# JER/S

Hou Yingqi

2024/12/11

Now: TDR 24.12.0

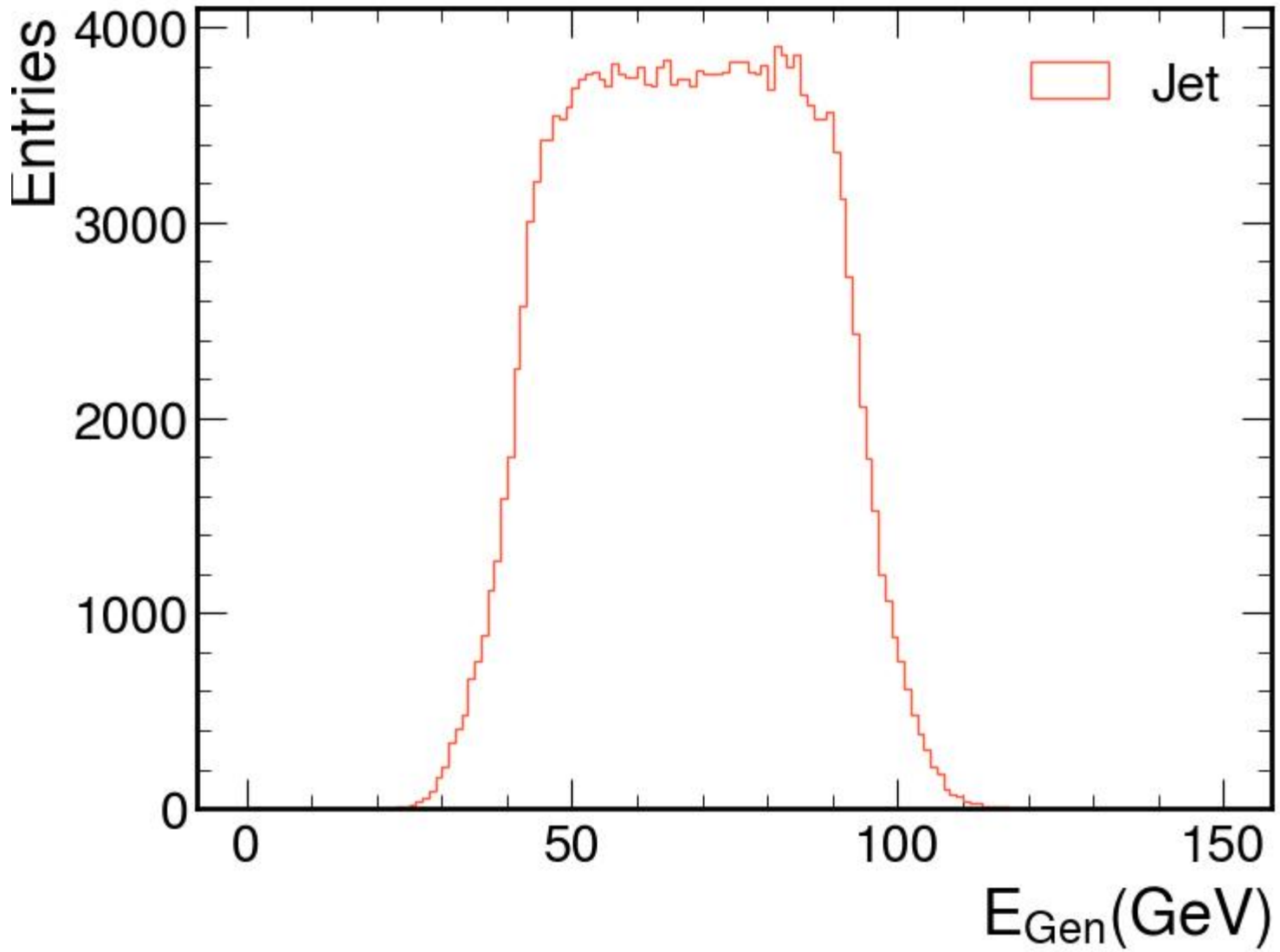
Selection:

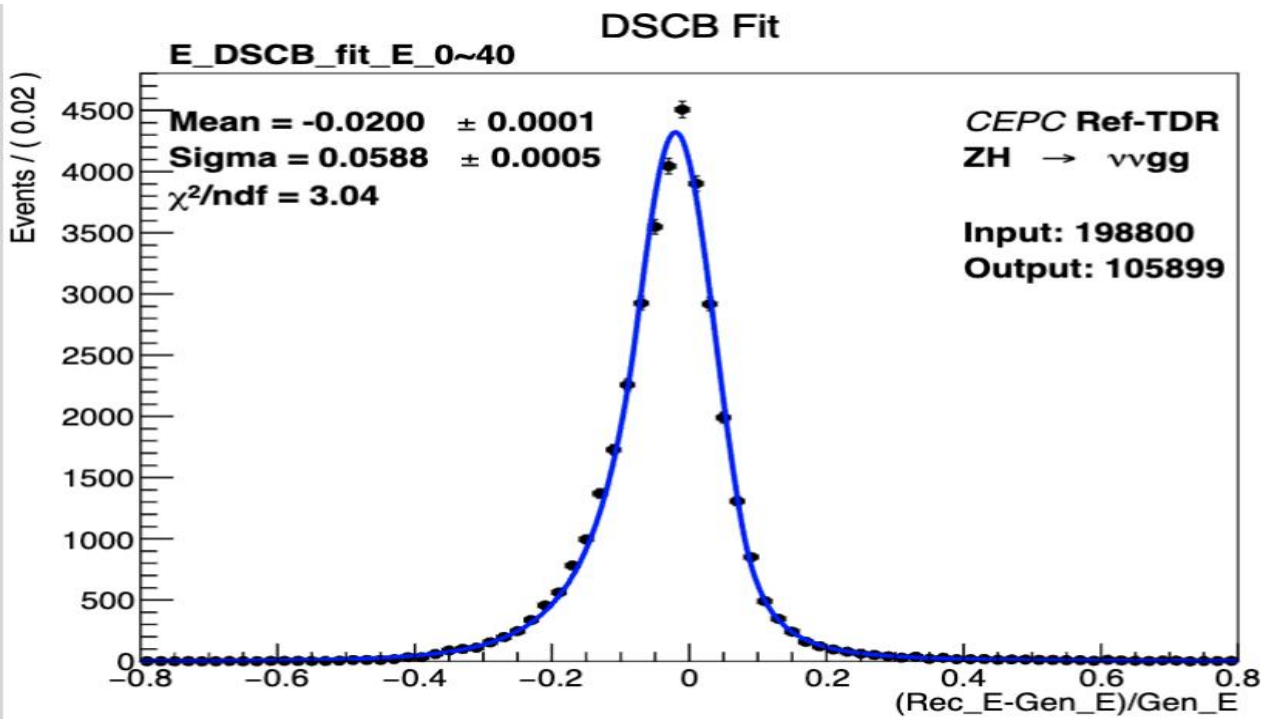
```
data_barrel = data[(abs(data["GEN_jet1_costheta"]) < 0.70) & (abs(data["GEN_jet2_costheta"]) < 0.70)]
data_barrel_match =  data_barrel[ (data_barrel["jet1_GENMatch_id"] != data_barrel["jet2_GENMatch_id"]) ]

data_barrel_match["jet1_theta"] = np.arccos(data_barrel_match["jet1_costheta"])
data_barrel_match["jet2_theta"] = np.arccos(data_barrel_match["jet2_costheta"])
data_barrel_match["deltaR_j1j2"] = np.sqrt((data_barrel_match["jet1_theta"] - data_barrel_match["jet2_theta"])**2 +
                                           (data_barrel_match["jet1_phi"] - data_barrel_match["jet2_phi"])**2)
dR_cut = 0.6
data_barrel_match_rmOverlape_cutdR = data_barrel_match[(data_barrel_match["jet1_GENMatch_mindR"]<dR_cut)
                                                       & (data_barrel_match["jet2_GENMatch_mindR"]<dR_cut) & (data_barrel_match["deltaR_j1j2"] >= 2)]
```

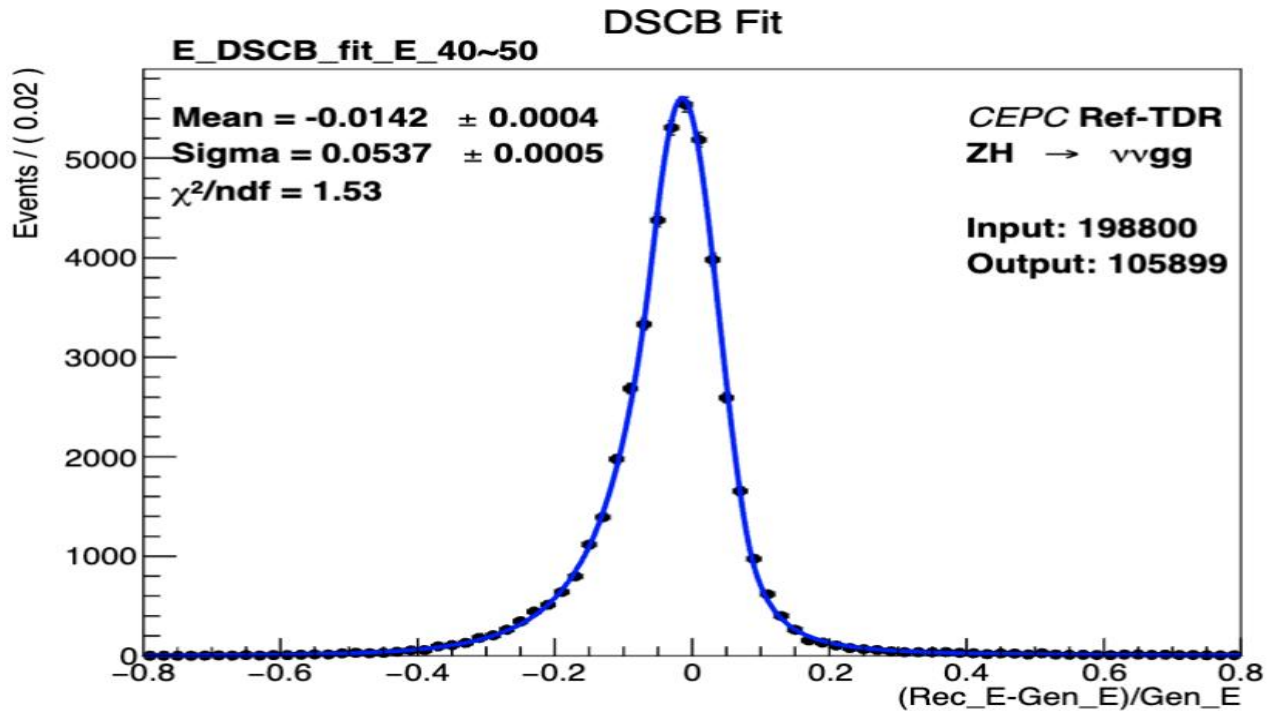
Process:

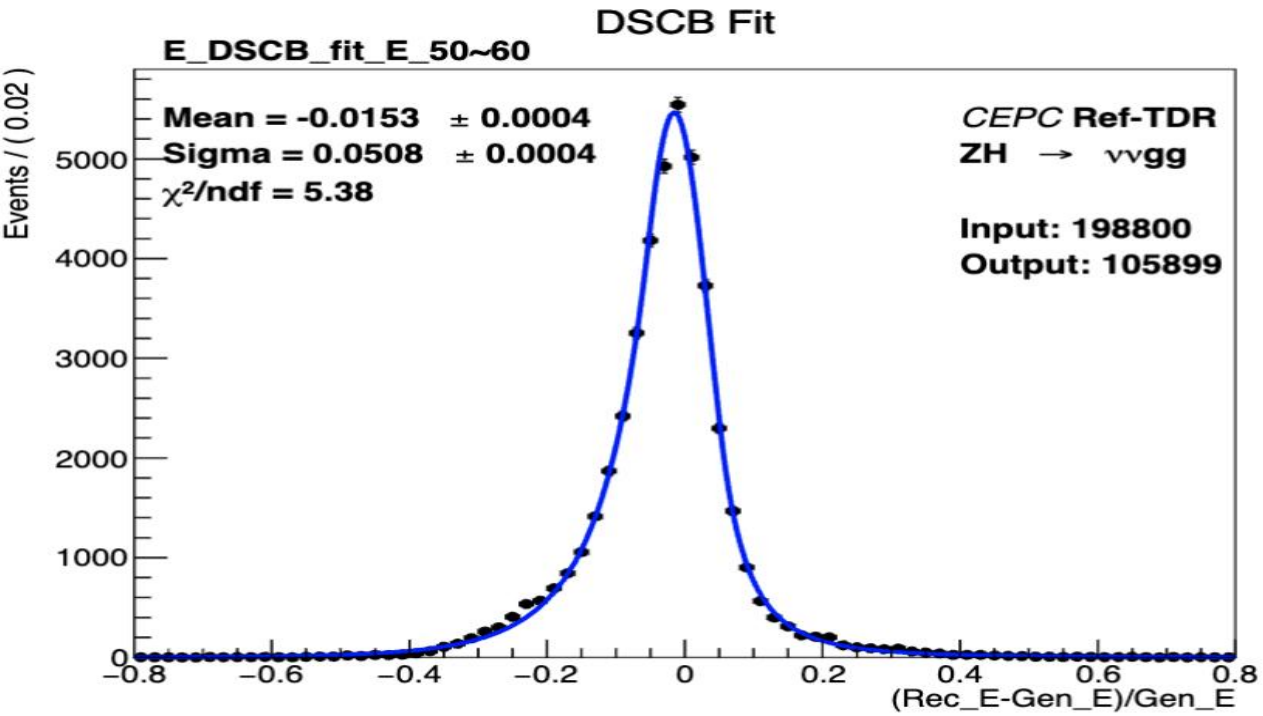
```
data = getEntries("/cefs/higgs/houyingqi/jet_E240_nnHgg/jet_E240_nnHgg.root", "jets", variables)
```

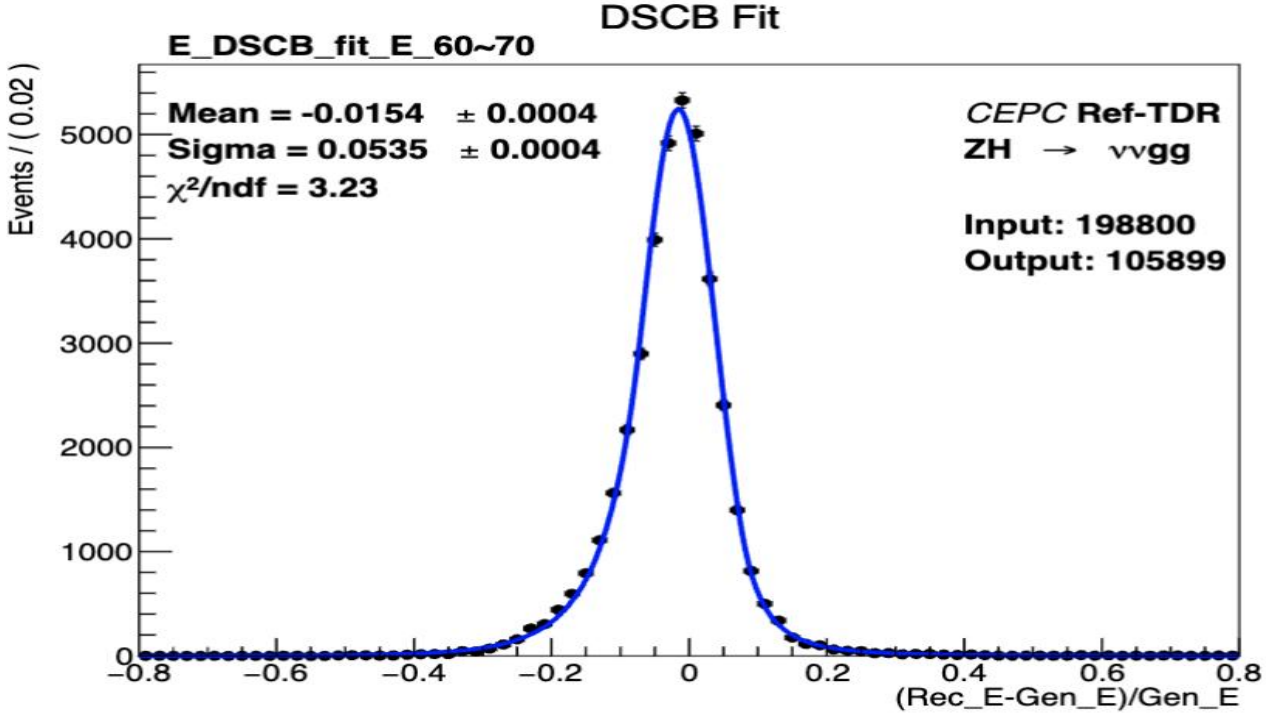
Check GenJet

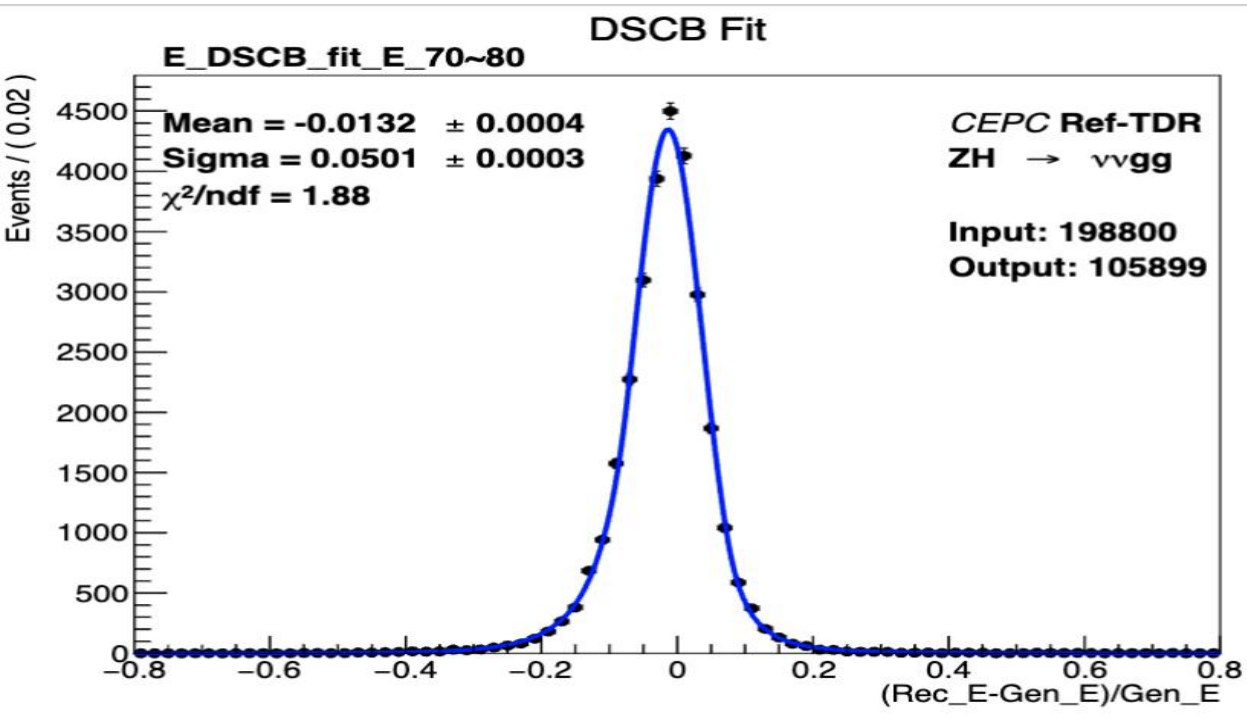


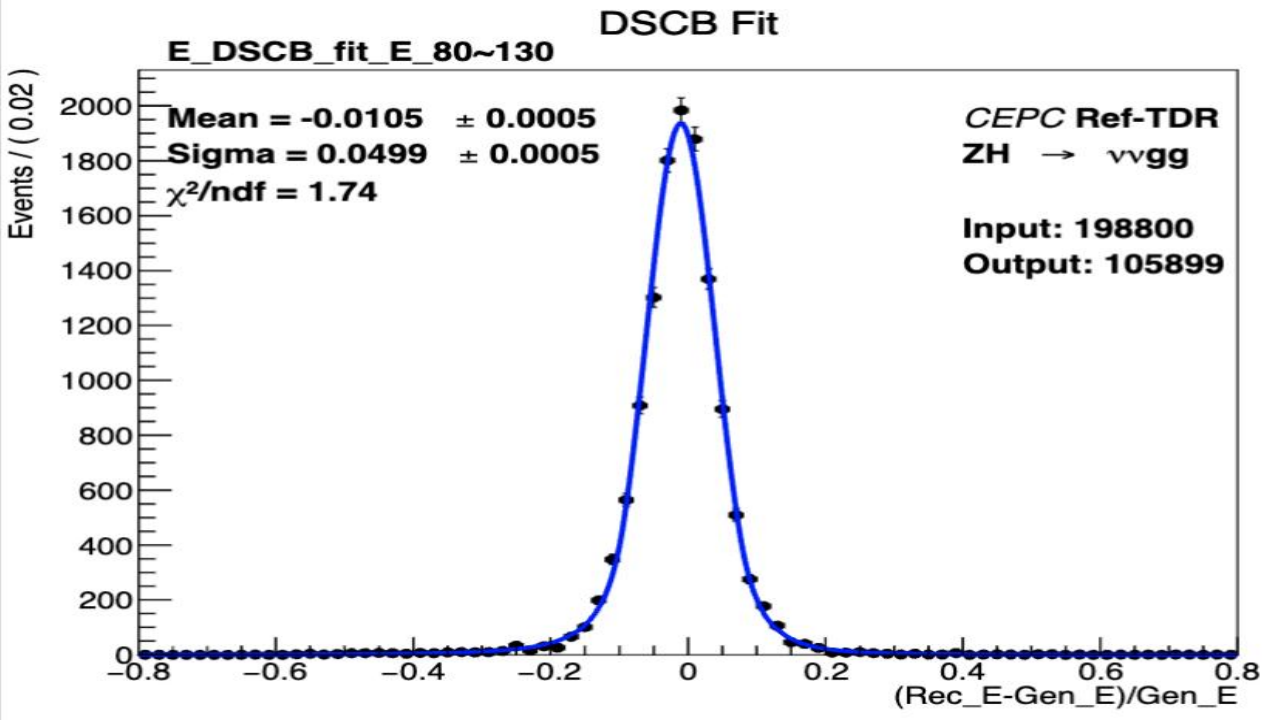

DSCB Fit
E_DSCB_fit_E_0~40
Mean = -0.0200 ± 0.0001
Sigma = 0.0588 ± 0.0005
χ²/ndf = 3.04
CEPC Ref-TDR
ZH → νν̄gg
Input: 198800
Output: 105899
Events / ( 0.02 )
(Rec_E-Gen_E)/Gen_E

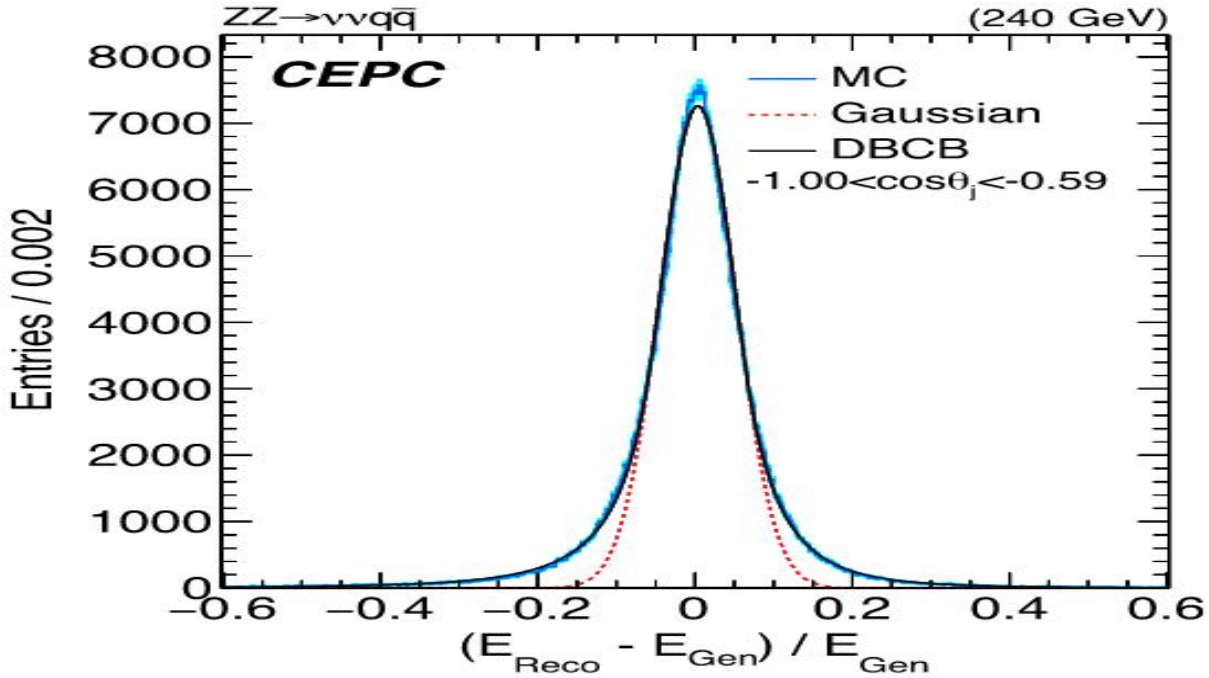

DSCB Fit
E_DSCB_fit_E_40~50
Mean = -0.0142 ± 0.0004
Sigma = 0.0537 ± 0.0005
χ²/ndf = 1.53
CEPC Ref-TDR
ZH → νν̄gg
Input: 198800
Output: 105899
Events / ( 0.02 )
(Rec_E-Gen_E)/Gen_E


DSCB Fit
E_DSCB_fit_E_50~60
Mean = -0.0153 ± 0.0004
Sigma = 0.0508 ± 0.0004
χ²/ndf = 5.38
CEPC Ref-TDR
ZH → νν̄gg
Input: 198800
Output: 105899
Events / ( 0.02 )
(Rec_E-Gen_E)/Gen_E


DSCB Fit
E_DSCB_fit_E_60~70
Mean = -0.0154 ± 0.0004
Sigma = 0.0535 ± 0.0004
χ²/ndf = 3.23
CEPC Ref-TDR
ZH → νν̄gg
Input: 198800
Output: 105899
Events / ( 0.02 )
(Rec_E-Gen_E)/Gen_E




PAPER

Jet performance at the circular electron-positron collider

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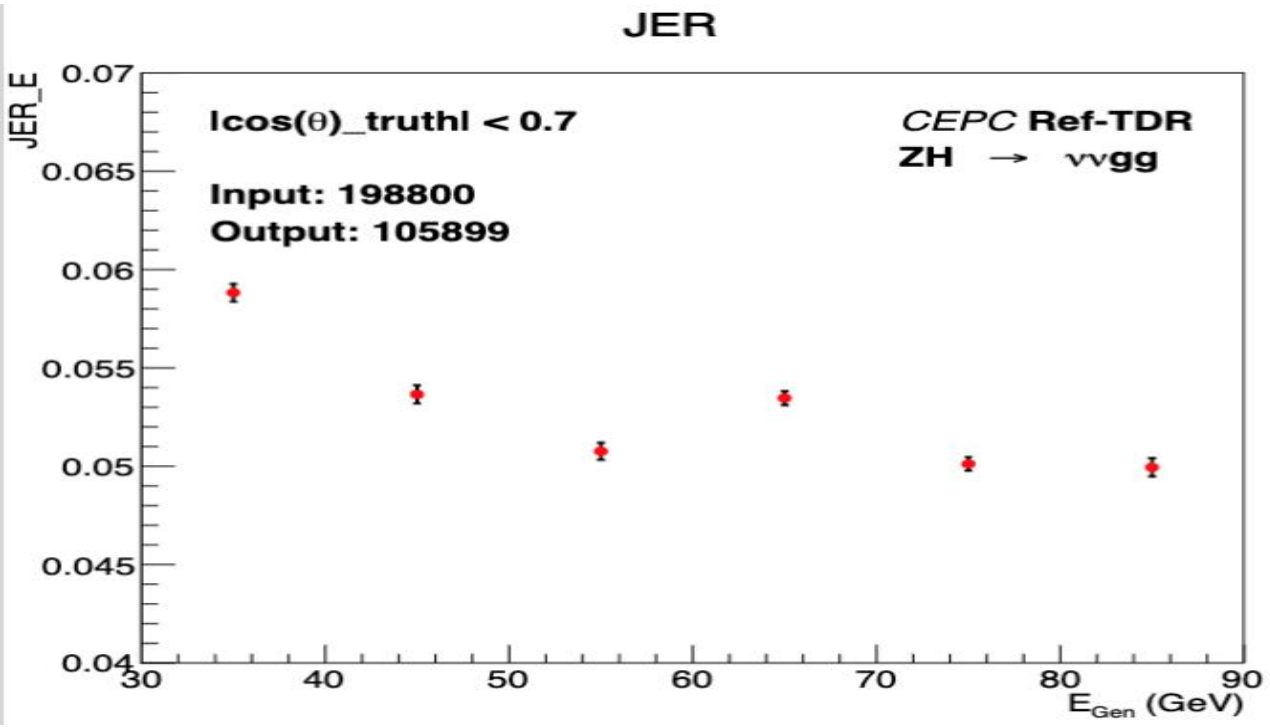
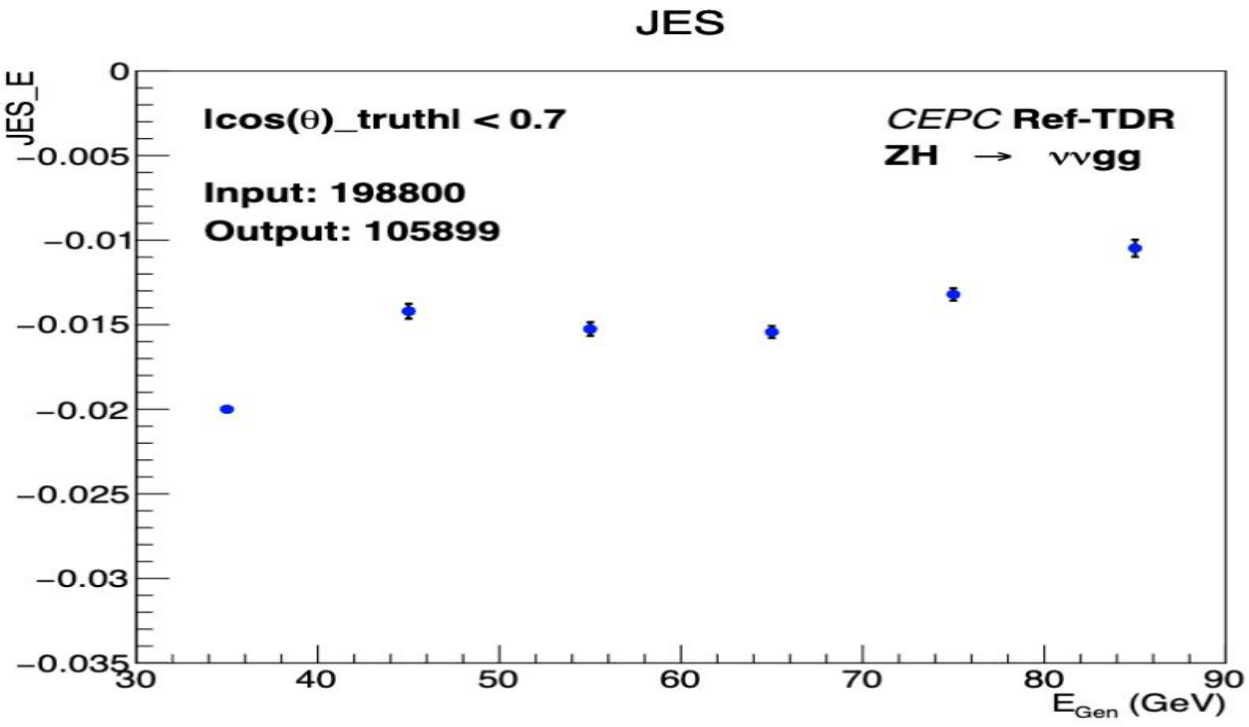
- ✓ According toPeizhu's diagram, we can see that this is reasonable that some points of the peak do not fit well.



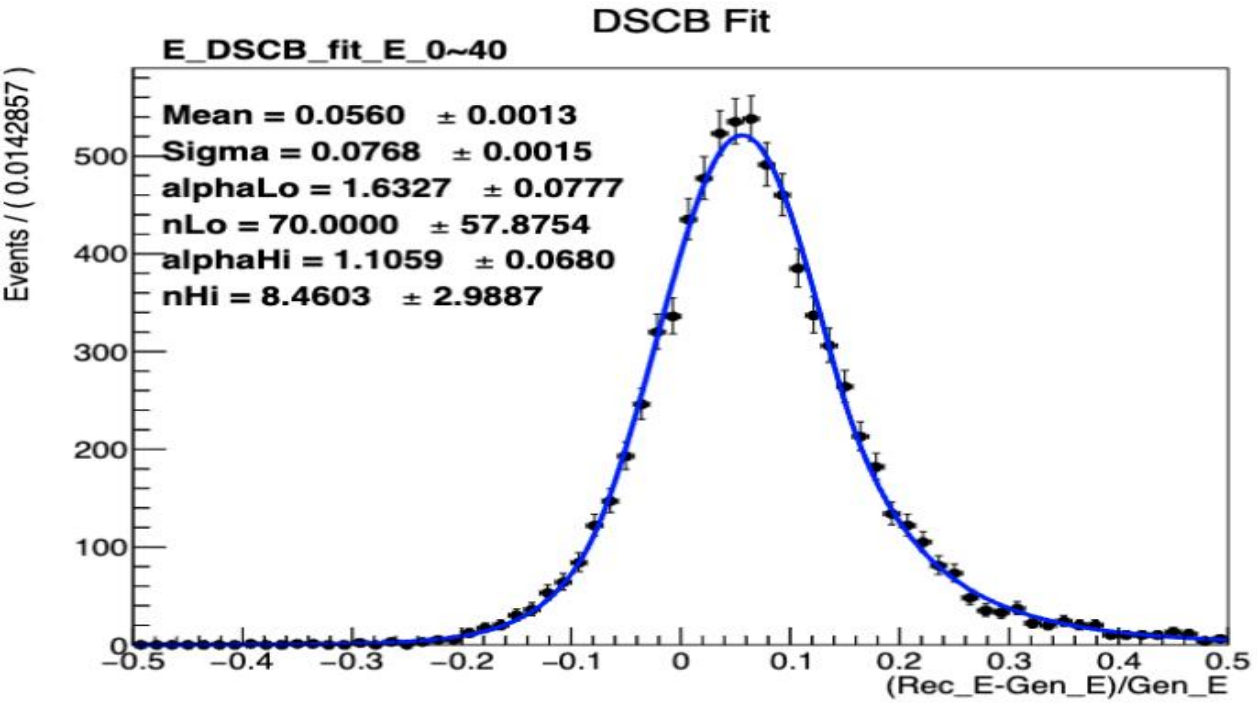

- ✓ JER gengrally decreases with the increase of energy.
- ✓ JER has a trip between energy of 60~70 GeV, doubt is a matter of Genmatch.

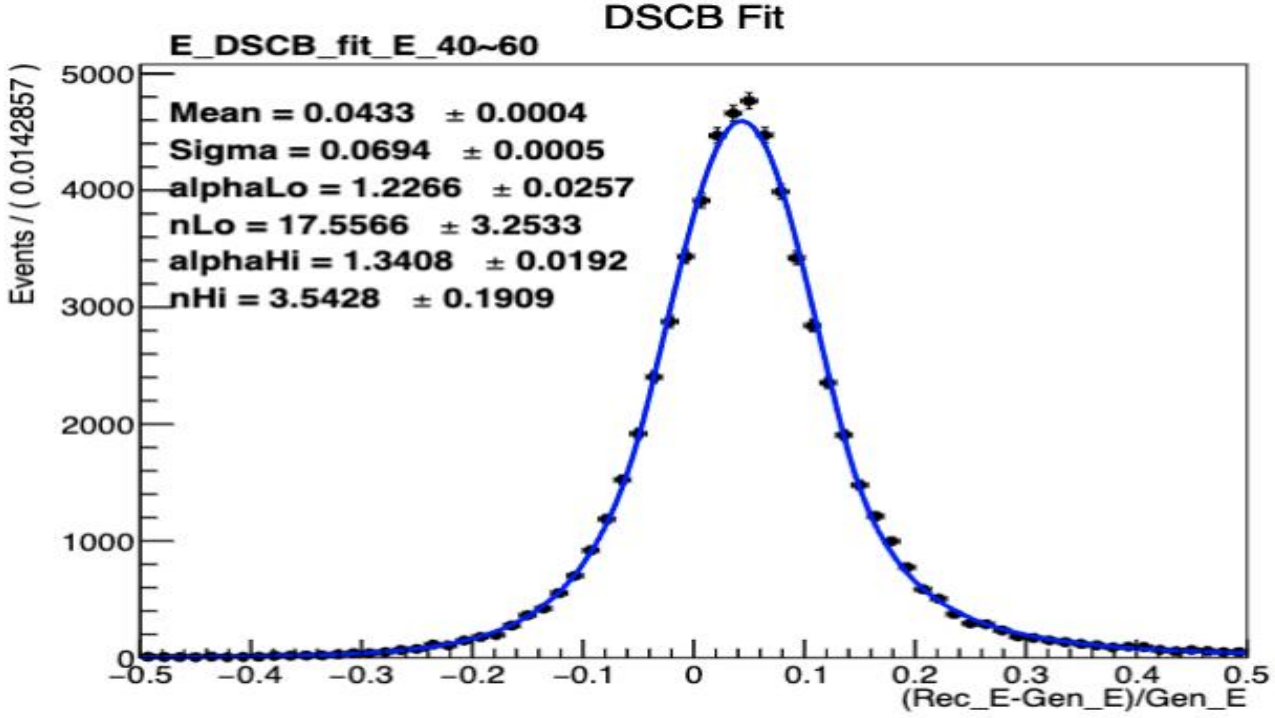
- ➢ JES has a tendency to increase with the increase of enerfy.
- ➢ Compared to the precious version, JES is negative now.

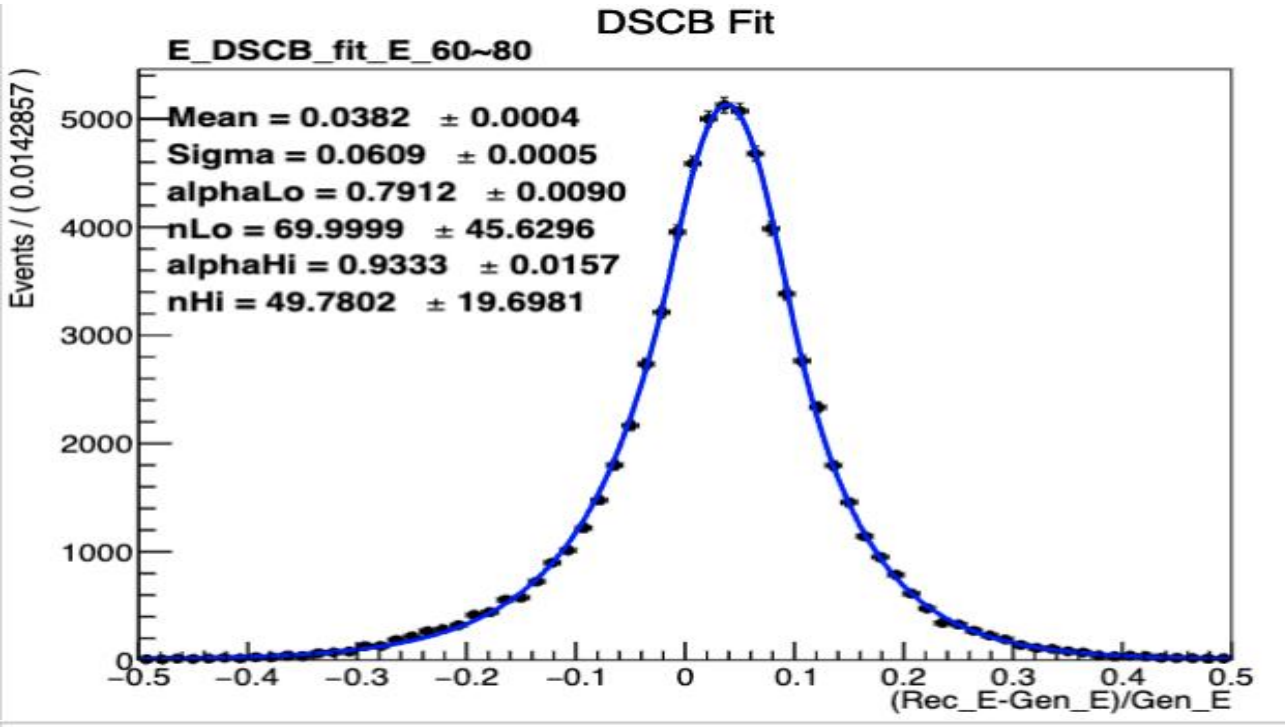
Before: TDR 24.10.0

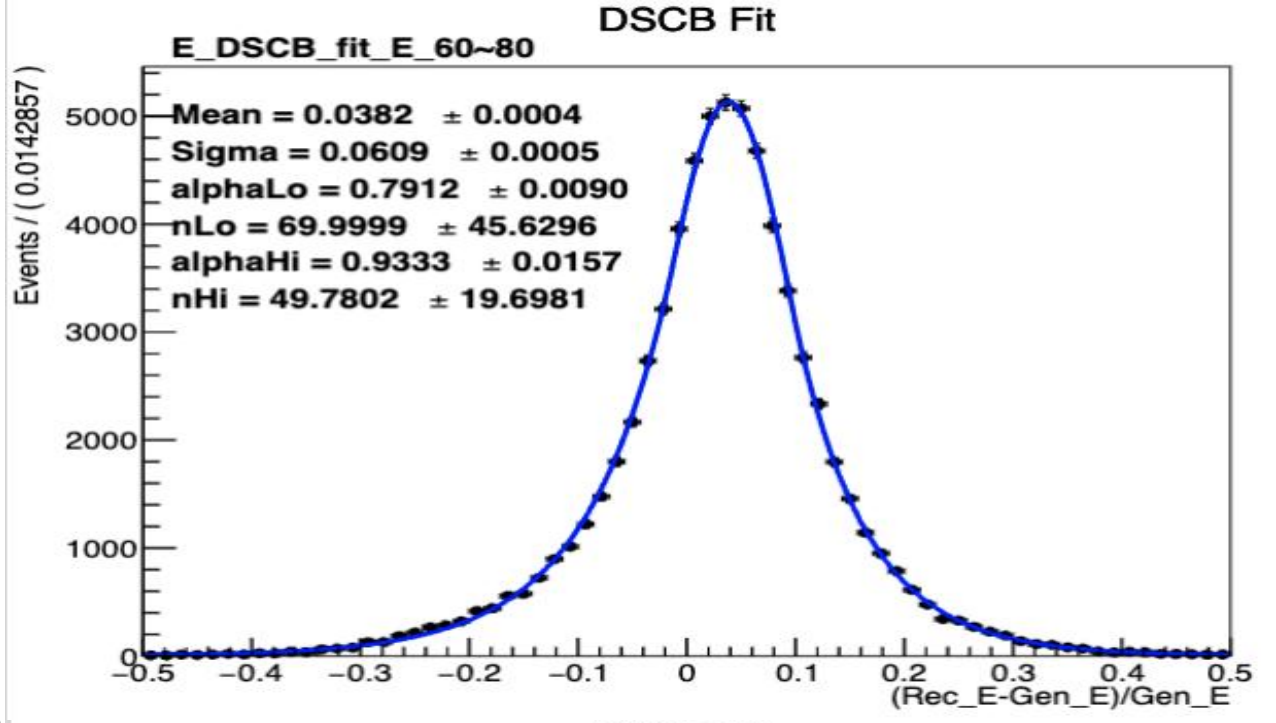
Selection:

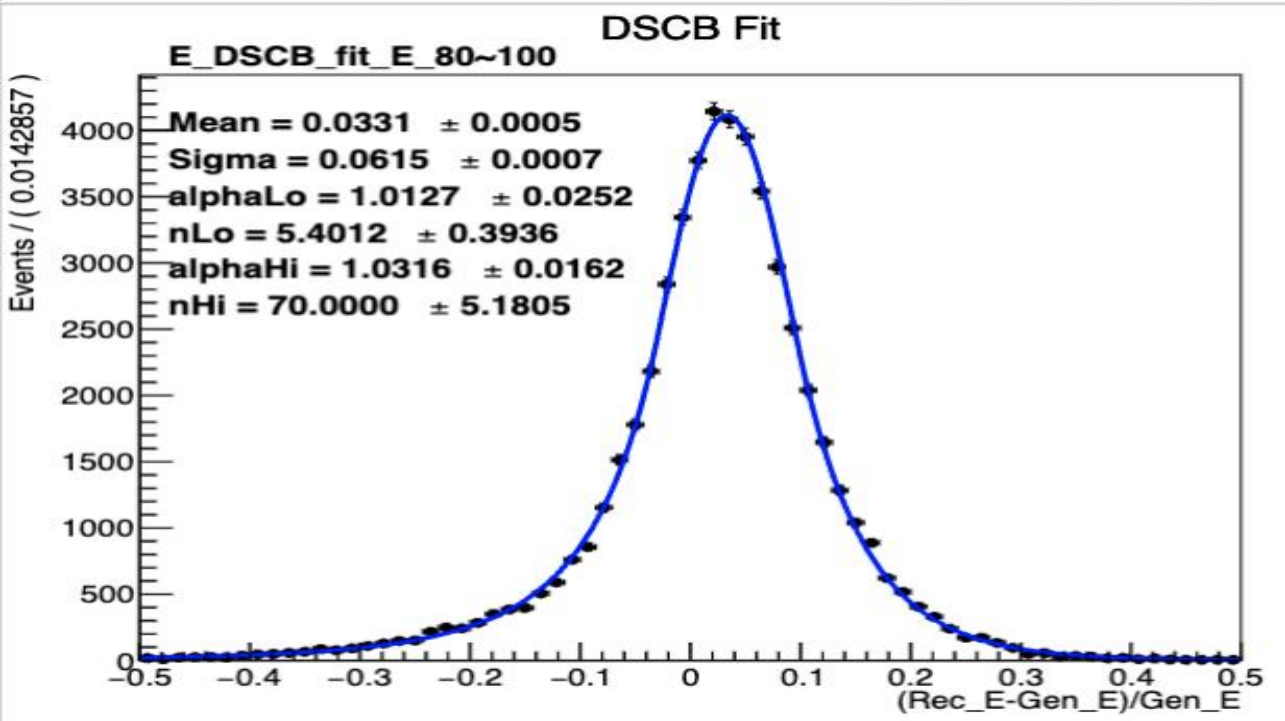
```
data_barrel = data[(abs(data["GEN_jet1_costheta"]) < 0.70) & (abs(data["GEN_jet2_costheta"]) < 0.70)]

data_barrel_match_rmOverlape =  data_barrel[ (data_barrel["jet1_GENMatch_id"] != data_barrel["jet2_GENMatch_id"]) ]
dR_cut = 0.6
data_barrel_match_rmOverlape_cutdR = data_barrel_match_rmOverlape[(data_barrel_match_rmOverlape["jet1_GENMatch_mindR"]<dR_cut)
                                                                  & (data_barrel_match_rmOverlape["jet2_GENMatch_mindR"]<dR_cut)]
```

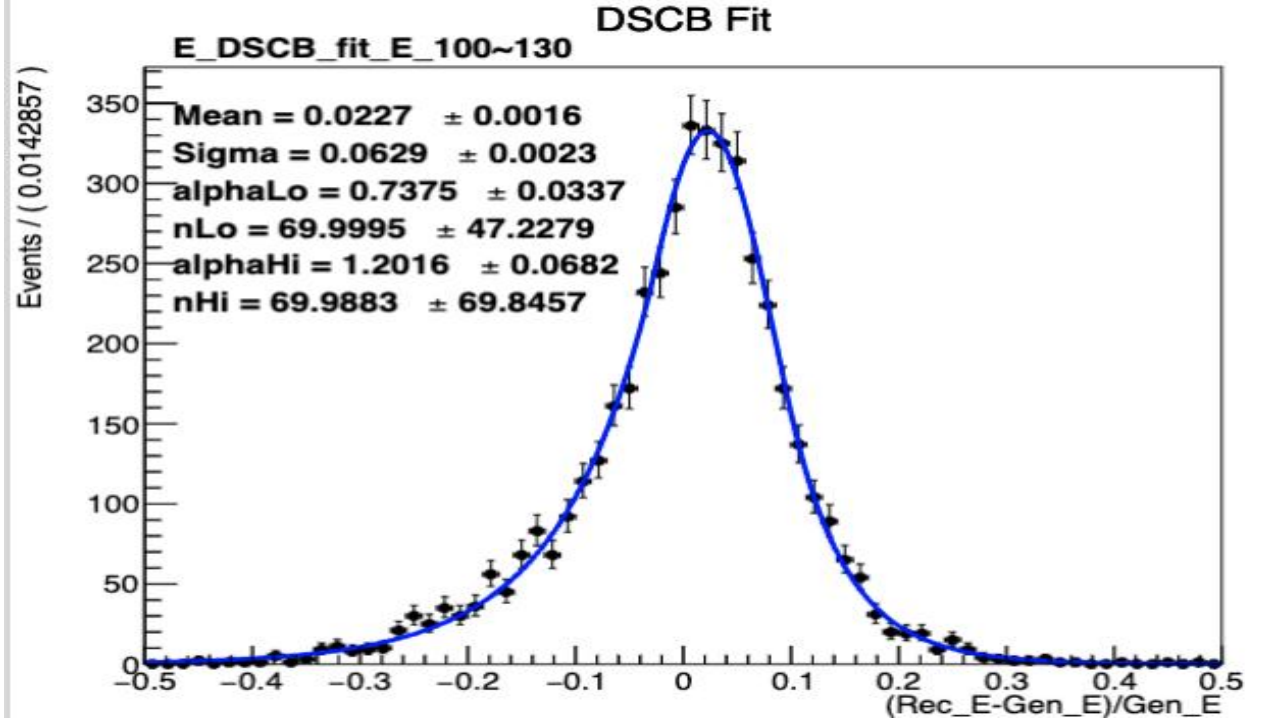


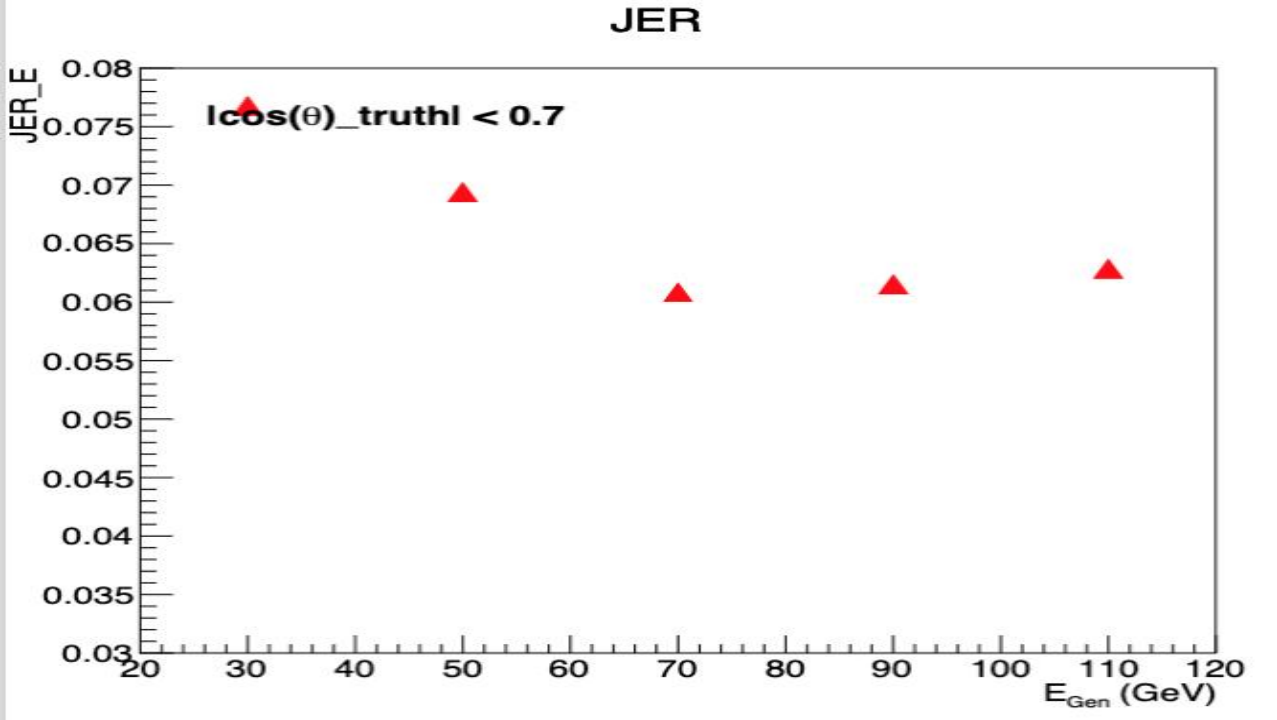



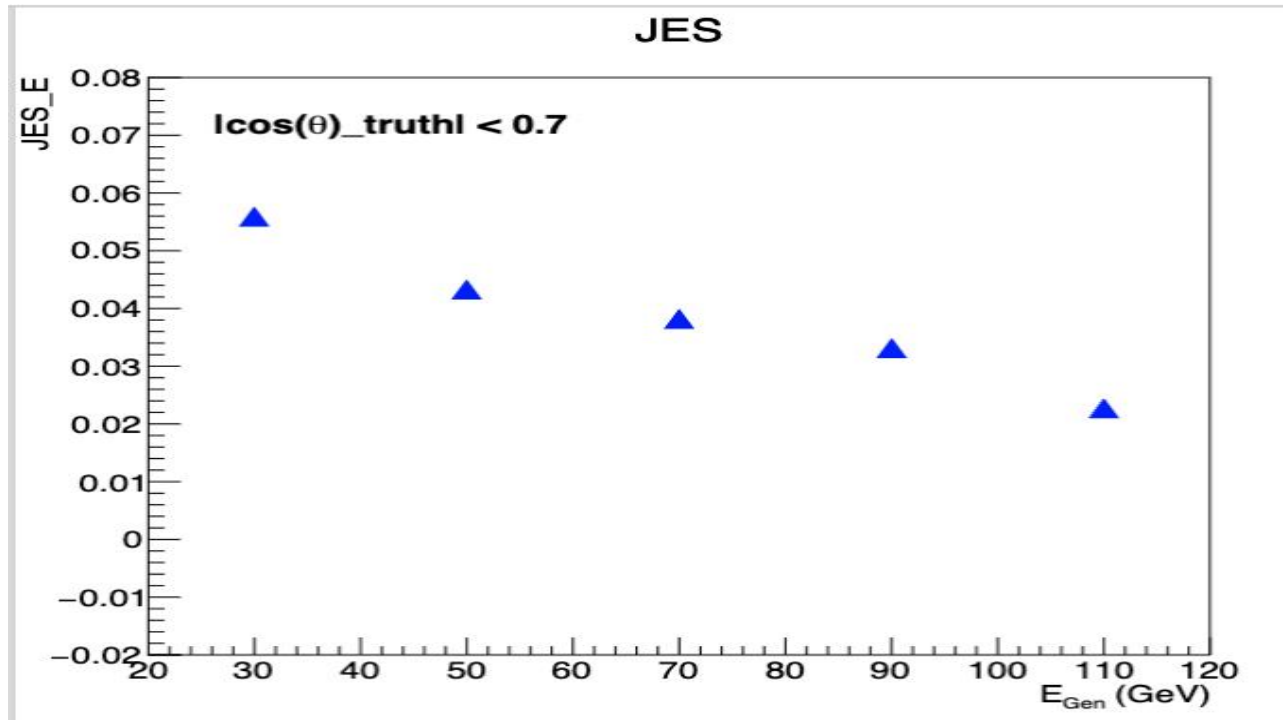

DSCB Fit
E_DSCB_fit_E_60~80
Mean = 0.0382 ± 0.0004
Sigma = 0.0609 ± 0.0005
alphaLo = 0.7912 ± 0.0090
nLo = 69.9999 ± 45.6296
alphaHi = 0.9333 ± 0.0157
nHi = 49.7802 ± 19.6981
Events / ( 0.0142857 )
(Rec_E-Gen_E)/Gen_E


DSCB Fit
E_DSCB_fit_E_60~80
Mean = 0.0382 ± 0.0004
Sigma = 0.0609 ± 0.0005
alphaLo = 0.7912 ± 0.0090
nLo = 69.9999 ± 45.6296
alphaHi = 0.9333 ± 0.0157
nHi = 49.7802 ± 19.6981
Events / ( 0.0142857 )
(Rec_E-Gen_E)/Gen_E

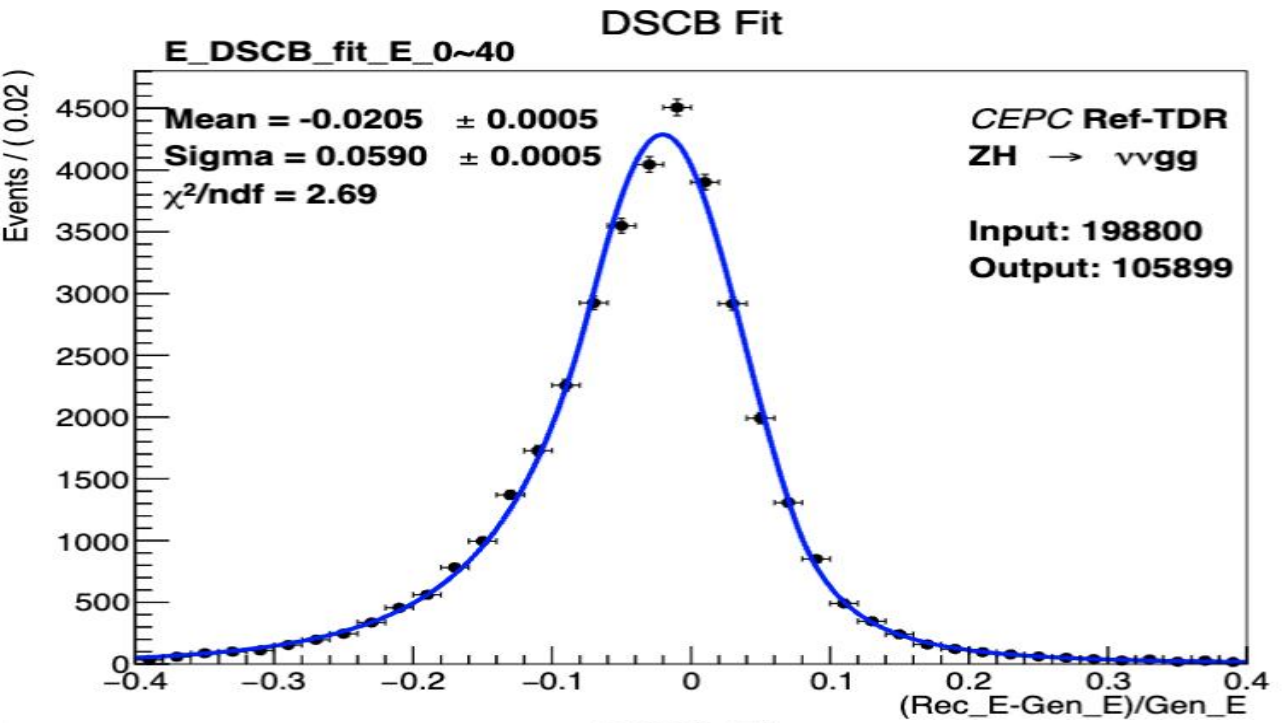

DSCB Fit
E_DSCB_fit_E_80~100
Mean = 0.0331 ± 0.0005
Sigma = 0.0615 ± 0.0007
alphaLo = 1.0127 ± 0.0252
nLo = 5.4012 ± 0.3936
alphaHi = 1.0316 ± 0.0162
nHi = 70.0000 ± 5.1805
Events / ( 0.0142857 )
(Rec_E-Gen_E)/Gen_E

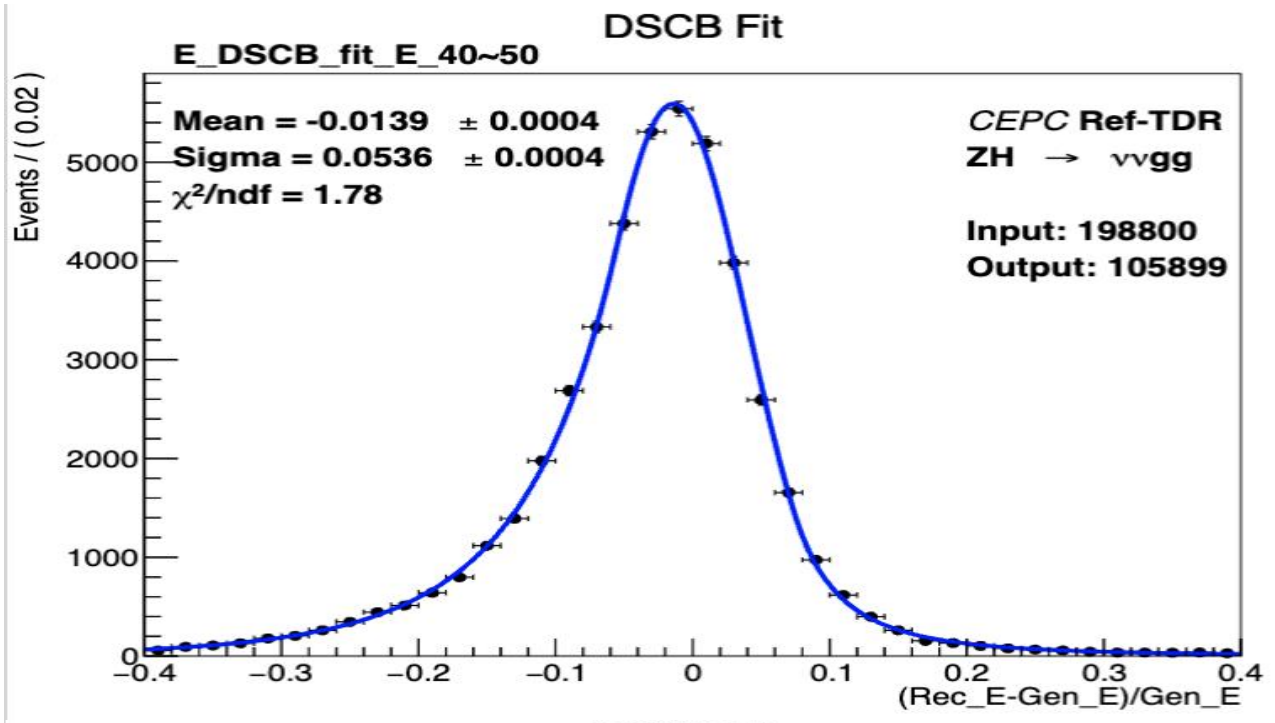

DSCB Fit
E_DSCB_fit_E_100~130
Mean = 0.0227 ± 0.0016
Sigma = 0.0629 ± 0.0023
alphaLo = 0.7375 ± 0.0337
nLo = 69.9995 ± 47.2279
alphaHi = 1.2016 ± 0.0682
nHi = 69.9883 ± 69.8457
Events / ( 0.0142857 )
(Rec_E-Gen_E)/Gen_E

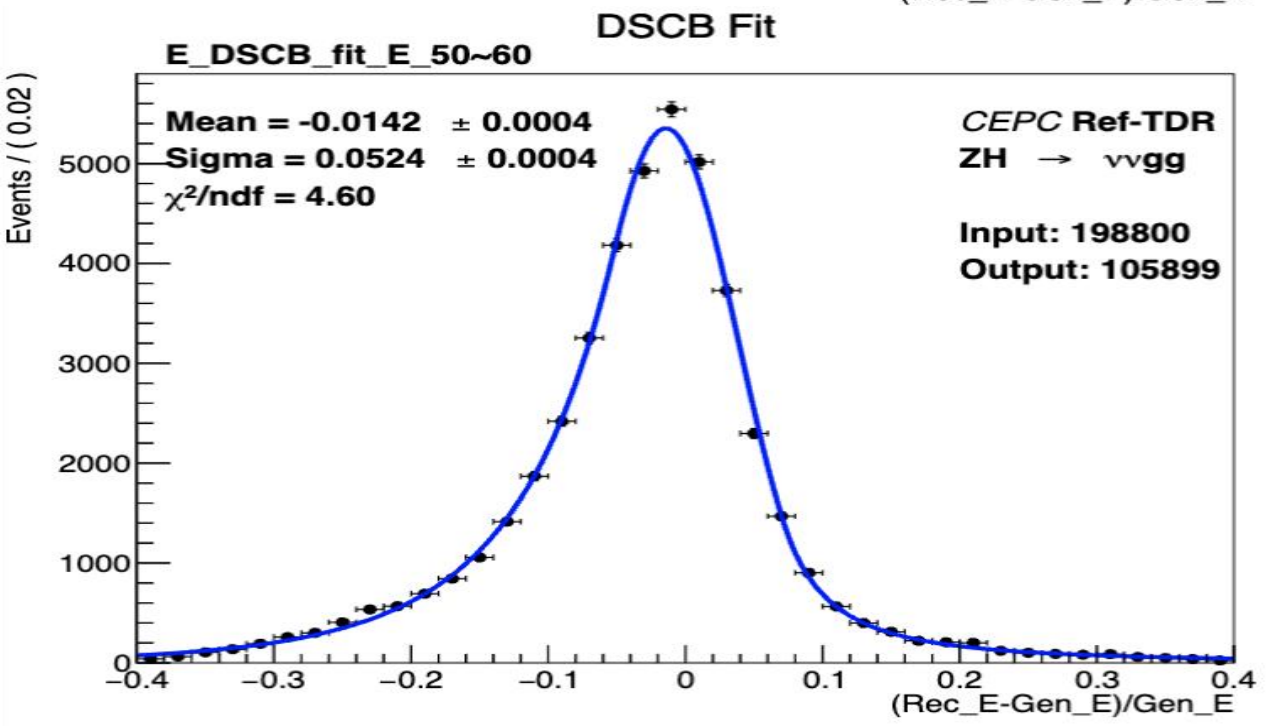

JER
JER_E
|cos(θ)_truth| < 0.7
0.08
0.075
0.07
0.065
0.06
0.055
0.05
0.045
0.04
0.035
0.03
20
30
40
50
60
70
80
90
100
110
120
E_Gen (GeV)

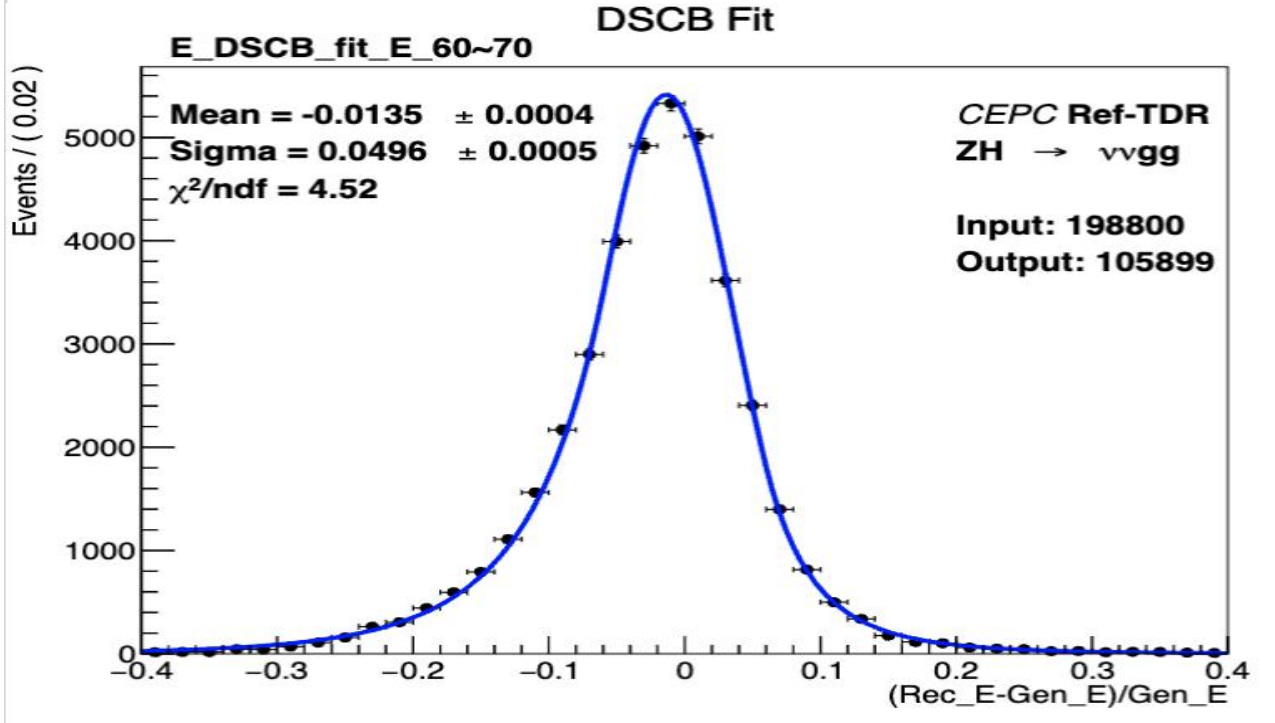

JES
JES_E
|cos(θ)_truth| < 0.7
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
−0.01
−0.02
20
30
40
50
60
70
80
90
100
110
120
E_Gen (GeV)

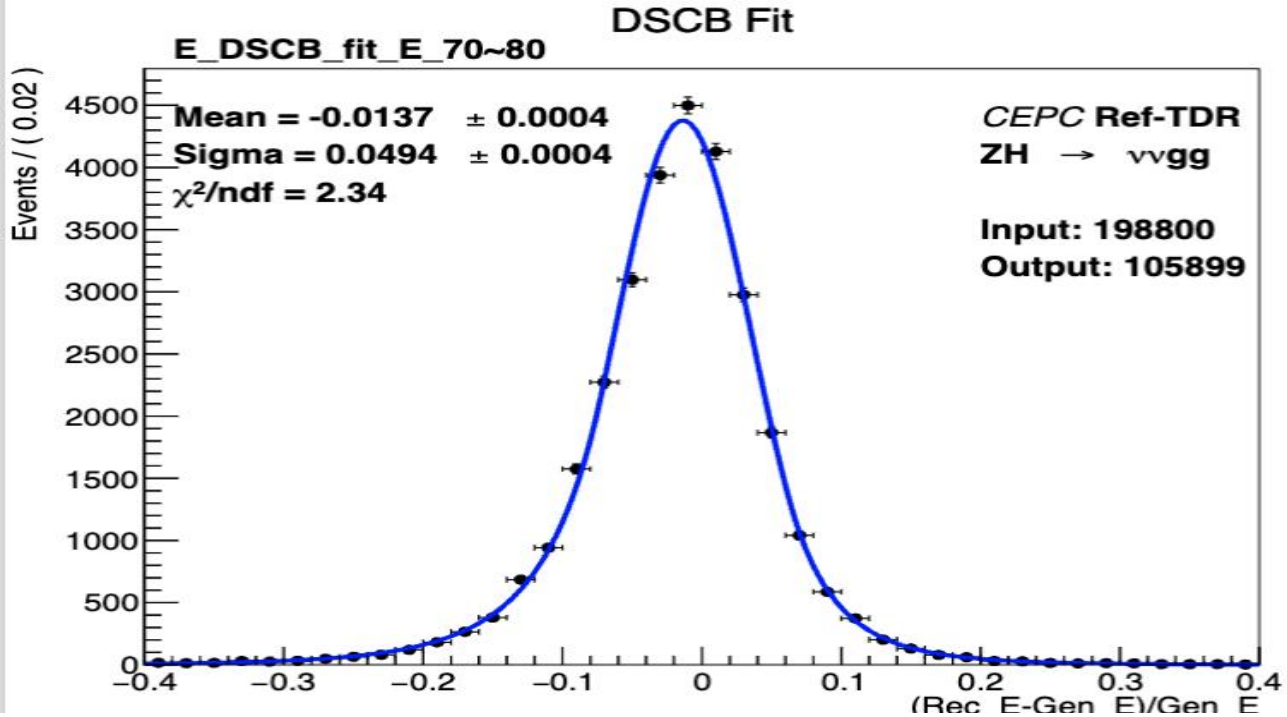
# Back up

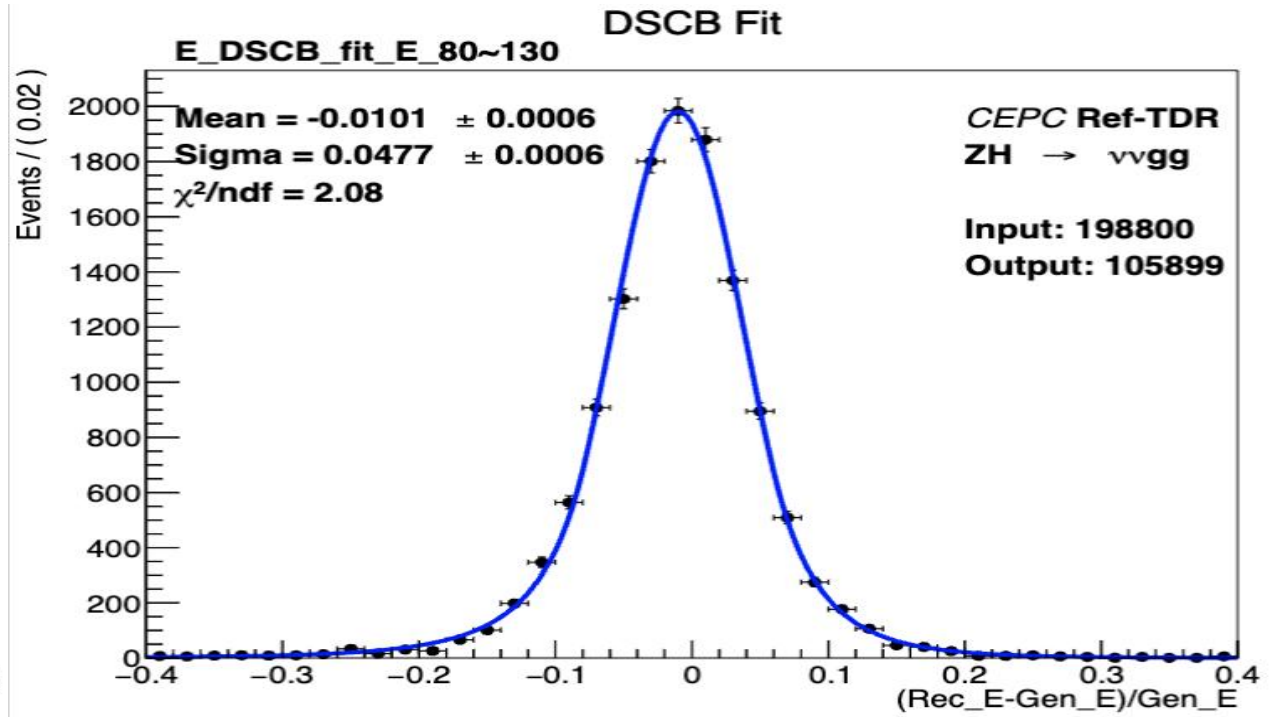

DSCB Fit
E_DSCB_fit_E_0~40
Mean = -0.0205 ± 0.0005
Sigma = 0.0590 ± 0.0005
χ²/ndf = 2.69
CEPC Ref-TDR
ZH → ννgg
Input: 198800
Output: 105899
Events / ( 0.02 )
(Rec_E-Gen_E)/Gen_E

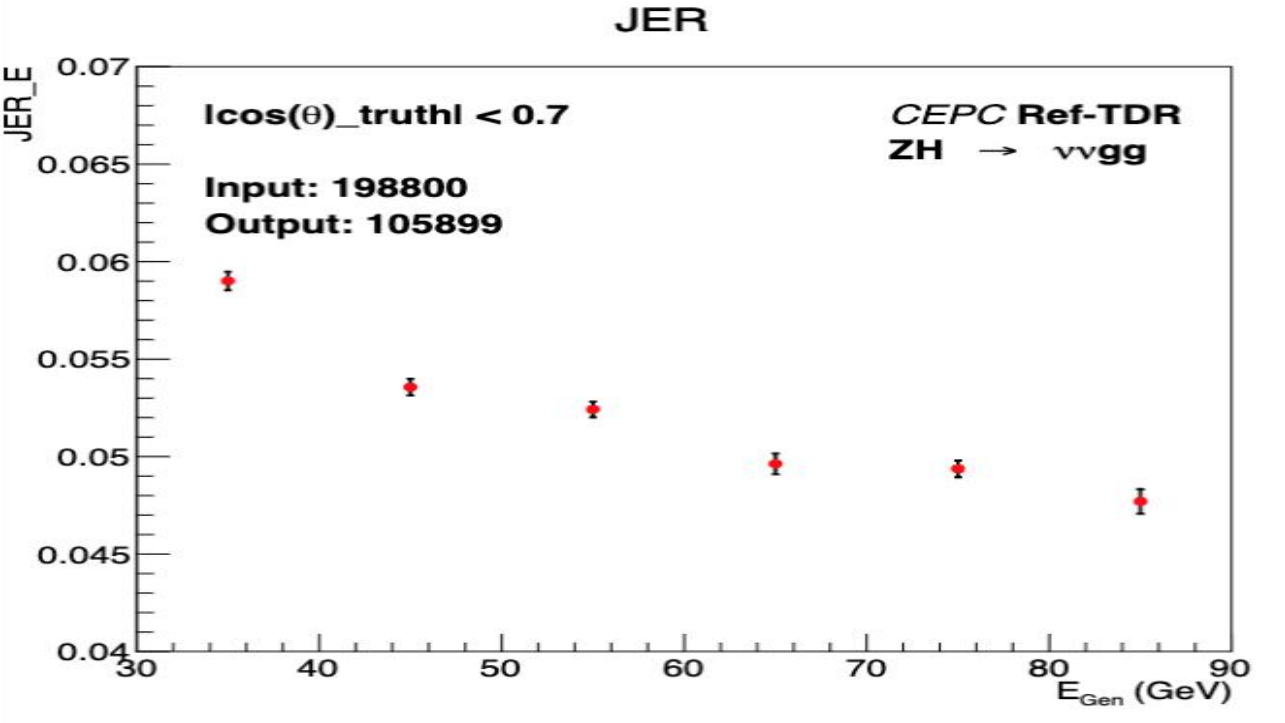

DSCB Fit
E_DSCB_fit_E_40~50
Mean = -0.0139 ± 0.0004
Sigma = 0.0536 ± 0.0004
χ²/ndf = 1.78
CEPC Ref-TDR
ZH → ννgg
Input: 198800
Output: 105899
Events / ( 0.02 )
(Rec_E-Gen_E)/Gen_E

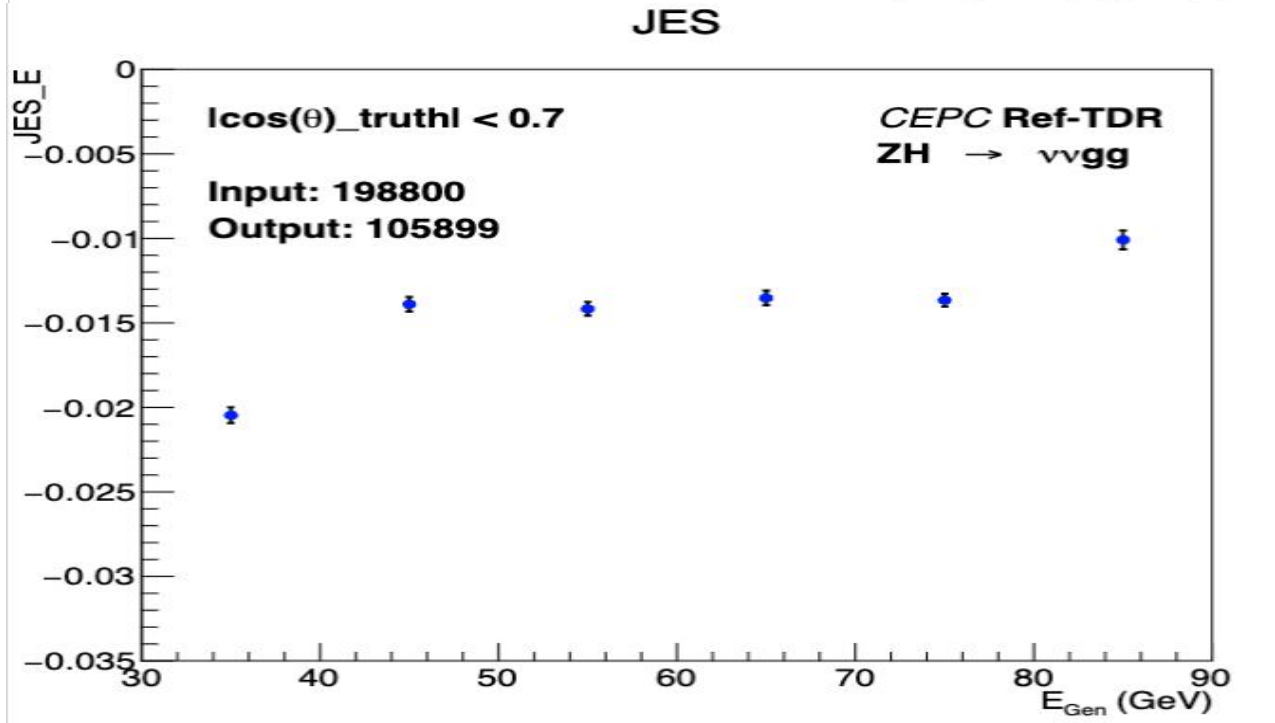

DSCB Fit
E_DSCB_fit_E_50~60
Mean = -0.0142 ± 0.0004
Sigma = 0.0524 ± 0.0004
χ²/ndf = 4.60
CEPC Ref-TDR
ZH → ννgg
Input: 198800
Output: 105899
Events / ( 0.02 )
(Rec_E-Gen_E)/Gen_E


DSCB Fit
E_DSCB_fit_E_60~70
Mean = -0.0135 ± 0.0004
Sigma = 0.0496 ± 0.0005
χ²/ndf = 4.52
CEPC Ref-TDR
ZH → ννgg
Input: 198800
Output: 105899
Events / ( 0.02 )
(Rec_E-Gen_E)/Gen_E


DSCB Fit
E_DSCB_fit_E_70~80
Mean = -0.0137 ± 0.0004
Sigma = 0.0494 ± 0.0004
χ²/ndf = 2.34
CEPC Ref-TDR
ZH → ννgg
Input: 198800
Output: 105899
Events / ( 0.02 )
(Rec_E-Gen_E)/Gen_E


DSCB Fit
E_DSCB_fit_E_80~130
Mean = -0.0101 ± 0.0006
Sigma = 0.0477 ± 0.0006
χ²/ndf = 2.08
CEPC Ref-TDR
ZH → ννgg
Input: 198800
Output: 105899
Events / ( 0.02 )
(Rec_E-Gen_E)/Gen_E


JER
|cos(θ)_truthl < 0.7
CEPC Ref-TDR
ZH → ννgg
Input: 198800
Output: 105899
JER_E
E_Gen (GeV)


JES
|cos(θ)_truthl < 0.7
CEPC Ref-TDR
ZH → ννgg
Input: 198800
Output: 105899
JES_E
E_Gen (GeV)