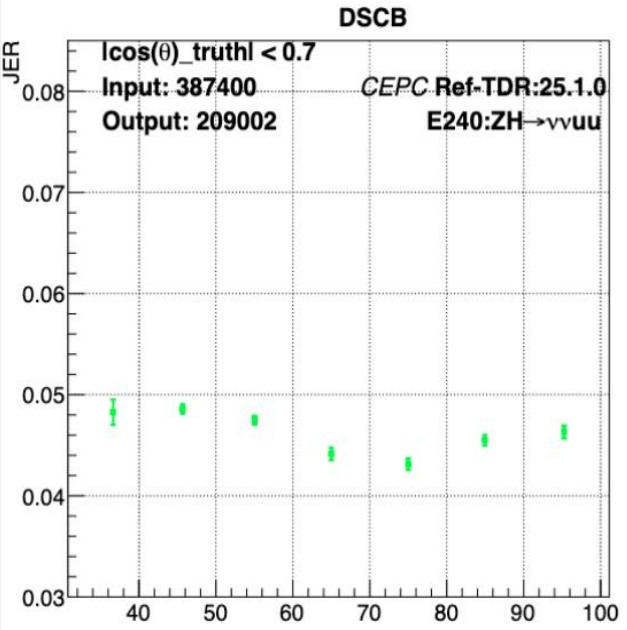
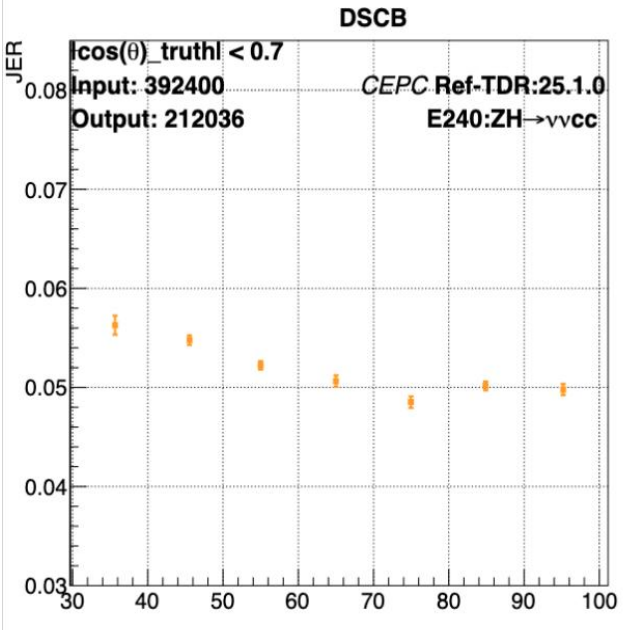
JES/JER

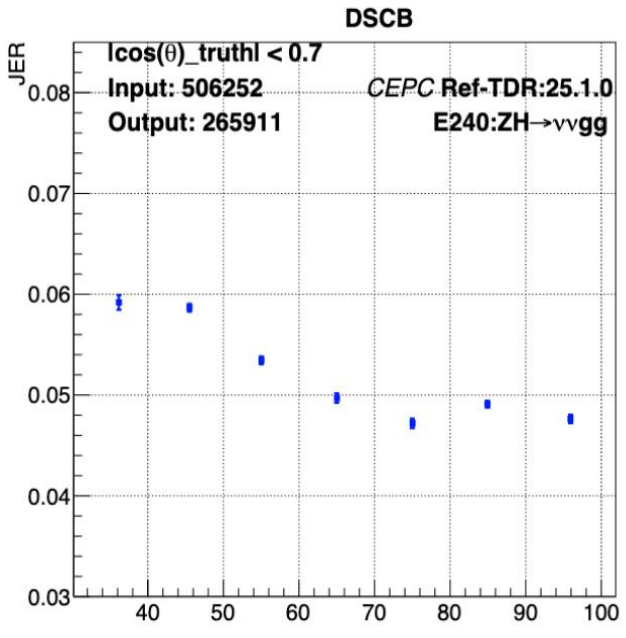
Hou Yingqi

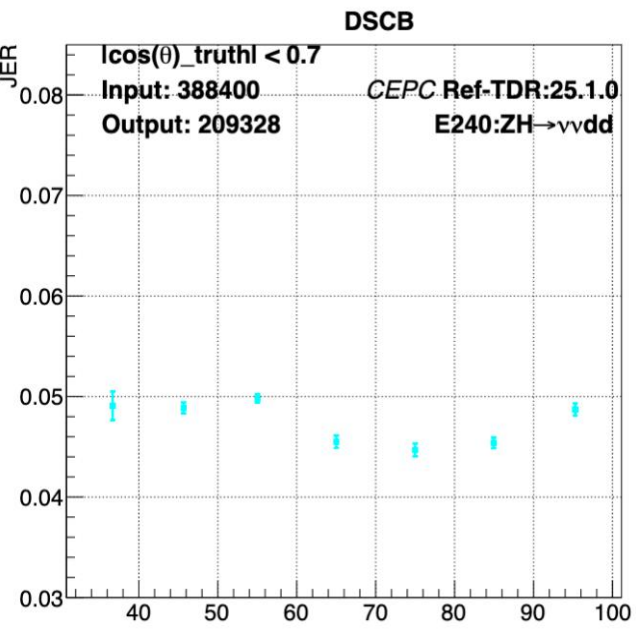
2025/2/19

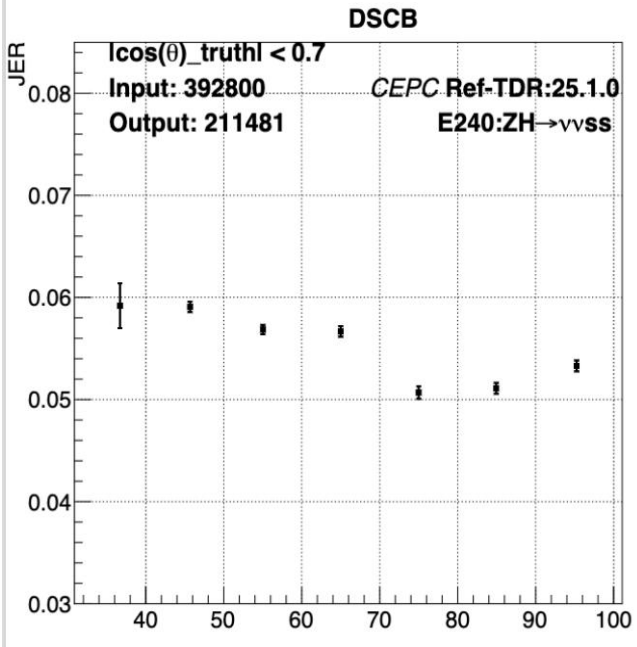
JER of different process

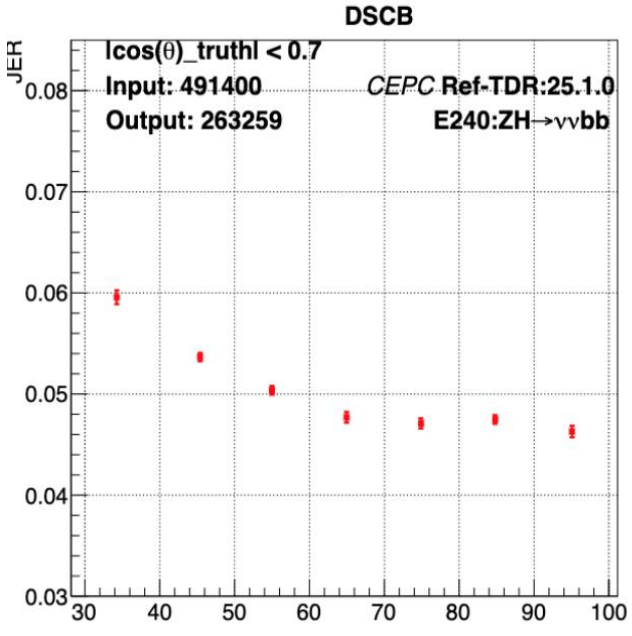


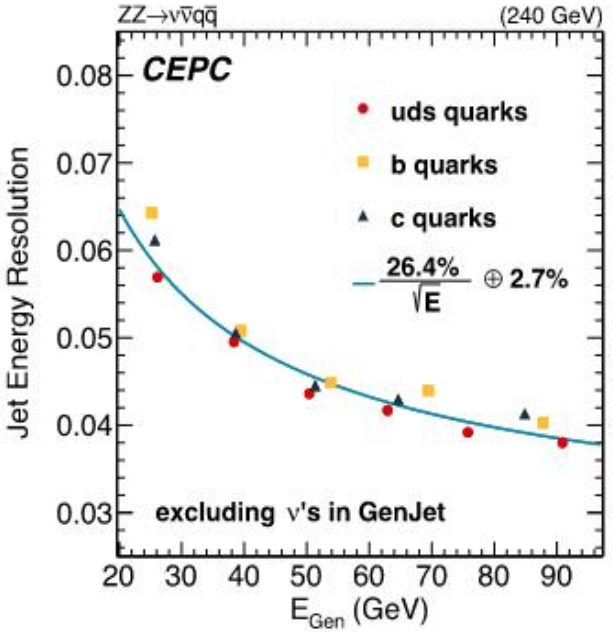






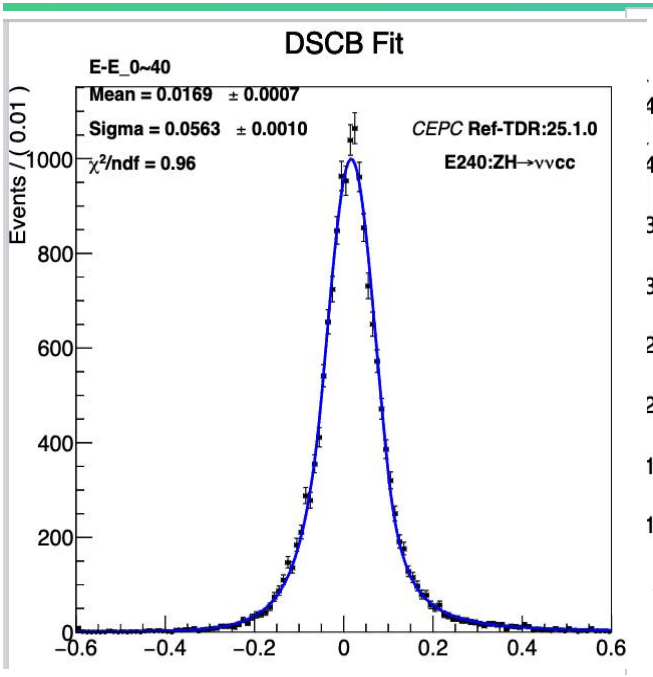


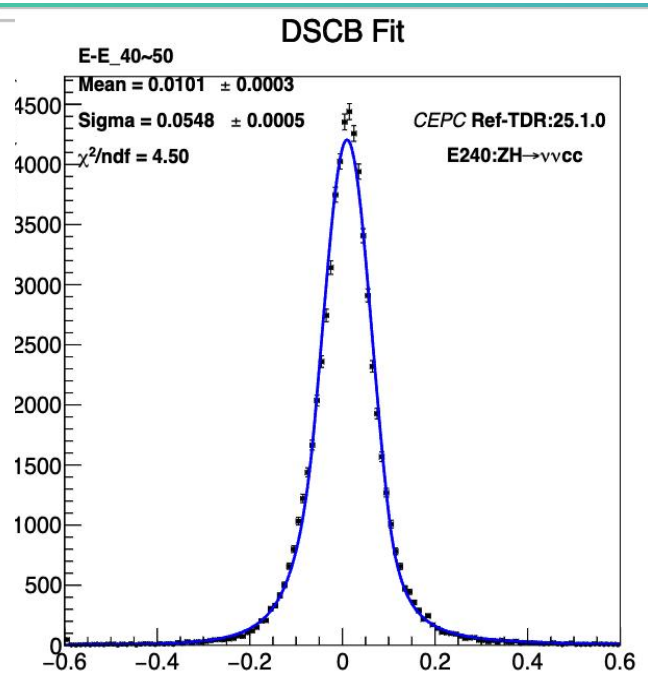


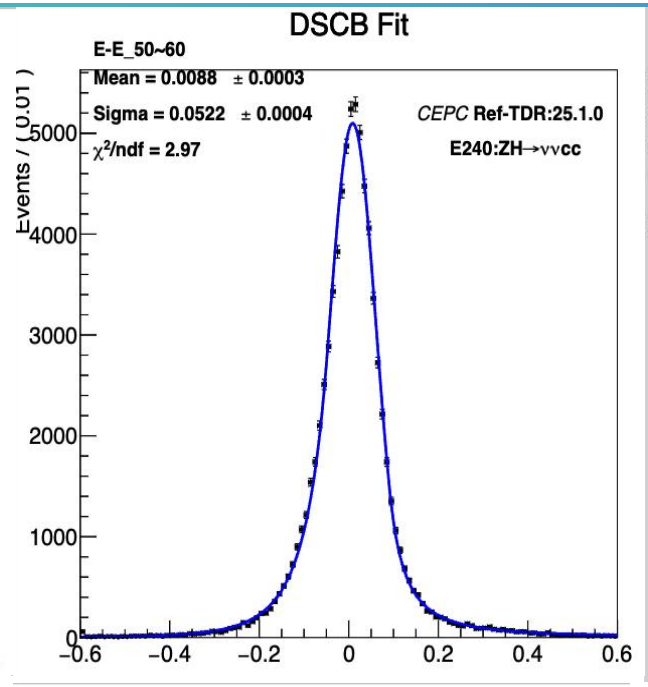


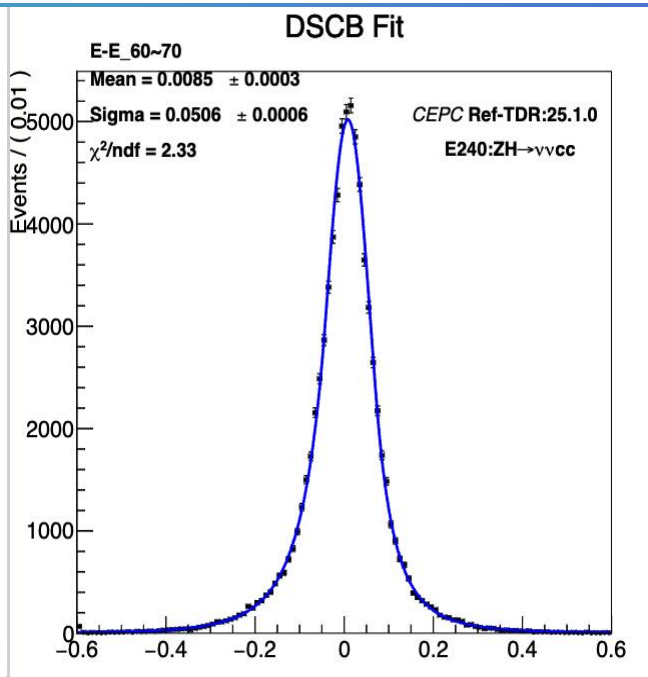
- ZH->cc bb gg have similar trends.

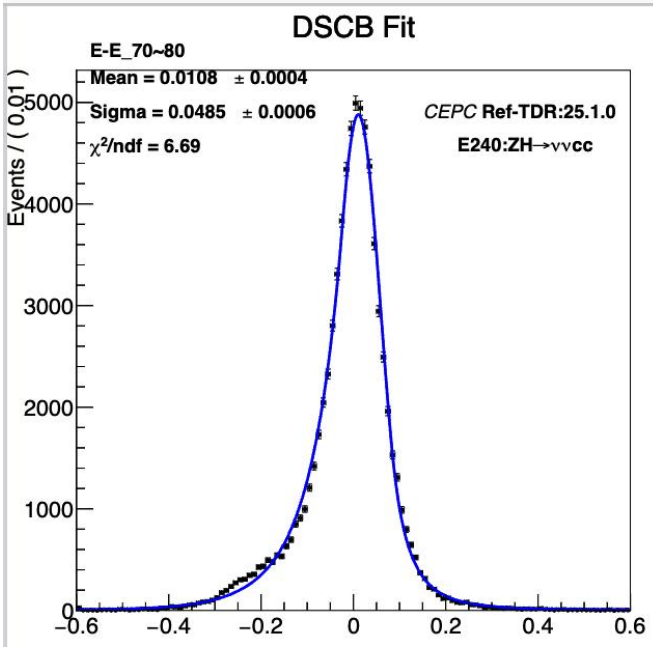
Fit Result

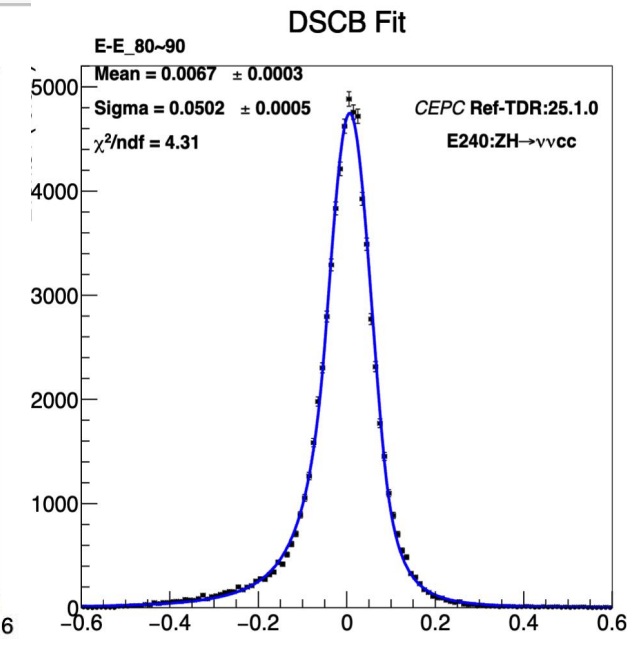

DSCB Fit
E-E_0~40
Mean = 0.0169 ± 0.0007
Sigma = 0.0563 ± 0.0010
χ²/ndf = 0.96
CEPC Ref-TDR:25.1.0
E240:ZH→νν̄cc̄
Events / (0.01)

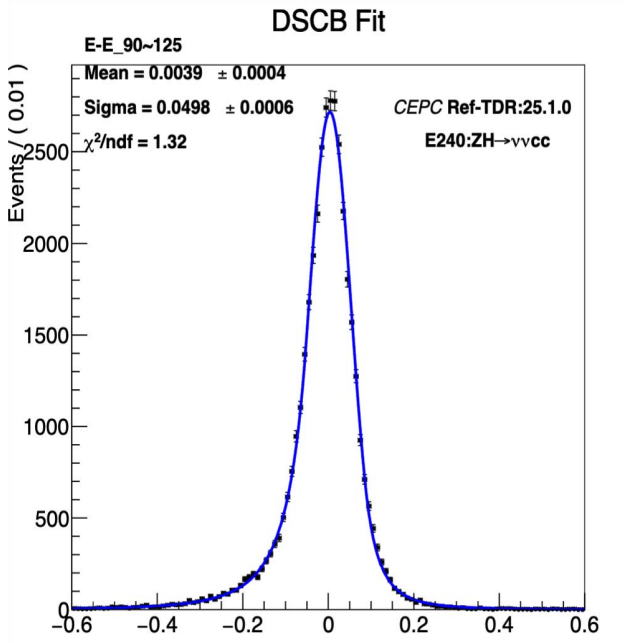

DSCB Fit
E-E_40~50
Mean = 0.0101 ± 0.0003
Sigma = 0.0548 ± 0.0005
χ²/ndf = 4.50
CEPC Ref-TDR:25.1.0
E240:ZH→νν̄cc̄


DSCB Fit
E-E_50~60
Mean = 0.0088 ± 0.0003
Sigma = 0.0522 ± 0.0004
χ²/ndf = 2.97
CEPC Ref-TDR:25.1.0
E240:ZH→νν̄cc̄
Events / (0.01)

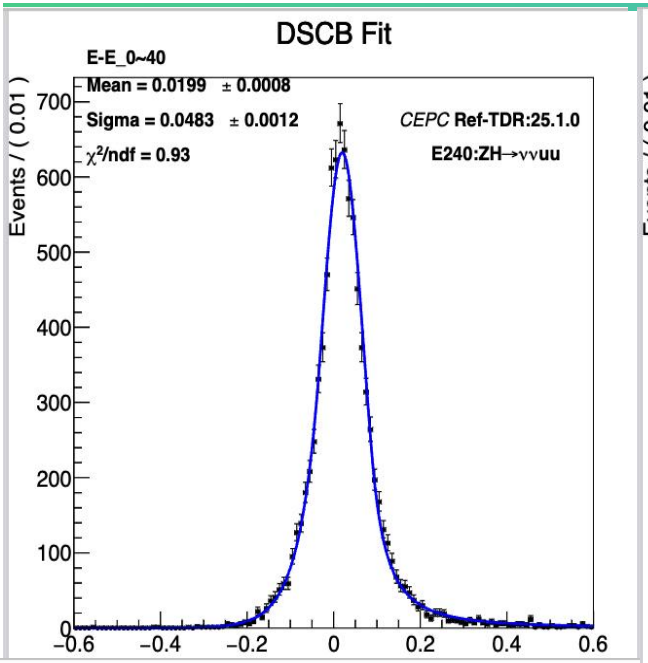

DSCB Fit
E-E_60~70
Mean = 0.0085 ± 0.0003
Sigma = 0.0506 ± 0.0006
χ²/ndf = 2.33
CEPC Ref-TDR:25.1.0
E240:ZH→νν̄cc̄
Events / (0.01)

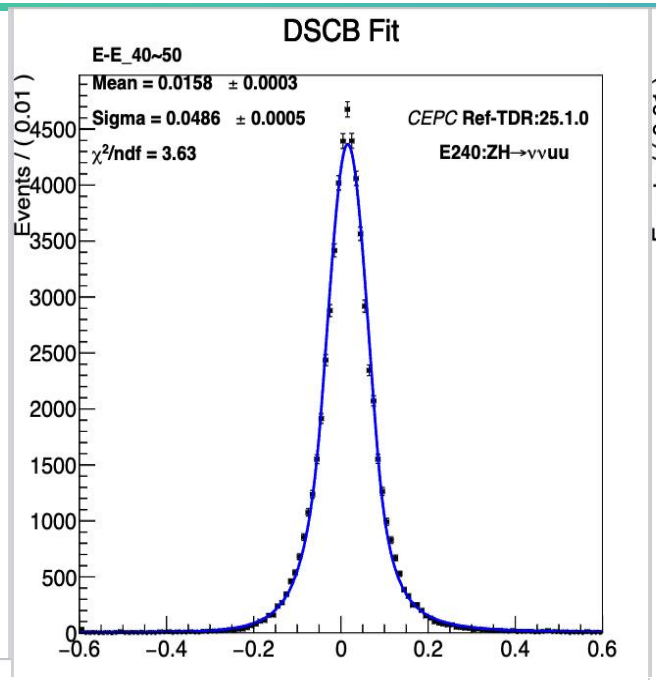

DSCB Fit
E-E_70~80
Mean = 0.0108 ± 0.0004
Sigma = 0.0485 ± 0.0006
χ²/ndf = 6.69
CEPC Ref-TDR:25.1.0
E240:ZH→νν̄cc̄
Events / (0.01)

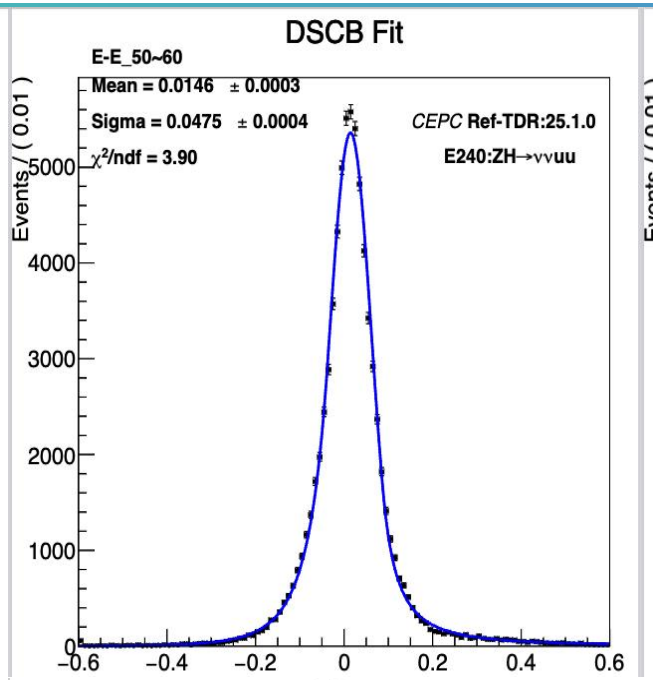

DSCB Fit
E-E_80~90
Mean = 0.0067 ± 0.0003
Sigma = 0.0502 ± 0.0005
χ²/ndf = 4.31
CEPC Ref-TDR:25.1.0
E240:ZH→νν̄cc̄

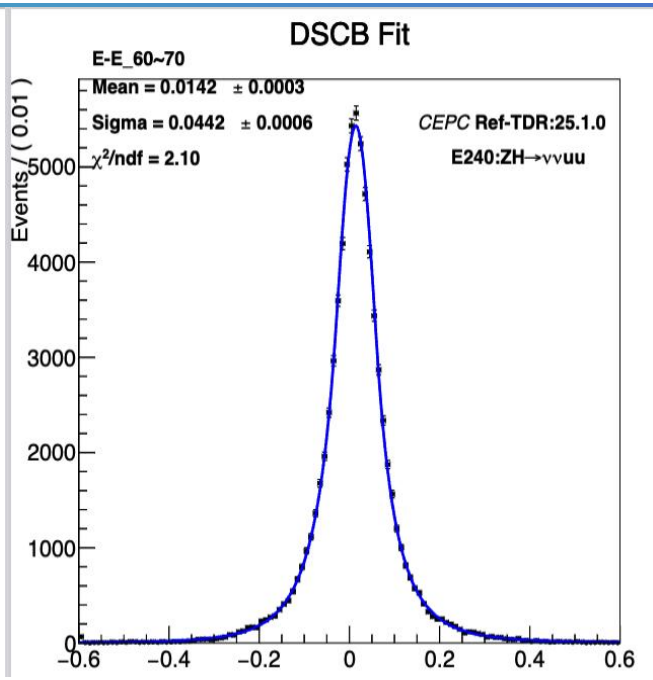

DSCB Fit
E-E_90~125
Mean = 0.0039 ± 0.0004
Sigma = 0.0498 ± 0.0006
χ²/ndf = 1.32
CEPC Ref-TDR:25.1.0
E240:ZH→νν̄cc̄
Events / (0.01)

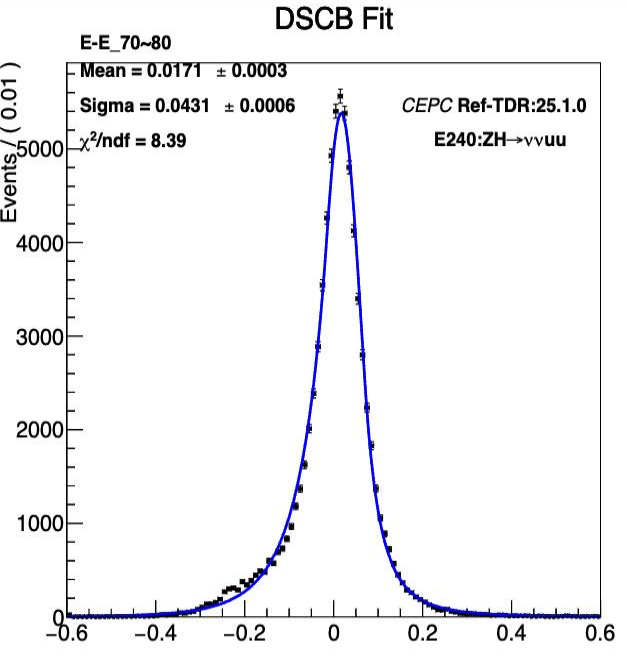
Fit Result

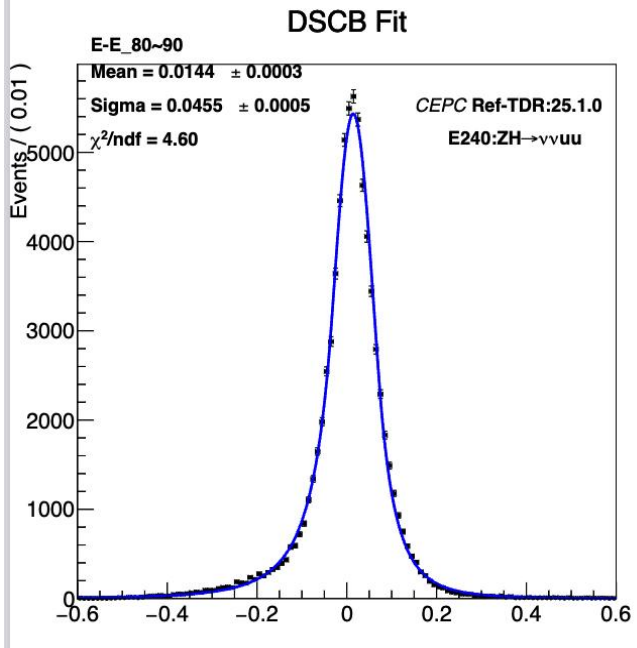

DSCB Fit
E-E_0~40
Mean = 0.0199 ± 0.0008
Sigma = 0.0483 ± 0.0012
χ²/ndf = 0.93
CEPC Ref-TDR:25.1.0
E240:ZH→vvuu
Events / (0.01)

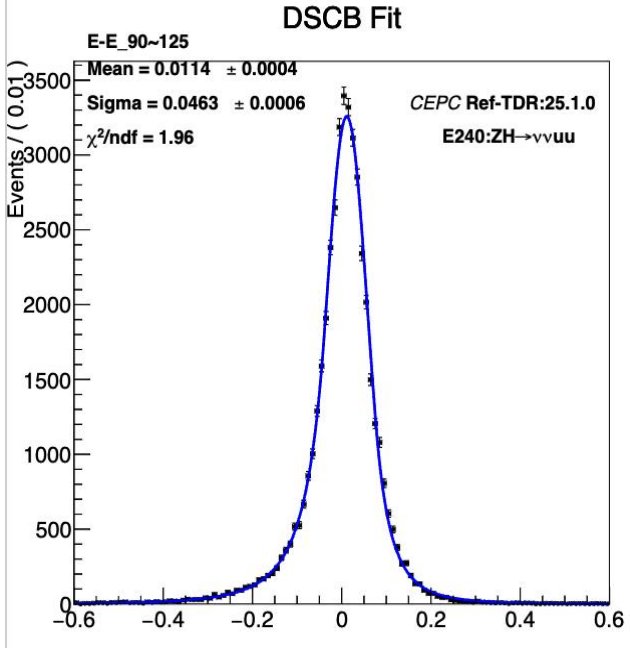

DSCB Fit
E-E_40~50
Mean = 0.0158 ± 0.0003
Sigma = 0.0486 ± 0.0005
χ²/ndf = 3.63
CEPC Ref-TDR:25.1.0
E240:ZH→vvuu
Events / (0.01)


DSCB Fit
E-E_50~60
Mean = 0.0146 ± 0.0003
Sigma = 0.0475 ± 0.0004
χ²/ndf = 3.90
CEPC Ref-TDR:25.1.0
E240:ZH→vvuu
Events / (0.01)


DSCB Fit
E-E_60~70
Mean = 0.0142 ± 0.0003
Sigma = 0.0442 ± 0.0006
χ²/ndf = 2.10
CEPC Ref-TDR:25.1.0
E240:ZH→vvuu
Events / (0.01)


DSCB Fit
E-E_70~80
Mean = 0.0171 ± 0.0003
Sigma = 0.0431 ± 0.0006
χ²/ndf = 8.39
CEPC Ref-TDR:25.1.0
E240:ZH→vvuu
Events / (0.01)


DSCB Fit
E-E_80~90
Mean = 0.0144 ± 0.0003
Sigma = 0.0455 ± 0.0005
χ²/ndf = 4.60
CEPC Ref-TDR:25.1.0
E240:ZH→vvuu
Events / (0.01)


DSCB Fit
E-E_90~125
Mean = 0.0114 ± 0.0004
Sigma = 0.0463 ± 0.0006
χ²/ndf = 1.96
CEPC Ref-TDR:25.1.0
E240:ZH→vvuu
Events / (0.01)

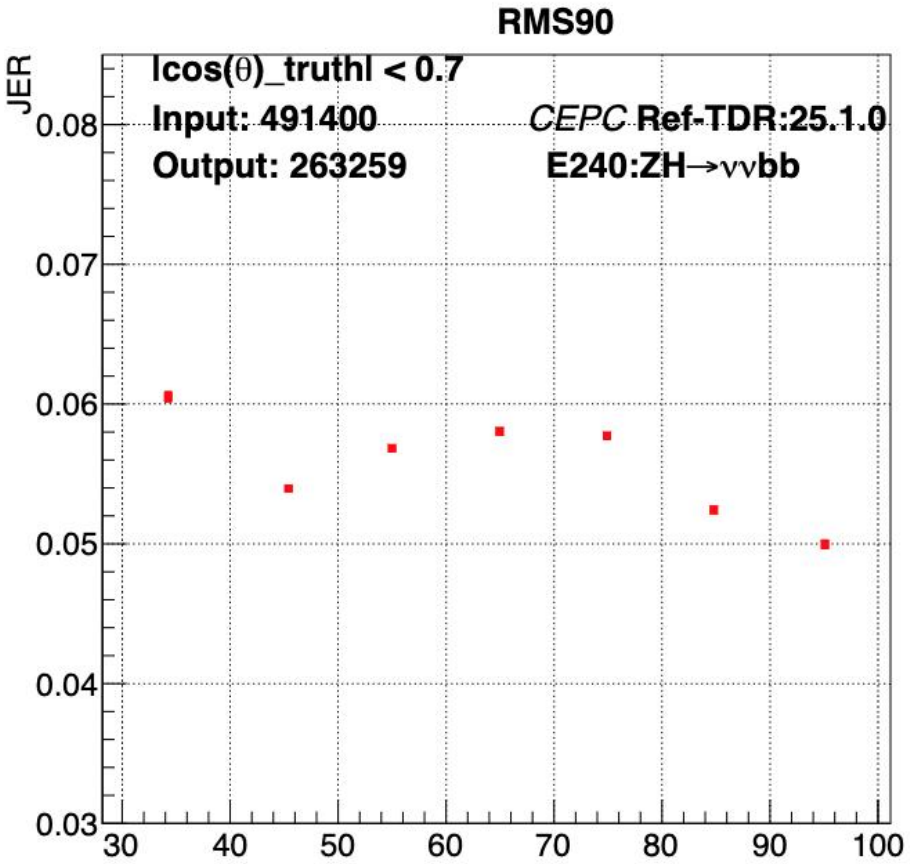
code aboutc RMS90

```python
def calculate_rms(data):
    """计算RMS"""
    mean = np.mean(data)
    sq_sum = np.sum(np.square(data))
    return np.sqrt(sq_sum / len(data) - mean ** 2)

def calculate_rms90(values):
    """滑动窗口计算RMS90并返回最小RMS值"""
    # 将数据展平成一维，并进行排序
    sorted_values = ak.flatten(values, axis=0)
    sorted_values = np.sort(sorted_values)

    n = len(sorted_values)
    count90 = int(0.9 * n)  # 计算90%的样本大小
    min_rms = float('inf')  # 初始化最小RMS为正无穷

    # 使用滑动窗口遍历所有可能的90%样本
    for start in range(n - count90 + 1):
        # 取出当前窗口的数据
        window = sorted_values[start:start + count90]
        # 计算窗口数据的RMS
        rms = calculate_rms(window)
        # 更新最小RMS
        min_rms = min(min_rms, rms)
    return min_rms
```



JER/JES of eeqq(eebb)

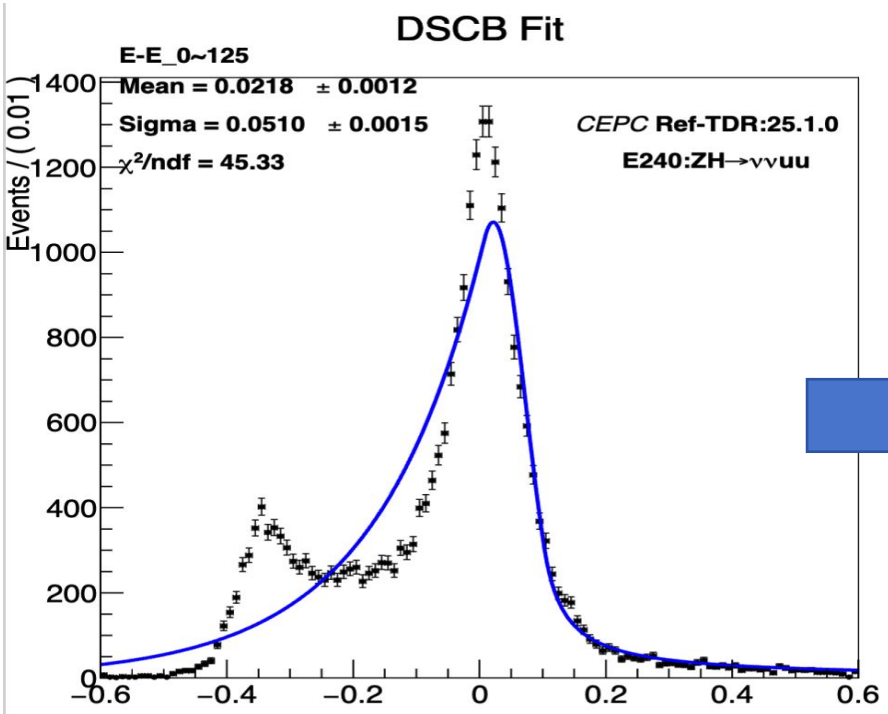
Process:

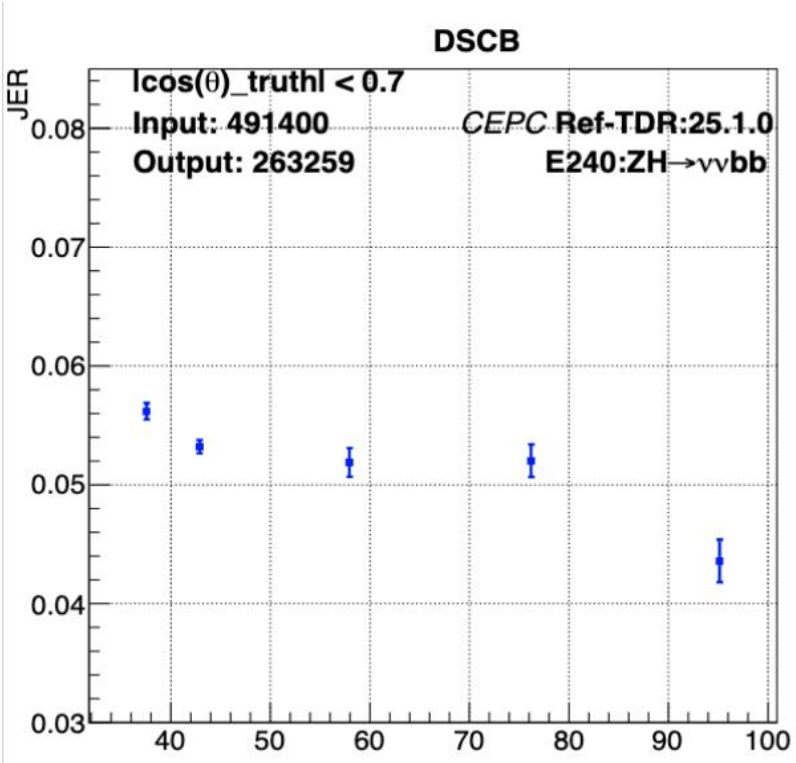
✓ The center of mass energy are :

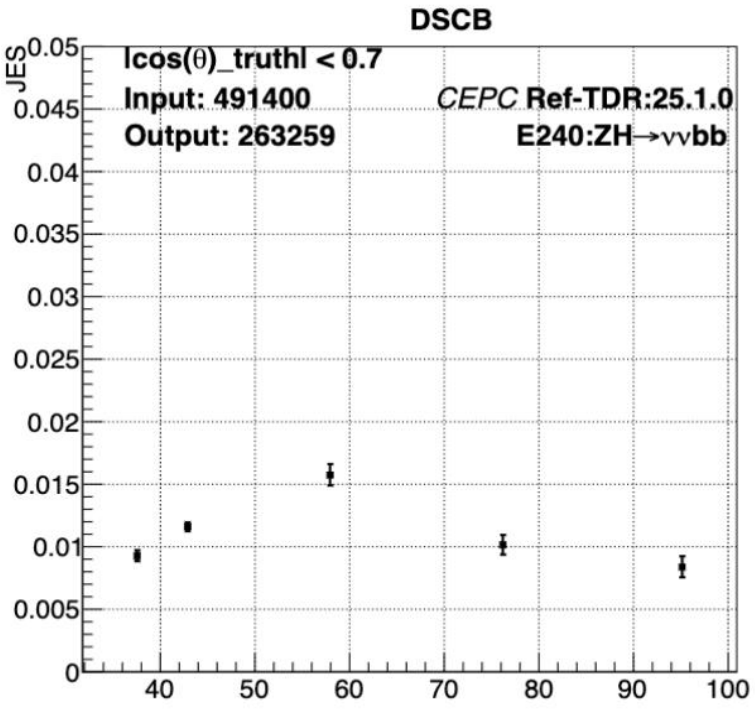
80GeV 91.2GeV 120GeV 160GeV 200GeV

Condition:

- |costheta|<0.7
- 120GeV 160GeV 200GeV dijetmass>100GeV

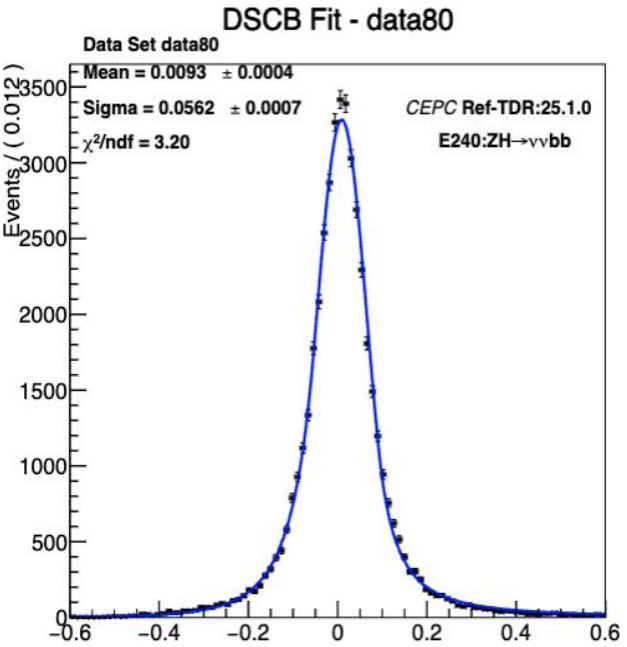


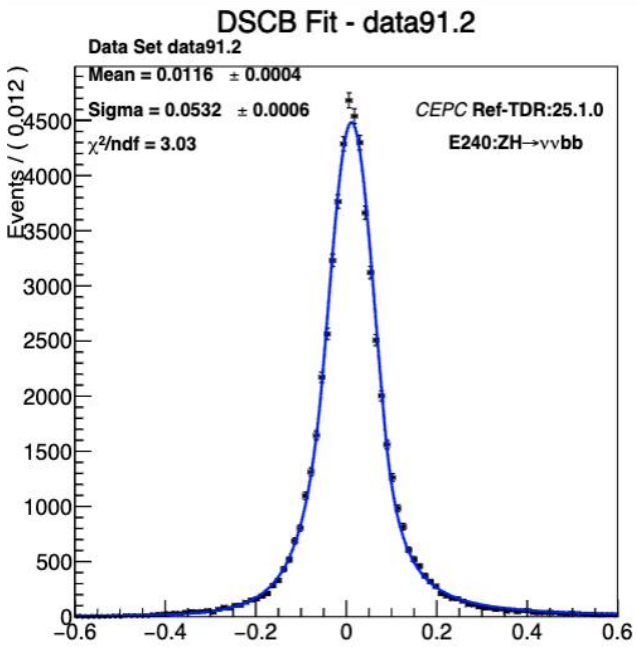


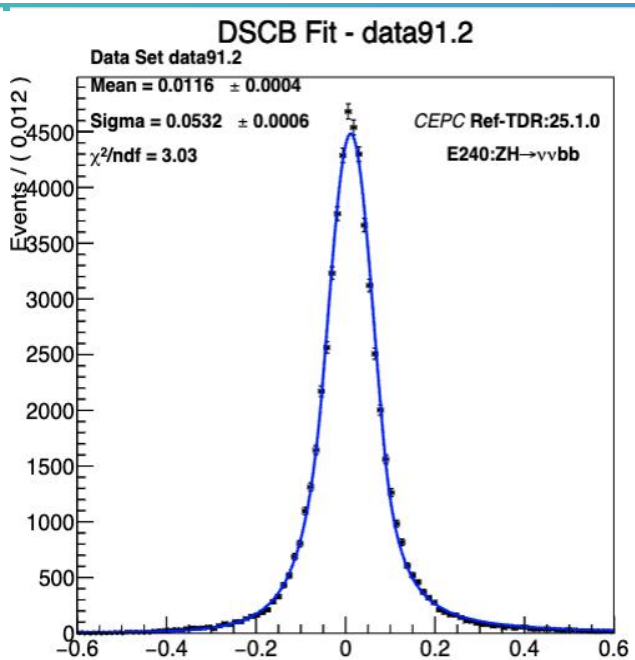


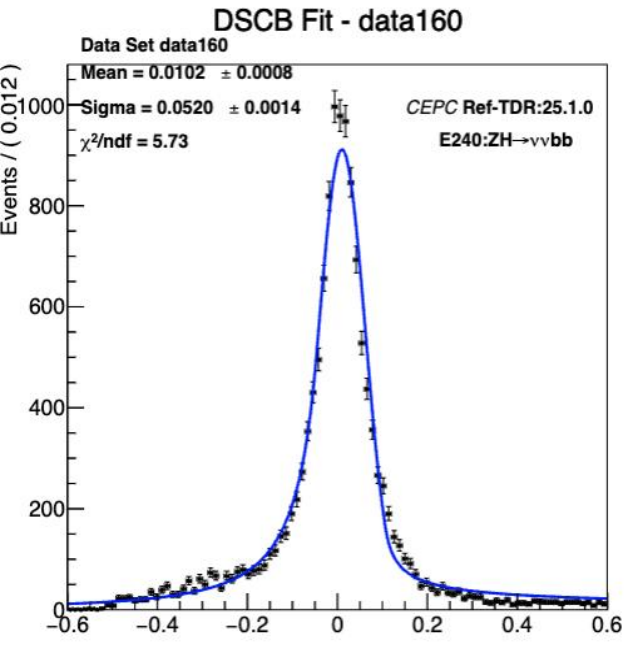
eebb of 120GeV

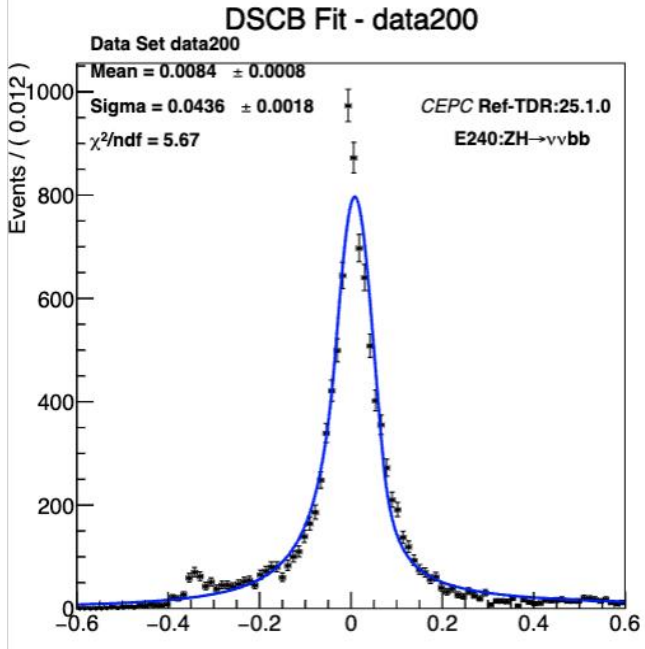
Fit result


DSCB Fit - data80
Data Set data80
Mean = 0.0093 ± 0.0004
Sigma = 0.0562 ± 0.0007
χ²/ndf = 3.20
CEPC Ref-TDR:25.1.0
E240:ZH→νν̄bb̄
Events / (0.012)

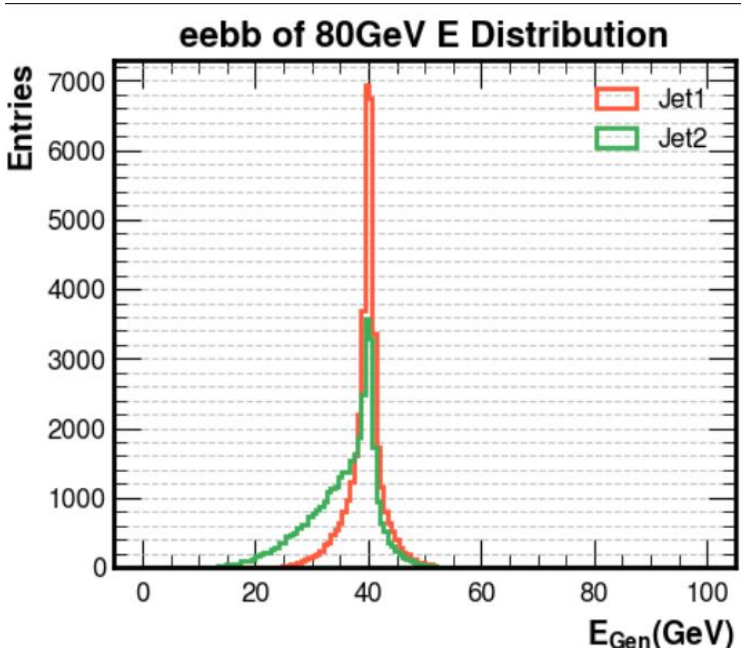

DSCB Fit - data91.2
Data Set data91.2
Mean = 0.0116 ± 0.0004
Sigma = 0.0532 ± 0.0006
χ²/ndf = 3.03
CEPC Ref-TDR:25.1.0
E240:ZH→νν̄bb̄
Events / (0.012)

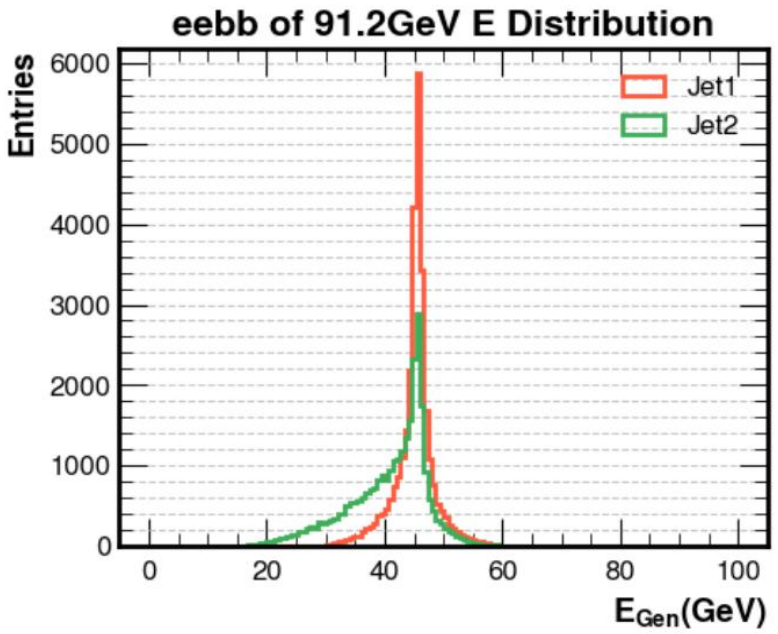

DSCB Fit - data91.2
Data Set data91.2
Mean = 0.0116 ± 0.0004
Sigma = 0.0532 ± 0.0006
χ²/ndf = 3.03
CEPC Ref-TDR:25.1.0
E240:ZH→νν̄bb̄
Events / (0.012)

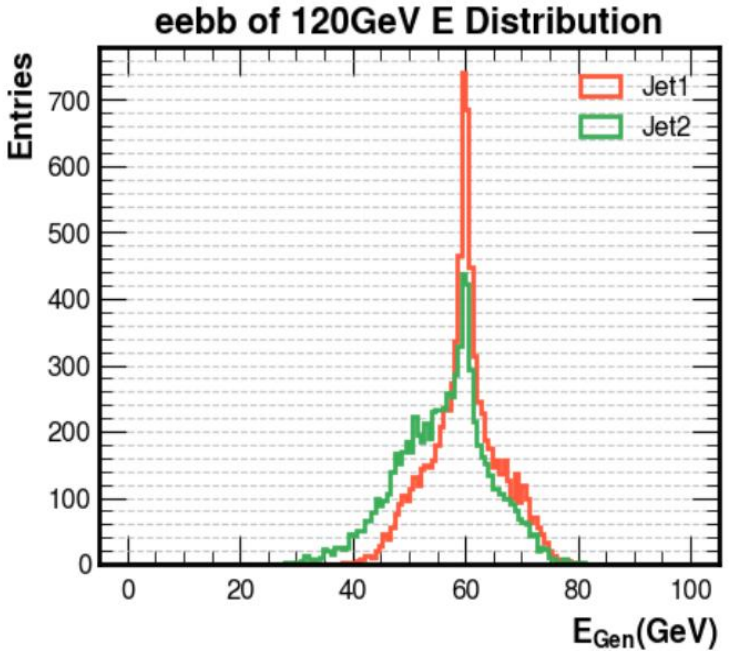

DSCB Fit - data160
Data Set data160
Mean = 0.0102 ± 0.0008
Sigma = 0.0520 ± 0.0014
χ²/ndf = 5.73
CEPC Ref-TDR:25.1.0
E240:ZH→νν̄bb̄
Events / (0.012)

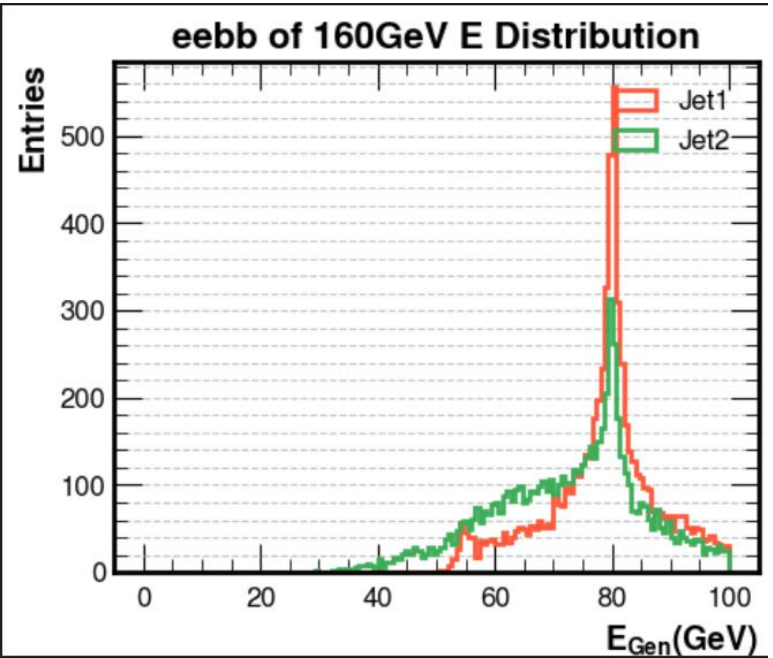

DSCB Fit - data200
Data Set data200
Mean = 0.0084 ± 0.0008
Sigma = 0.0436 ± 0.0018
χ²/ndf = 5.67
CEPC Ref-TDR:25.1.0
E240:ZH→νν̄bb̄
Events / (0.012)

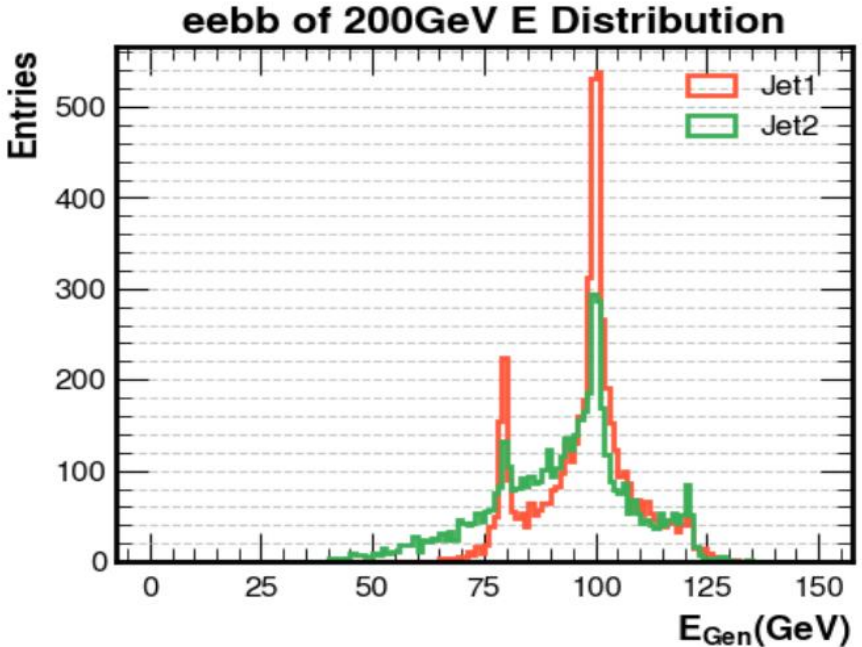
Energy Distrubition





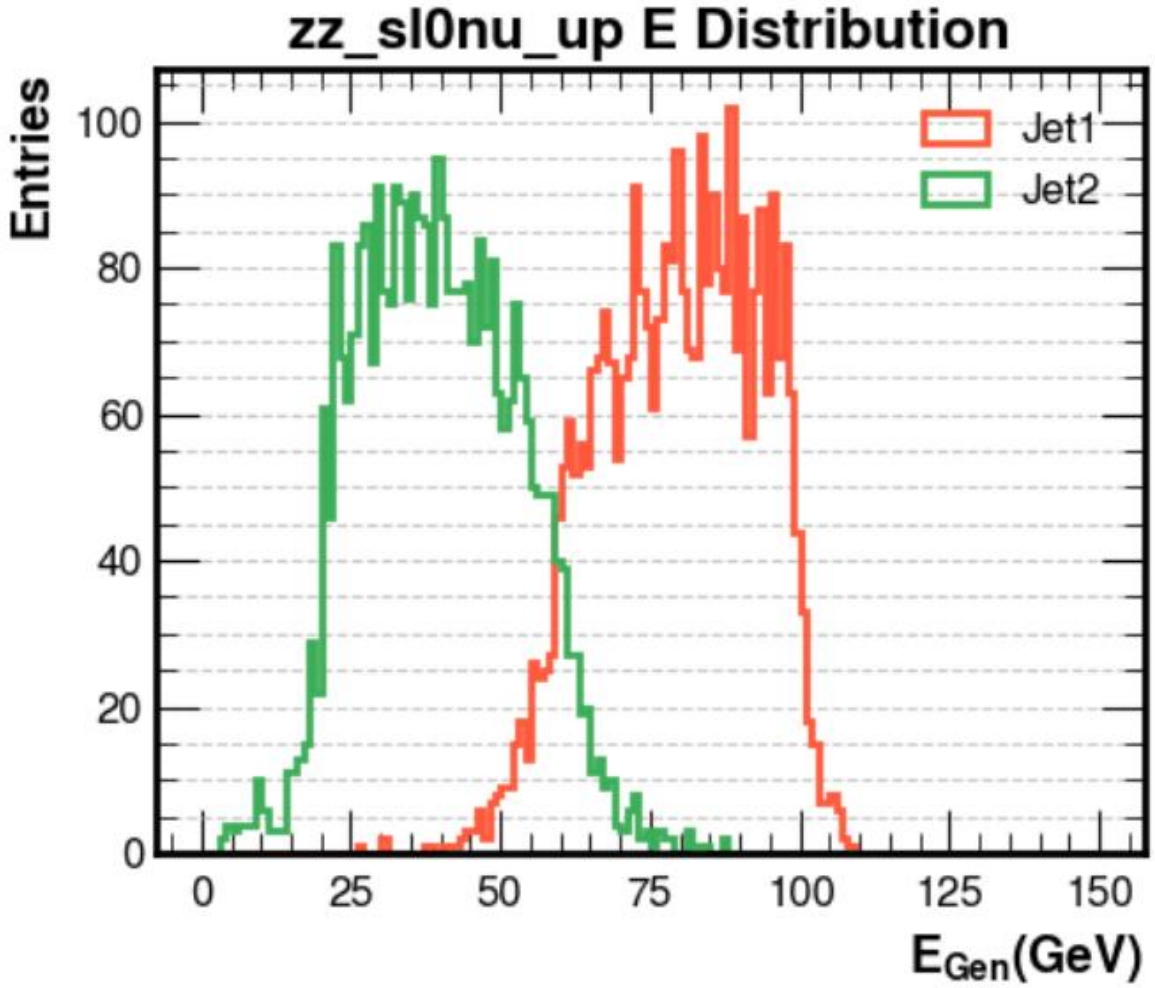


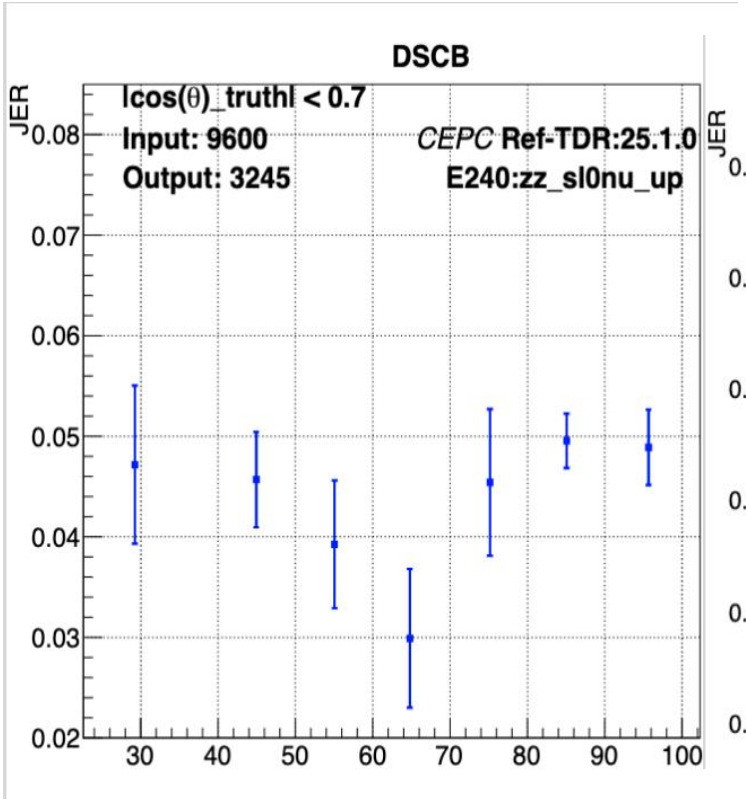


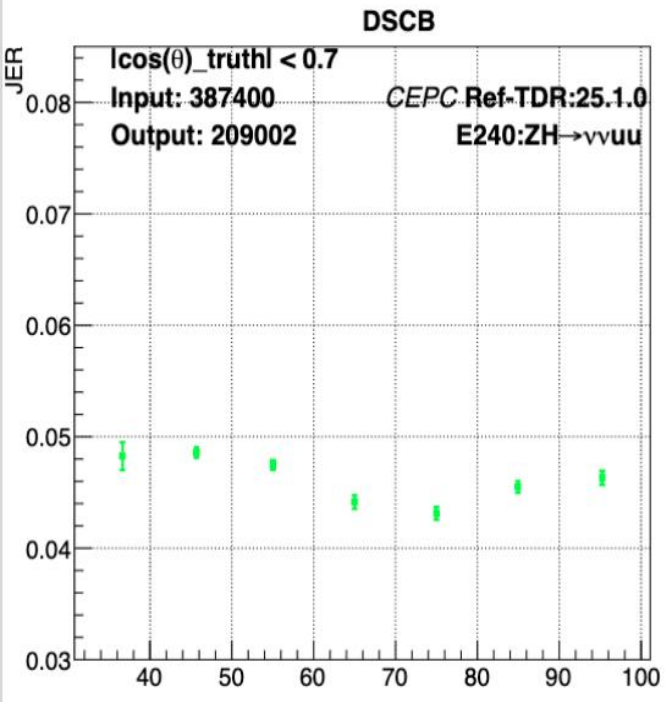


zz_sl0nu_up

with |costheta|<0.7







- Jets from Z are more forward.

zz_sl0nu_up

with |costheta|<1