DUNE TMS UPDATES

TMS Magnetic Field Simulation

Handing Magnetic Field Maps to the geometry:

- We apply varying magnetic field to the geometry of TMS by Using : **b_field_filename B-field_mapv4.txt**
- **Run the job :**python ProcessND.py --b_field_location /pnfs/dune/scratch/users/sushils/mygeo/B-field_mapv4.txt --b_field_filename B-field_mapv4.txt --topvol volArgonCubeDetector75 --use_dk2nu --manual_geometry_override nd_hall_with_lar_tms_nosand_Bfield.gdml --geometry_location /pnfs/dune/scratch/users/sushils/mygeo/nd_hall_with_lar_tms_nosand_Bfield.gdml --pot 1e16 --stages gen+g4+tmsreco --outdir /pnfs/dune/scratch/users/sushils/test1

File used for analysis:

- **/dune/app/users/sushils/dune-tms/scripts/Reco/magfield.root**

Analysis of the TMSRECO files:

Resolution plots:

1)Muon resolution Vs True Muon energy.

2)Muon resolution Vs True muon angle .

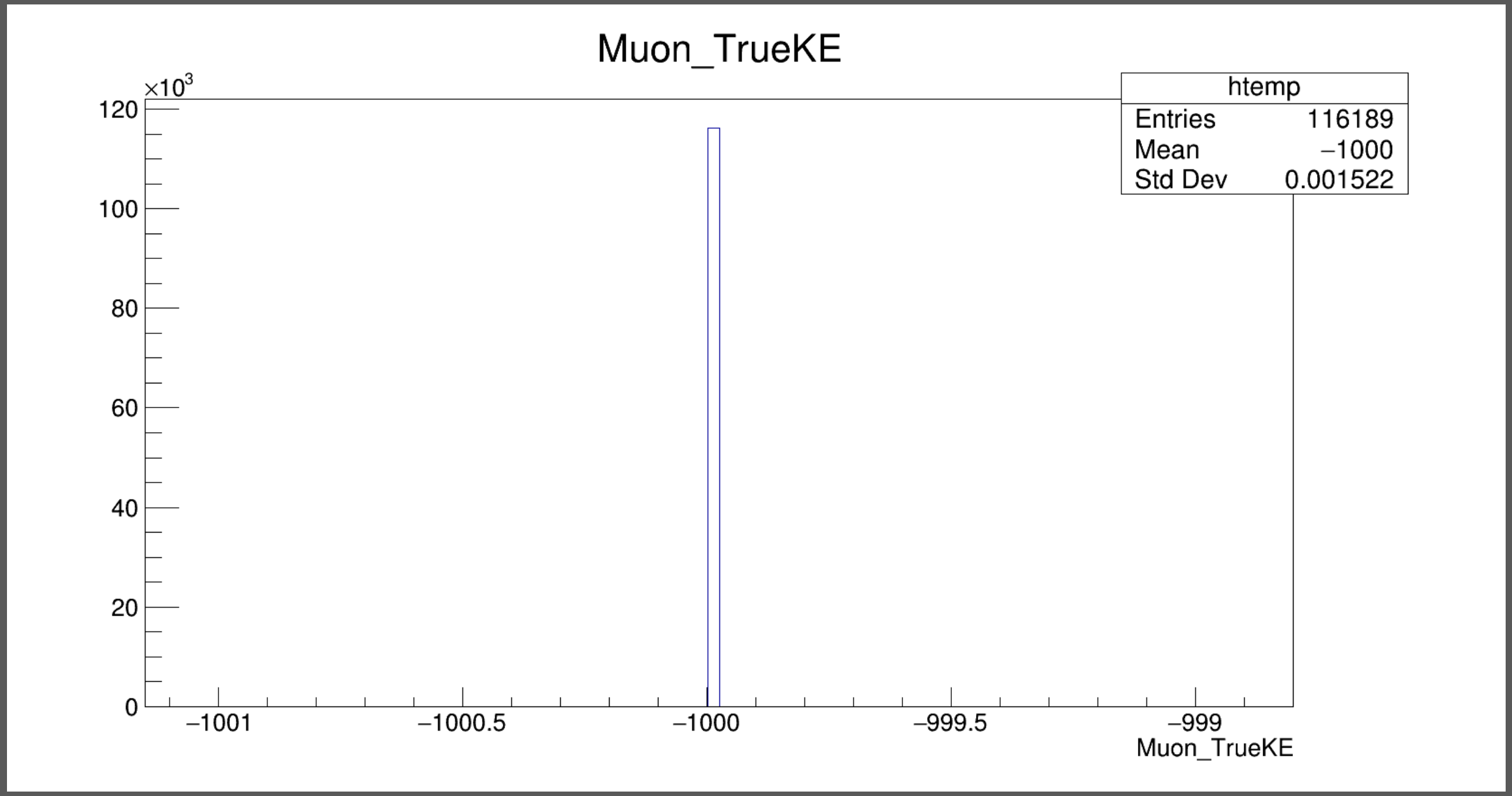
3)Muon sign selection purity Vs True Muon energy(some explanation on this would be nice)

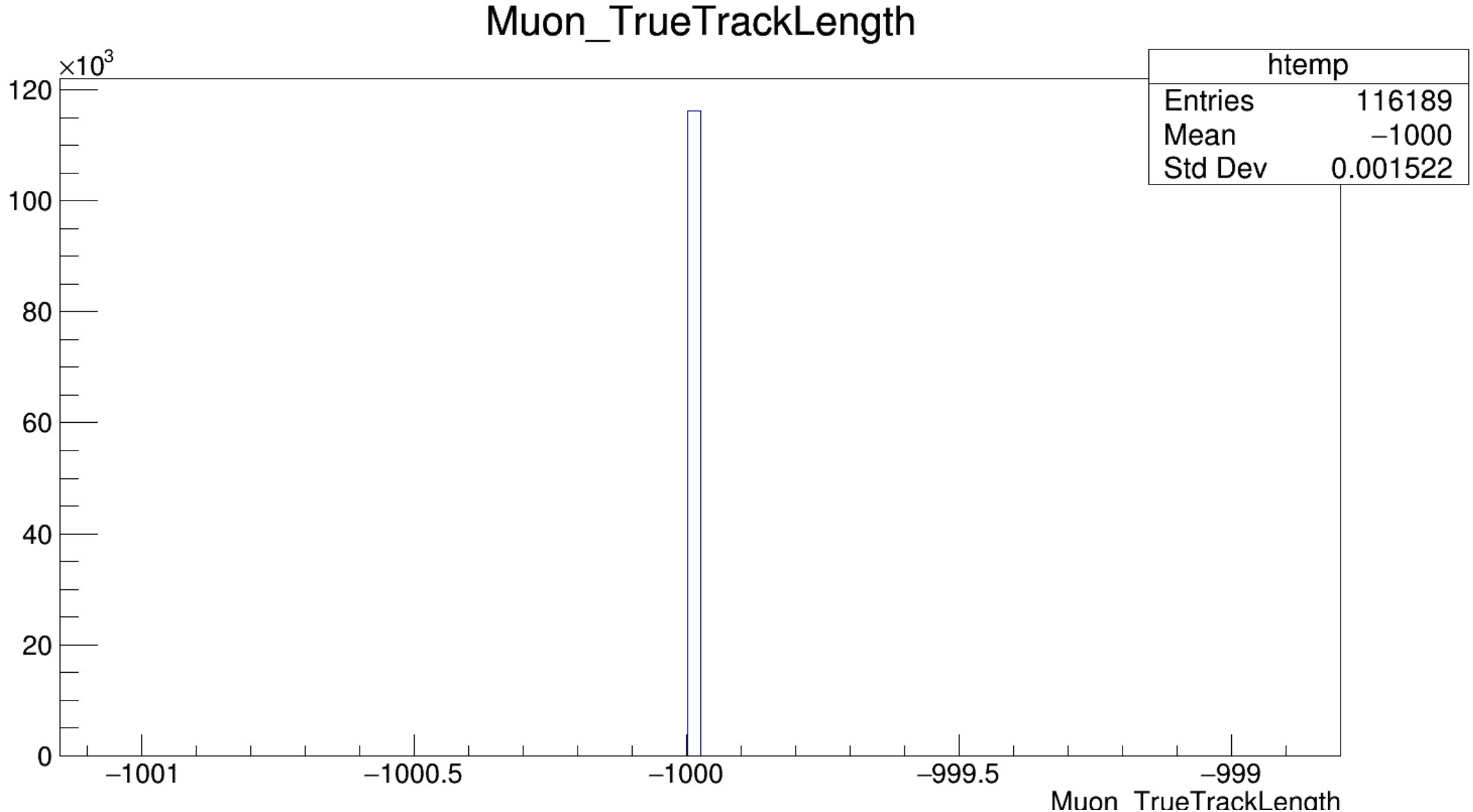
We have **true** and **reco** information in the form of **Truth_Info** & **Lines_candidates** respectively.

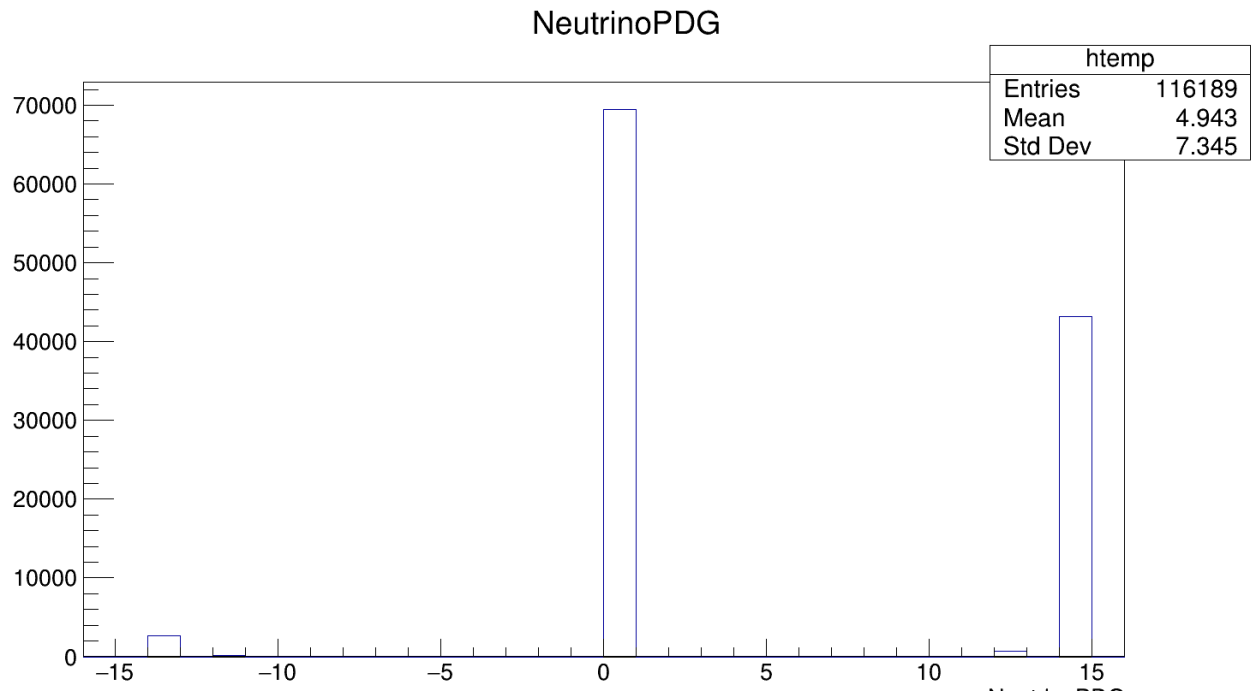
I looked upon **truth** and **reco** information to achieve my objectives.

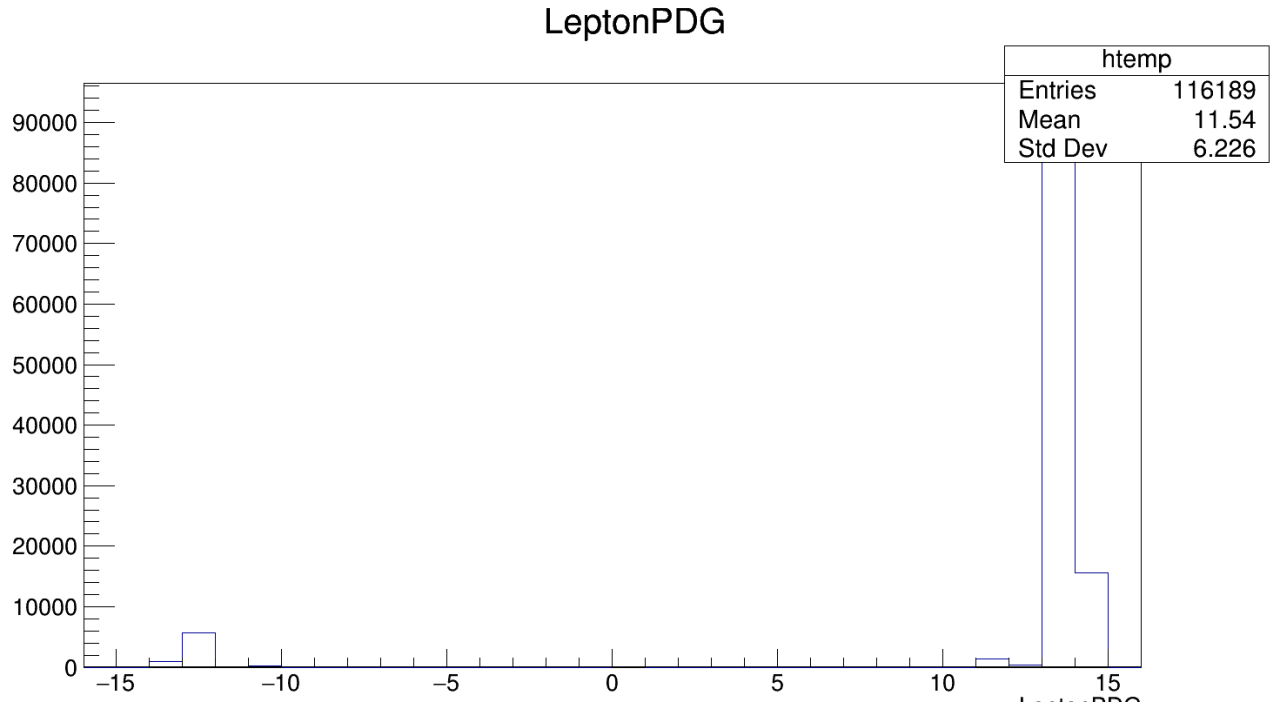
We only have information related to **True muon K.E (incorrect—we got negative values of KE))** but we don't have info related to **Reco muon KE** in the **TTree.**

Likewise, we don't have information which would give us the plots for **Muon sign selection purity Vs True Muon energy** & **Muon resolution Vs True muon angle** .

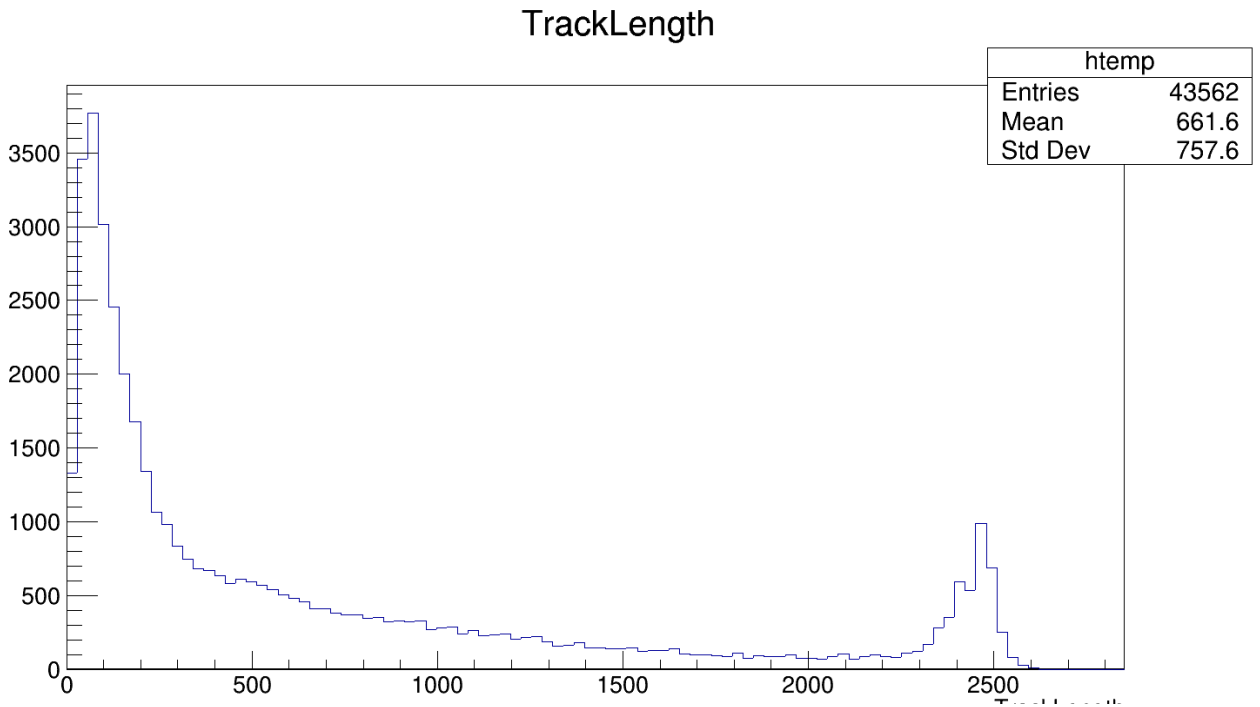

Muon_TrueKE
×10^3
120
100
80
60
40
20
0
−1001
−1000.5
−1000
−999.5
−999
Muon_TrueKE
htemp
Entries 116189
Mean −1000
Std Dev 0.001522

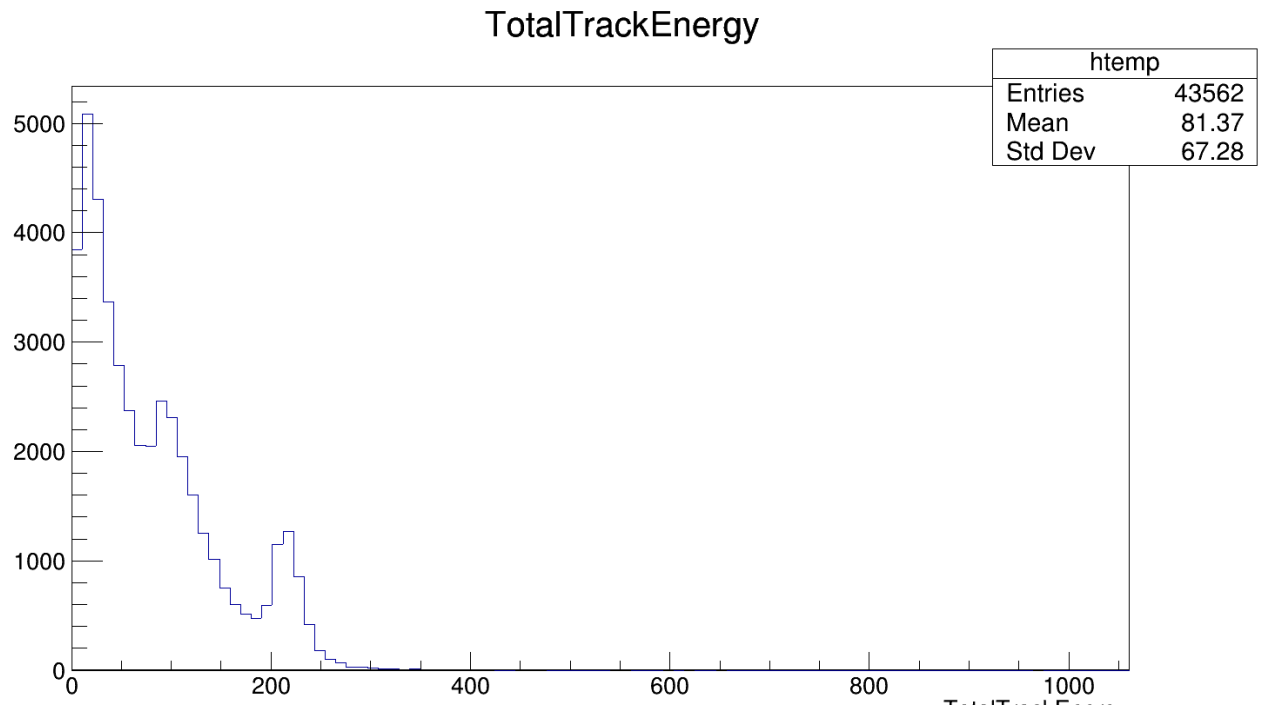

Muon_TrueTrackLength
htemp
Entries 116189
Mean −1000
Std Dev 0.001522
×10^3
120
100
80
60
40
20
0
−1001
−1000.5
−1000
−999.5
−999
Muon_TrueTrackLength

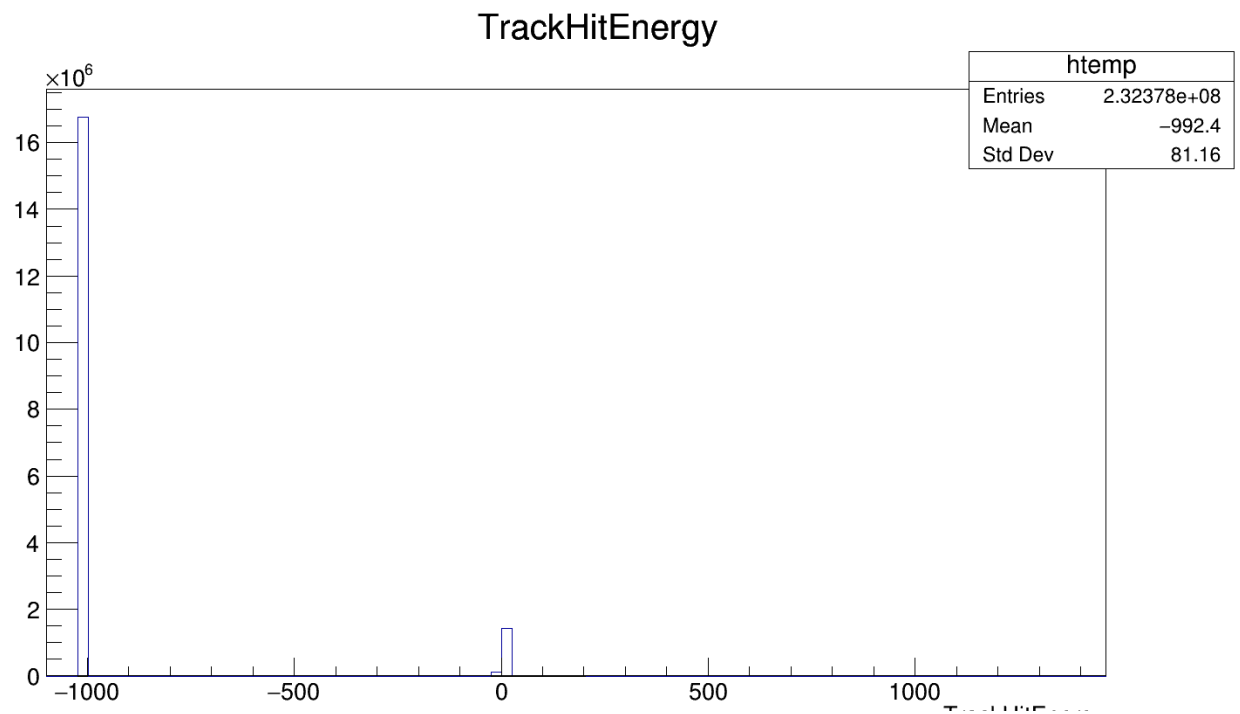

NeutrinoPDG
htemp
Entries 116189
Mean 4.943
Std Dev 7.345
70000
60000
50000
40000
30000
20000
10000
0
−15
−10
−5
0
5
10
15

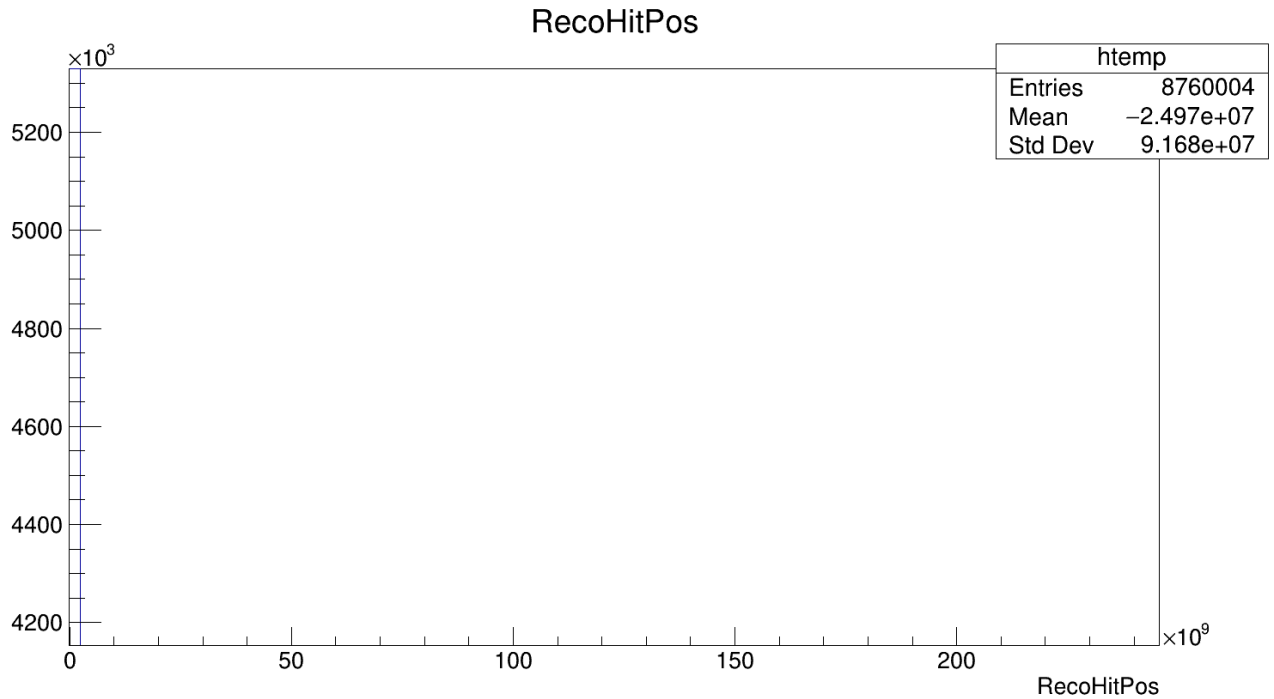

LeptonPDG
htemp
Entries 116189
Mean 11.54
Std Dev 6.226
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
−15
−10
−5
0
5
10
15

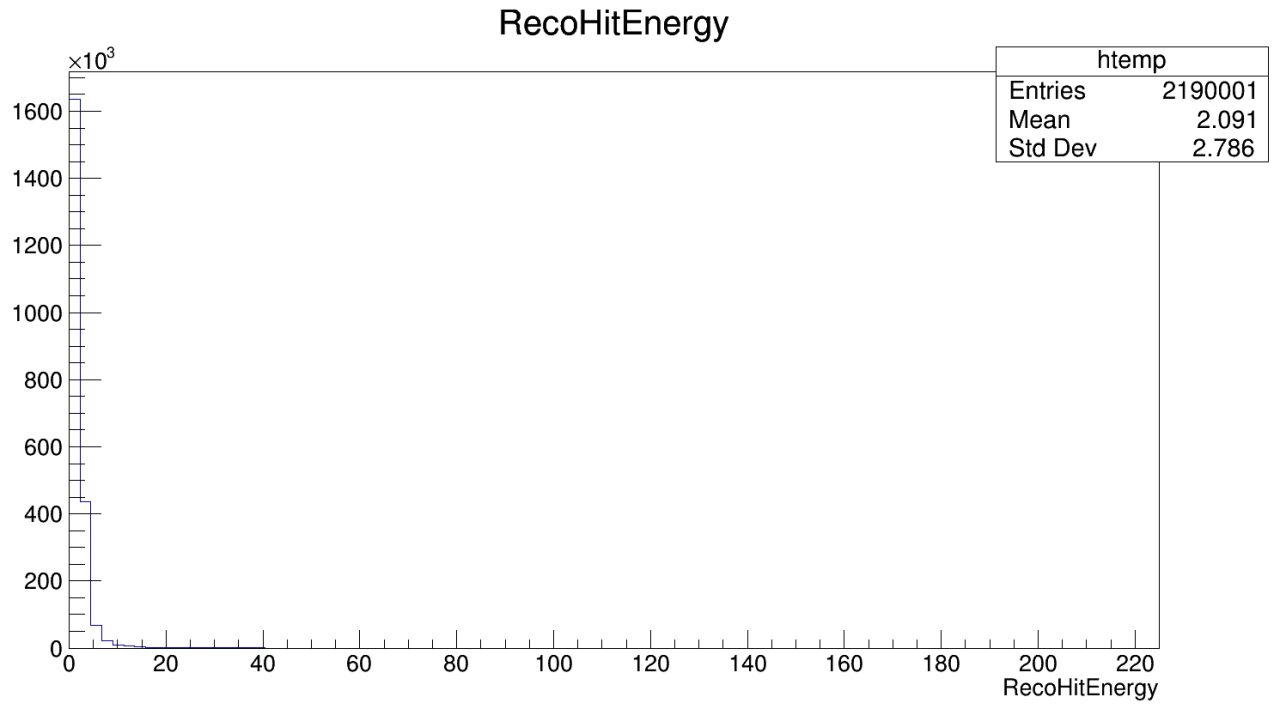
Line Candidates(Reconstruction information):



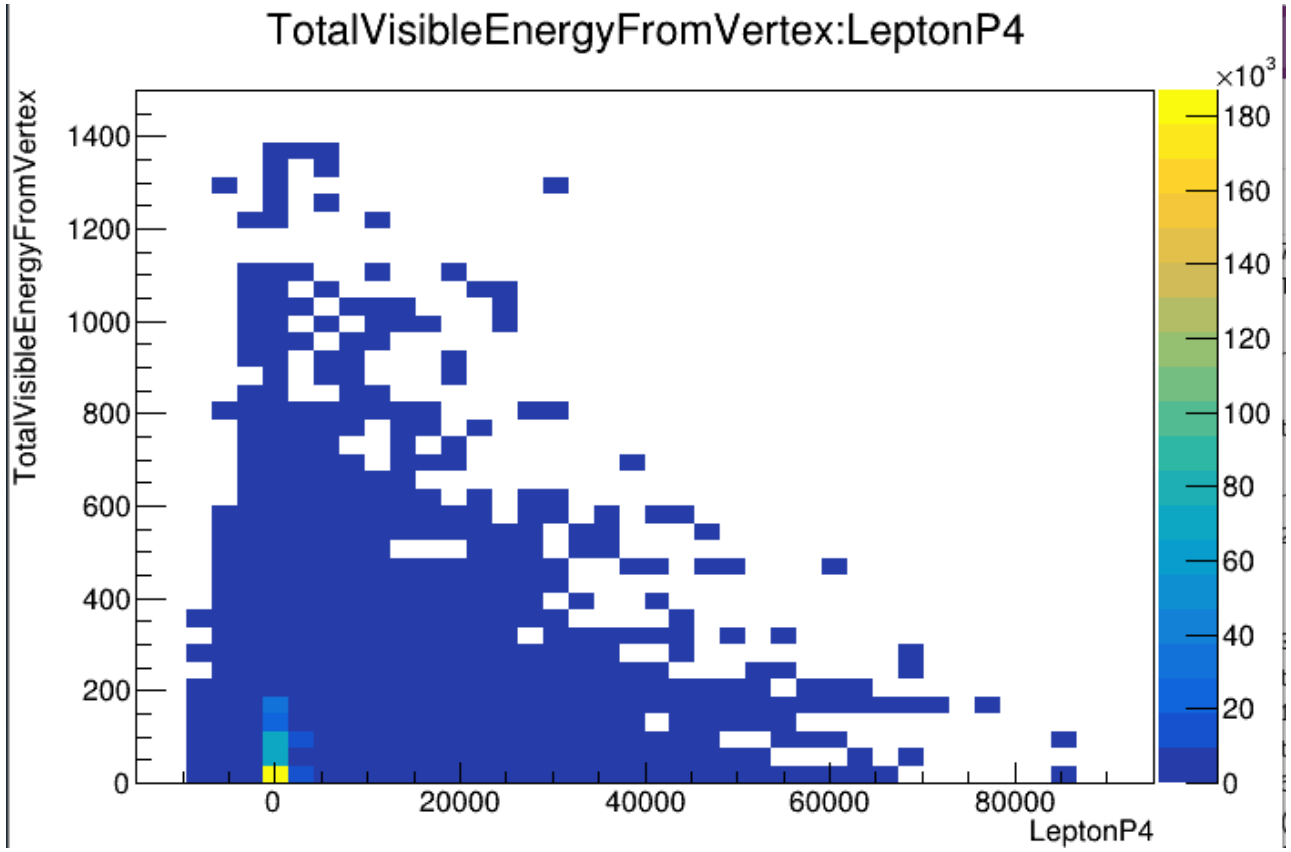

TotalTrackEnergy
htemp
Entries 43562
Mean 81.37
Std Dev 67.28
5000
4000
3000
2000
1000
0
0
200
400
600
800
1000

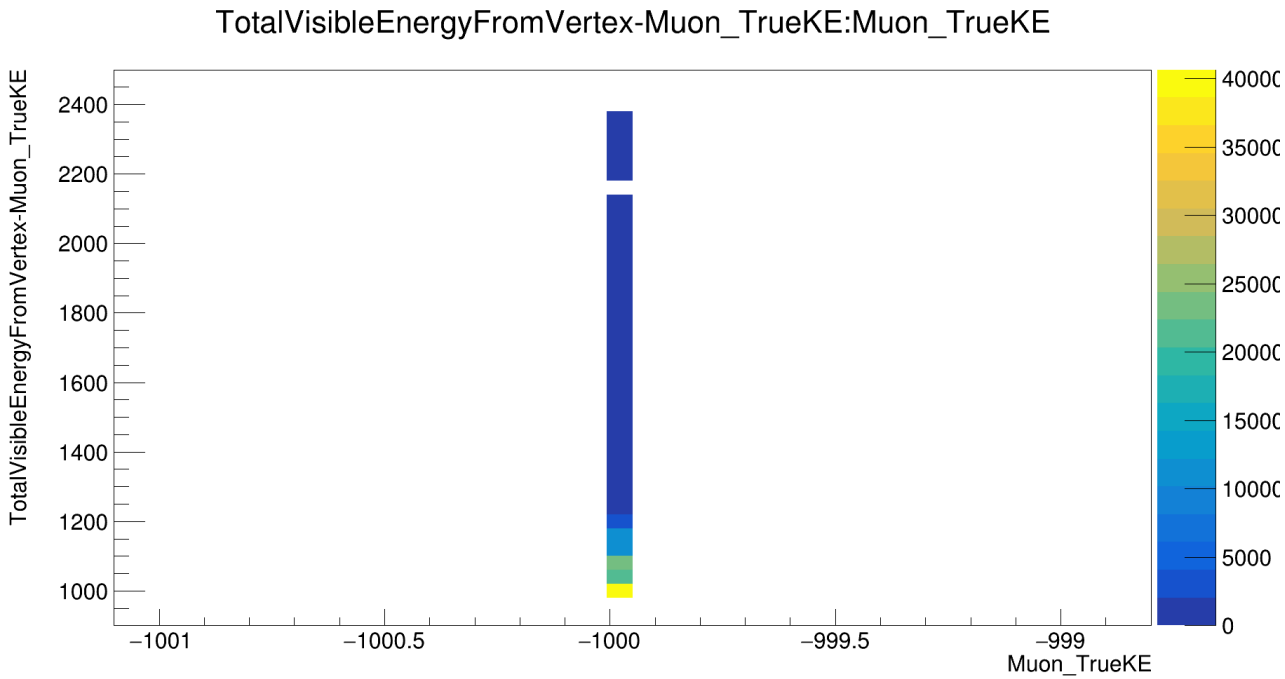

TrackHitEnergy
htemp
Entries 2.32378e+08
Mean −992.4
Std Dev 81.16
×10^6
16
14
12
10
8
6
4
2
0
−1000
−500
0
500
1000


RecoHitPos
htemp
Entries 8760004
Mean −2.497e+07
Std Dev 9.168e+07
×10^3
5200
5000
4800
4600
4400
4200
0
50
100
150
200
×10^9
RecoHitPos


RecoHitEnergy
htemp
Entries 2190001
Mean 2.091
Std Dev 2.786
×10^3
1600
1400
1200
1000
800
600
400
200
0
0 20 40 60 80 100 120 140 160 180 200 220
RecoHitEnergy

Few 2D Histograms:




TotalVisibleEnergyFromVertex-Muon_TrueKE:Muon_TrueKE
TotalVisibleEnergyFromVertex-Muon_TrueKE
2400
2200
2000
1800
1600
1400
1200
1000
−1001
−1000.5
−1000
−999.5
−999
Muon_TrueKE
40000
35000
30000
25000
20000
15000
10000
5000
0