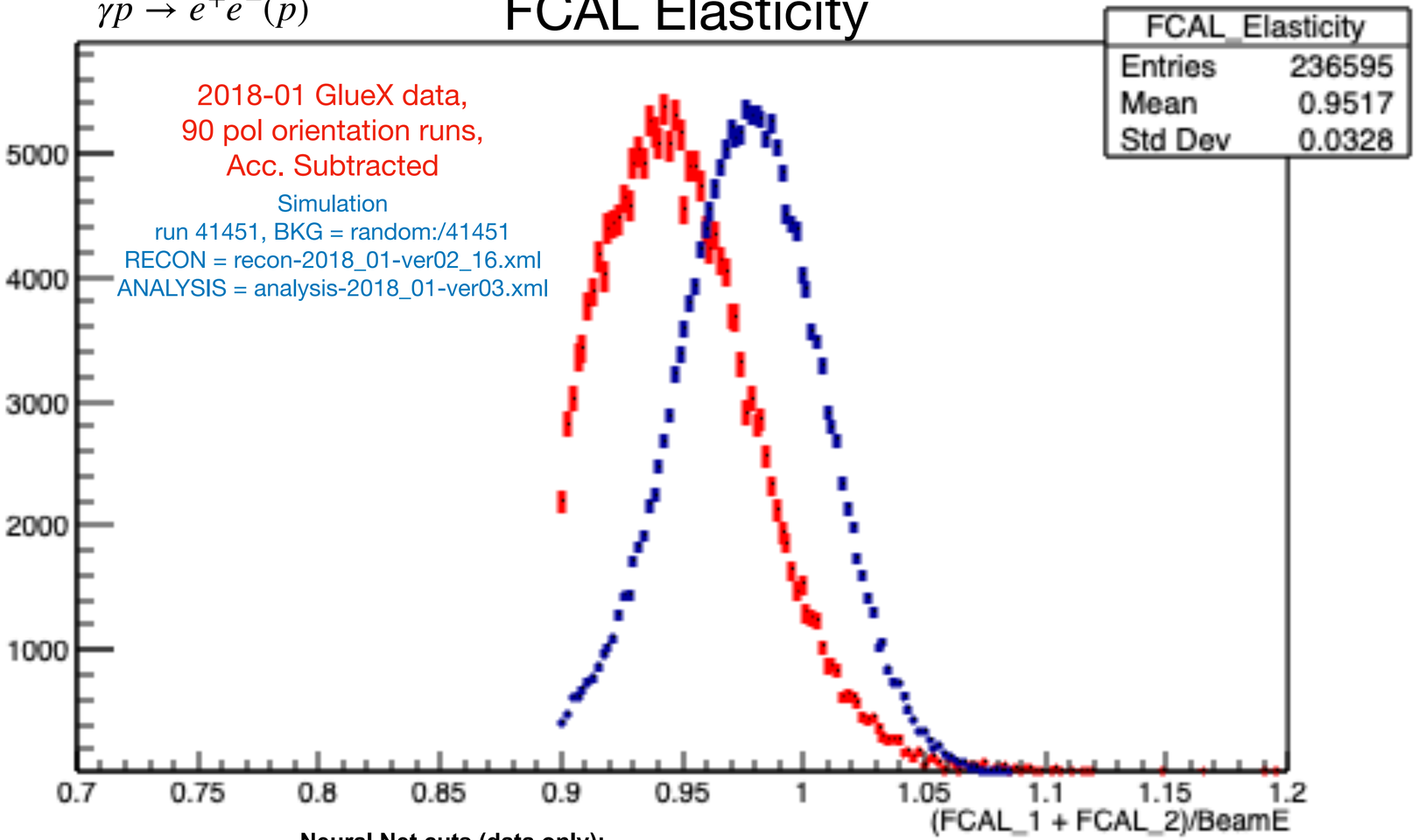
FCAL Elasticity

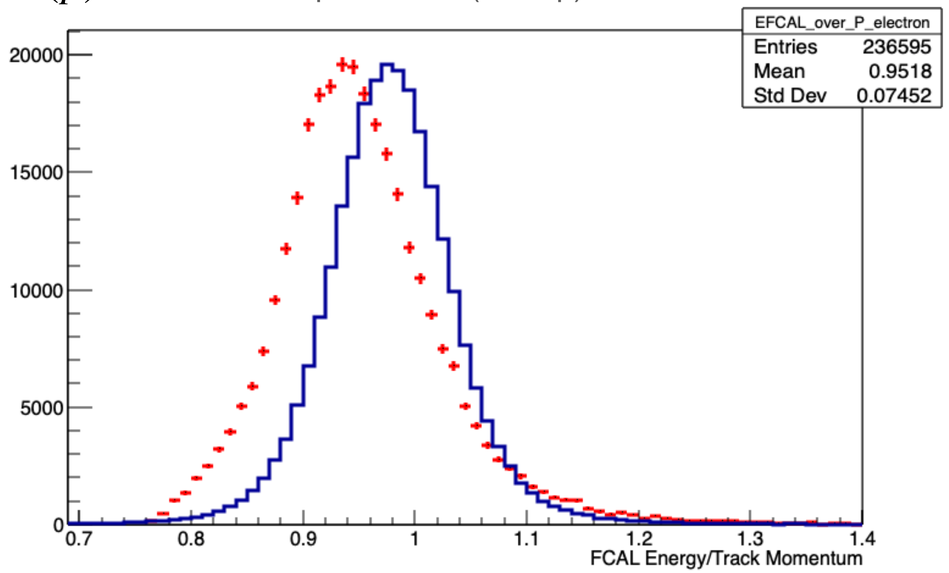
$\gamma p \rightarrow e^+e^-(p)$



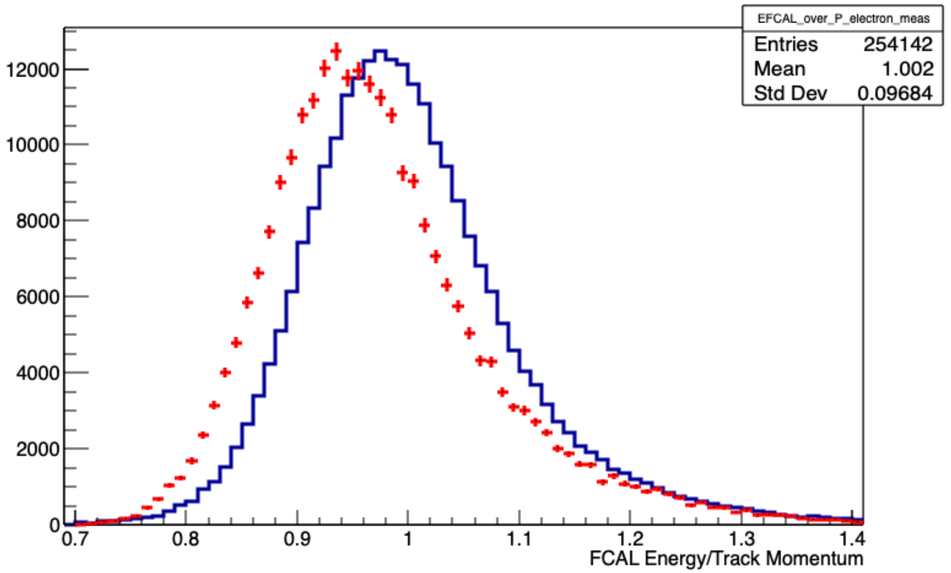
Neural Net cuts (data only):
Each individual track is required to pass a neural net trained to separate e+/π+ and e-/π- respectively.
Fiducial cuts:
Coherent peak: 8.2 < E_beam < 8.8
2 particle invariant mass (avoids the rho0 peak): 0.25 GeV < W < 0.621 GeV
Both tracks have a hit in the TOF
Theta1,Theta2 > 1.5 degrees
Window Free vertex cut: 52 cm < z < 78 cm
FCAL Elasticity > *0.9*

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

E/p Electron (kinfit p)



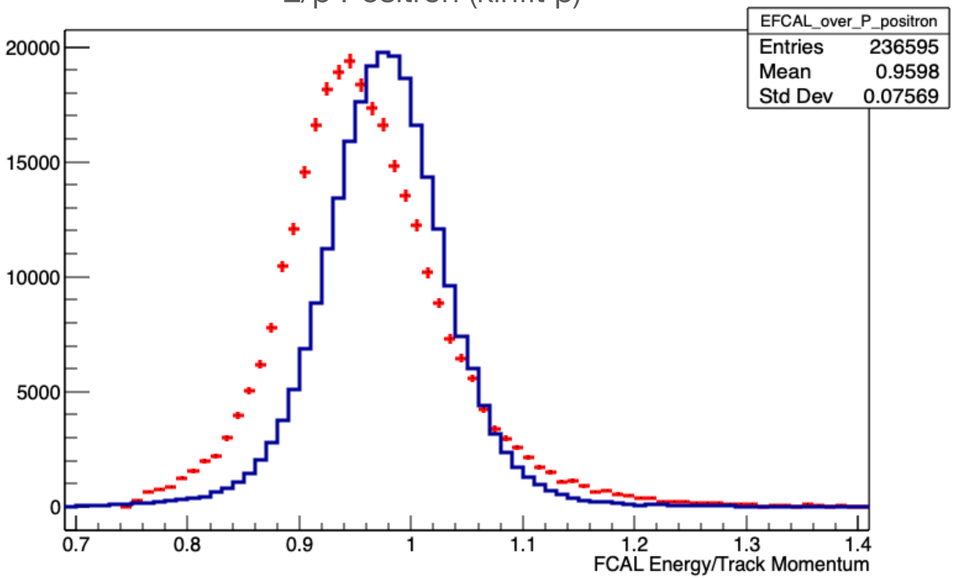
E/p Electron (measured p)



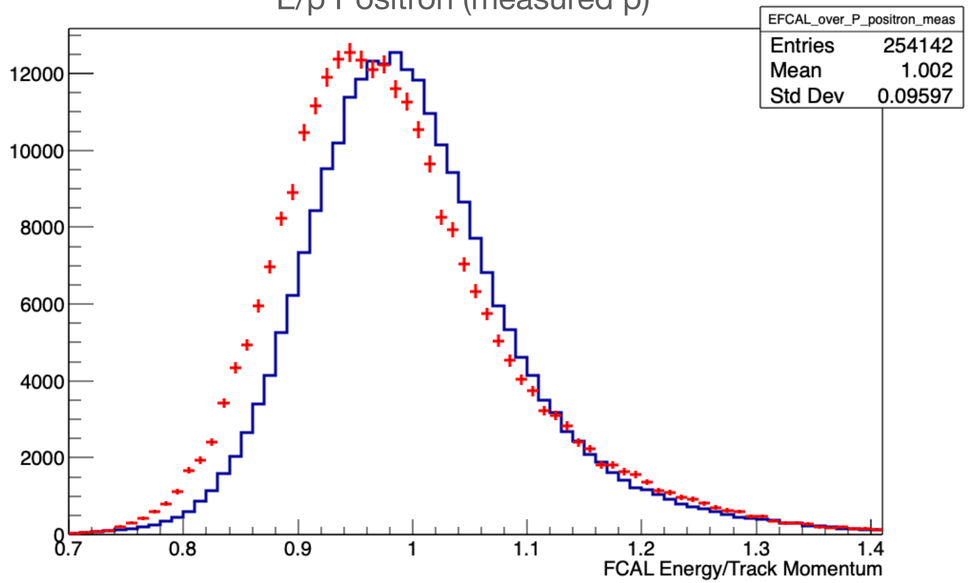
Data

Simulation

E/p Positron (kinfit p)

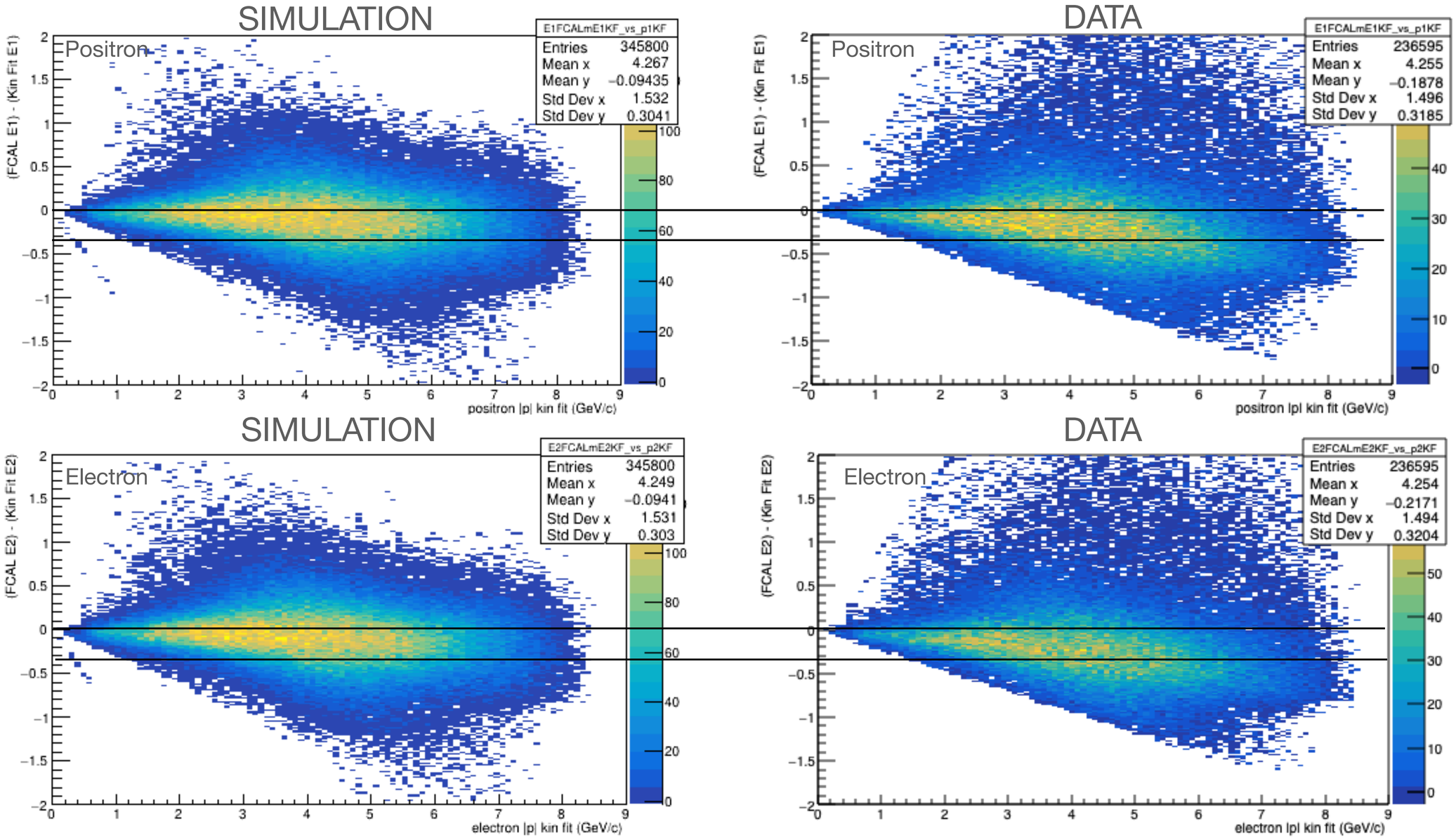


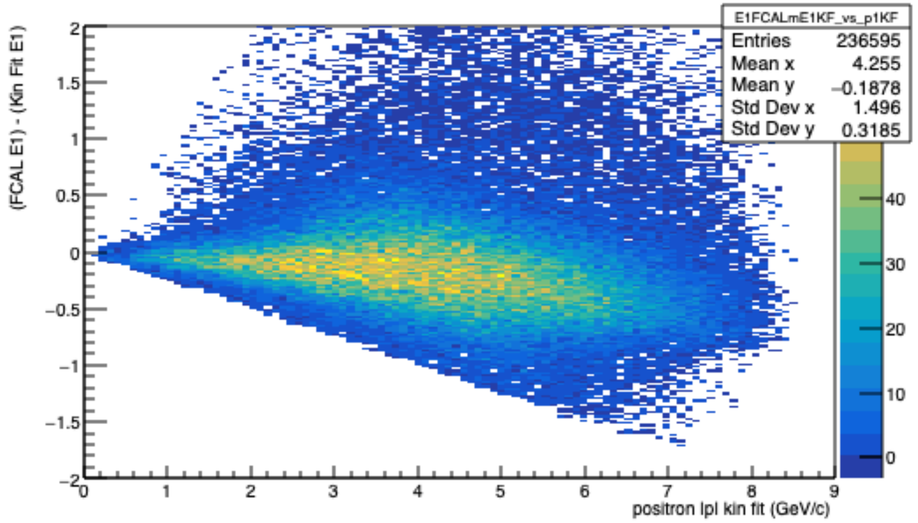
E/p Positron (measured p)



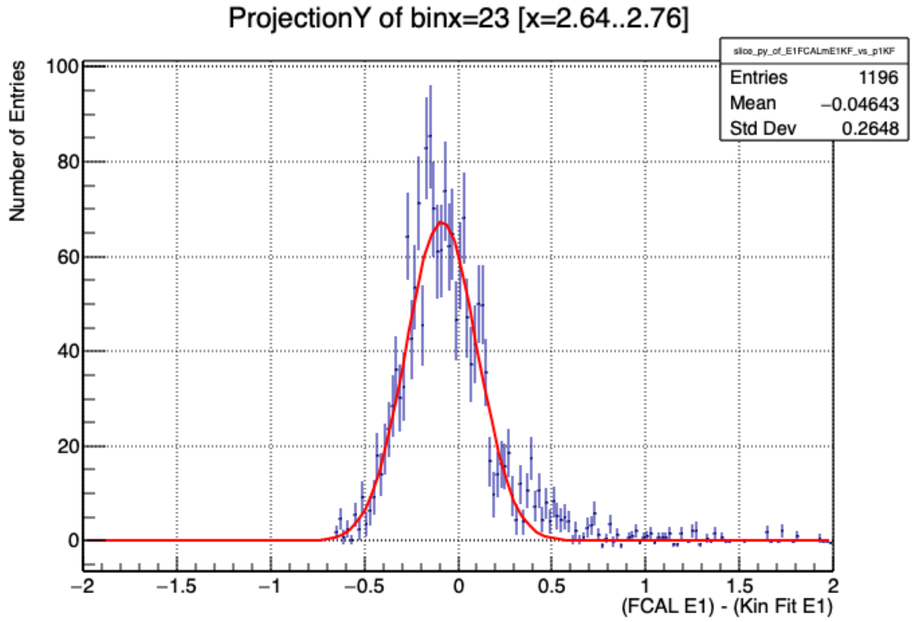
Richard: Does the energy defect in the fcal look like a gain factor or an offset, ie. does the difference between measured cluster energy and expected correlate with measured energy?

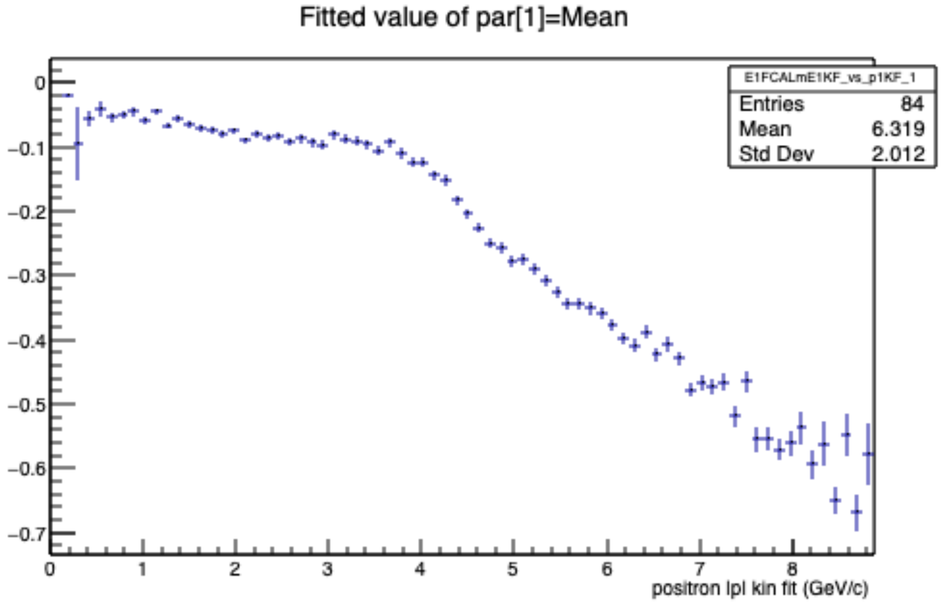
(FCAL Energy - Track Kinfit Energy) VS Track Kinfit Momentum





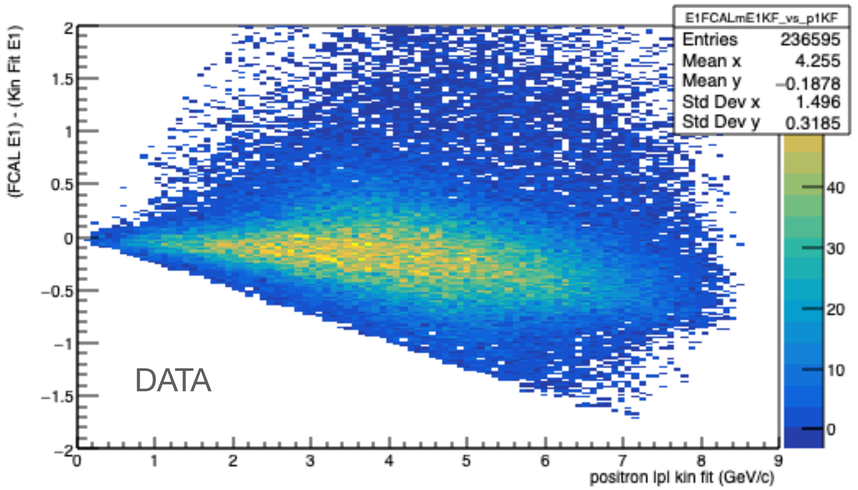
Fit Slices in KF p



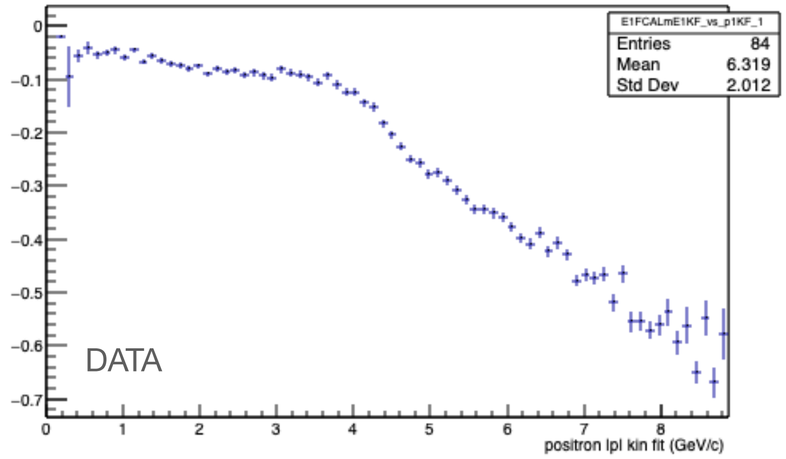


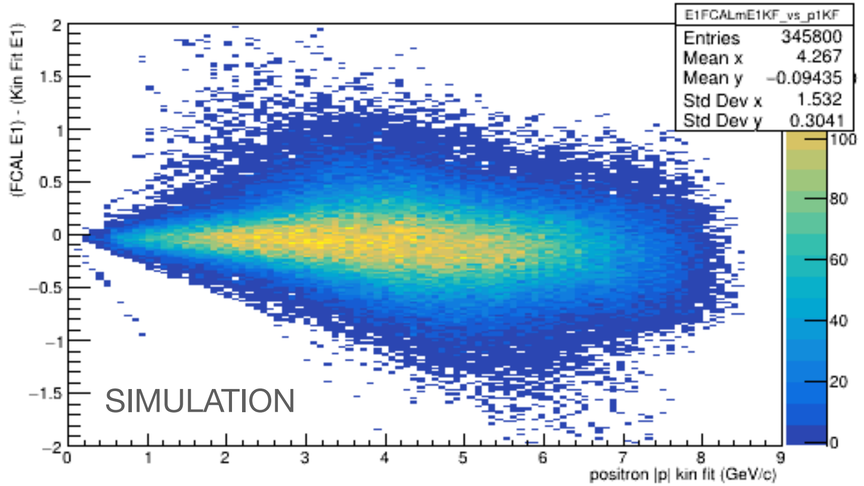
Positron

Comparing simulation and data

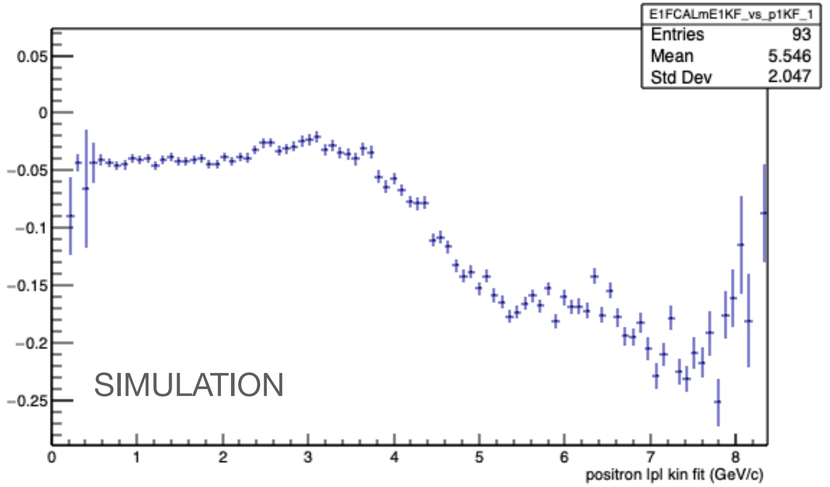


gaus mean value of (E_FCAL - E_kinfit) in bins of p



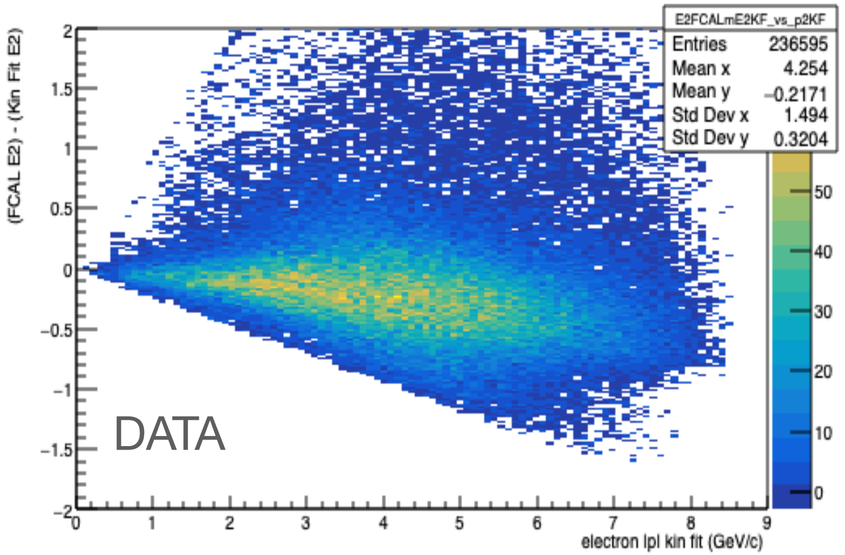


gaus mean value of (E_FCAL - E_kinfit) in bins of p

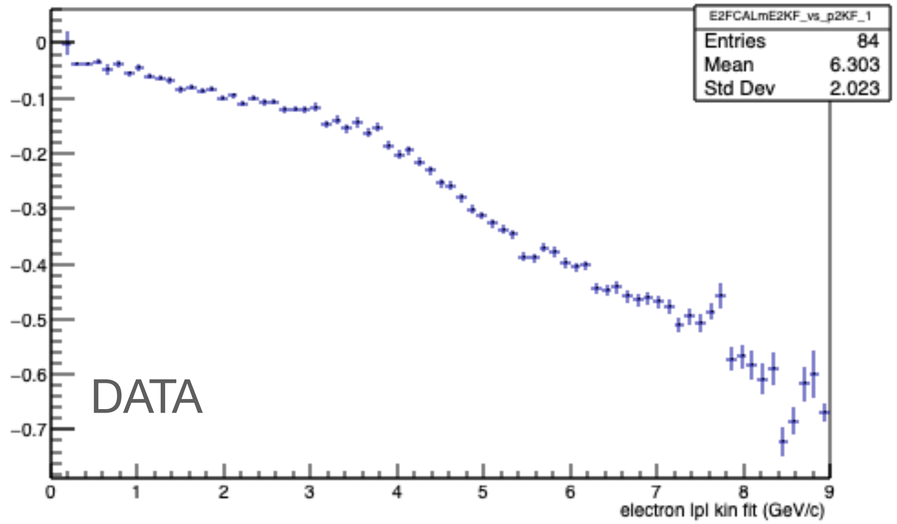


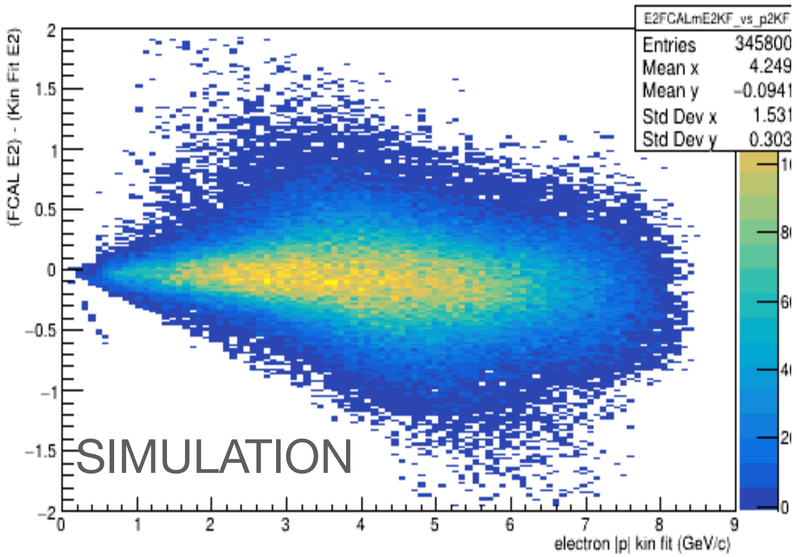
Electron

Comparing simulation and data

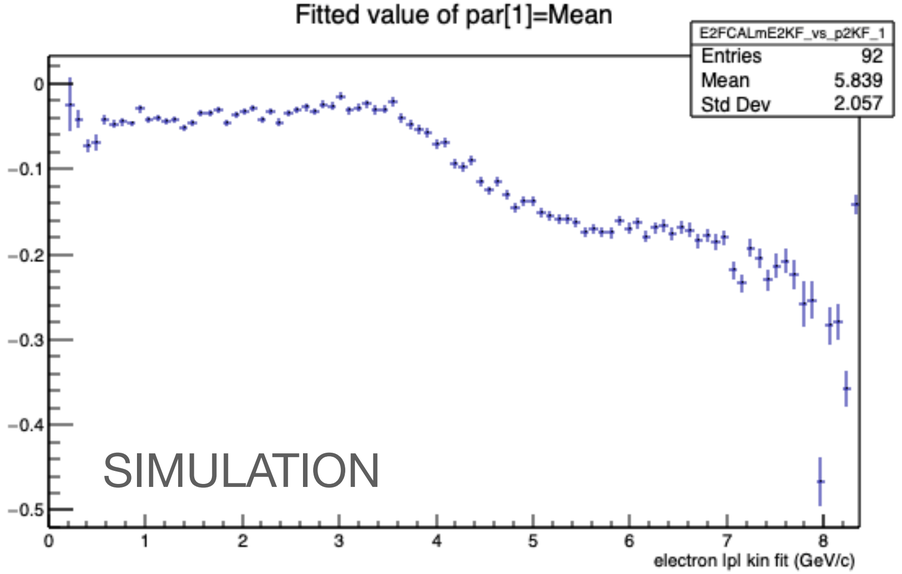


gaus mean value of (E_FCAL - E_kinfit) in bins of p

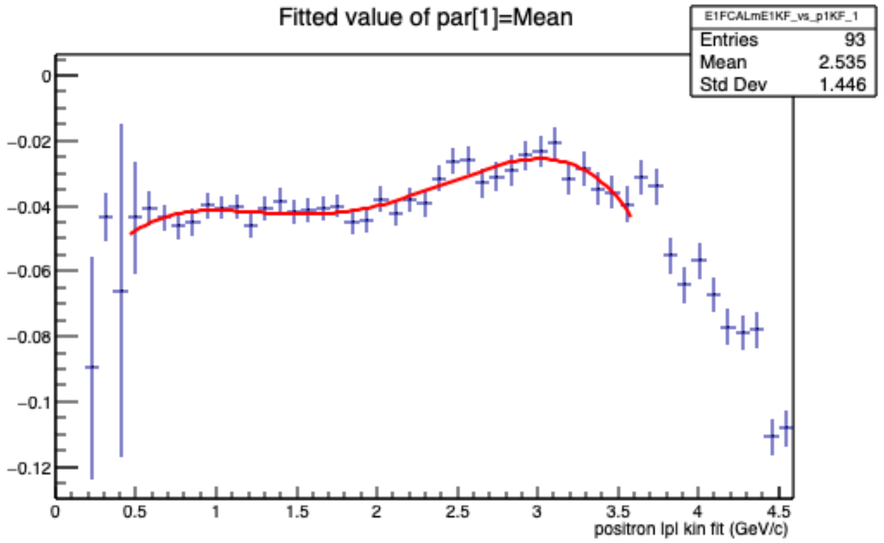


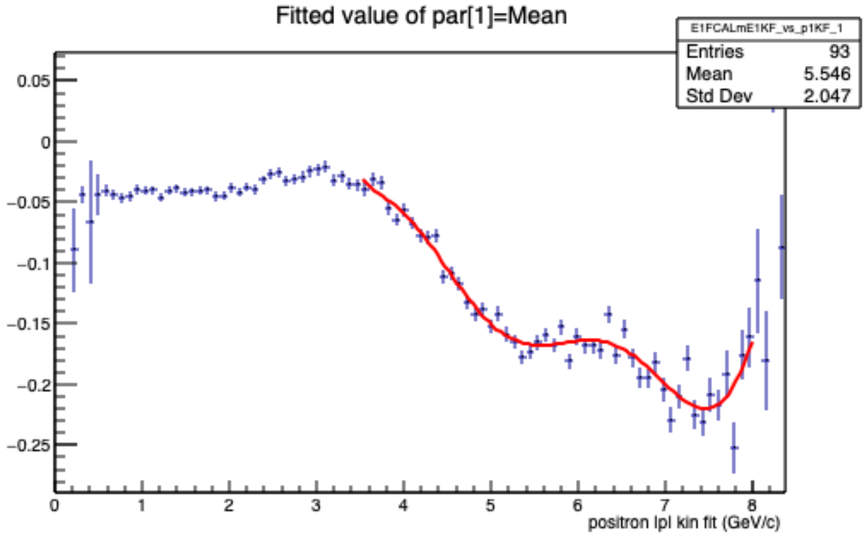


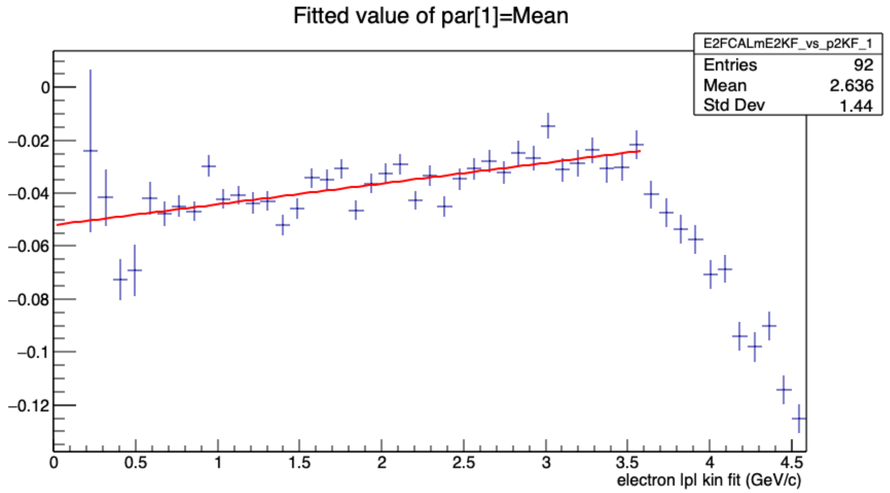
Fitted value of par[1]=Mean

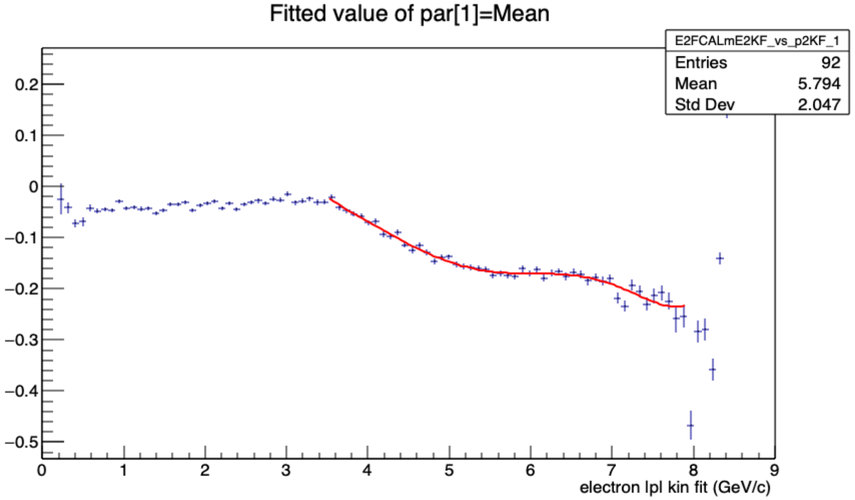


Simulation

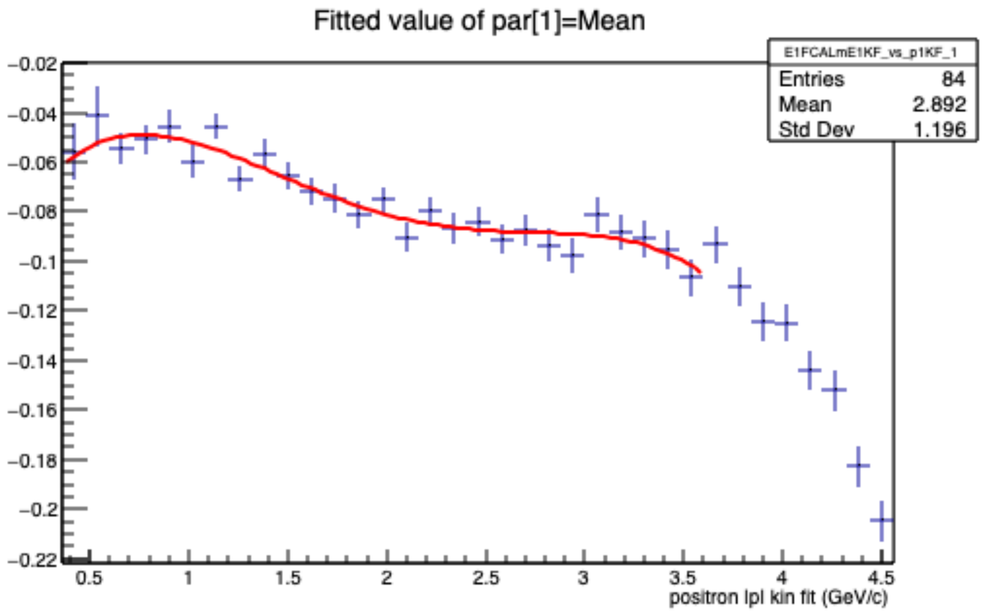

Fitted value of par[1]=Mean
E1FCALmE1KF_vs_p1KF_1
Entries 93
Mean 2.535
Std Dev 1.446
positron lpl kin fit (GeV/c)

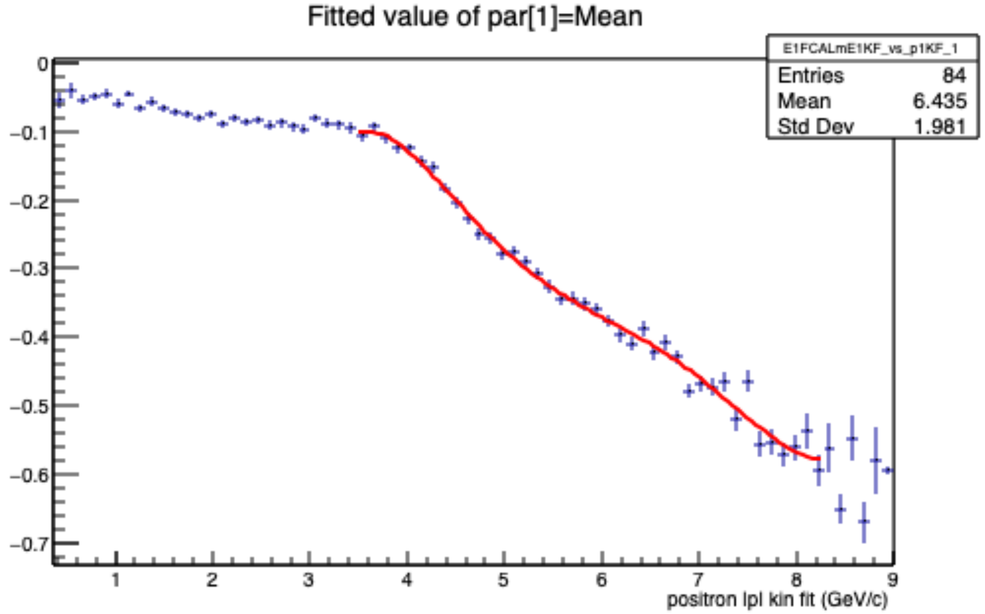

Fitted value of par[1]=Mean
E1FCALmE1KF_vs_p1KF_1
Entries 93
Mean 5.546
Std Dev 2.047
positron lpl kin fit (GeV/c)

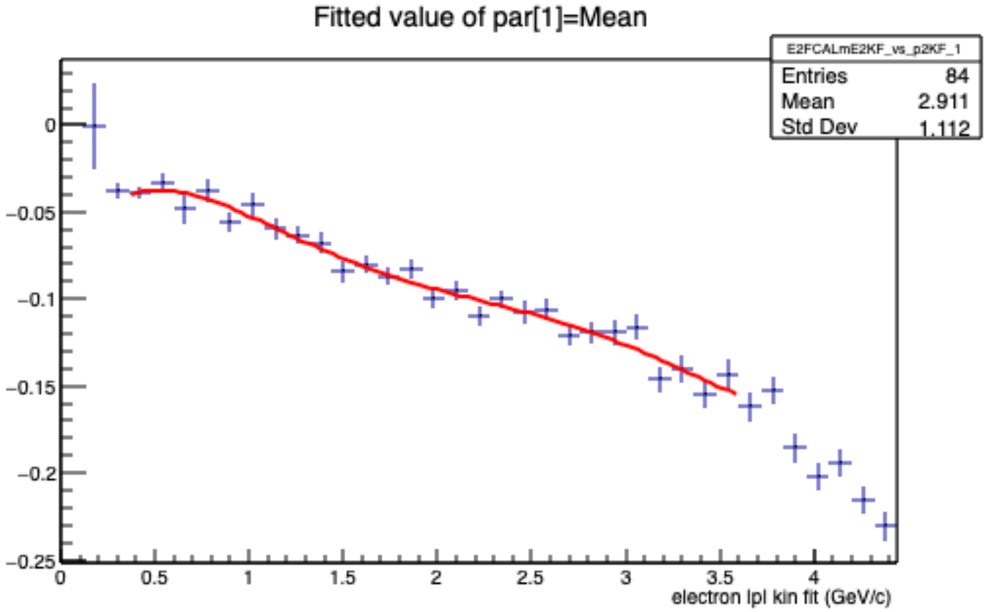

Fitted value of par[1]=Mean
E2FCALmE2KF_vs_p2KF_1
Entries 92
Mean 2.636
Std Dev 1.44
electron lpl kin fit (GeV/c)

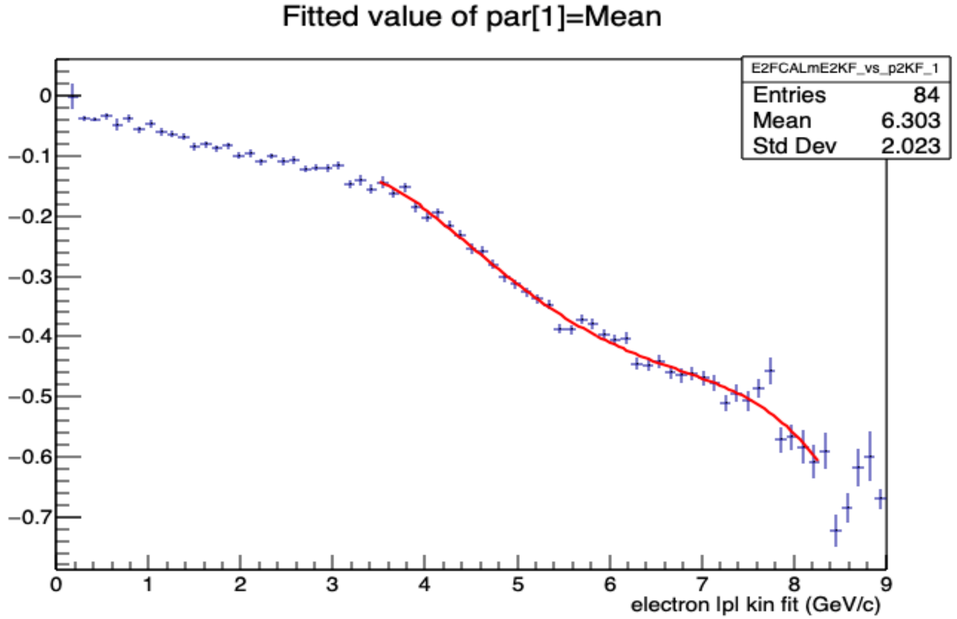

Fitted value of par[1]=Mean
E2FCALmE2KF_vs_p2KF_1
Entries 92
Mean 5.794
Std Dev 2.047
electron lpl kin fit (GeV/c)

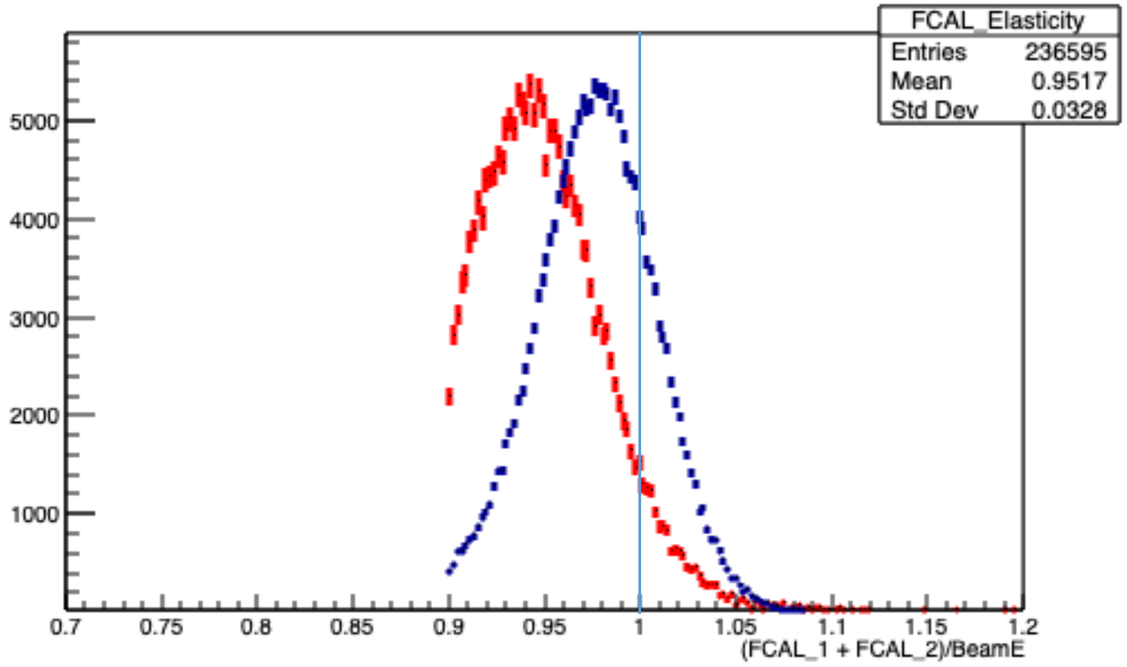
DATA

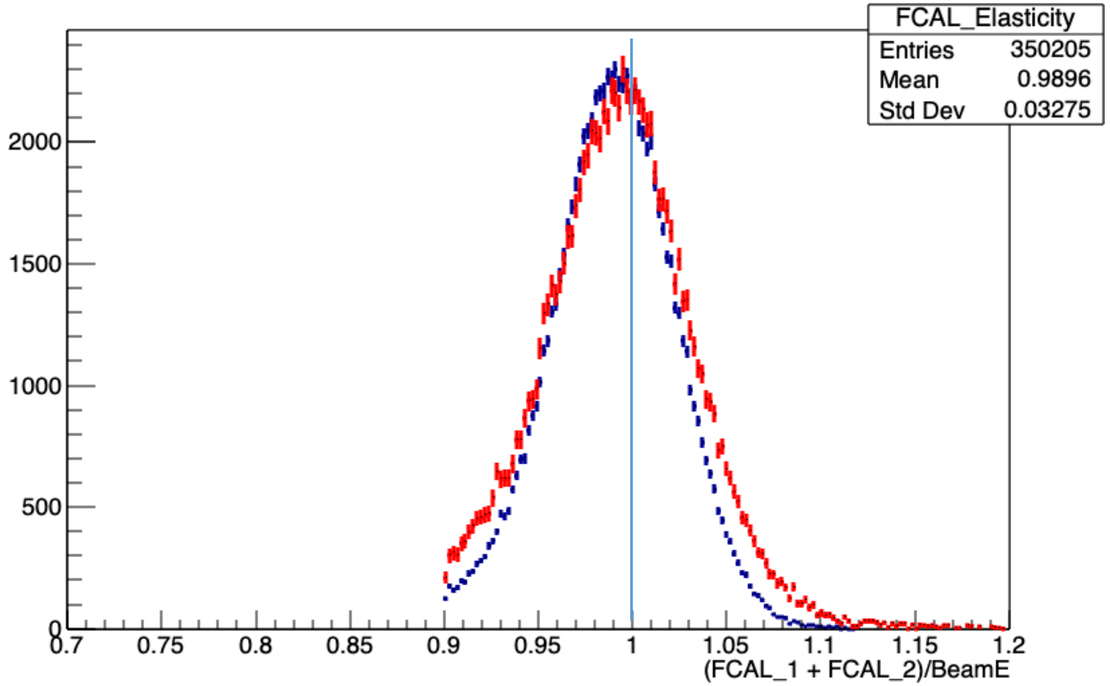

Fitted value of par[1]=Mean
E1FCALmE1KF_vs_p1KF_1
Entries 84
Mean 2.892
Std Dev 1.196
positron lpl kin fit (GeV/c)


Fitted value of par[1]=Mean
E1FCALmE1KF_vs_p1KF_1
Entries 84
Mean 6.435
Std Dev 1.981
positron lpl kin fit (GeV/c)

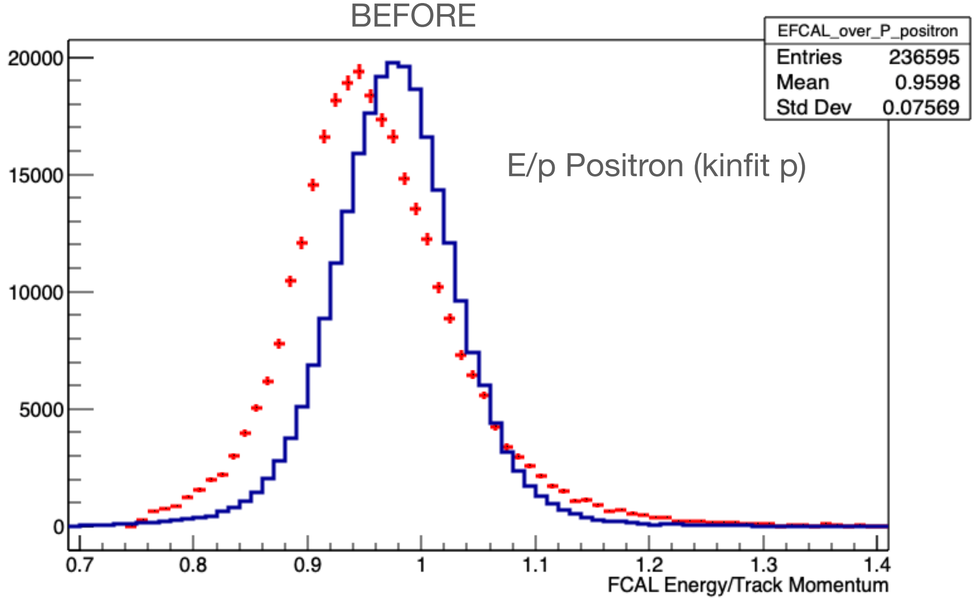

Fitted value of par[1]=Mean
E2FCALmE2KF_vs_p2KF_1
Entries 84
Mean 2.911
Std Dev 1.112
electron lpl kin fit (GeV/c)

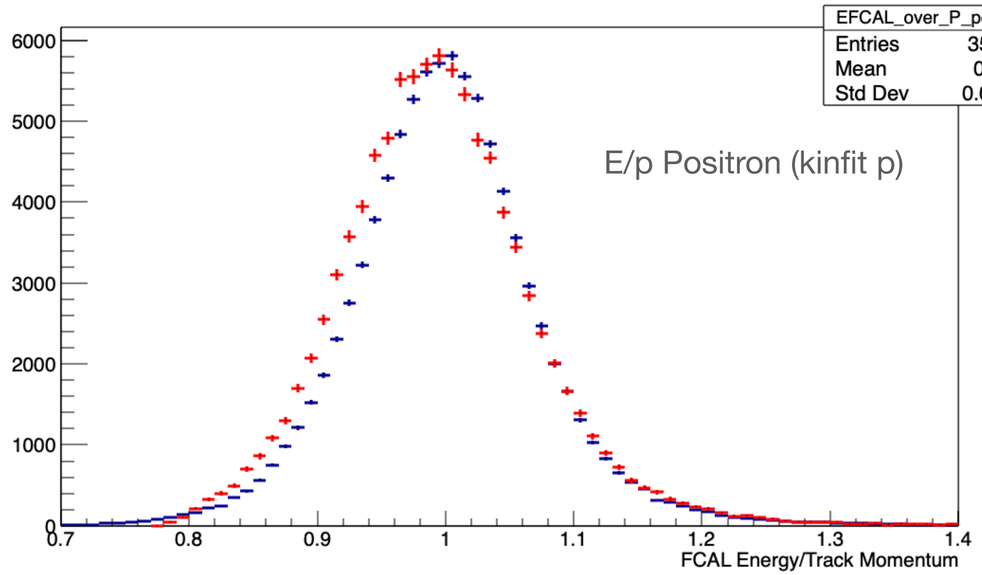

Fitted value of par[1]=Mean
E2FCALmE2KF_vs_p2KF_1
Entries 84
Mean 6.303
Std Dev 2.023
electron lpl kin fit (GeV/c)

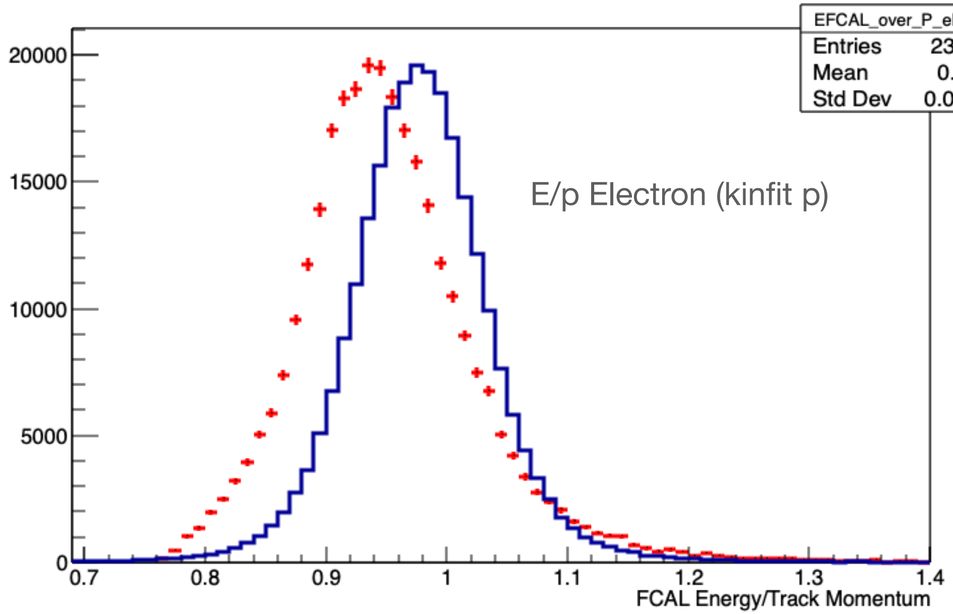

FCAL_Elasticity
Entries 236595
Mean 0.9517
Std Dev 0.0328
5000
4000
3000
2000
1000
0.7 0.75 0.8 0.85 0.9 0.95 1 1.05 1.1 1.15 1.2
(FCAL_1 + FCAL_2)/BeamE

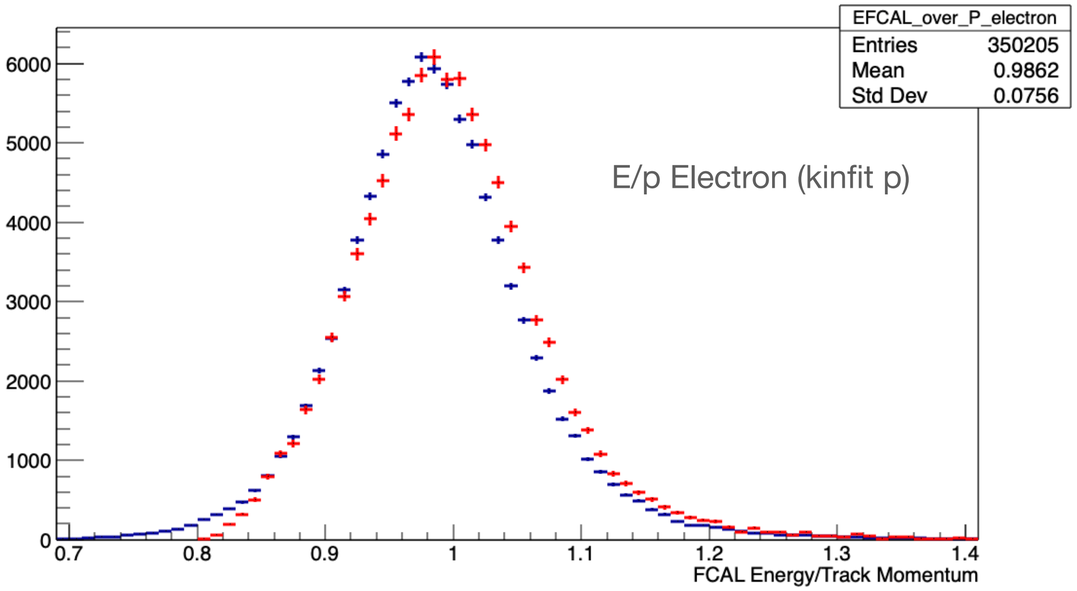

FCAL_Elasticity
Entries 350205
Mean 0.9896
Std Dev 0.03275
2000
1500
1000
500
0
0.7 0.75 0.8 0.85 0.9 0.95 1 1.05 1.1 1.15 1.2
(FCAL_1 + FCAL_2)/BeamE

BEFORE

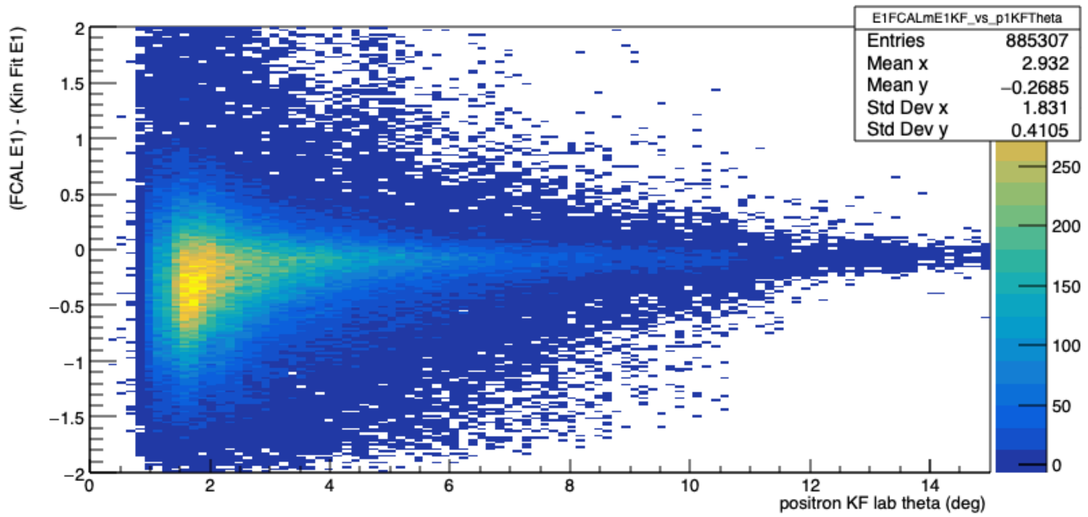

EFCAL_over_P_positron
Entries 236595
Mean 0.9598
Std Dev 0.07569
E/p Positron (kinfit p)
FCAL Energy/Track Momentum

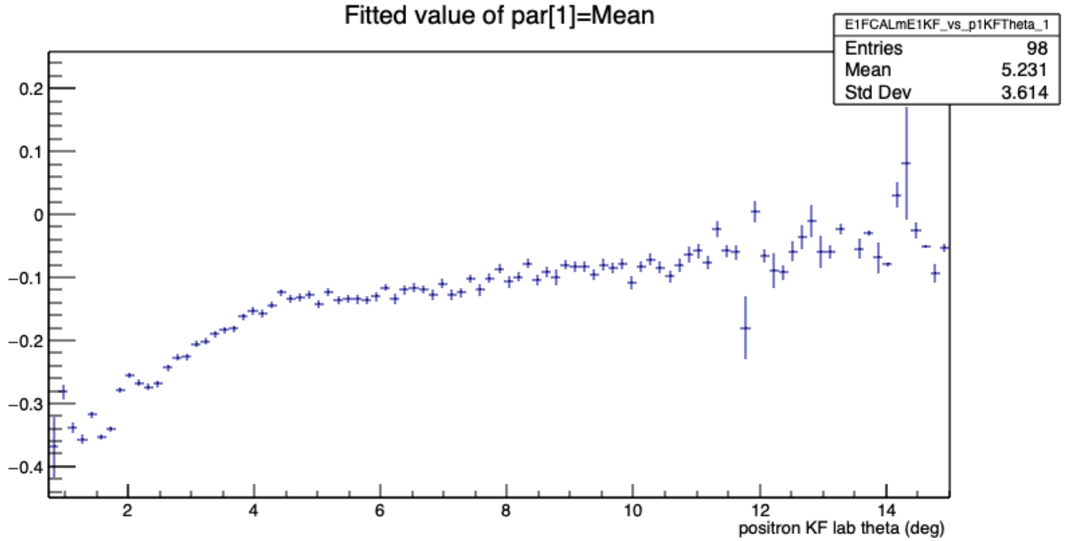

EFCAL_over_P_positron
Entries 350205
Mean 0.9998
Std Dev 0.07394
E/p Positron (kinfit p)
FCAL Energy/Track Momentum


EFCAL_over_P_electron
Entries 236595
Mean 0.9518
Std Dev 0.07452
E/p Electron (kinfit p)
FCAL Energy/Track Momentum

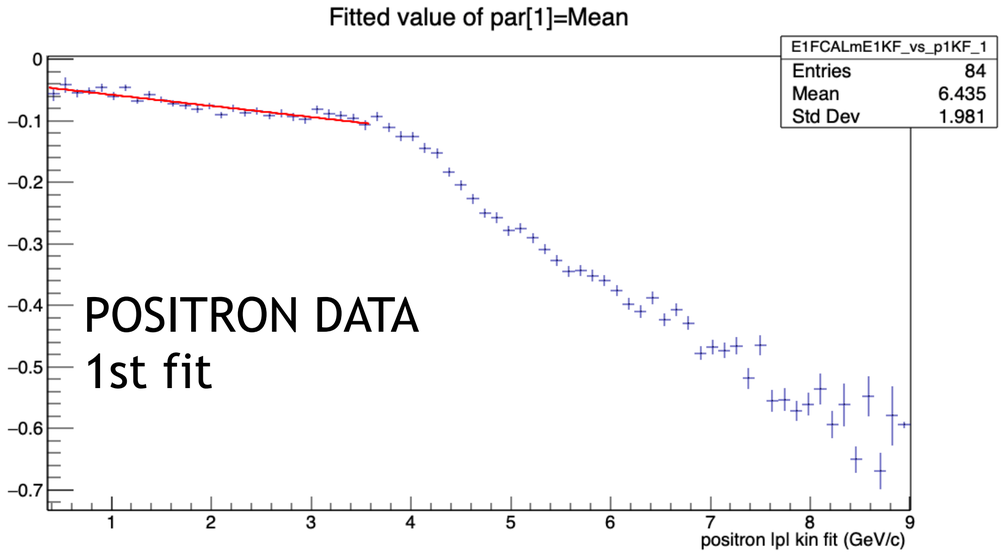

EFCAL_over_P_electron
Entries 350205
Mean 0.9862
Std Dev 0.0756
E/p Electron (kinfit p)
FCAL Energy/Track Momentum

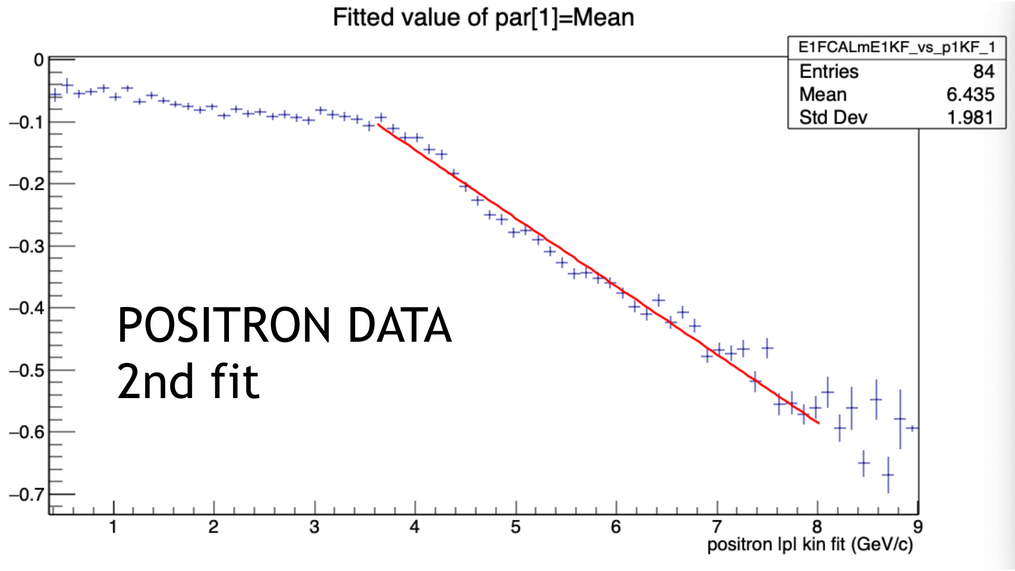
BACKUP SLIDES

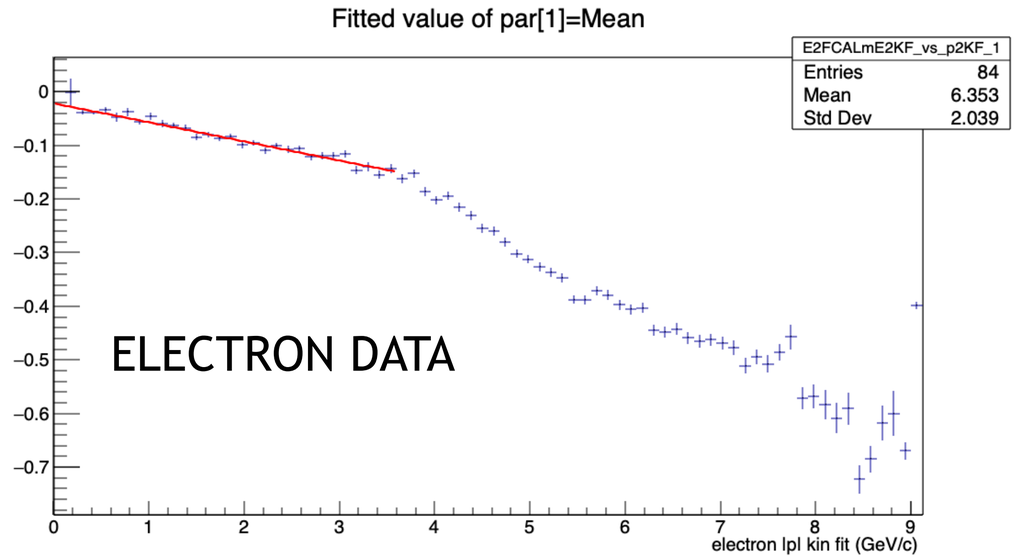

E1FCALmE1KF_vs_p1KFTheta
Entries 885307
Mean x 2.932
Mean y −0.2685
Std Dev x 1.831
Std Dev y 0.4105
(FCAL E1) - (Kin Fit E1)
positron KF lab theta (deg)

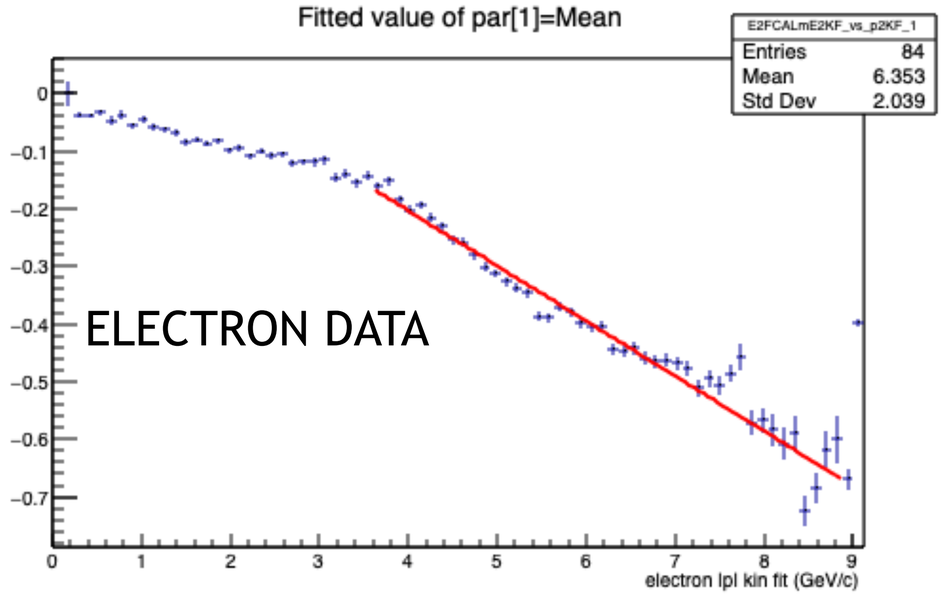

Fitted value of par[1]=Mean
E1FCALmE1KF_vs_p1KFTheta_1
Entries 98
Mean 5.231
Std Dev 3.614
positron KF lab theta (deg)

First attempt

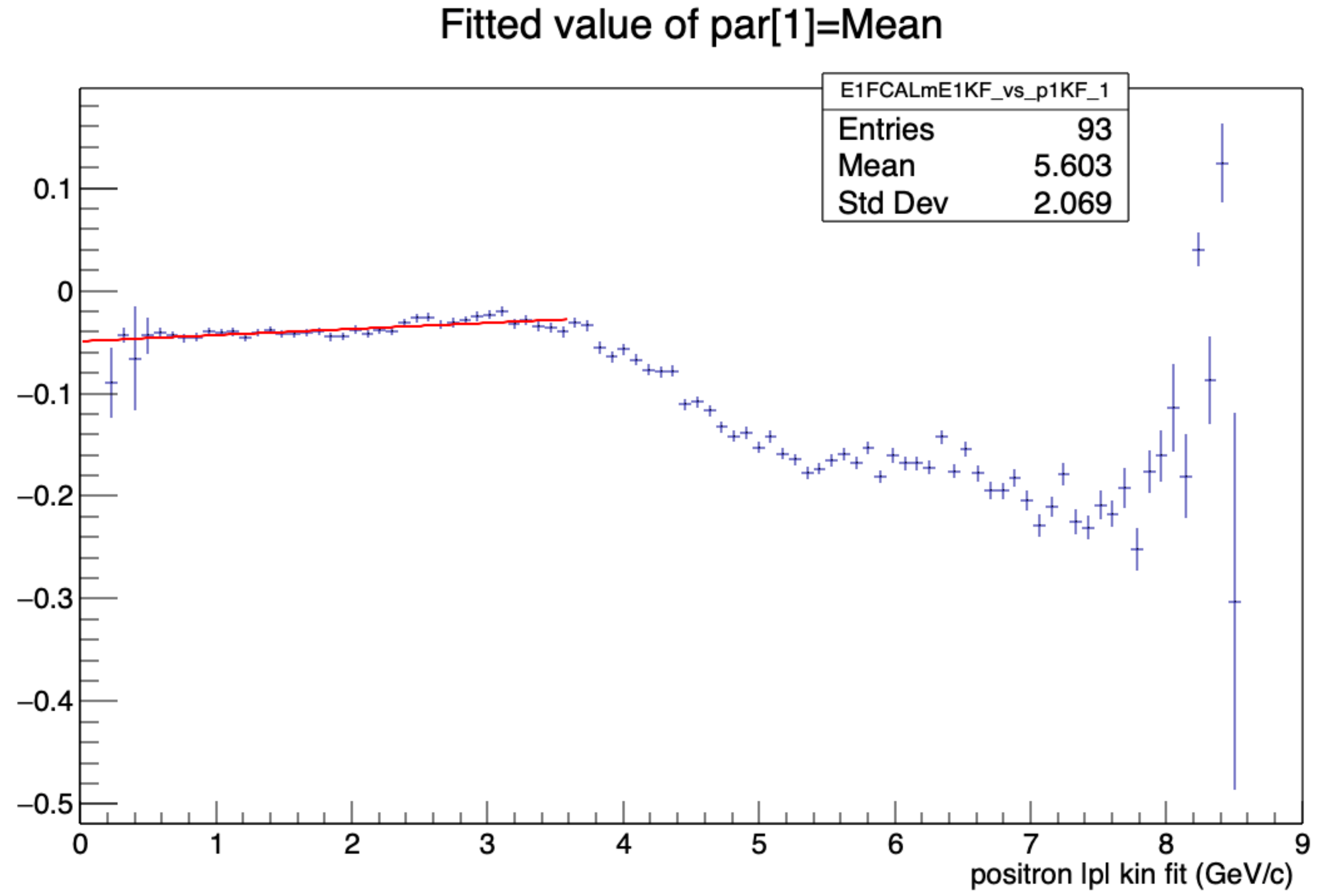

Fitted value of par[1]=Mean
E1FCALmE1KF_vs_p1KF_1
Entries 84
Mean 6.435
Std Dev 1.981
POSITRON DATA
1st fit
positron lpl kin fit (GeV/c)

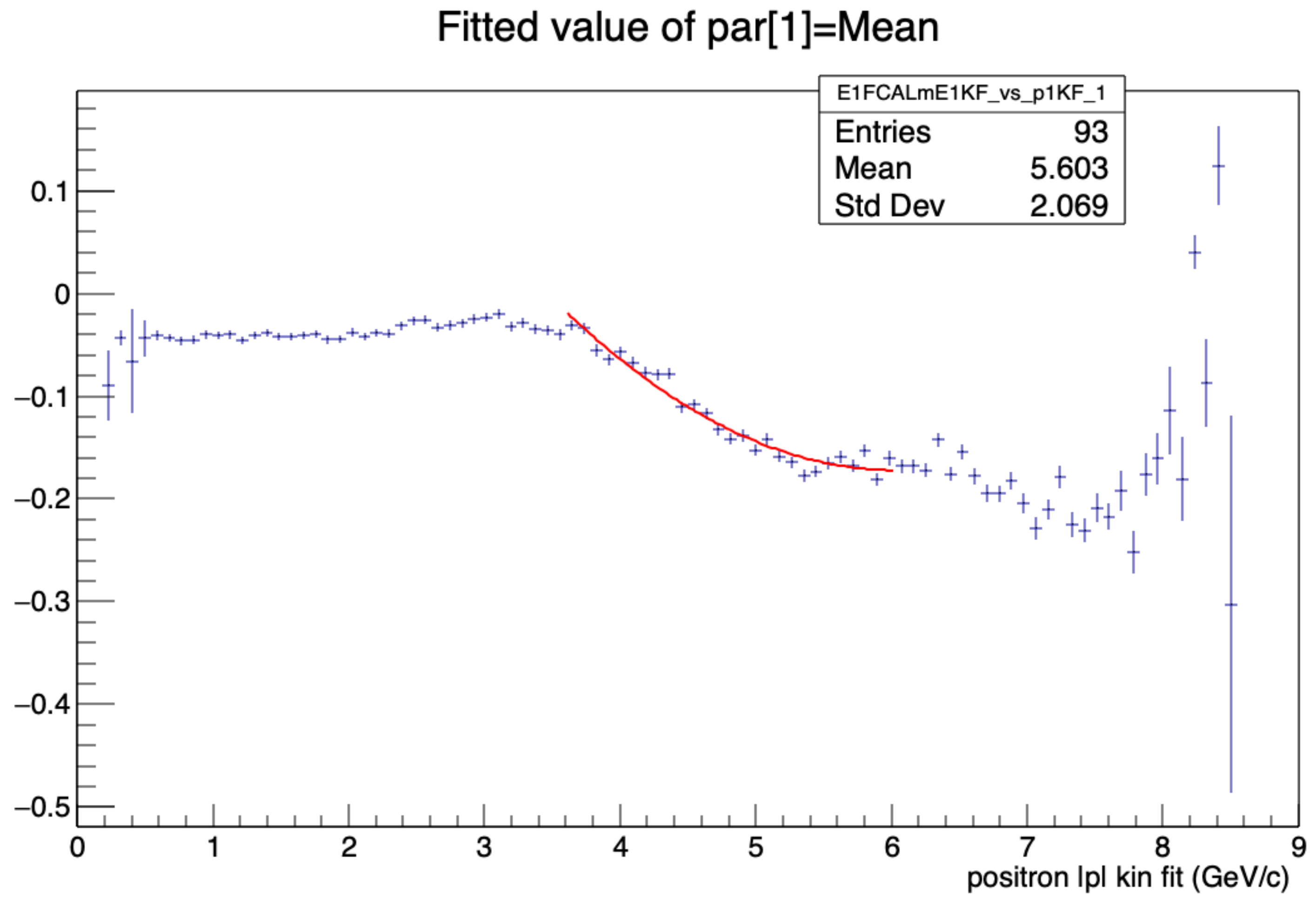

Fitted value of par[1]=Mean
E1FCALmE1KF_vs_p1KF_1
Entries 84
Mean 6.435
Std Dev 1.981
POSITRON DATA
2nd fit
positron lpl kin fit (GeV/c)

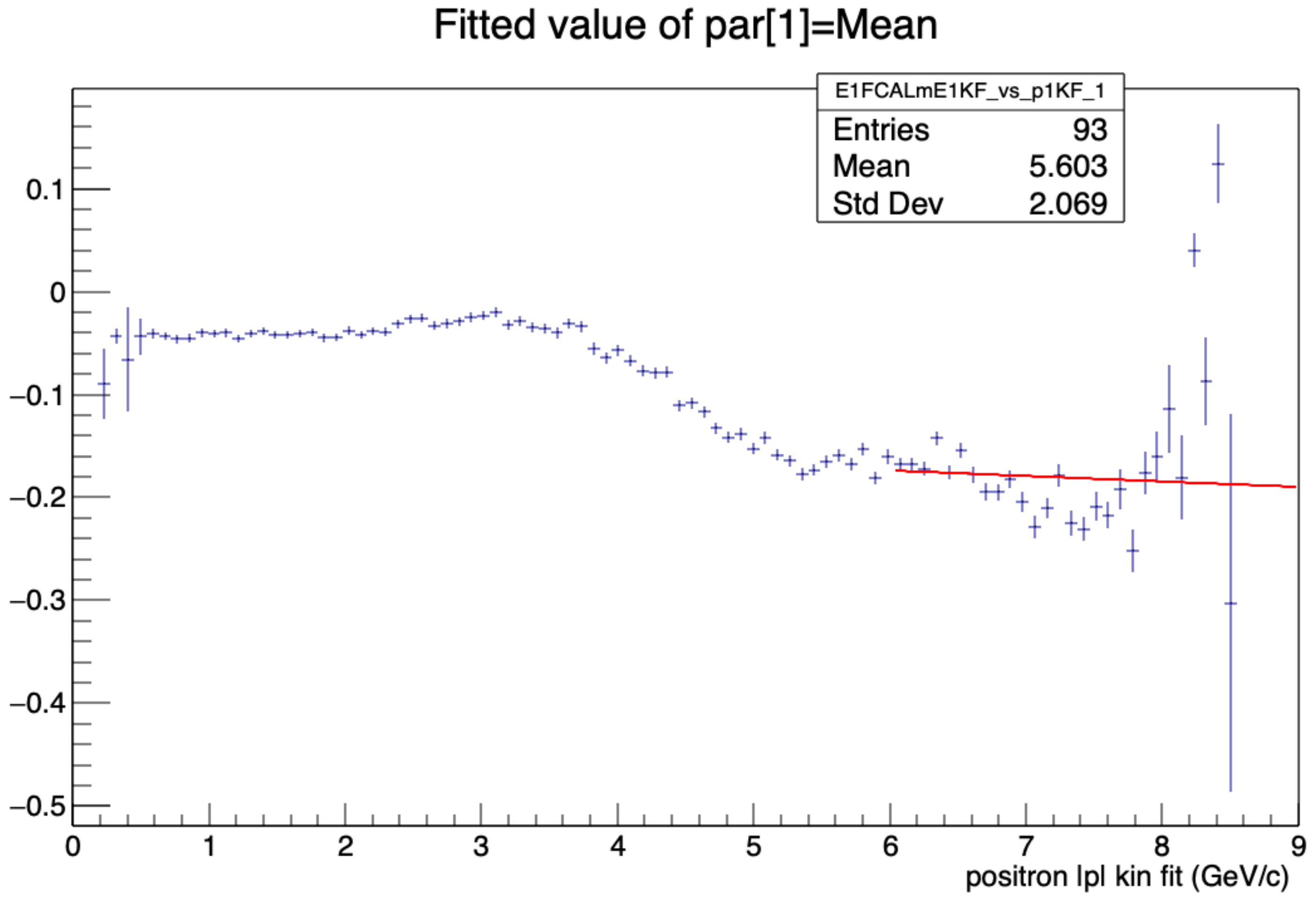

Fitted value of par[1]=Mean
E2FCALmE2KF_vs_p2KF_1
Entries 84
Mean 6.353
Std Dev 2.039
ELECTRON DATA
electron lpl kin fit (GeV/c)


Fitted value of par[1]=Mean
E2FCALmE2KF_vs_p2KF_1
Entries 84
Mean 6.353
Std Dev 2.039
ELECTRON DATA
electron lpl kin fit (GeV/c)

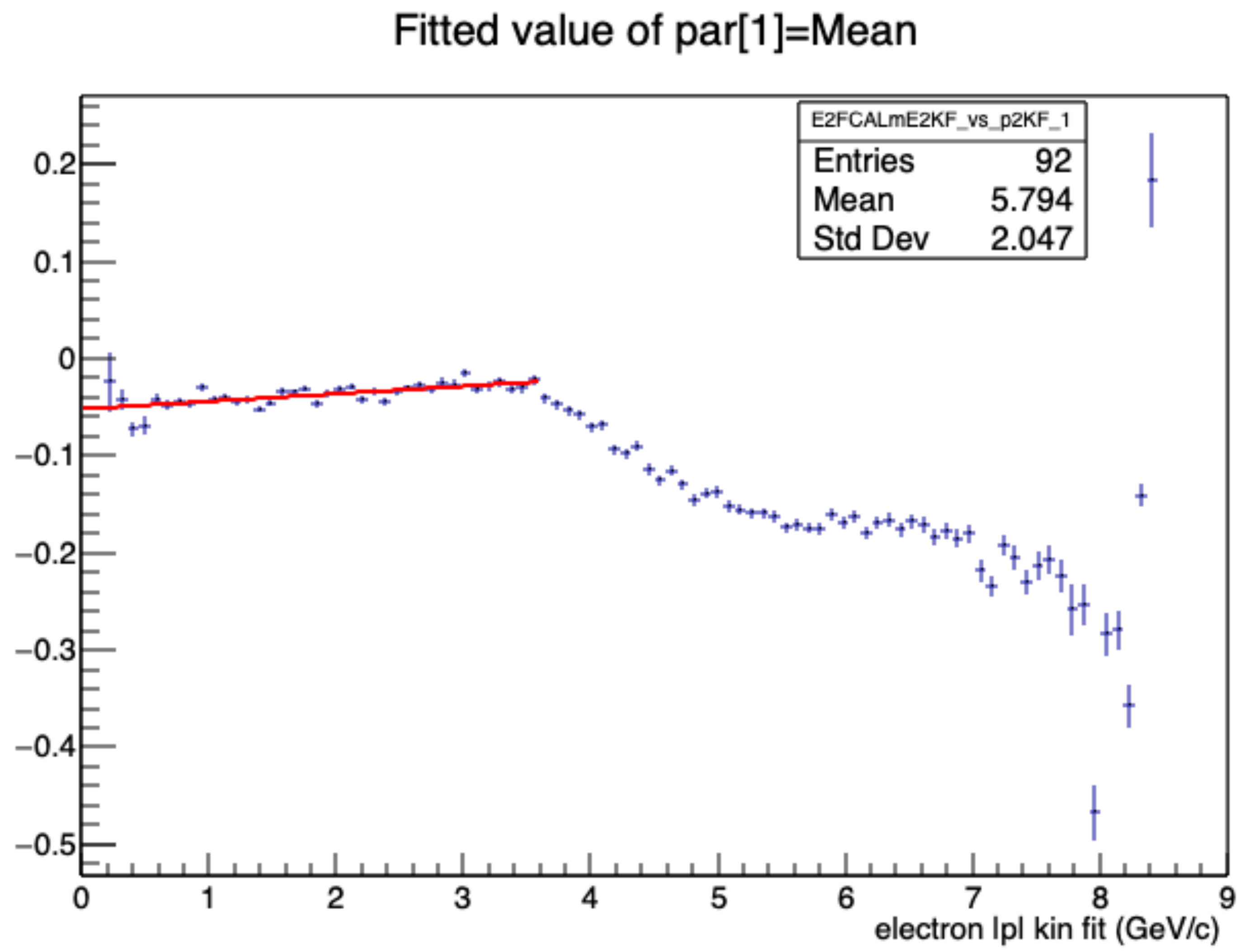
POSITRONS

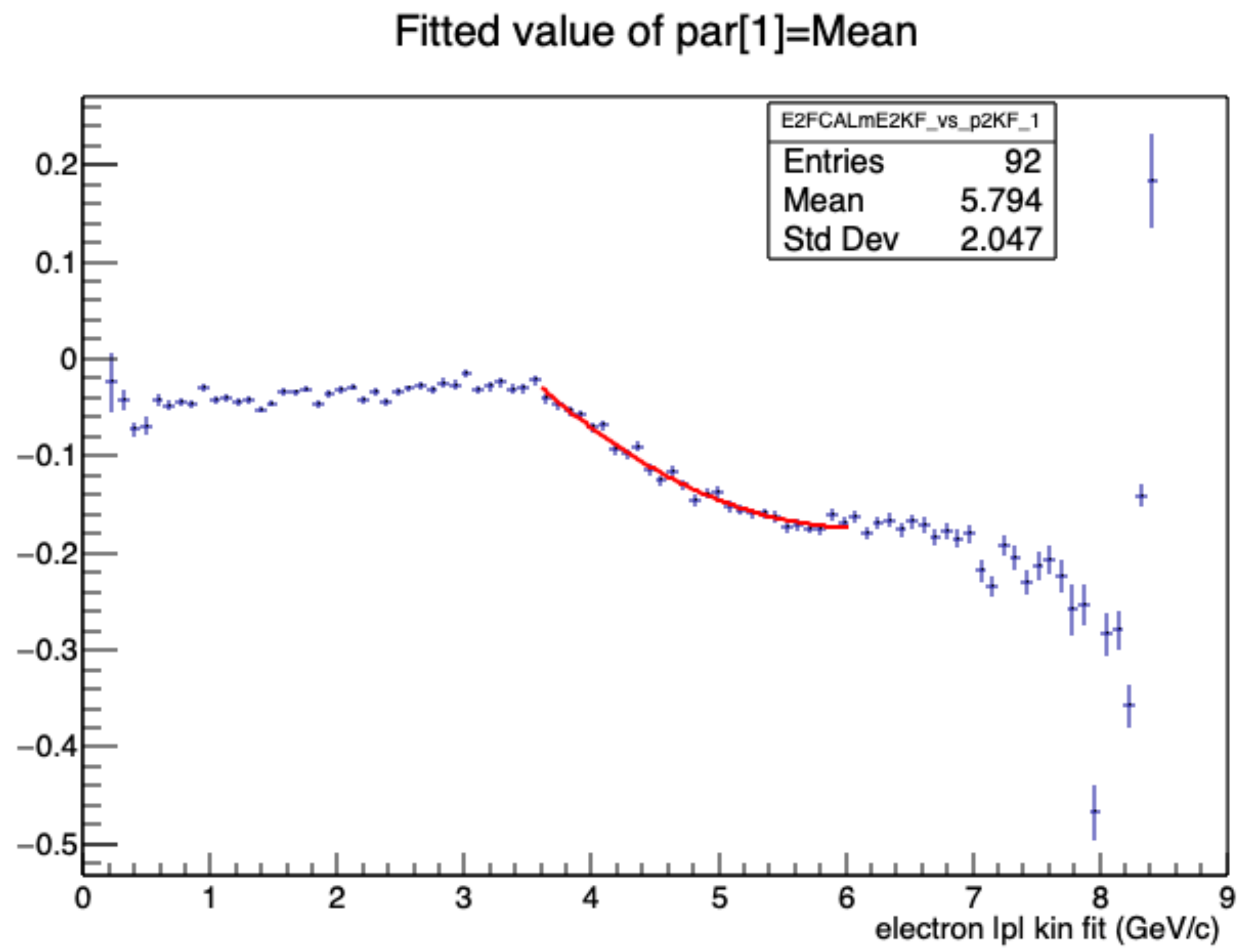


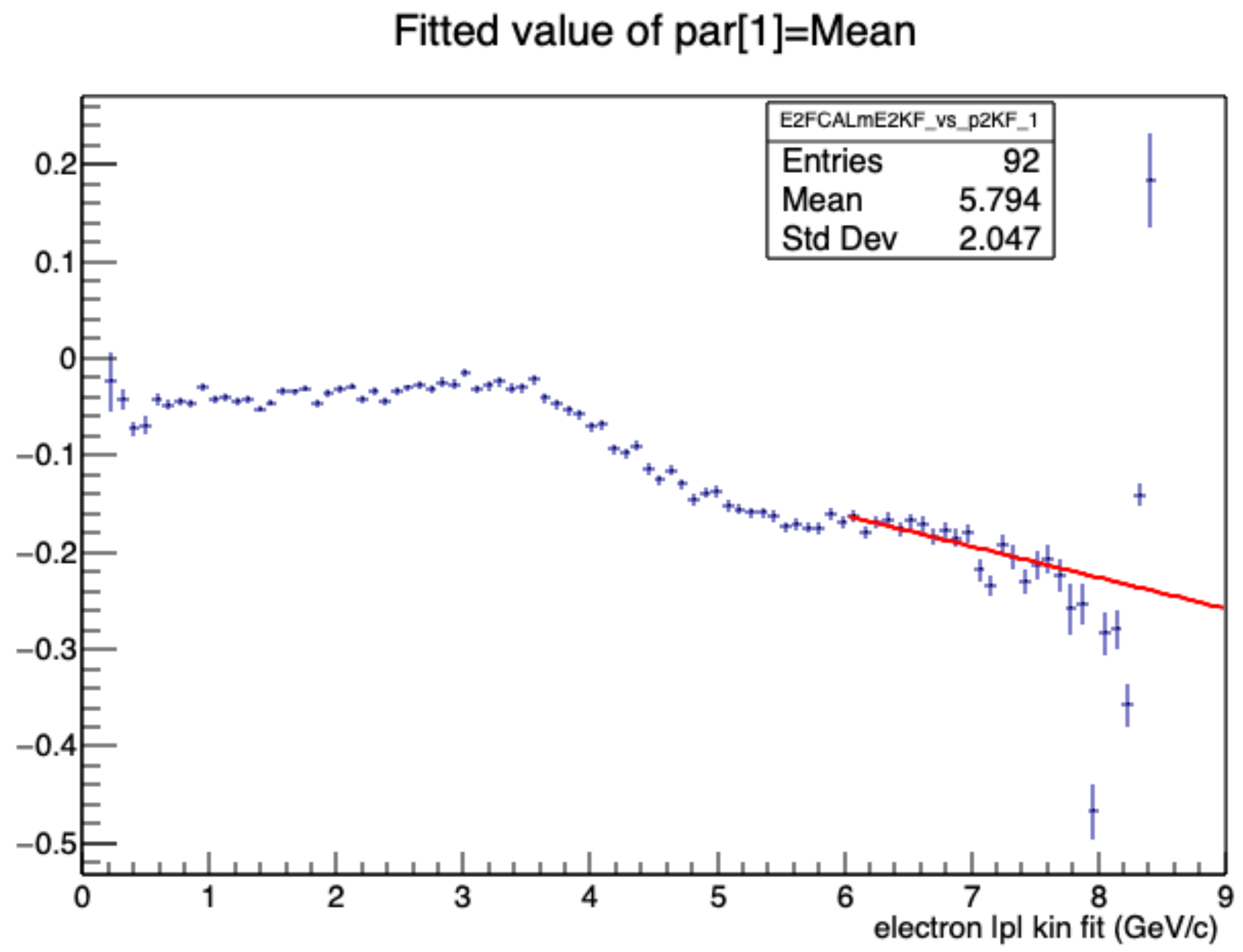




ELECTRONS







Correcting both simulation and data