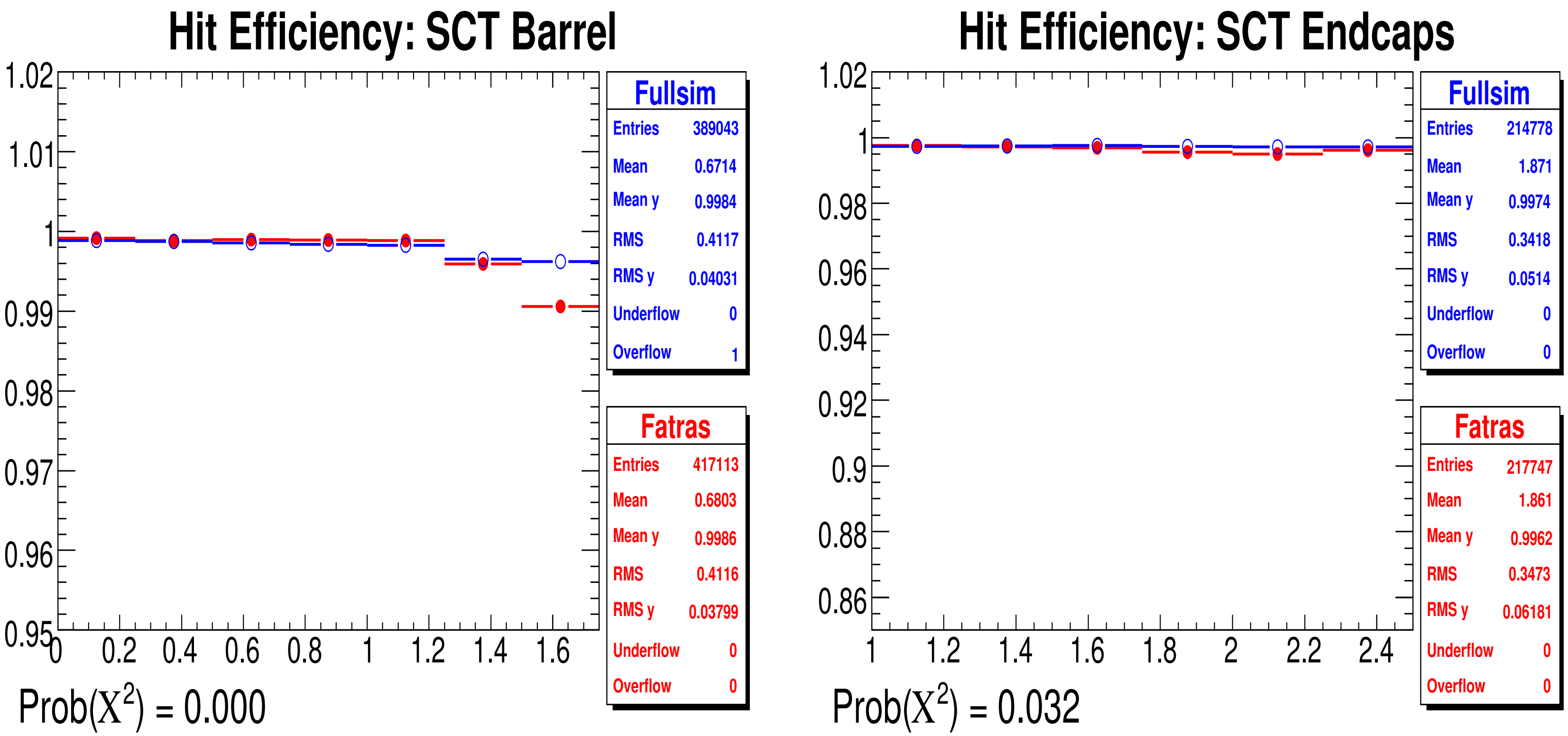
Number of SCT hits vs eta
8.8
8.6
8.4
8.2
8
7.8
-2.5 -2 -1.5 -1 -0.5 0 0.5 1 1.5 2 2.5
Prob(X²) = 0.000
Fullsim
Entries 103694
Mean 0.0006199
Mean y 8.264
RMS 1.305
RMS y 1.435
Underflow 0
Overflow 0
Fatras
Entries 109864
Mean 0.0006674
Mean y 8.027
RMS 1.331
RMS y 1.284
Underflow 0
Overflow 0



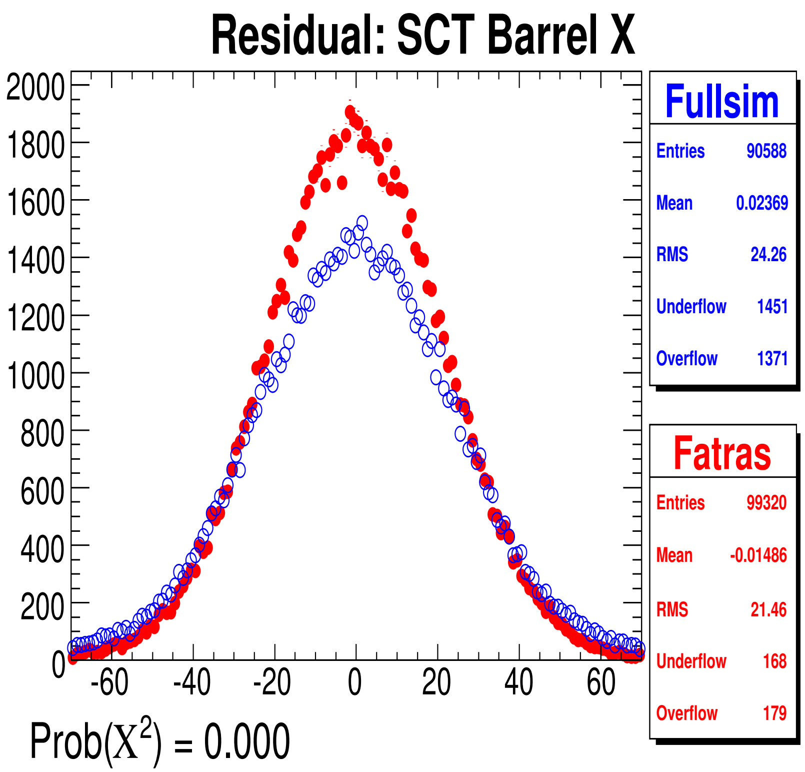
Number of SCT double holes vs eta
0.05
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
-2.5 -2 -1.5 -1 -0.5 0 0.5 1 1.5 2 2.5
Prob(X²) = 0.000
Fullsim
Entries 103694
Mean 0.0006199
Mean y 0.008949
RMS 1.305
RMS y 0.1015
Underflow 0
Overflow 0
Fatras
Entries 109864
Mean 0.0006674
Mean y 0.01311
RMS 1.331
RMS y 0.1194
Underflow 0
Overflow 0



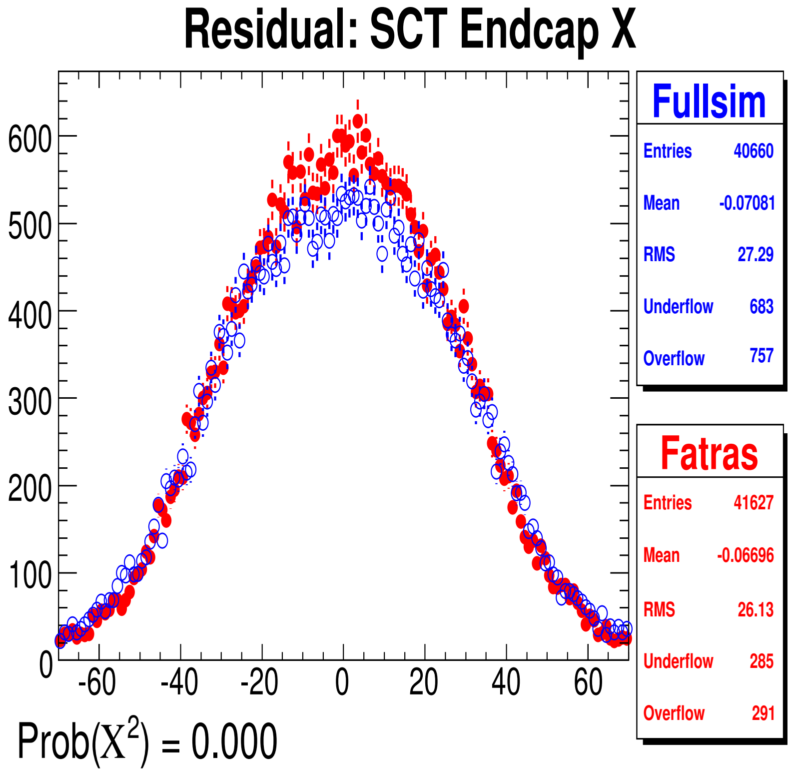
Number of SCT holes vs eta
0.1
0.08
0.06
0.04
0.02
-2.5 -2 -1.5 -1 -0.5 0 0.5 1 1.5 2 2.5
Prob(X²) = 0.000
Fullsim
Entries 103694
Mean 0.0006199
Mean y 0.01959
RMS 1.305
RMS y 0.2097
Underflow 0
Overflow 0
Fatras
Entries 109864
Mean 0.0006674
Mean y 0.02863
RMS 1.331
RMS y 0.2453
Underflow 0
Overflow 0



Hit Efficiency: SCT Barrel
Fullsim
Entries 389043
Mean 0.6714
Mean y 0.9984
RMS 0.4117
RMS y 0.04031
Underflow 0
Overflow 1
Fatras
Entries 417113
Mean 0.6803
Mean y 0.9986
RMS 0.4116
RMS y 0.03799
Underflow 0
Overflow 0
Prob(X^2) = 0.000
Hit Efficiency: SCT Endcaps
Fullsim
Entries 214778
Mean 1.871
Mean y 0.9974
RMS 0.3418
RMS y 0.0514
Underflow 0
Overflow 0
Fatras
Entries 217747
Mean 1.861
Mean y 0.9962
RMS 0.3473
RMS y 0.06181
Underflow 0
Overflow 0
Prob(X^2) = 0.032



Residual: SCT Barrel X
Fullsim
Entries 90588
Mean 0.02369
RMS 24.26
Underflow 1451
Overflow 1371
Fatras
Entries 99320
Mean -0.01486
RMS 21.46
Underflow 168
Overflow 179
Prob(X^2) = 0.000



Residual: SCT Endcap X
Fullsim
Entries 40660
Mean -0.07081
RMS 27.29
Underflow 683
Overflow 757
Fatras
Entries 41627
Mean -0.06696
RMS 26.13
Underflow 285
Overflow 291
Prob(X^2) = 0.000

Comments SCT Hits

Hit content

- Distribution of number of SCT hits is strange for Fatras (dips for Nhits = 7, 9?)

Hit content vs eta

- **Number of SCT hits doesn't increase in the end-cap?**
- **More SCT holes at high $-\eta$ than $+\eta$?**

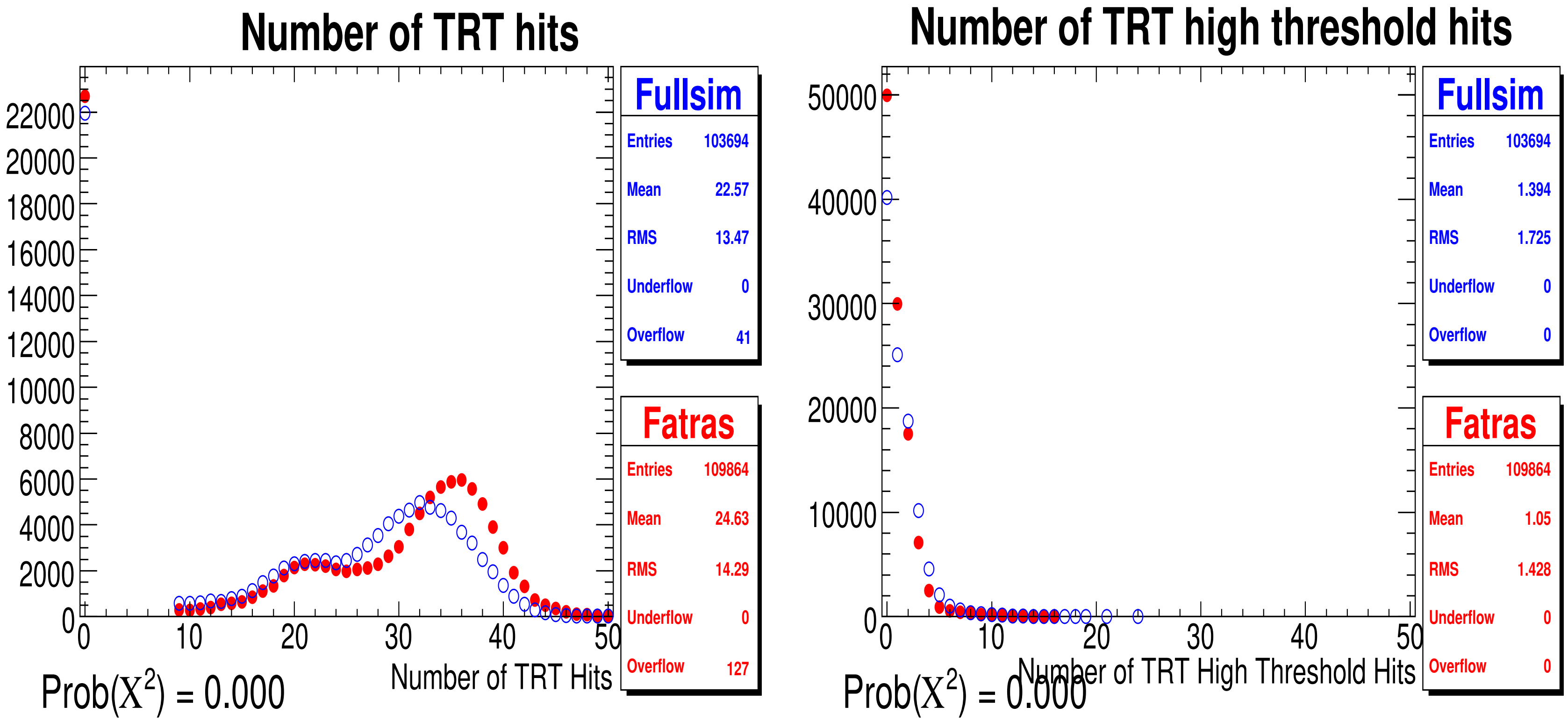
Hit efficiency:

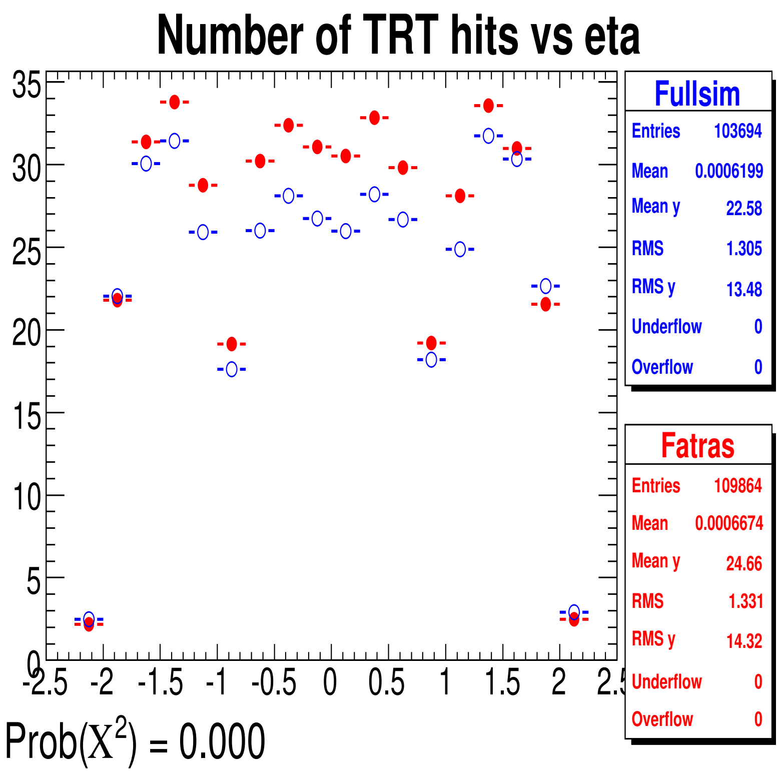
- Good agreement

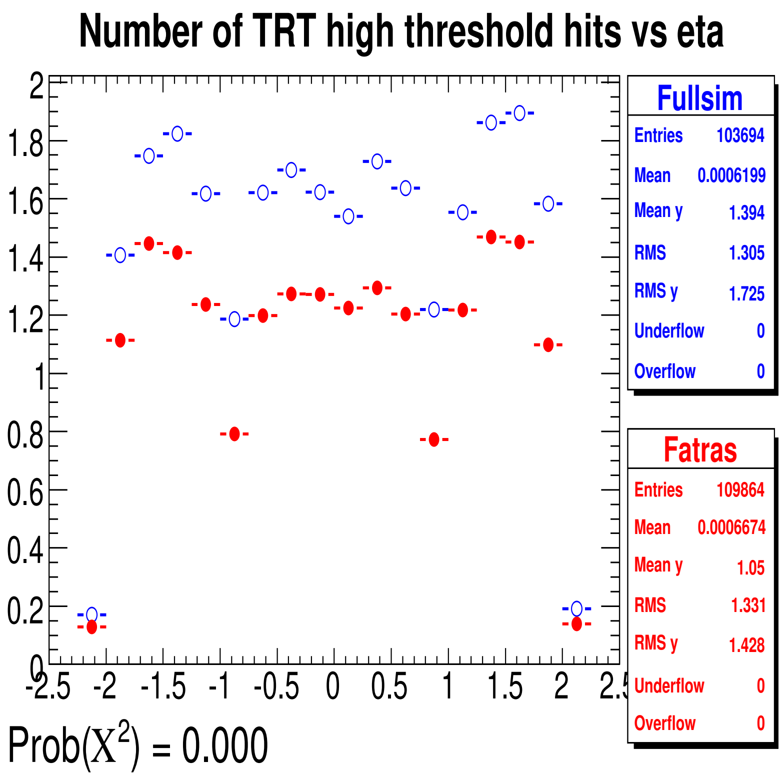
Residuals:

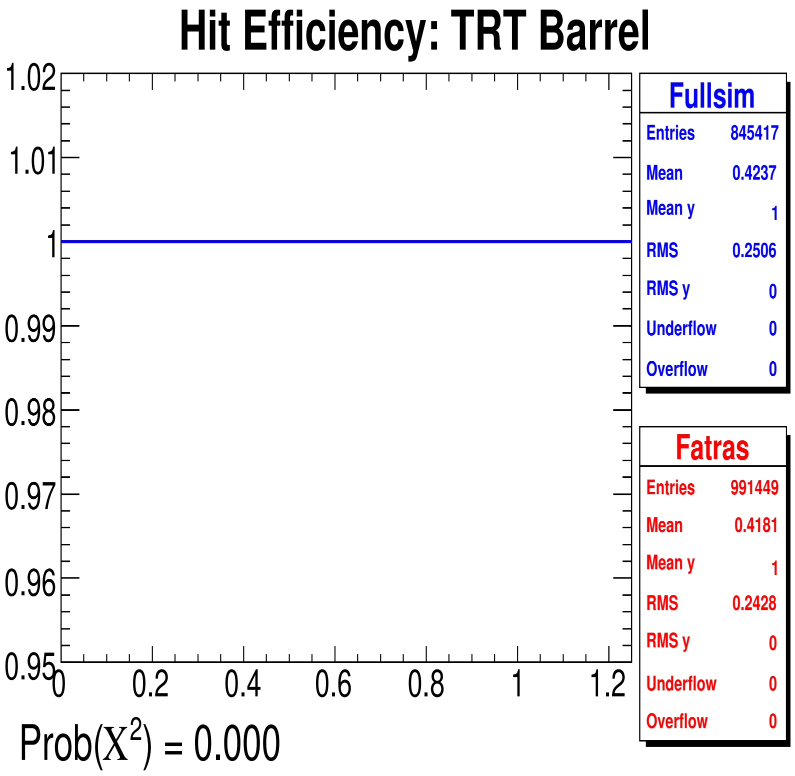
- Narrower for Fatras (Central region more populated)

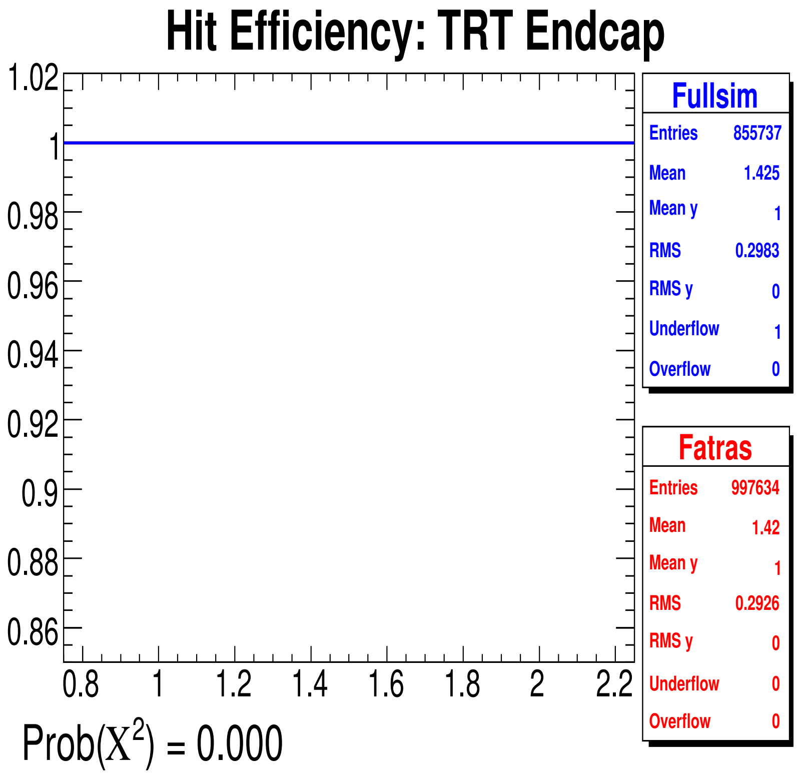
TRT Hit Information

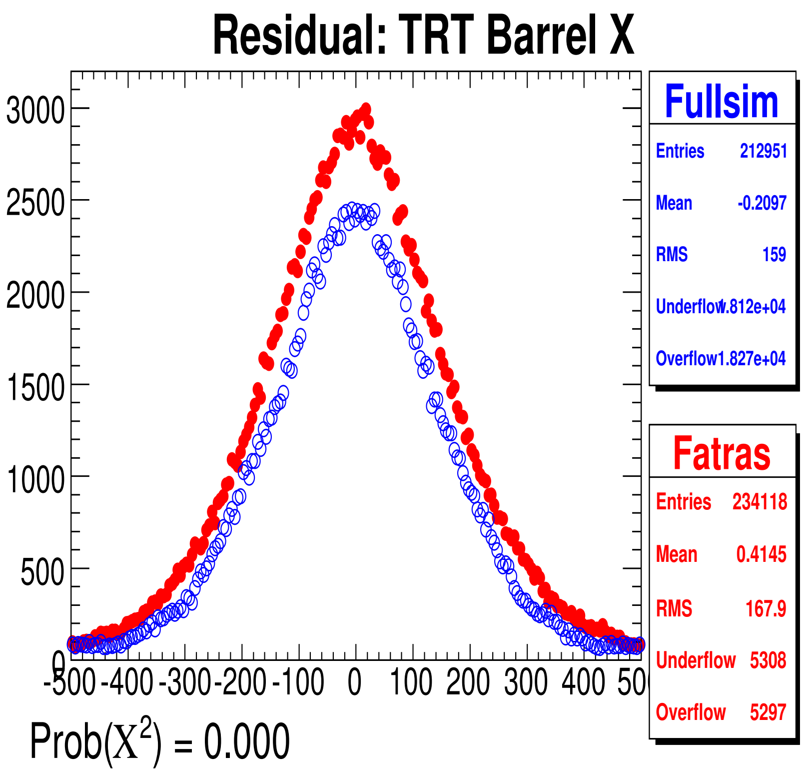

Number of TRT hits
Fullsim
Entries 103694
Mean 22.57
RMS 13.47
Underflow 0
Overflow 41
Fatras
Entries 109864
Mean 24.63
RMS 14.29
Underflow 0
Overflow 127
Number of TRT Hits
Prob(X^2) = 0.000
Number of TRT high threshold hits
Fullsim
Entries 103694
Mean 1.394
RMS 1.725
Underflow 0
Overflow 0
Fatras
Entries 109864
Mean 1.05
RMS 1.428
Underflow 0
Overflow 0
Number of TRT High Threshold Hits
Prob(X^2) = 0.000

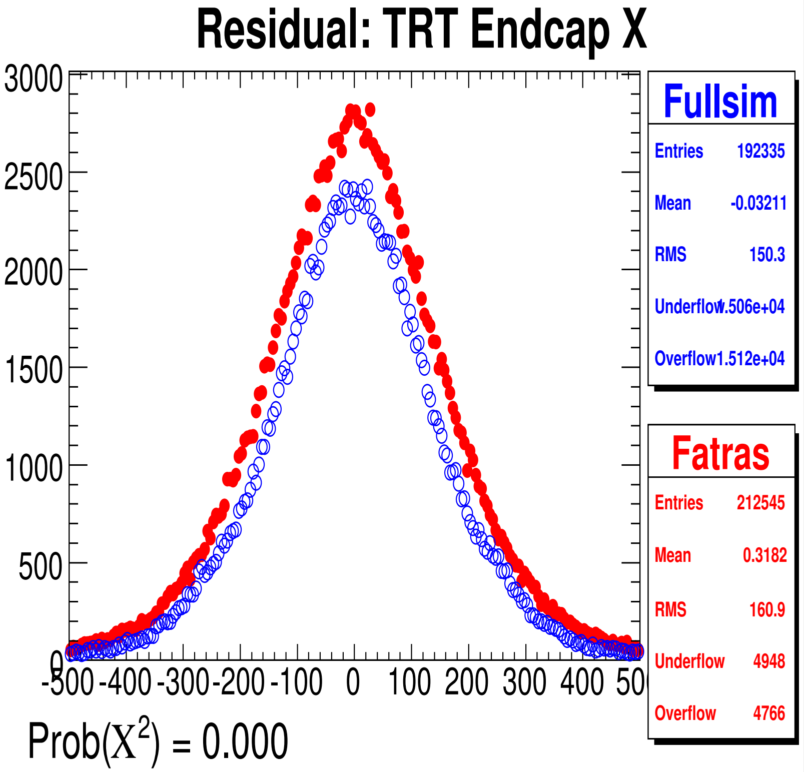

Number of TRT hits vs eta
Fullsim
Entries 103694
Mean 0.0006199
Mean y 22.58
RMS 1.305
RMS y 13.48
Underflow 0
Overflow 0
Fatras
Entries 109864
Mean 0.0006674
Mean y 24.66
RMS 1.331
RMS y 14.32
Underflow 0
Overflow 0
Prob(X^2) = 0.000


Number of TRT high threshold hits vs eta
Fullsim
Entries 103694
Mean 0.0006199
Mean y 1.394
RMS 1.305
RMS y 1.725
Underflow 0
Overflow 0
Fatras
Entries 109864
Mean 0.0006674
Mean y 1.05
RMS 1.331
RMS y 1.428
Underflow 0
Overflow 0
Prob(X^2) = 0.000


Hit Efficiency: TRT Barrel
1.02
1.01
1
0.99
0.98
0.97
0.96
0.95
0
0.2
0.4
0.6
0.8
1
1.2
Fullsim
Entries 845417
Mean 0.4237
Mean y 1
RMS 0.2506
RMS y 0
Underflow 0
Overflow 0
Fatras
Entries 991449
Mean 0.4181
Mean y 1
RMS 0.2428
RMS y 0
Underflow 0
Overflow 0
Prob(X^2) = 0.000


Hit Efficiency: TRT Endcap
1.02
1
0.98
0.96
0.94
0.92
0.9
0.88
0.86
0.8
1
1.2
1.4
1.6
1.8
2
2.2
Fullsim
Entries 855737
Mean 1.425
Mean y 1
RMS 0.2983
RMS y 0
Underflow 1
Overflow 0
Fatras
Entries 997634
Mean 1.42
Mean y 1
RMS 0.2926
RMS y 0
Underflow 0
Overflow 0
Prob(X^2) = 0.000


Residual: TRT Barrel X
3000
2500
2000
1500
1000
500
0
-500 -400 -300 -200 -100 0 100 200 300 400 500
Fullsim
Entries 212951
Mean -0.2097
RMS 159
Underflow 1.812e+04
Overflow 1.827e+04
Fatras
Entries 234118
Mean 0.4145
RMS 167.9
Underflow 5308
Overflow 5297
Prob(X^2) = 0.000


Residual: TRT Endcap X
3000
2500
2000
1500
1000
500
0
-500 -400 -300 -200 -100 0 100 200 300 400 500
Fullsim
Entries 192335
Mean -0.03211
RMS 150.3
Underflow 1.506e+04
Overflow 1.512e+04
Fatras
Entries 212545
Mean 0.3182
RMS 160.9
Underflow 4948
Overflow 4766
Prob(X^2) = 0.000

Comments TRT Hits

Hit content

- Distribution of TRT hits is different, less hits in Fullsim...
- ...but more high threshold hits in Fullsim

Hit content vs η

- Shape vs η in pretty good agreement

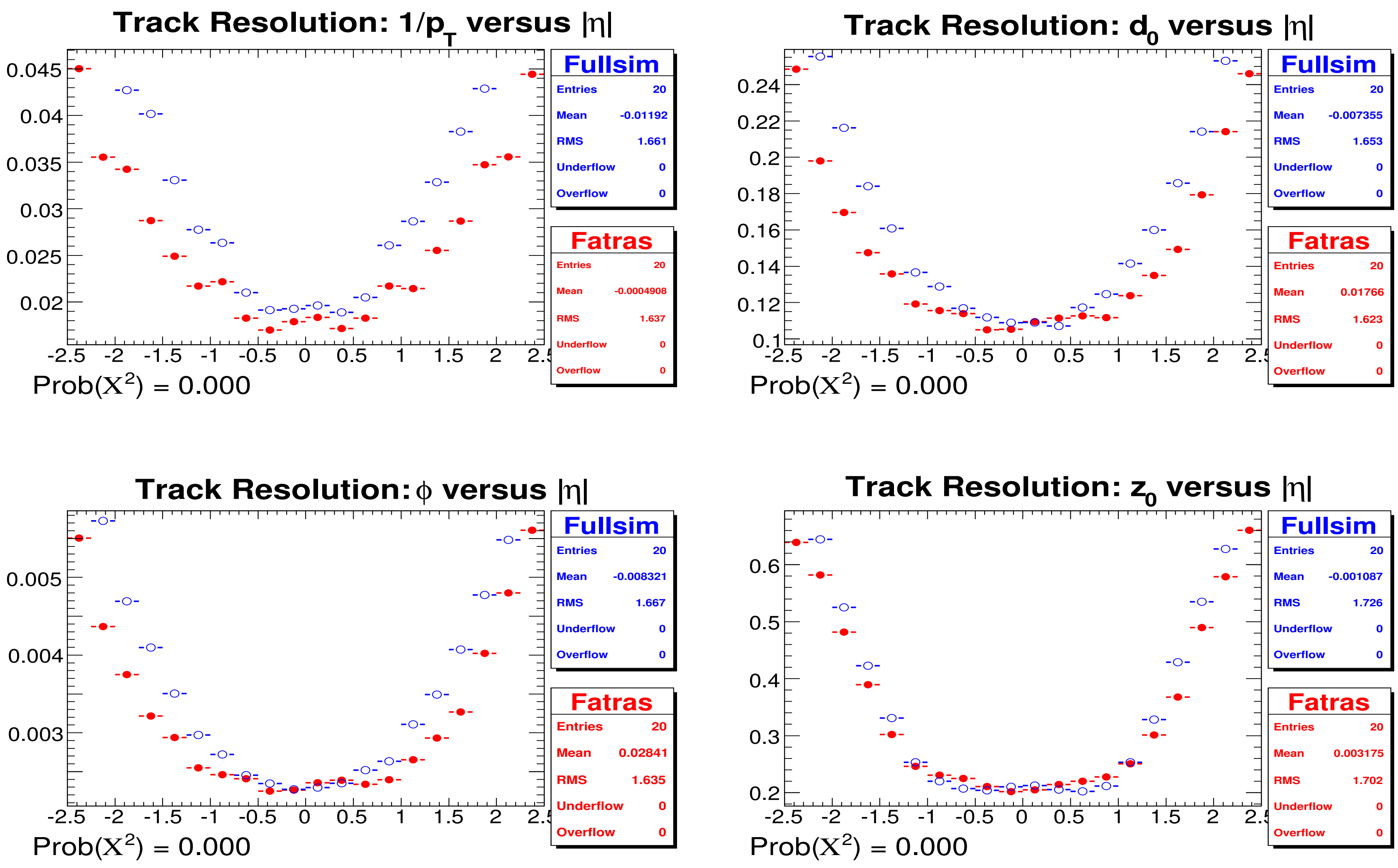
Hit efficiency:

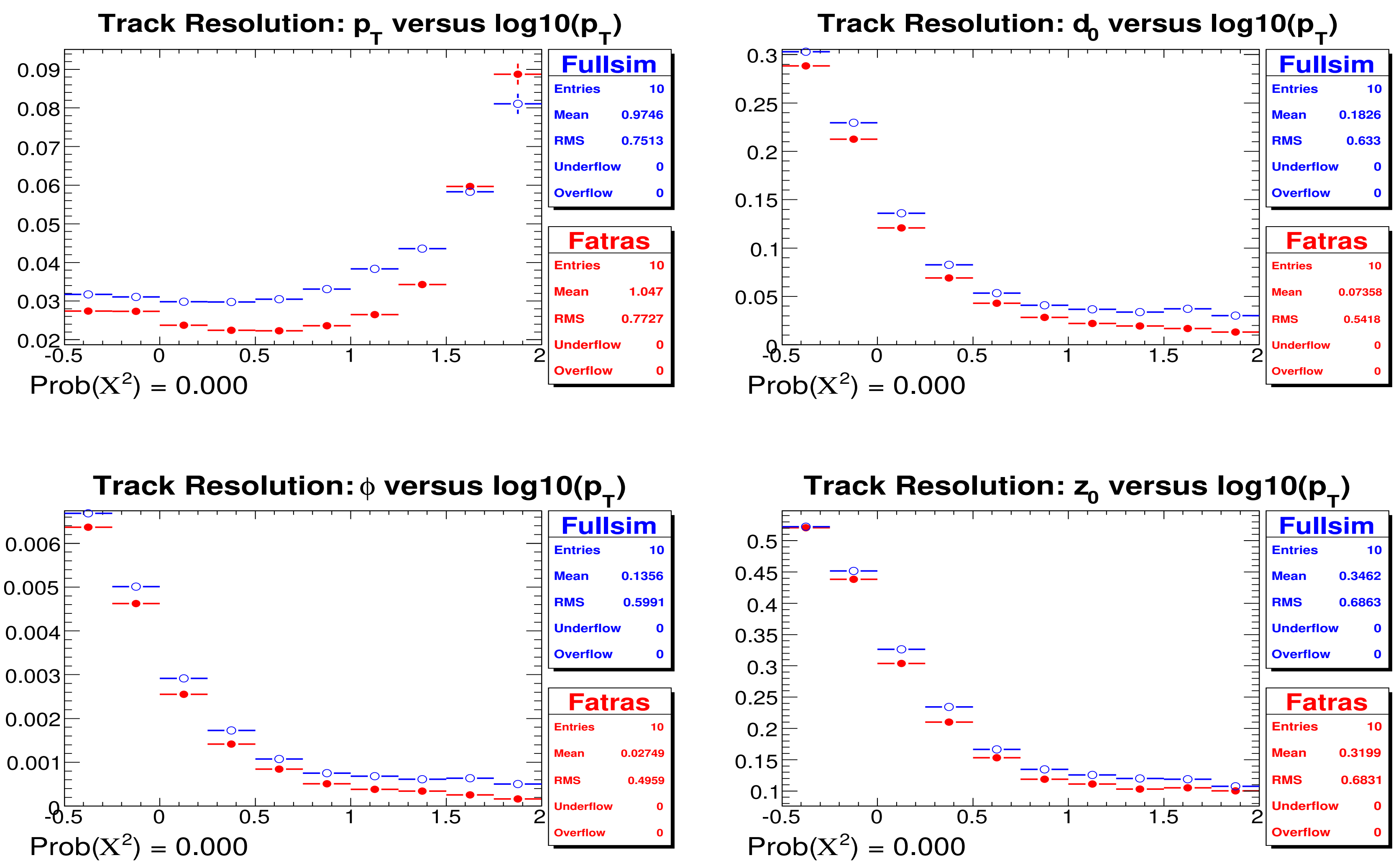
- Non-applicable: there are no "holes" in TRT and outliers are not in ESD

Residuals:

- Wider for Fatras

Track Parameters Resolution vs p_T, η

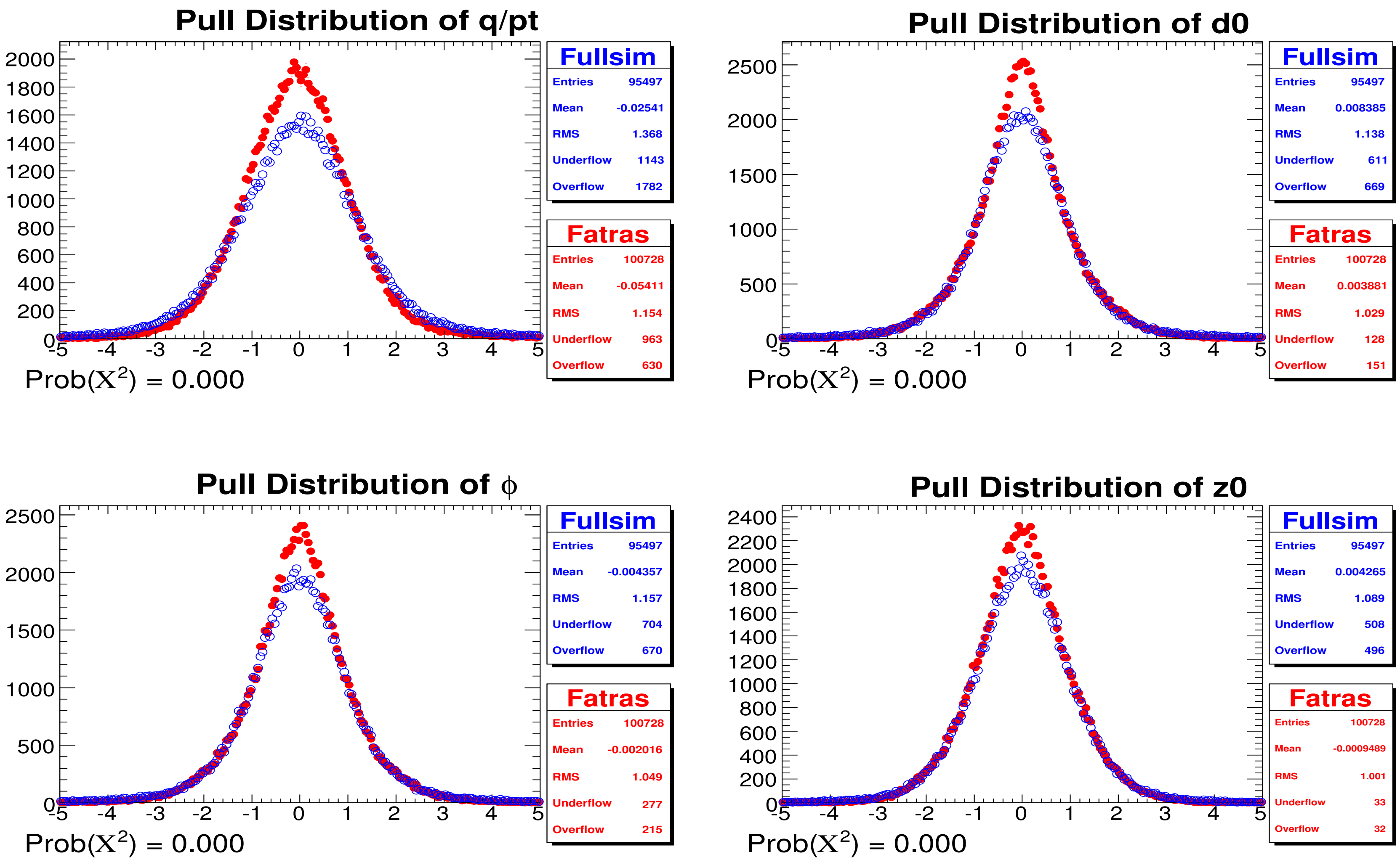

Track Resolution: 1/p_T versus |η|
Fullsim
Entries 20
Mean -0.01192
RMS 1.661
Underflow 0
Overflow 0
Fatras
Entries 20
Mean -0.0004908
RMS 1.637
Underflow 0
Overflow 0
Prob(X²) = 0.000
Track Resolution: d_0 versus |η|
Fullsim
Entries 20
Mean -0.007355
RMS 1.653
Underflow 0
Overflow 0
Fatras
Entries 20
Mean 0.01766
RMS 1.623
Underflow 0
Overflow 0
Prob(X²) = 0.000
Track Resolution: φ versus |η|
Fullsim
Entries 20
Mean -0.008321
RMS 1.667
Underflow 0
Overflow 0
Fatras
Entries 20
Mean 0.02841
RMS 1.635
Underflow 0
Overflow 0
Prob(X²) = 0.000
Track Resolution: z_0 versus |η|
Fullsim
Entries 20
Mean -0.001087
RMS 1.726
Underflow 0
Overflow 0
Fatras
Entries 20
Mean 0.003175
RMS 1.702
Underflow 0
Overflow 0
Prob(X²) = 0.000

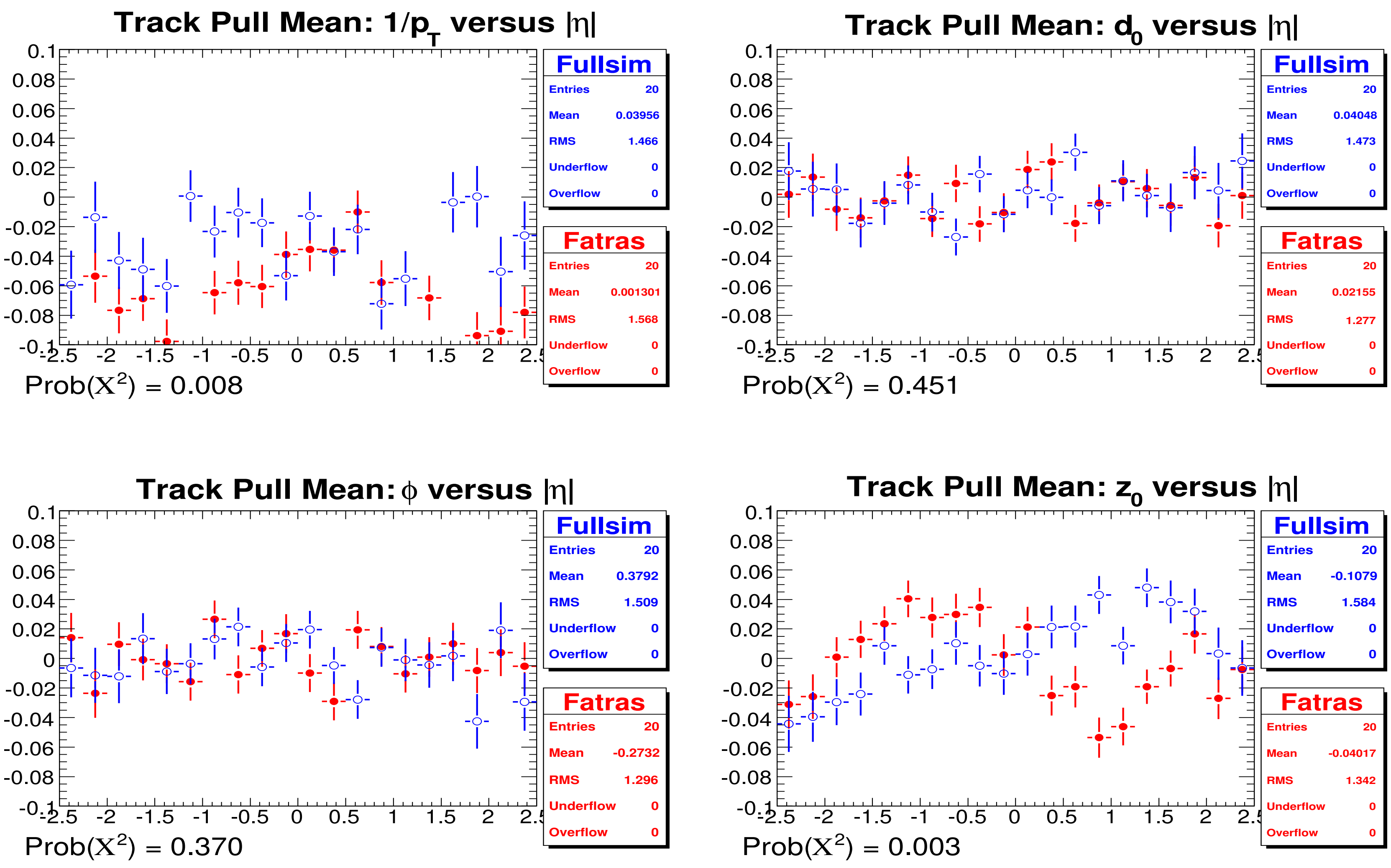

Track Resolution: p_T versus log10(p_T)
Fullsim
Entries 10
Mean 0.9746
RMS 0.7513
Underflow 0
Overflow 0
Fatras
Entries 10
Mean 1.047
RMS 0.7727
Underflow 0
Overflow 0
Prob(X²) = 0.000
Track Resolution: d_0 versus log10(p_T)
Fullsim
Entries 10
Mean 0.1826
RMS 0.633
Underflow 0
Overflow 0
Fatras
Entries 10
Mean 0.07358
RMS 0.5418
Underflow 0
Overflow 0
Prob(X²) = 0.000
Track Resolution: φ versus log10(p_T)
Fullsim
Entries 10
Mean 0.1356
RMS 0.5991
Underflow 0
Overflow 0
Fatras
Entries 10
Mean 0.02749
RMS 0.4959
Underflow 0
Overflow 0
Prob(X²) = 0.000
Track Resolution: z_0 versus log10(p_T)
Fullsim
Entries 10
Mean 0.3462
RMS 0.6863
Underflow 0
Overflow 0
Fatras
Entries 10
Mean 0.3199
RMS 0.6831
Underflow 0
Overflow 0
Prob(X²) = 0.000

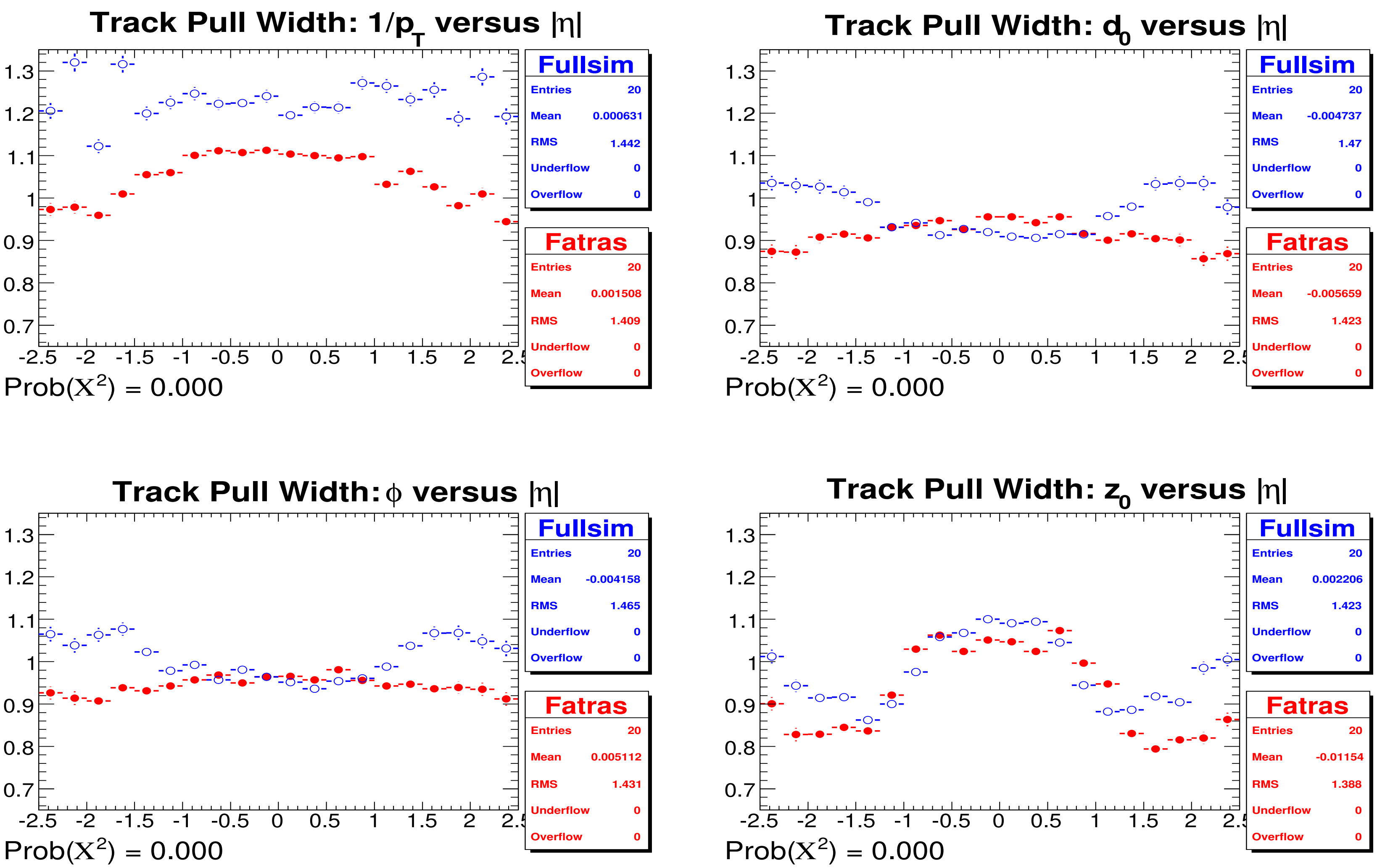
Comments

- Fatras underestimates parameters resolution in most regions of phase space

Pull Distributions


Pull Distribution of q/pt
Fullsim
Entries 95497
Mean -0.02541
RMS 1.368
Underflow 1143
Overflow 1782
Fatras
Entries 100728
Mean -0.05411
RMS 1.154
Underflow 963
Overflow 630
Prob(X²) = 0.000
Pull Distribution of d0
Fullsim
Entries 95497
Mean 0.008385
RMS 1.138
Underflow 611
Overflow 669
Fatras
Entries 100728
Mean 0.003881
RMS 1.029
Underflow 128
Overflow 151
Prob(X²) = 0.000
Pull Distribution of ϕ
Fullsim
Entries 95497
Mean -0.004357
RMS 1.157
Underflow 704
Overflow 670
Fatras
Entries 100728
Mean -0.002016
RMS 1.049
Underflow 277
Overflow 215
Prob(X²) = 0.000
Pull Distribution of z0
Fullsim
Entries 95497
Mean 0.004265
RMS 1.089
Underflow 508
Overflow 496
Fatras
Entries 100728
Mean -0.0009489
RMS 1.001
Underflow 33
Overflow 32
Prob(X²) = 0.000

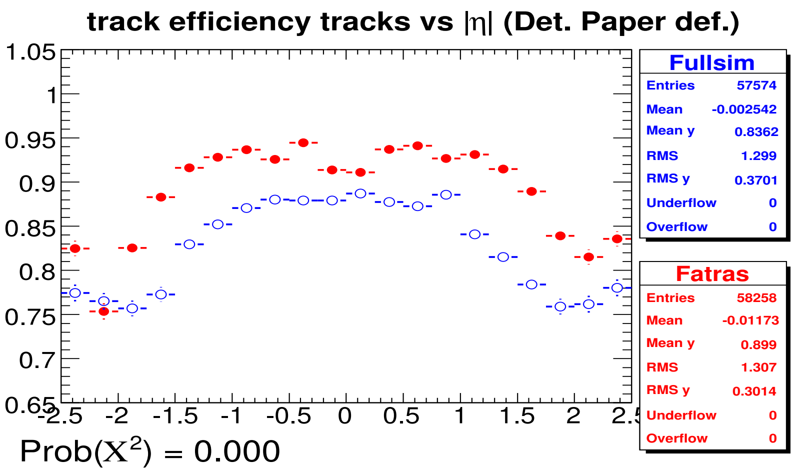

Track Pull Mean: 1/p_T versus |η|
Fullsim
Entries 20
Mean 0.03956
RMS 1.466
Underflow 0
Overflow 0
Fatras
Entries 20
Mean 0.001301
RMS 1.568
Underflow 0
Overflow 0
Prob(X²) = 0.008
Track Pull Mean: d_0 versus |η|
Fullsim
Entries 20
Mean 0.04048
RMS 1.473
Underflow 0
Overflow 0
Fatras
Entries 20
Mean 0.02155
RMS 1.277
Underflow 0
Overflow 0
Prob(X²) = 0.451
Track Pull Mean: ϕ versus |η|
Fullsim
Entries 20
Mean 0.3792
RMS 1.509
Underflow 0
Overflow 0
Fatras
Entries 20
Mean -0.2732
RMS 1.296
Underflow 0
Overflow 0
Prob(X²) = 0.370
Track Pull Mean: z_0 versus |η|
Fullsim
Entries 20
Mean -0.1079
RMS 1.584
Underflow 0
Overflow 0
Fatras
Entries 20
Mean -0.04017
RMS 1.342
Underflow 0
Overflow 0
Prob(X²) = 0.003

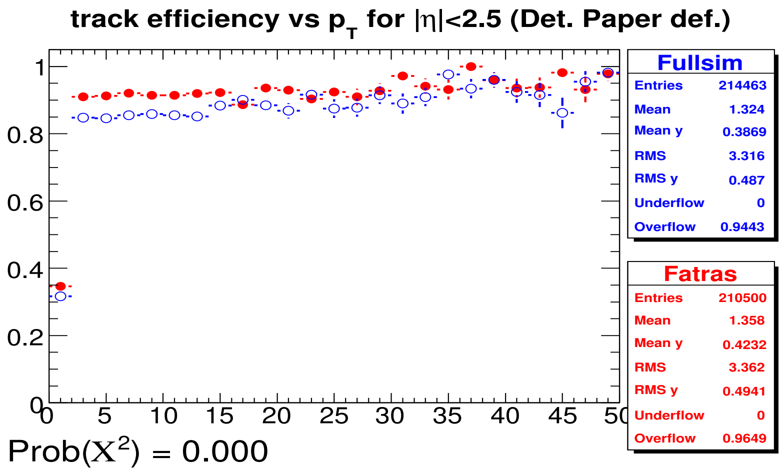

Track Pull Width: 1/p_T versus |η|
Fullsim
Entries 20
Mean 0.000631
RMS 1.442
Underflow 0
Overflow 0
Fatras
Entries 20
Mean 0.001508
RMS 1.409
Underflow 0
Overflow 0
Prob(X²) = 0.000
Track Pull Width: d_0 versus |η|
Fullsim
Entries 20
Mean -0.004737
RMS 1.47
Underflow 0
Overflow 0
Fatras
Entries 20
Mean -0.005659
RMS 1.423
Underflow 0
Overflow 0
Prob(X²) = 0.000
Track Pull Width: ϕ versus |η|
Fullsim
Entries 20
Mean -0.004158
RMS 1.465
Underflow 0
Overflow 0
Fatras
Entries 20
Mean 0.005112
RMS 1.431
Underflow 0
Overflow 0
Prob(X²) = 0.000
Track Pull Width: z_0 versus |η|
Fullsim
Entries 20
Mean 0.002206
RMS 1.423
Underflow 0
Overflow 0
Fatras
Entries 20
Mean -0.01154
RMS 1.388
Underflow 0
Overflow 0
Prob(X²) = 0.000

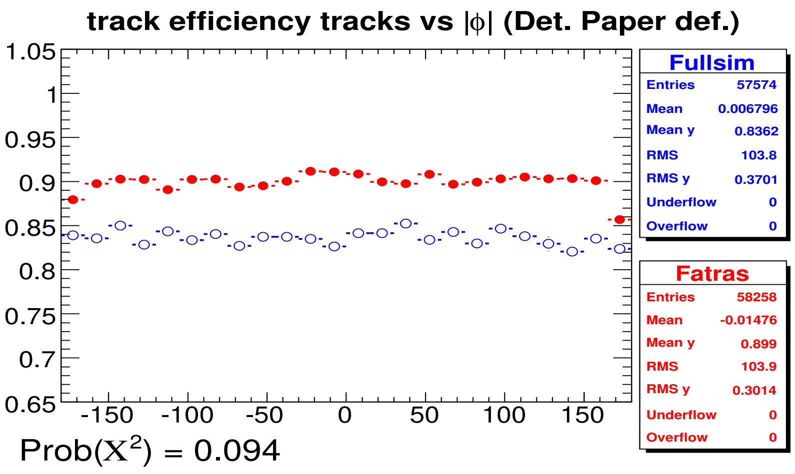
Comments

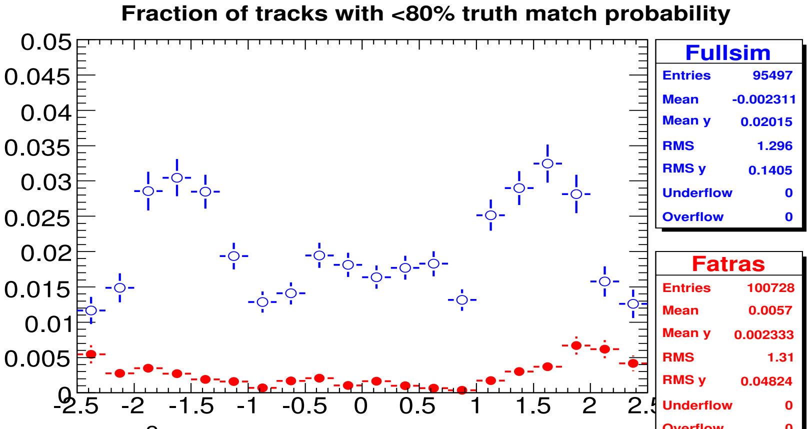
- Central region of pull distribution is narrower for Fatras than Fullsim, tails are in good agreement (!)
- Pull mean vs eta in relatively good agreement
- Pull width vs eta has largest discrepancy in endcap region

Track Efficiencies And Fake Rate

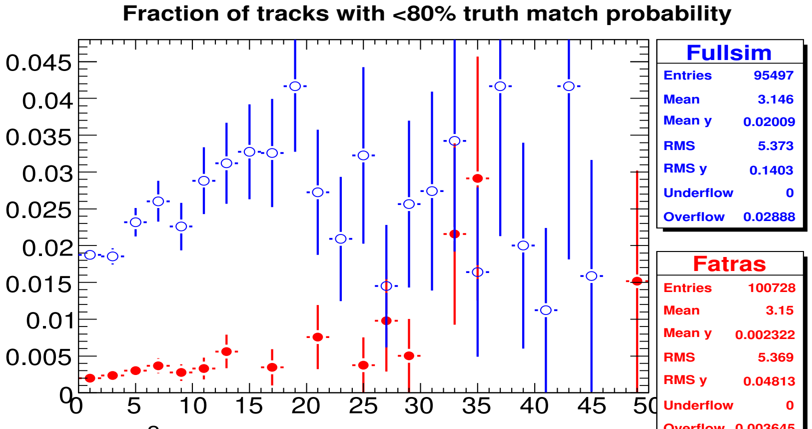

track efficiency tracks vs |η| (Det. Paper def.)
Fullsim
Entries 57574
Mean -0.002542
Mean y 0.8362
RMS 1.299
RMS y 0.3701
Underflow 0
Overflow 0
Fatras
Entries 58258
Mean -0.01173
Mean y 0.899
RMS 1.307
RMS y 0.3014
Underflow 0
Overflow 0
Prob(X²) = 0.000


track efficiency vs p_T for |η|<2.5 (Det. Paper def.)
Fullsim
Entries 214463
Mean 1.324
Mean y 0.3869
RMS 3.316
RMS y 0.487
Underflow 0
Overflow 0.9443
Fatras
Entries 210500
Mean 1.358
Mean y 0.4232
RMS 3.362
RMS y 0.4941
Underflow 0
Overflow 0.9649
Prob(X²) = 0.000

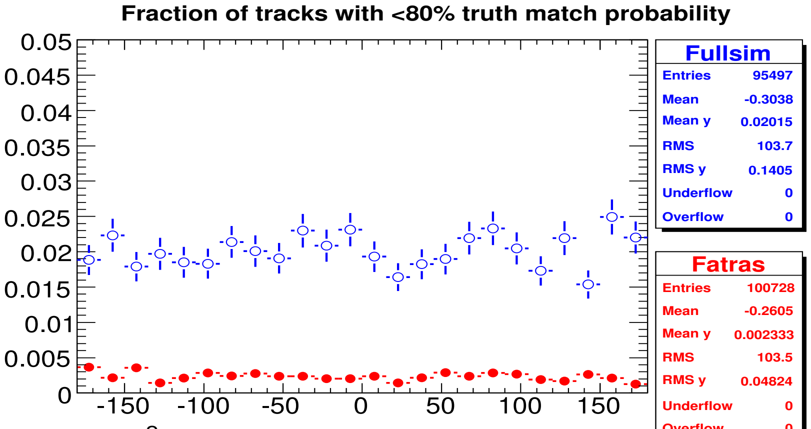

track efficiency tracks vs |φ| (Det. Paper def.)
Fullsim
Entries 57574
Mean 0.006796
Mean y 0.8362
RMS 103.8
RMS y 0.3701
Underflow 0
Overflow 0
Fatras
Entries 58258
Mean -0.01476
Mean y 0.899
RMS 103.9
RMS y 0.3014
Underflow 0
Overflow 0
Prob(X²) = 0.094



Prob(X^2) = 0.000



Prob(X^2) = 0.000

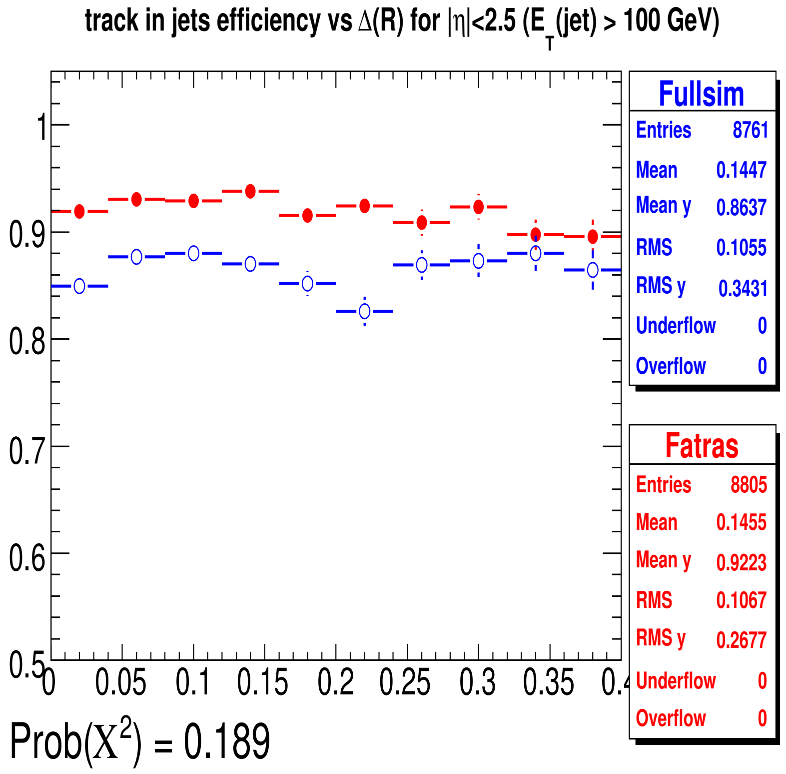


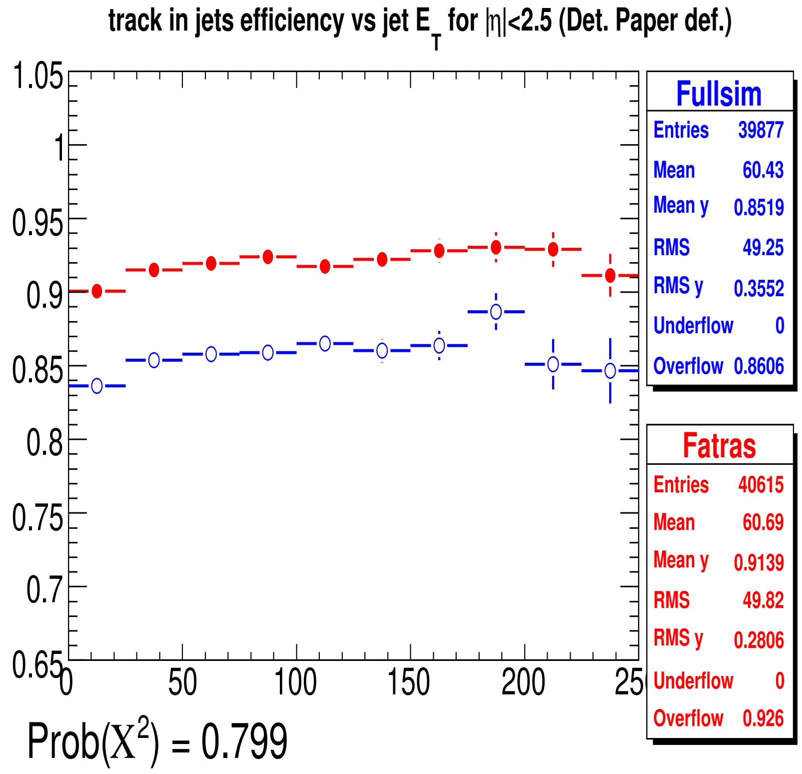
Prob(X^2) = 0.677

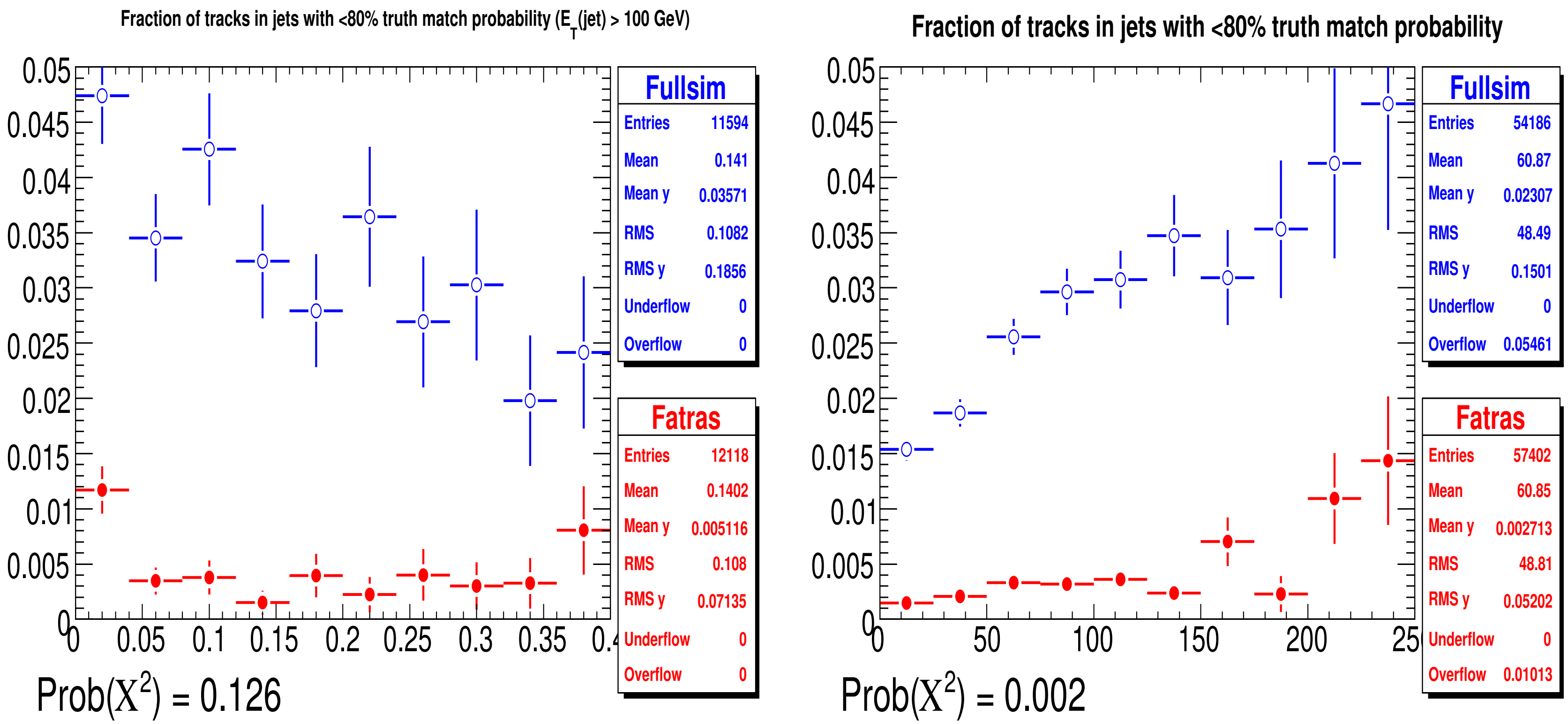
Comments

- Tracking efficiency higher for Fatras ($\approx 90\%$) than Fullsim ($\approx 84\%$)
- Fake rate is about 2-3 times larger for Fullsim than Fatras

Tracking Inside Jets


track in jets efficiency vs Δ(R) for |η|<2.5 (E_T(jet) > 100 GeV)
Fullsim
Entries 8761
Mean 0.1447
Mean y 0.8637
RMS 0.1055
RMS y 0.3431
Underflow 0
Overflow 0
Fatras
Entries 8805
Mean 0.1455
Mean y 0.9223
RMS 0.1067
RMS y 0.2677
Underflow 0
Overflow 0
0.5
0.6
0.7
0.8
0.9
1
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
Prob(X^2) = 0.189


track in jets efficiency vs jet E_T for |η|<2.5 (Det. Paper def.)
Fullsim
Entries 39877
Mean 60.43
Mean y 0.8519
RMS 49.25
RMS y 0.3552
Underflow 0
Overflow 0.8606
Fatras
Entries 40615
Mean 60.69
Mean y 0.9139
RMS 49.82
RMS y 0.2806
Underflow 0
Overflow 0.926
0.65
0.7
0.75
0.8
0.85
0.9
0.95
1
1.05
0
50
100
150
200
250
Prob(X^2) = 0.799

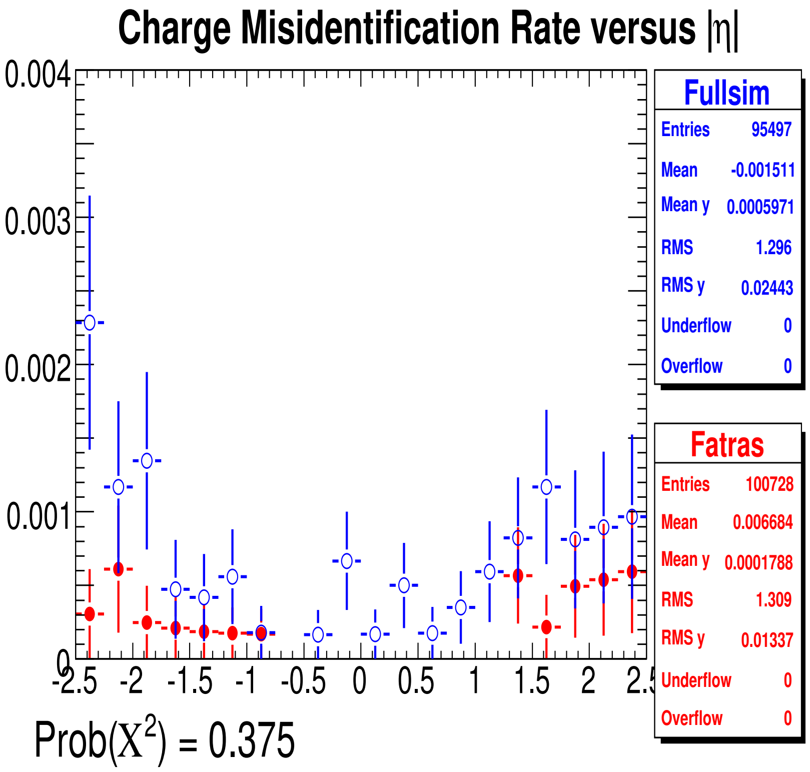


Fraction of tracks in jets with <80% truth match probability (E_T(jet) > 100 GeV)
Fullsim
Entries 11594
Mean 0.141
Mean y 0.03571
RMS 0.1082
RMS y 0.1856
Underflow 0
Overflow 0
Fatras
Entries 12118
Mean 0.1402
Mean y 0.005116
RMS 0.108
RMS y 0.07135
Underflow 0
Overflow 0
Prob(X^2) = 0.126
Fraction of tracks in jets with <80% truth match probability
Fullsim
Entries 54186
Mean 60.87
Mean y 0.02307
RMS 48.49
RMS y 0.1501
Underflow 0
Overflow 0.05461
Fatras
Entries 57402
Mean 60.85
Mean y 0.002713
RMS 48.81
RMS y 0.05202
Underflow 0
Overflow 0.01013
Prob(X^2) = 0.002

Comments

- Difference in efficiency ($\approx 6\%$) similar inside jets than for general tracks
- Similar shape for efficiency
- Fake rate increases faster at low ΔR for Fullsim than Fatras

Charge Misid



- Low stats, but twice larger for Fullsim