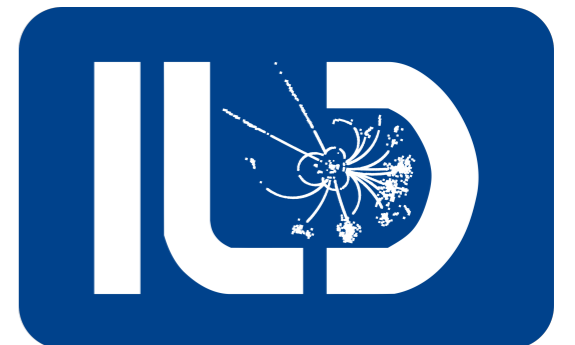


Jet Energy Scale Calibration using $e^+e^- \rightarrow \gamma Z$ process

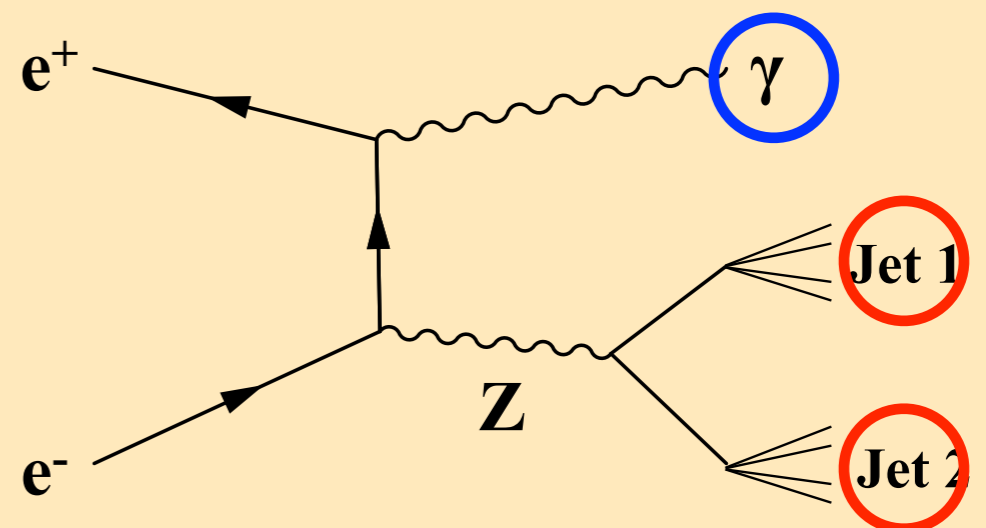
Takahiro Mizuno
SOKENDAI



Recent progress

- The results using **DBD samples** were reported at the ILD group meeting held on 13/10/2020. Please look at <https://agenda.linearcollider.org/event/8657/> for the detail.
- The new results using **mc-2020 samples** and differences were reported at the S&A group meeting held on 28/07/2021. <https://agenda.linearcollider.org/event/9339/>

Jet Energy Scale Calibration

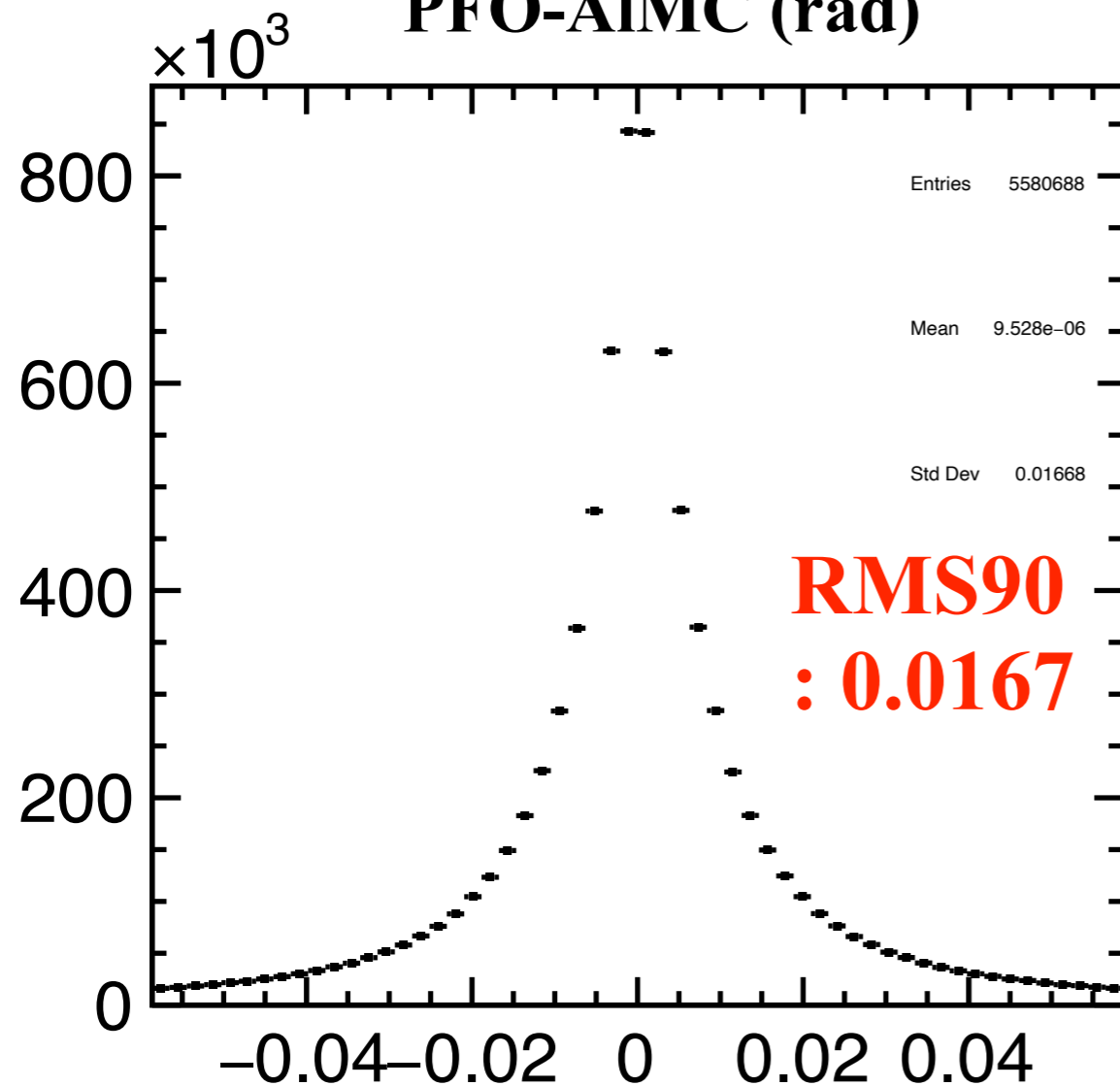


Input Variables Correctness

eLpR Samples
MC Cut:
Correct photon selection
Method 3 has answer

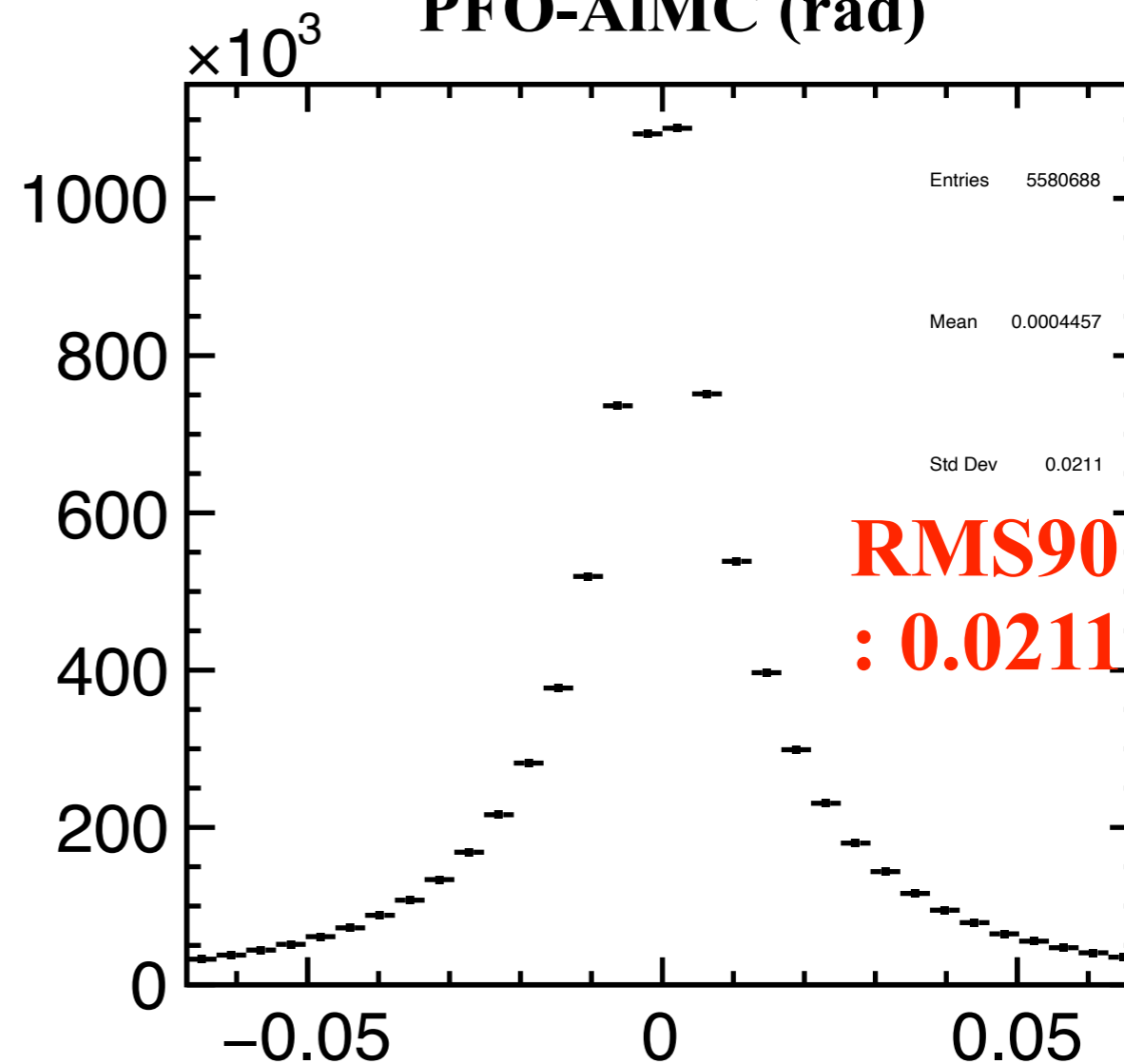
Theta

PFO-AIMC (rad)



Phi

PFO-AIMC (rad)



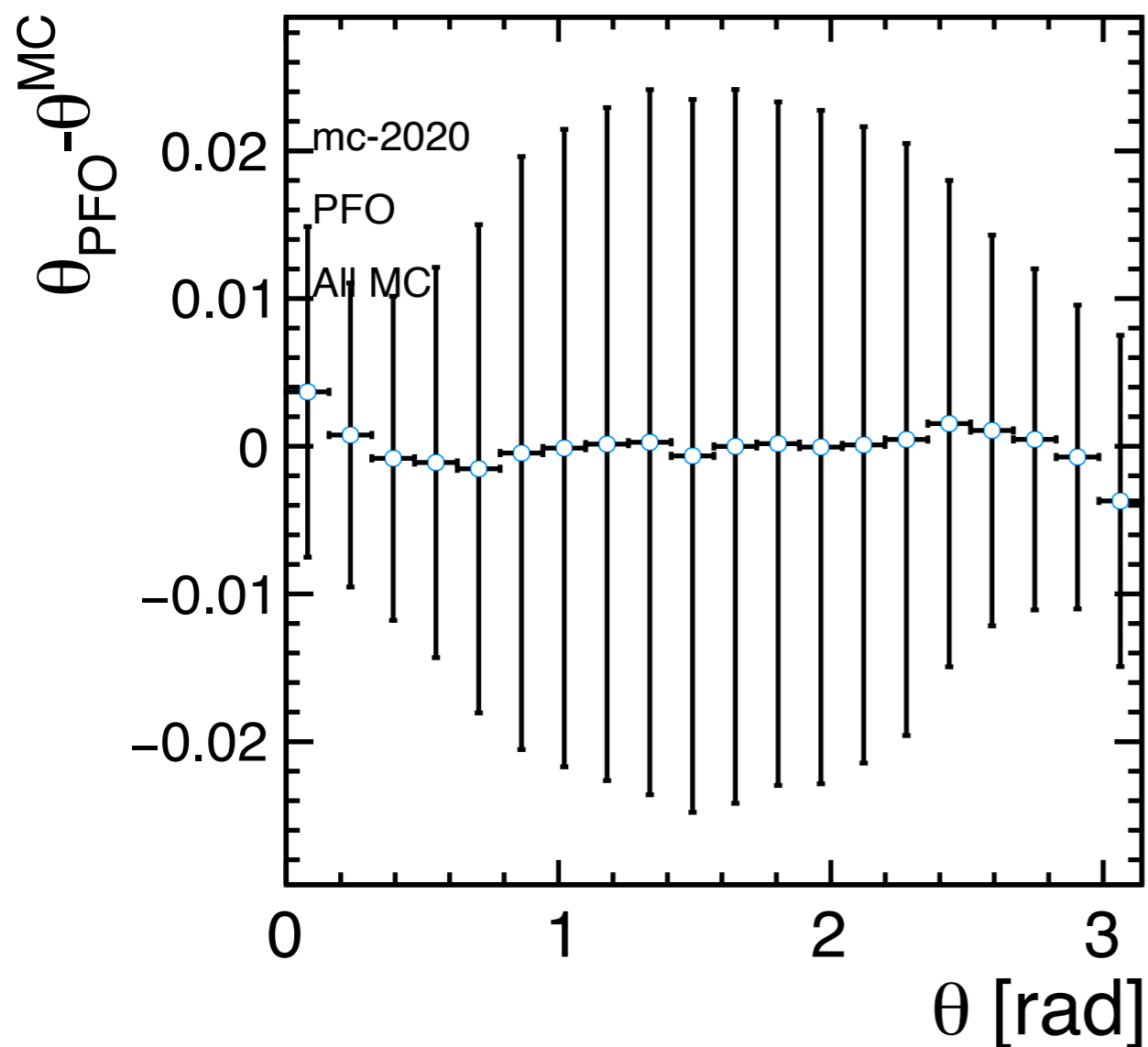
Both have ~0.02 rad RMS90.

Abs. Differences

Circle points are mean90 and **bars are RMS90.**

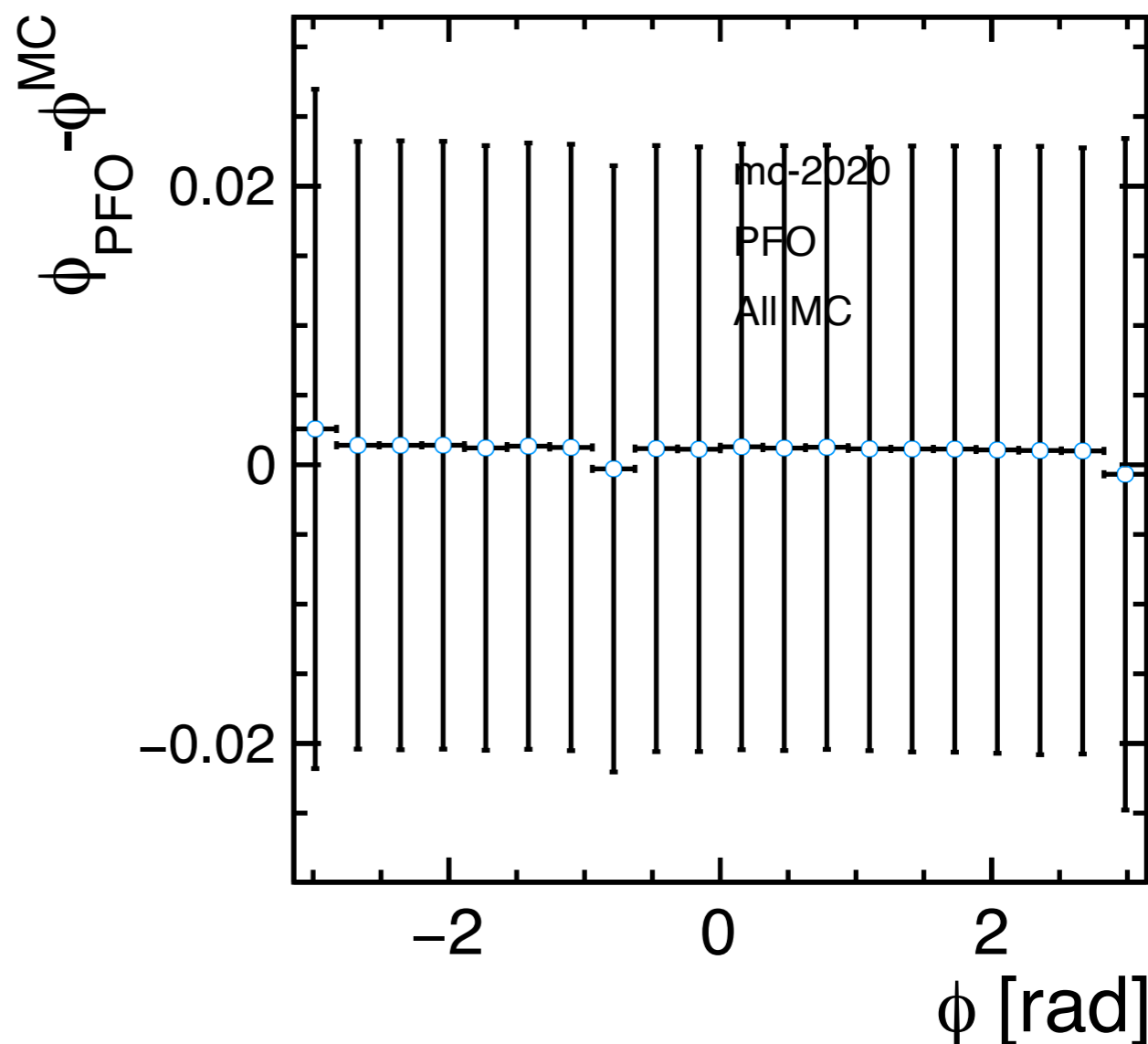
eLpR Samples
MC Cut:
Correct photon selection
Method 3 has answer

Theta Difference



Bias with structure

Phi Difference



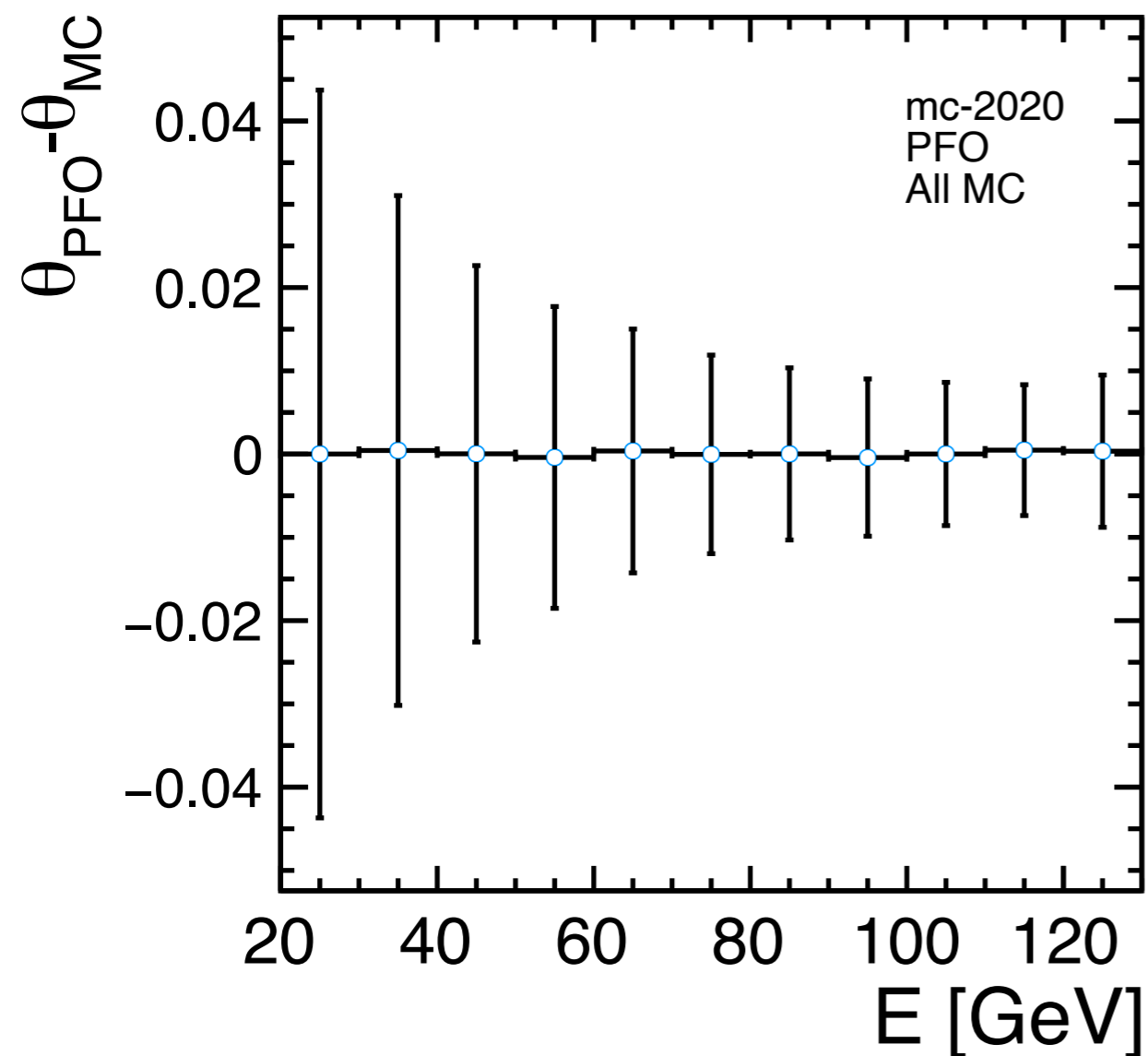
Uniformly positive bias

Abs. Differences

Circle points are mean90 and **bars are RMS90.**

eLpR Samples
MC Cut:
Correct photon selection
Method 3 has answer

Theta Difference

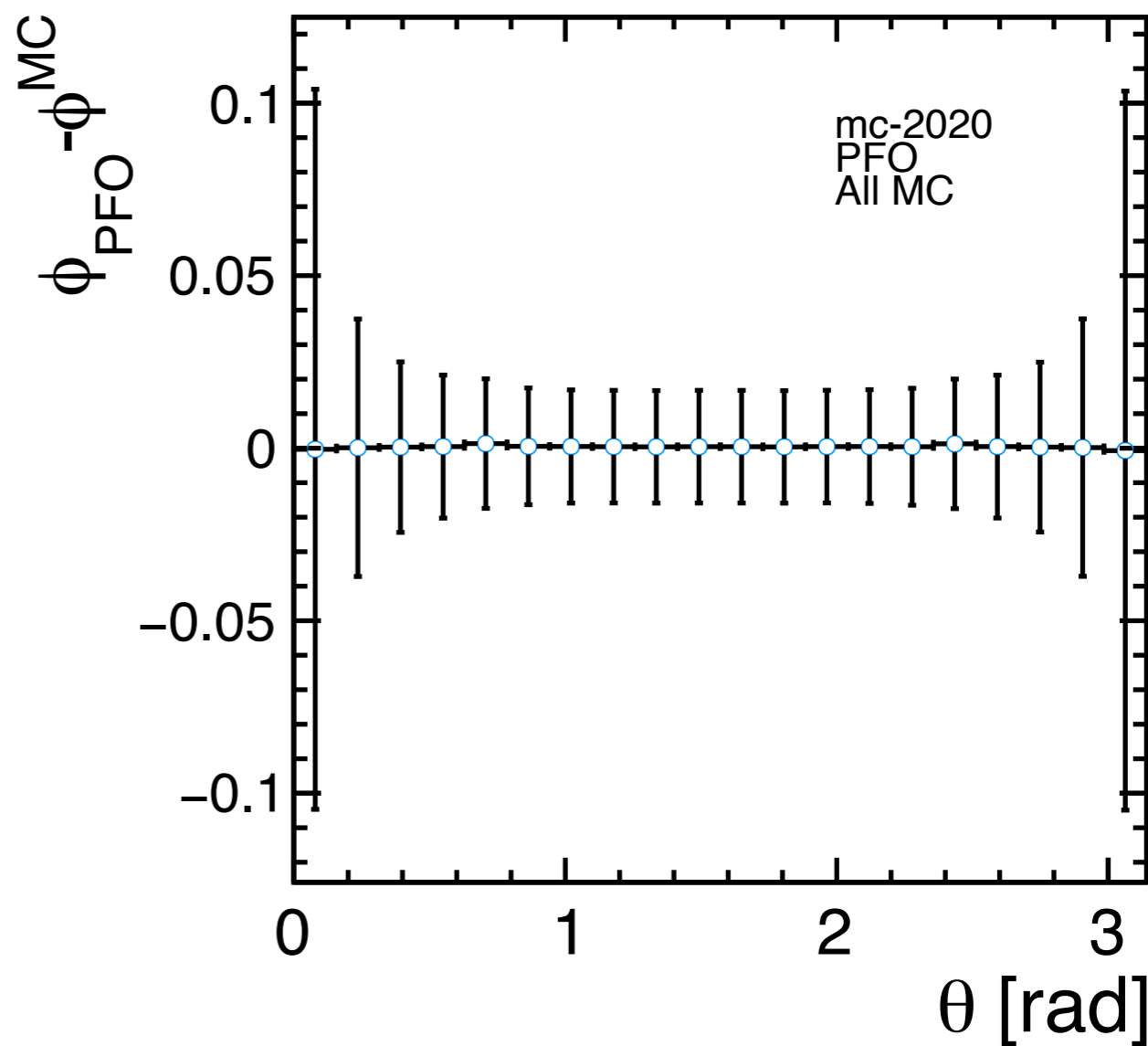
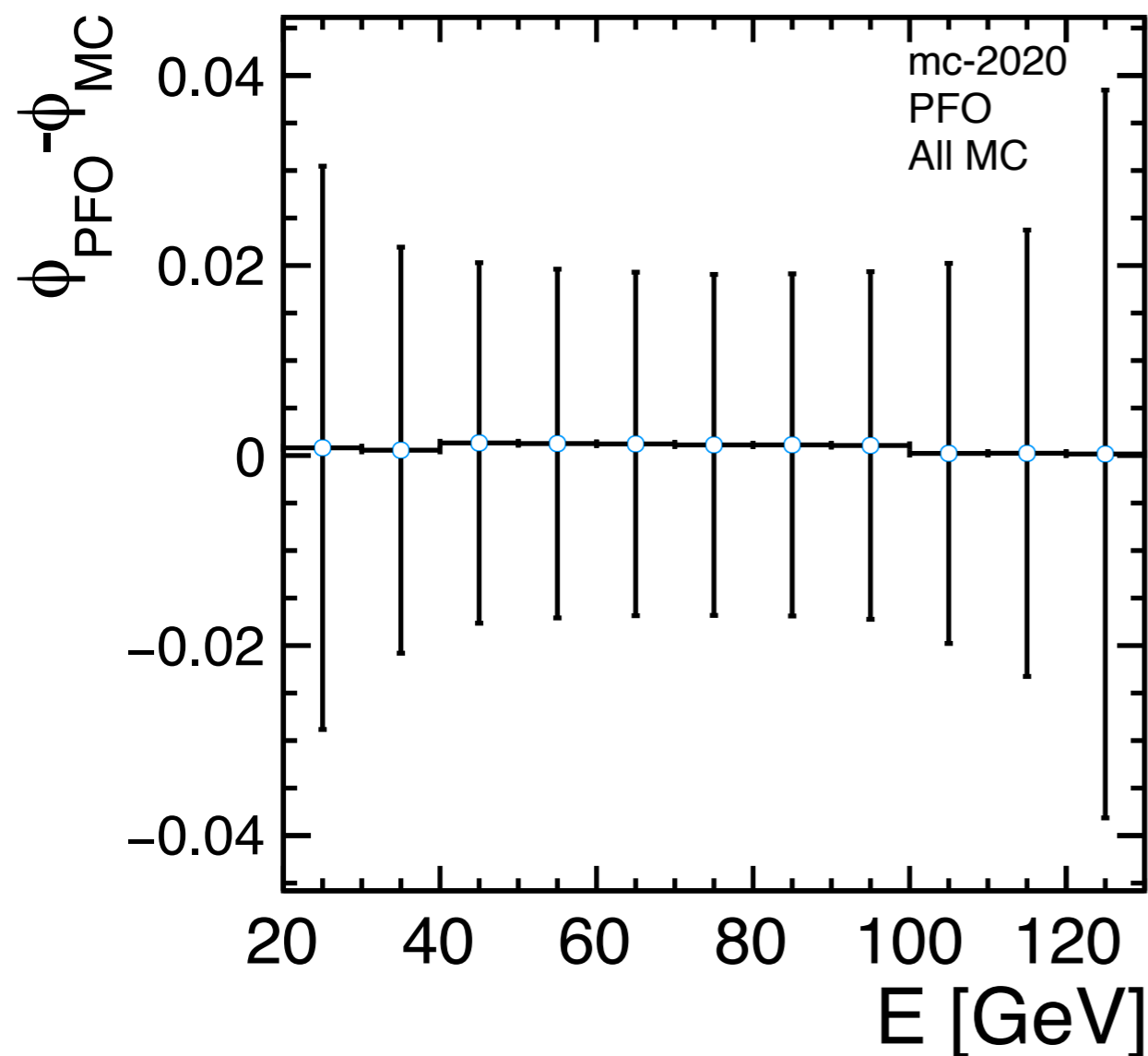


Abs. Differences

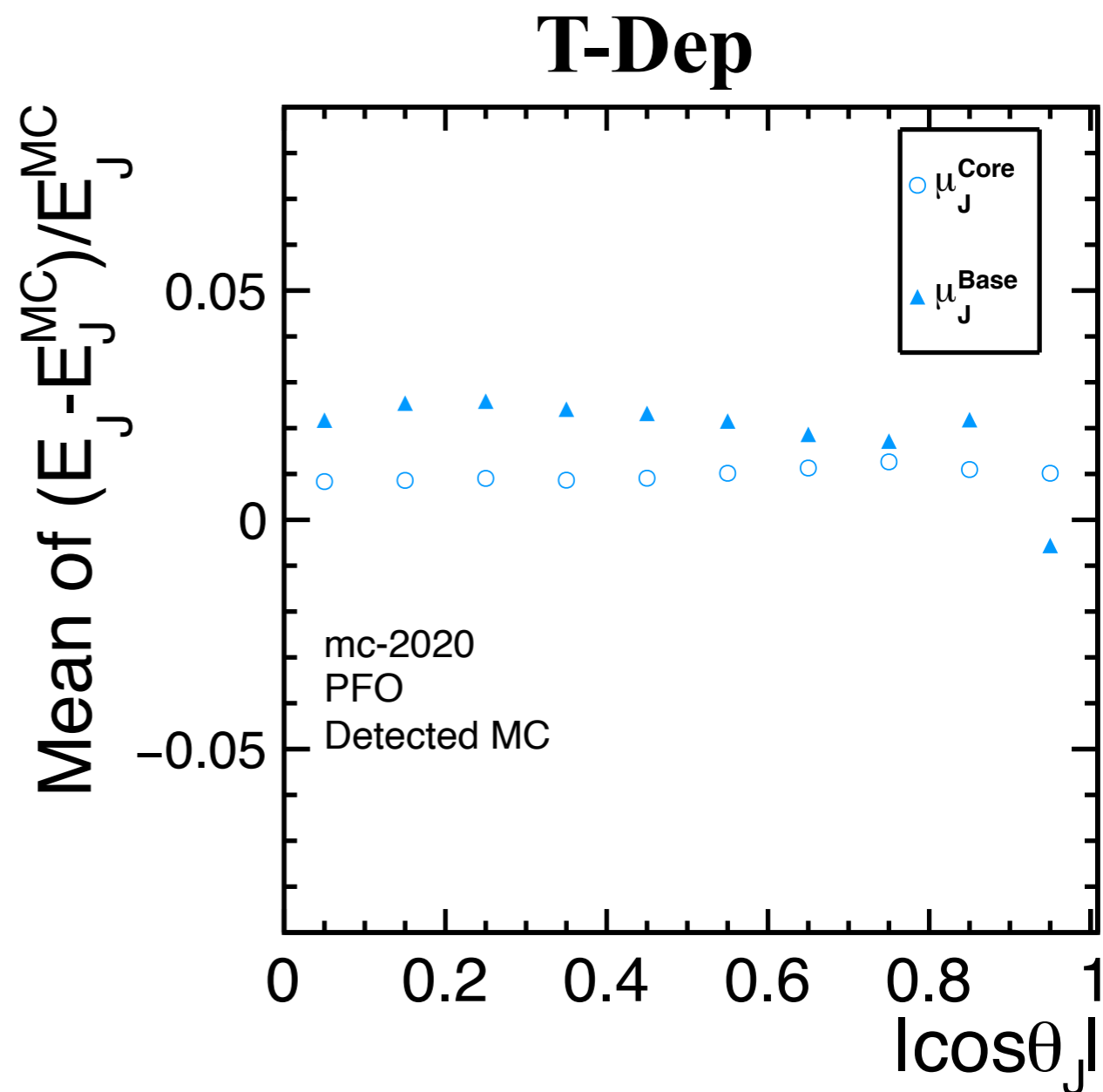
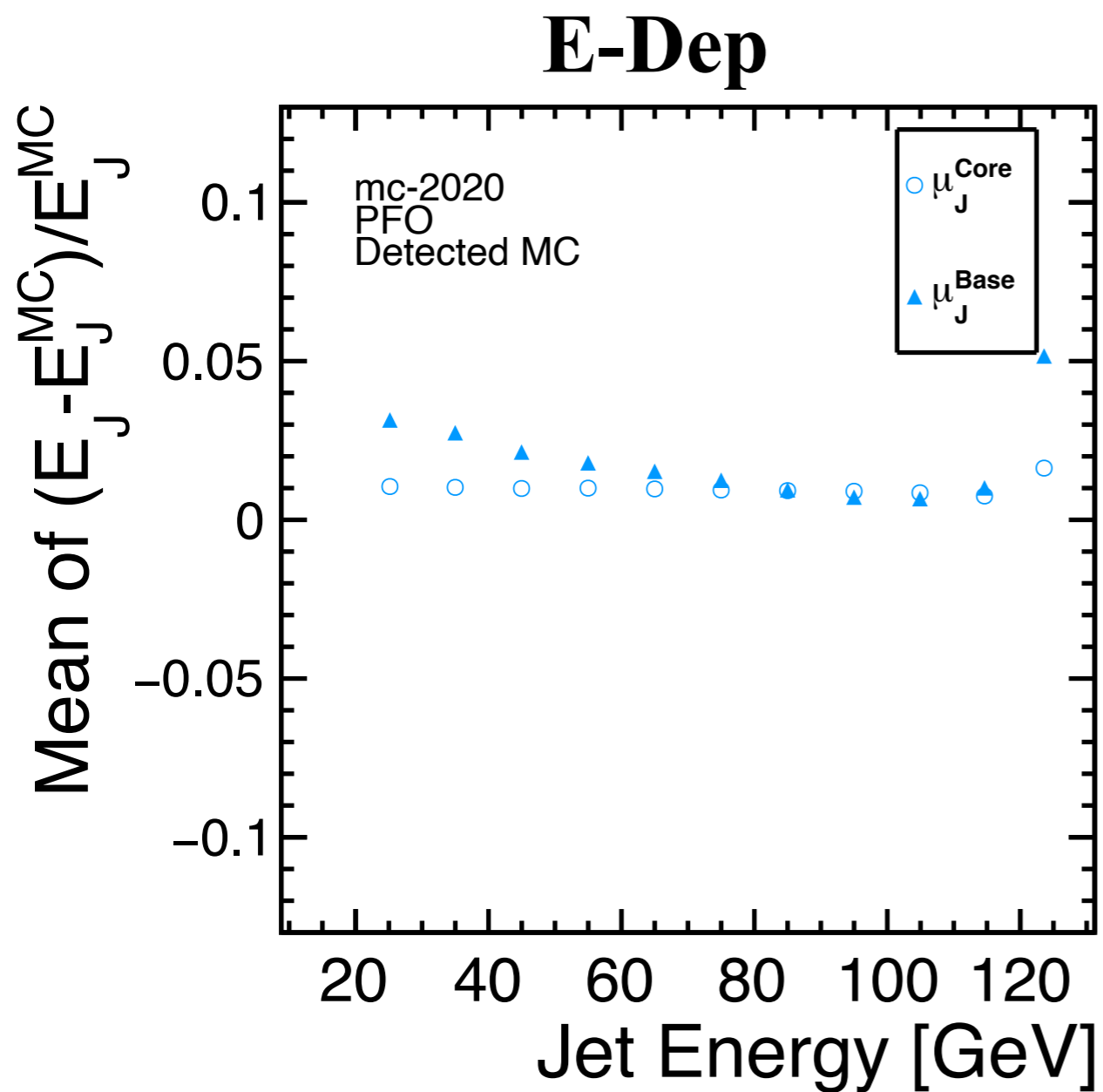
Circle points are mean90 and **bars are RMS90.**

eLpR Samples
MC Cut:
Correct photon selection
Method 3 has answer

Phi Difference



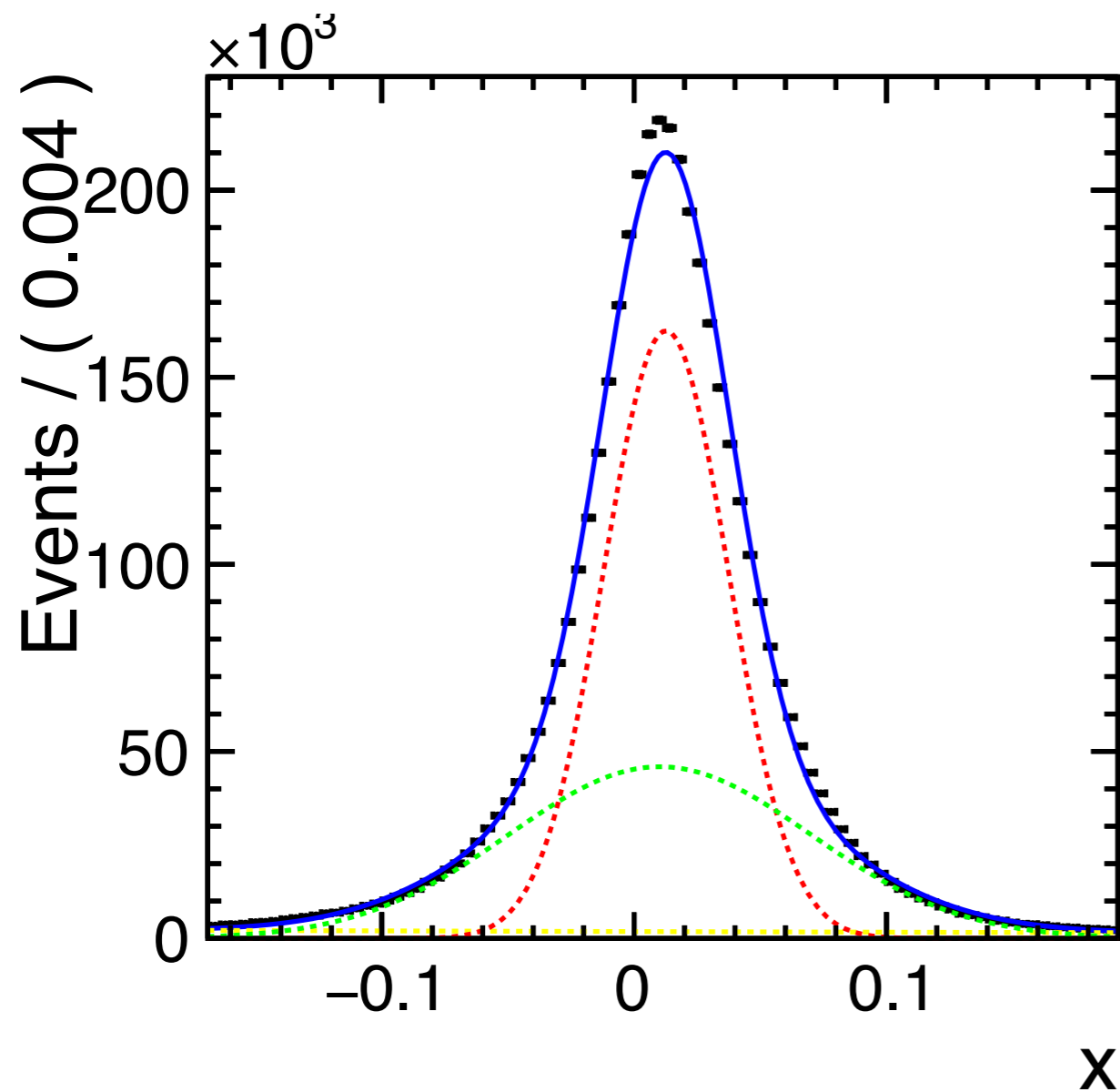
PFO E, T-Dep (De-MC)



PFO has positive bias.

PFO total jet energy

“PFO-DeMC”



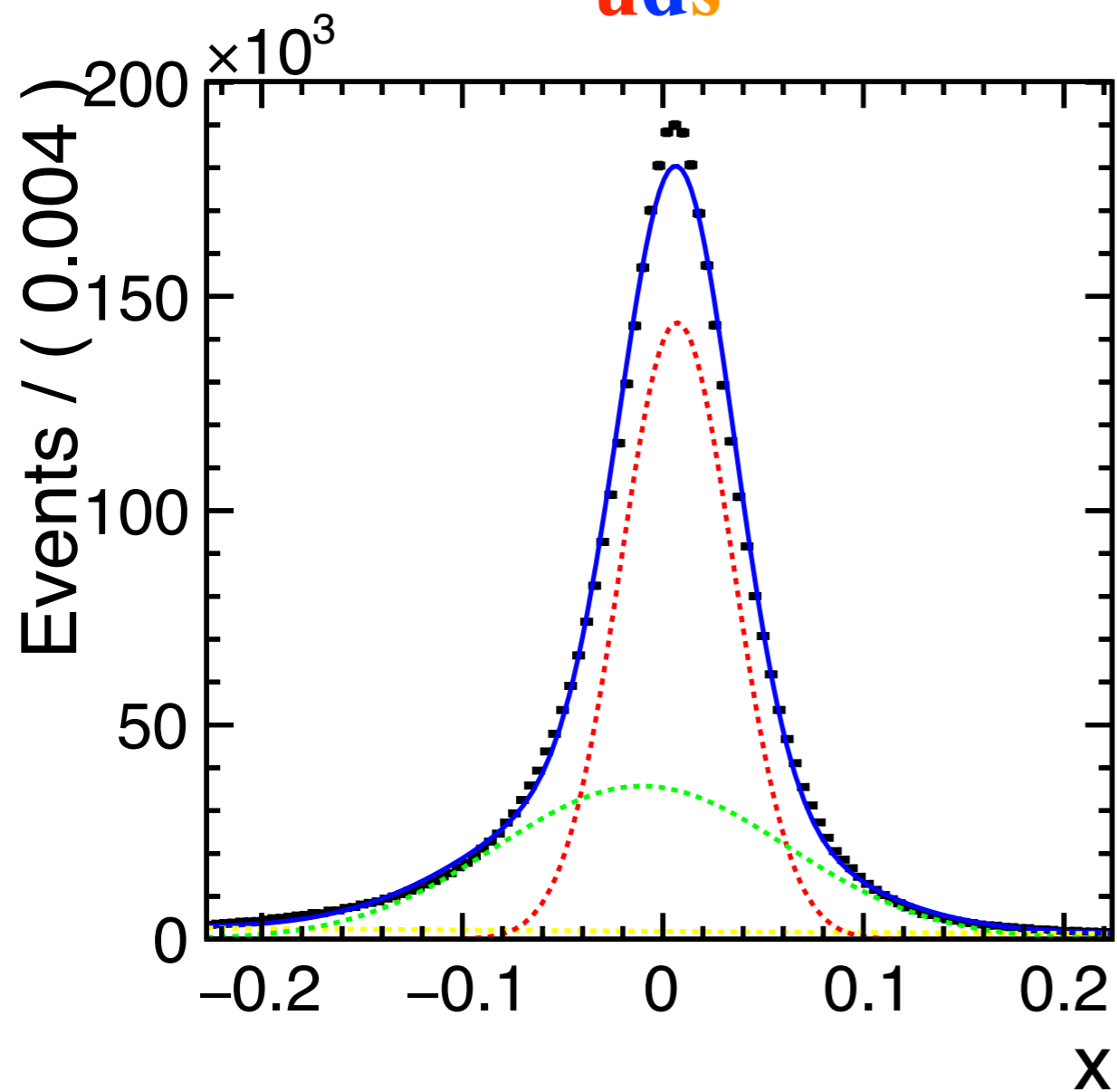
```
mean = 0.0126462 +/- 2.41881e-05 L
mean2 = 0.0102031 +/- 6.68892e-05
sigma1 = 0.0246751 +/- 4.3274e-05
sigma2 = 0.0597194 +/- 0.000132119
sig1frac = 0.593811 +/- 0.001651 L
bkgfrac = 0.0521796 +/- 0.000252966
```

Mean of the smaller gaussian ~ 0.007

PFO total jet energy

“PFO-DeMC”

uds

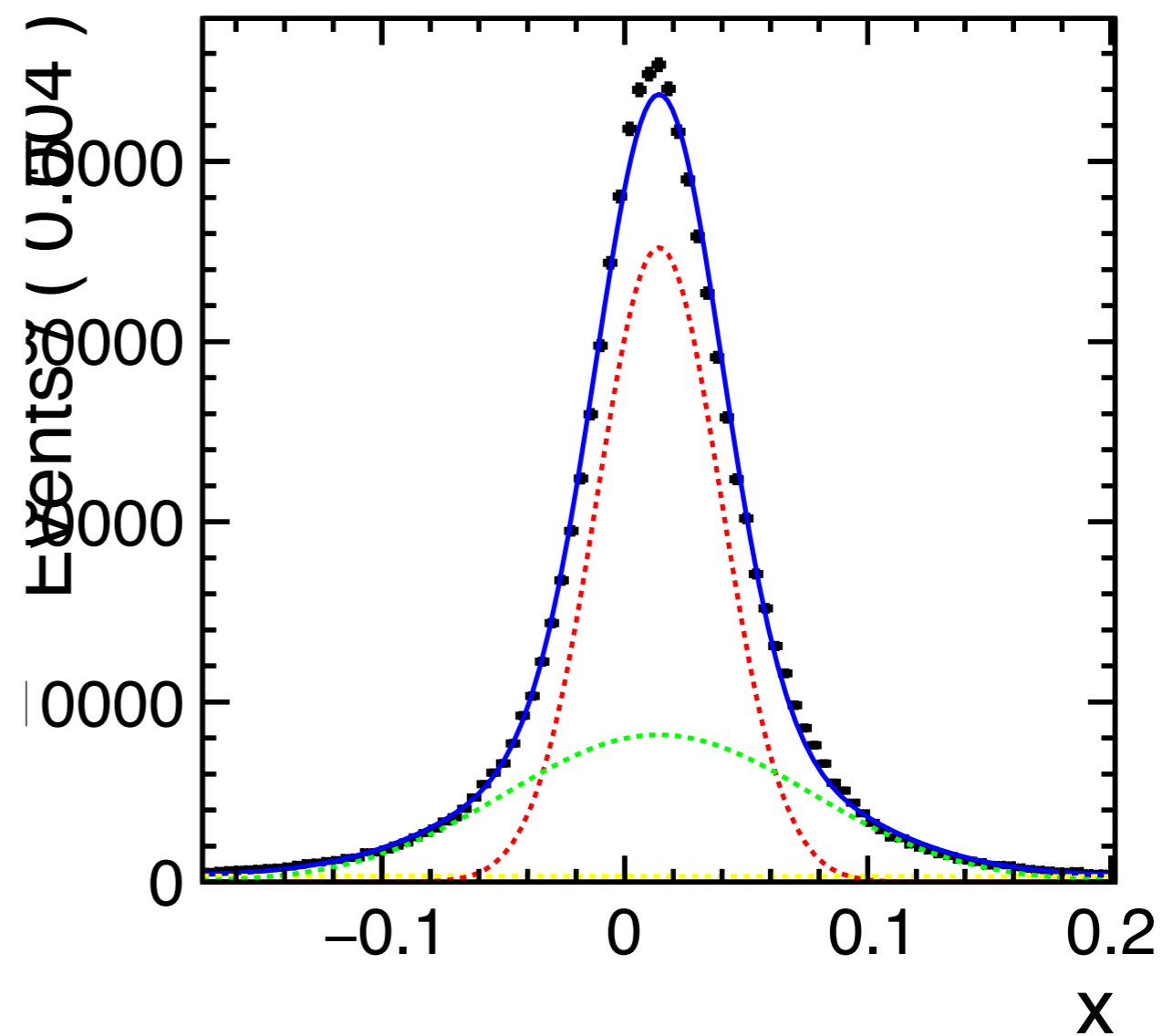


```

mean = 0.0121634 +/- 3.1261e-05  L(-
mean2 = 0.00970865 +/- 8.04217e-05
sigma1 = 0.0239189 +/- 5.63416e-05
sigma2 = 0.0577992 +/- 0.000156935
sig1frac = 0.570911 +/- 0.00215365
bkgfrac = 0.0547523 +/- 0.000328001

```

b



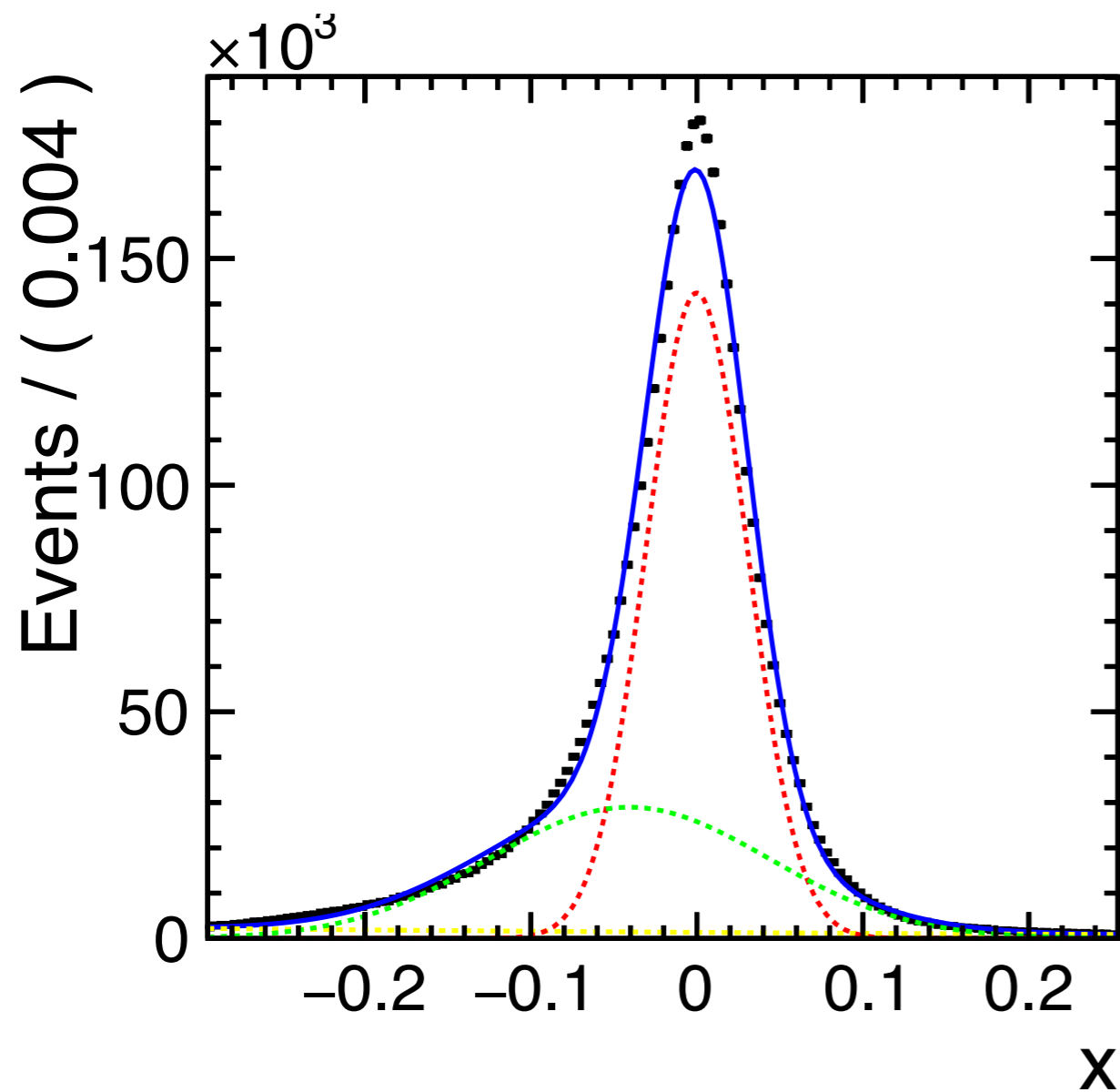
```

mean = 0.0141163 +/- 5.10573e-05  L
mean2 = 0.0139278 +/- 0.000157122
sigma1 = 0.0255424 +/- 8.75397e-05
sigma2 = 0.0625605 +/- 0.000322588
sig1frac = 0.637533 +/- 0.00334766
bkgfrac = 0.046245 +/- 0.000531351

```

PFO total jet energy

“PFO-MC(quarks)”



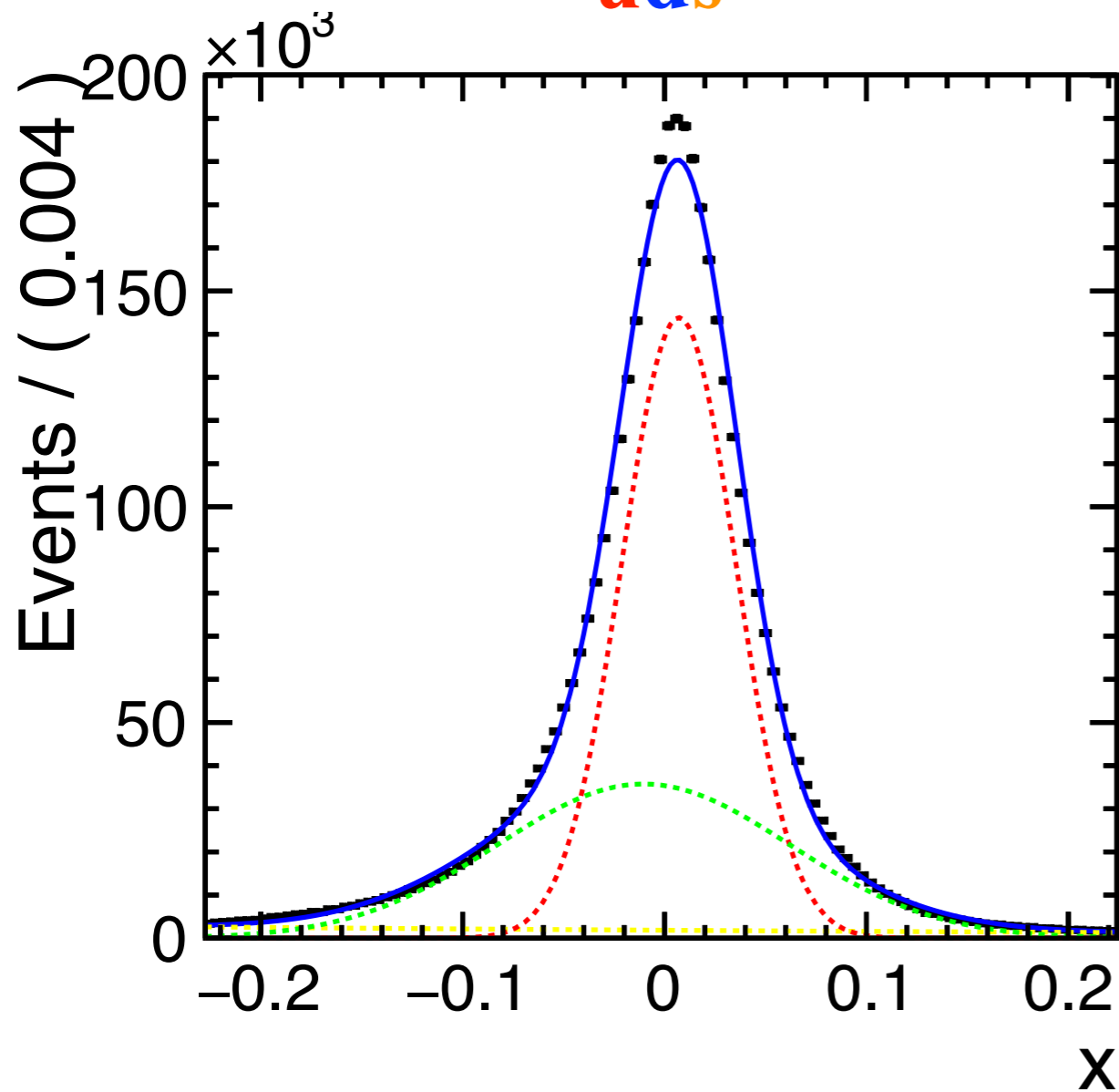
```
mean = -0.000131068 +/- 2.86878e-05  
mean2 = -0.0408103 +/- 0.000152969  
sigma1 = 0.0304382 +/- 3.63788e-05  
sigma2 = 0.0845995 +/- 0.000141593  
sig1frac = 0.63893 +/- 0.000876704  
bkgfrac = 0.0516184 +/- 0.000289862
```

PFO total jet energy

“PFO-MC(quarks)”

uds

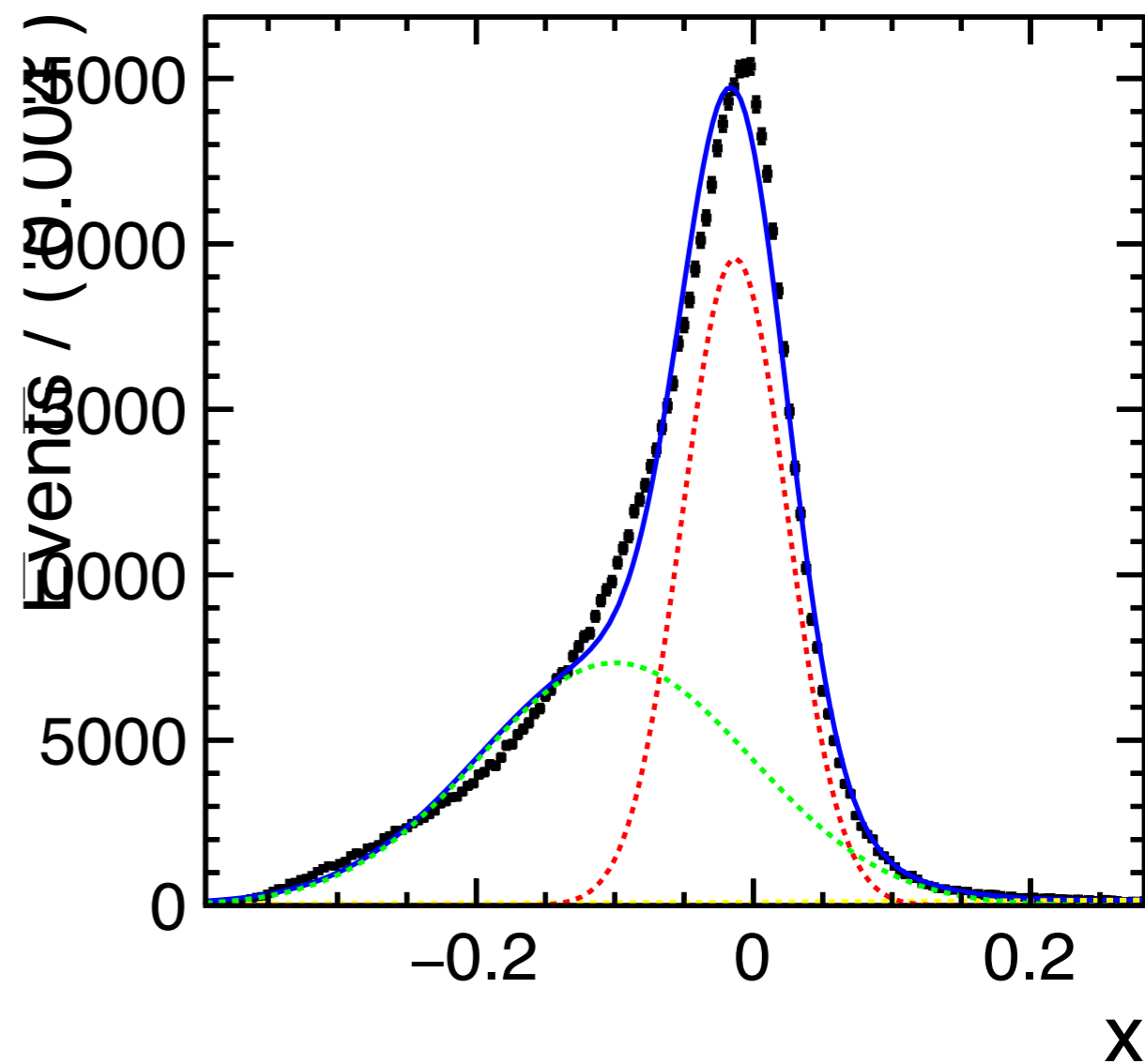
b



```

mean = 0.00235774 +/- 3.43218e-05  L(-0.1 - 0.1)
mean2 = -0.00626636 +/- 9.58478e-05  L(-0.1 - 0.1)
sigma1 = 0.0256816 +/- 5.90396e-05  L(0.005 - 0.05)
sigma2 = 0.059851 +/- 0.000161193  L(0.05 - 0.2)
sig1frac = 0.578097 +/- 0.00220472  L(0 - 1)
bkgfrac = 0.0550327 +/- 0.000332775  L(0 - 1)

```



```

mean = -0.0133071 +/- 0.000103814
mean2 = -0.0997099 +/- 0.000341045
sigma1 = 0.037782 +/- 0.000108181
sigma2 = 0.0984826 +/- 0.000240112
sig1frac = 0.505844 +/- 0.00174362
bkgfrac = 0.0191361 +/- 0.00086861

```