Central Tracker Benchmark: $\bar{p}p \longrightarrow n(\pi^+\pi^-)$ (n=1,2)

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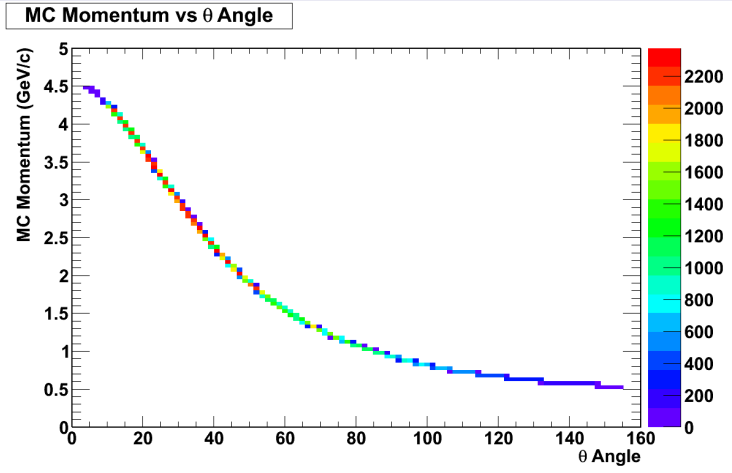


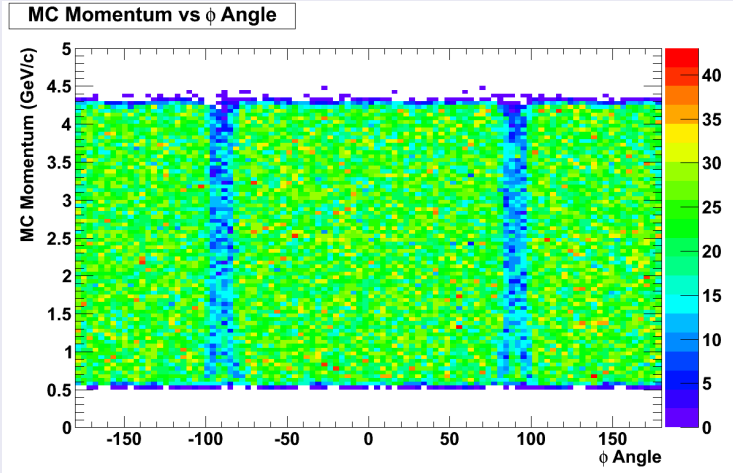


$$\bar{p}p \longrightarrow \pi^+\pi^-$$

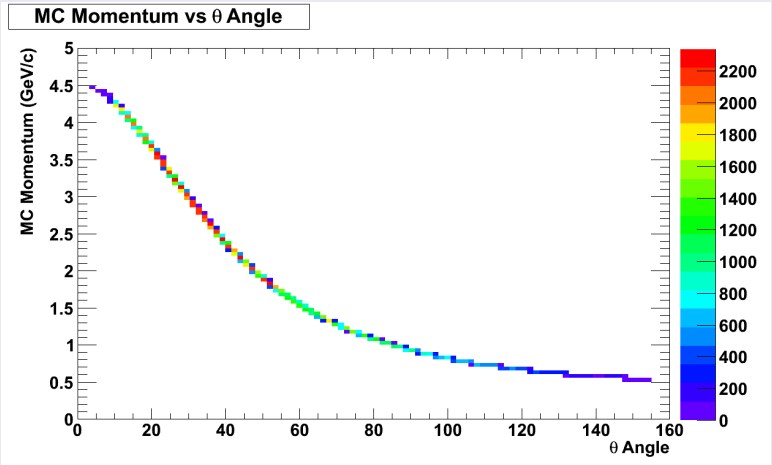
Single pion track reconstruction

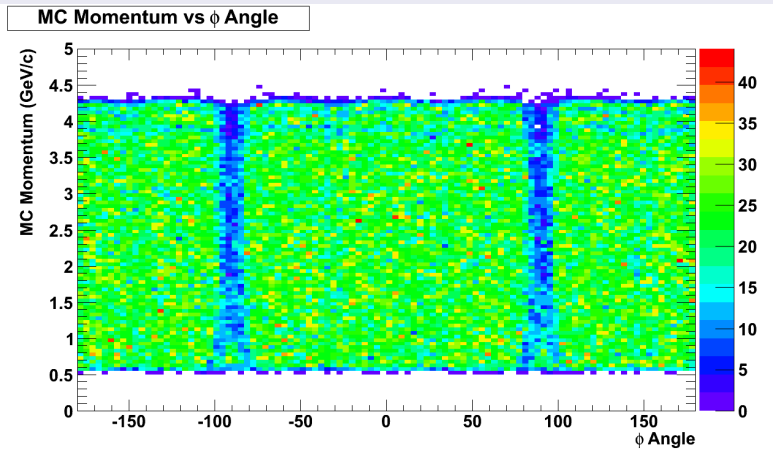
No clean up (Run906)





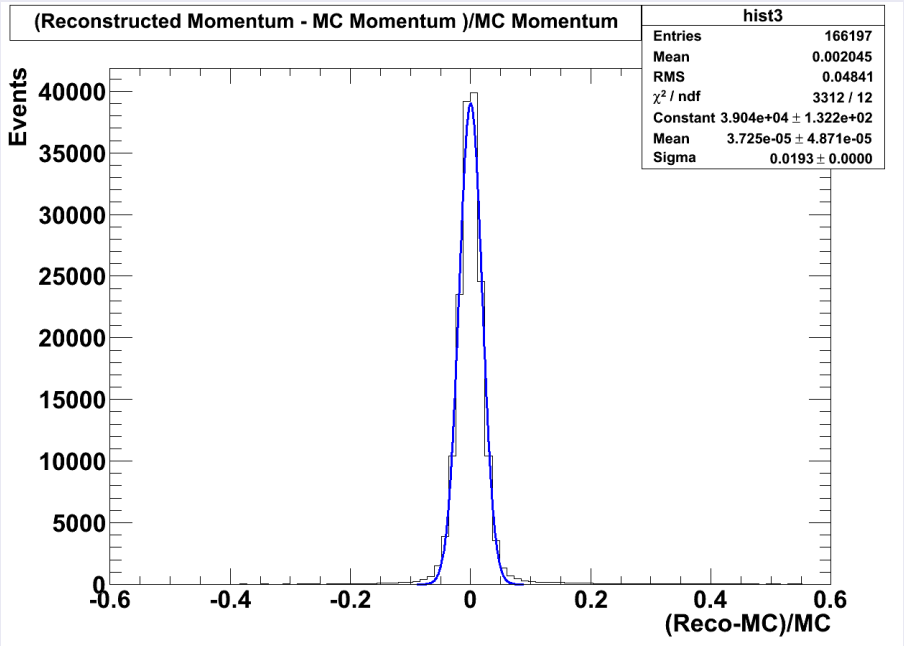
Clean up (Run906cu)





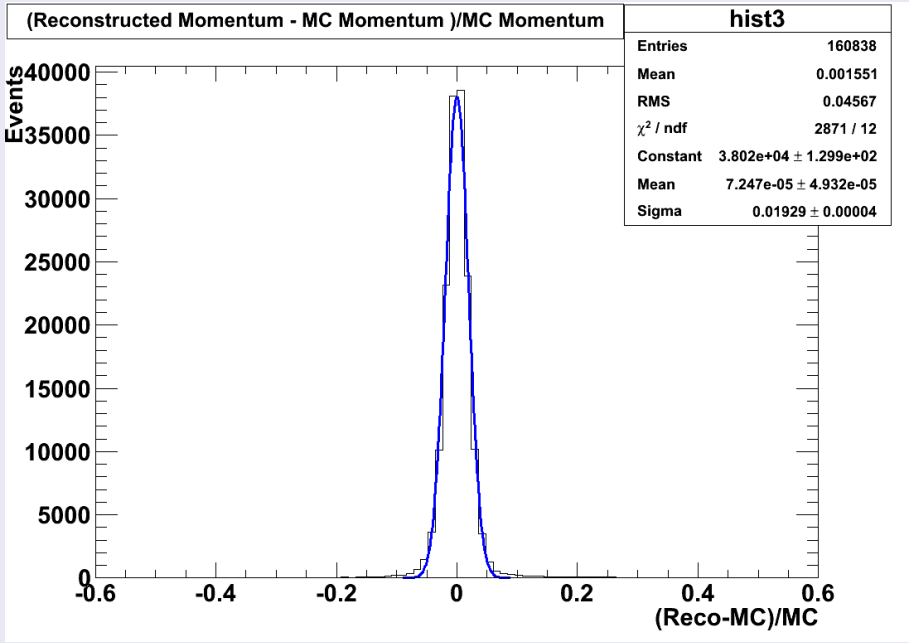
Single pion track reconstruction

No clean up (Run906)



Resolution: (1.9±0.02)%

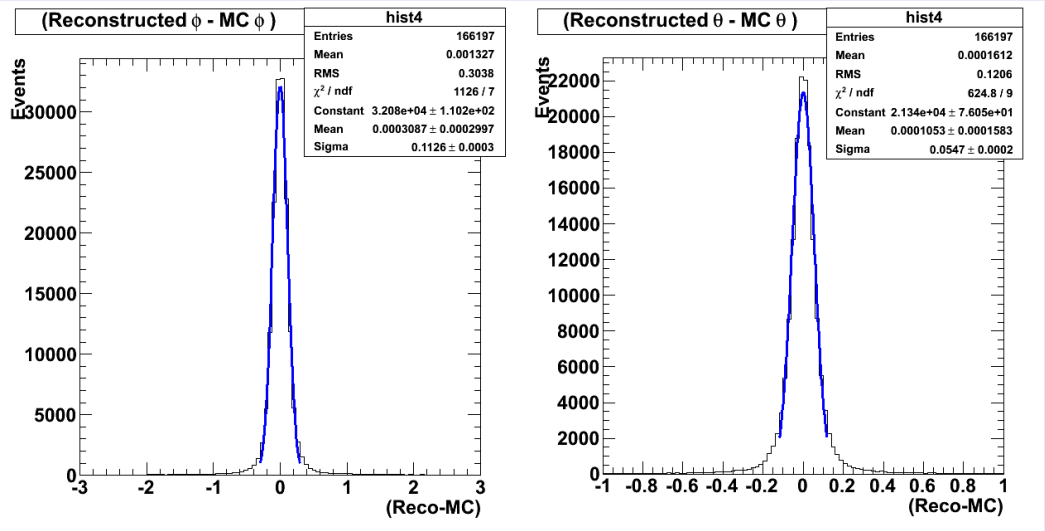
Clean up (Run906cu)



Resolution: (1.9±0.01)%

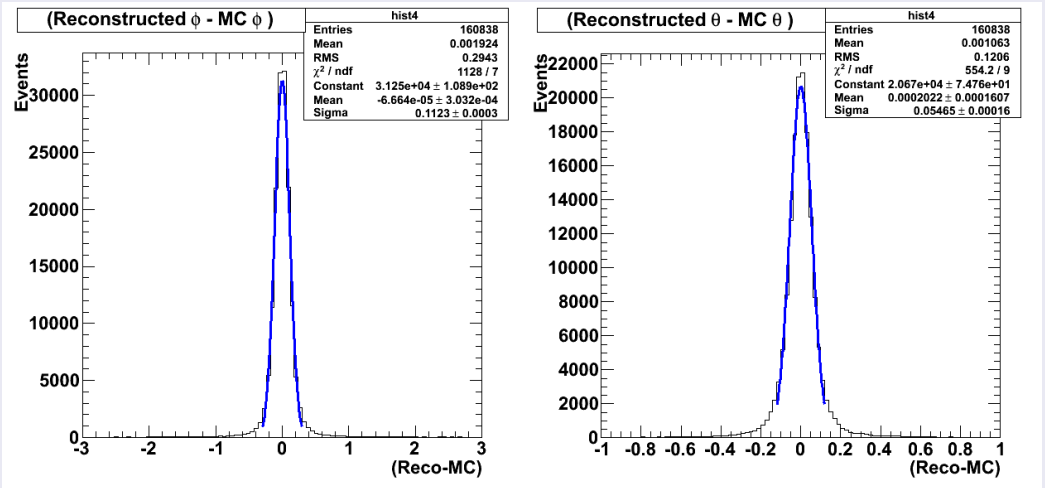
θ, ϕ resolution

No clean up (Run906)



$\sigma(\phi)=(0.113\pm0.003)^\circ$
$\sigma(\theta)=(0.054\pm0.002)^\circ$

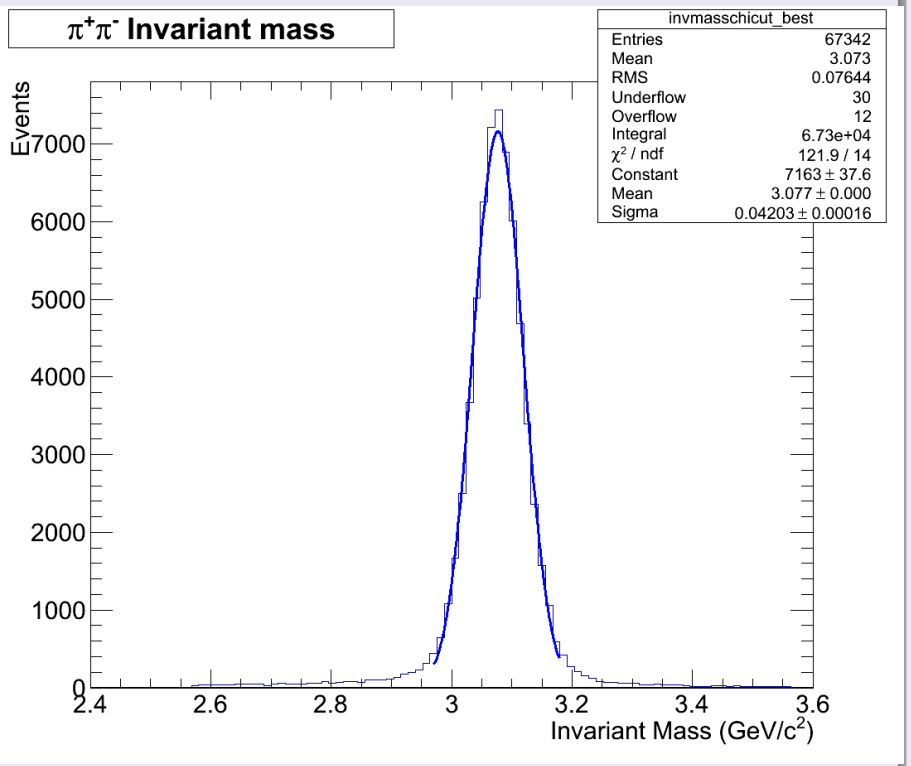
No clean up (Run906)



$\sigma(\phi)=(0.112\pm0.003)^\circ$
$\sigma(\theta)=(0.055\pm0.002)^\circ$

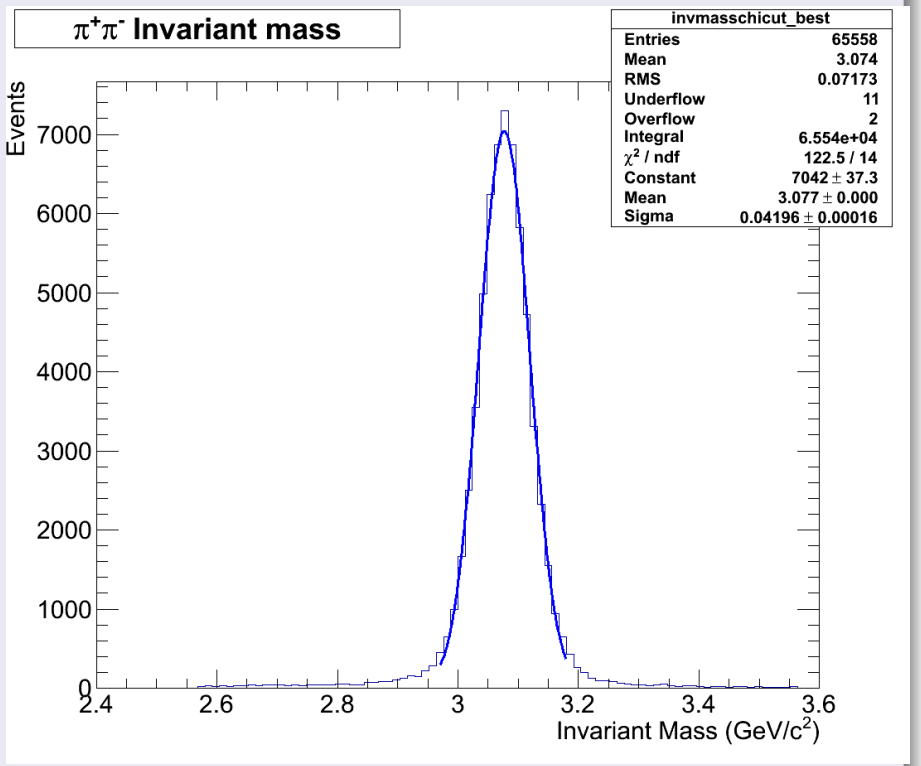
Invariant mass distribution

No clean up (Run906)



Resolution: 42.03±0.16 MeV
Efficiency (67.7±0.3)%

Clean up (Run906cu)

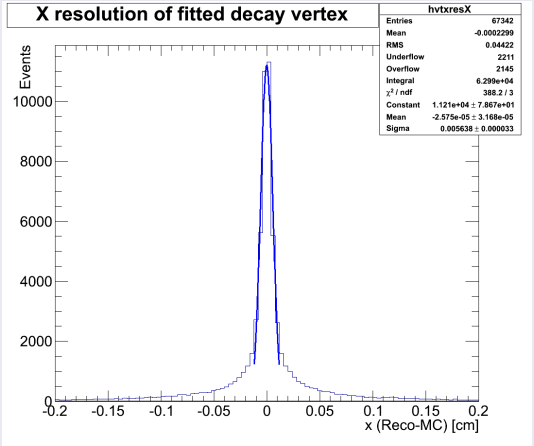


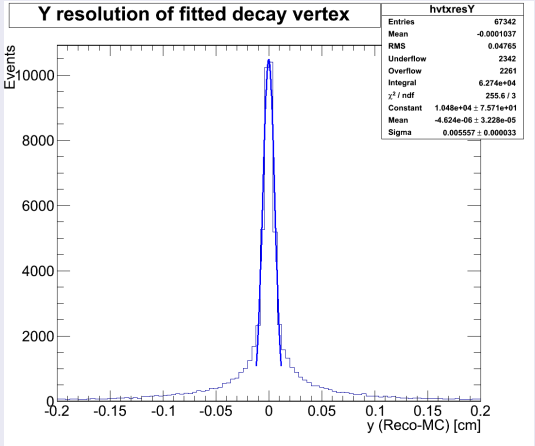
Resolution: 41.96±0.16 MeV
Efficiency (68.6±0.3)%

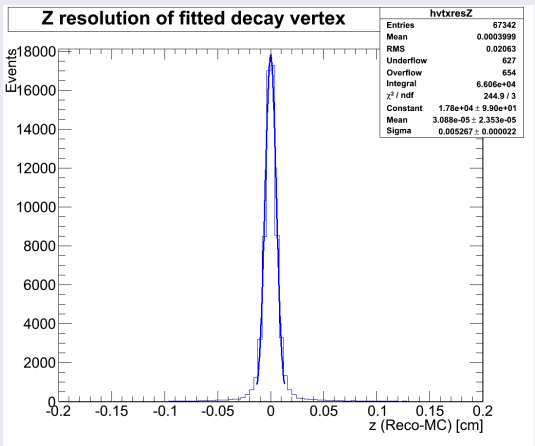
Efficiency=Number of reconstructed events/ number of generated events.
Run906: Number of generated events: 99500
Run906cu: Number of generated events: 95500

Vertex resolution

No clean up (Run906)

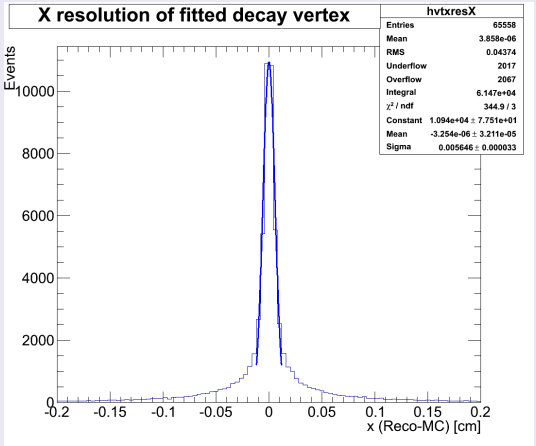


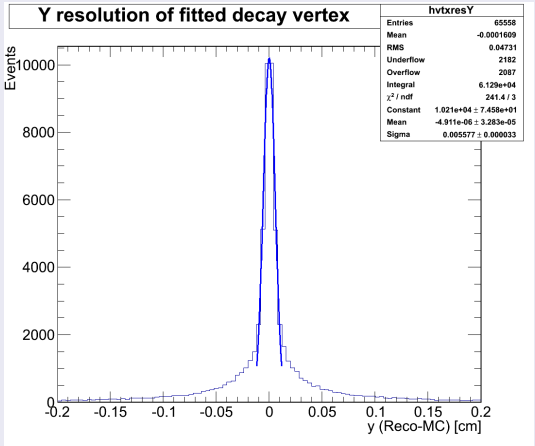


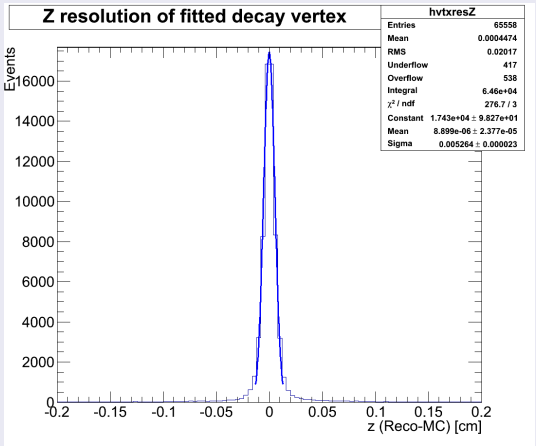


σ_x :(56.38±0.33) μm; σ_y :(55.57±0.33) μm; σ_z :(52.67±0.22) μm;

Clean up (Run906cu)







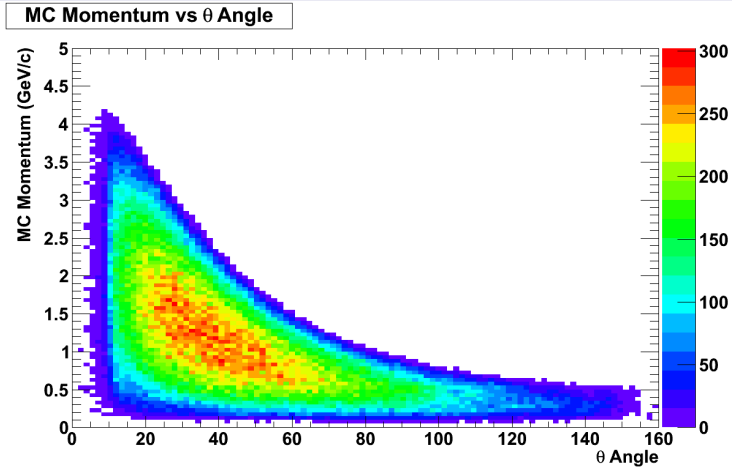
σ_x :(56.46±0.33) μm; σ_y :(55.77±0.33) μm; σ_z :(52.64±0.23) μm;

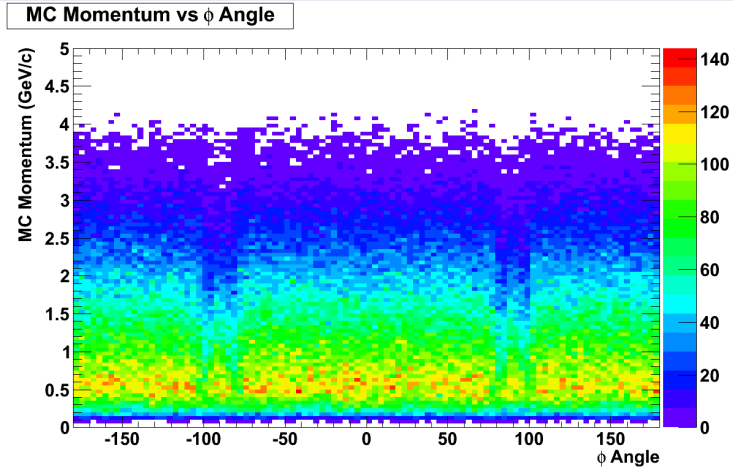


$$\bar{p}p \longrightarrow \pi^+\pi^-\pi^+\pi^-$$

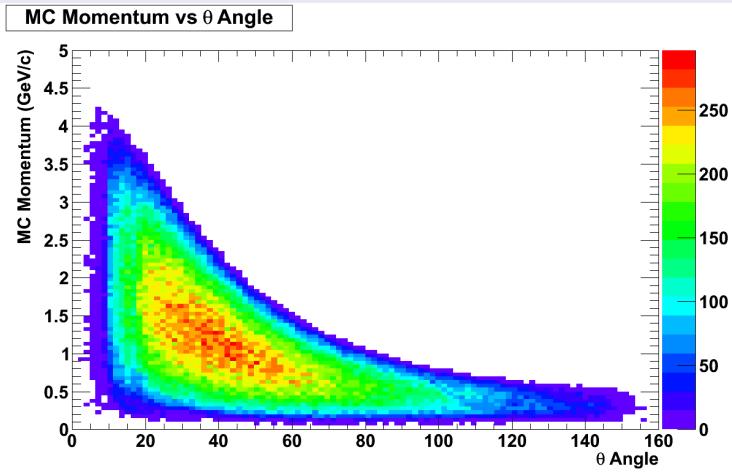
Single pion track reconstruction

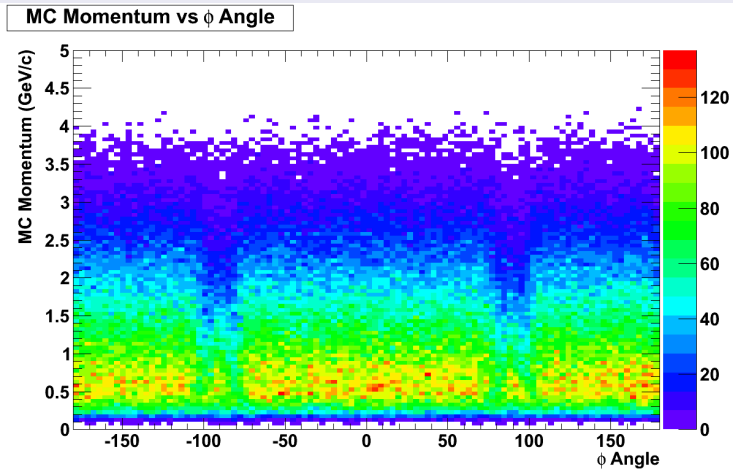
No clean up (Run916)





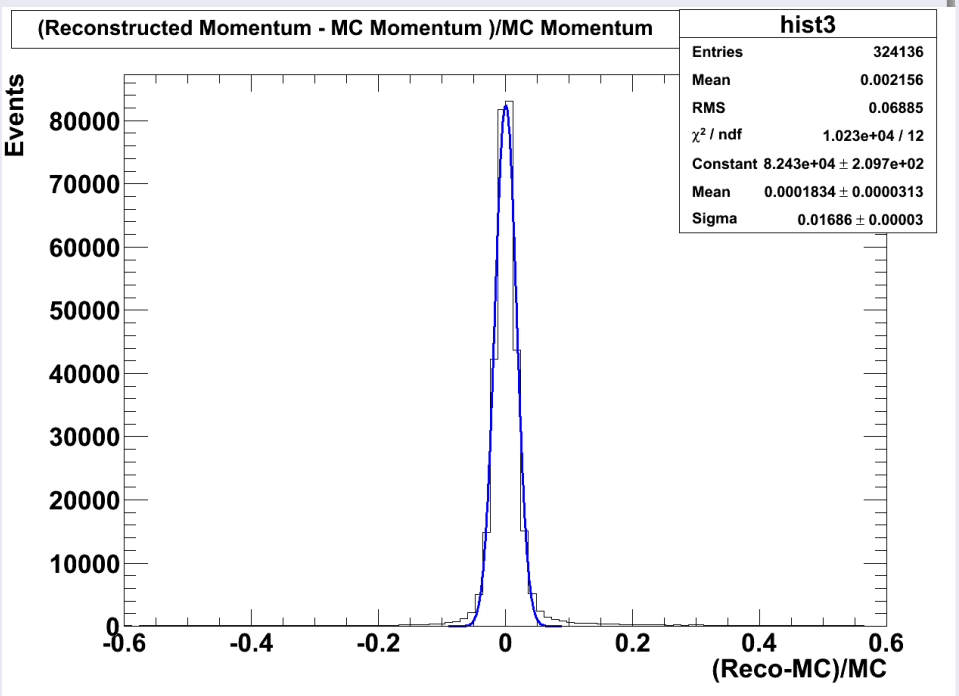
Clean up (Run916cu)





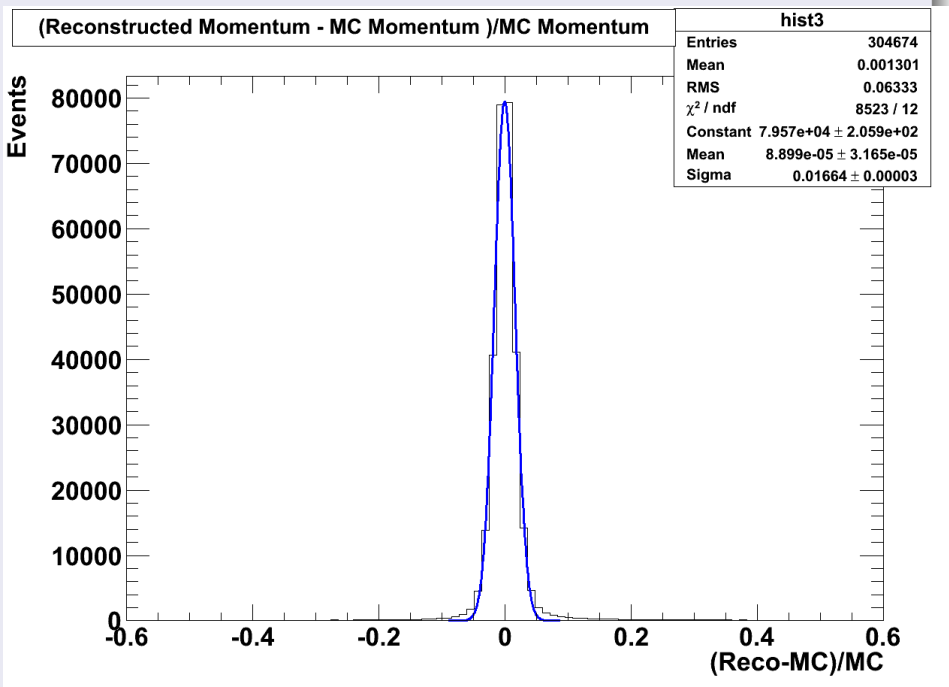
Single pion track reconstruction

No clean up (Run916)



Resolution: (1.7±0.01)%

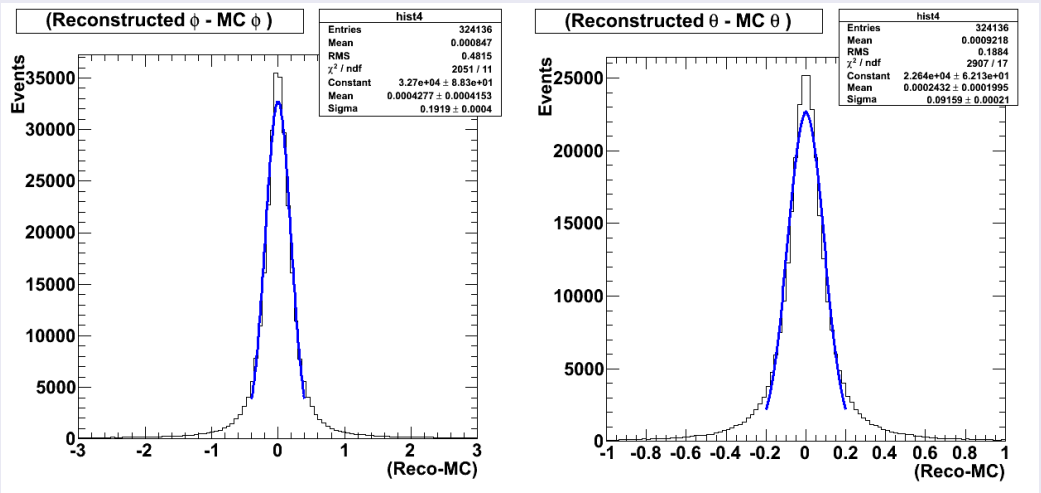
Clean up (Run916cu)



Resolution: (1.7±0.01)%

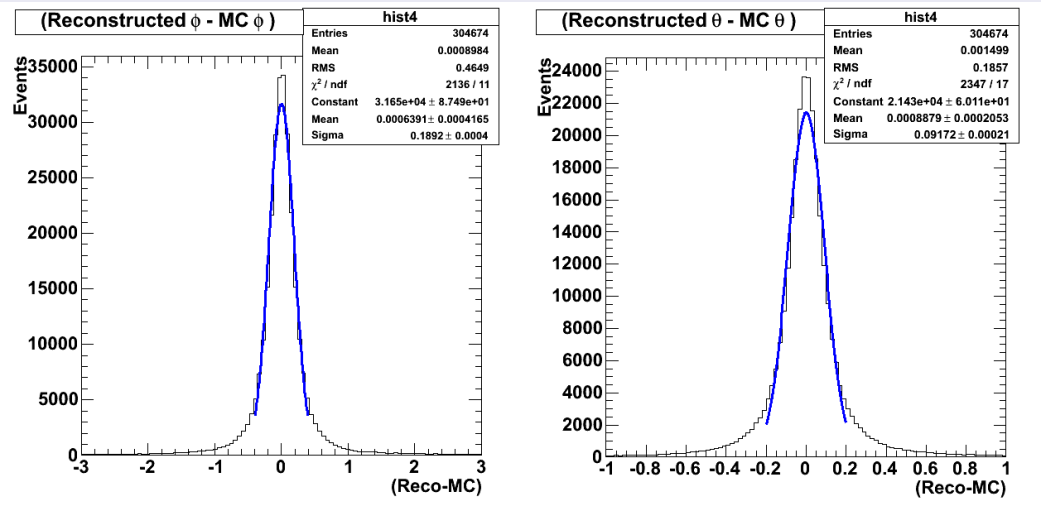
θ, ϕ resolution

No clean up (Run916)



$\sigma(\phi)=(0.191\pm0.001)^\circ$
$\sigma(\theta)=(0.091\pm0.001)^\circ$

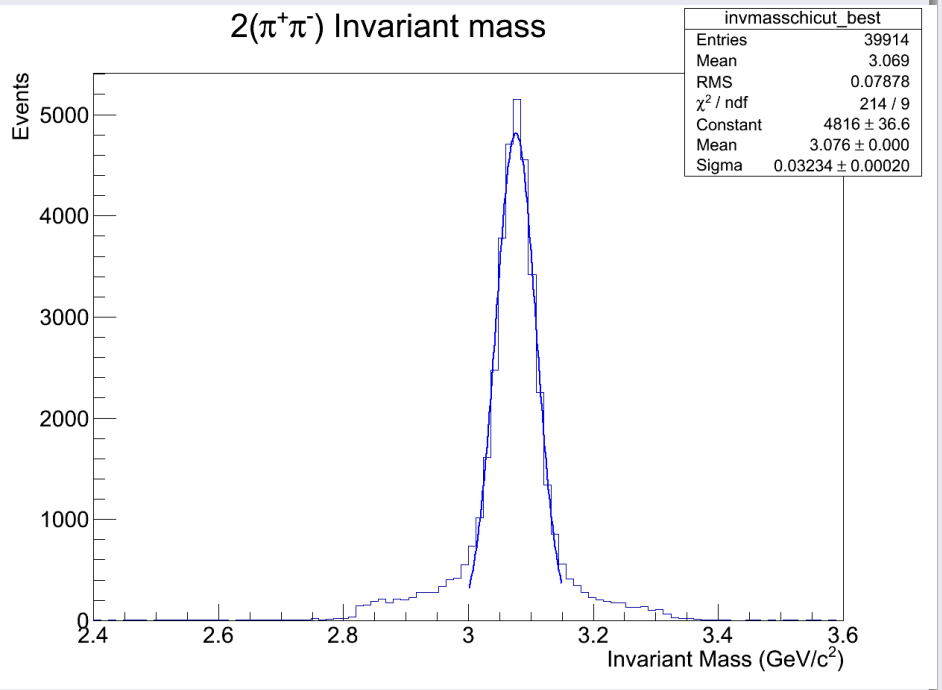
No clean up (Run916)



$\sigma(\phi)=(0.189\pm0.001)^\circ$
$\sigma(\theta)=(0.091\pm0.001)^\circ$

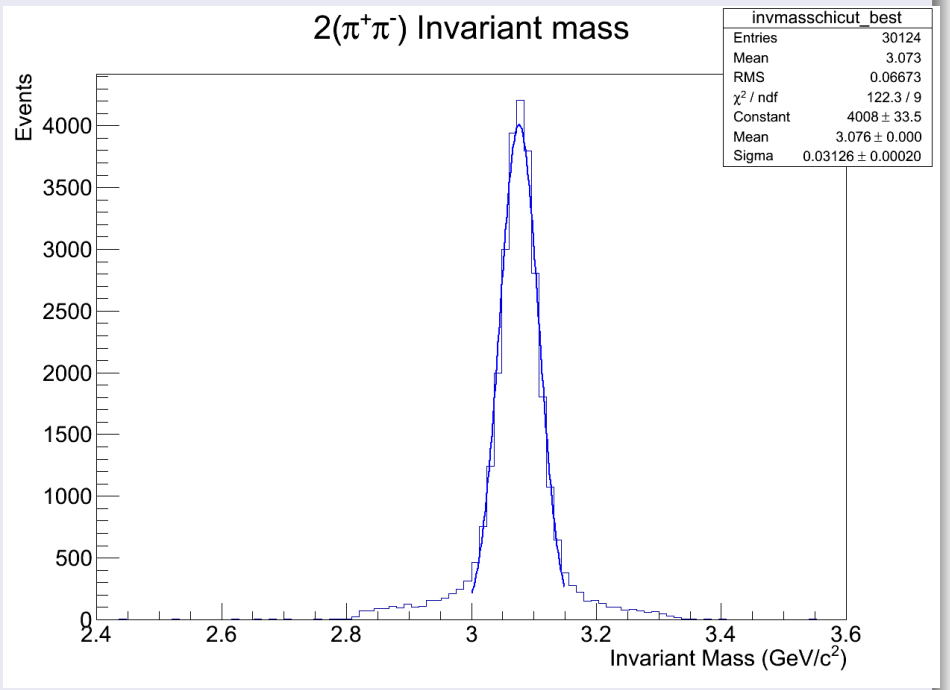
Invariant mass distribution

No clean up (Run916)



Resolution: 32.34±0.2 MeV
Efficiency (39.91±0.2)%

Clean up (Run916cu)

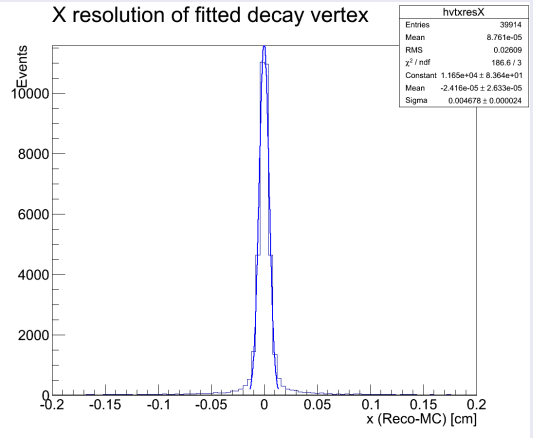


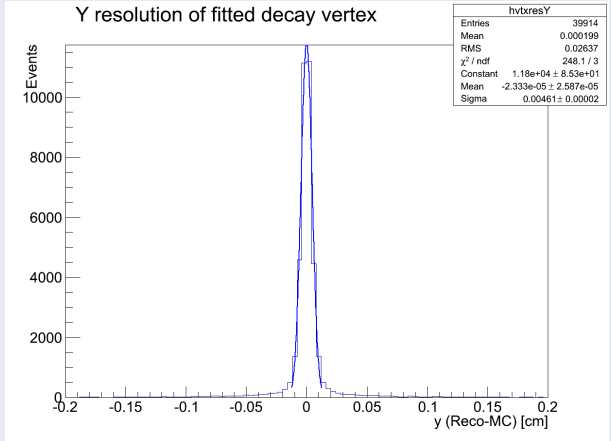
Resolution: 31.26±0.2 MeV
Efficiency (30.12±0.2)%

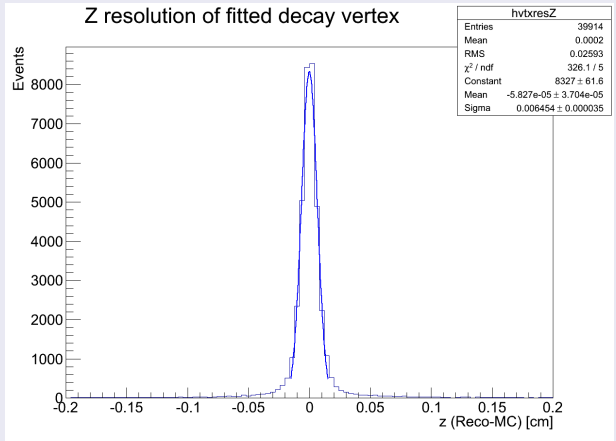
Efficiency=Number of reconstructed events/ number of generated events.
Run916: Number of generated events: 100000
Run916cu: Number of generated events: 100000

Vertex resolution

No clean up (Run916)

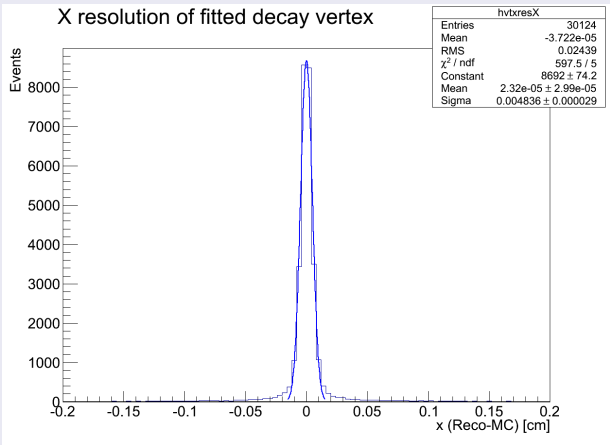


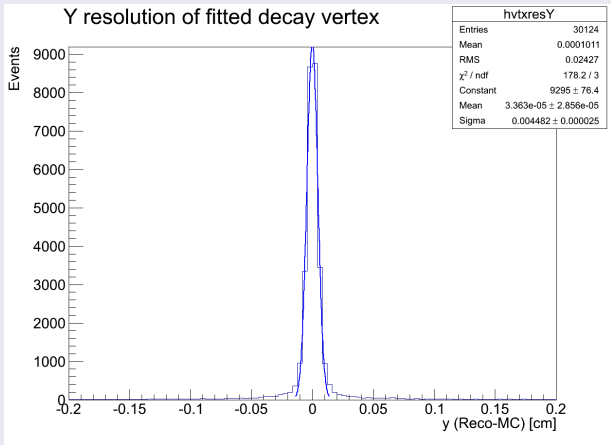


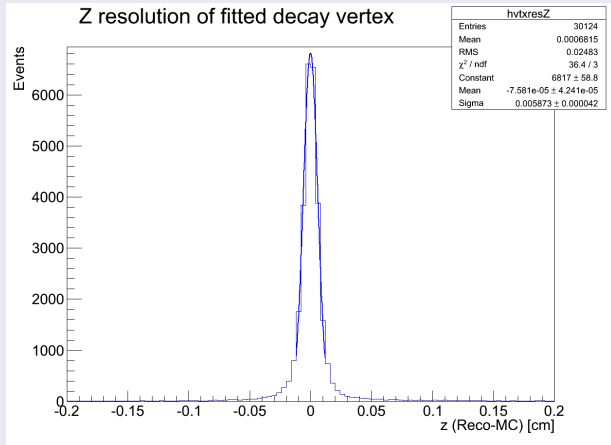


σ_x :(46.78±0.24) μm; σ_y :(46.10±0.20) μm; σ_z :(64.54±0.35) μm;

Clean up (Run916cu)







σ_x :(48.36±0.29) μm; σ_y :(44.82±0.25) μm; σ_z :(58.73±0.42) μm;

Outlook

$\bar{p}p \longrightarrow \pi^+\pi^-$	No clean up	Clean up
Single track resolution	(1.9± 0.02)%	(1.9±0.01)%
θ resolution	(0.054±0.002)°	(0.055±0.002)°
ϕ resolution	(0.113±0.003)°	(0.112±0.003)°
Invariant mass resolution	(42.03±0.16) MeV	(41.96±0.16) MeV
Invariant mass efficiency	(67.7±0.3)%	(68.6±0.3)%
Vertex: X resolution	(56.38±0.33) μm	(56.46±0.33) μm
Vertex: Y resolution	(55.57±0.33) μm	(55.77±0.33) μm
Vertex: Z resolution	(52.67±0.22) μm	(52.64±0.23) μm

$\bar{p}p \longrightarrow \pi^+\pi^-\pi^+\pi^-$	No clean up	Clean up
Single track resolution	(1.7±0.01)%	(1.7±0.01)%
θ resolution	(0.091±0.001)°	(0.091±0.001)°
ϕ resolution	(0.191±0.001)°	(0.189±0.001)°
Invariant mass resolution	(32.34±0.2) MeV	(31.26±0.2) MeV
Invariant mass efficiency	(39.91±0.2)%	(30.12±0.2)%
Vertex: X resolution	(46.78±0.24)μm	(48.36±0.3)μm
Vertex: Y resolution	(46.10±0.20)μm	(44.82±0.3)μm
Vertex: Z resolution	(64.54±0.35)μm	(58.73±0.4)μm