4-track sample

General information – 4-track sample:
Number of triggers = 3,246,950
Number of those events with exactly one valid proton in each direction = 2,138,400
Number of those events with exactly 4 tracks = 1,185,020
Number of events with exactly 4 tracks 1 vertex = 990,067
Number of events with exactly 4 tracks with Q=0 = 846,757
Number of events with exactly 4 tracks 1 vertex fiducial Q=0 = 790,963

Number that balance in px and py (between central system and forward portions: All:
dpy entries = 1,026,708
dpy integral = 664,700
dpx entries = 1,026,708
dpx integral = 671,800
integral stands for bin sum subtracting underflow and overflow data
fiducialRegion:
dpy entries = 884,012
dpy integral = 590,200
dpx entries = 884012
dpx integral = 596,900

overall cuts used in this analysis

4-track events – first part
entire 2015 – second part

total charge :Q=0
pion pairs: pi1pi2 & pi3pi4
pi1pi3 & pi2pi4
fiducial eta < 2.5
ptCut = 0.0
Qpair=0

mass window: 0.49 < M(pion_pair) < 0.51
centered at the K0_mass = 0.497

not using the primary vertex collection
not using the V0Producer's Kshort collection

overall cuts used in this analysis

selecting the 4-pion mass by resquesting:

a) M(K0sK0s) = m1234
Qpi1pi2=0 and Qpi3pi4=0
0.49 < m_pi1pi2 < 0.51
0.49 < m_pi3pi4 < 0.51

b) M(K0sK0s) = m1324
Qpi1pi3=0 and Qpi2pi4=0
0.49 < m_pi1pi3 < 0.51
0.49 < m_pi2pi4 < 0.51

overall cuts used in this analysis

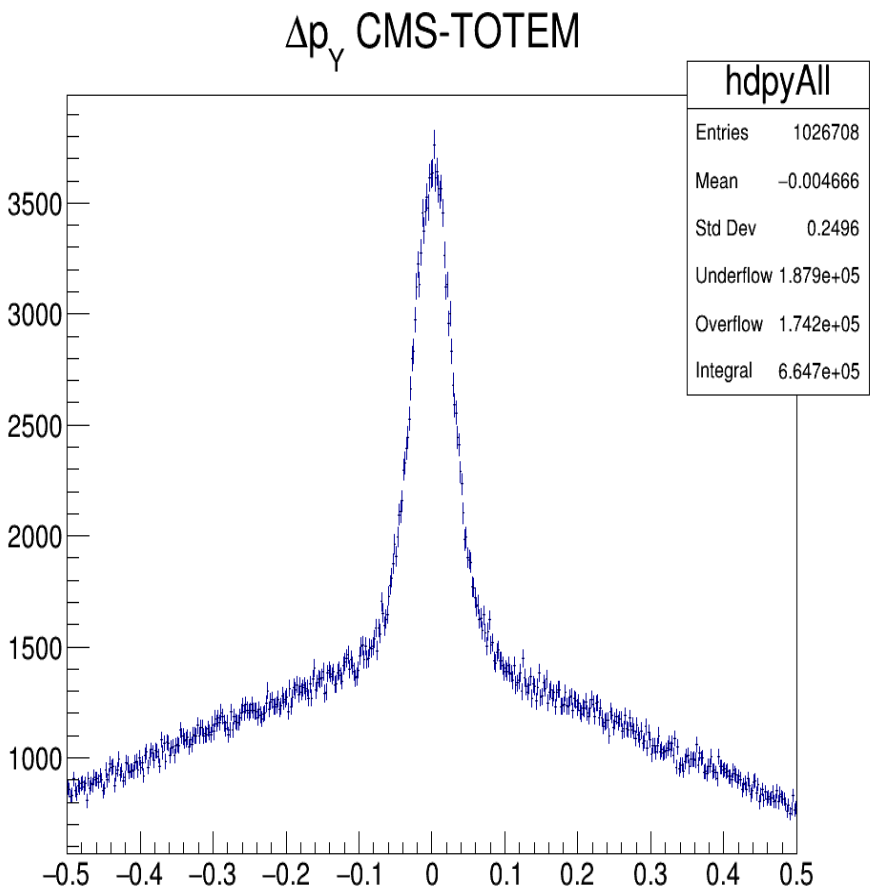
CTpycut : Δpy < 0.06
no CTpxcut
no CTvertex
no Rpvertex
no PID

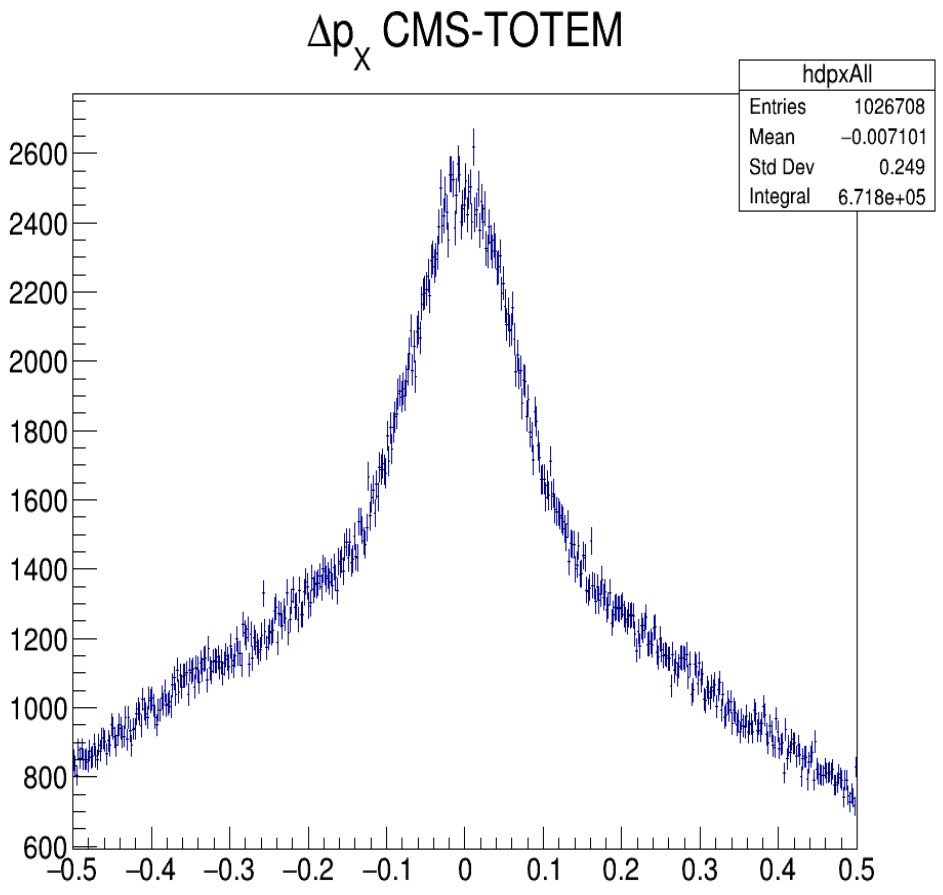
M(K0sK0s):

a) vtxdxy > 10 microns – job#502
pi1pi2+pi3pi4 (tag m1234) & pi1pi3+pi2pi4 (tag m1324)

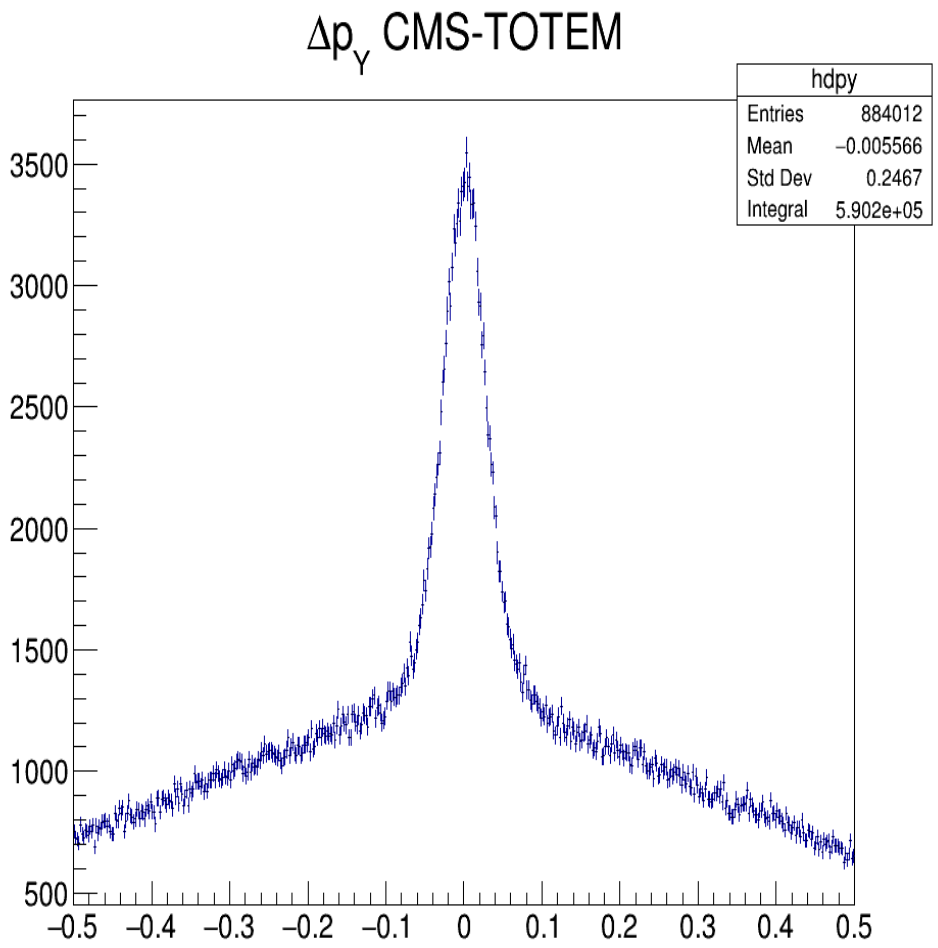
b) vtxdxy > 50 microns – job#503
pi1pi2+pi3pi4 (tag m1234) & pi1pi3+pi2pi4 (tag m1324)

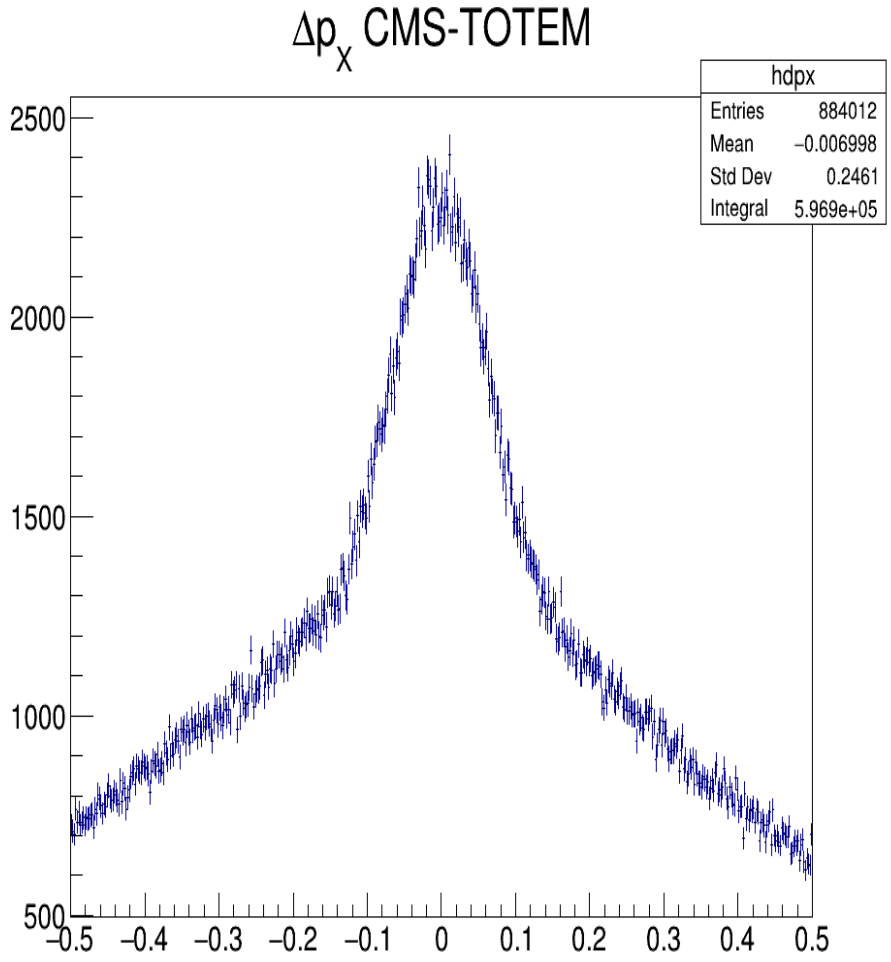
Balance: All

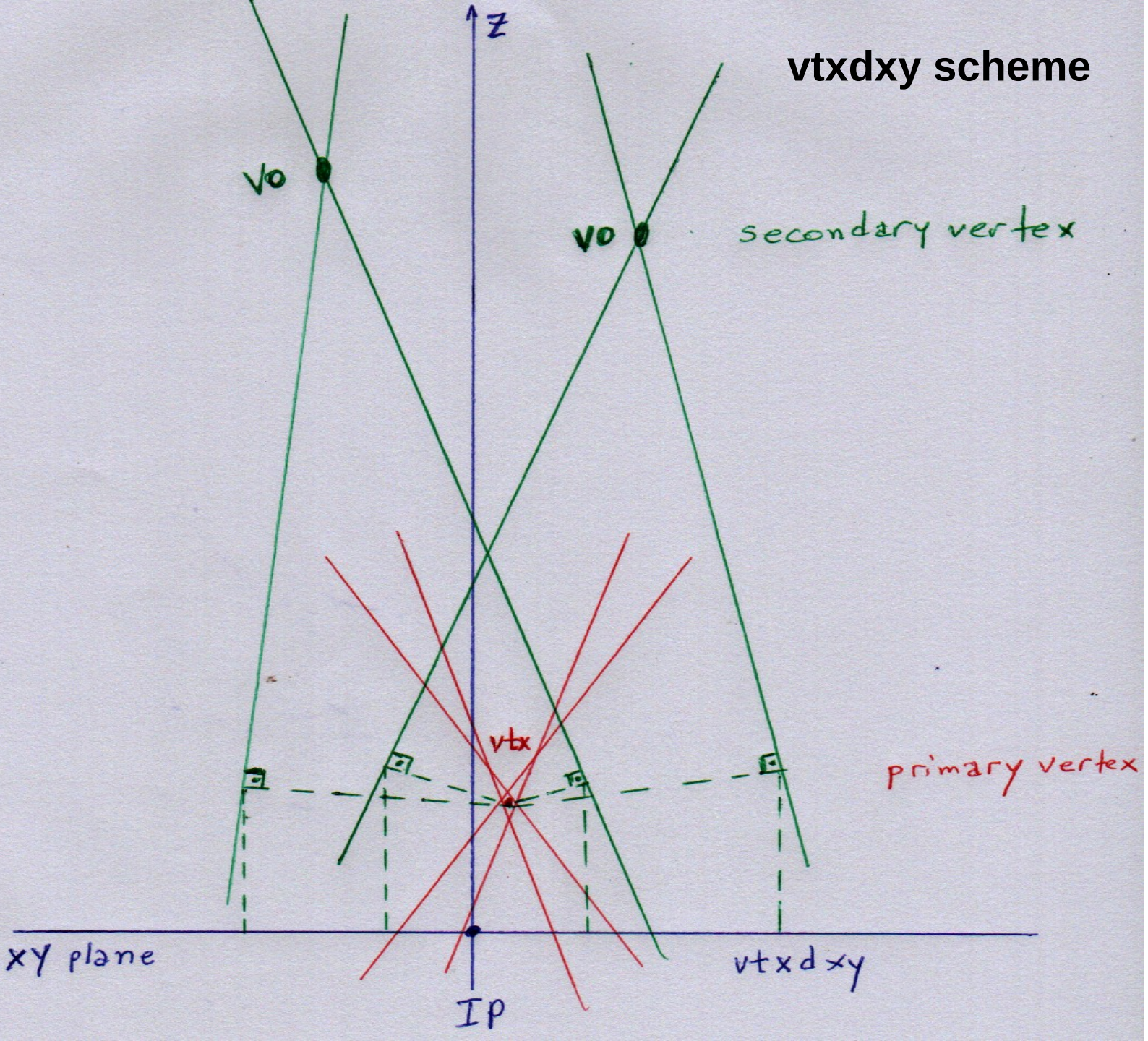

Δp_Y CMS-TOTEM
hdpyAll
Entries 1026708
Mean −0.004666
Std Dev 0.2496
Underflow 1.879e+05
Overflow 1.742e+05
Integral 6.647e+05
3500
3000
2500
2000
1500
1000
−0.5 −0.4 −0.3 −0.2 −0.1 0 0.1 0.2 0.3 0.4 0.5


Δp_X CMS-TOTEM
hdpxAll
Entries 1026708
Mean −0.007101
Std Dev 0.249
Integral 6.718e+05
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
−0.5 −0.4 −0.3 −0.2 −0.1 0 0.1 0.2 0.3 0.4 0.5

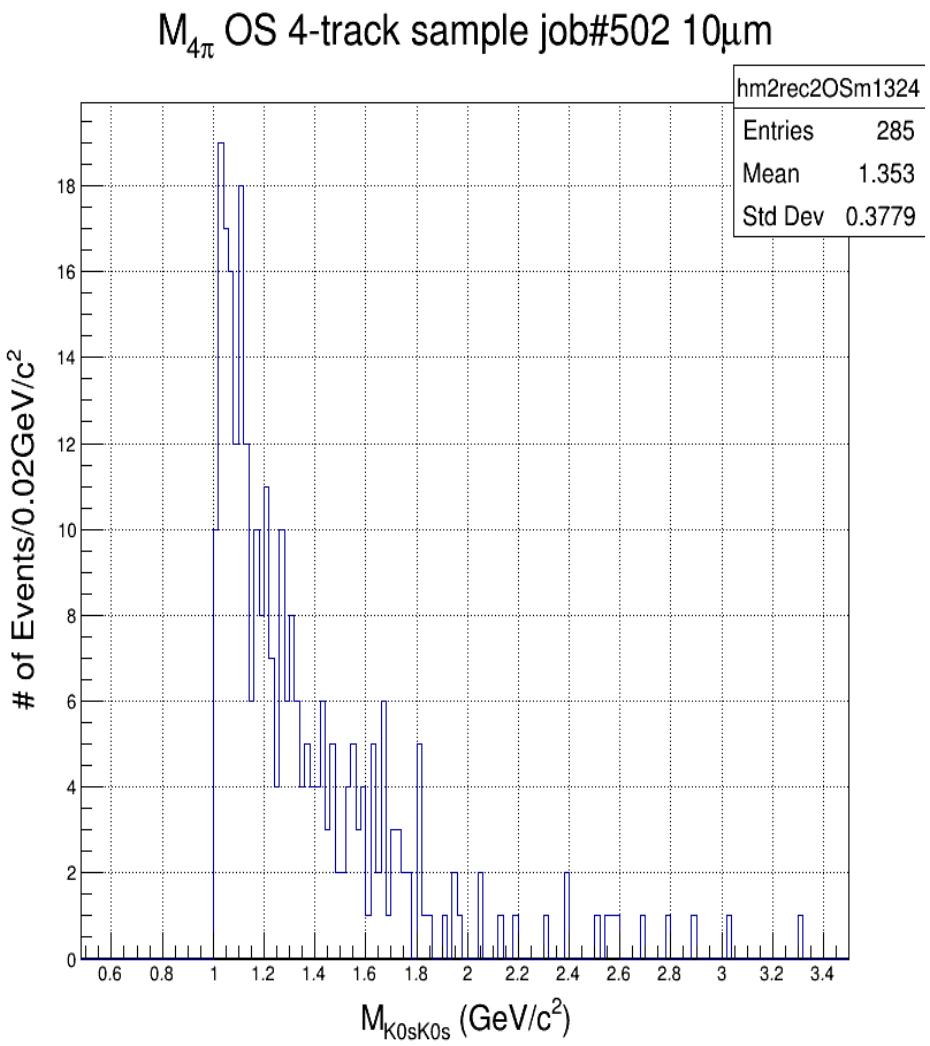
Balance: fiducial

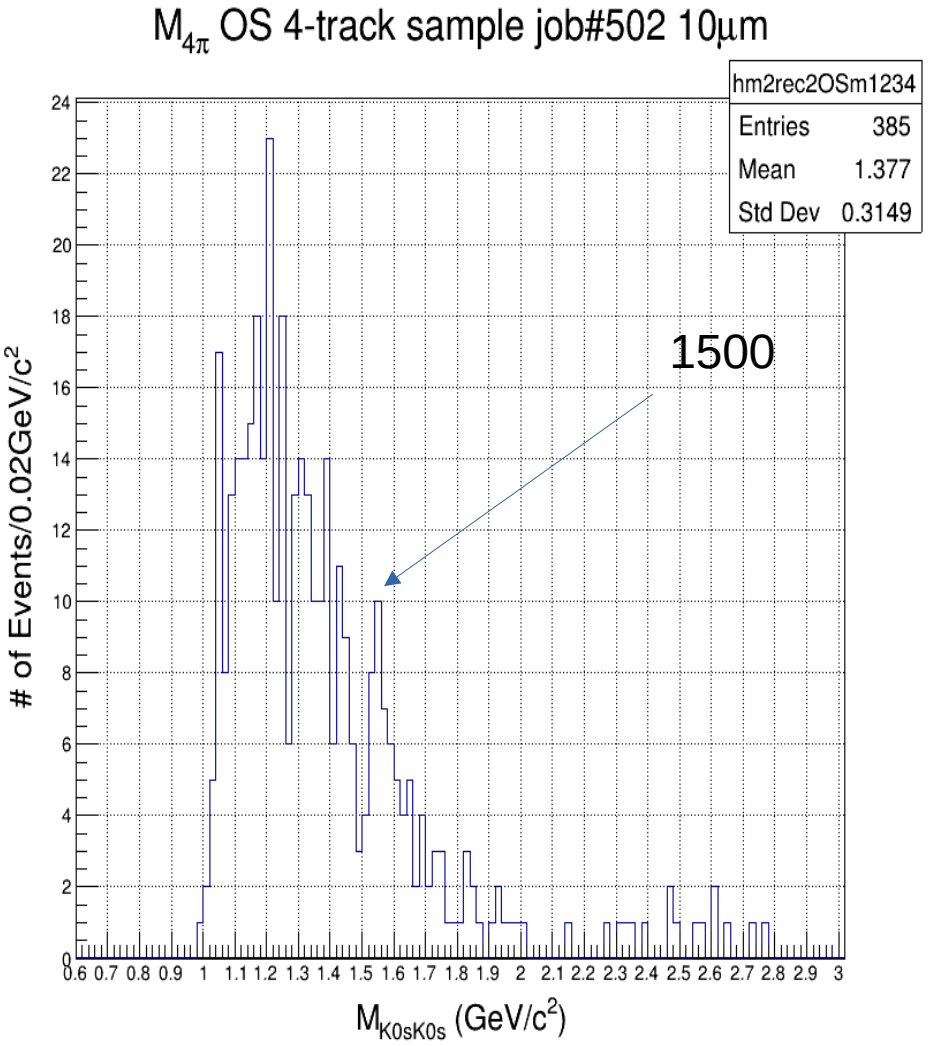




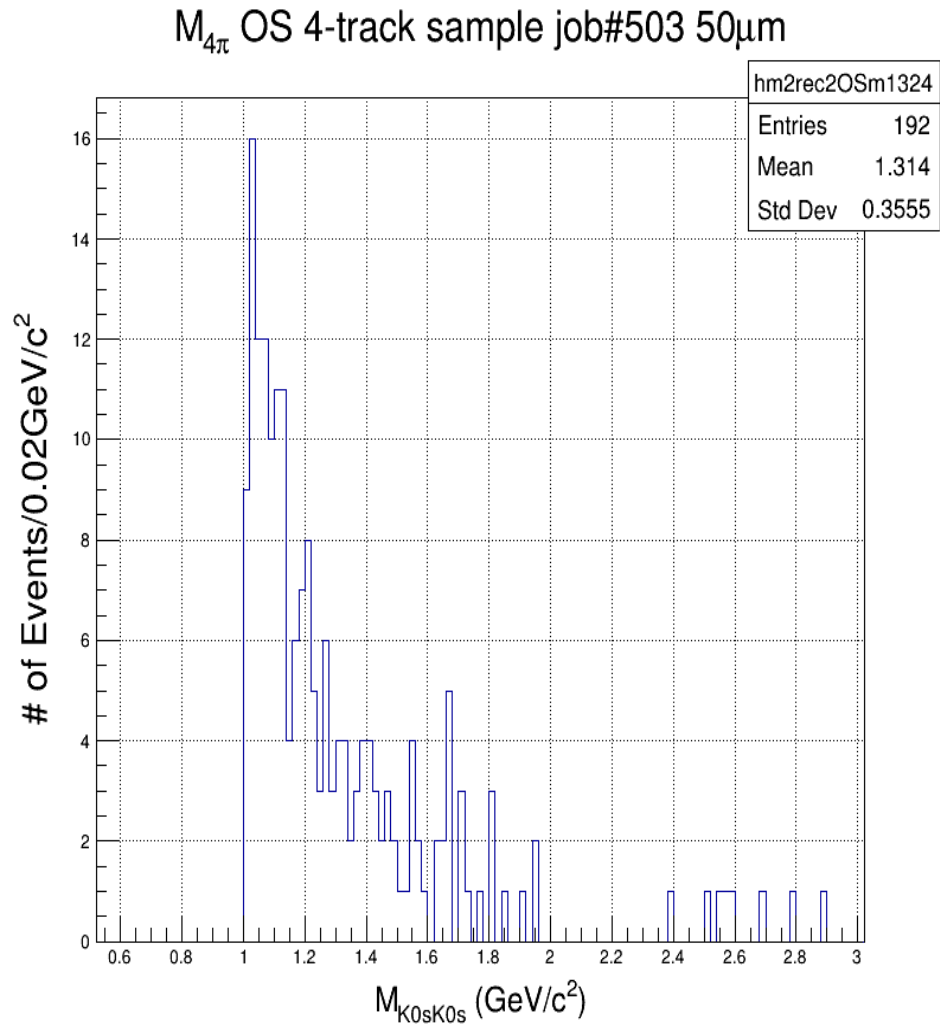

vtxdxy scheme
z
Vo
Vo
secondary vertex
vtx
primary vertex
xy plane
vtxdxy
Ip

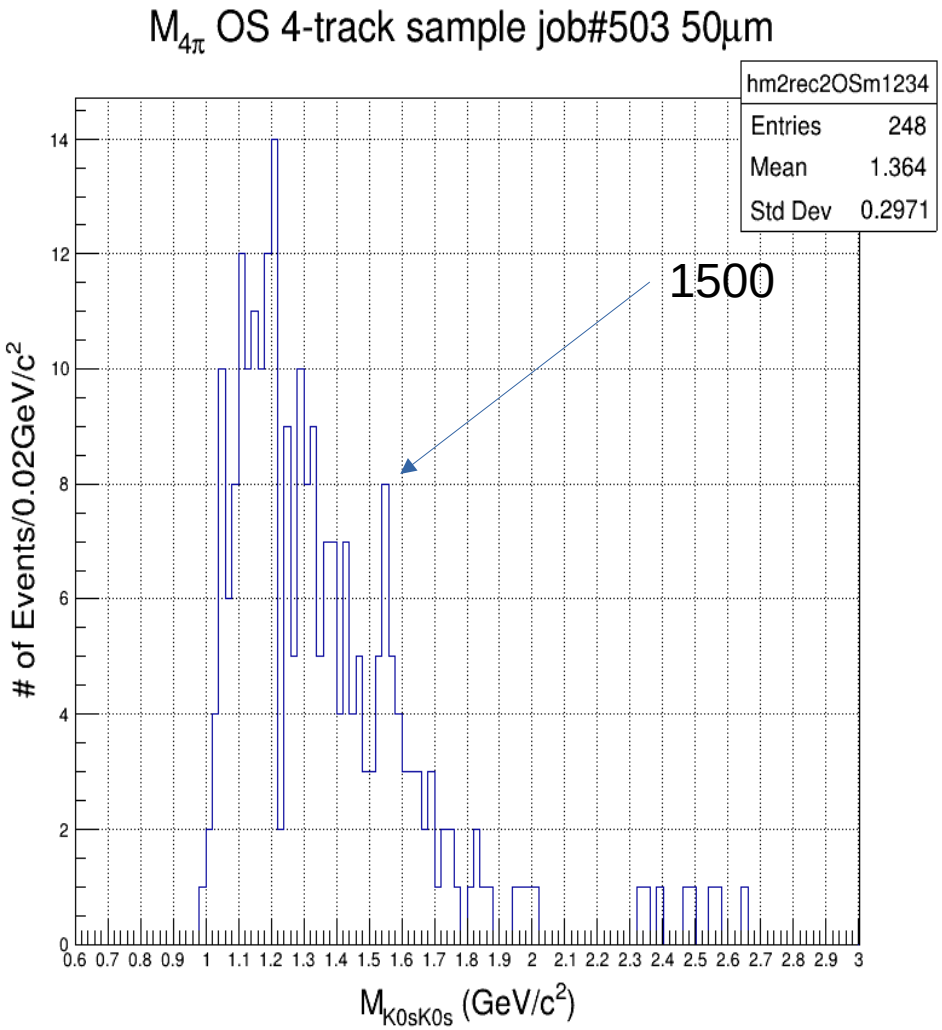
vtxdxy > 10μm

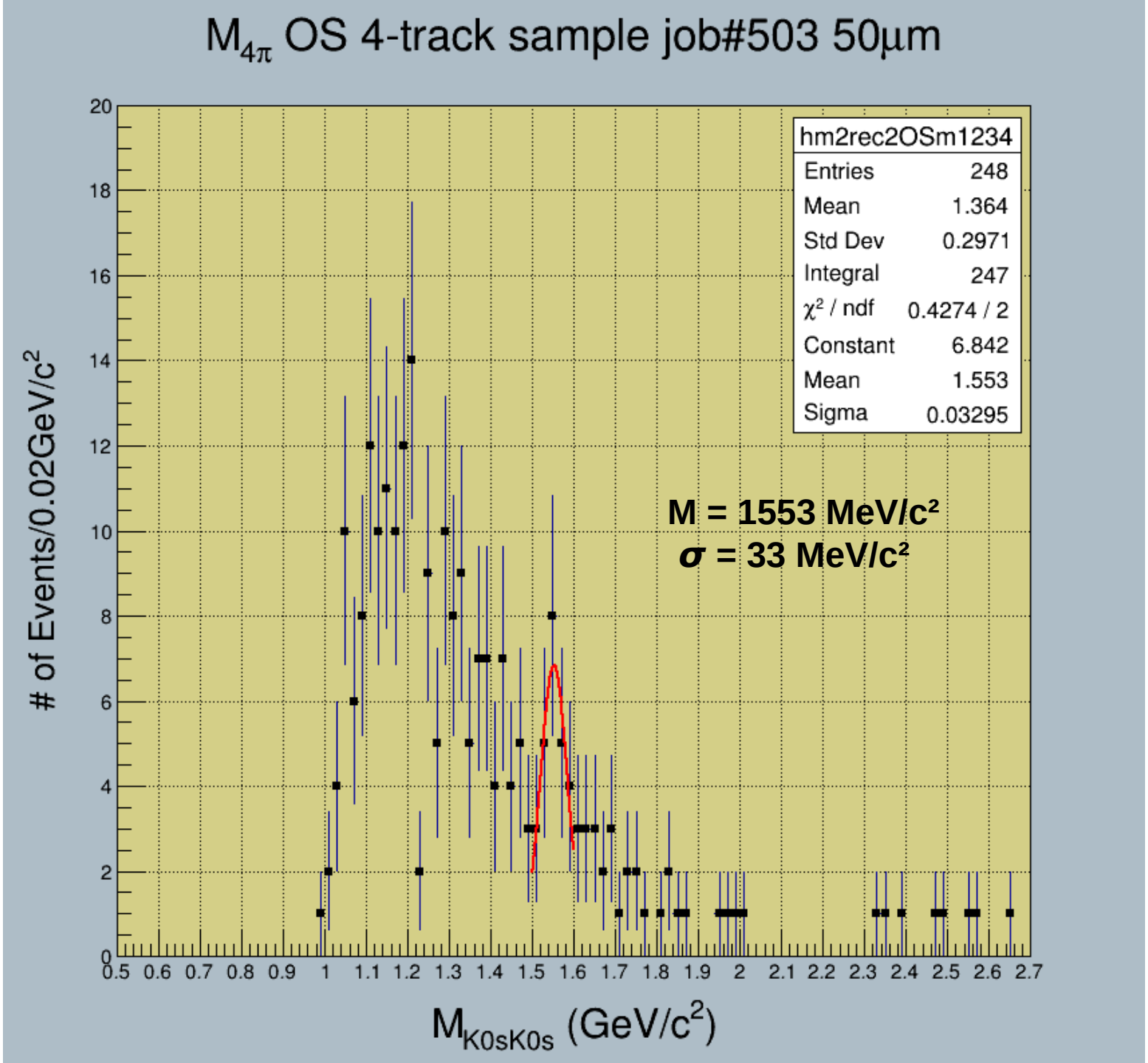

$M_{4\pi}$ OS 4-track sample job#502 10μm
hm2rec2OSm1324
Entries 285
Mean 1.353
Std Dev 0.3779
# of Events/0.02GeV/c^2
M_{K0sK0s} (GeV/c^2)


$M_{4\pi}$ OS 4-track sample job#502 10μm
hm2rec2OSm1234
Entries 385
Mean 1.377
Std Dev 0.3149
1500
# of Events/0.02GeV/c^2
M_{K0sK0s} (GeV/c^2)

vtxdxy > 50μm


$M_{4\pi}$ OS 4-track sample job#503 50μm
hm2rec2OSm1324
Entries 192
Mean 1.314
Std Dev 0.3555
# of Events/0.02GeV/c^2
M_{K0sK0s} (GeV/c^2)


$M_{4\pi}$ OS 4-track sample job#503 50μm
hm2rec2OSm1234
Entries 248
Mean 1.364
Std Dev 0.2971
1500
# of Events/0.02GeV/c^2
M_{K0sK0s} (GeV/c^2)

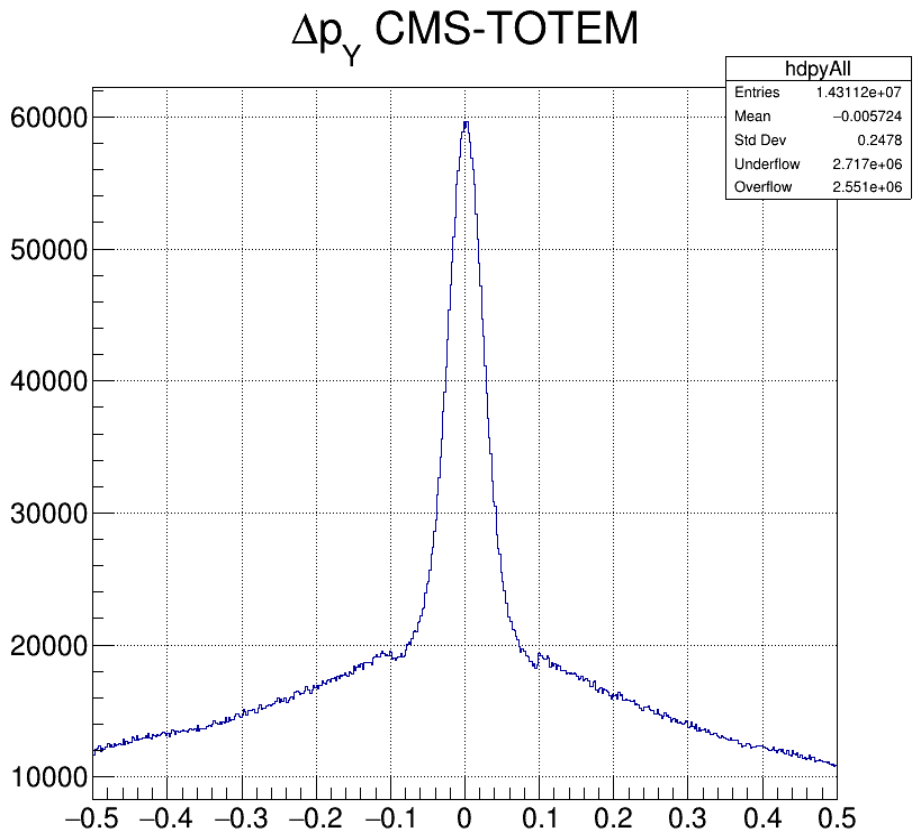

$M_{4\pi}$ OS 4-track sample job#503 50μm
hm2rec2OSm1234
Entries 248
Mean 1.364
Std Dev 0.2971
Integral 247
χ^2 / ndf 0.4274 / 2
Constant 6.842
Mean 1.553
Sigma 0.03295
M = 1553 MeV/c²
σ = 33 MeV/c²
# of Events/0.02GeV/c²
M_{K0sK0s} (GeV/c²)

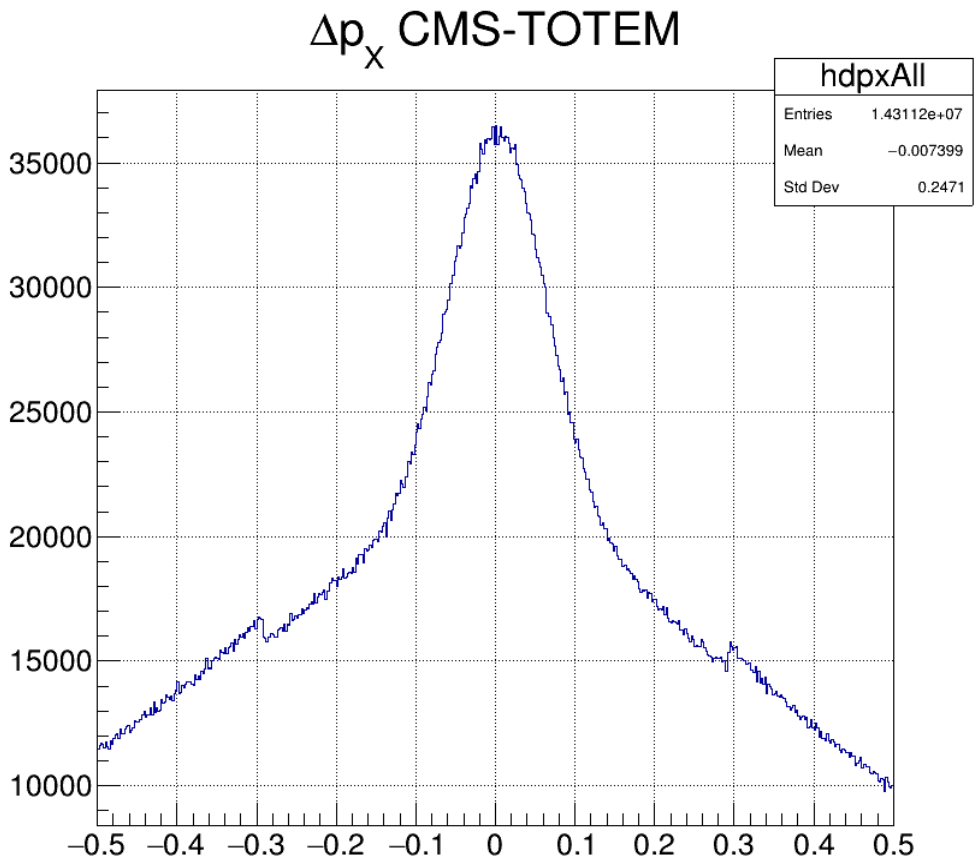
entire 2015 data

General information – entire 2015 data:
Number of triggers = 91,883,900
Number of those events with exactly one valid proton in each direction = 64,320,100
Number of those events with exactly 4 tracks = 1,924,960
Number of events with exactly 4 tracks 1 vertex = 1,887,660
Number of events with exactly 4 tracks with Q=0 = 1,331,020
Number of events with exactly 4 tracks 1 vertex fiducial Q=0 = 1,240,530

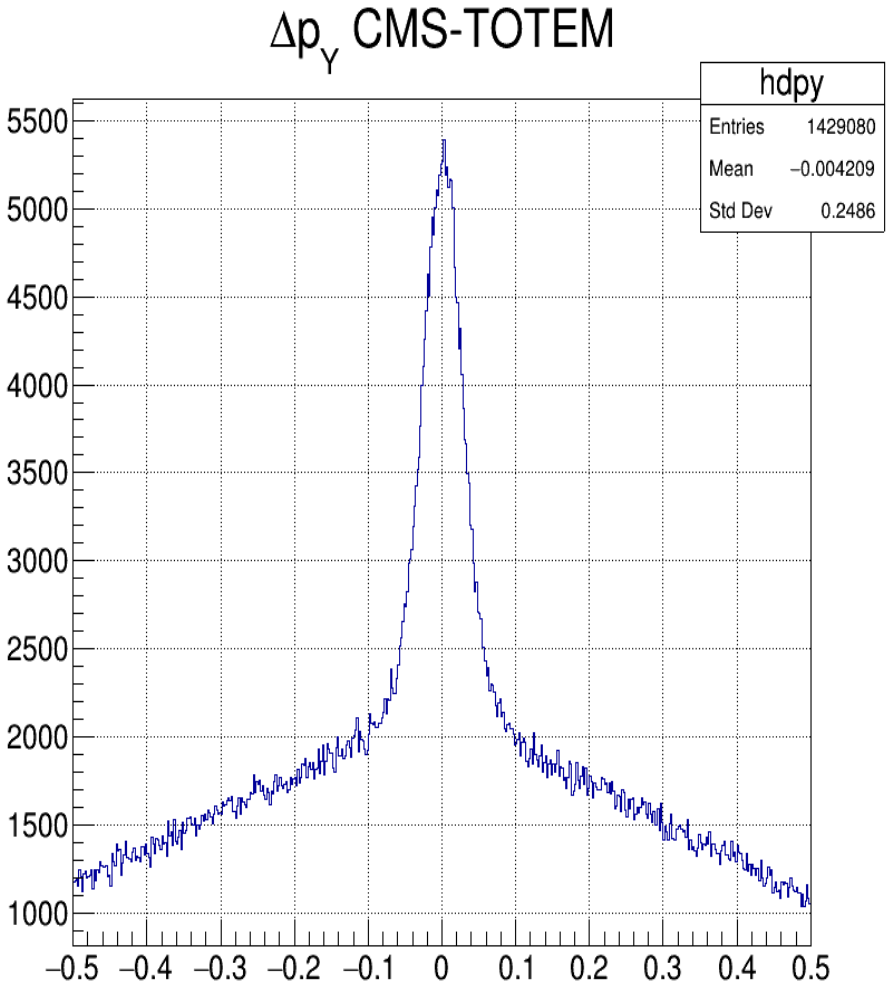
Number that balance in px and py (between central system and forward portions: All:
dpy entries = 14,311,200
dpy integral = 9,043,000
dpx entries = 14,311,200
dpx integral = 9,378,000
integral stands for bin sum subtracting underflow and overflow data
fiducialRegion:
dpy entries = 1,429,080
dpy integral = 935,000
dpx entries = 1,429,080
dpx integral = 944,800

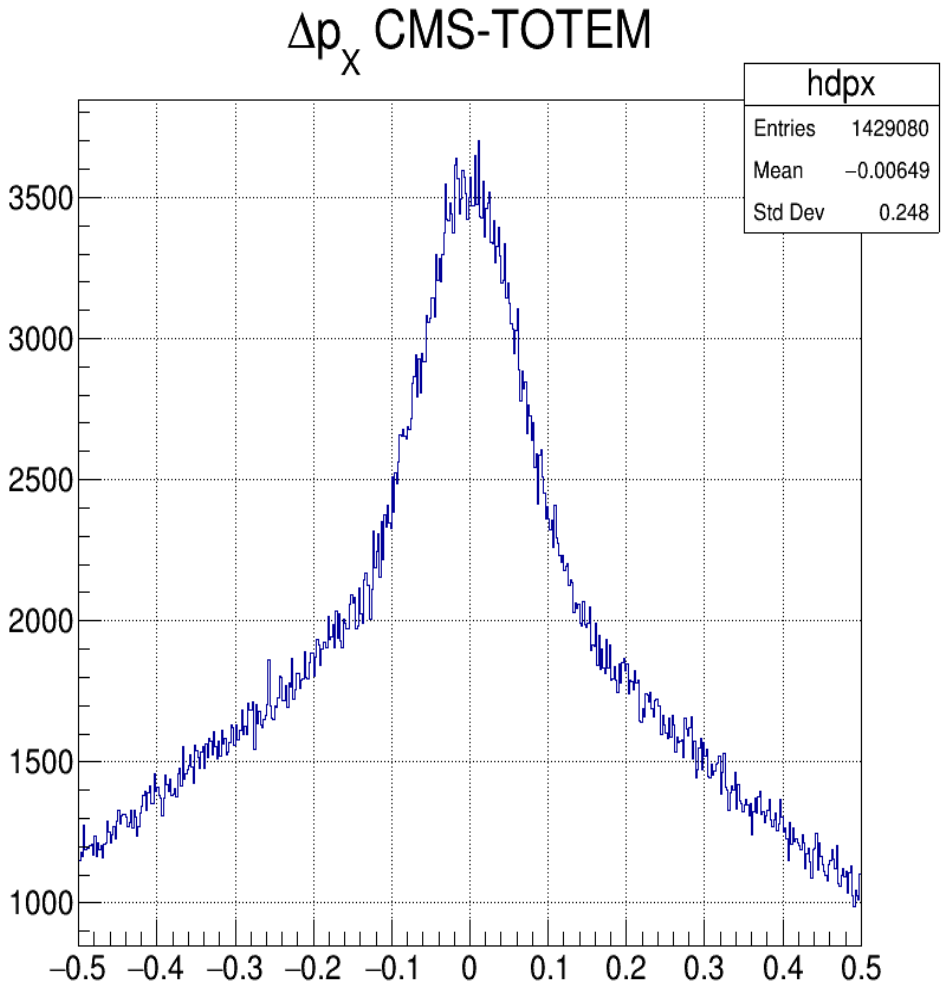
Balance: All


Δp_Y CMS-TOTEM
hdpyAll
Entries 1.43112e+07
Mean −0.005724
Std Dev 0.2478
Underflow 2.717e+06
Overflow 2.551e+06
60000
50000
40000
30000
20000
10000
−0.5 −0.4 −0.3 −0.2 −0.1 0 0.1 0.2 0.3 0.4 0.5

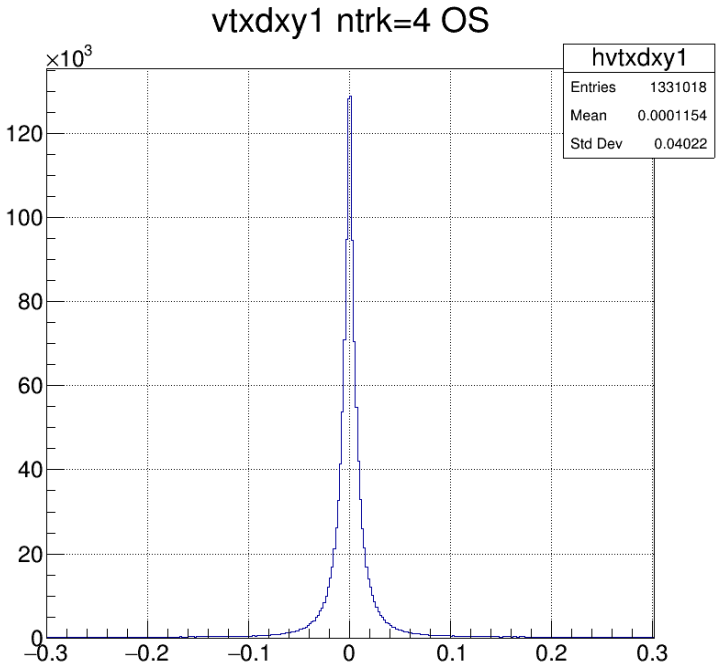

Δp_X CMS-TOTEM
hdpxAll
Entries 1.43112e+07
Mean −0.007399
Std Dev 0.2471
35000
30000
25000
20000
15000
10000
−0.5 −0.4 −0.3 −0.2 −0.1 0 0.1 0.2 0.3 0.4 0.5

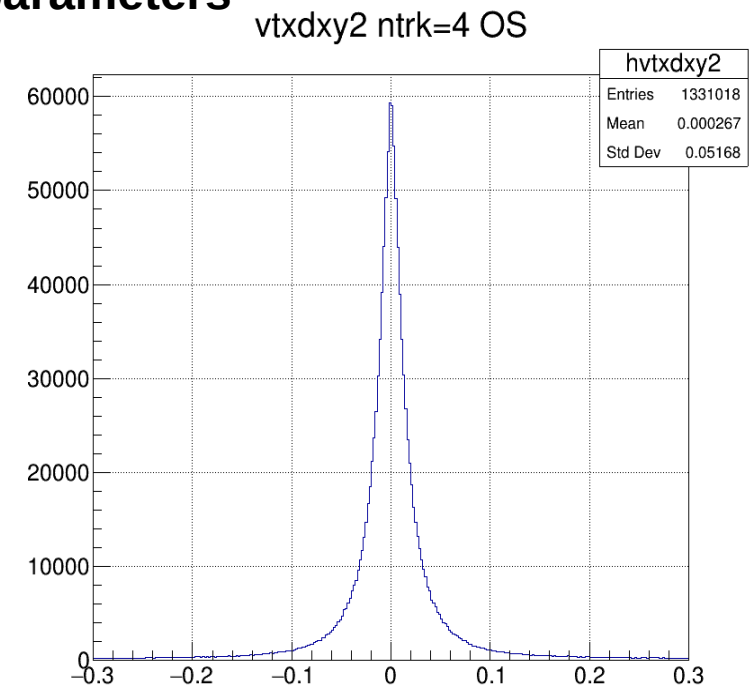
Balance: fiducial

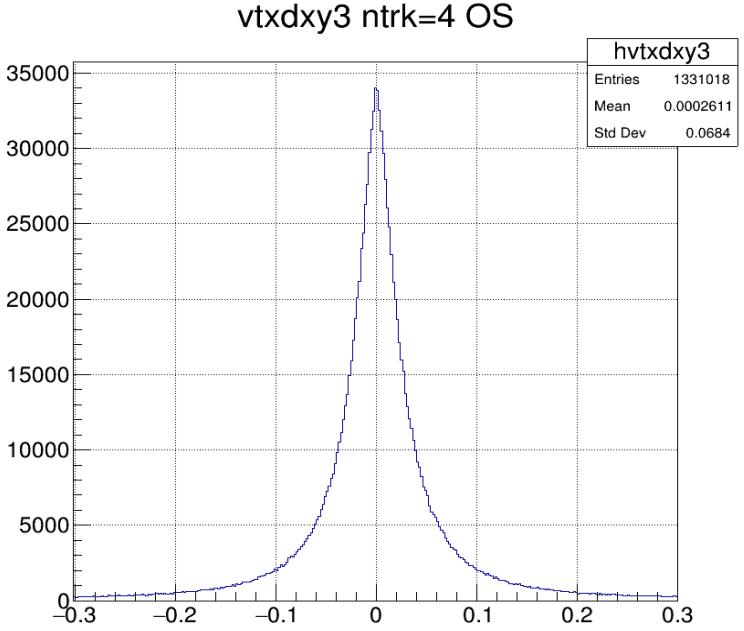


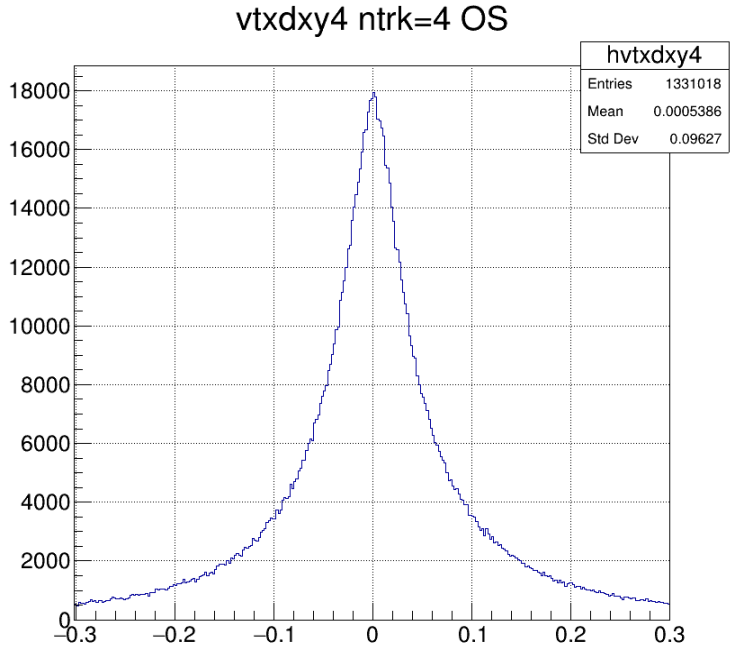


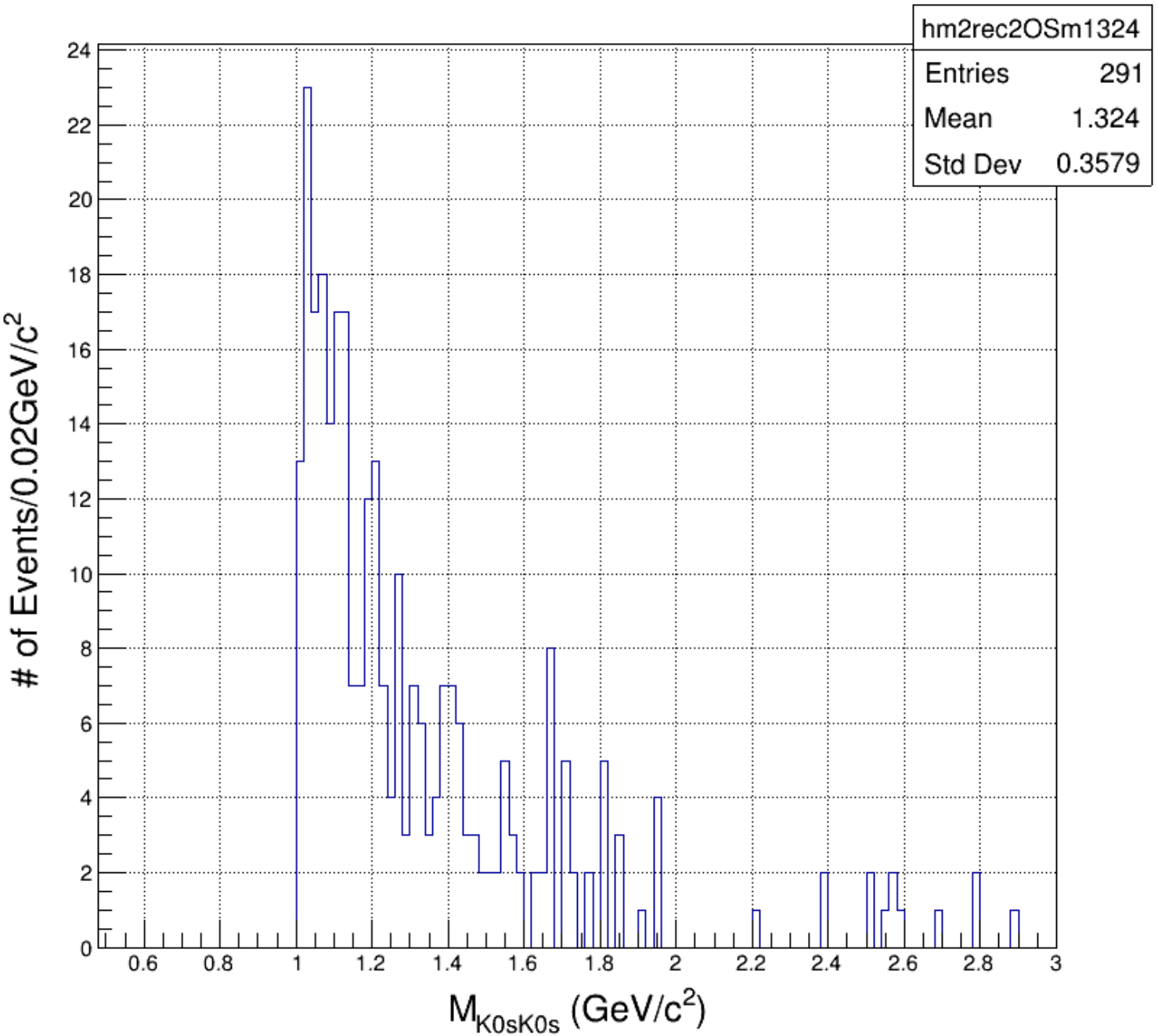
transverse impact parameters

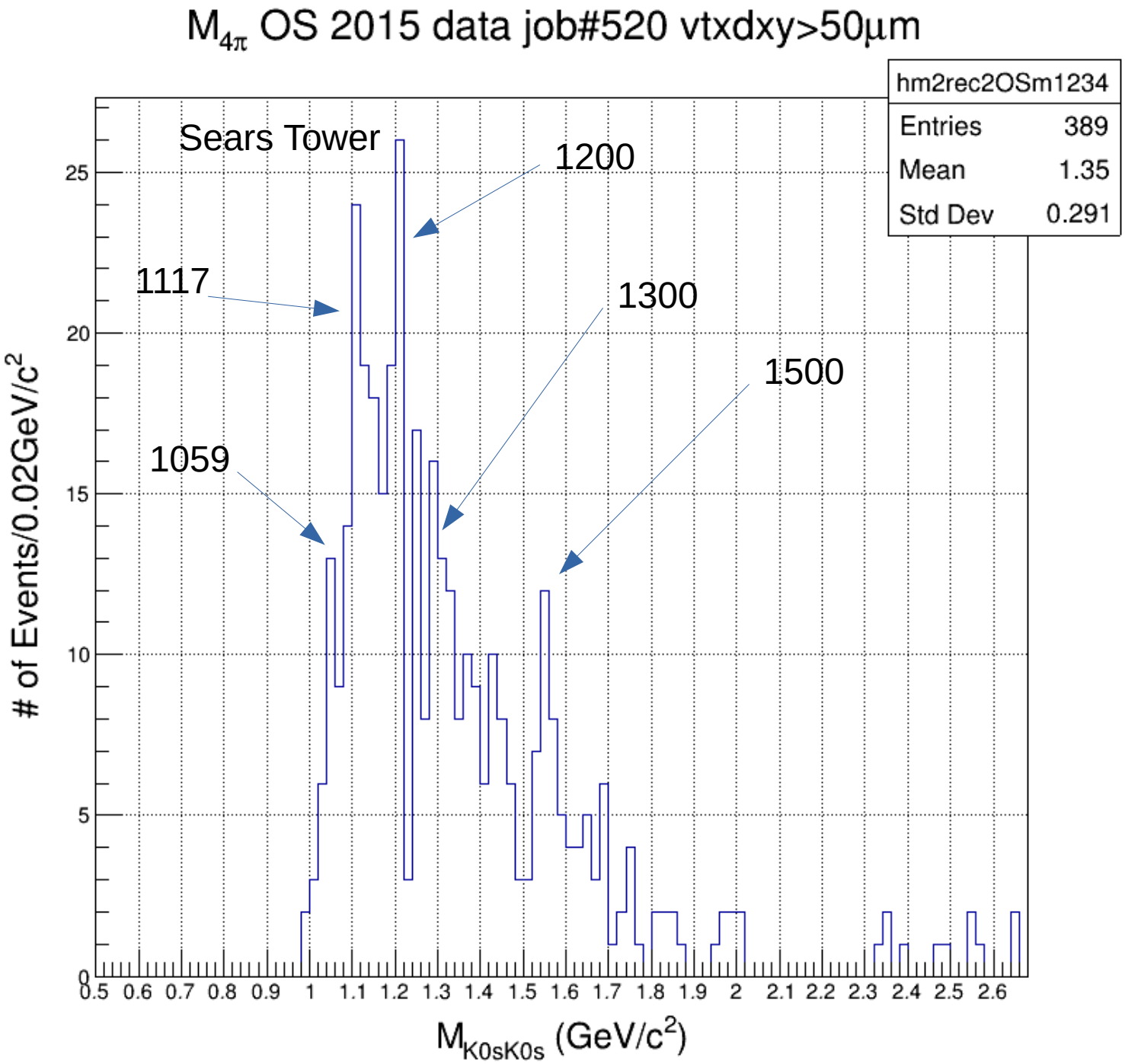


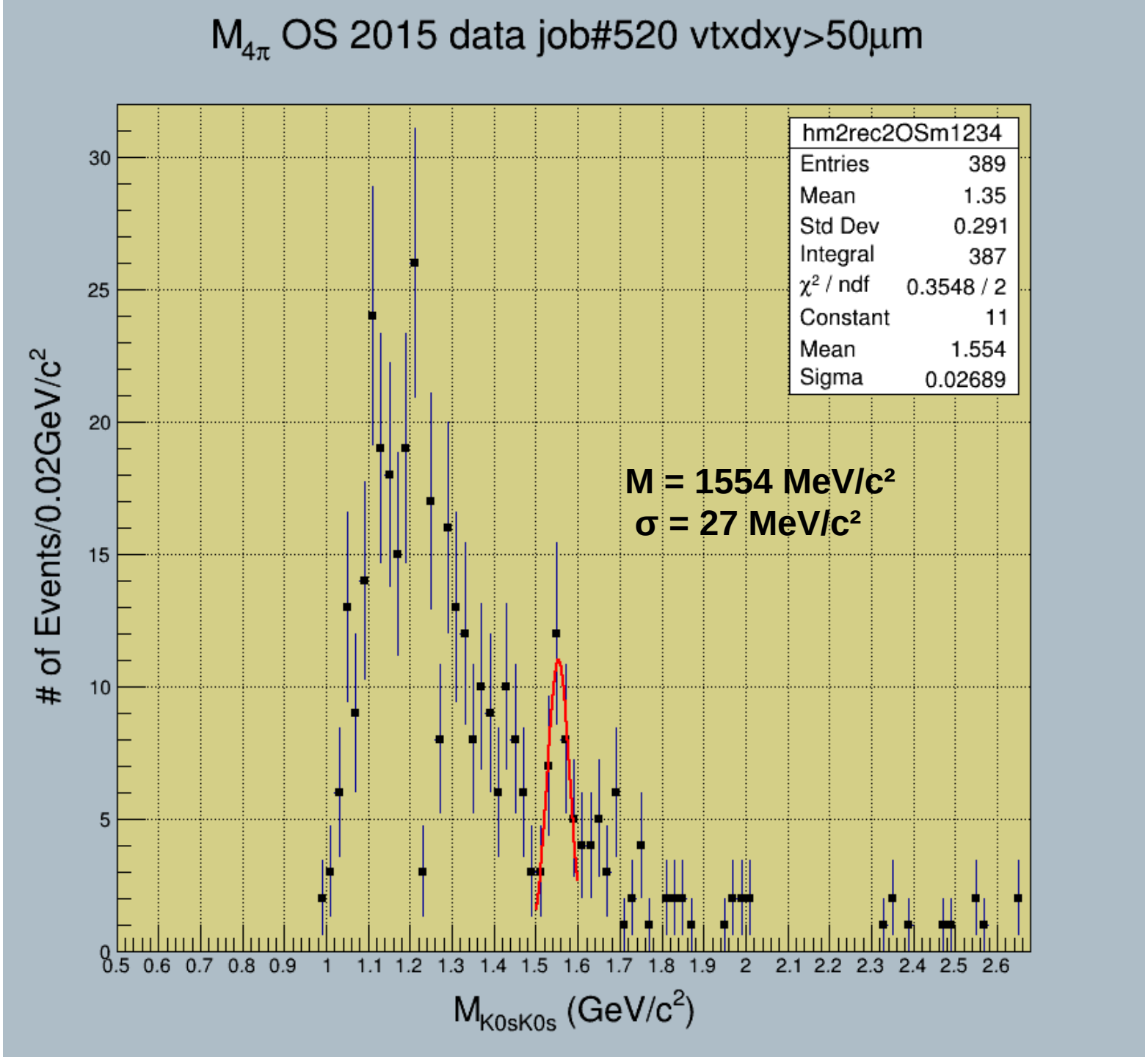


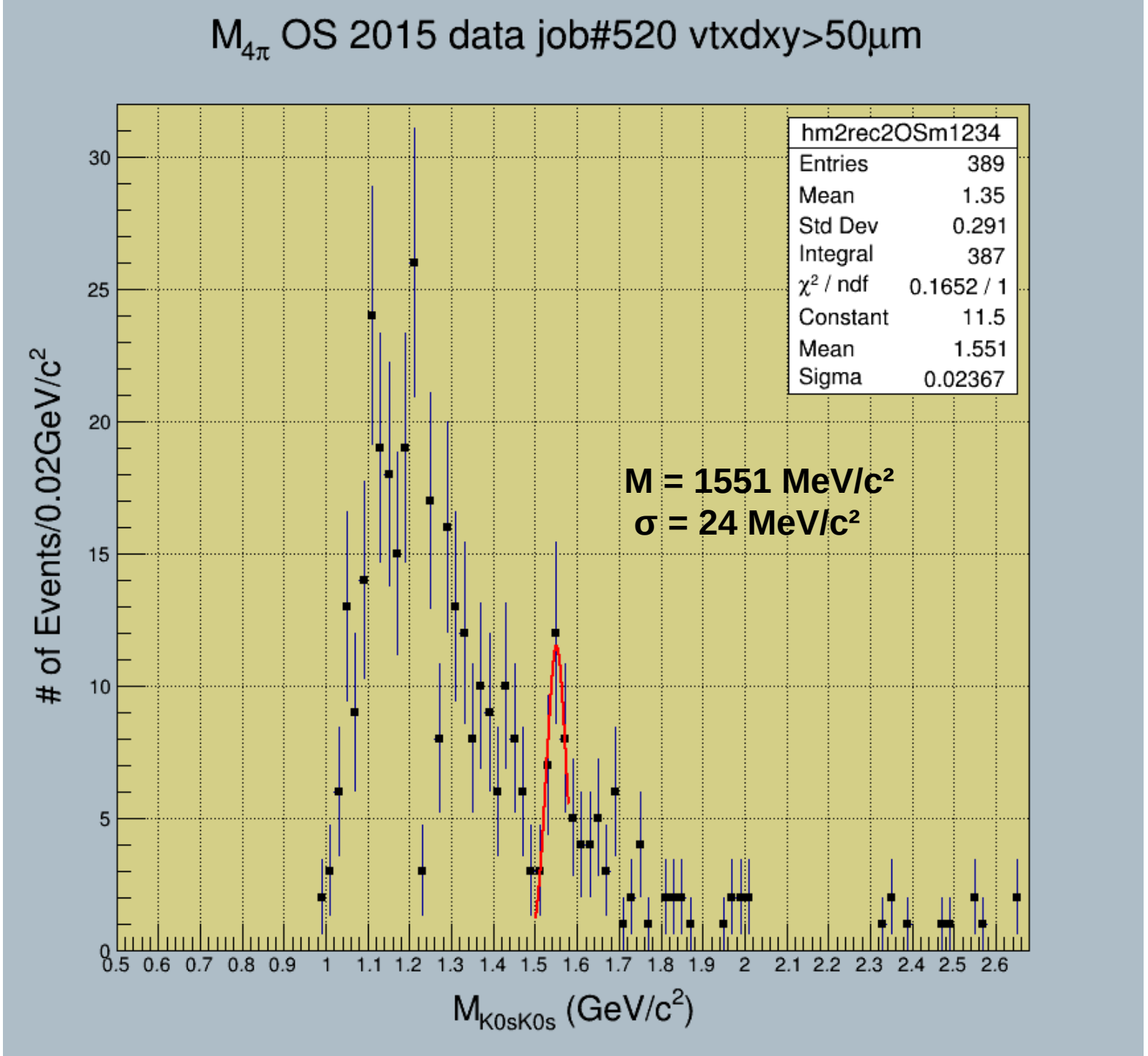





$M_{4\pi}$ OS 2015 data job#520 vtxdxy>50μm
hm2rec2OSm1324
Entries 291
Mean 1.324
Std Dev 0.3579
# of Events/0.02GeV/c^2
M_{K0sK0s} (GeV/c^2)
0 2 4 6 8 10 12 14 16 18 20 22 24
0.6 0.8 1 1.2 1.4 1.6 1.8 2 2.2 2.4 2.6 2.8 3


$M_{4\pi}$ OS 2015 data job#520 vtxdxy>50μm
hm2rec2OSm1234
Entries 389
Mean 1.35
Std Dev 0.291
Sears Tower
1200
1117
1300
1500
1059
# of Events/0.02GeV/c^2
M_{K0sK0s} (GeV/c^2)


$M_{4\pi}$ OS 2015 data job#520 vtxdxy>50μm
hm2rec2OSm1234
Entries 389
Mean 1.35
Std Dev 0.291
Integral 387
χ^2 / ndf 0.3548 / 2
Constant 11
Mean 1.554
Sigma 0.02689
M = 1554 MeV/c²
σ = 27 MeV/c²
# of Events/0.02GeV/c²
M_{K0sK0s} (GeV/c²)


$M_{4\pi}$ OS 2015 data job#520 vtxdxy>50μm
hm2rec2OSm1234
Entries 389
Mean 1.35
Std Dev 0.291
Integral 387
χ^2 / ndf 0.1652 / 1
Constant 11.5
Mean 1.551
Sigma 0.02367
M = 1551 MeV/c²
σ = 24 MeV/c²
# of Events/0.02GeV/c²
M_{K0sK0s} (GeV/c²)