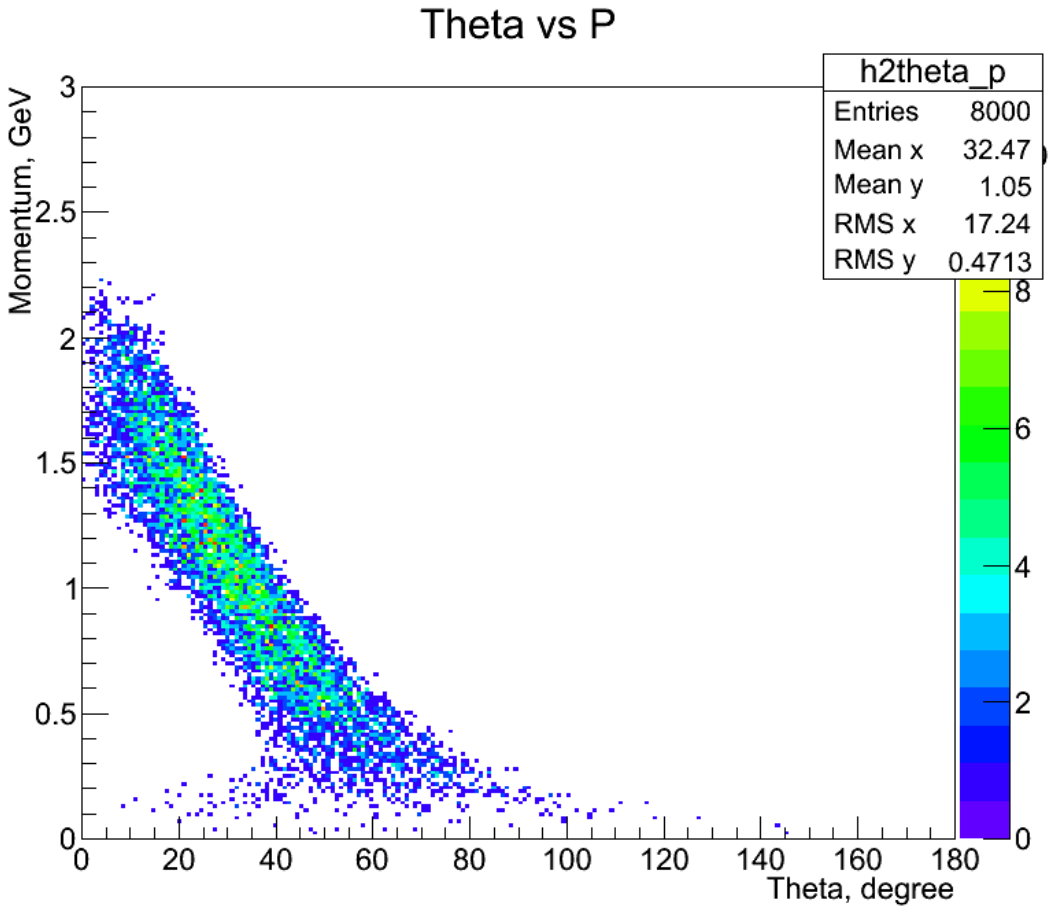
Kinematics of the reaction

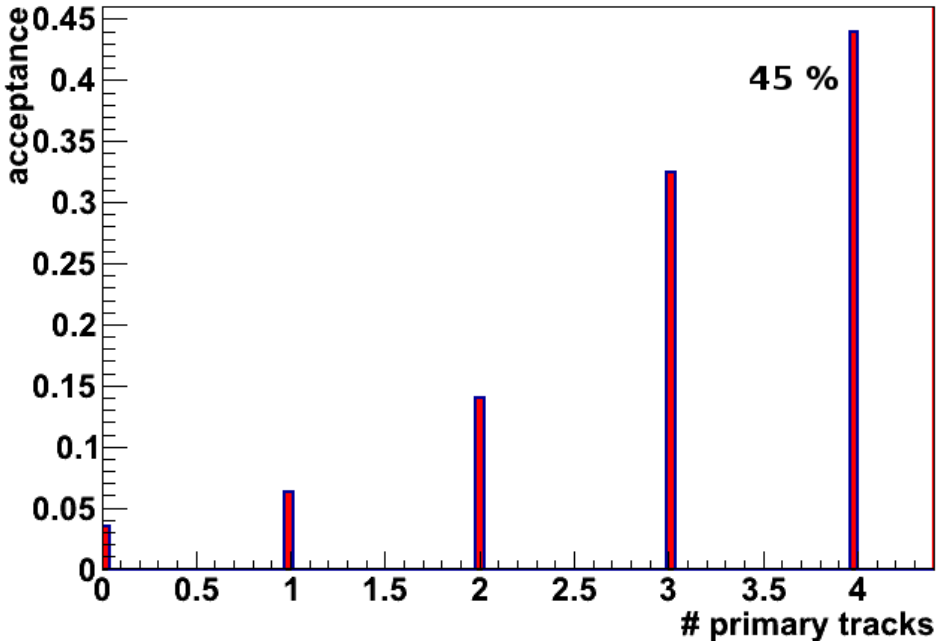
$$p\bar{p} \rightarrow \eta_c \rightarrow \phi\phi \rightarrow K^+K^-K^+K^-,$$

E_{CM}=2980 MeV, p_z=3677 MeV

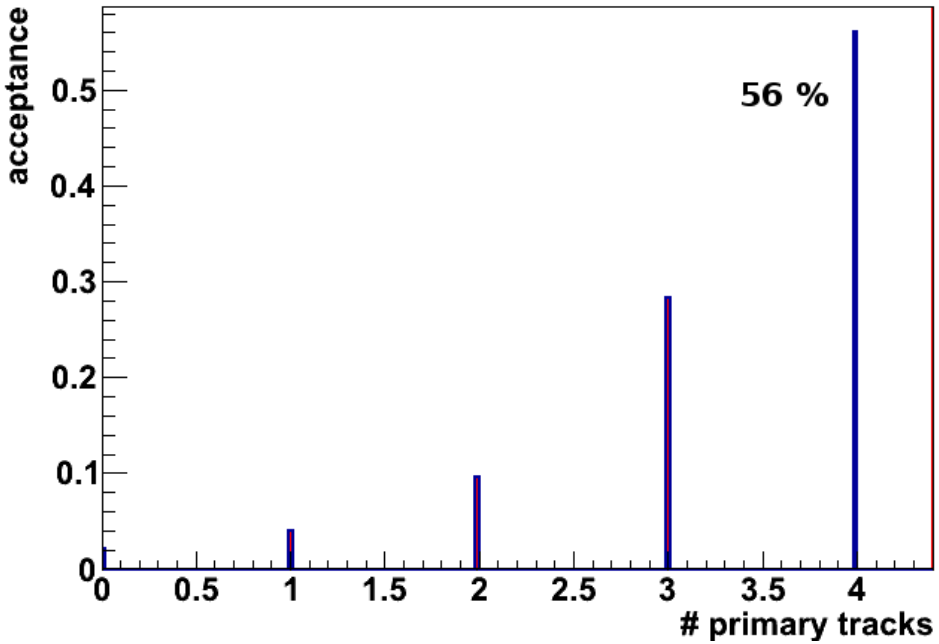


Geometrical acceptance

STT



TPC



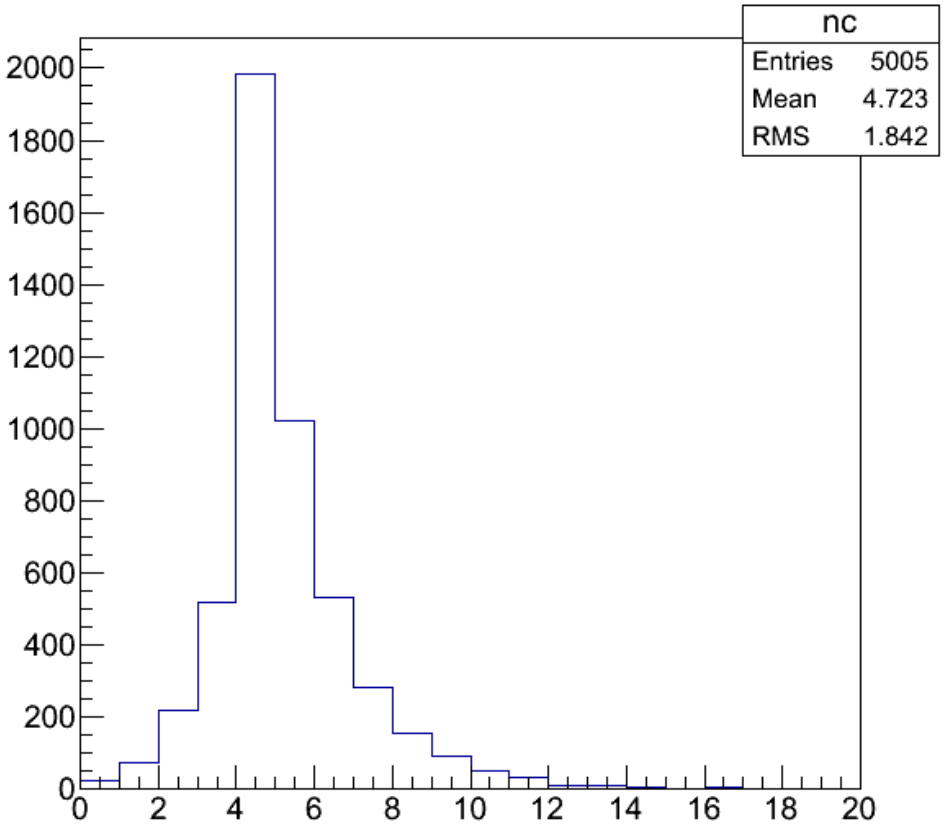
Analyzis

5k TPC events with latest trunk version, and 5k+5k STT events (without last night update) with/without cleanup

- Charged candidates with opposite charge are combined to ϕ candidate with ϕ mass preselection $1.02 \pm 0.1 GeV$
- Vertex fit is performed and best η_c candidate in each event is selected by minimal χ^2.
- Events with ϕ candidate within mass window: $1.00 GeV < m(K+K-) < 1.04 GeV$ are selected
- η_c mass window [2.90;3.06] GeV

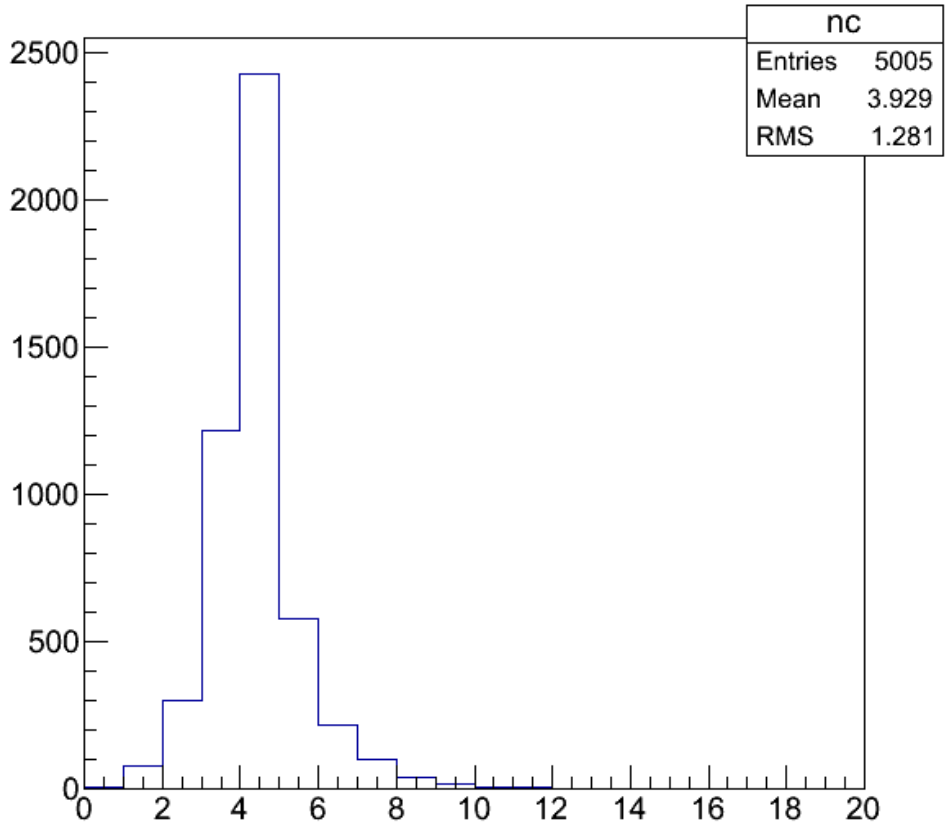
Number of reconstructed charged tracks

STT
n charged



84% >=4 tracks

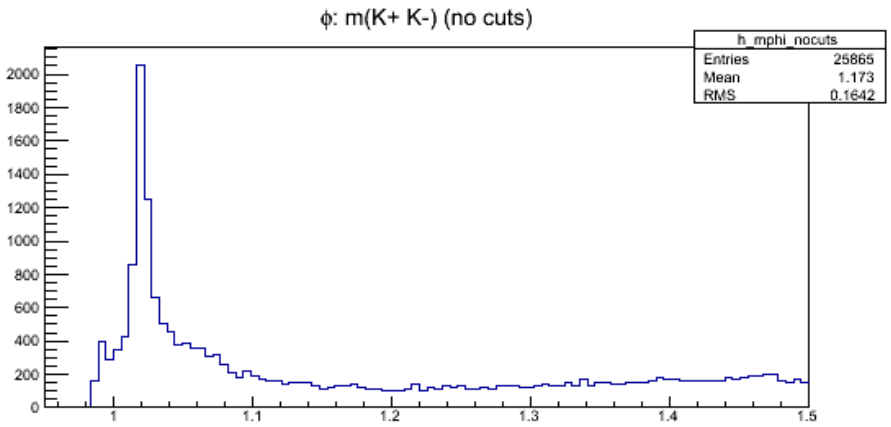
TPC
n charged

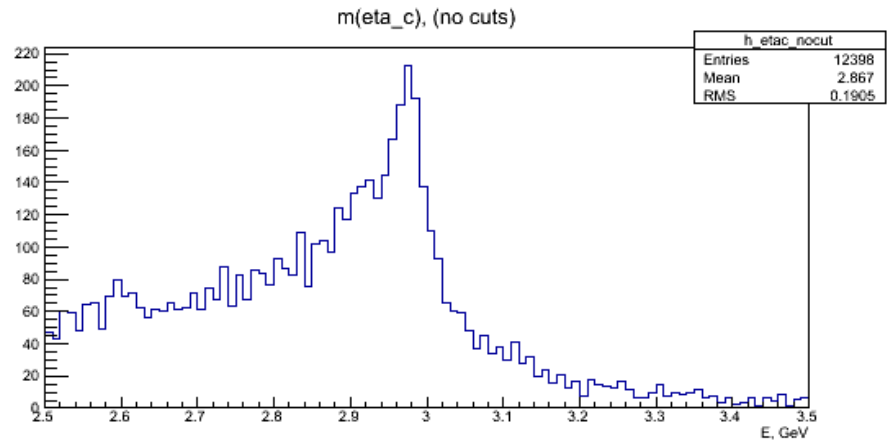


68% >=4 tracks

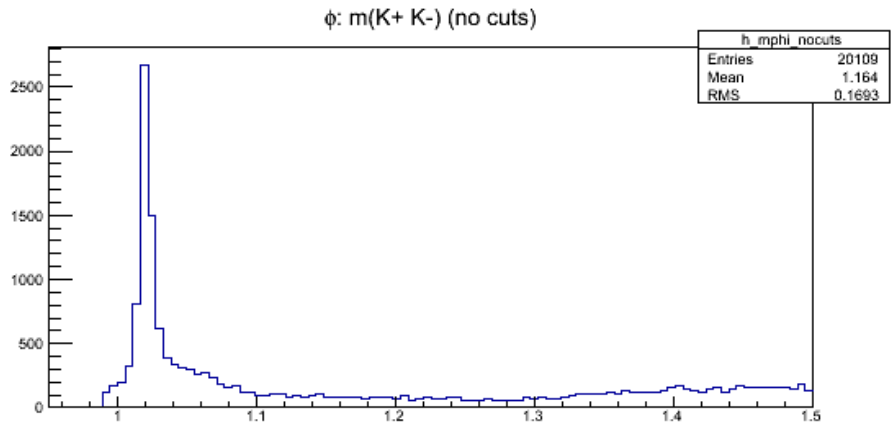
Invaraint mass (No cuts applied)

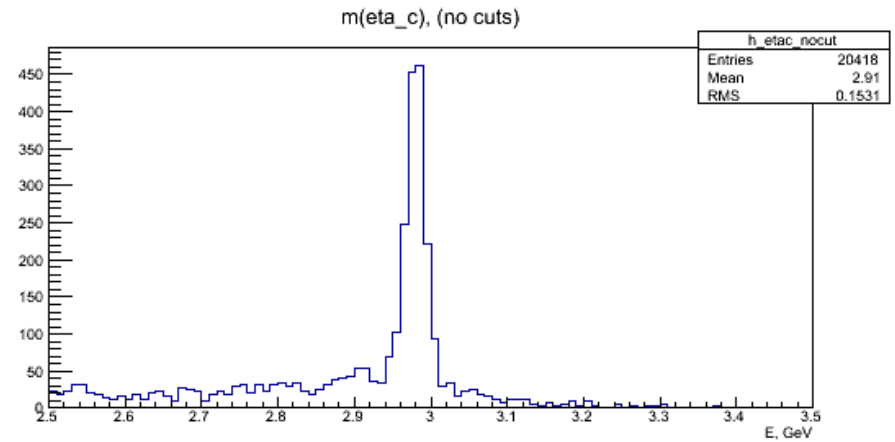
STT





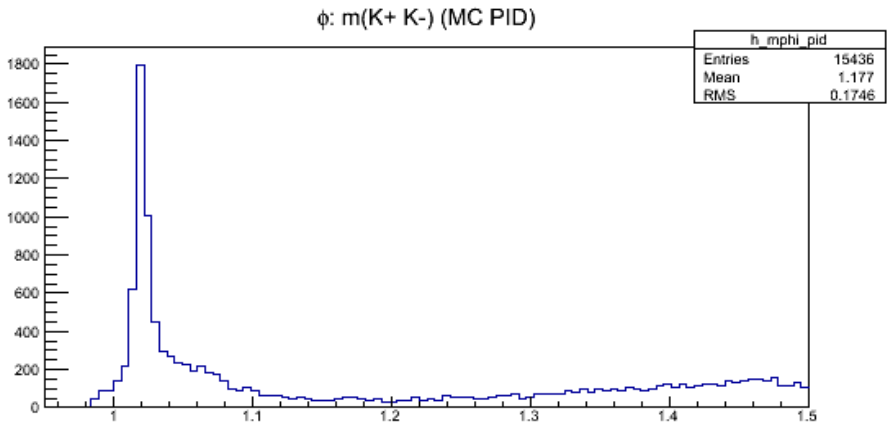
TPC

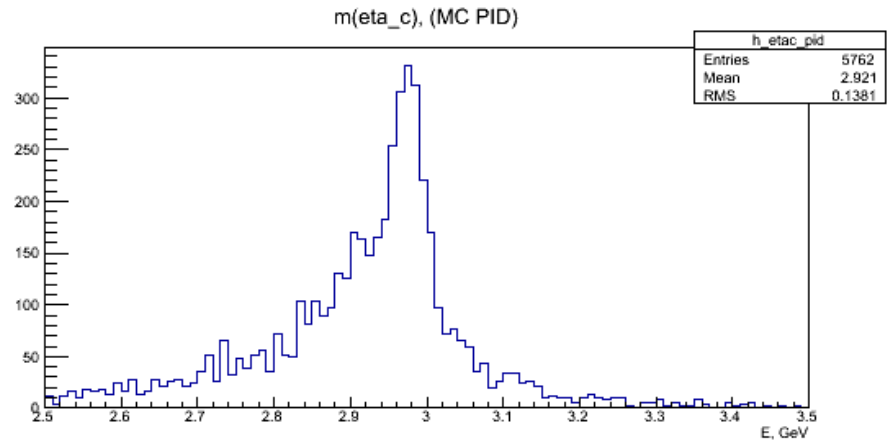




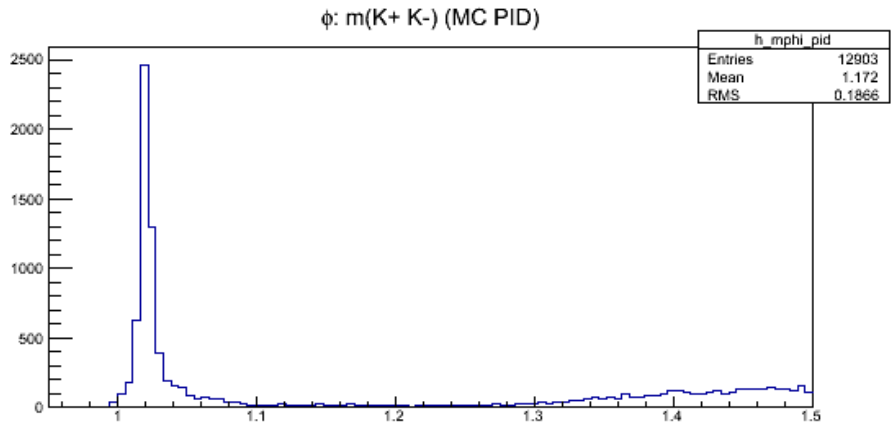
Monte Carlo based PID

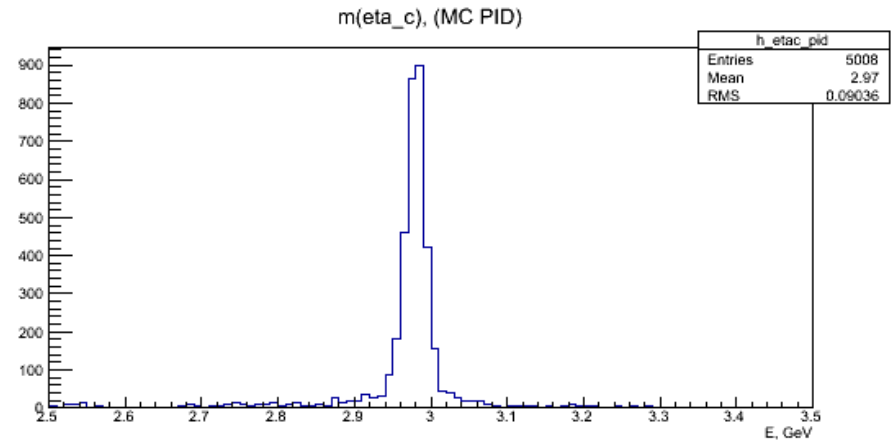
STT





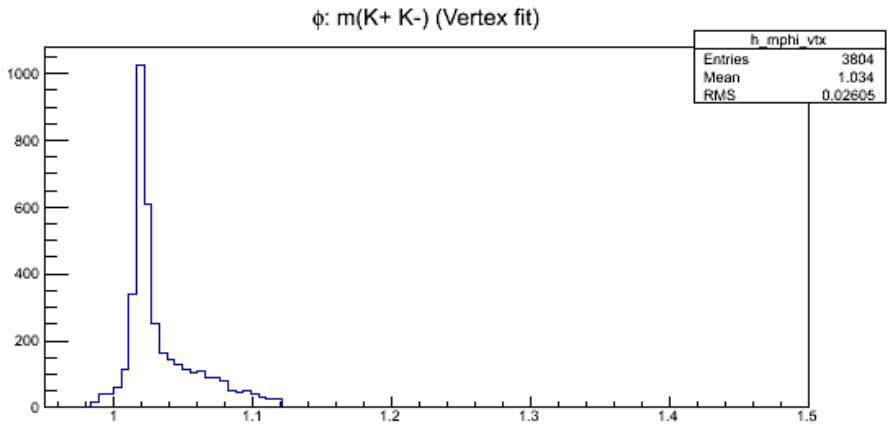
TPC

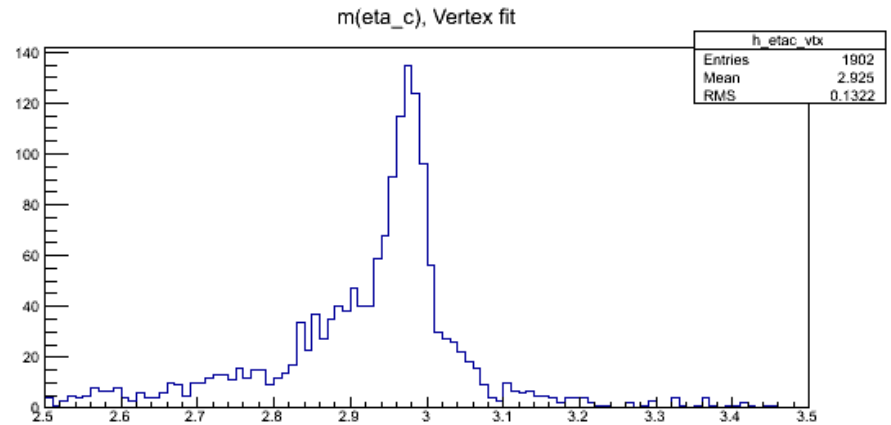




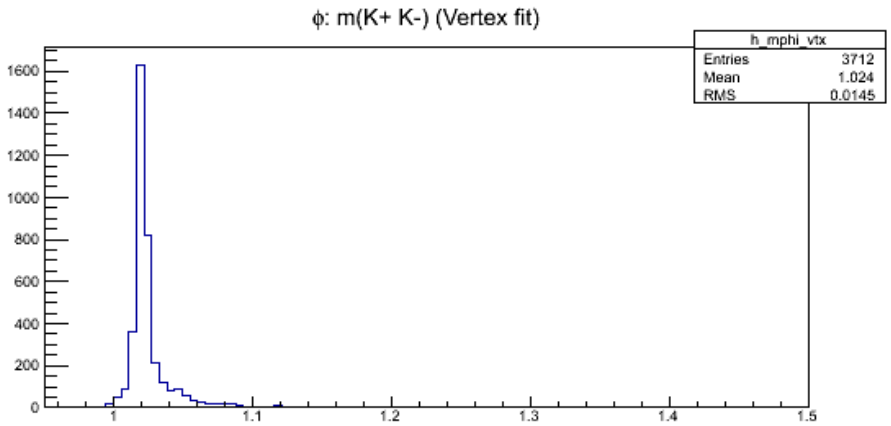
Best candidate from vertex fit

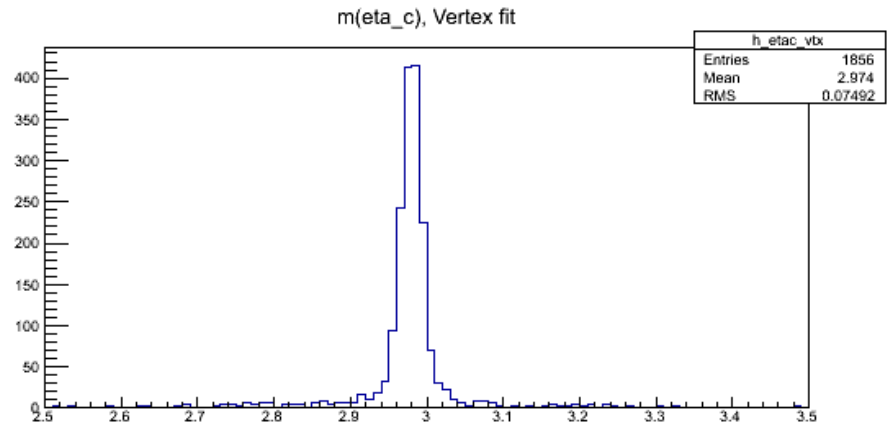
STT





TPC





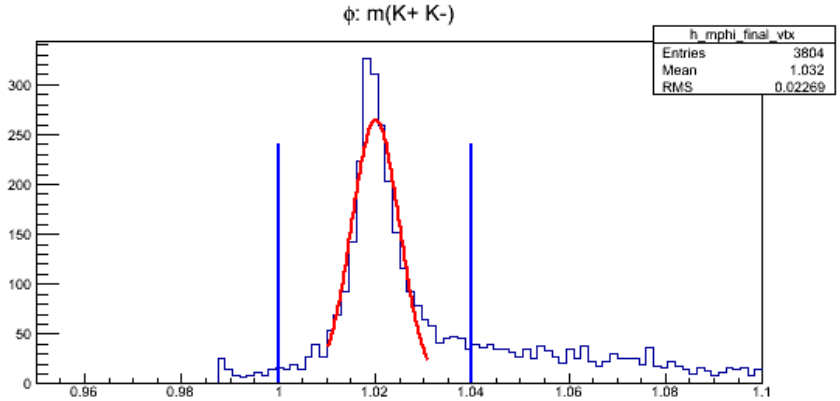
Peak fit procedure

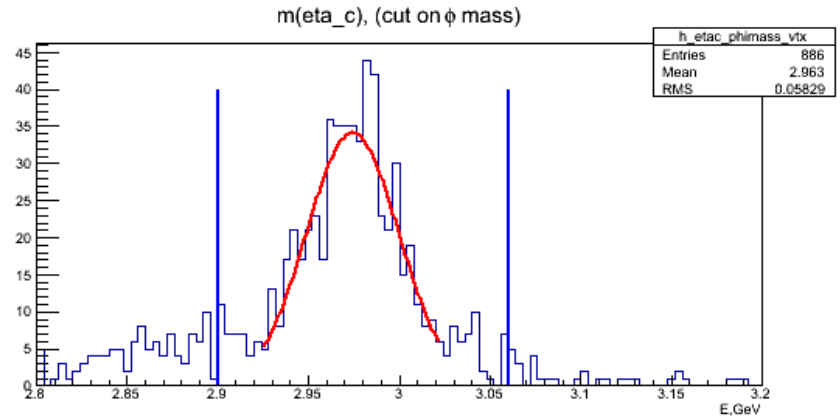
Two step peak fit:

- First fit with a gaus and extraction of μ, σ
- Second fit with a gaus in the range [μ-1.6*σ,μ+1.6*σ] to extract peak width σ_2

Cut on invariant mass

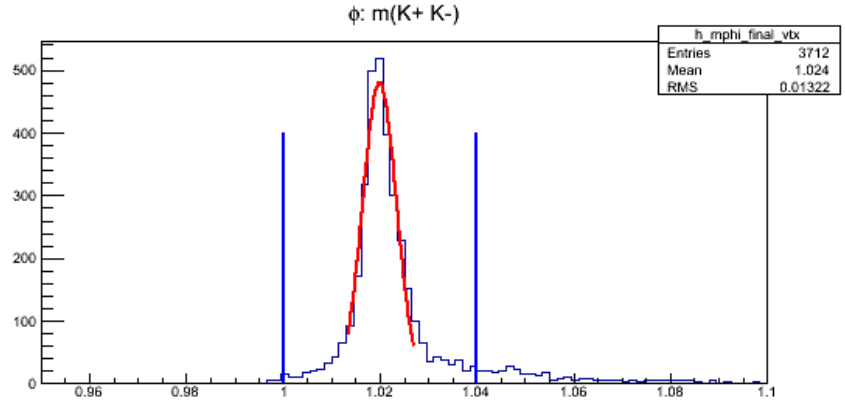
STT

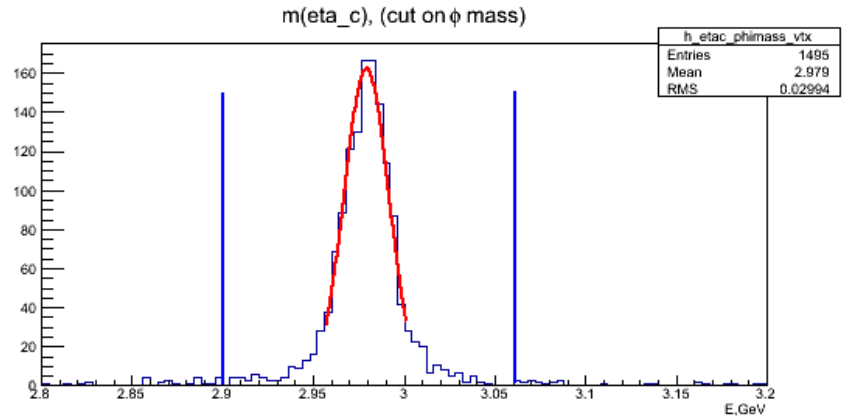




- $\sigma(\phi)$= 4.9 MeV
- $\sigma(\eta_c)$= 25.4 MeV
- ε_{ff}=12.6%

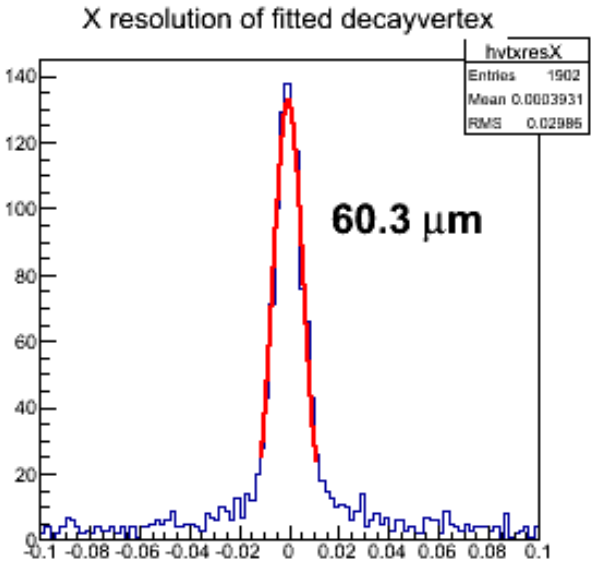
TPC

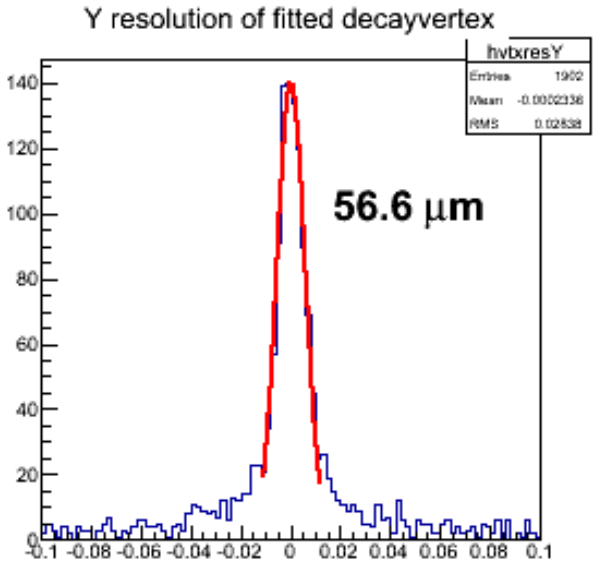


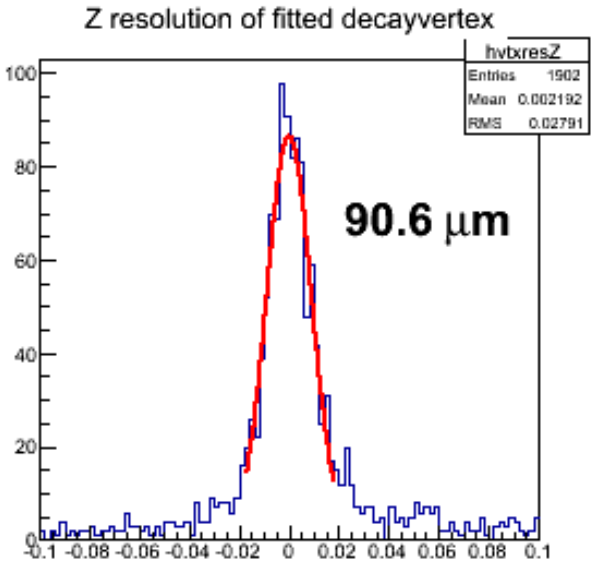


- $\sigma(\phi)$= 3.5 MeV
- $\sigma(\eta_c)$= 12.3 MeV
- ε_{ff}=27.9%

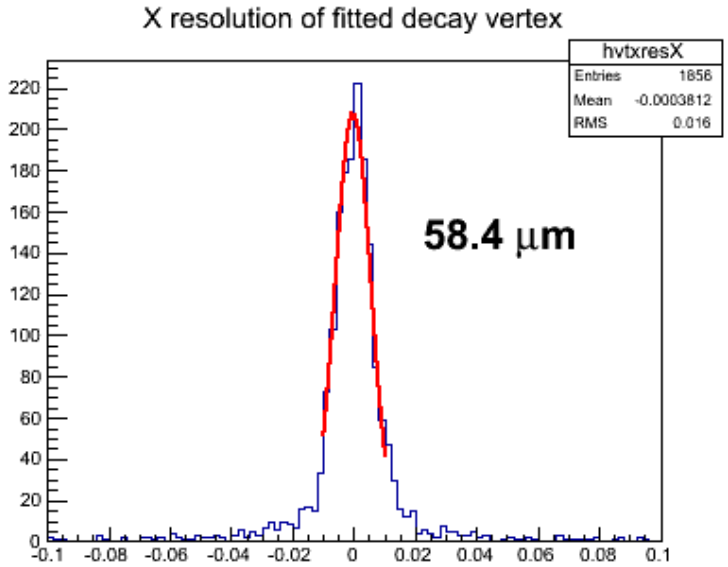
Vertex resolution (STT)

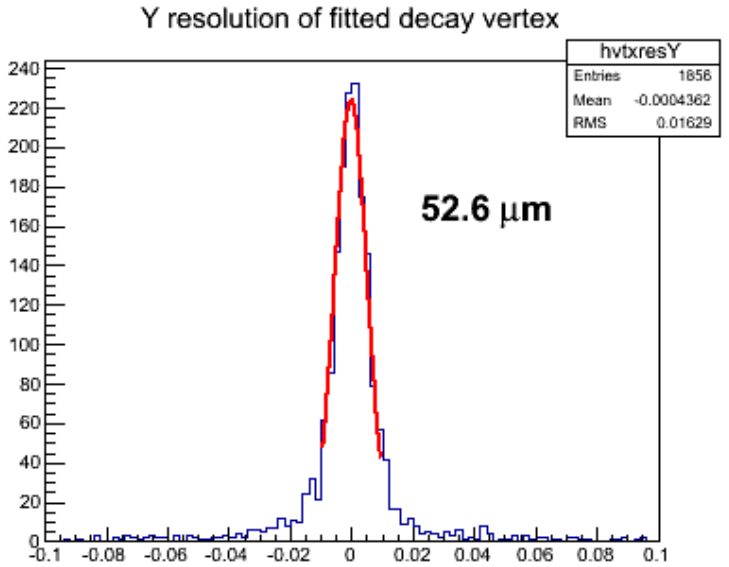


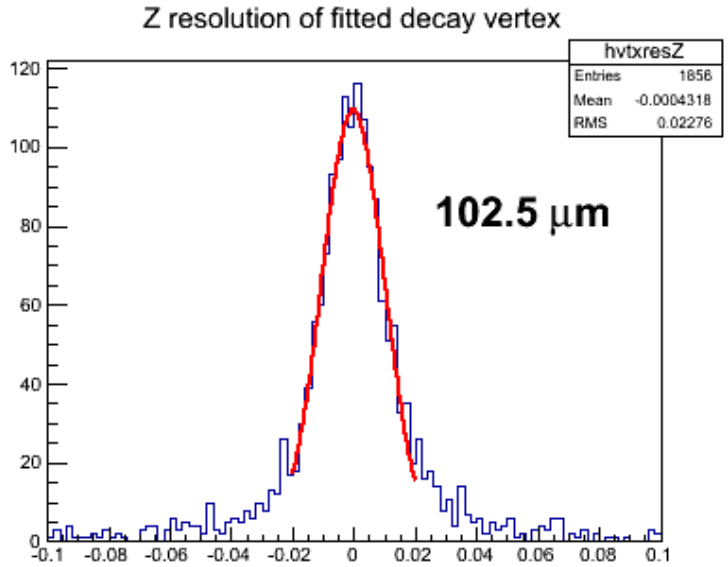




Vertex resolution (TPC)

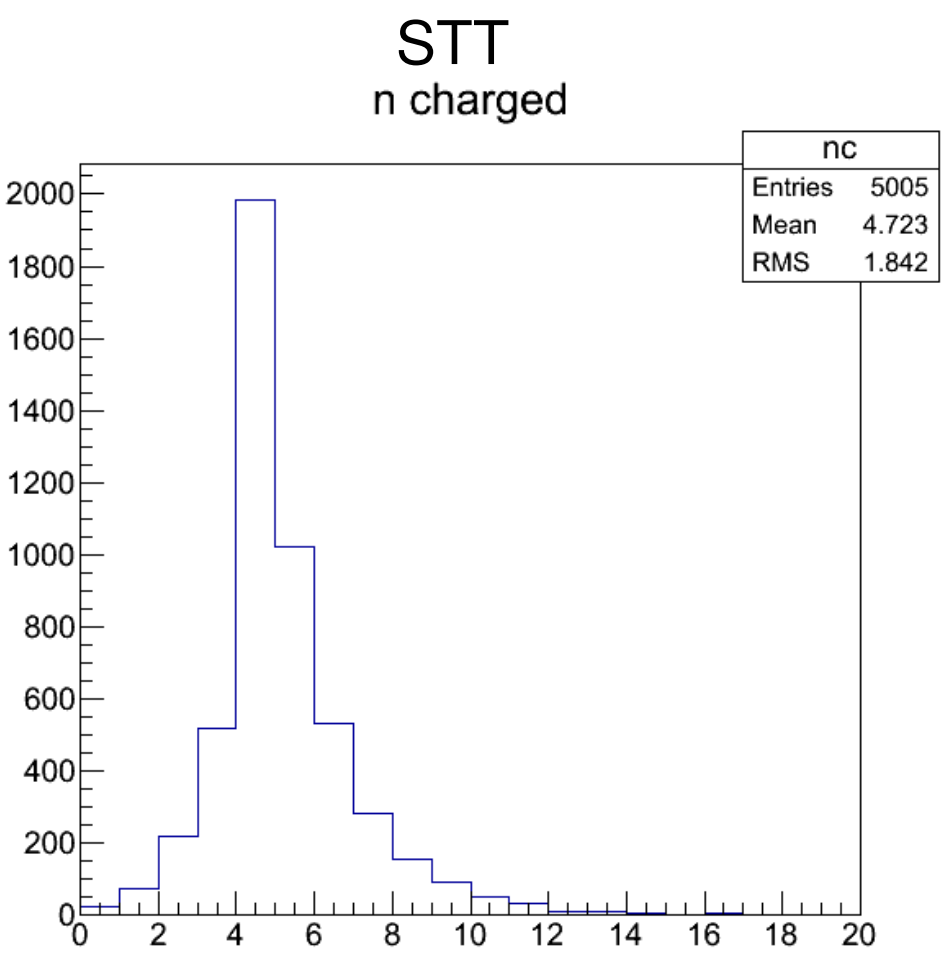


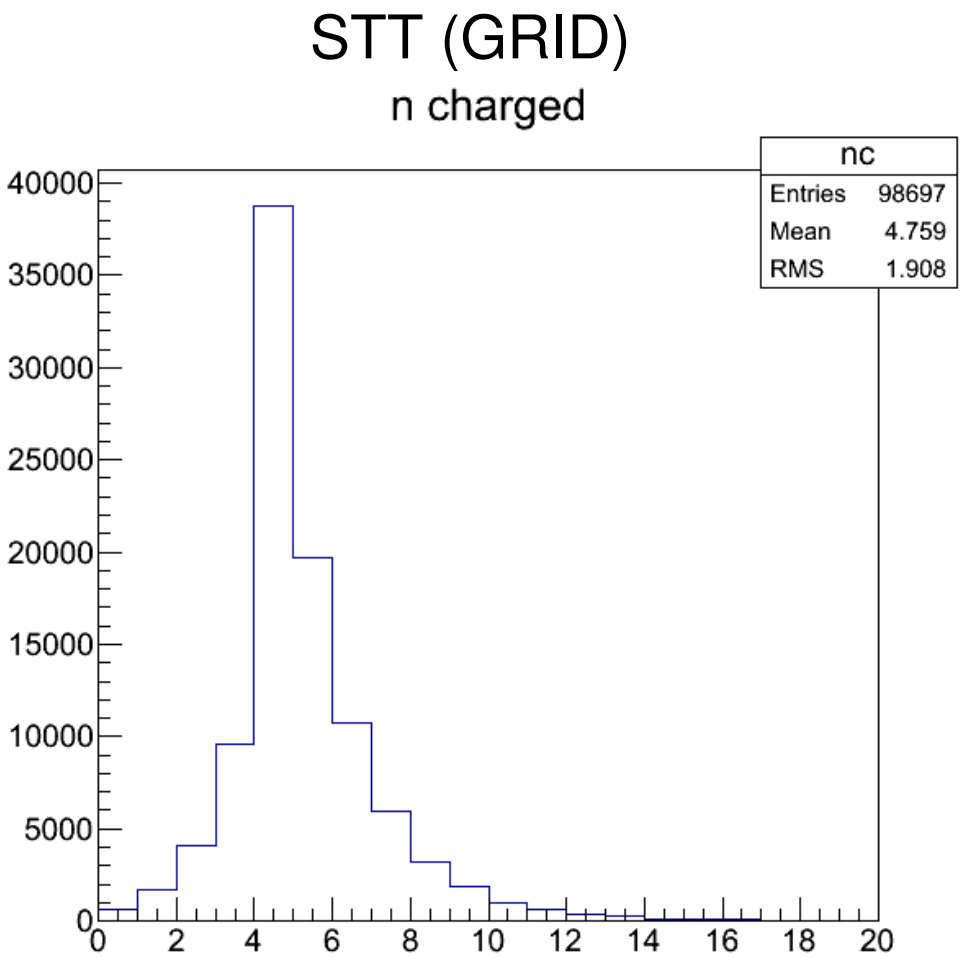




Comparison of STT with data produced on GRID

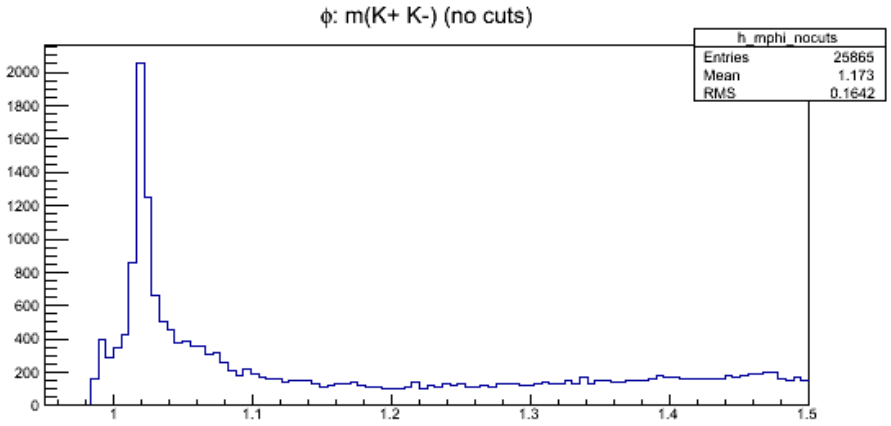
Number of reconstructed charged tracks

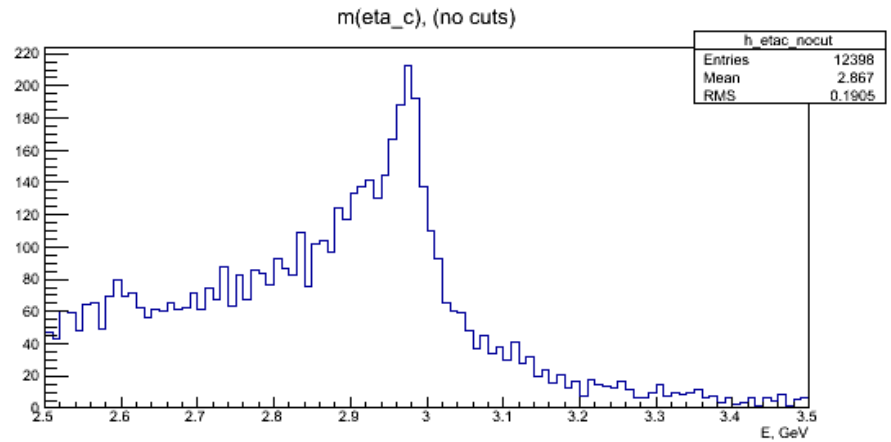




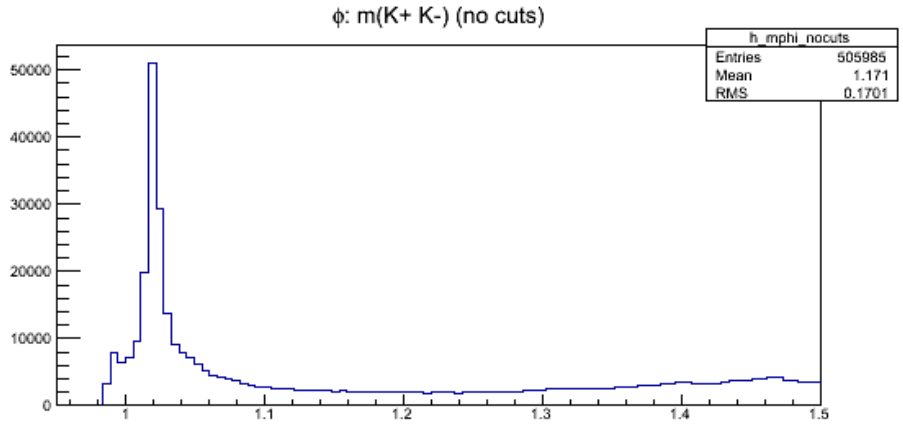
Invaraint mass (No cuts applied)

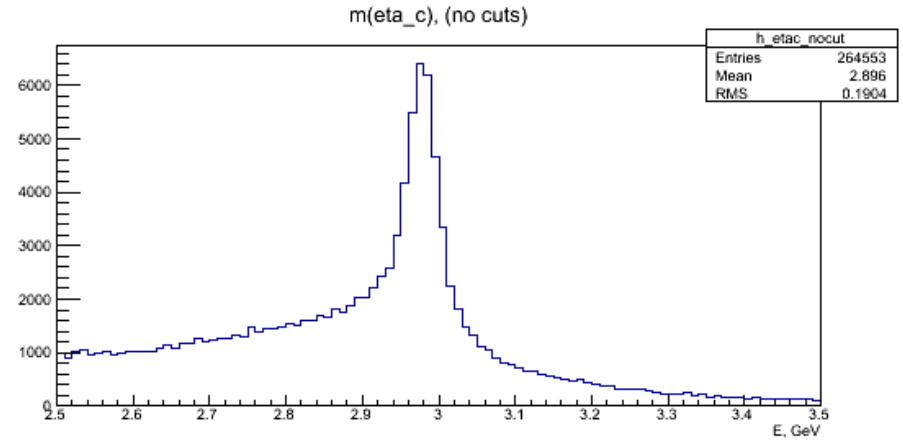
STT





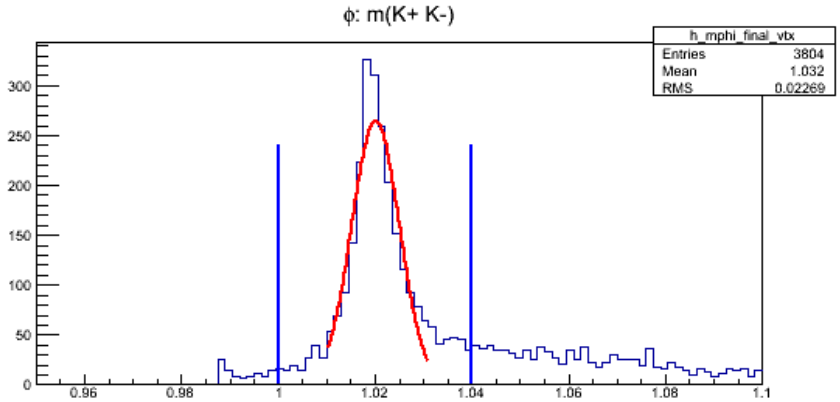
STT (GRID)

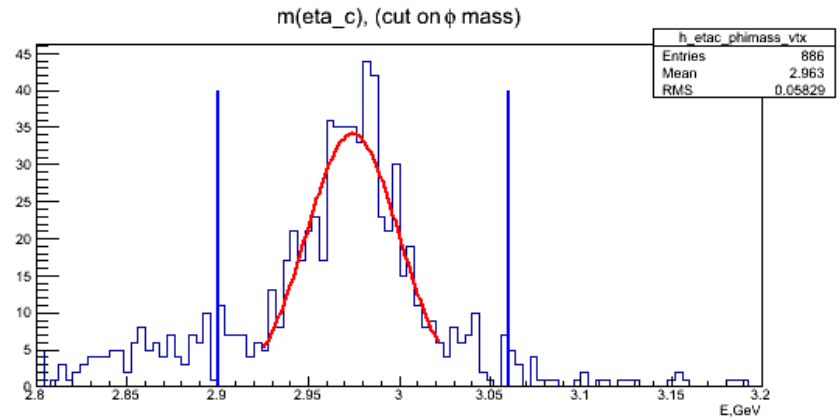




Cut on invariant mass

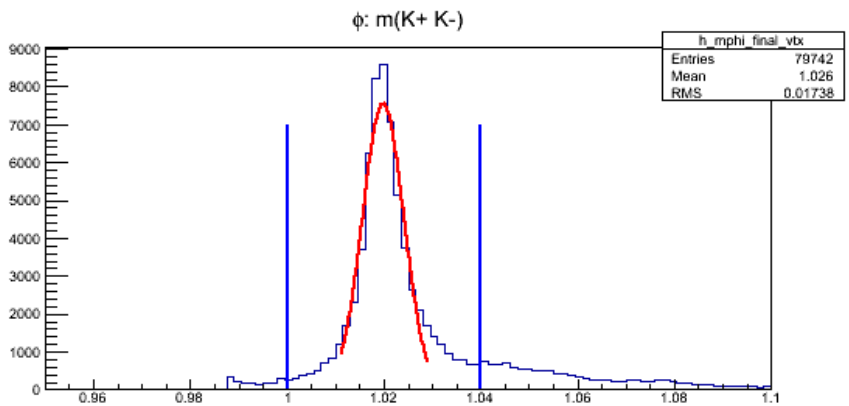
STT

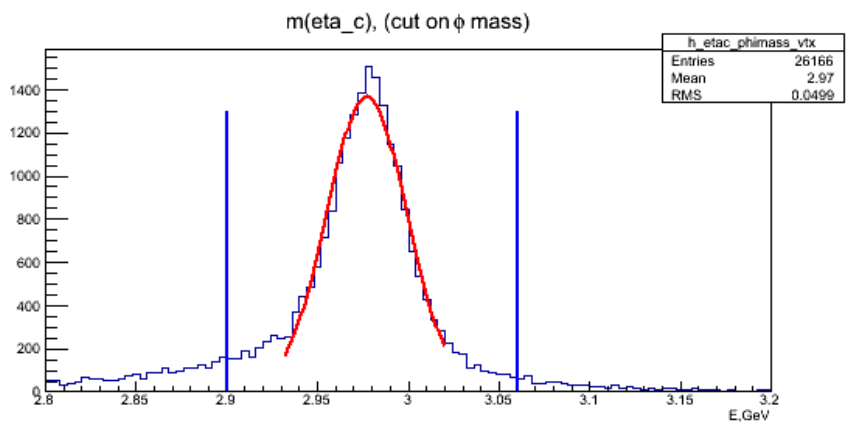




- $\sigma(\phi)$= 4.9 MeV
- $\sigma(\eta_c)$= 25.4 MeV
- ε_{ff}=12.6%

STT (GRID)

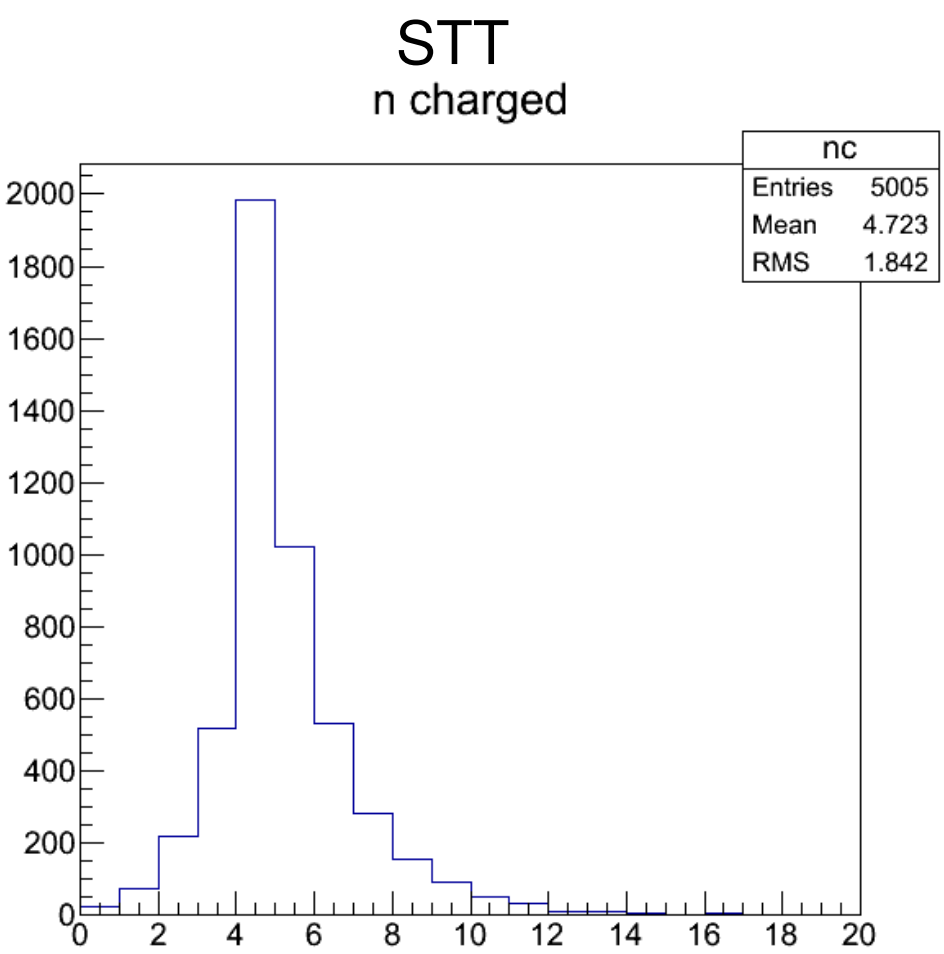


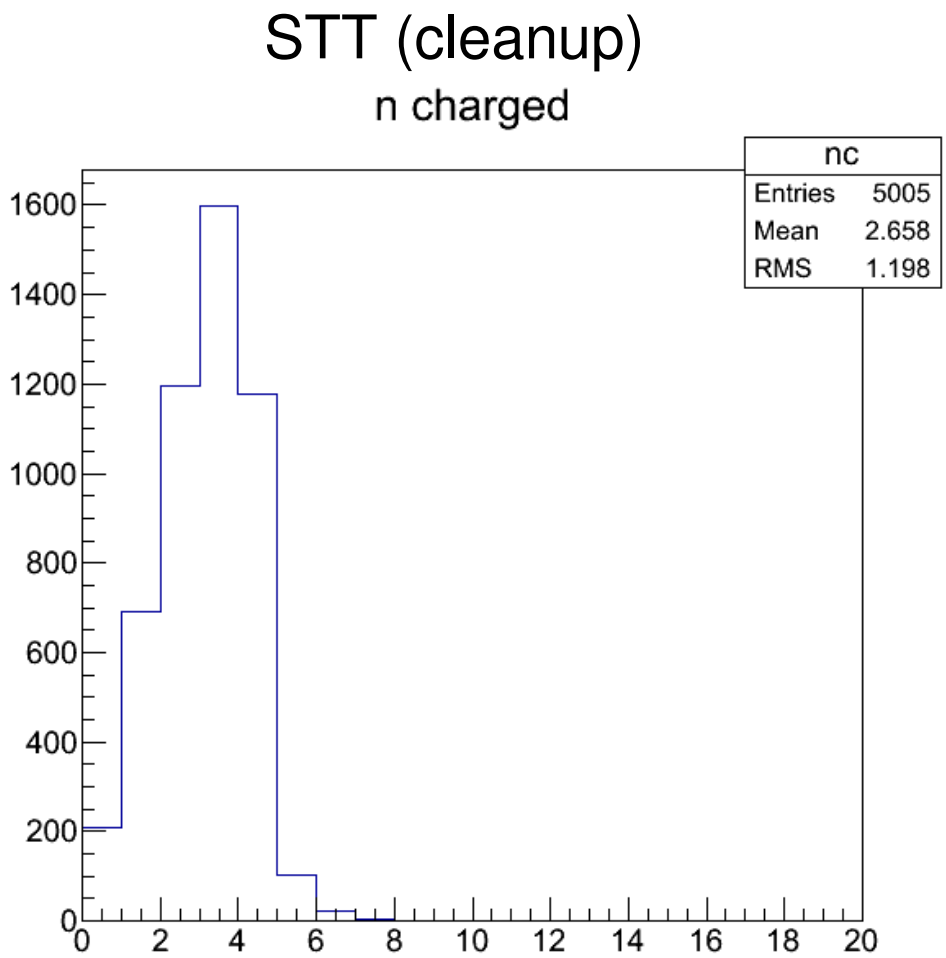


- $\sigma(\phi)$= 4.2 MeV
- $\sigma(\eta_c)$= 22.1 MeV
- ε_{ff}=21.3%

Comparison of STT with/without cleanup

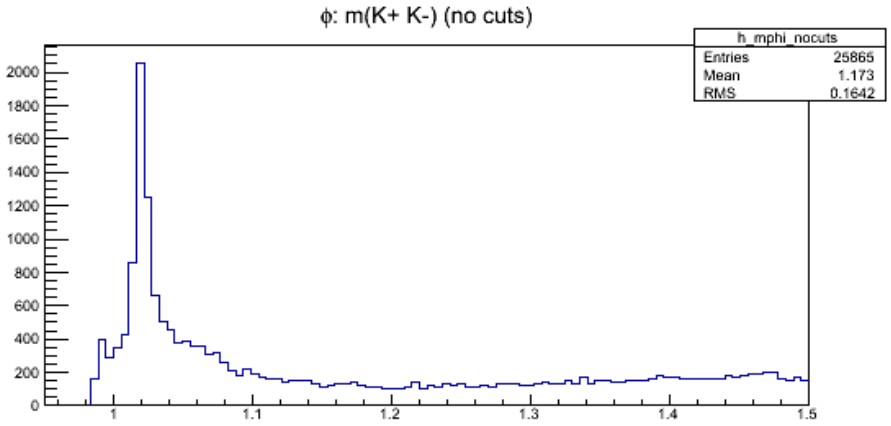
Number of reconstructed charged tracks

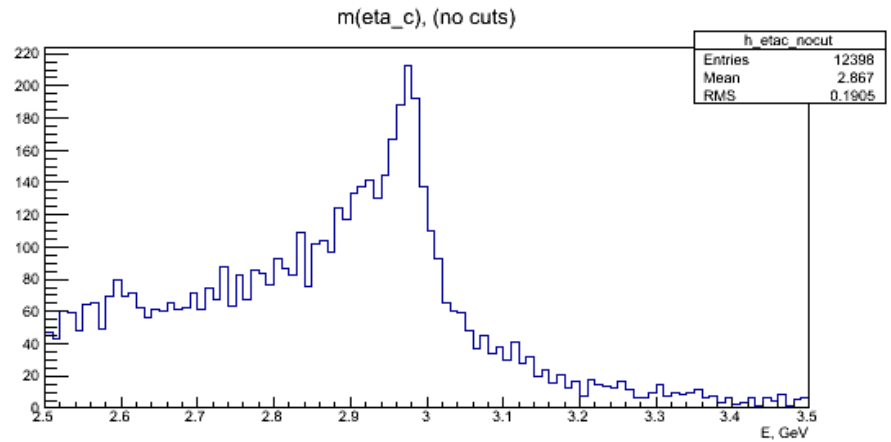




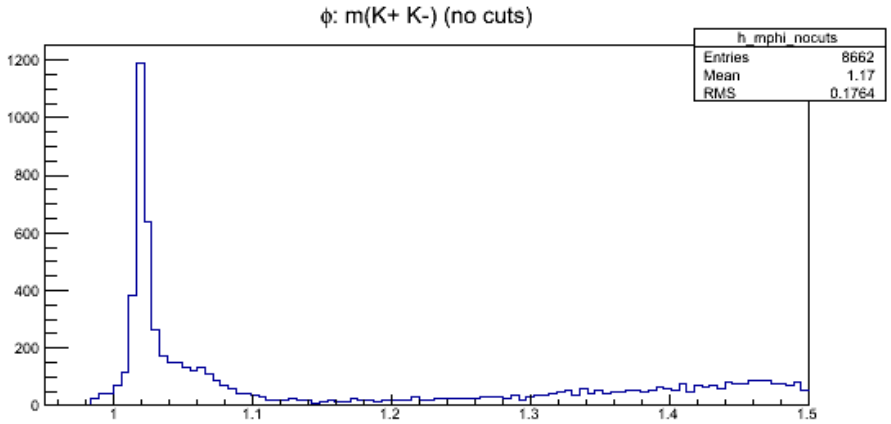
Invaraint mass (No cuts applied)

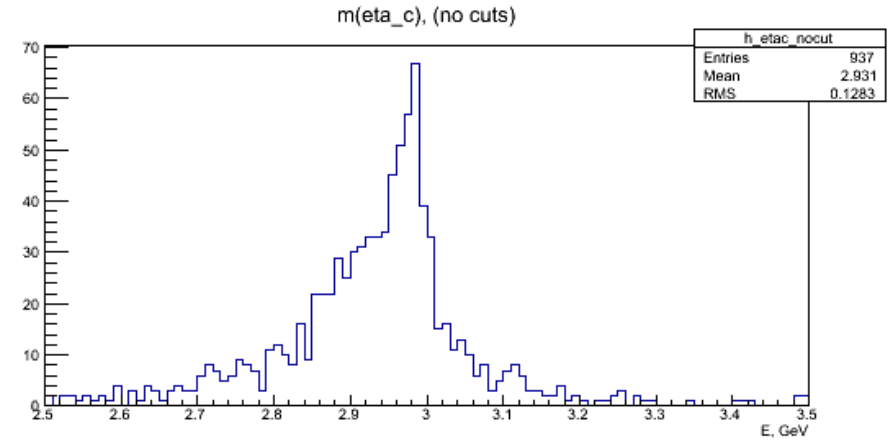
STT





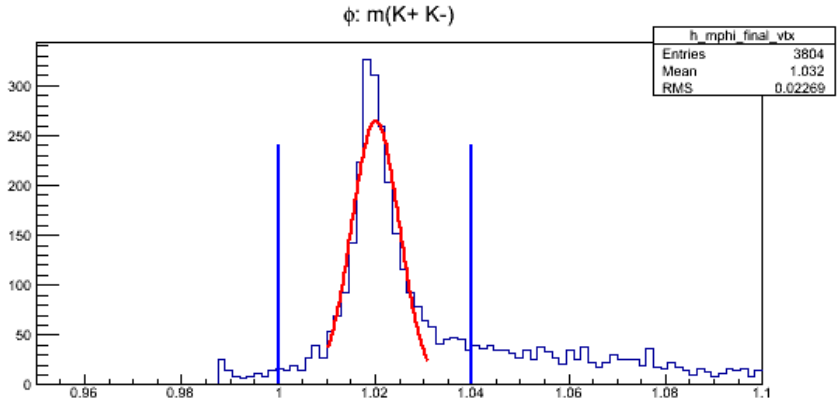
STT (cleanup)

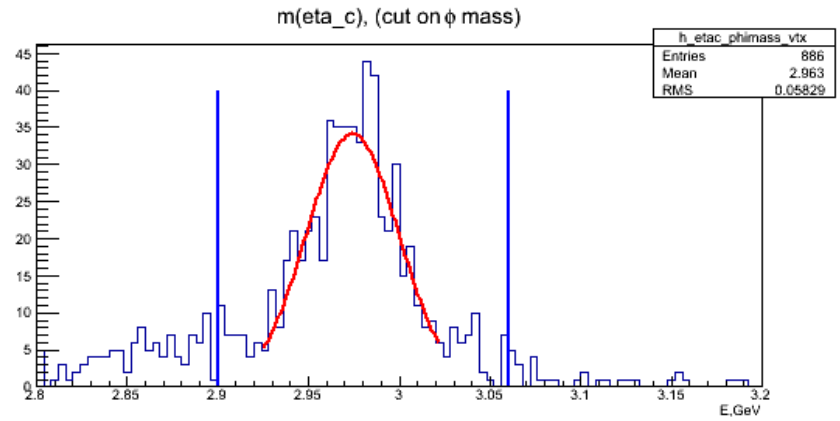




Cut on invariant mass

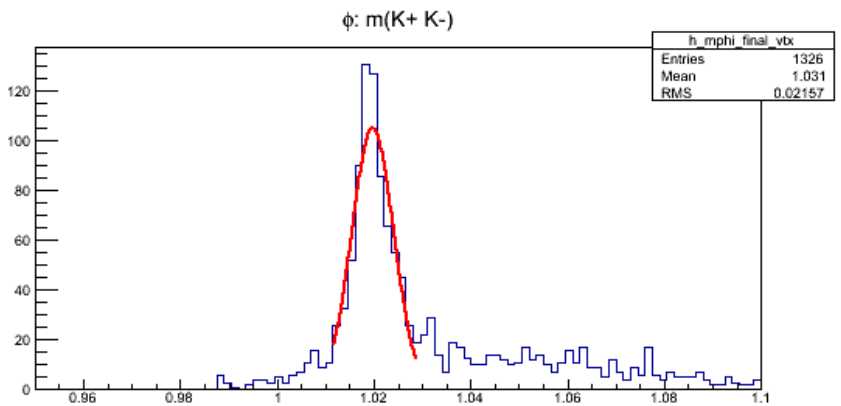
STT

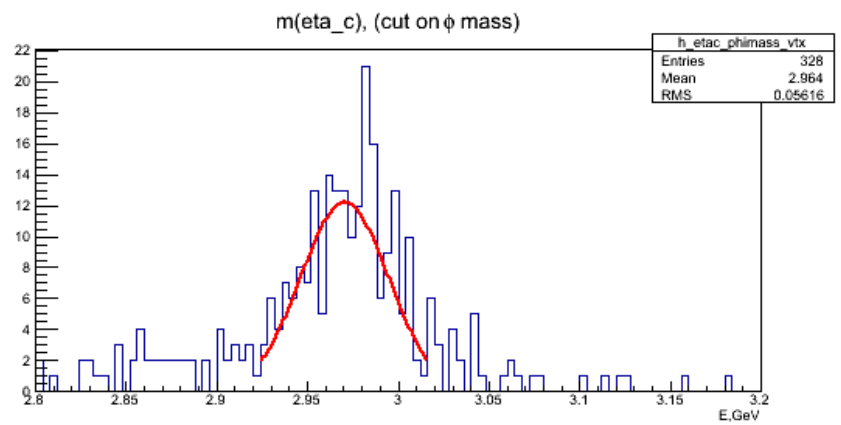




- $\sigma(\phi)$= 4.9 MeV
- $\sigma(\eta_c)$= 25.4 MeV
- ε_{ff}=12.6%

STT (cleanup)





- $\sigma(\phi)$= 4.3 MeV
- $\sigma(\eta_c)$= 24.2 MeV
- ε_{ff}=4.8%