Electron Reconstruction Study Weekly Updates

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Energy Resolution for Each Energy Bin

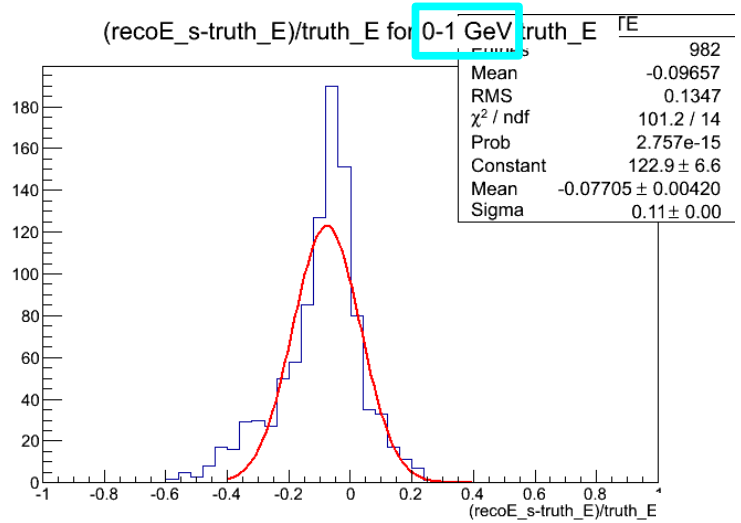
- Electron Particle Gun Sample

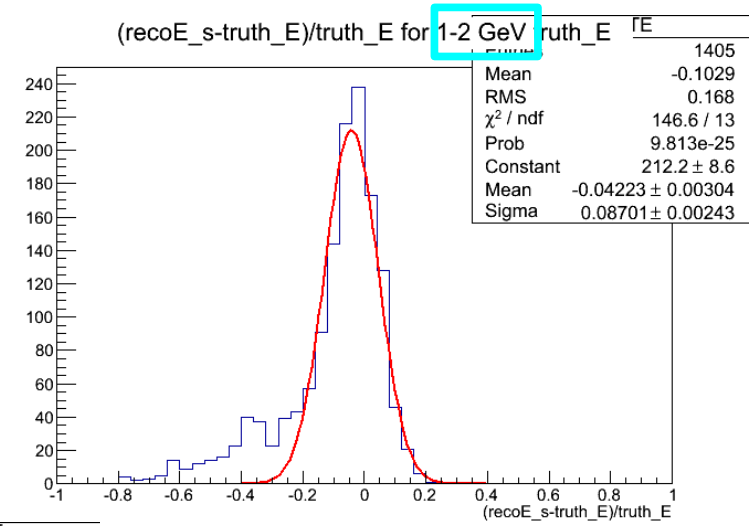
  0-10 GeV Flat Energy spectrum; 0-45 degree angle

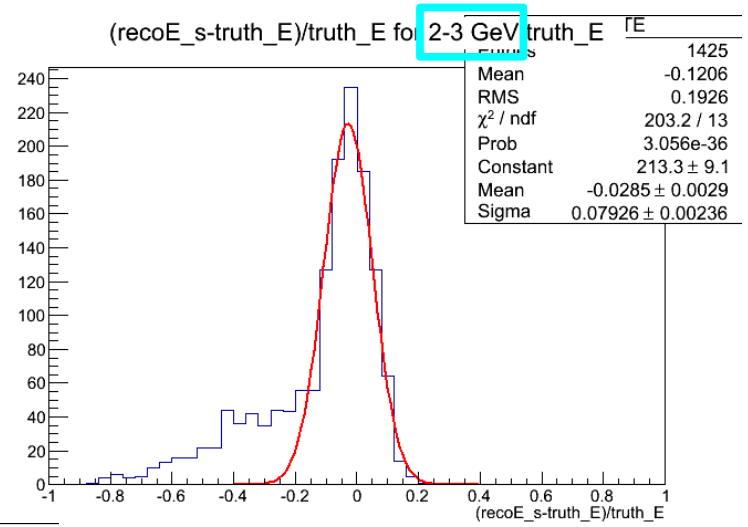
- Energy Resolution

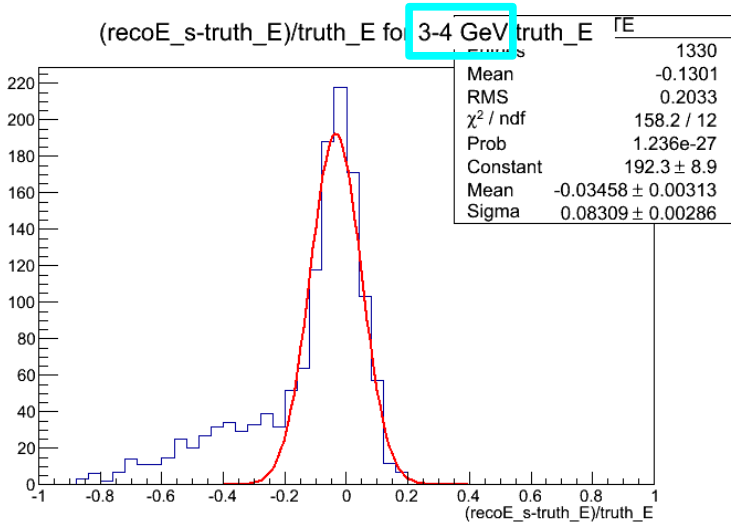
  $\frac{recoEs - truthE}{truthE}$ plots for each true energy bin

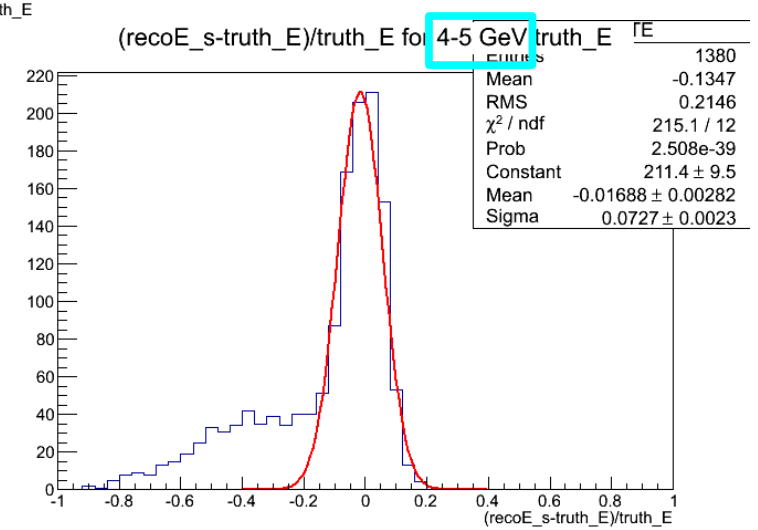
- All Plots With Reco Cut

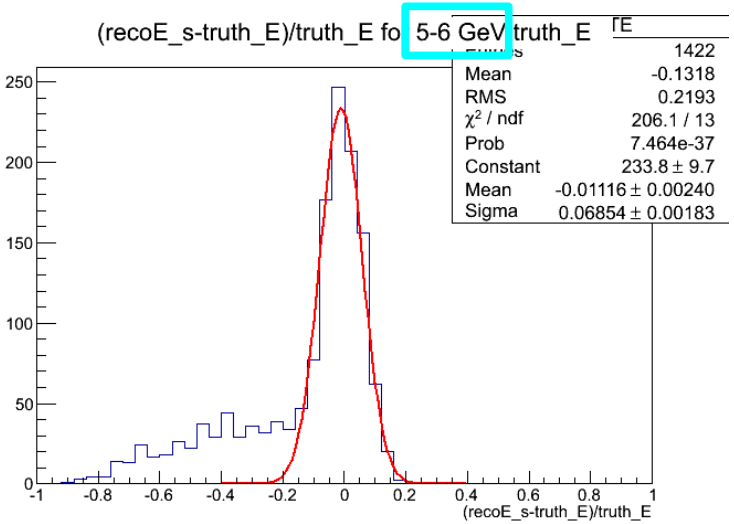

(recoE_s-truth_E)/truth_E for 0-1 GeV truth_E
982
Mean -0.09657
RMS 0.1347
χ² / ndf 101.2 / 14
Prob 2.757e-15
Constant 122.9 ± 6.6
Mean -0.07705 ± 0.00420
Sigma 0.11 ± 0.00
(recoE_s-truth_E)/truth_E

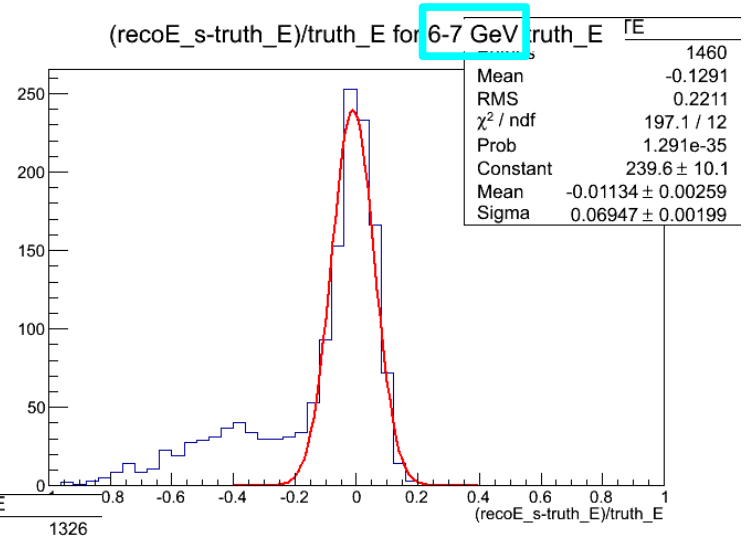

(recoE_s-truth_E)/truth_E for 1-2 GeV truth_E
1405
Mean -0.1029
RMS 0.168
χ² / ndf 146.6 / 13
Prob 9.813e-25
Constant 212.2 ± 8.6
Mean -0.04223 ± 0.00304
Sigma 0.08701 ± 0.00243
(recoE_s-truth_E)/truth_E

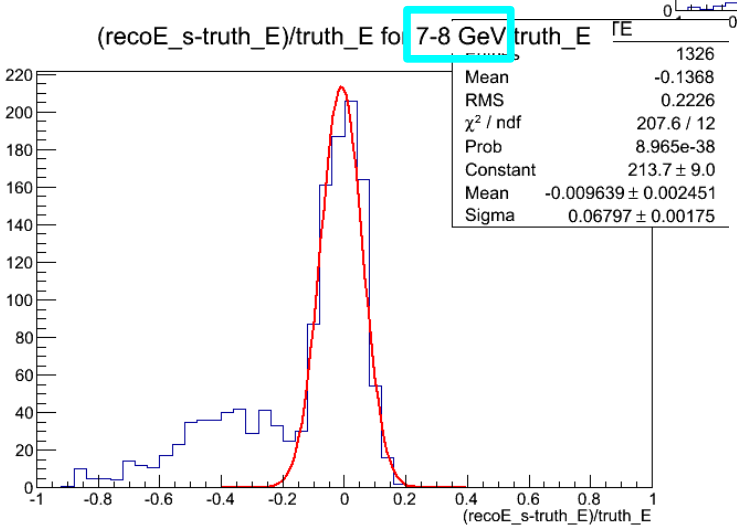

(recoE_s-truth_E)/truth_E for 2-3 GeV truth_E
1425
Mean -0.1206
RMS 0.1926
χ² / ndf 203.2 / 13
Prob 3.056e-36
Constant 213.3 ± 9.1
Mean -0.0285 ± 0.0029
Sigma 0.07926 ± 0.00236
(recoE_s-truth_E)/truth_E

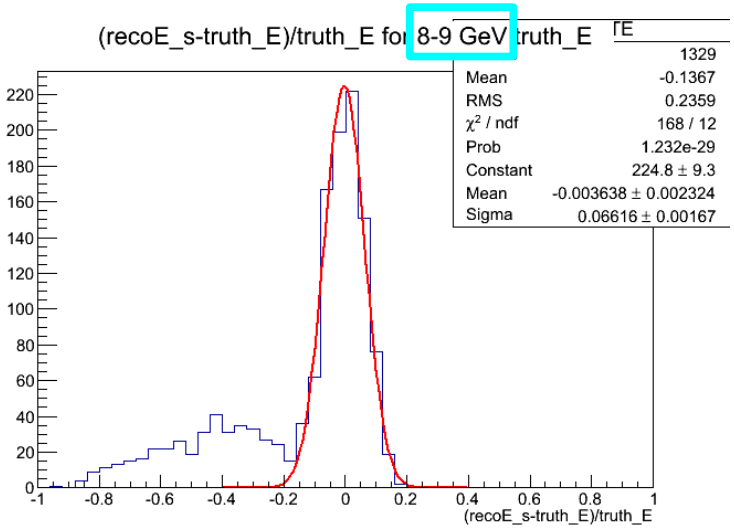

(recoE_s-truth_E)/truth_E for 3-4 GeV truth_E
1330
Mean -0.1301
RMS 0.2033
χ² / ndf 158.2 / 12
Prob 1.236e-27
Constant 192.3 ± 8.9
Mean -0.03458 ± 0.00313
Sigma 0.08309 ± 0.00286
(recoE_s-truth_E)/truth_E

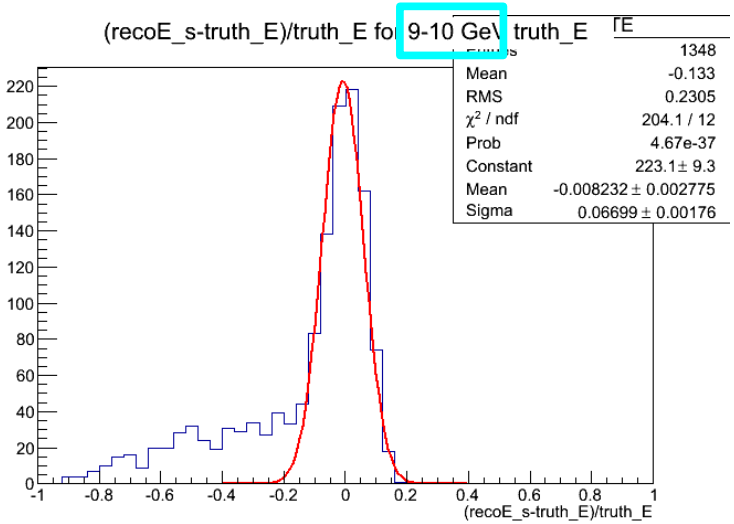

(recoE_s-truth_E)/truth_E for 4-5 GeV truth_E
1380
Mean -0.1347
RMS 0.2146
χ² / ndf 215.1 / 12
Prob 2.508e-39
Constant 211.4 ± 9.5
Mean -0.01688 ± 0.00282
Sigma 0.0727 ± 0.0023
(recoE_s-truth_E)/truth_E


(recoE_s-truth_E)/truth_E for 5-6 GeV truth_E
1422
Mean -0.1318
RMS 0.2193
χ² / ndf 206.1 / 13
Prob 7.464e-37
Constant 233.8 ± 9.7
Mean -0.01116 ± 0.00240
Sigma 0.06854 ± 0.00183
(recoE_s-truth_E)/truth_E


(recoE_s-truth_E)/truth_E for 6-7 GeV truth_E
1460
Mean -0.1291
RMS 0.2211
χ² / ndf 197.1 / 12
Prob 1.291e-35
Constant 239.6 ± 10.1
Mean -0.01134 ± 0.00259
Sigma 0.06947 ± 0.00199
(recoE_s-truth_E)/truth_E


(recoE_s-truth_E)/truth_E for 7-8 GeV truth_E
1326
Mean -0.1368
RMS 0.2226
χ² / ndf 207.6 / 12
Prob 8.965e-38
Constant 213.7 ± 9.0
Mean -0.009639 ± 0.002451
Sigma 0.06797 ± 0.00175
(recoE_s-truth_E)/truth_E


(recoE_s-truth_E)/truth_E for 8-9 GeV truth_E
1329
Mean -0.1367
RMS 0.2359
χ² / ndf 168 / 12
Prob 1.232e-29
Constant 224.8 ± 9.3
Mean -0.003638 ± 0.002324
Sigma 0.06616 ± 0.00167
(recoE_s-truth_E)/truth_E


(recoE_s-truth_E)/truth_E for 9-10 GeV truth_E
1348
Mean -0.133
RMS 0.2305
χ² / ndf 204.1 / 12
Prob 4.67e-37
Constant 223.1 ± 9.3
Mean -0.008232 ± 0.002775
Sigma 0.06699 ± 0.00176
(recoE_s-truth_E)/truth_E

Medium Energy Sample

200 E20 POT;
nu e signal process only;
Fiducial;

Reco cut:

truth_fiducial_evt==1 && XzUzDiff>=-2 && XzUzDiff<4 && XzVzDiff>=-2 && XzVzDiff<4 && chi2PerDoF>0 && (vtx_mod<=60 && neighborhoodEnergy/recoE_s<0.022 || vtx_mod>60 && neighborhoodEnergy/recoE_s<0.042)

Reconstructed Efficiency:

Fraction:

hist(truth_fiducial_evt==1 && XzUzDiff>=-2 && XzUzDiff<4 && XzVzDiff>=-2 && XzVzDiff<4 && chi2PerDoF>0 && (vtx_mod<=60 && neighborhoodEnergy/recoE_s<0.022 || vtx_mod>60 && neighborhoodEnergy/recoE_s<0.042)**)**

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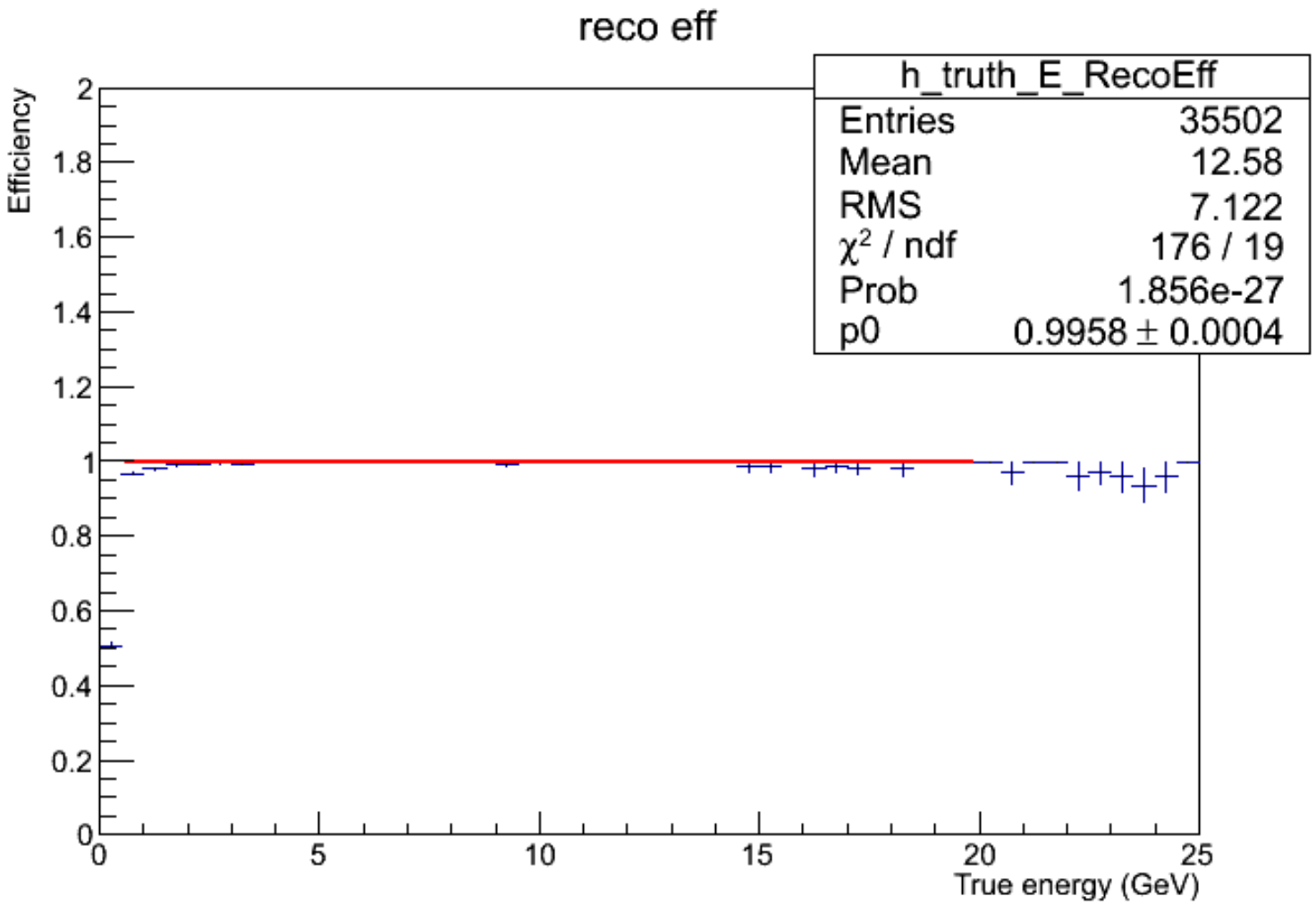
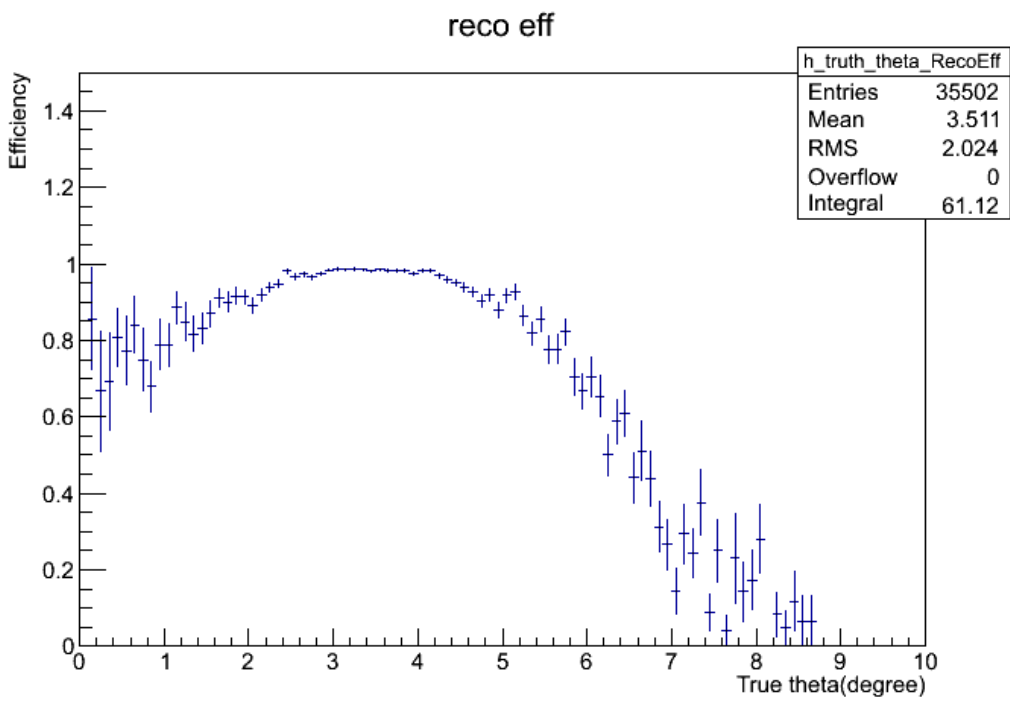
hist(truth_fiducial_evt==1**)**

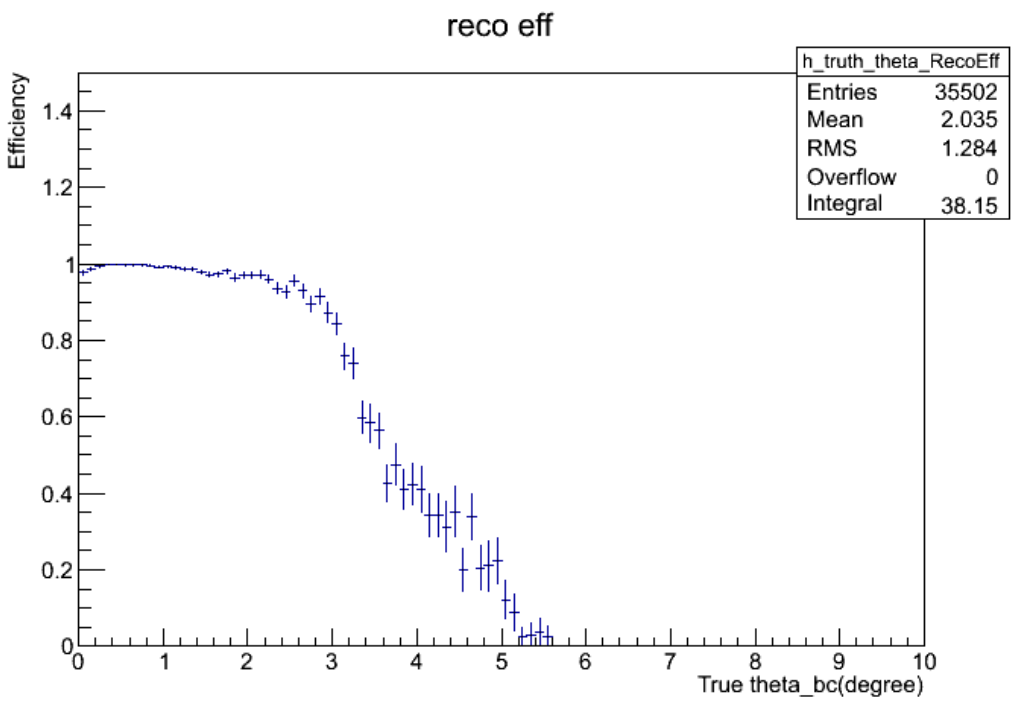
Reco Efficiency vs Truth energy



Reco Efficiency vs truth theta



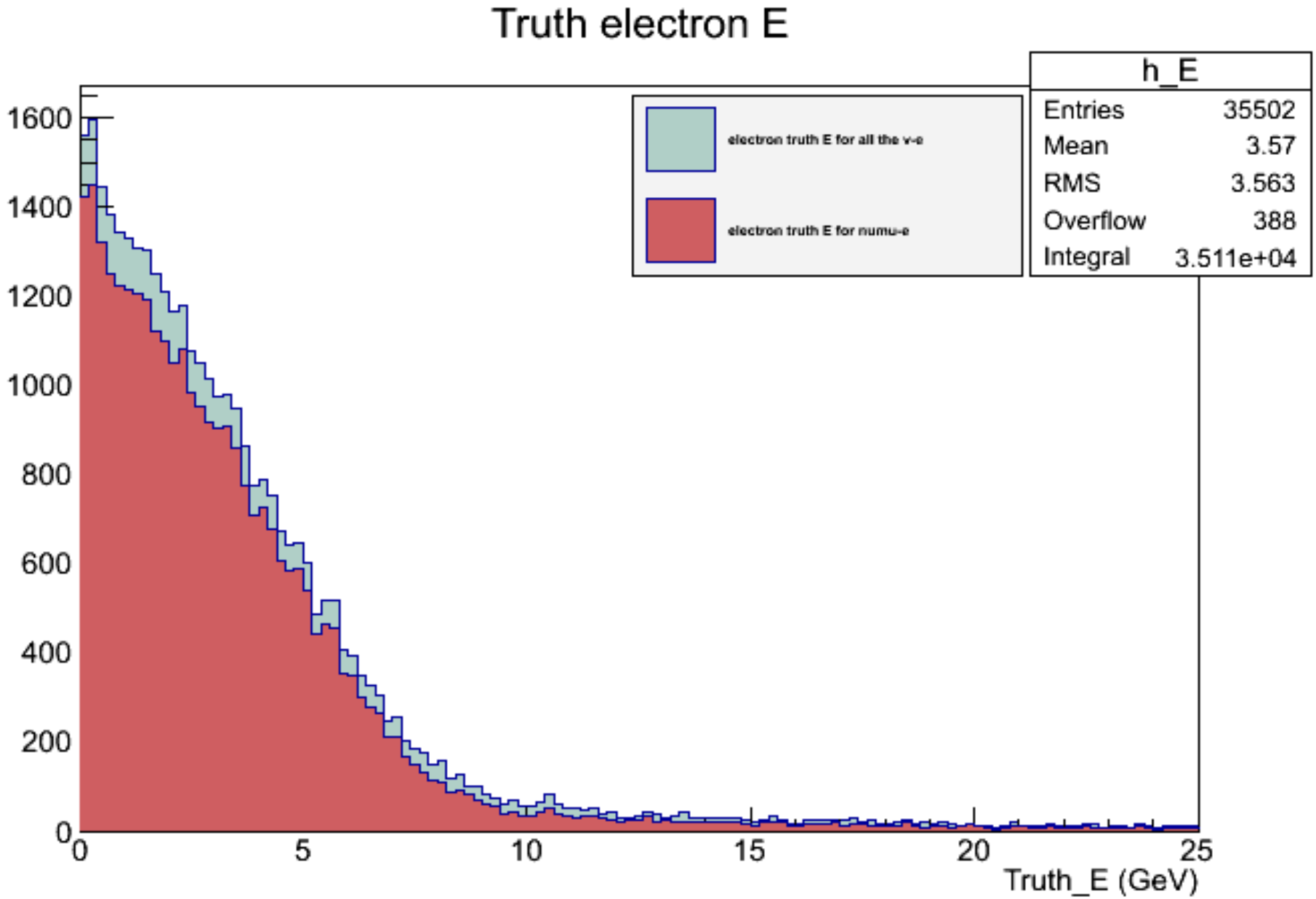
Electron Angle to the Detector



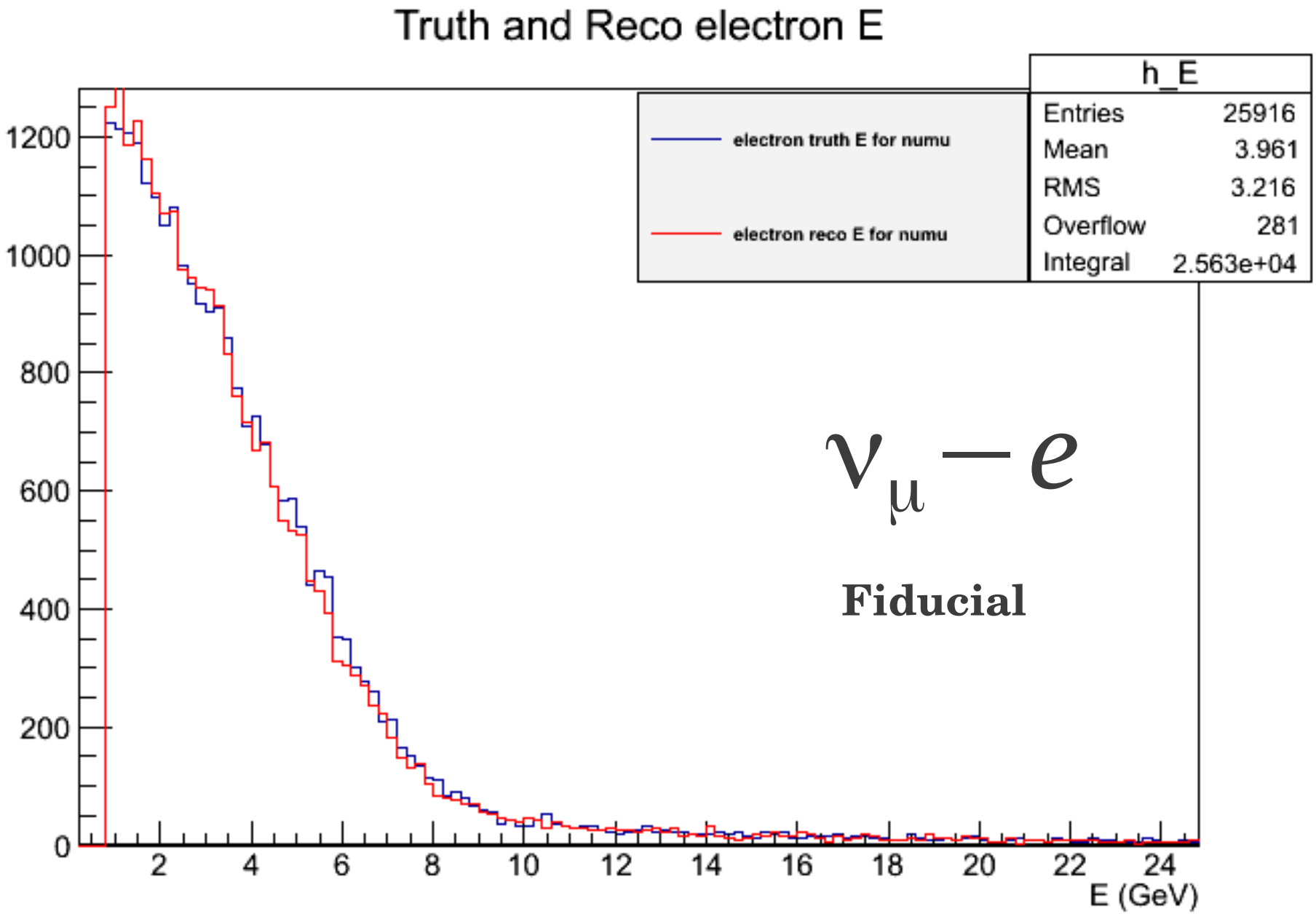
Electron Angle to the beam current

Truth Electron Energy Spectrum

(Fiducial)

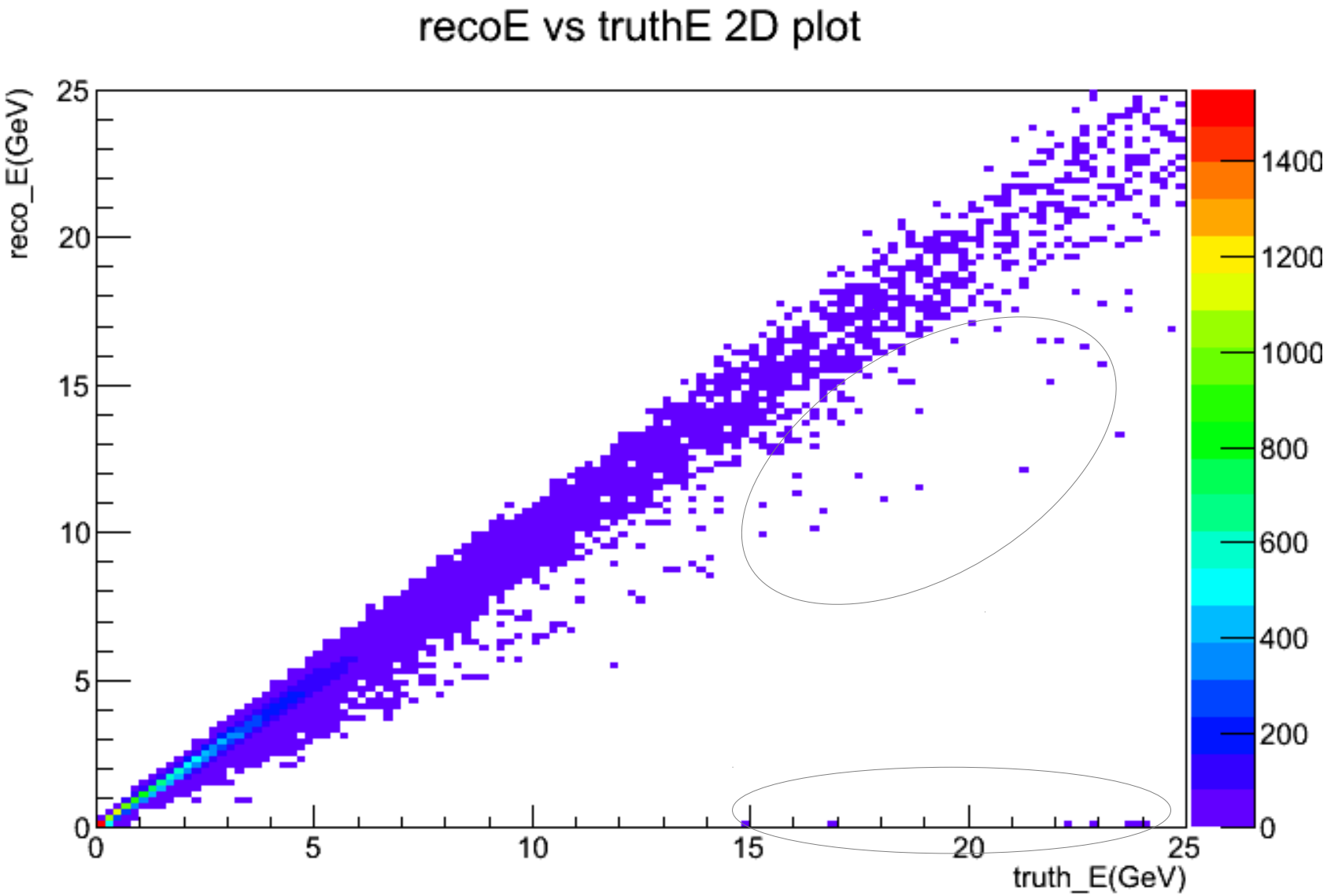


numu-e Energy Spectrum Truth and Reco



Reco E vs Truth E

(fiducial)

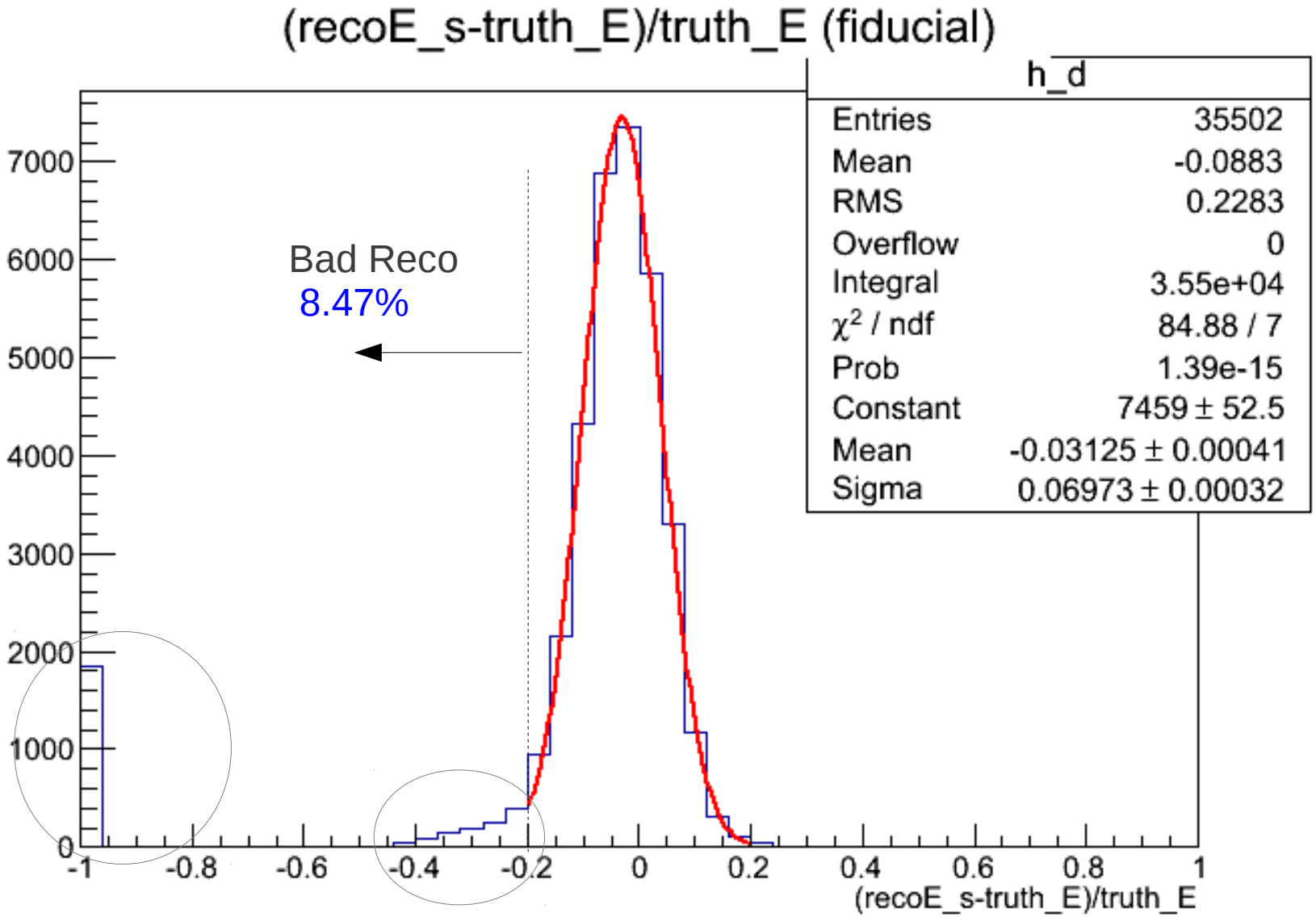


Reco E vs Truth E

XzUzDiff>=-2 && XzUzDiff<4 && XzVzDiff>=-2 && XzVzDiff<4 && chi2PerDoF>0 && truth_fiducial_evt==1

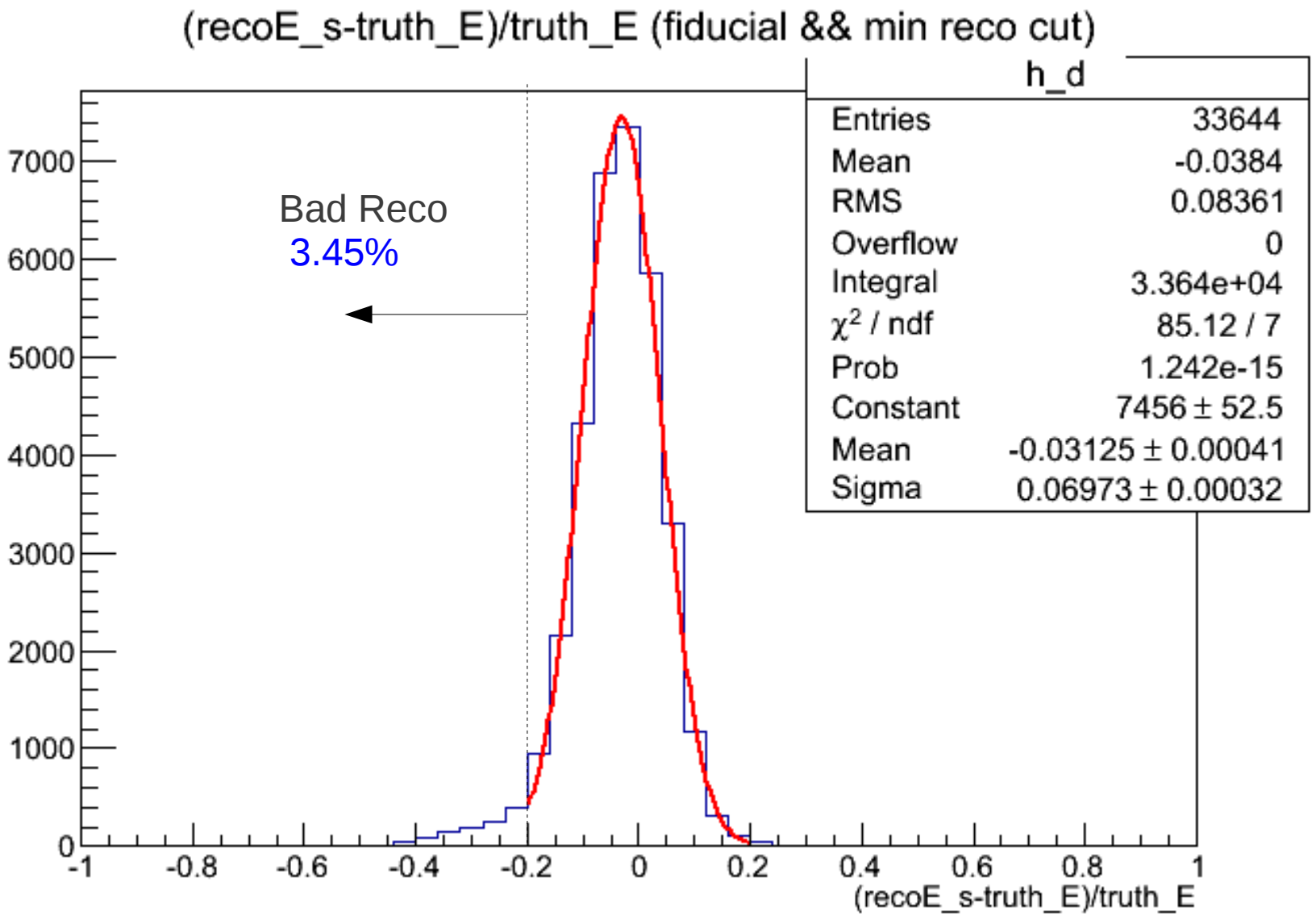
Reco Energy Original Resolution

(fiducial)



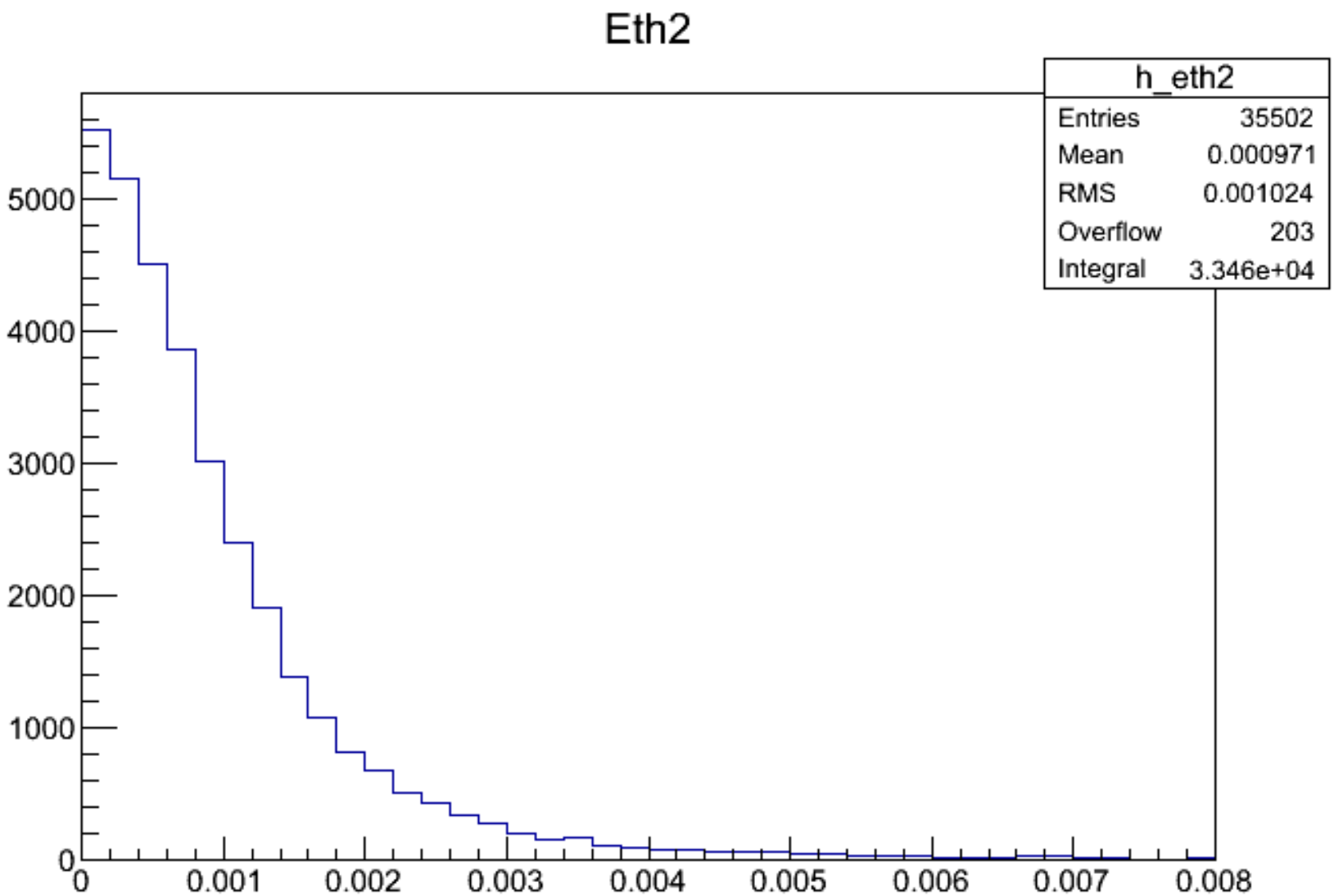
Minimum Reco Quality Cut

XzUzDiff>=-2 && XzUzDiff<4 && XzVzDiff>=-2 && XzVzDiff<4 && chi2PerDoF>0 && truth_fiducial_evt==1



Reconstructed Eth2

(Fiducial)



Truth Eth2

-9999?