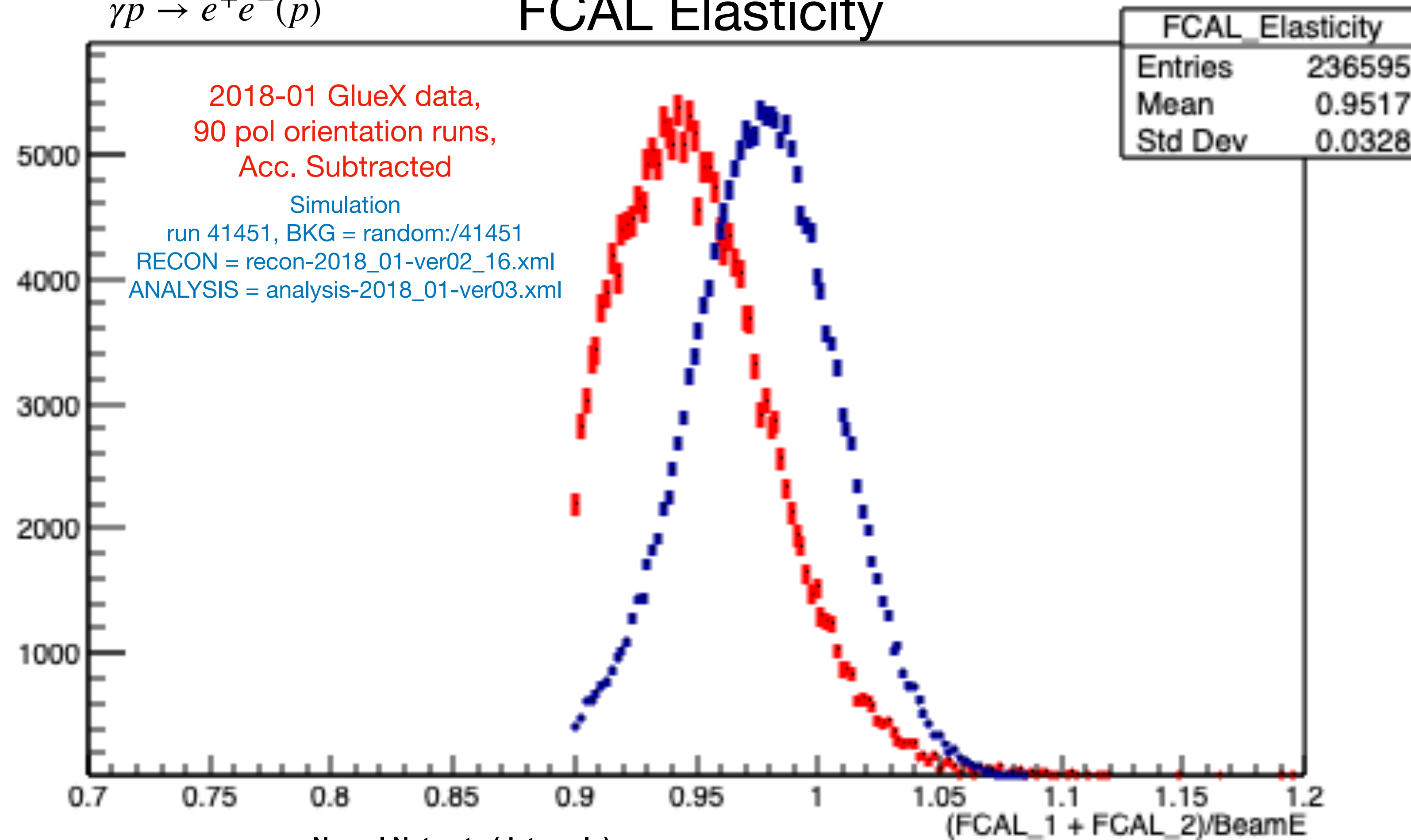


$$\gamma p \rightarrow e^+ e^- (p)$$

FCAL Elasticity



Neural Net cuts (data only):

Each individual track is required to pass a neural net trained to separate e^+/π^+ and e^-/π^- respectively.

Fiducial cuts:

Coherent peak: $8.2 < E_{\text{beam}} < 8.8$

2 particle invariant mass (avoids the ρ^0 peak): $0.25 \text{ GeV} < W < 0.621 \text{ GeV}$

Both tracks have a hit in the TOF

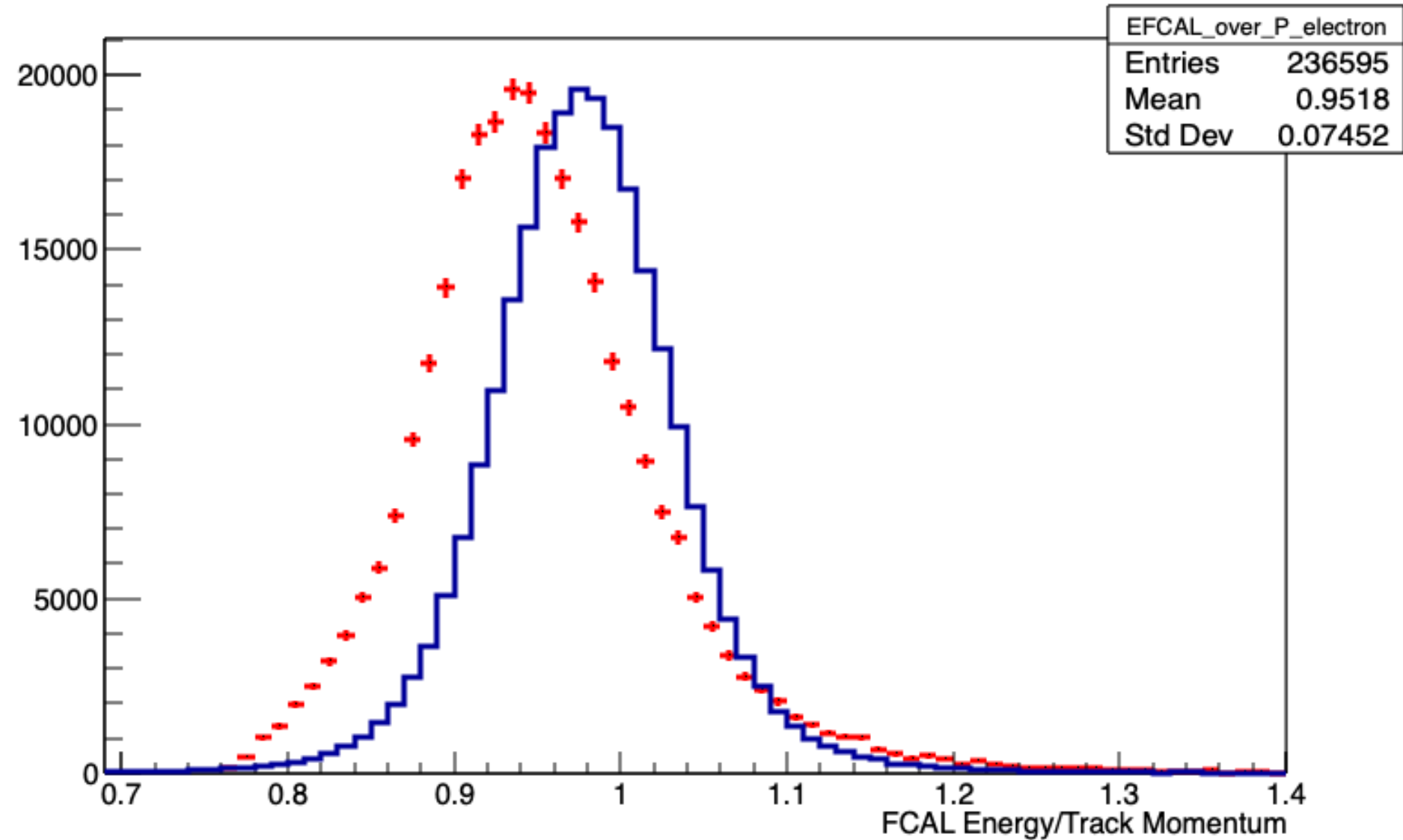
$\Theta_1, \Theta_2 > 1.5$ degrees

Window Free vertex cut: $52 \text{ cm} < z < 78 \text{ cm}$

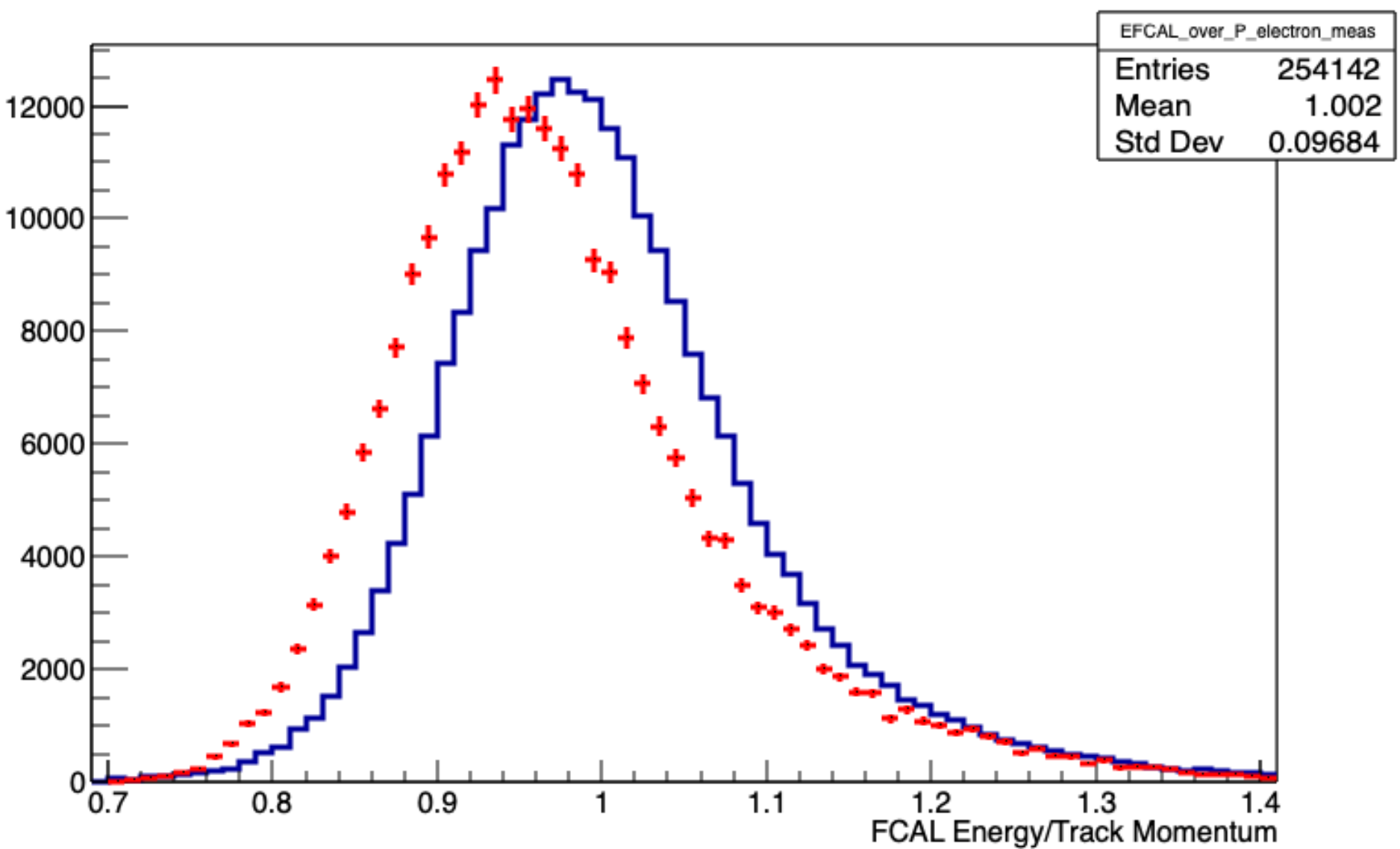
FCAL Elasticity > 0.9

$\gamma p \rightarrow e^+ e^-(p)$

E/p Electron (kinfit p)

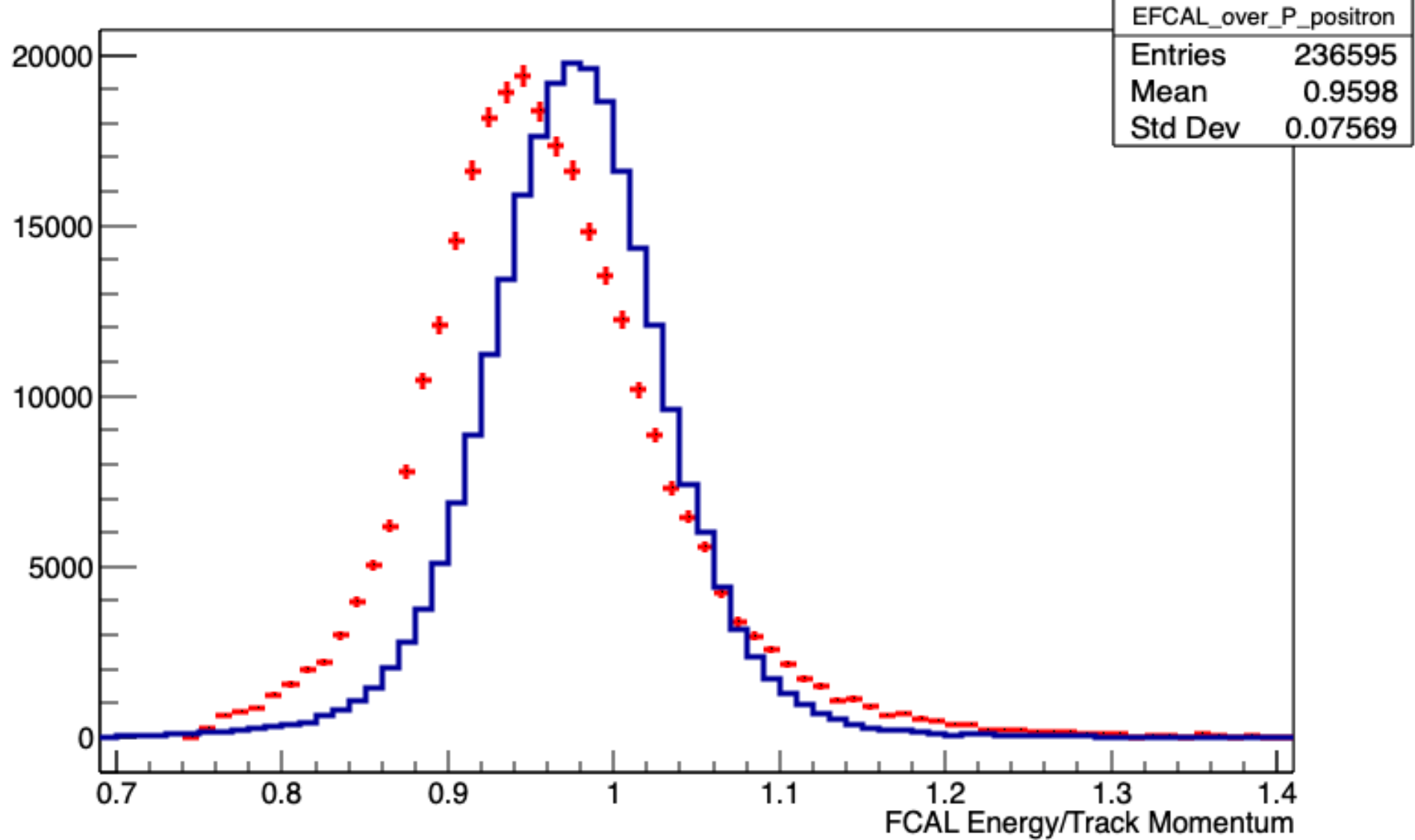


E/p Electron (measured p)

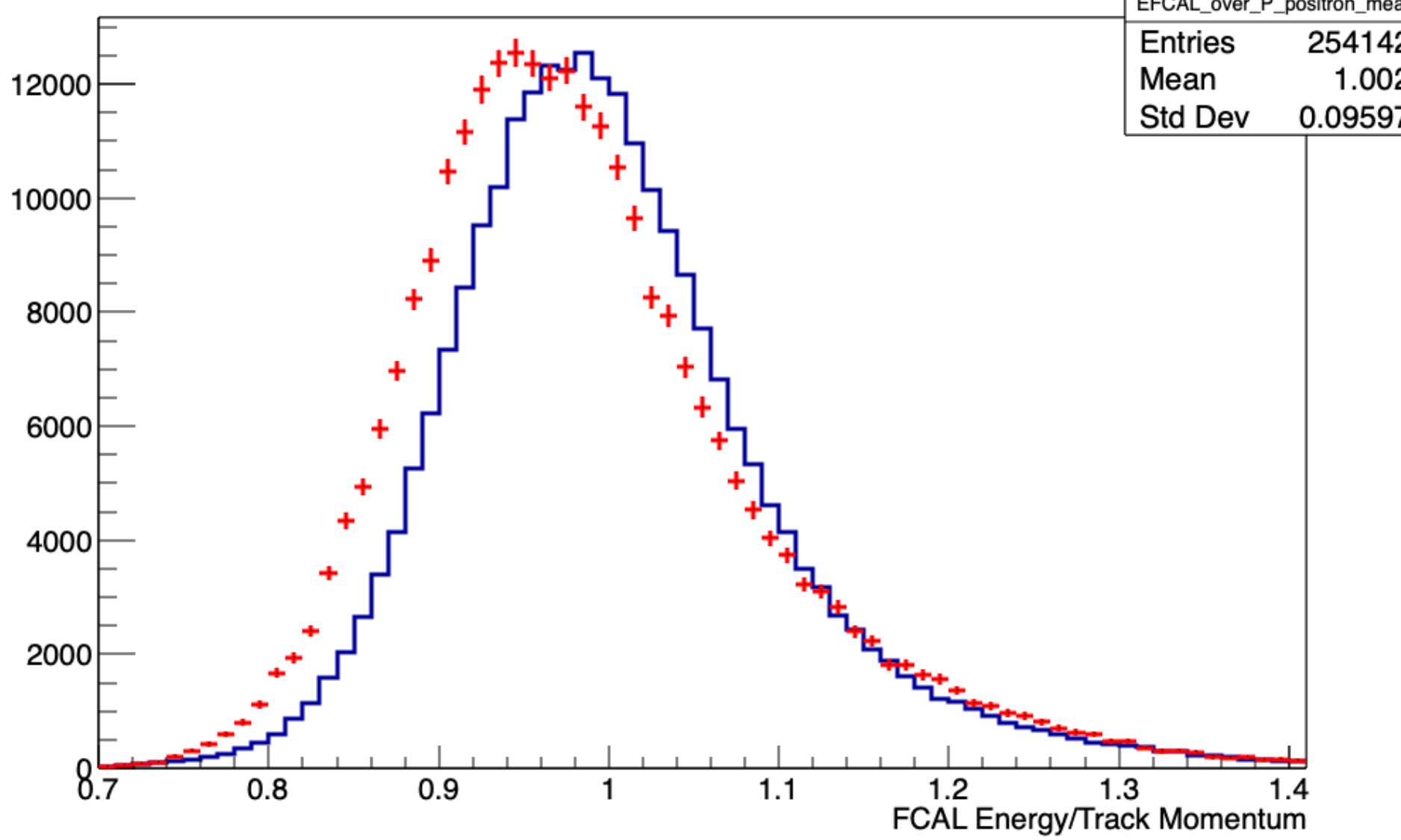


Data
Simulation

E/p Positron (kinfit p)

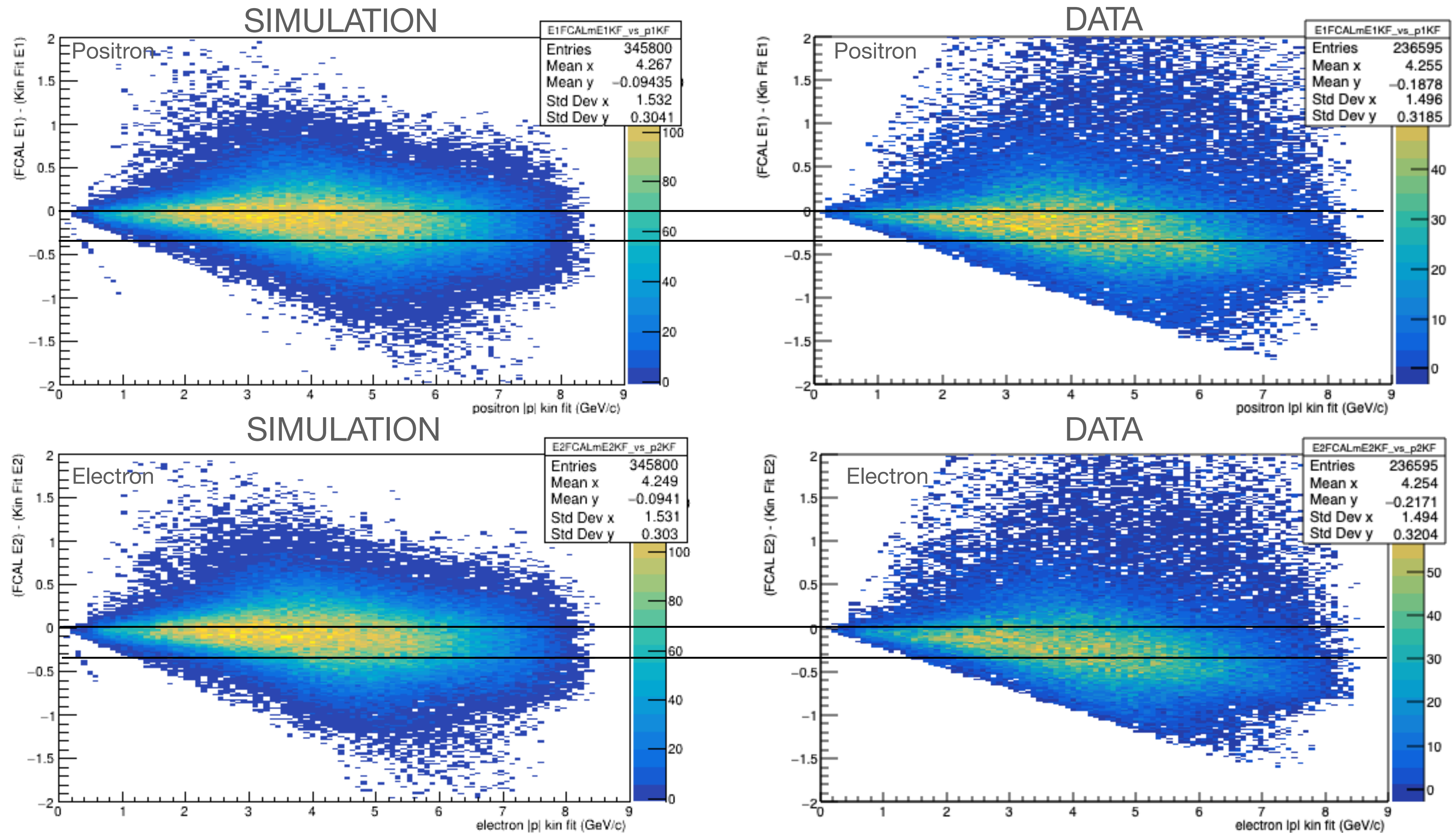


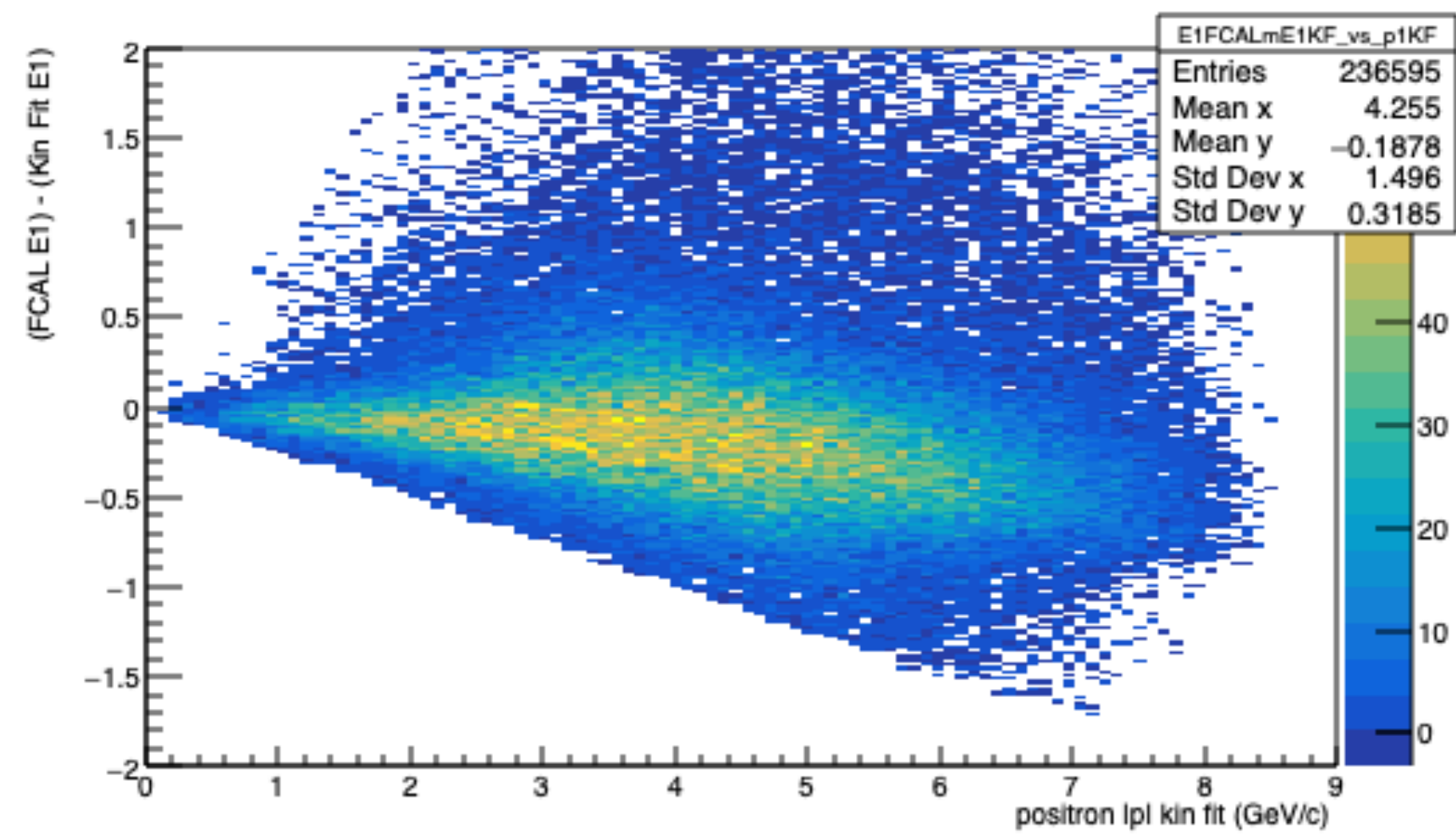
E/p Positron (measured p)



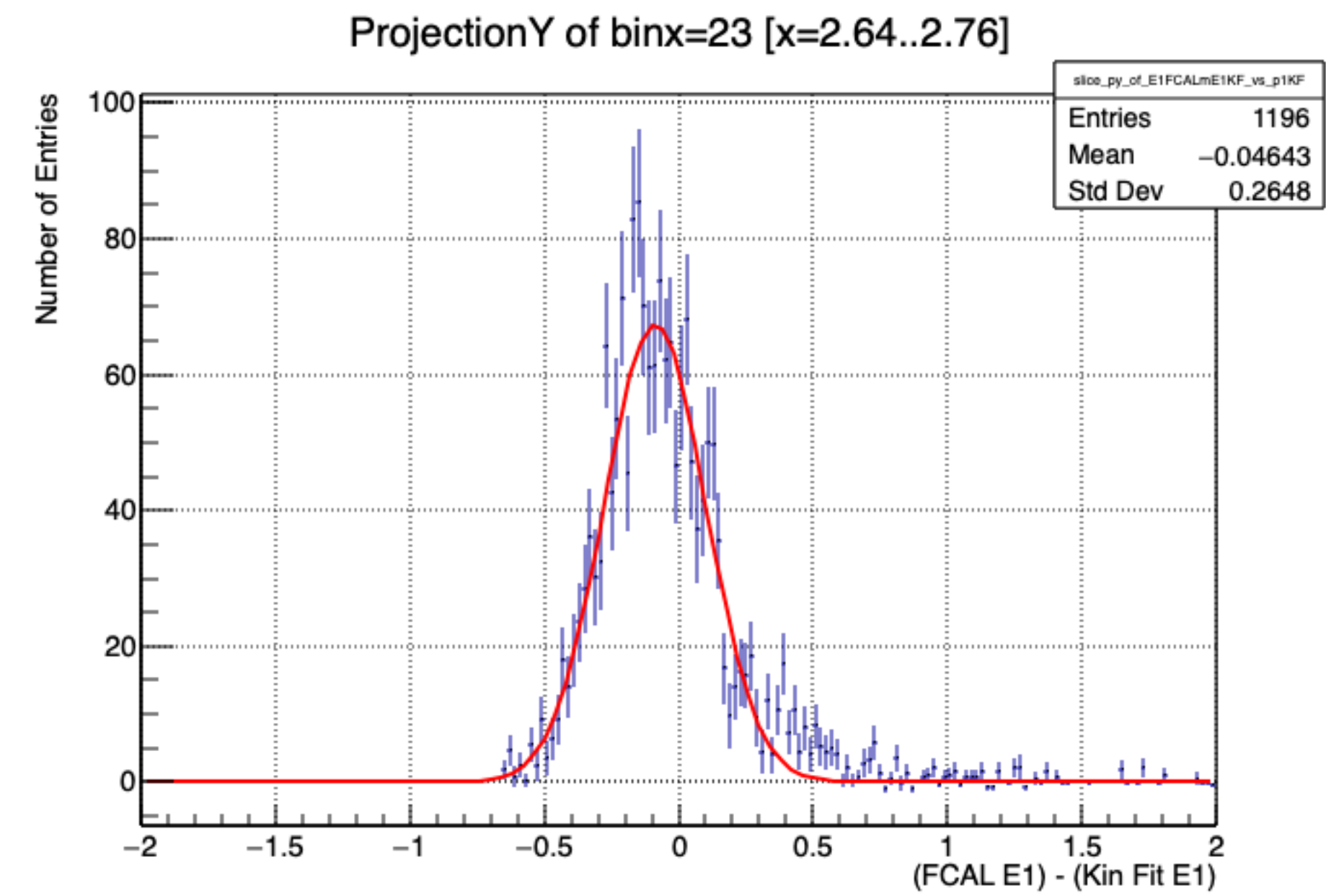
Richard: Does the energy defect in the fcal look like a gain factor or an offset, ie. does the difference between measured cluster energy and expected correlate with measured energy?

(FCAL Energy - Track Kinfit Energy) VS Track Kinfit Momentum

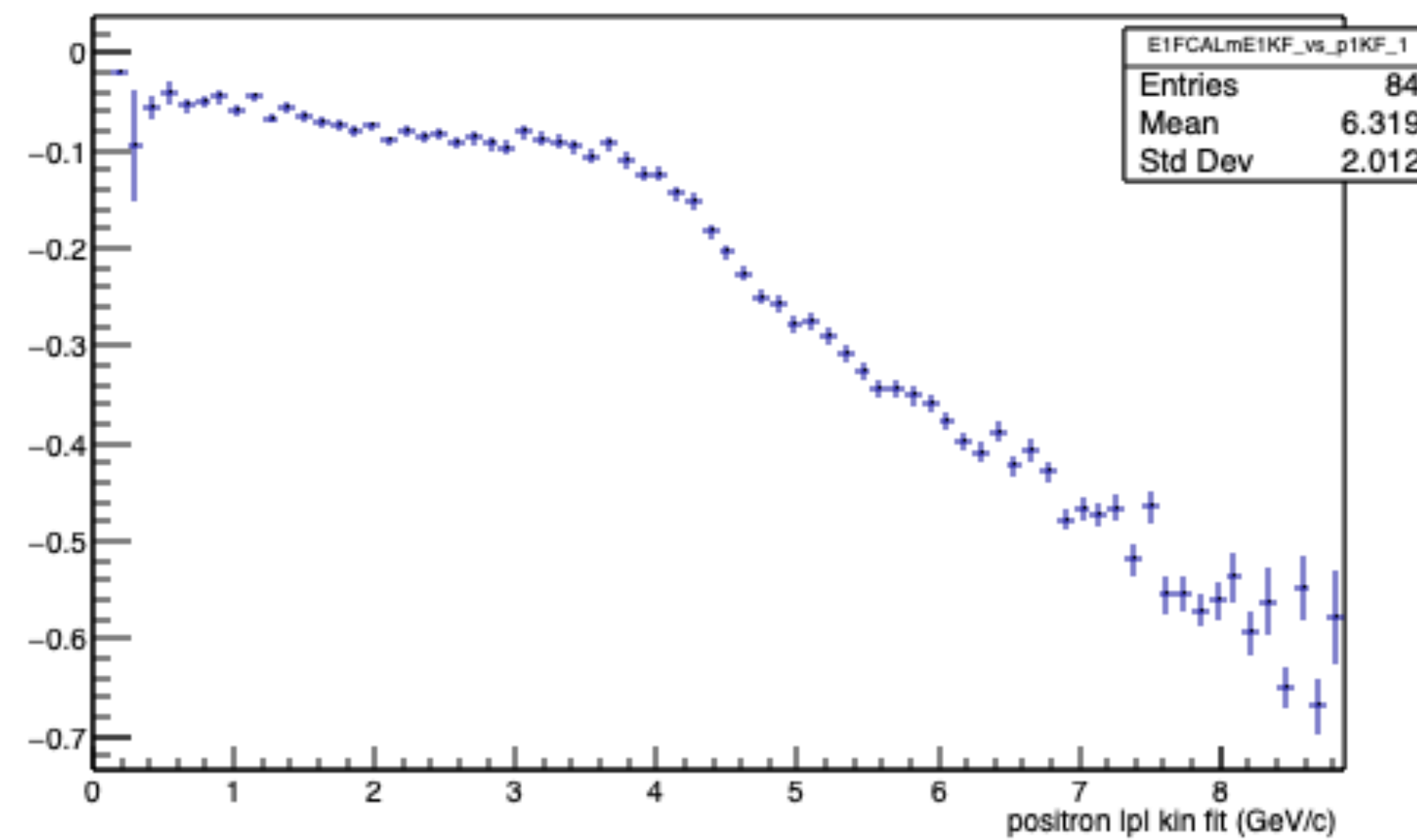




Fit Slices
in KF p



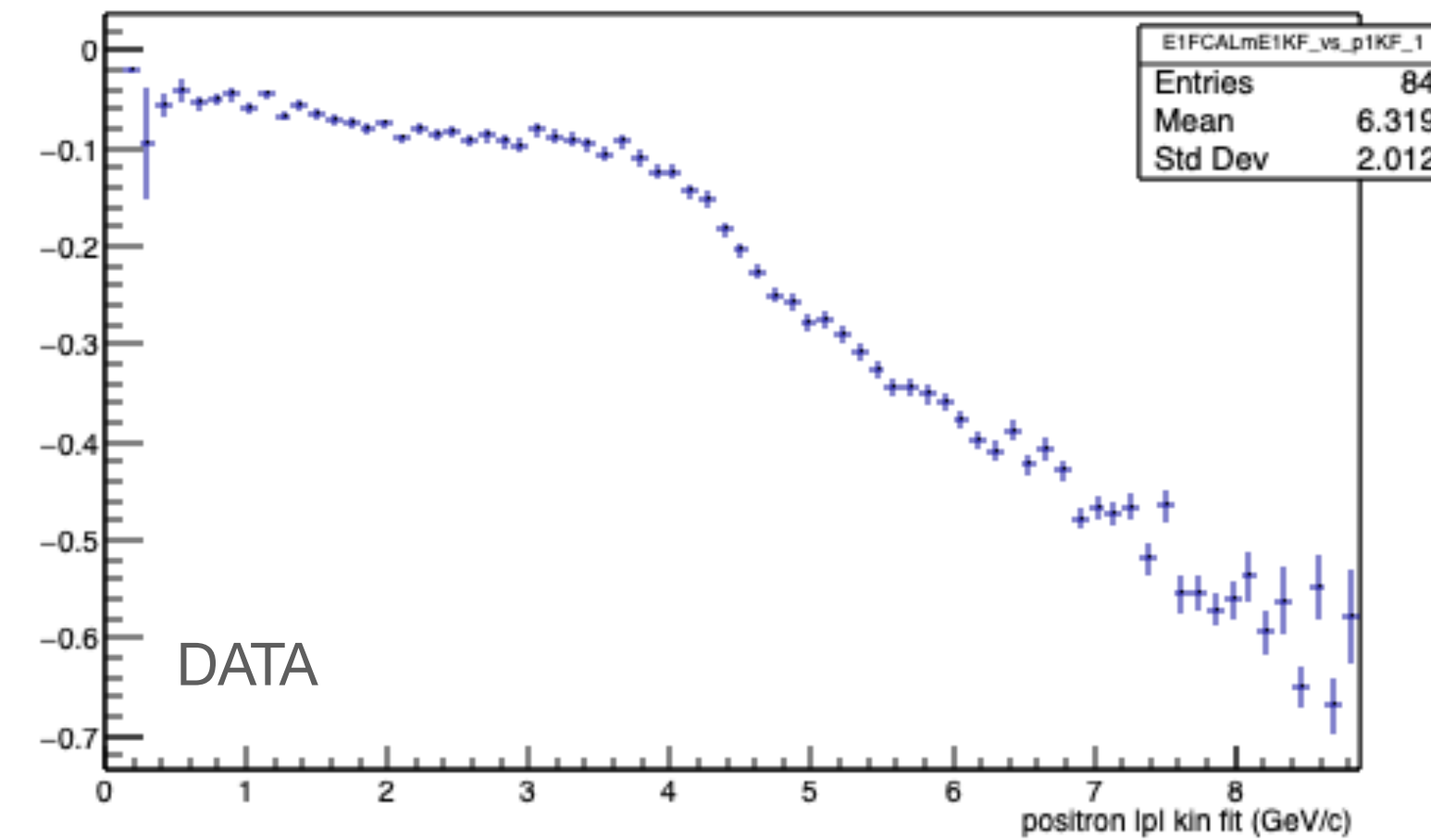
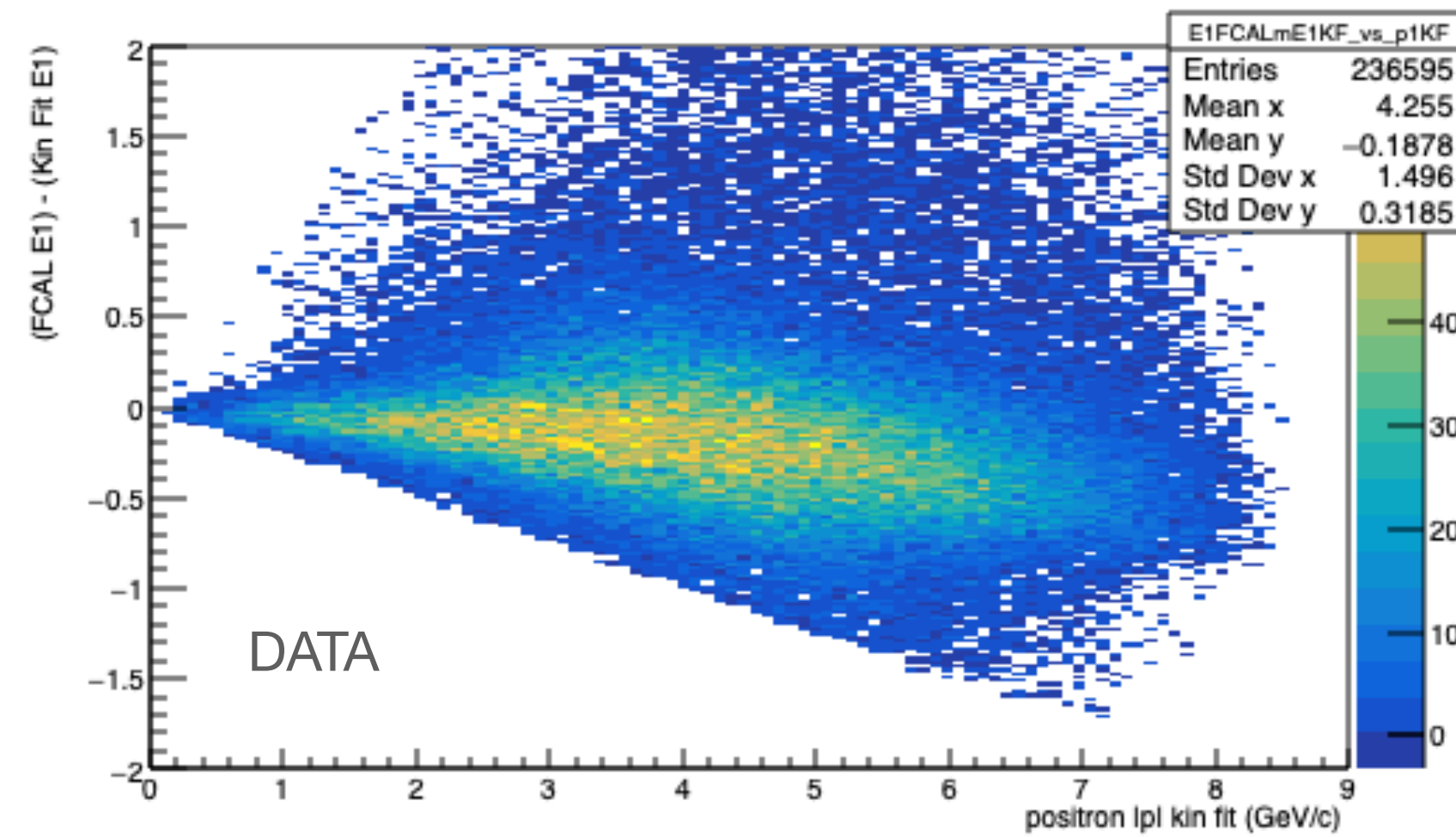
Fitted value of par[1]=Mean



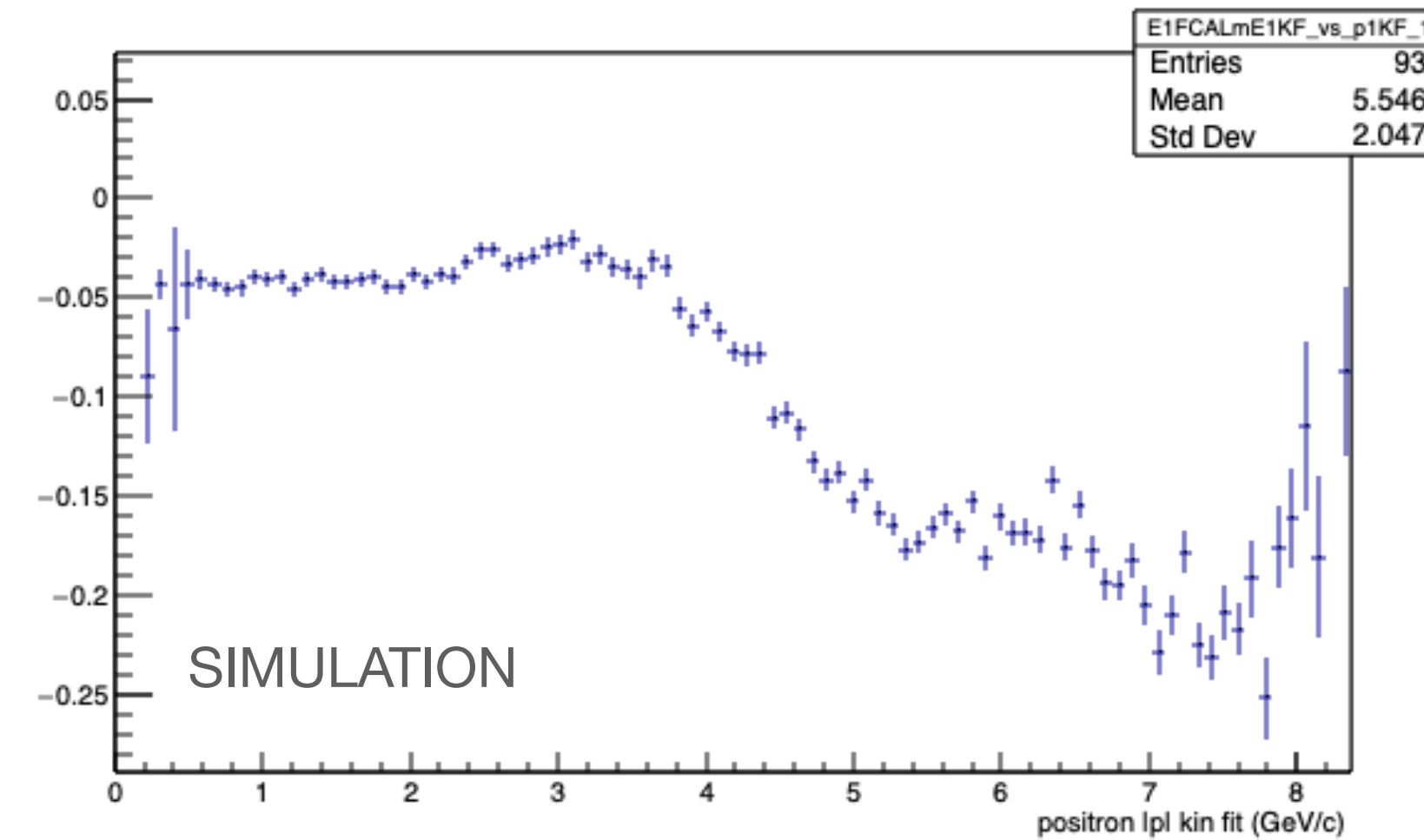
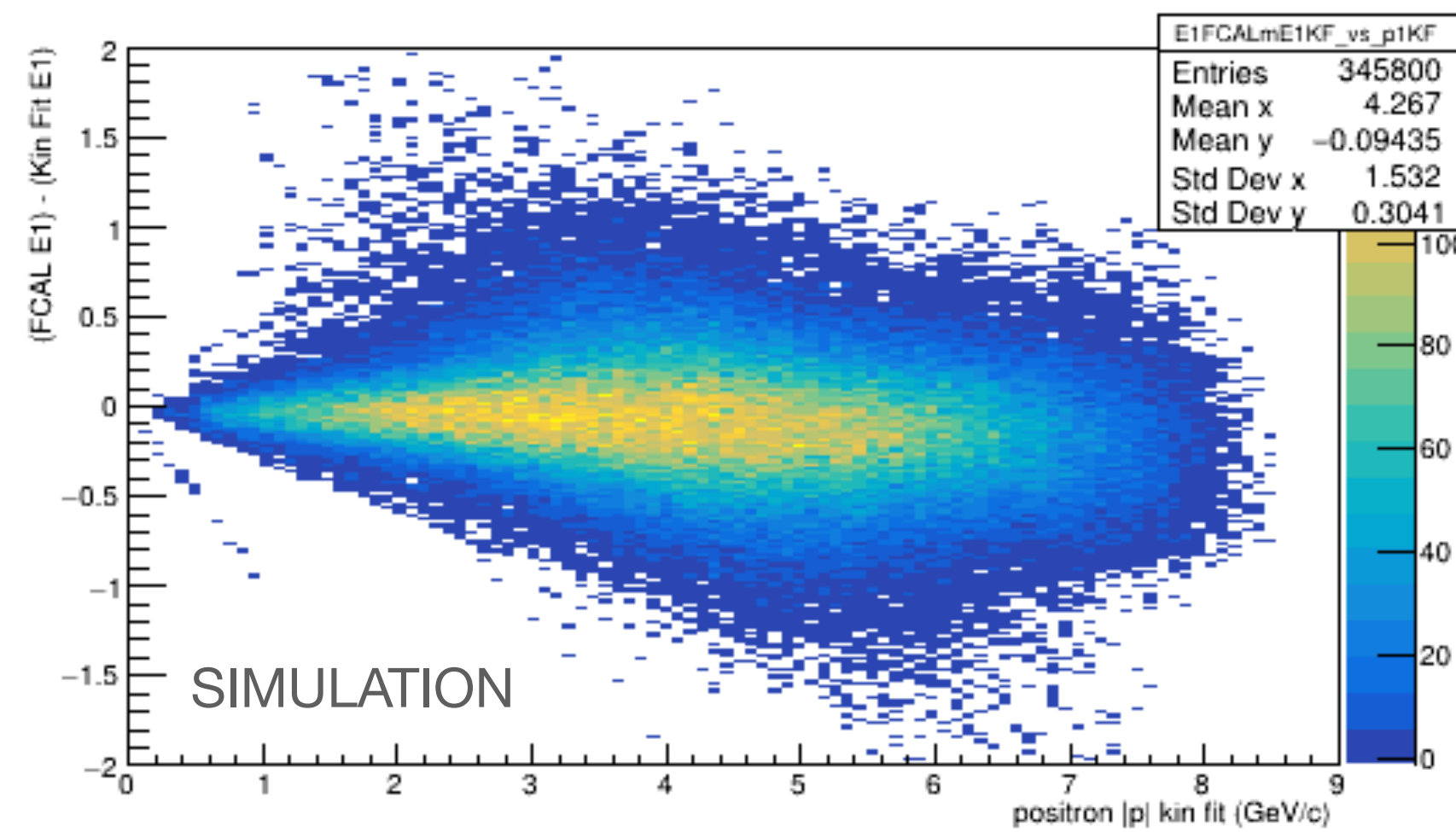
Positron

Comparing simulation and data

gaus mean value of $(E_{\text{FCAL}} - E_{\text{kinfit}})$ in bins of p

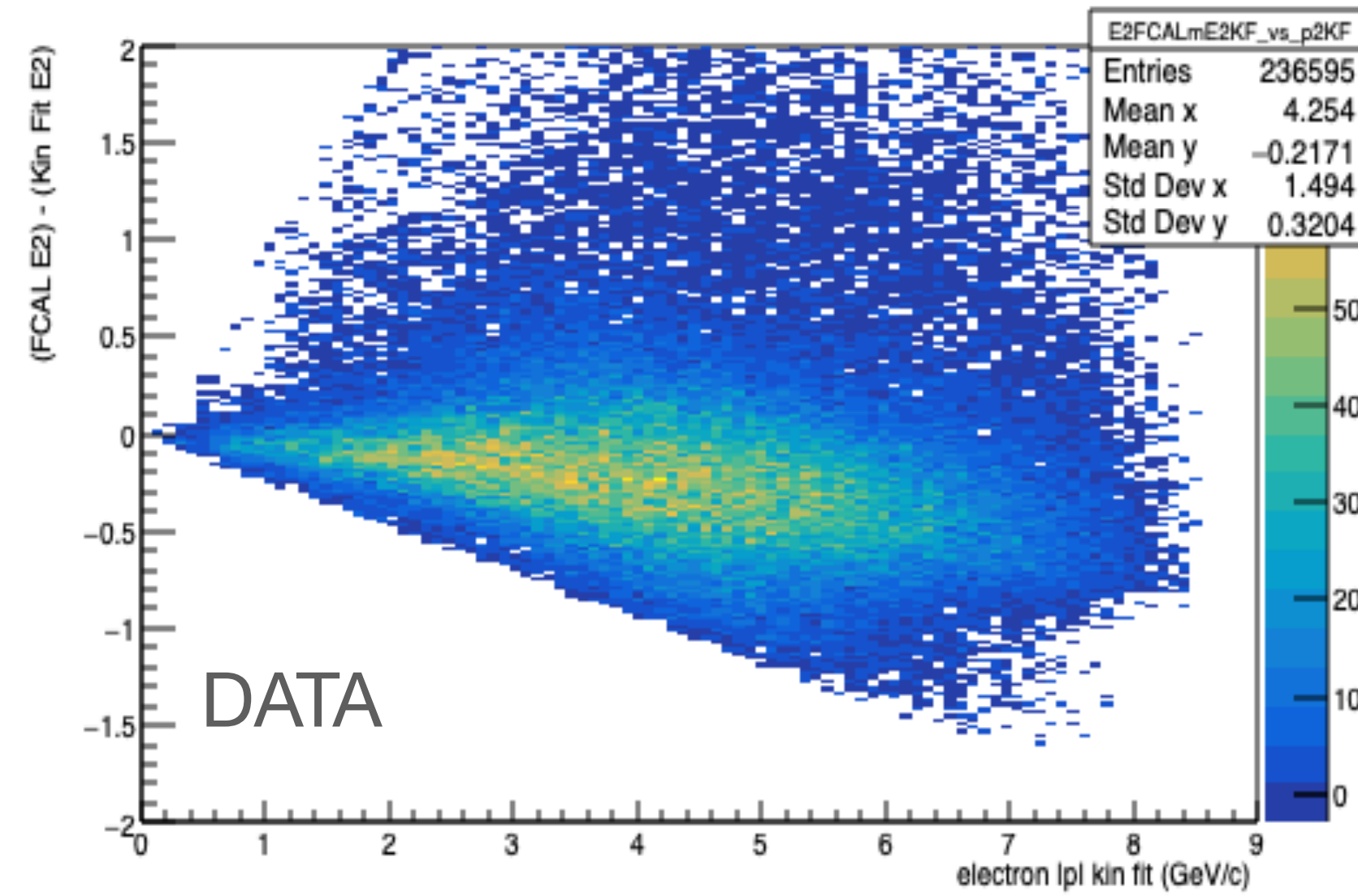


gaus mean value of $(E_{\text{FCAL}} - E_{\text{kinfit}})$ in bins of p

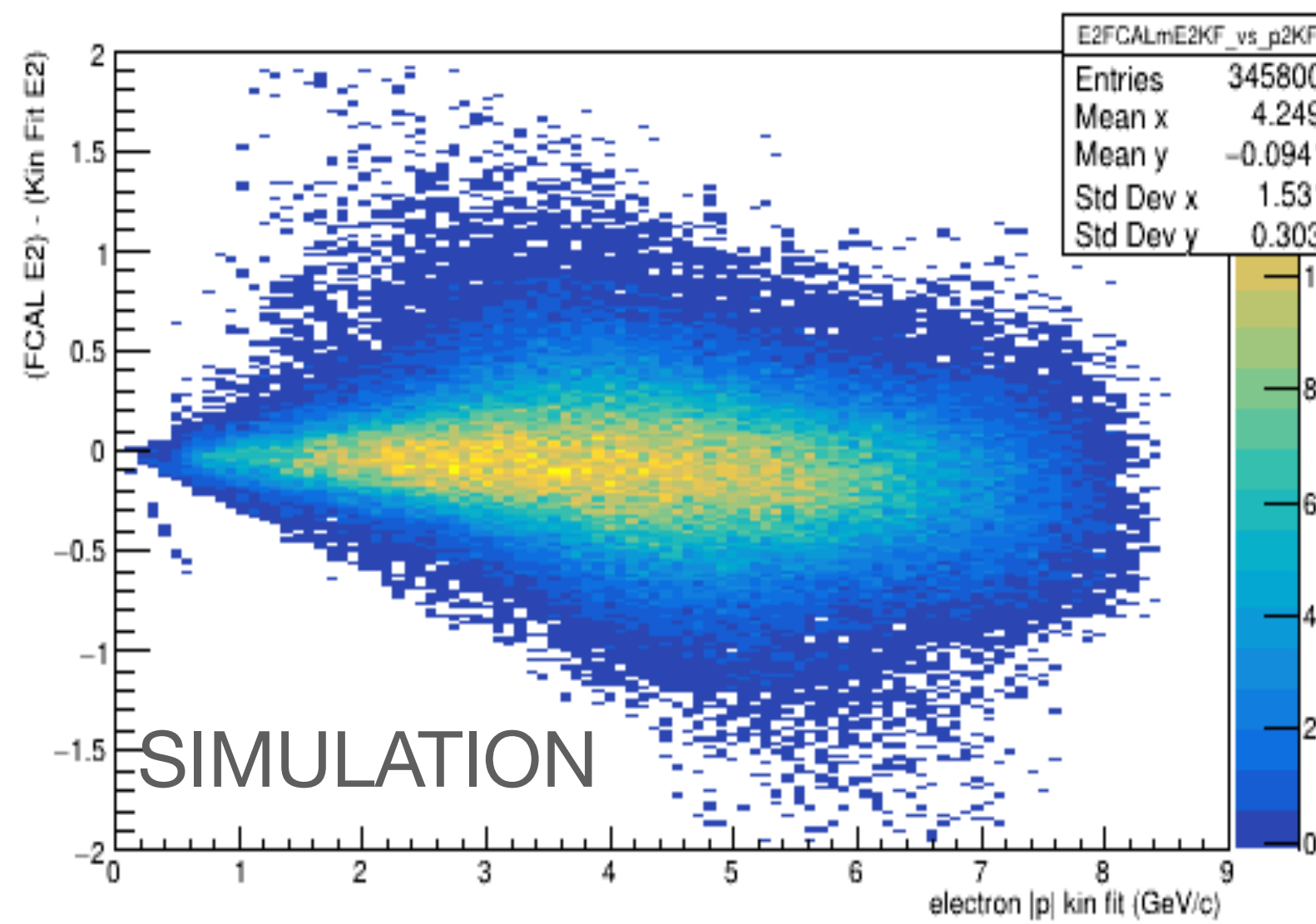
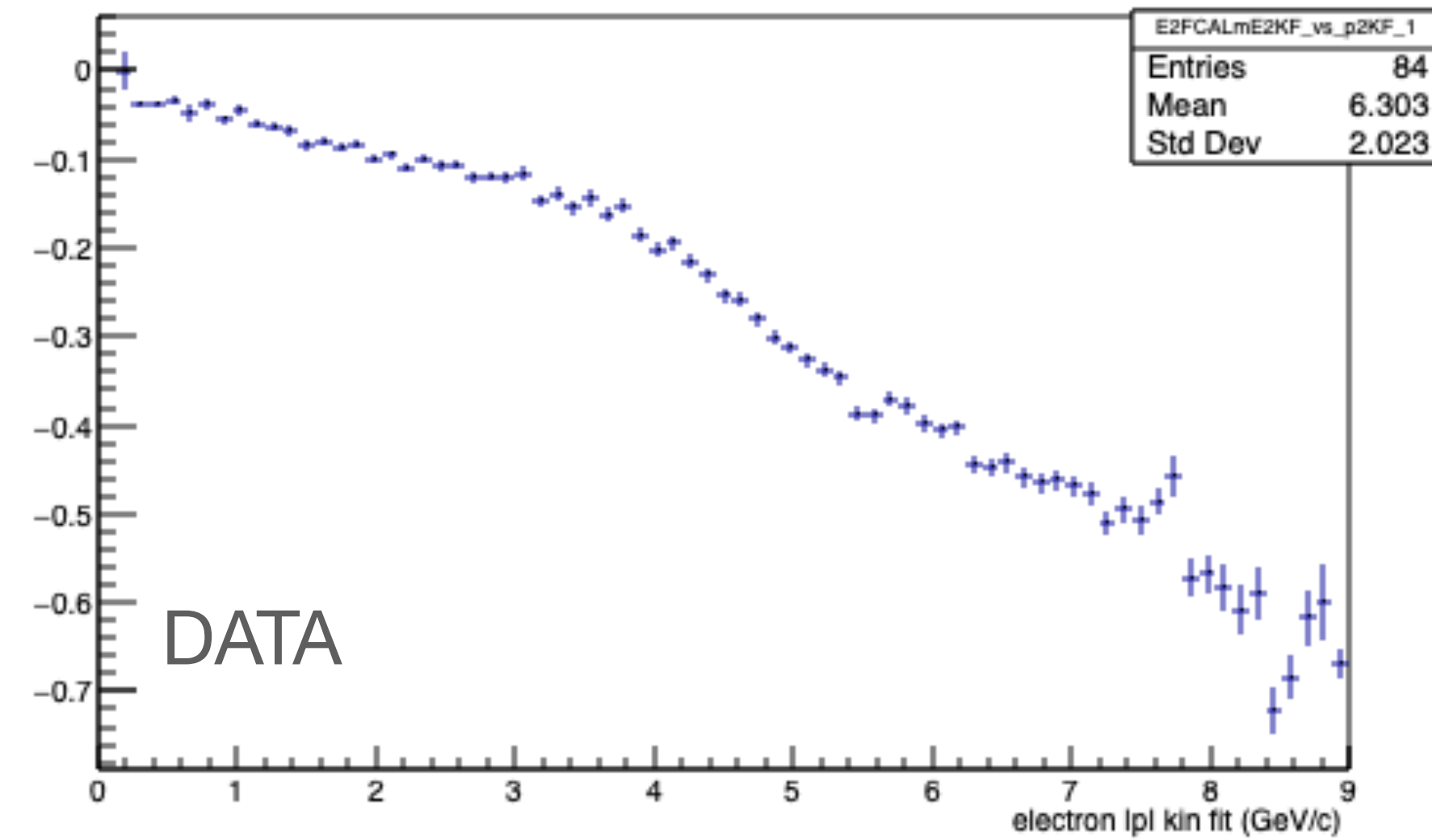


Electron

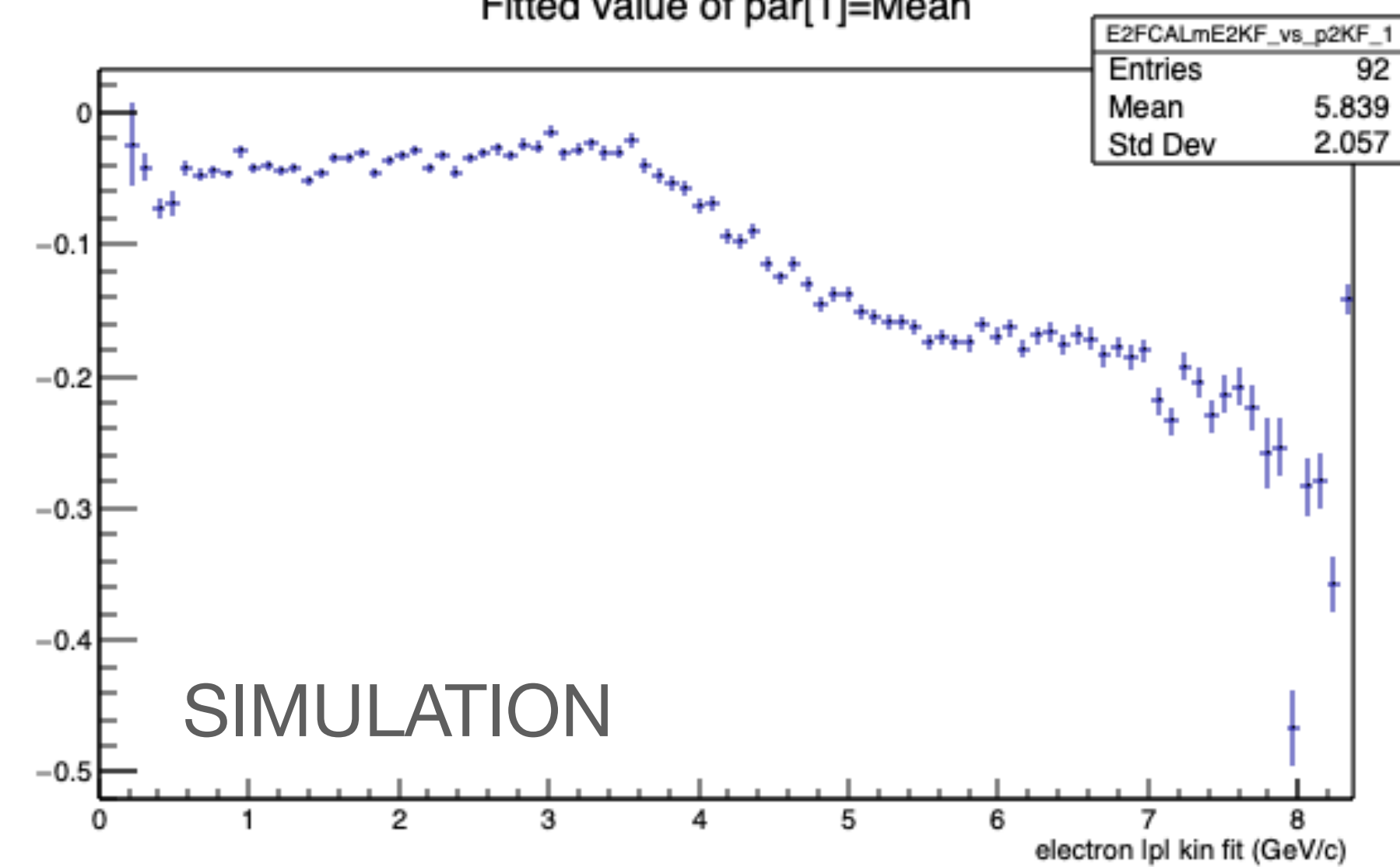
Comparing simulation and data



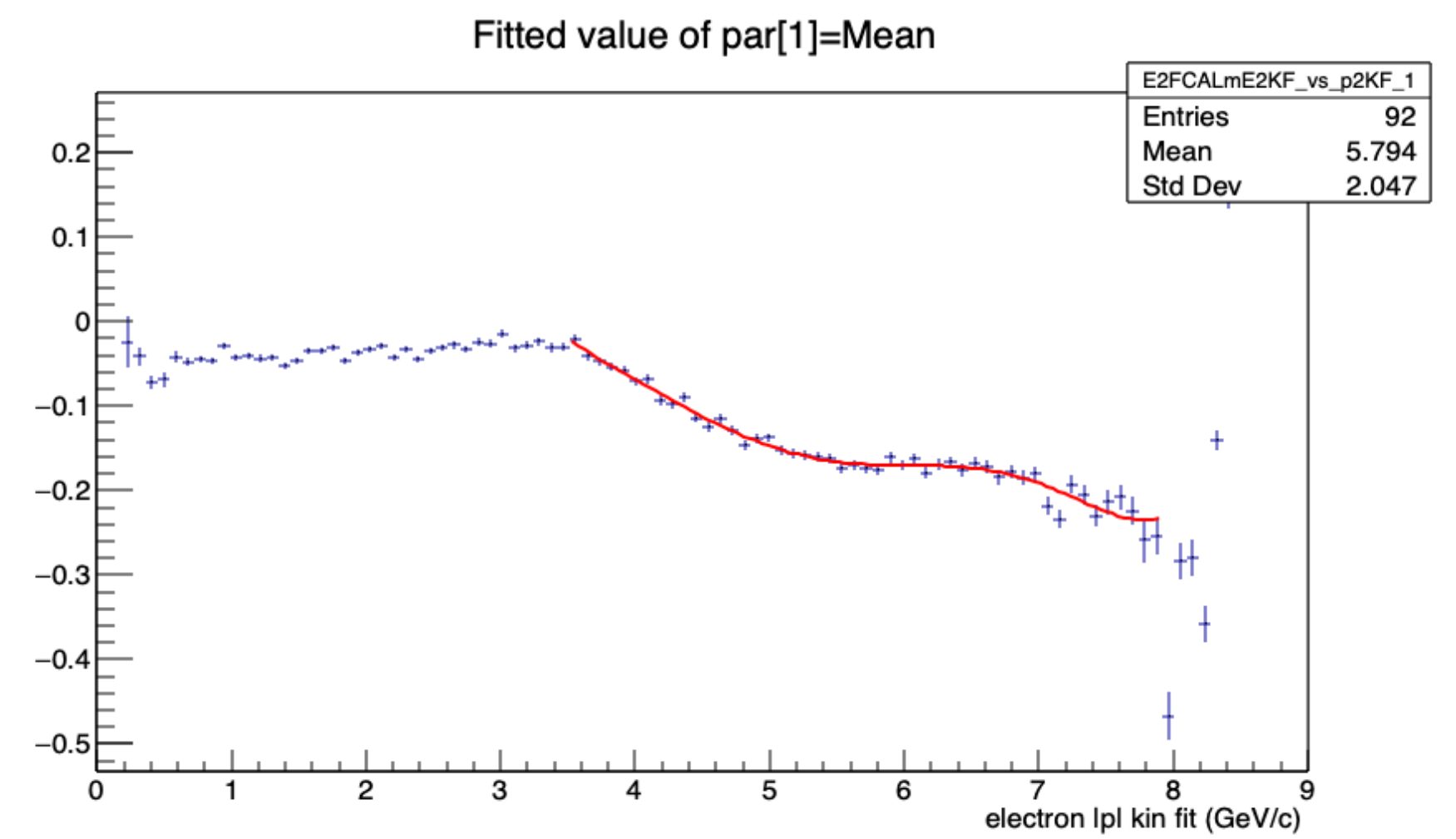
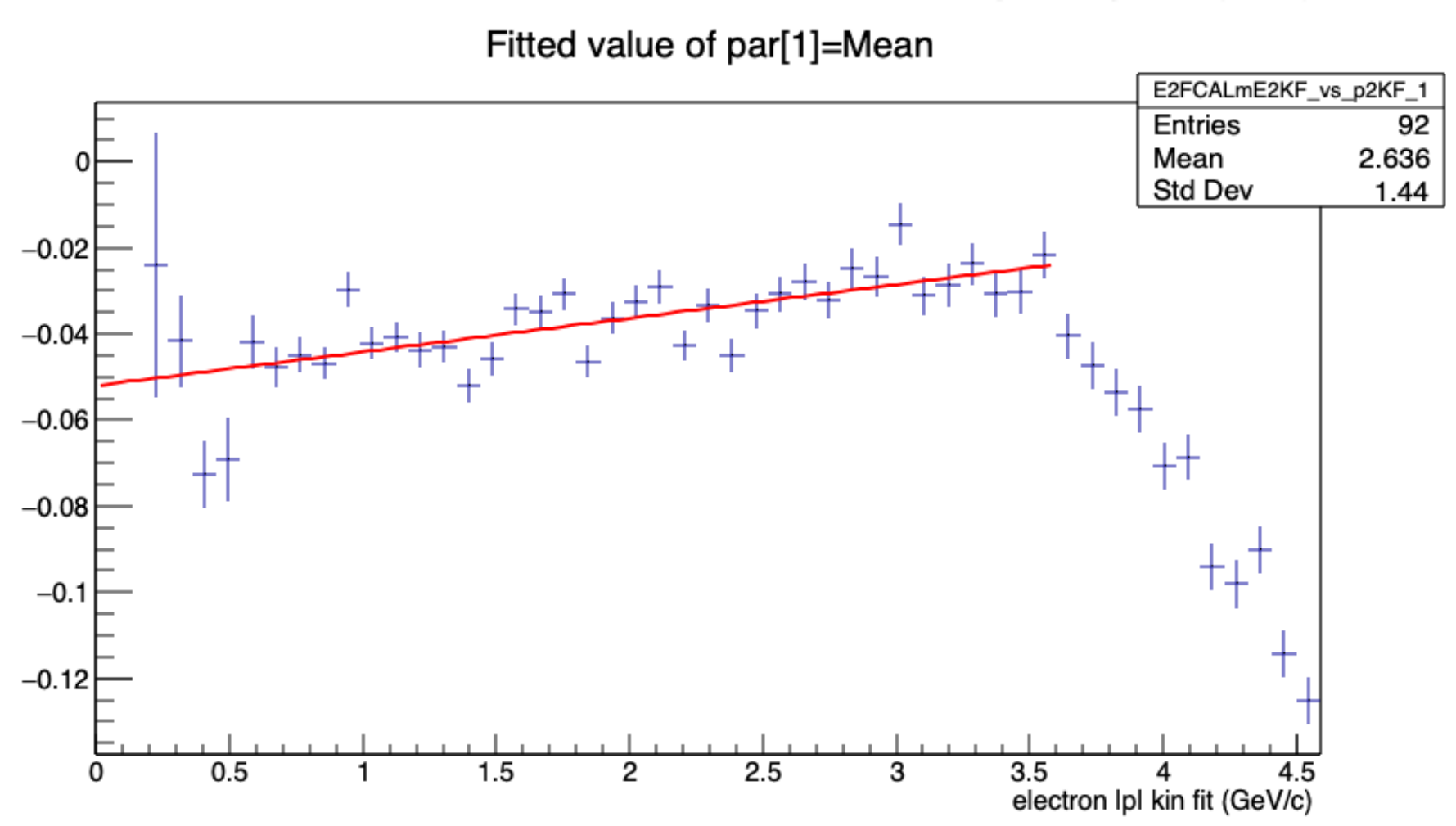
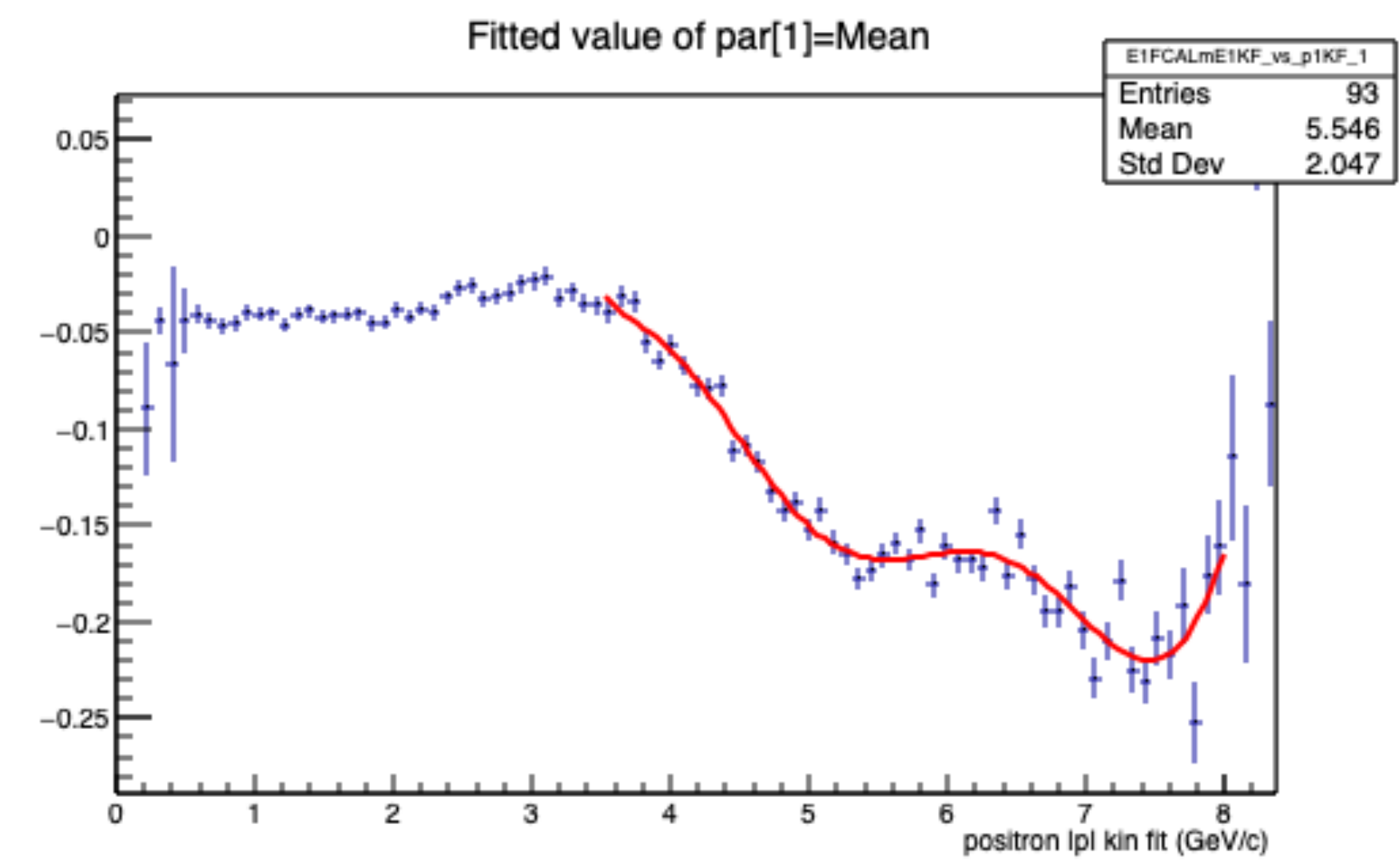
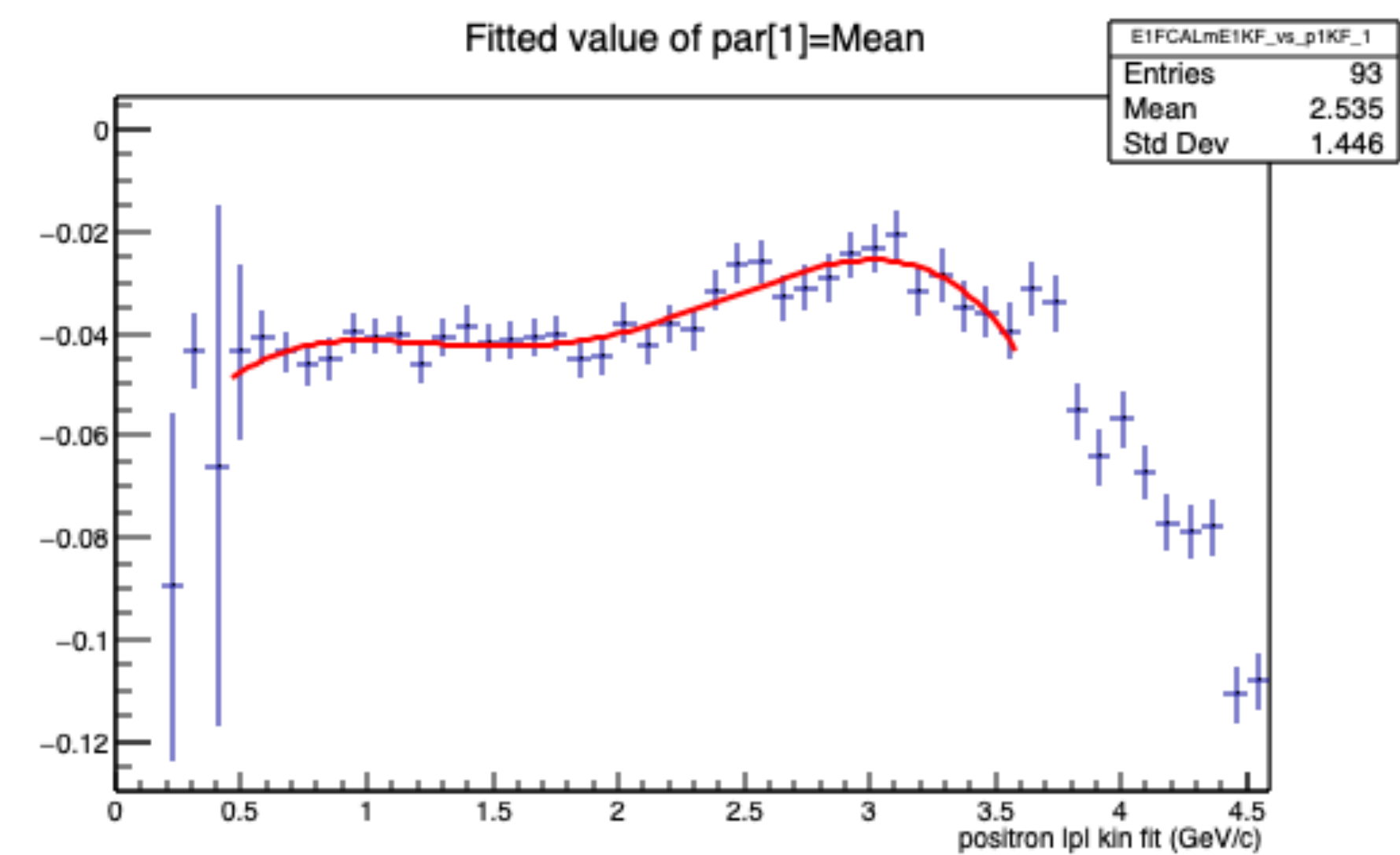
gaus mean value of (E_FCAL - E_kinfit) in bins of p



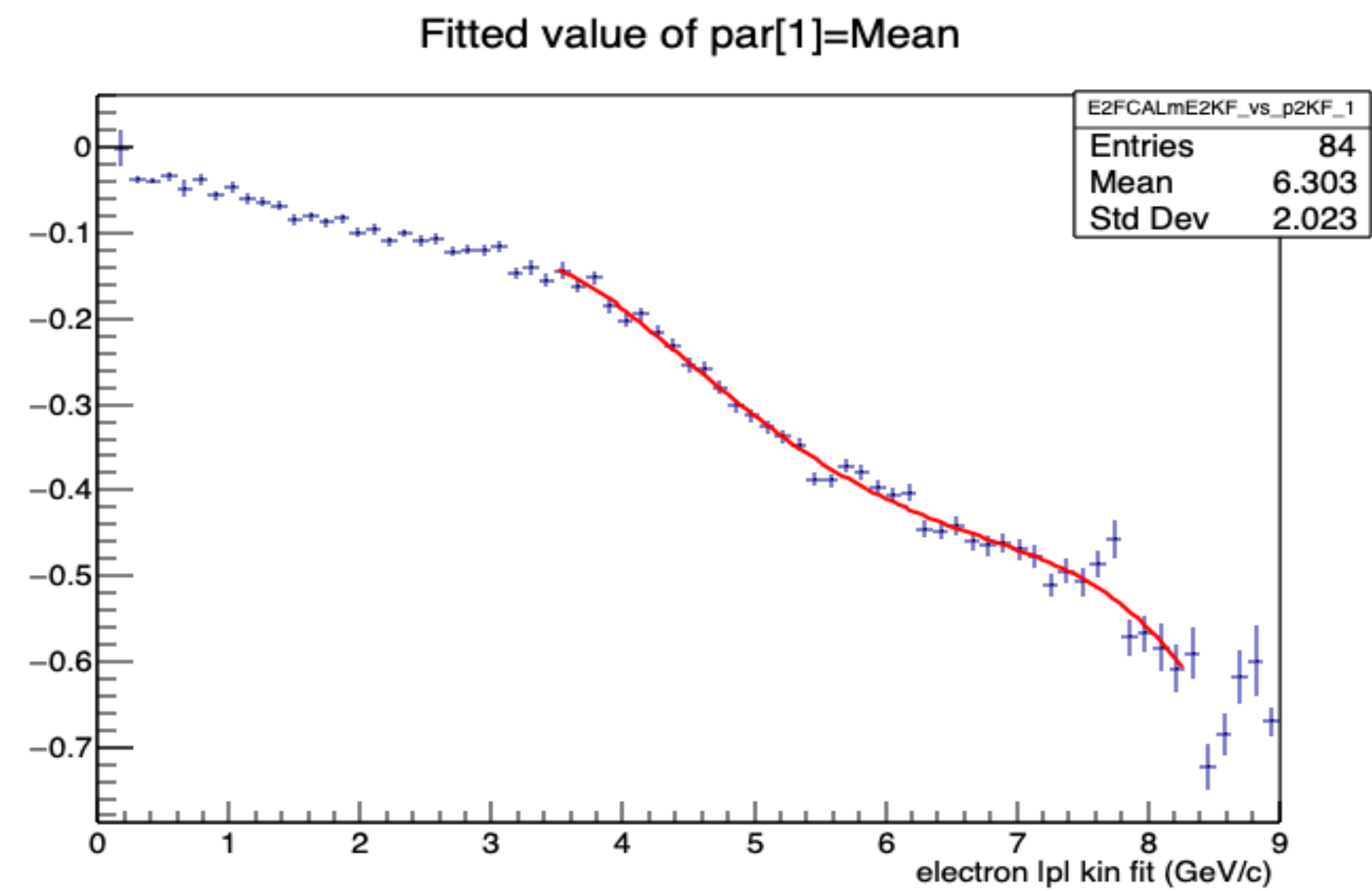
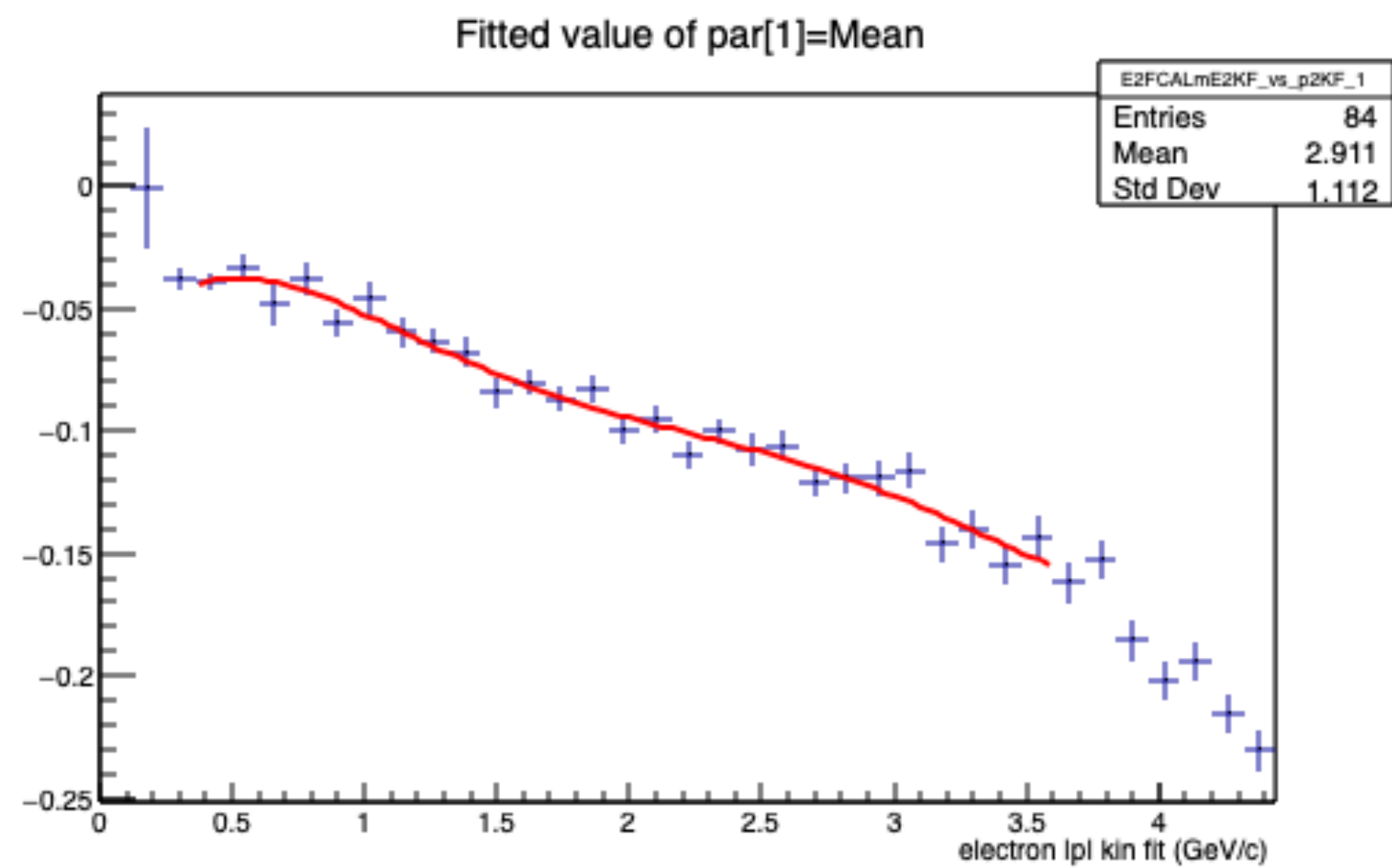
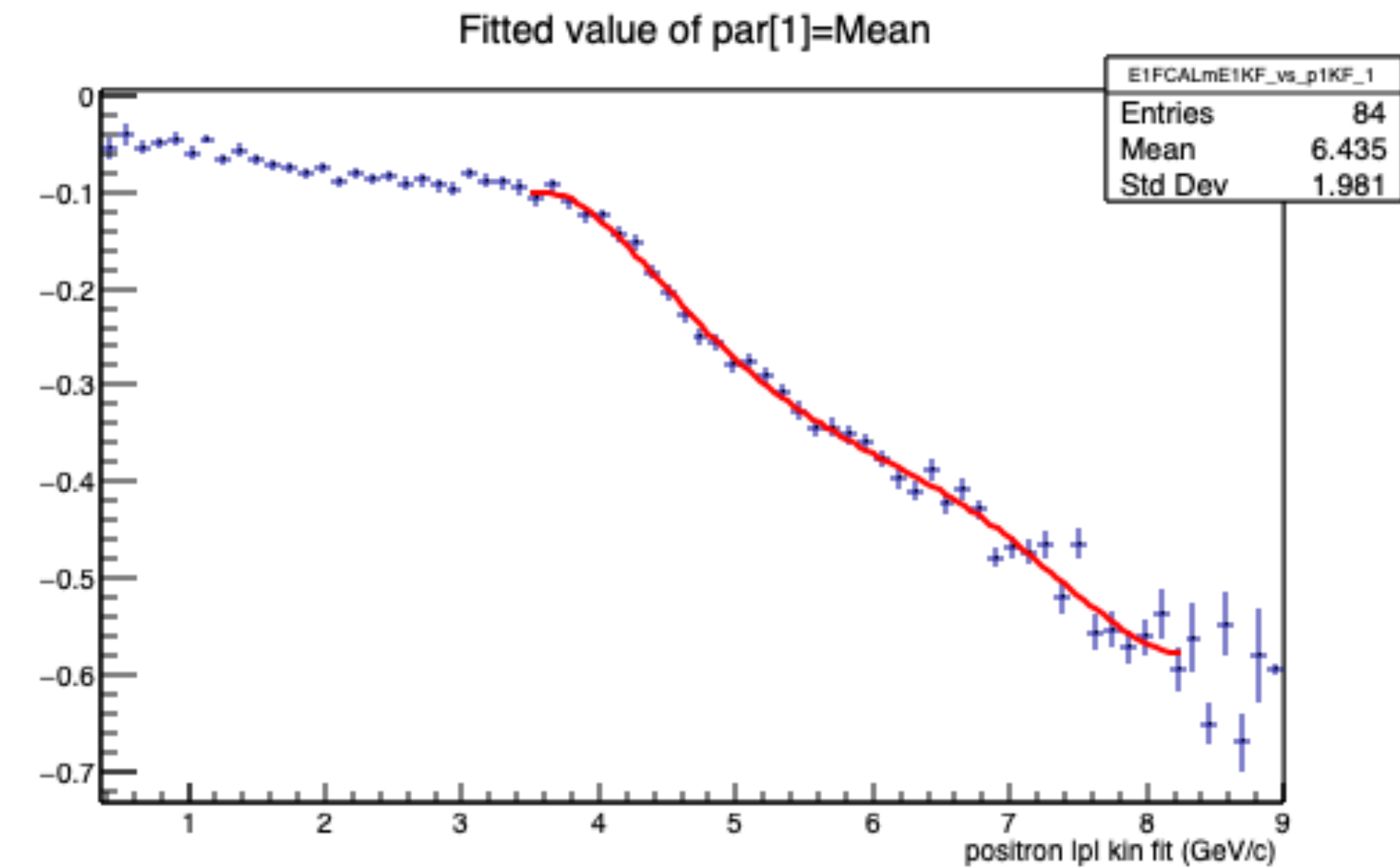
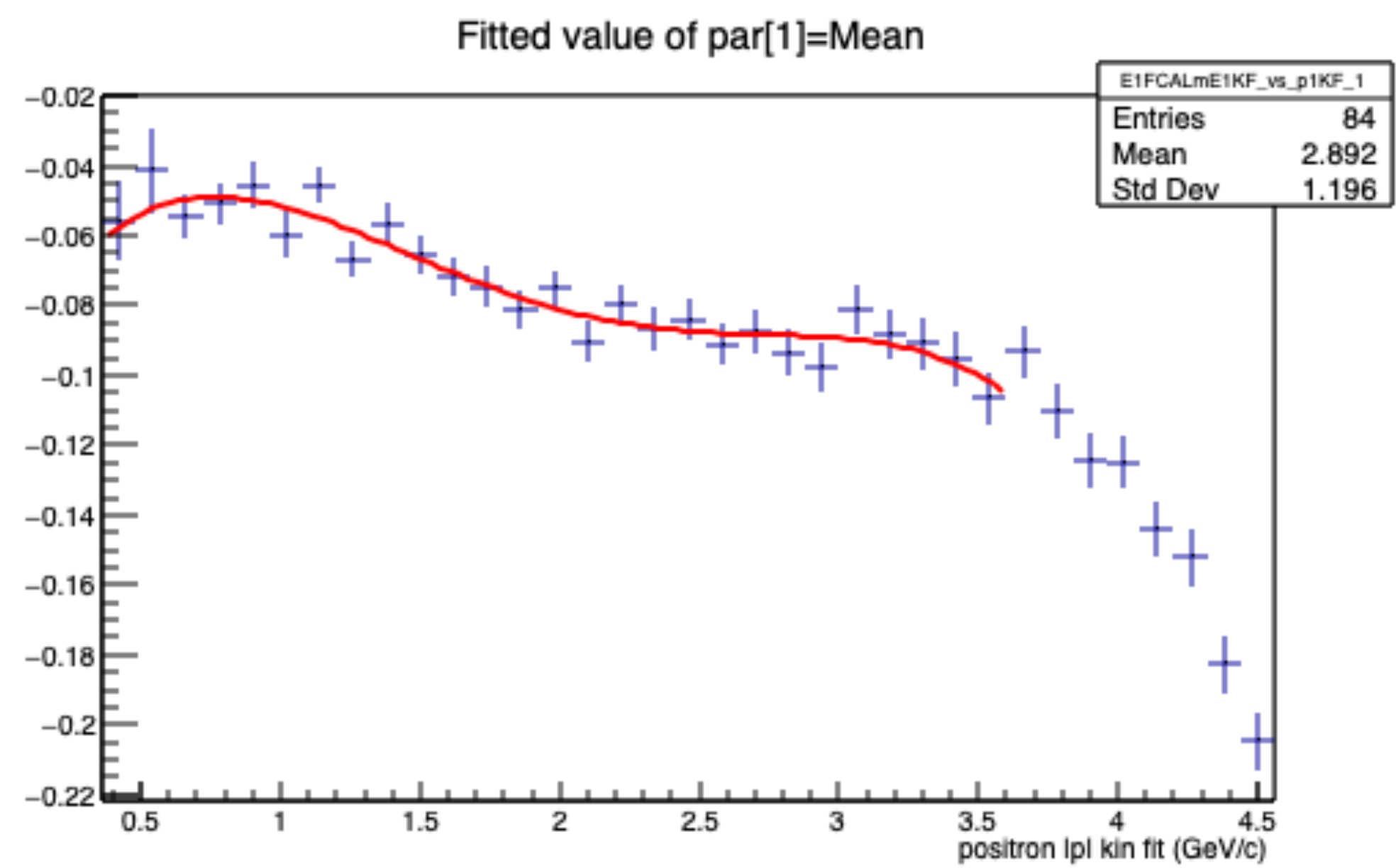
Fitted value of par[1]=Mean

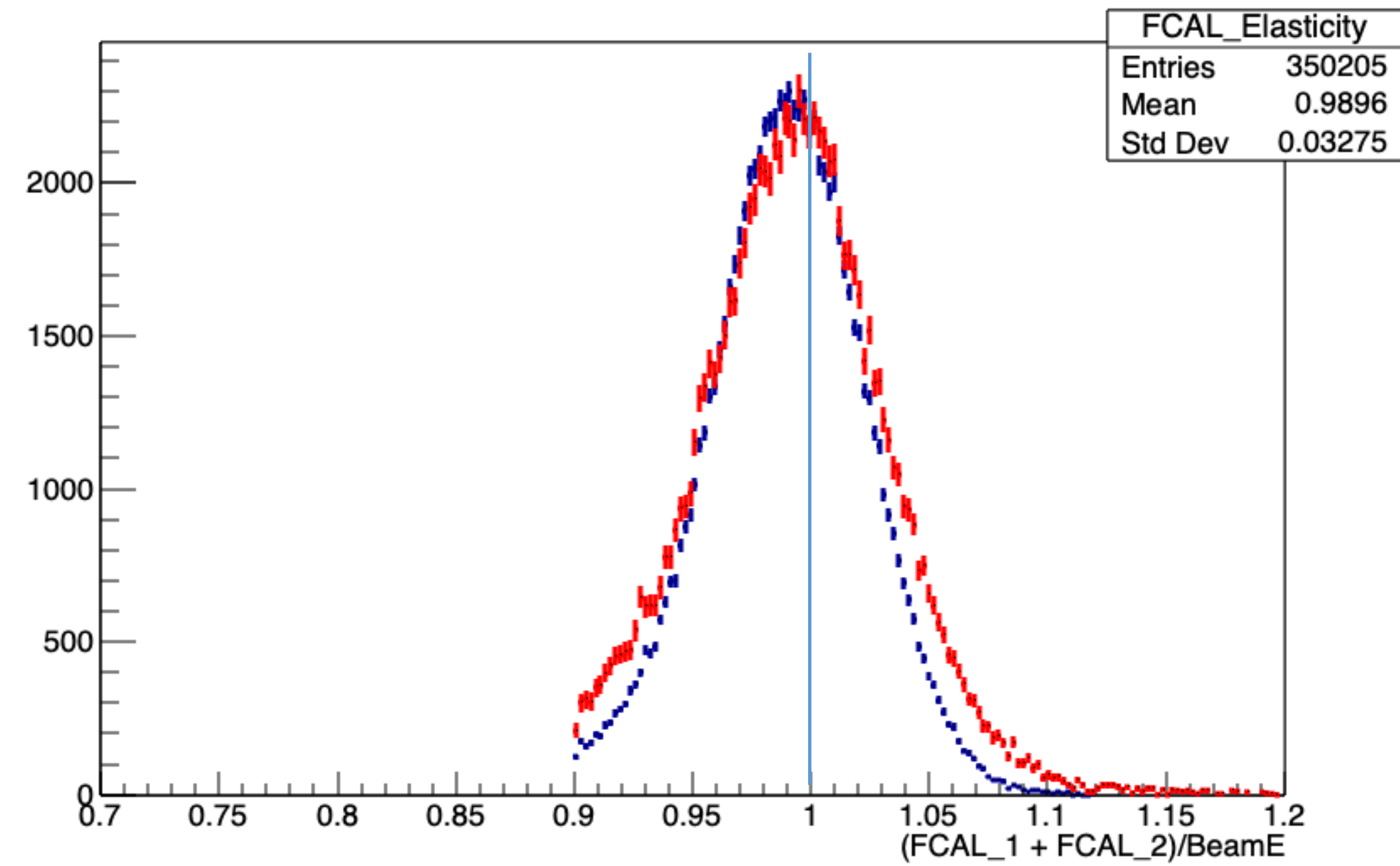
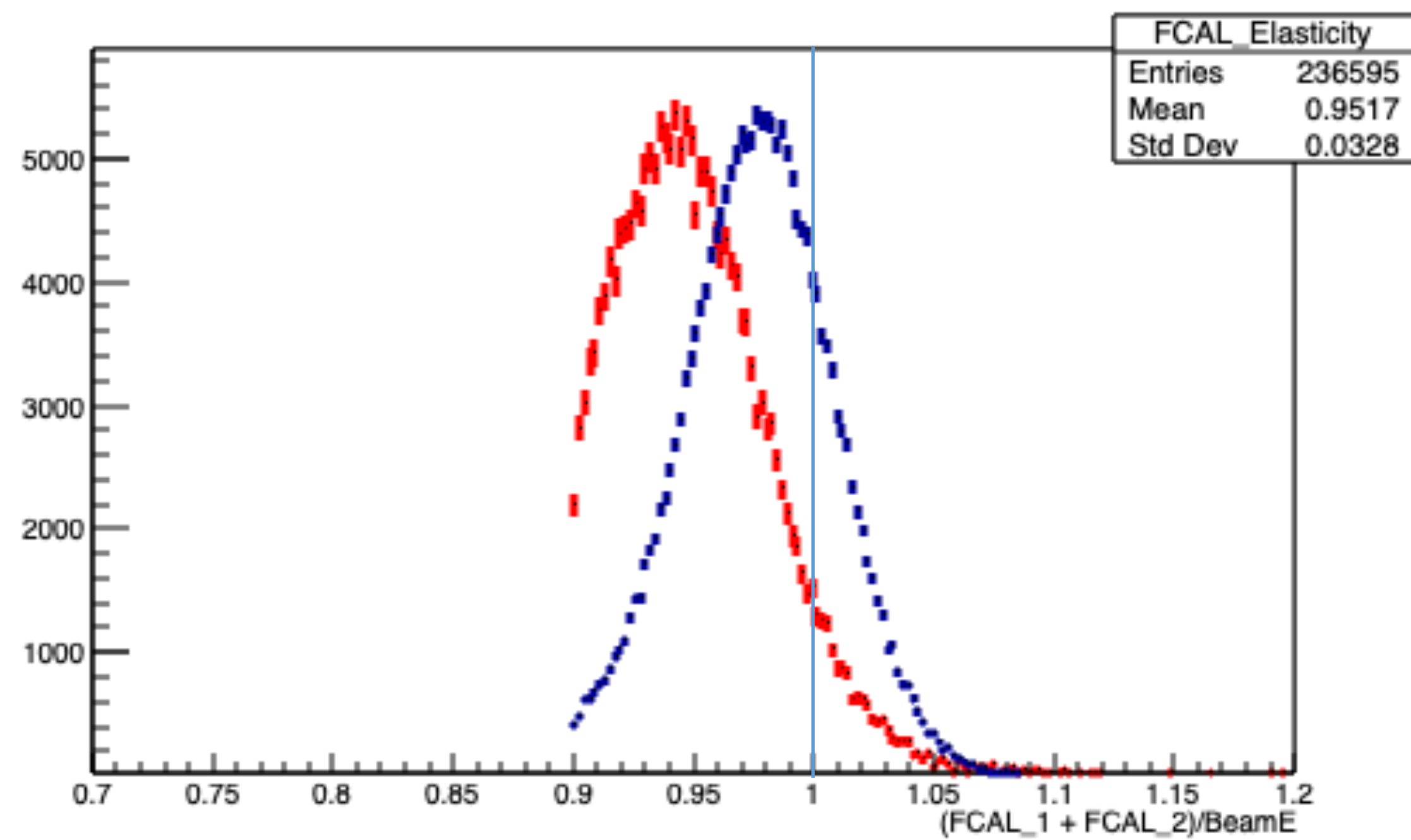


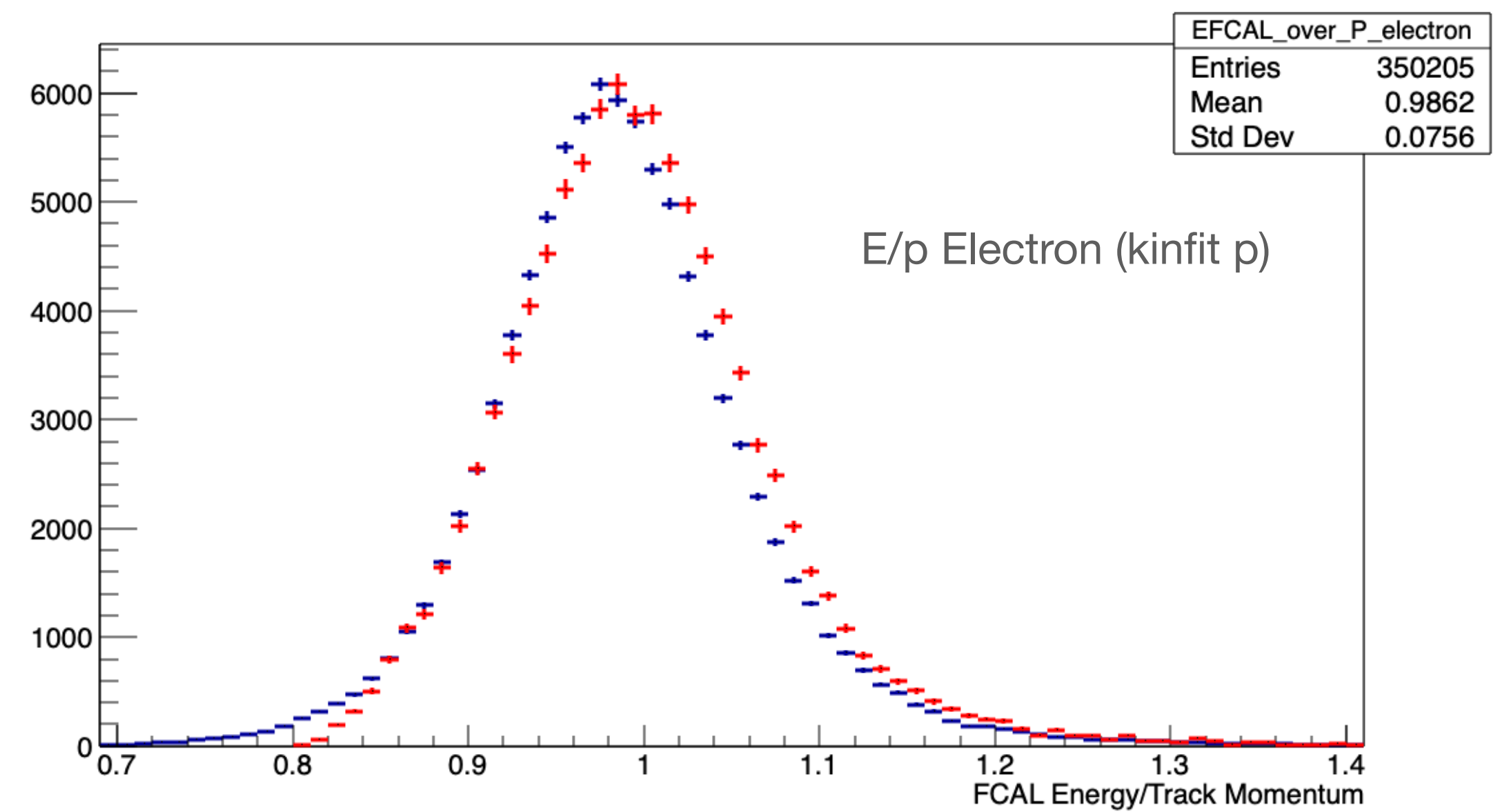
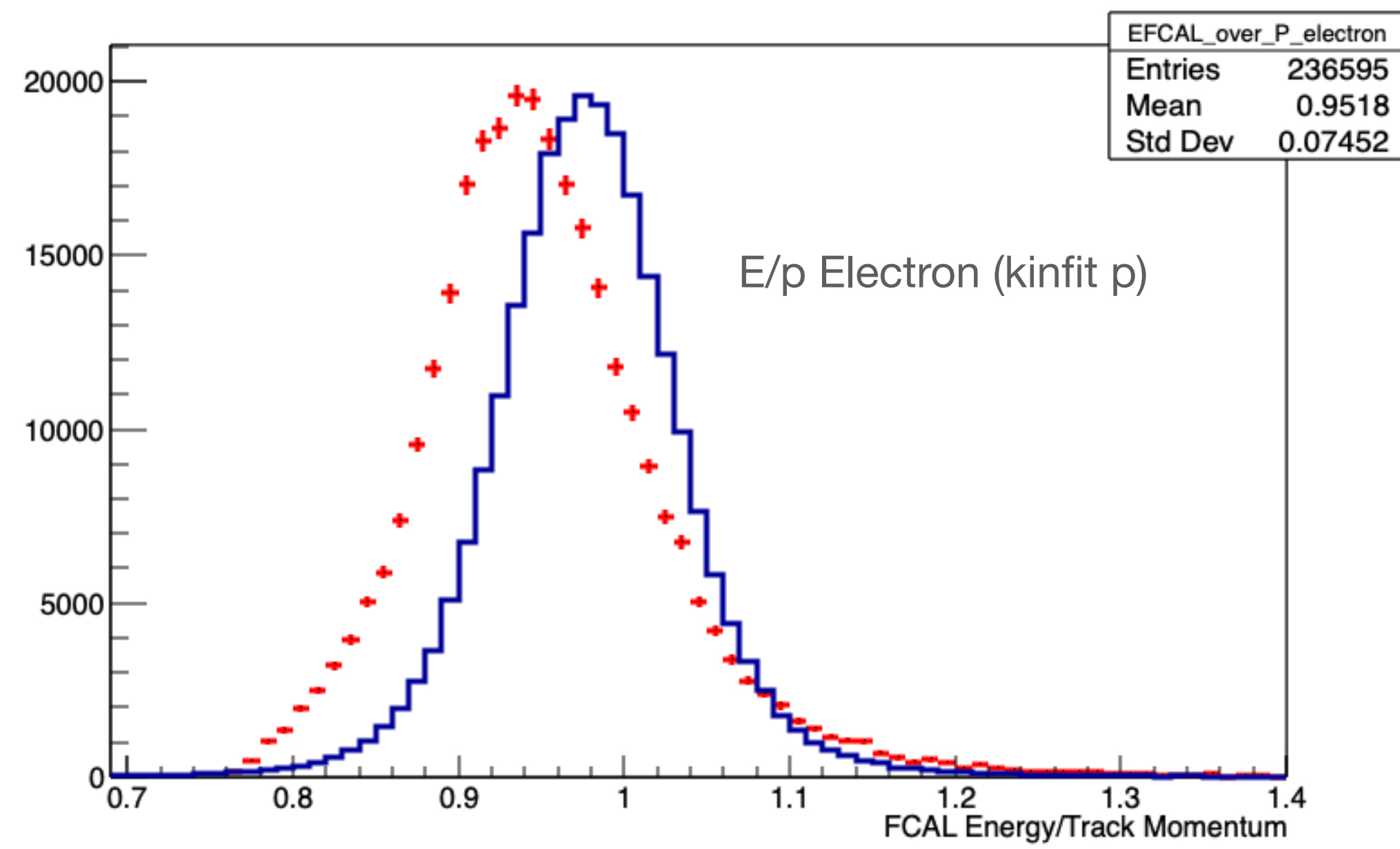
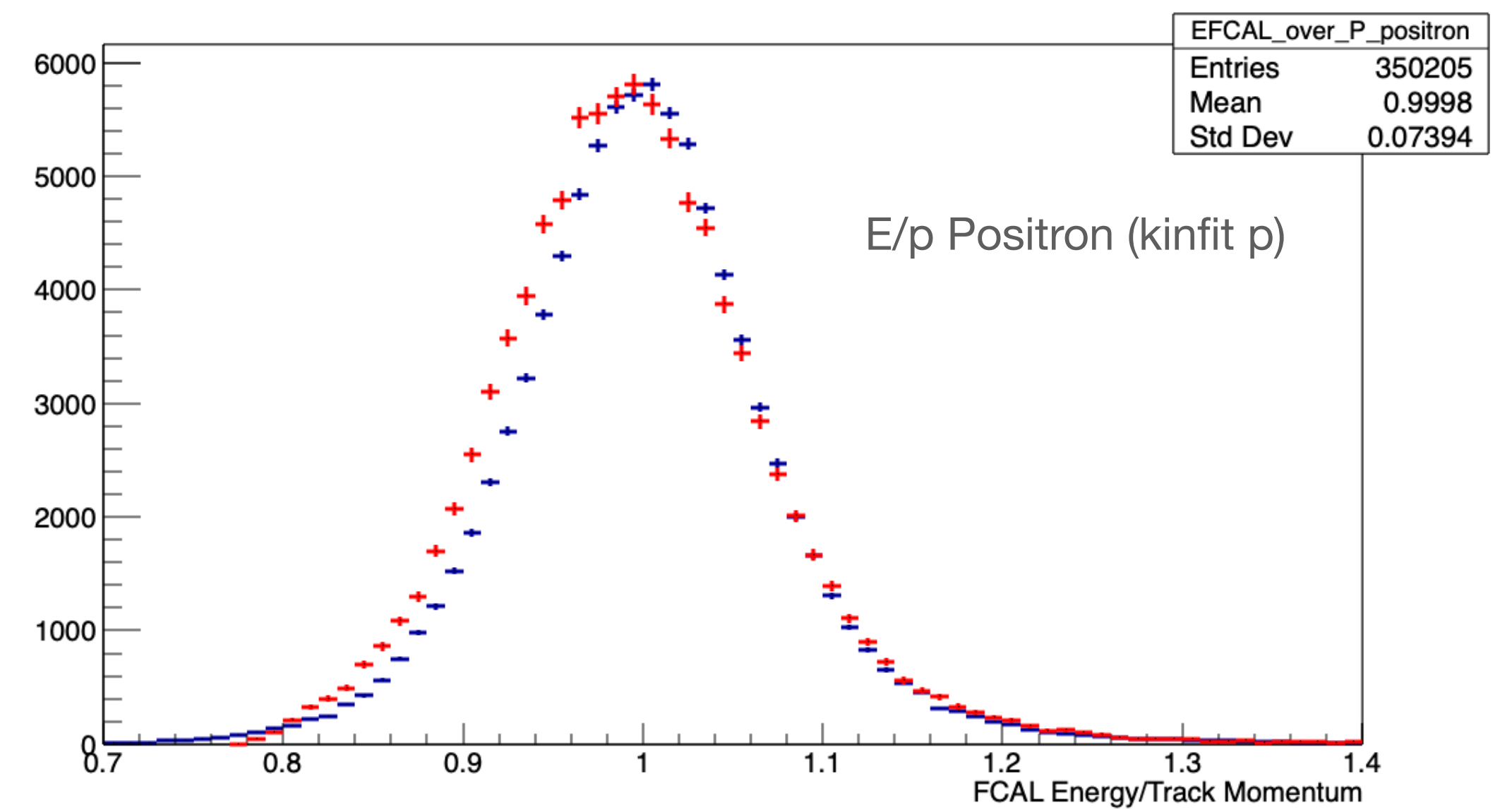
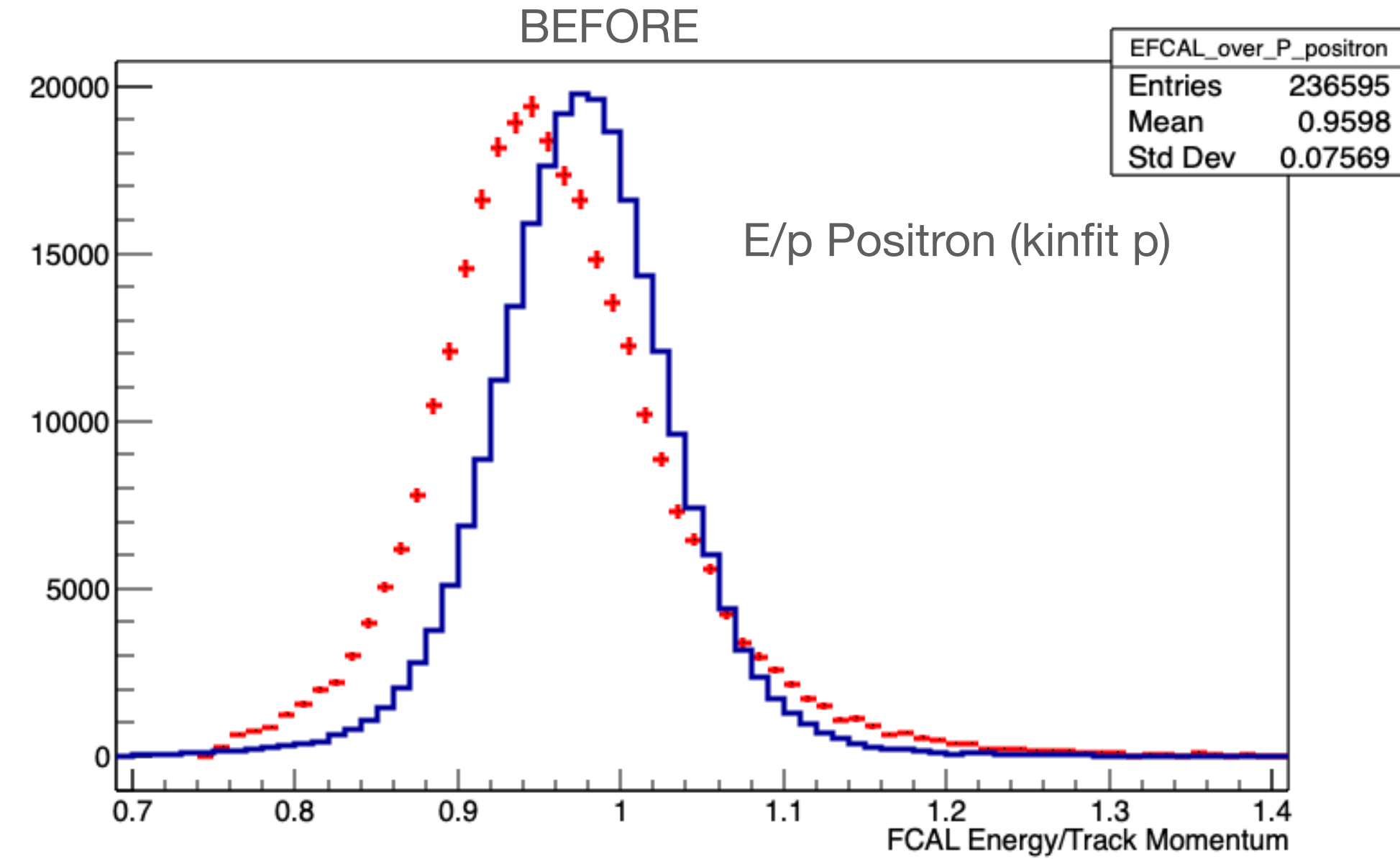
Simulation



DATA







```

SIMULATION: Positron p = 0.45 GeV to 3.60 GeV
*****
Minimizer is Linear / Migrad
Chi2          =      18.3506
Ndf           =         30
p0            =    -0.0815097 +/- 0.0203619
p1            =     0.113626 +/- 0.0506319
p2            =    -0.112878 +/- 0.0428994
p3            =     0.0455309 +/- 0.0149017
p4            =    -0.00615324 +/- 0.00181495

```

```

SIMULATION: Electron p = 0.45 GeV to 3.60 GeV
*****
Minimizer is Linear / Migrad
Chi2          =      86.3881
Ndf           =         36
p0            =    -0.052032 +/- 0.00179924
p1            =     0.00782447 +/- 0.000857772

```

```

SIMULATION: Positron p = 3.51 GeV to 8.01 GeV
*****
Minimizer is Linear / Migrad
Chi2          =     101.785
Ndf           =         42
p0            =     140.568 +/- 63.5889
p1            =    -189.004 +/- 84.1695
p2            =     106.853 +/- 47.1923
p3            =    -32.8906 +/- 14.5304
p4            =      5.94911 +/- 2.65375
p5            =    -0.63234 +/- 0.287549
p6            =     0.0365855 +/- 0.0171204
p7            =   -0.000889301 +/- 0.000432203

```

```

SIMULATION: Electron p = 3.51 GeV to 7.92 GeV
*****
Minimizer is Linear / Migrad
Chi2          =     58.6182
Ndf           =         42
p0            =     18.2227 +/- 13.7184
p1            =    -22.007 +/- 15.6547
p2            =     11.0161 +/- 7.34628
p3            =    -2.90704 +/- 1.81491
p4            =     0.423587 +/- 0.249019
p5            =    -0.0322319 +/- 0.0179977
p6            =     0.000999988 +/- 0.000535491

```

```

DATA: Positron p = 0.36 GeV to 3.60 GeV
*****
Minimizer is Linear / Migrad
Chi2          =     19.0528
Ndf           =         22
p0            =    -0.102153 +/- 0.0272216
p1            =     0.167009 +/- 0.0702197
p2            =    -0.168846 +/- 0.0612901
p3            =     0.059494 +/- 0.0217742
p4            =    -0.00709742 +/- 0.00269749

```

```

DATA: Electron p = 0.36 GeV to 3.60 GeV
*****
Minimizer is Linear / Migrad
Chi2          =     24.0806
Ndf           =         21
p0            =    -0.0788966 +/- 0.0324705
p1            =     0.191044 +/- 0.129576
p2            =    -0.283841 +/- 0.17562
p3            =     0.153231 +/- 0.105898
p4            =    -0.0371609 +/- 0.029203
p5            =     0.00331943 +/- 0.00300043

```

```

DATA: Positron p = 3.48 GeV to 8.28 GeV
*****
Minimizer is Linear / Migrad
Chi2          =     53.2885
Ndf           =         34
p0            =    -15.5234 +/- 3.15936
p1            =     14.3966 +/- 2.94378
p2            =     -5.18514 +/- 1.07748
p3            =     0.904002 +/- 0.193717
p4            =    -0.0770312 +/- 0.0171163
p5            =     0.00257271 +/- 0.000594971

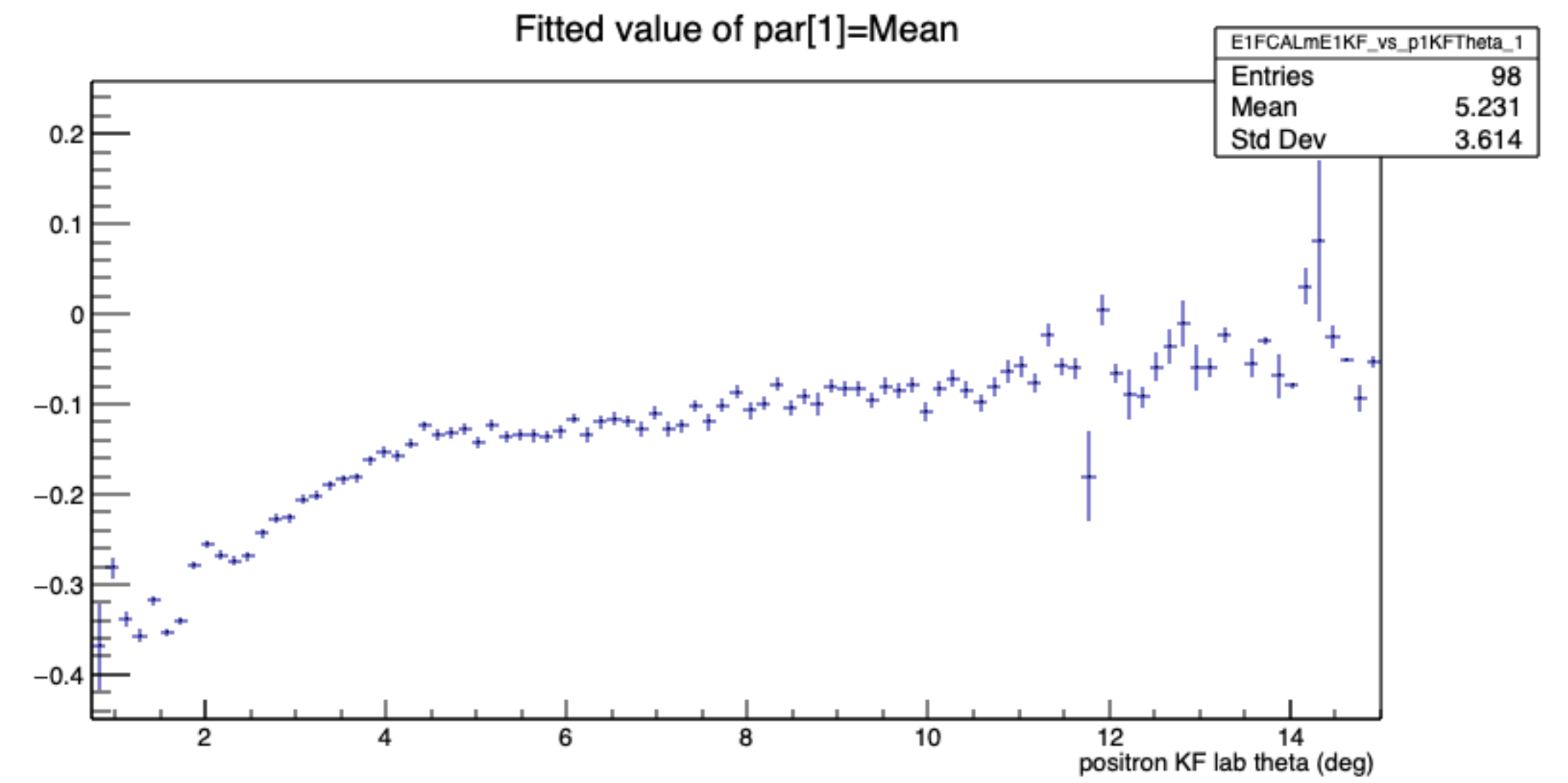
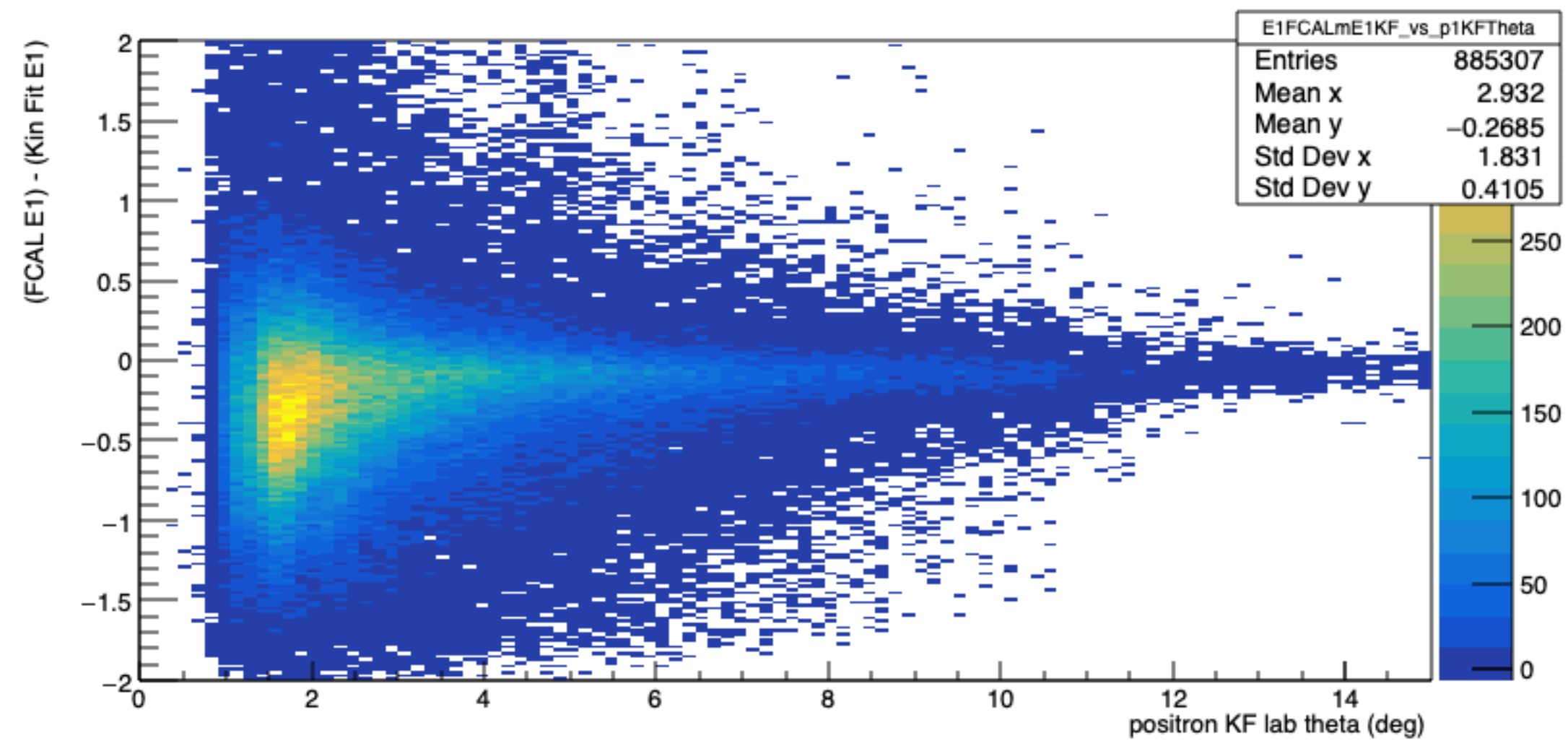
```

```

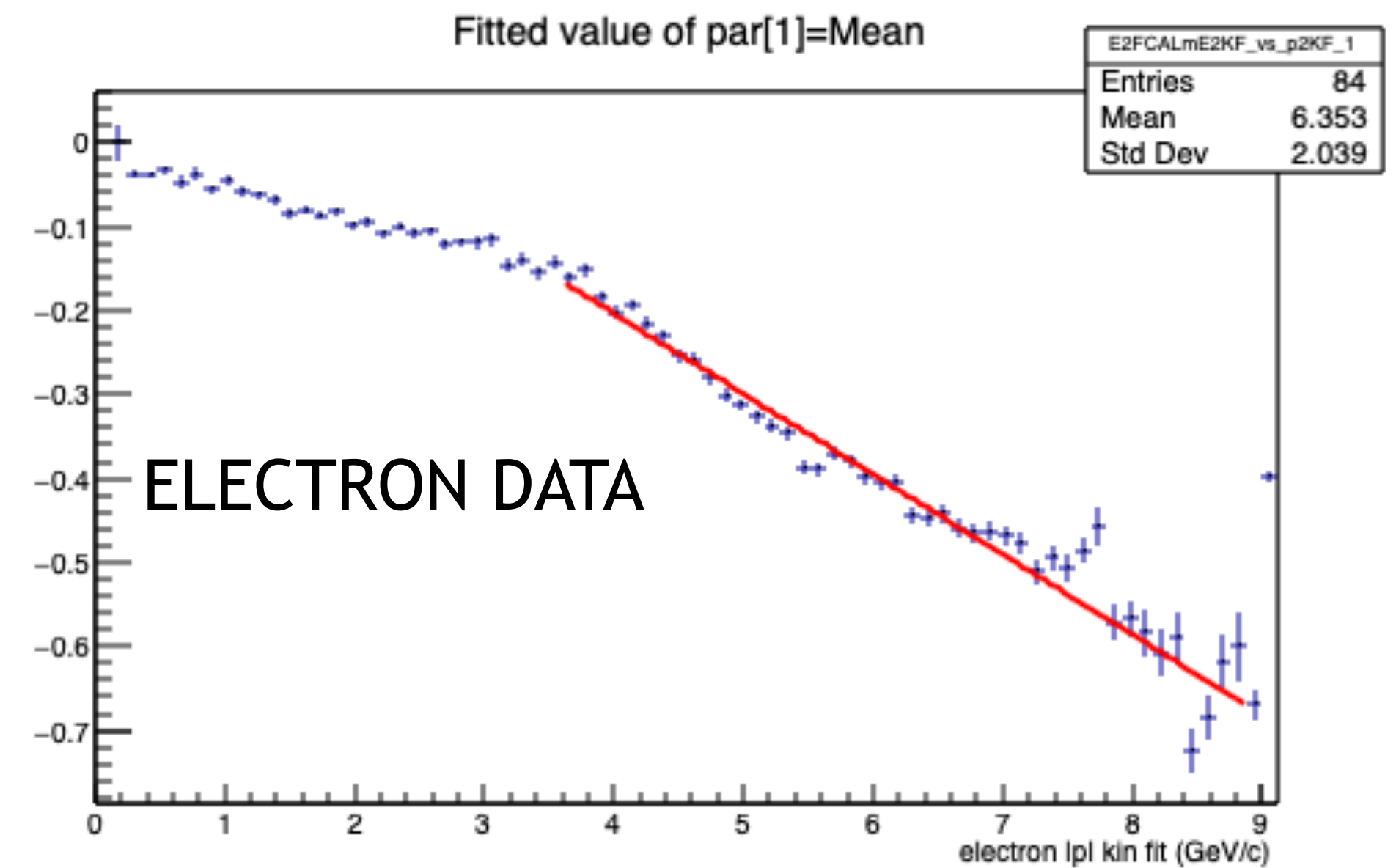
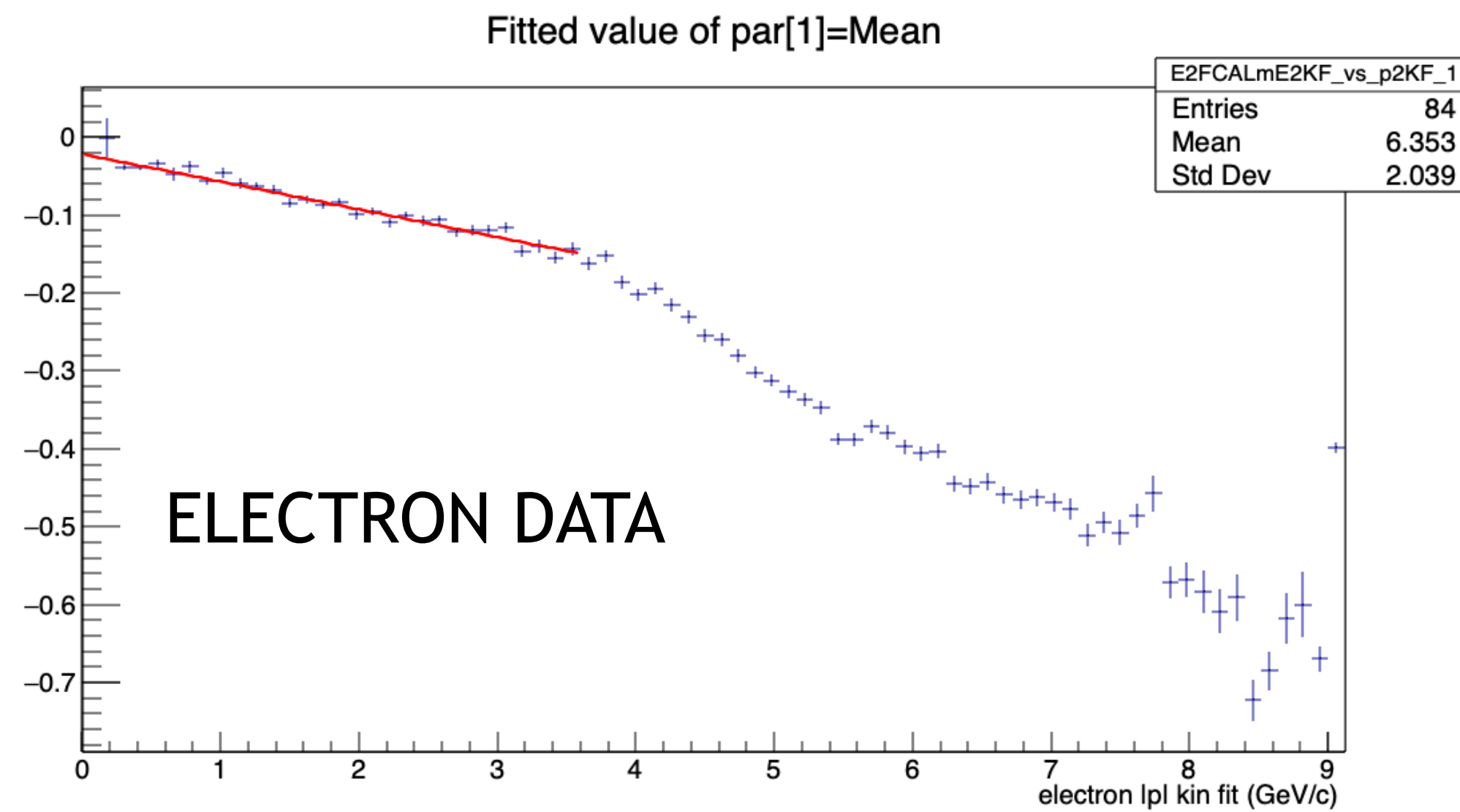
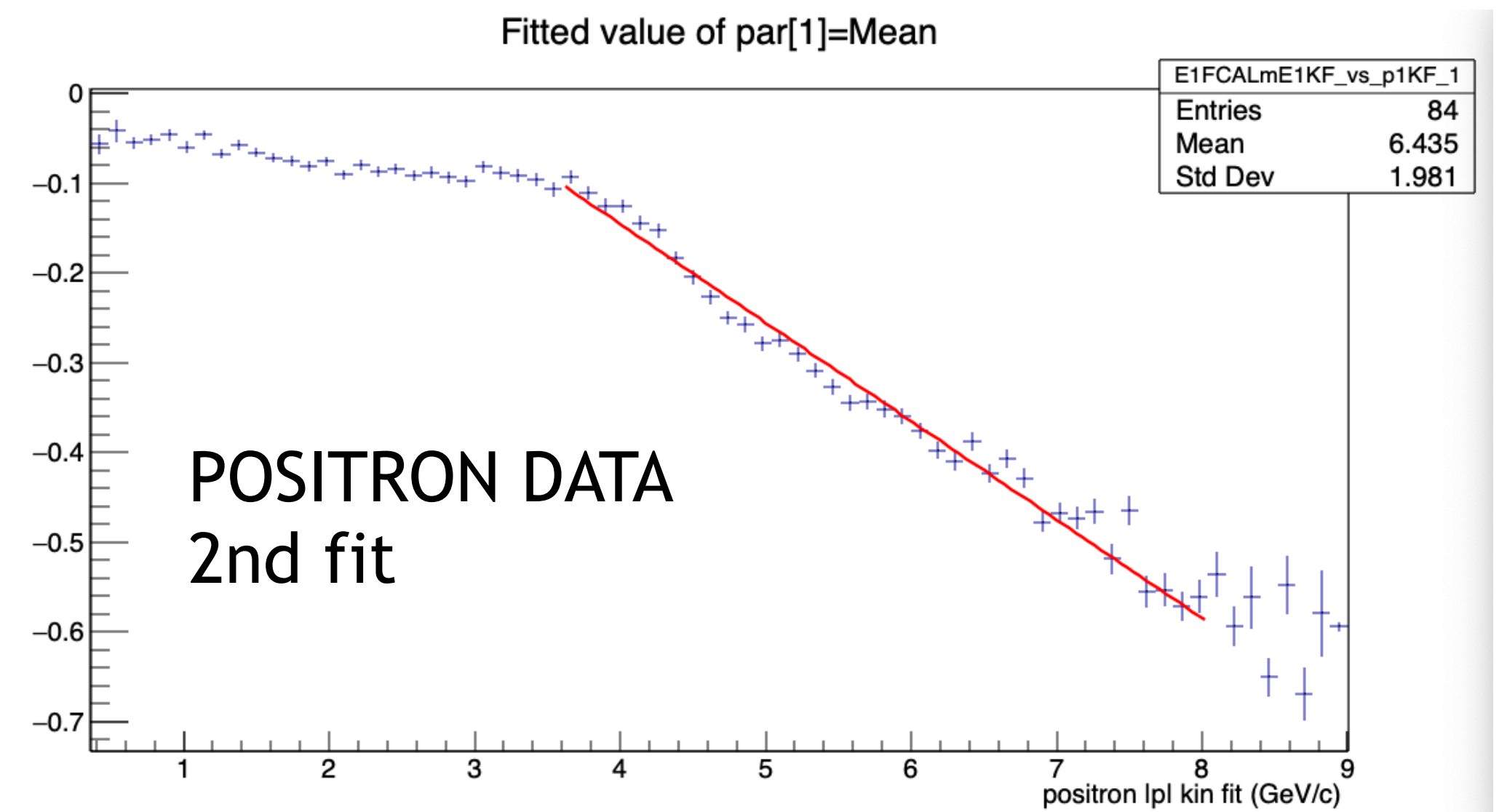
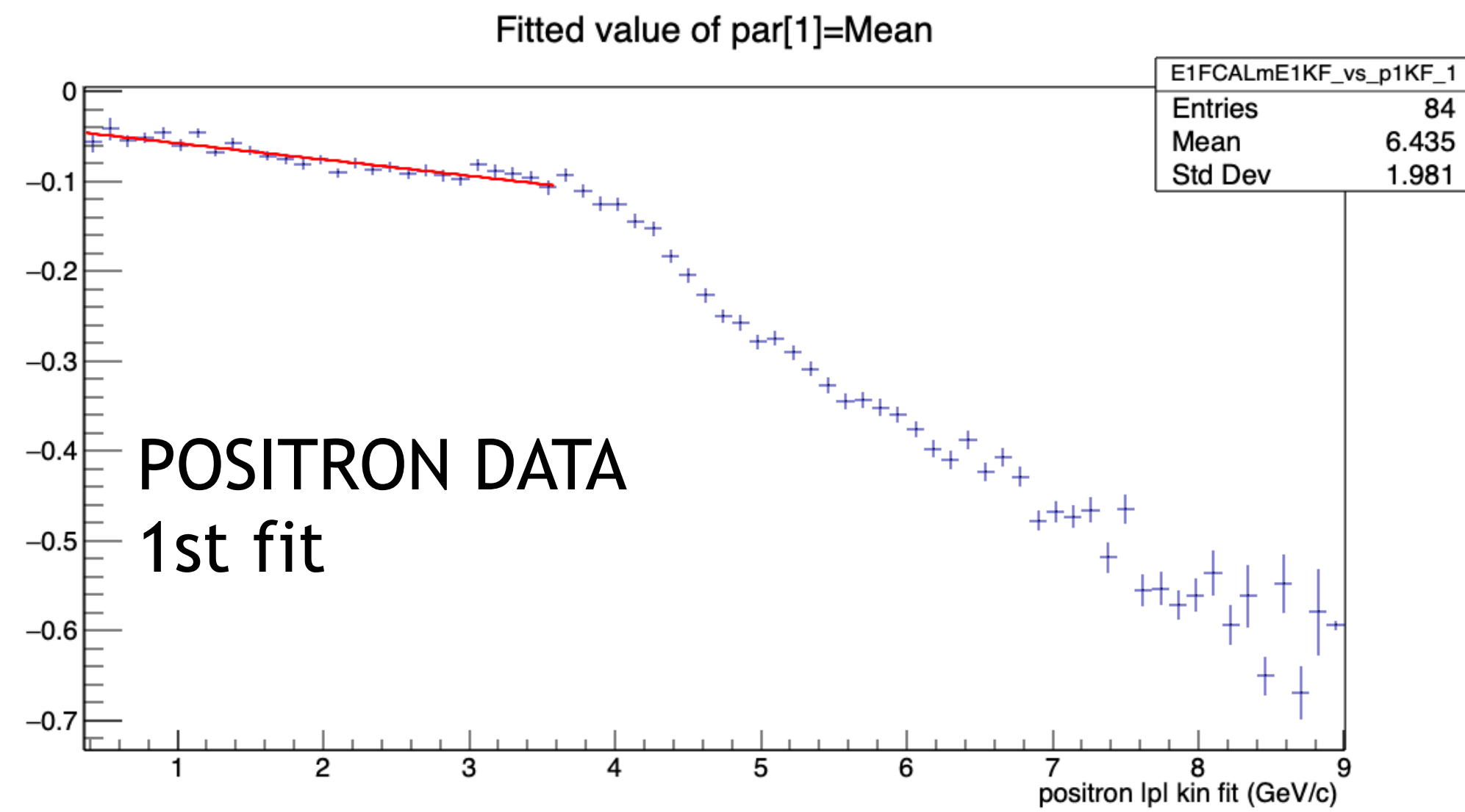
DATA: Positron p = 3.48 GeV to 8.28 GeV
*****
Minimizer is Linear / Migrad
Chi2          =     56.3409
Ndf           =         35
p0            =    -2.53871 +/- 0.713744
p1            =     2.08889 +/- 0.531436
p2            =    -0.630479 +/- 0.145249
p3            =     0.0775441 +/- 0.0172839
p4            =    -0.00343892 +/- 0.000756238

```

BACKUP SLIDES

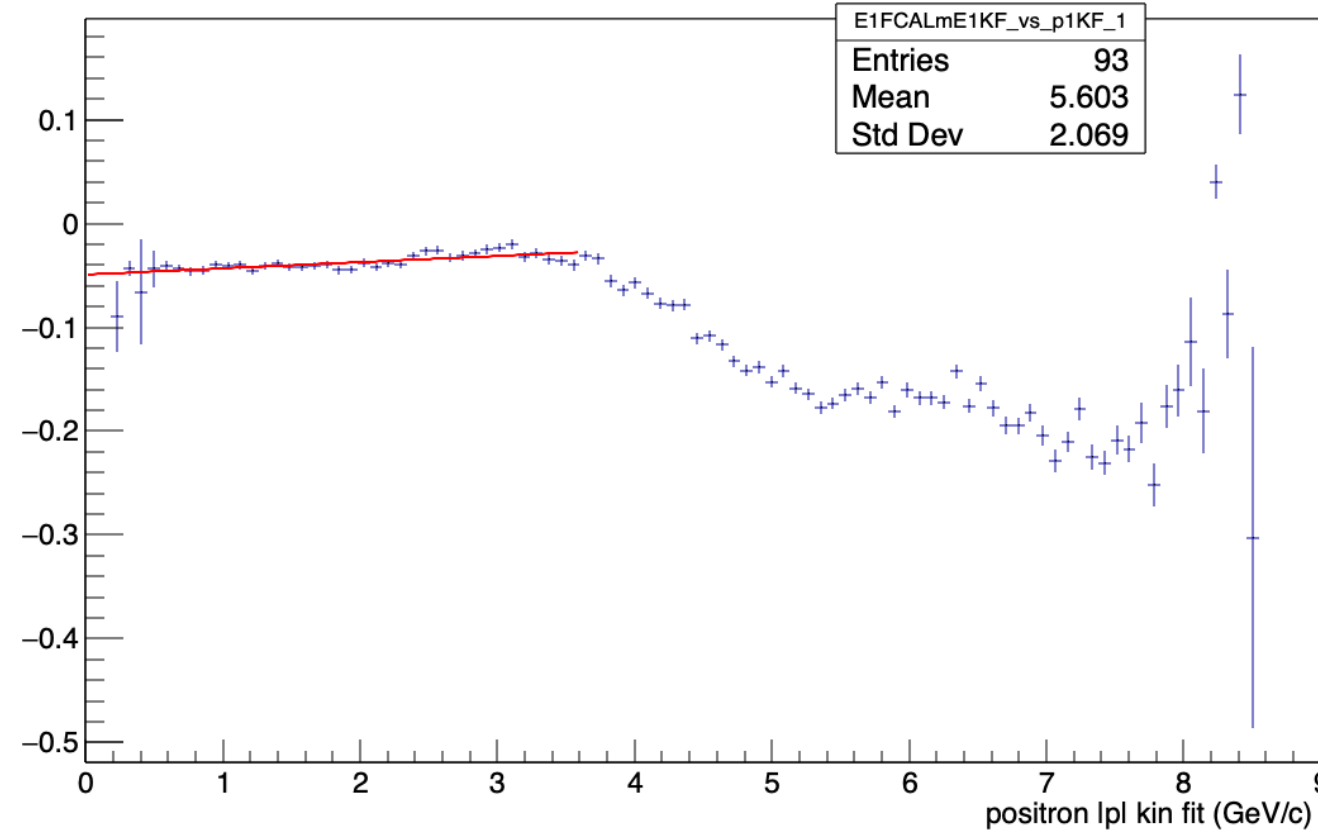


First attempt

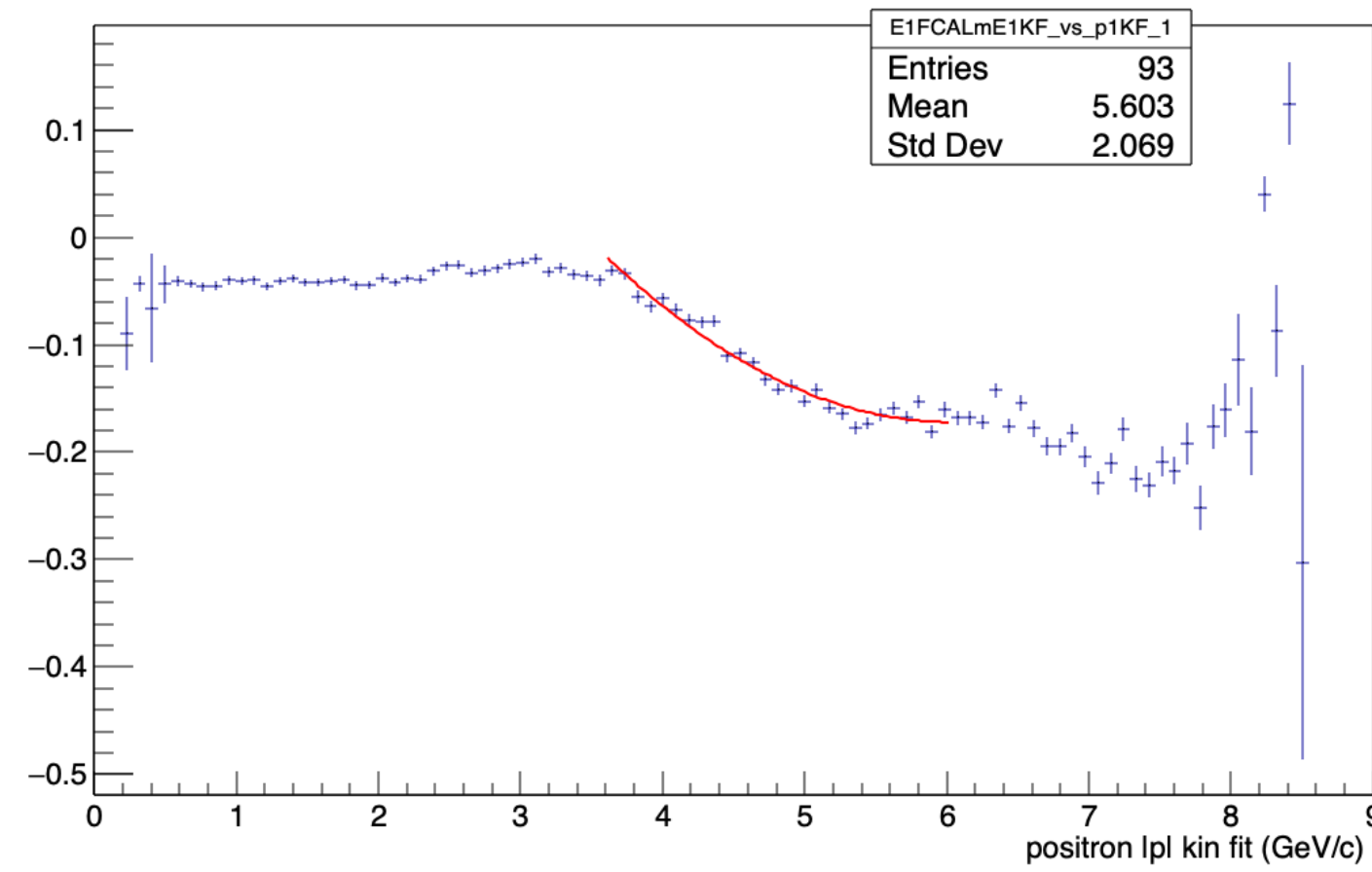


POSITRONS

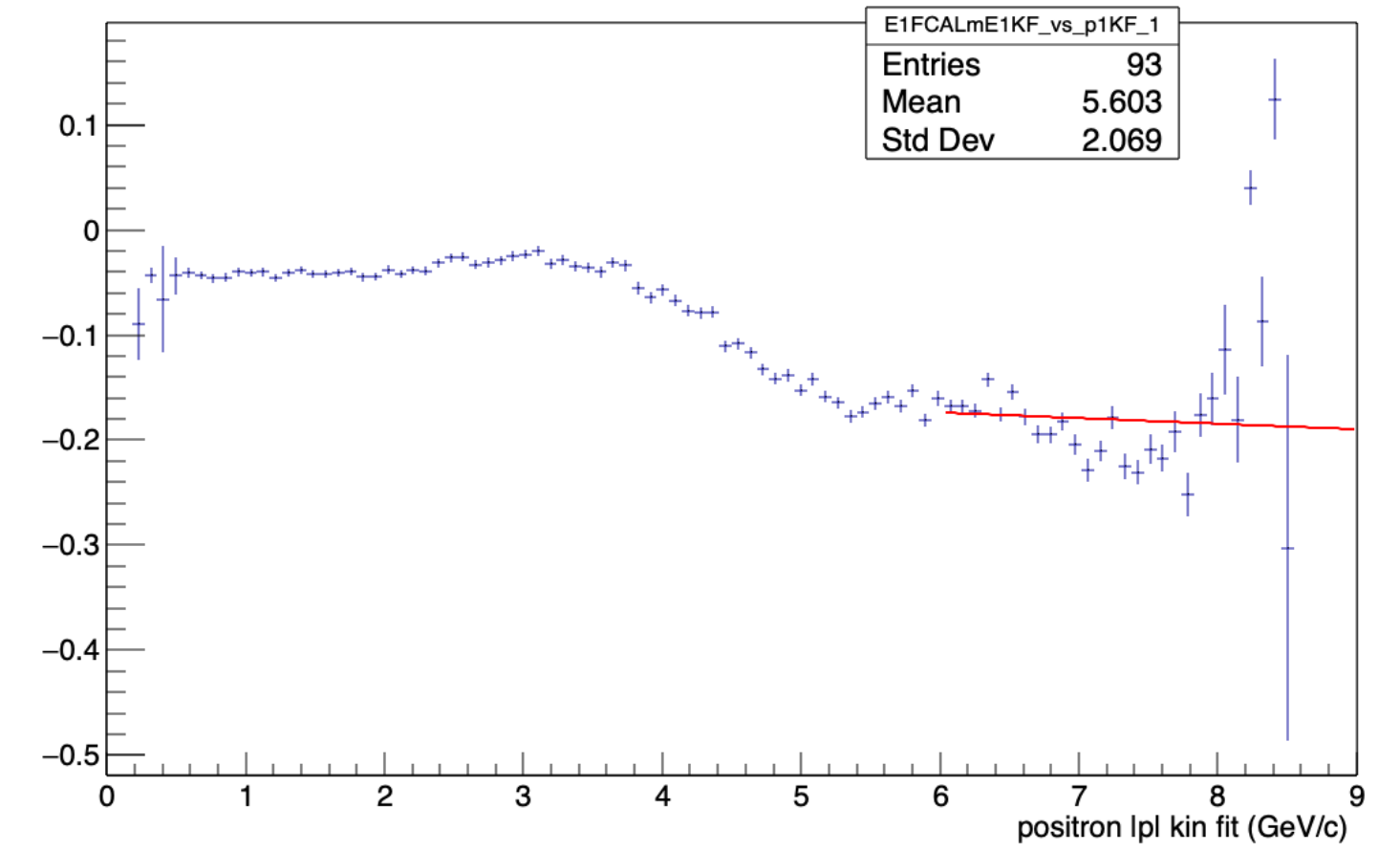
Fitted value of par[1]=Mean



Fitted value of par[1]=Mean

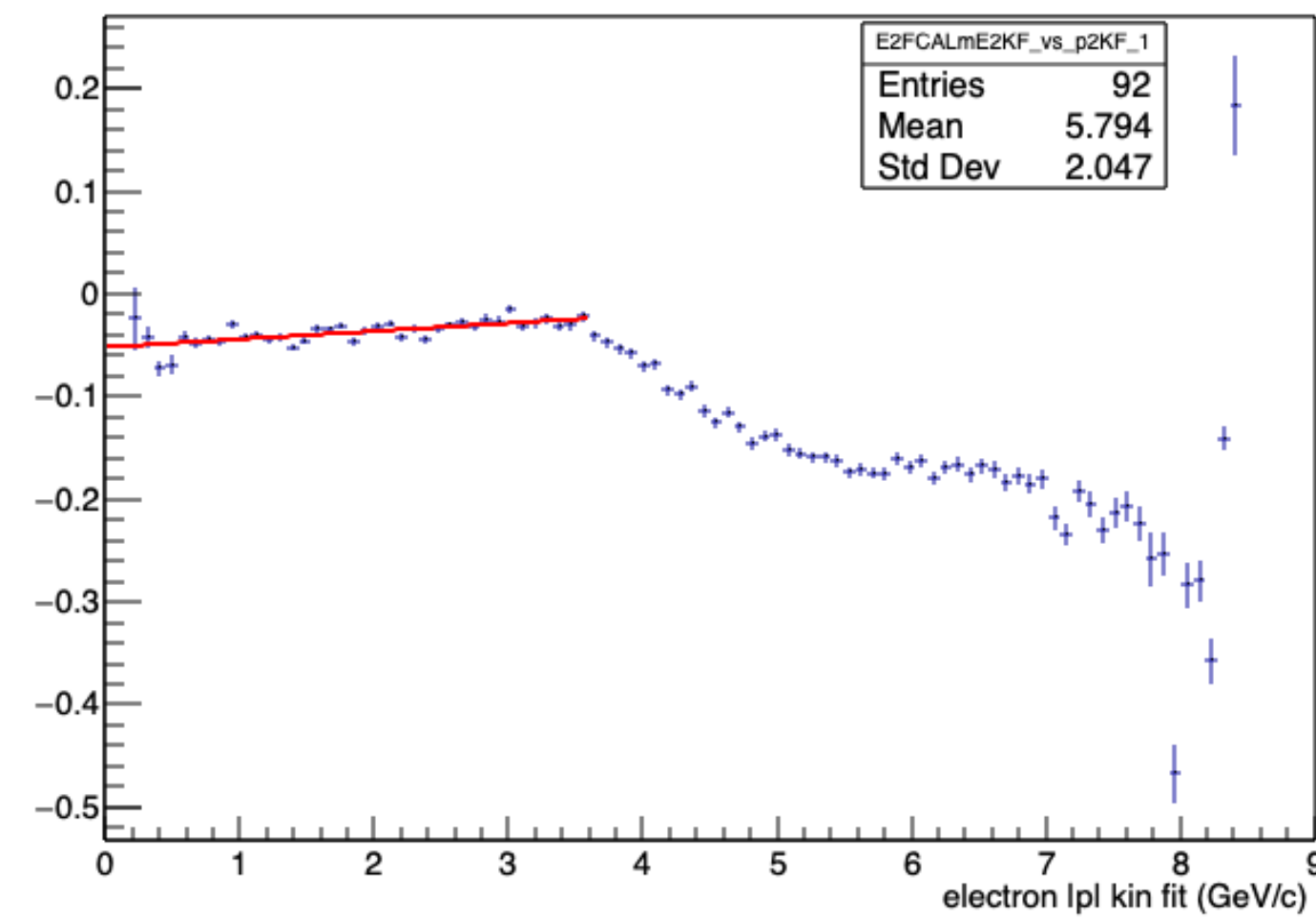


Fitted value of par[1]=Mean

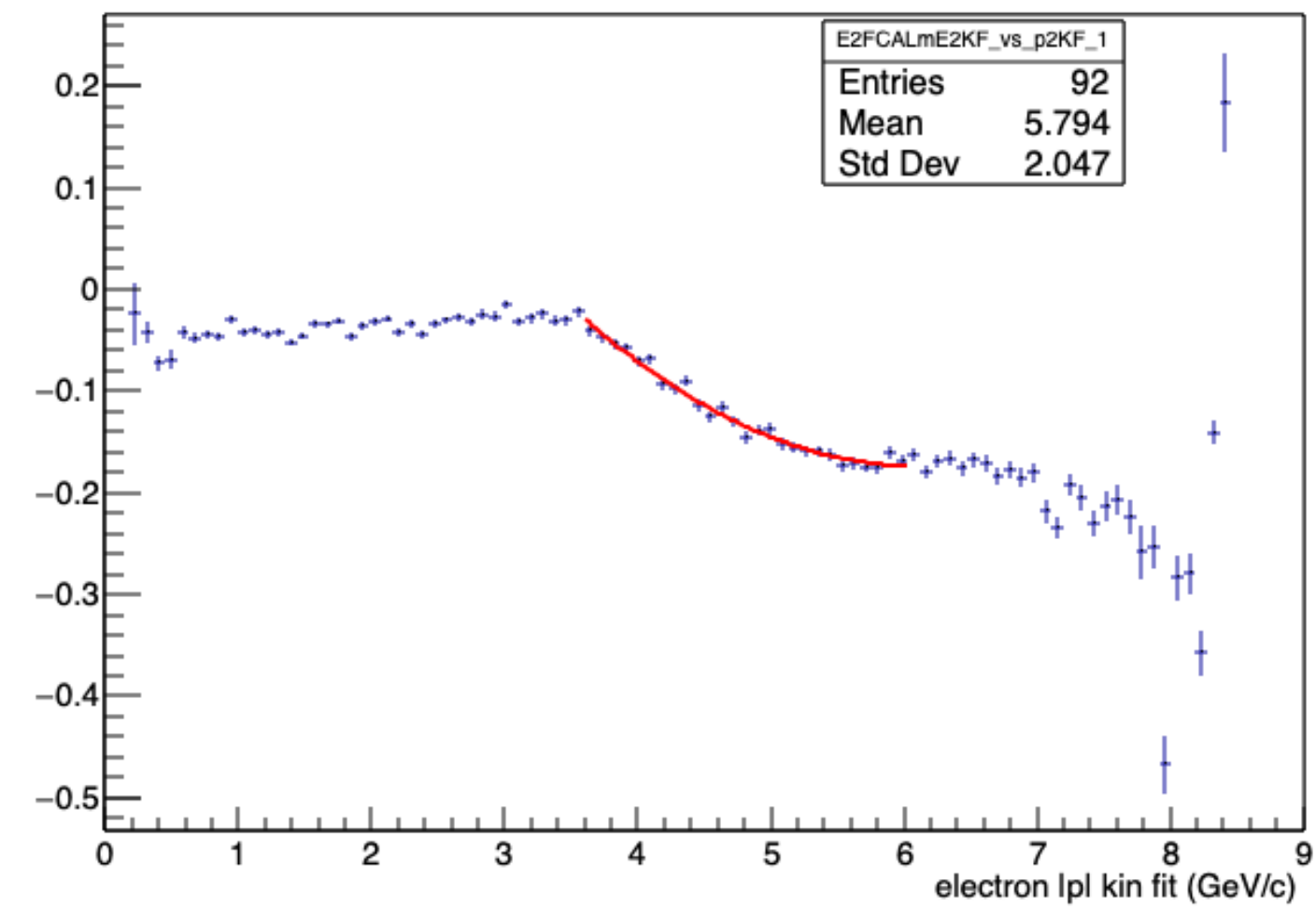


ELECTRONS

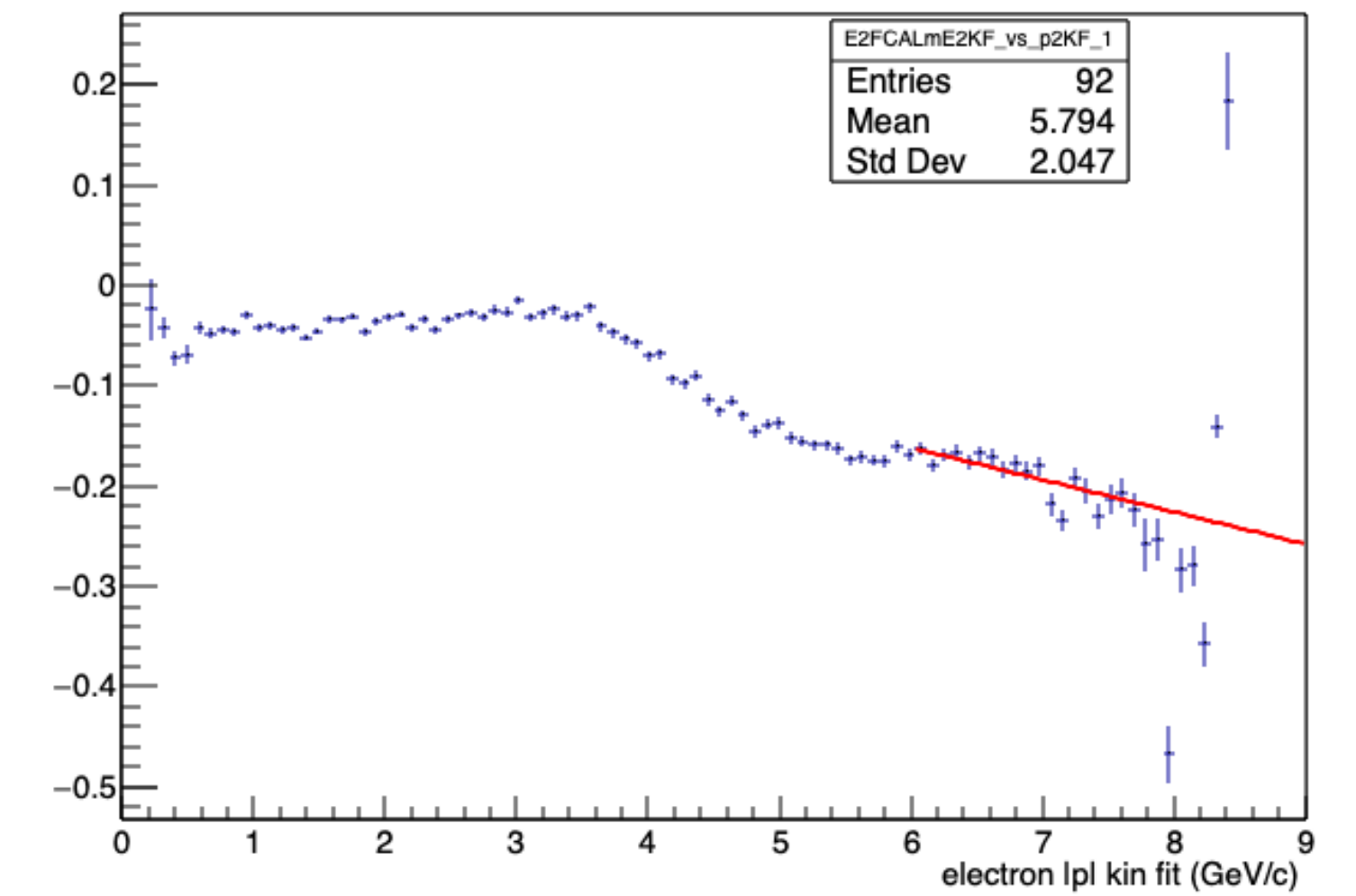
Fitted value of par[1]=Mean



Fitted value of par[1]=Mean



Fitted value of par[1]=Mean



Correcting both simulation and data

