

BMR -- Status

- ❖ BMR performance in $ZH \rightarrow \nu\nu + gg/bb/cc/uu/dd/ss$ with $\sqrt{s} = 240\text{GeV}/c^2$
- ❖ ISR is off or not saved? Cannot read the info.
- ❖ Compare performance under CEPCSW_tdr25.1.0 and CEPCSW_tdr24.12.0
 - Performance of $|\cos\theta_{\text{jet}}| < 0.85$ is better than that of $|\cos\theta_{\text{jet}}| < 0.7$ in 24.12.0 ~ improve by 0.1%-0.2%
 - Performance of Barrelratio>0.95 is better than CDR's?
- ❖ Distributions of different flavors

Performance study – BMR of 25.1.0

- ❖ Perform BMR study in $ZH \rightarrow \nu\nu + gg/bb/cc/uu/dd/ss$ with $\sqrt{s} = 240\text{GeV}/c^2$
- ❖ Comparisons without/with event cleaning under $|\cos\theta_{\text{jet}}| < 0.85$

Case	process	$ZH \rightarrow \nu v gg$	$ZH \rightarrow \nu v bb$	$ZH \rightarrow \nu v cc$	$ZH \rightarrow \nu v uu$	$ZH \rightarrow \nu v dd$	$ZH \rightarrow \nu v ss$
Physical level	BMR/%	3.96 ± 0.03	4.22 ± 0.07	3.99 ± 0.05	3.76 ± 0.02	3.96 ± 0.02	4.35 ± 0.02
	Efficiency/%	73.1	73.7	73.7	73.8	73.8	73.7
Detector level	BMR/%	3.93 ± 0.03	3.70 ± 0.04	3.91 ± 0.03	3.76 ± 0.02	3.95 ± 0.02	4.34 ± 0.02
	Efficiency/%	68.9	29.4	50.9	73.4	73.4	73.3

- Event cleaning: $\Sigma|Pt_{\text{ISR}}| < 1\text{GeV}/c \ \& \ \Sigma|Pt_{\nu}| < 1\text{GeV}/c$
- Before event cleaning, BMR ranges from 3.76% to 4.35%
- After event cleaning, BMR ranges from 3.70% to 4.34%

❖ Samples generated under CEPCSW_tdr25.1.0

- /cefs/higgs/maxiaotian/25.1.0/CEPCSW/jet
- /cefs/higgs/zhangkl/Production/2501

BMR performance of 24.12.0

- ❖ Perform BMR study in $ZH \rightarrow \nu\nu + gg/bb/cc/uu/dd/ss$ with $\sqrt{s} = 240\text{GeV}/c^2$
- ❖ Comparisons without/with event cleaning under $|\cos\theta_{\text{jet}}| < 0.7$

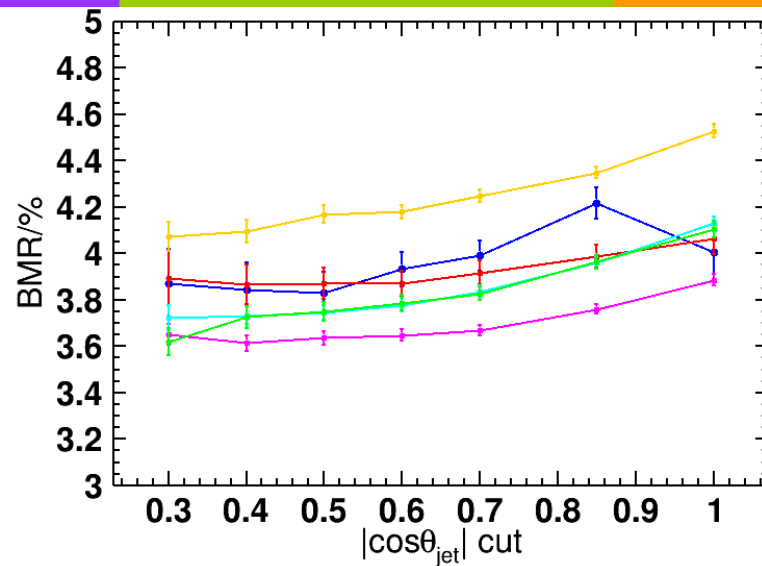
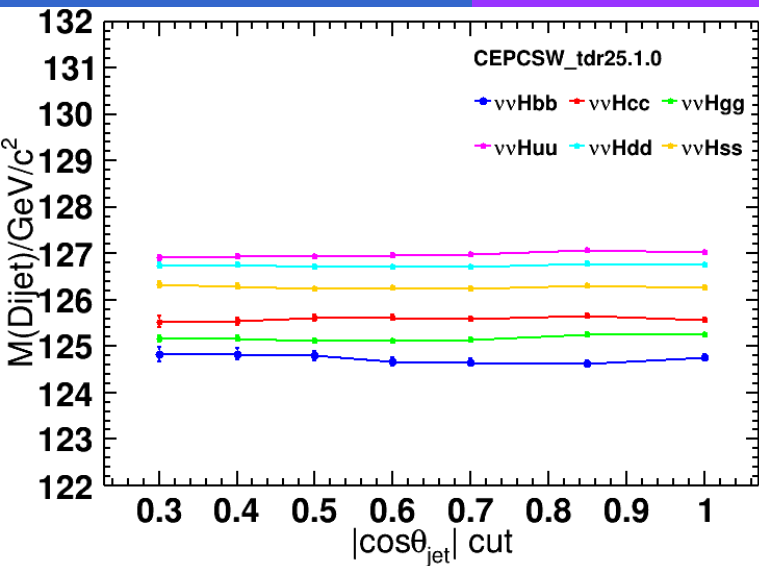
Case	process	$ZH \rightarrow \nu g g$	$ZH \rightarrow \nu b b$	$ZH \rightarrow \nu c c$	$ZH \rightarrow \nu u u$	$ZH \rightarrow \nu d d$	$ZH \rightarrow \nu s s$
Physical level	BMR/%	4.06 ± 0.02	4.43 ± 0.05	4.21 ± 0.04	3.90 ± 0.02	4.08 ± 0.02	4.56 ± 0.02
	Efficiency/%	59.3	58.0	57.9	58.2	58.3	58.2
Detector level	BMR/%	3.99 ± 0.02	3.81 ± 0.03	4.10 ± 0.02	3.90 ± 0.02	4.06 ± 0.02	4.53 ± 0.02
	Efficiency/%	53.1	22.0	38.0	55.1	55.2	55.1

- Event cleaning: $\Sigma|Pt_{\text{ISR}}| < 1\text{GeV}/c \ \& \ \Sigma|Pt_{\nu}| < 1\text{GeV}/c$
- Before event cleaning, BMR ranges from 3.90% to 4.56%
- After event cleaning, BMR ranges from 3.81% to 4.53%

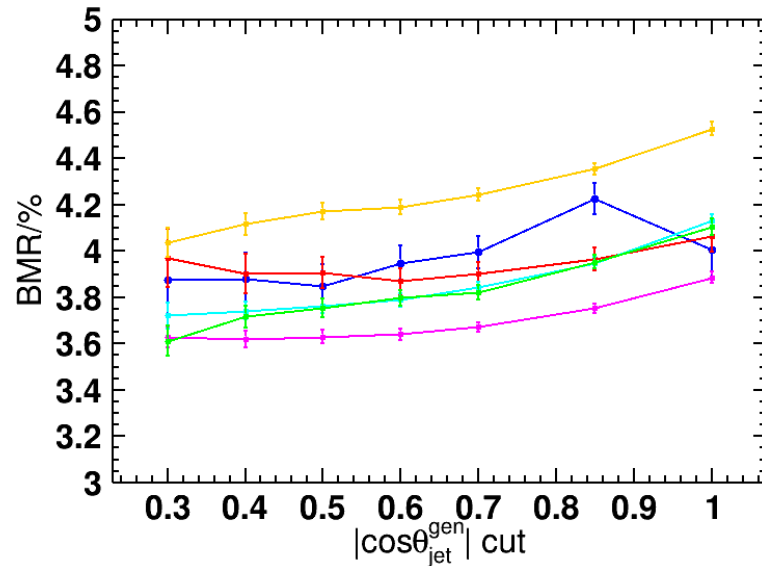
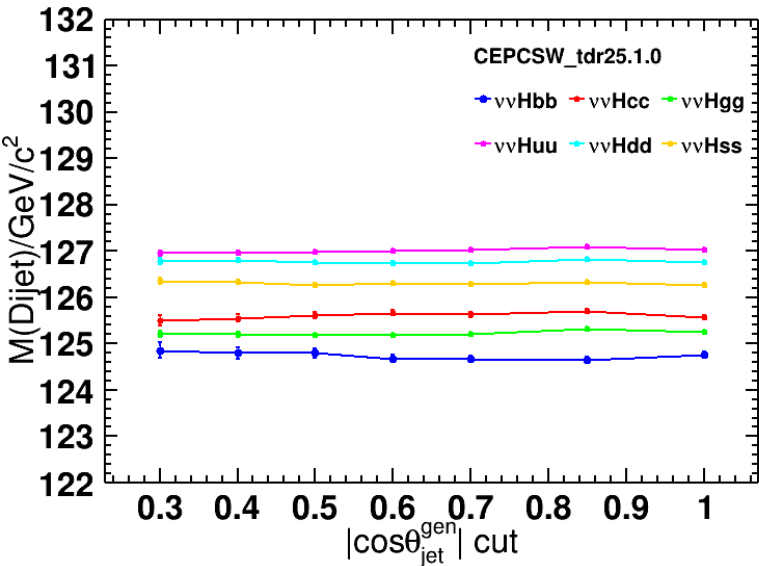
❖ Samples generated under CEPCSW_tdr24.12.0

- /cefs/higgs/maxiaotian/CEPCSW/sample/nogenmatch/24.12.0
- /cefs/higgs/zhangkl/Production/2412/

BMR – at different cos cut of 25.1.0

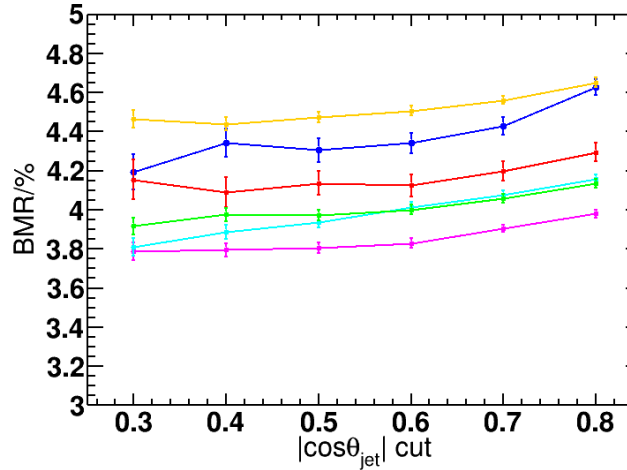
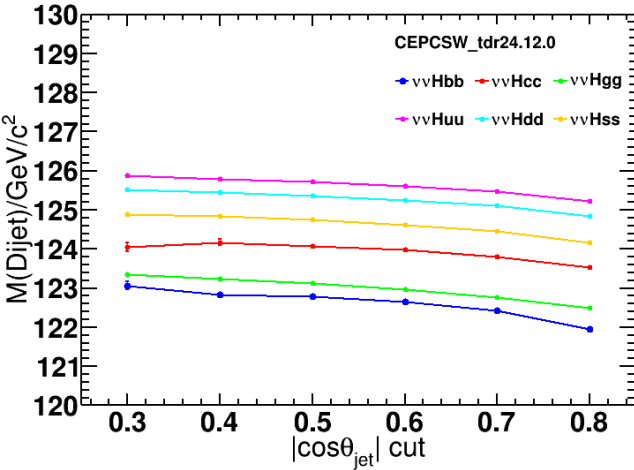


bb's BMR at
<1 falls
down



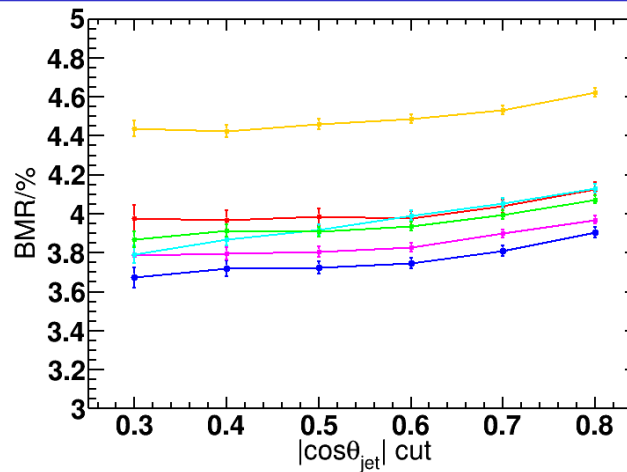
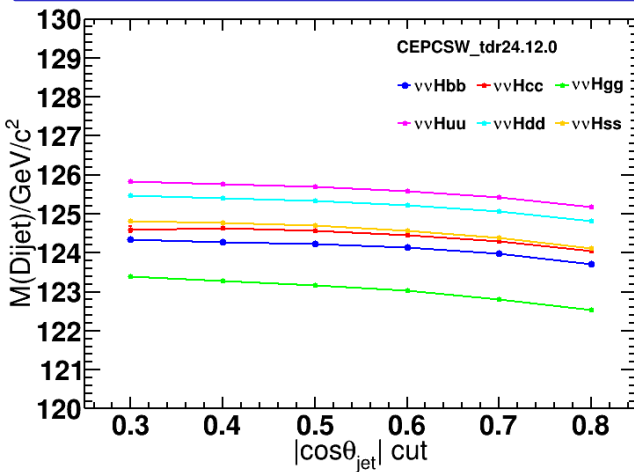
BMR – performance of 24.12.0

Higgs mass and BMR distributions according to $|\cos\theta_{\text{jet}}|$ cut -- no cleaning

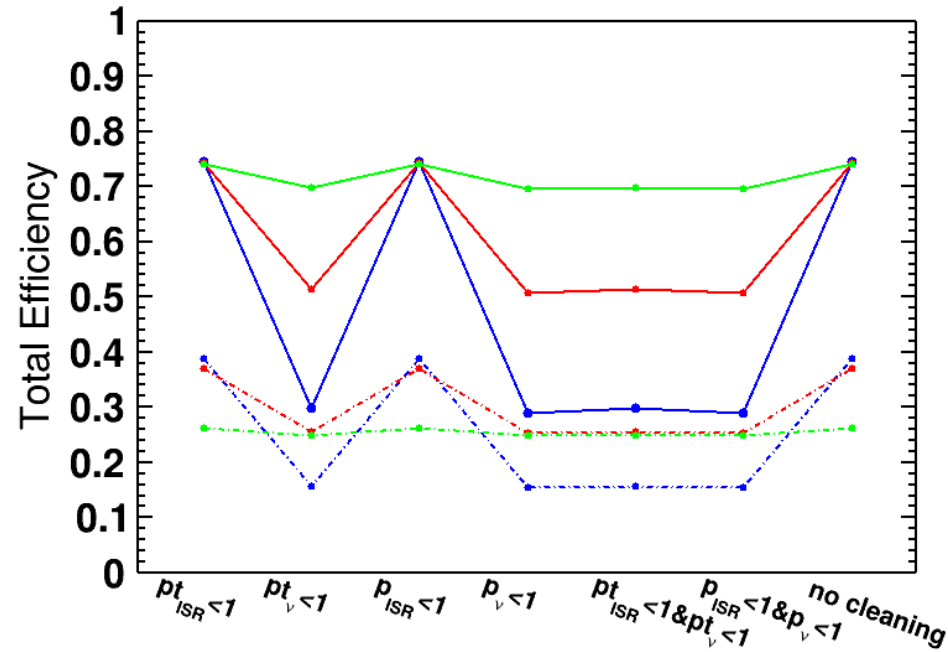
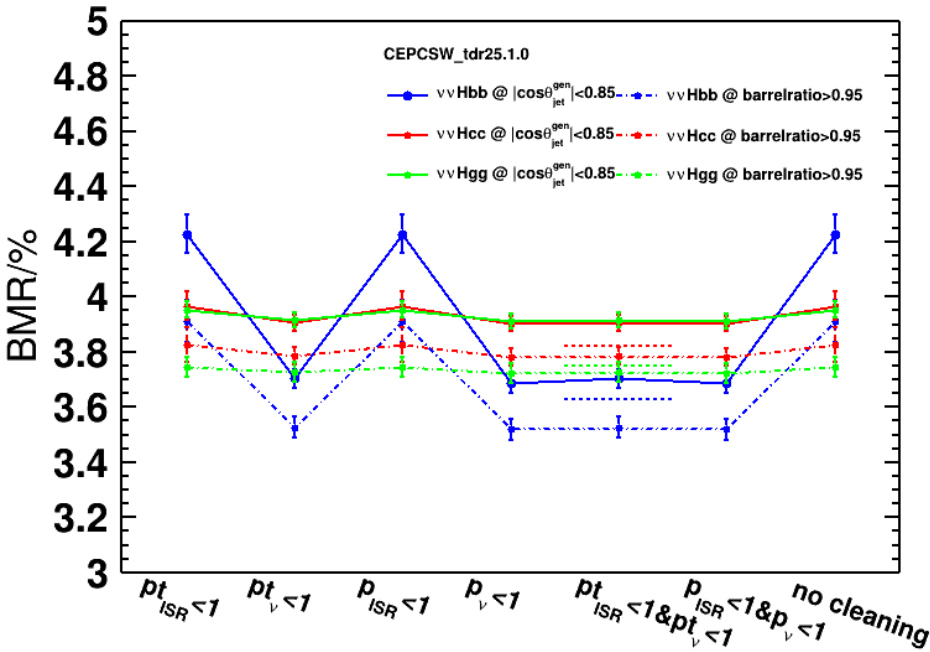


◆ Higgs mass decrease as $\cos\theta$ cut increase

Higgs mass and BMR distributions according to $|\cos\theta_{\text{jet}}|$ cut -- event cleaning



BMR – performance of 25.1.0



Current result – comparison with CDR

Table 1. Event cumulative efficiency for Higgs boson exclusive decay at the CEPC with $\sqrt{s} = 240$ GeV.

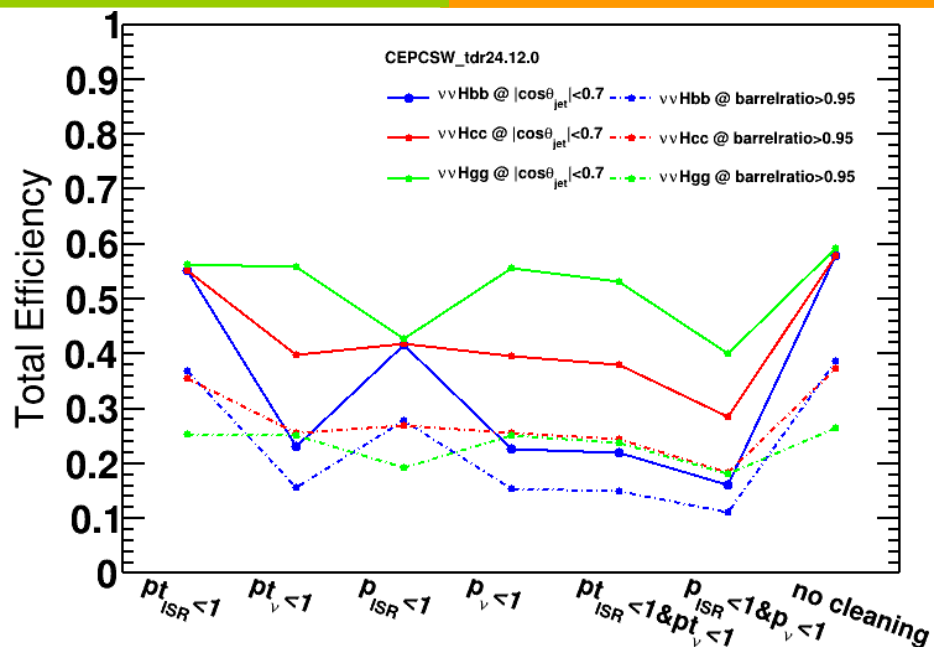
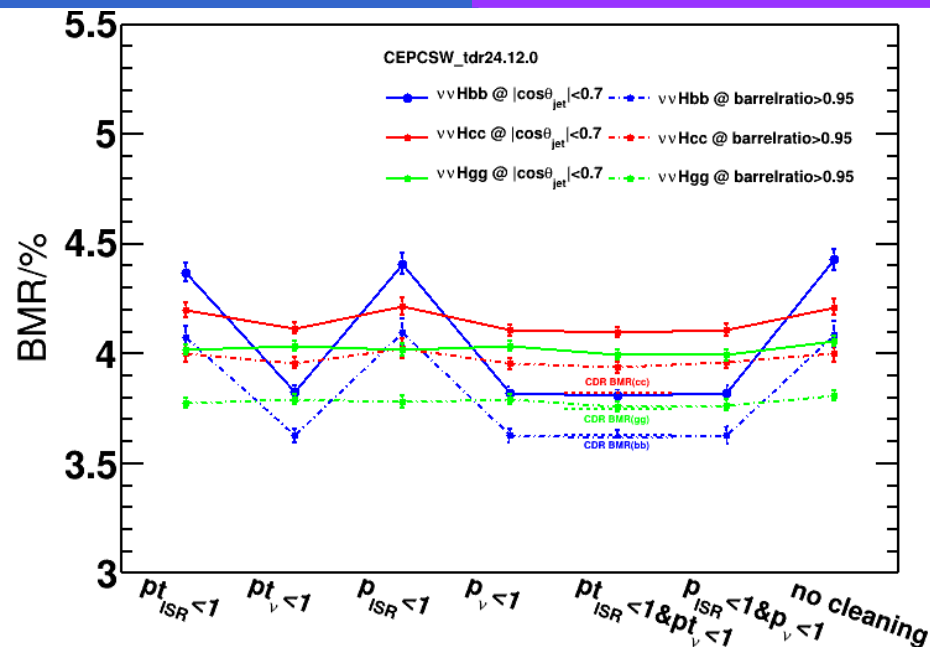
	gg(%)	bb(%)	cc(%)	WW*(%)	ZZ*(%)
Pt_ISR < 1 GeV	95.15	95.37	95.30	95.16	95.24
Pt_neutrino < 1 GeV	89.33	39.04	66.36	37.46	41.39
Cos(Theta_Jet) < 0.85	67.30	28.65	49.31	–	–

Table 3. Higgs boson mass resolution (sigma/Mean) for different decay modes with jets as final state particles, after event cleaning.

$H \rightarrow bb$	$H \rightarrow cc$	$H \rightarrow gg$	$H \rightarrow WW^*$	$H \rightarrow ZZ^*$
3.63%	3.82%	3.75%	3.81%	3.74%

CDR reference

BMR – performance of 24.12.0



Former result – consistent with CDR

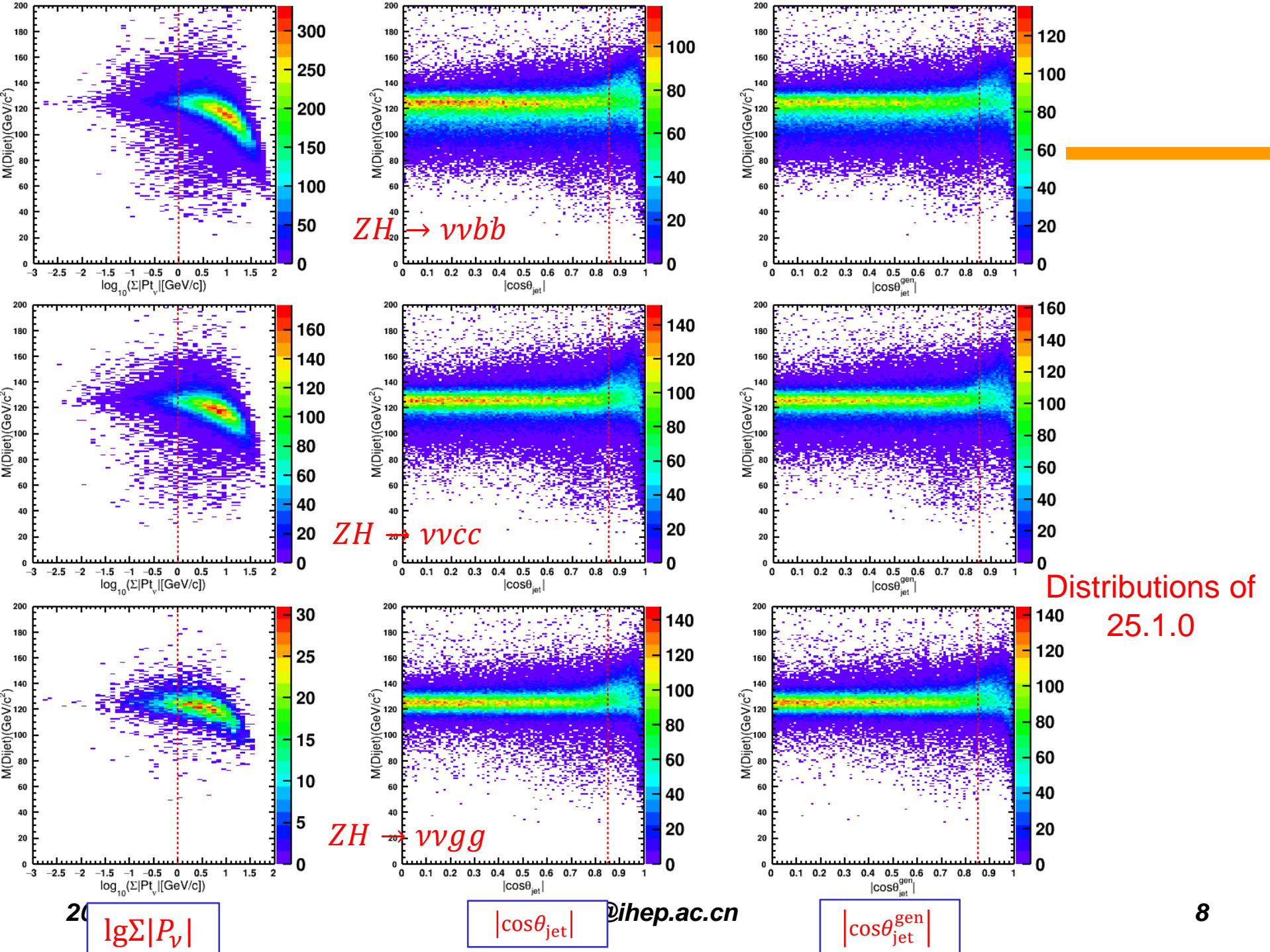
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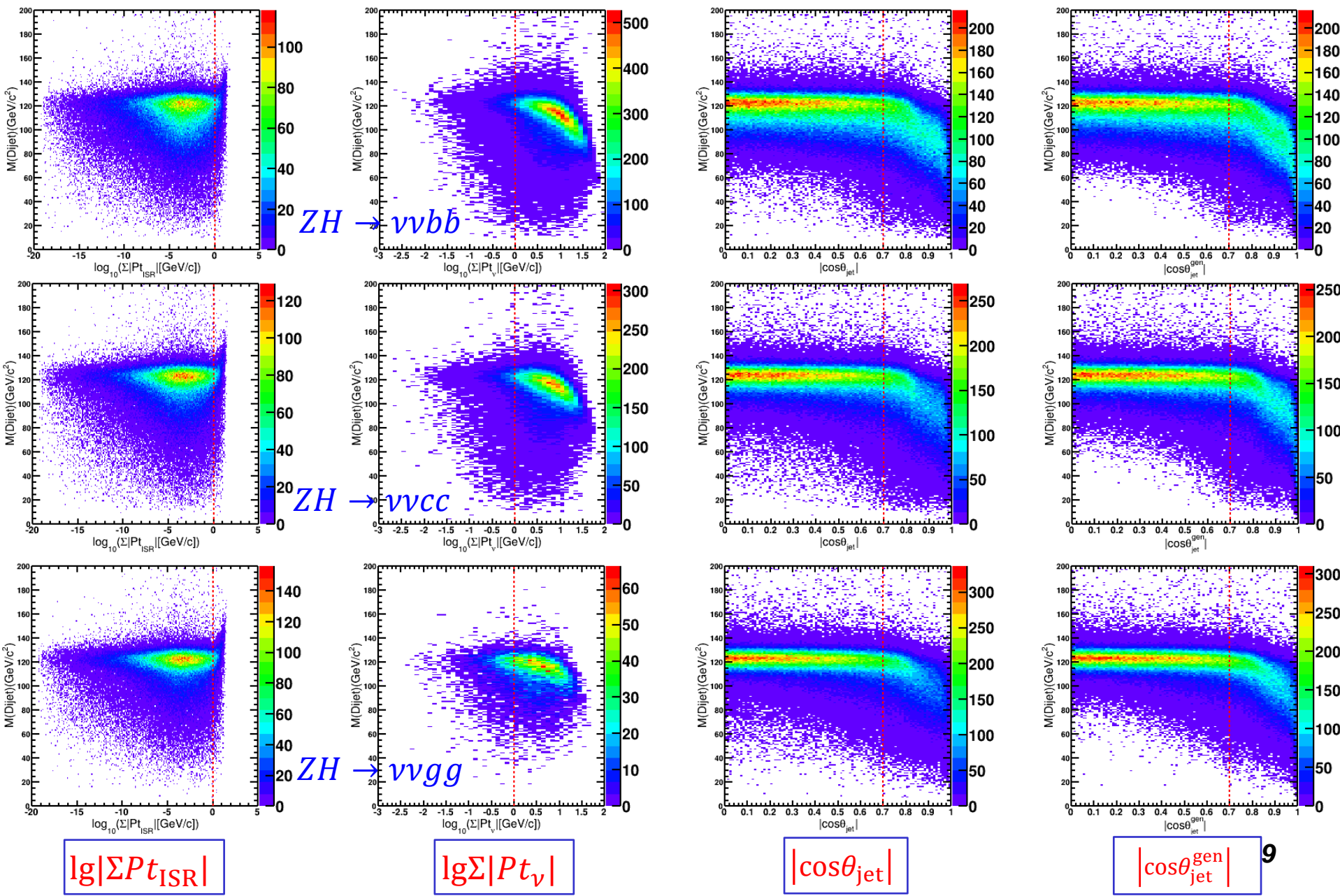
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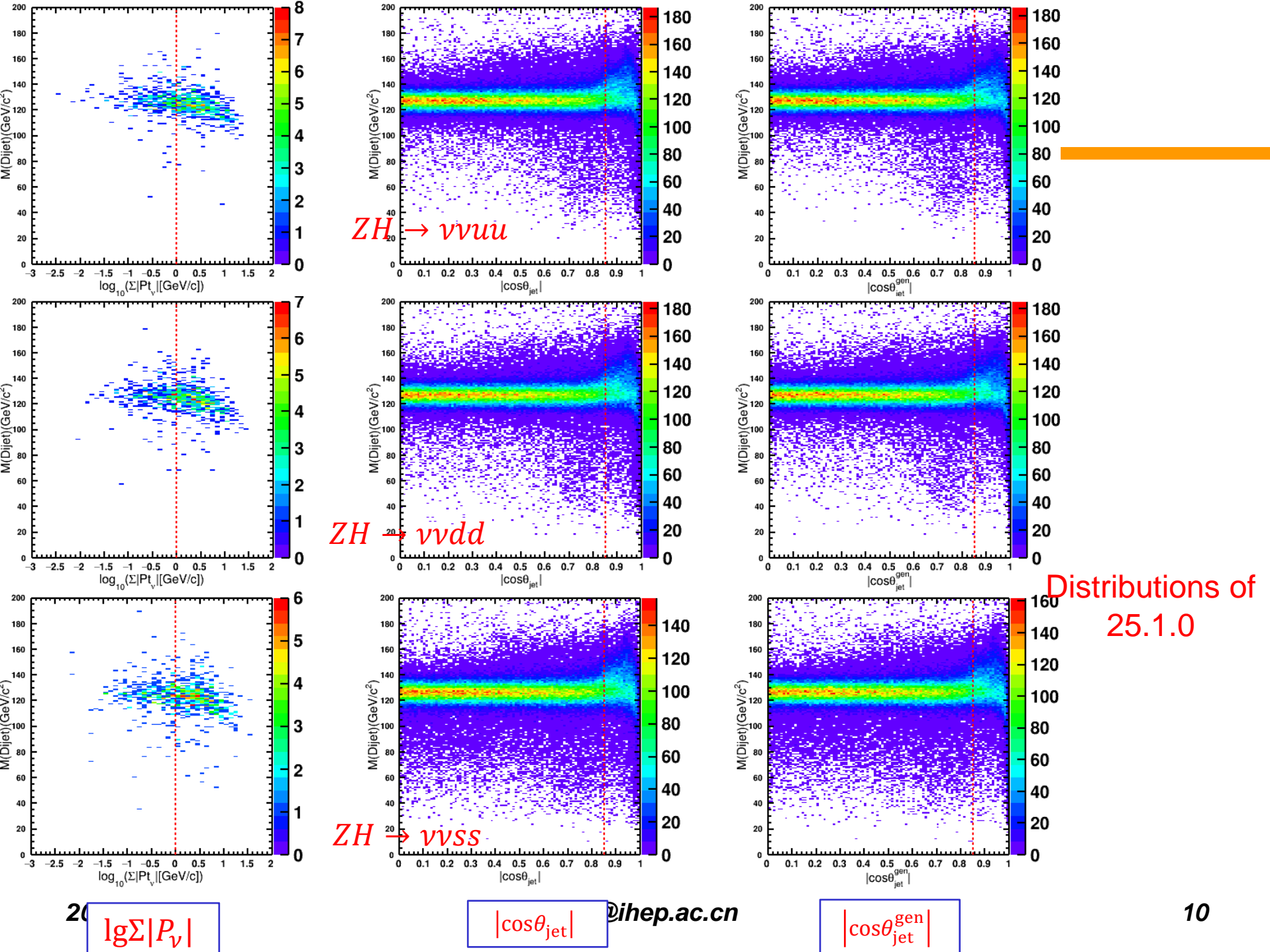
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3.63%	3.82%	3.75%	3.81%	3.74%

CDR reference



Distributions of 24.12.0



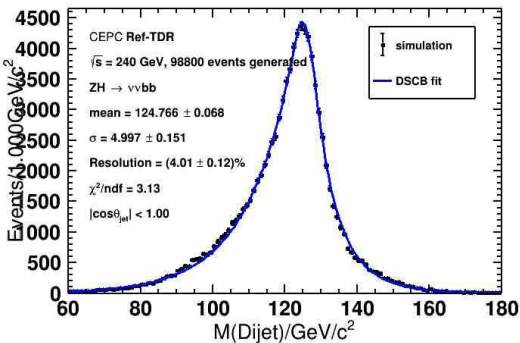
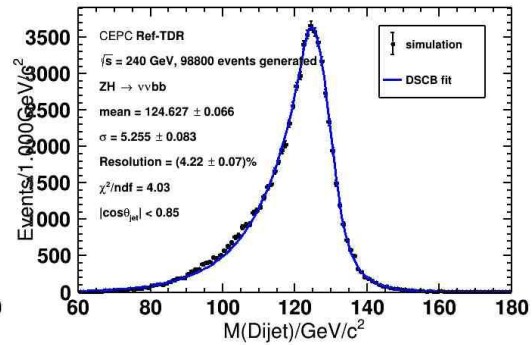
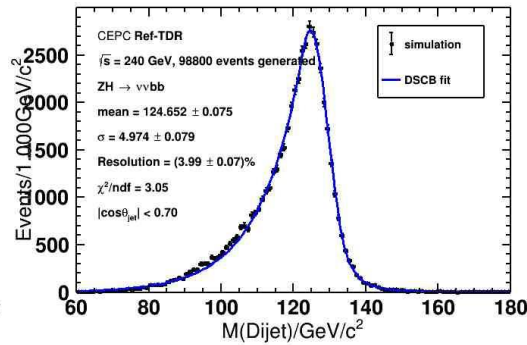
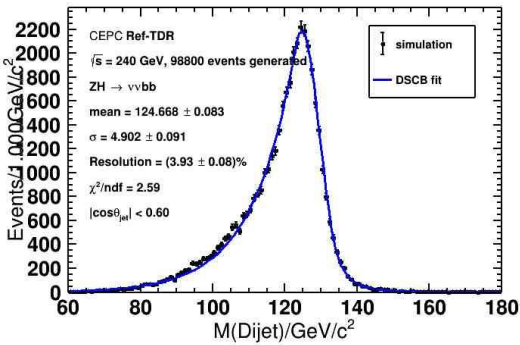
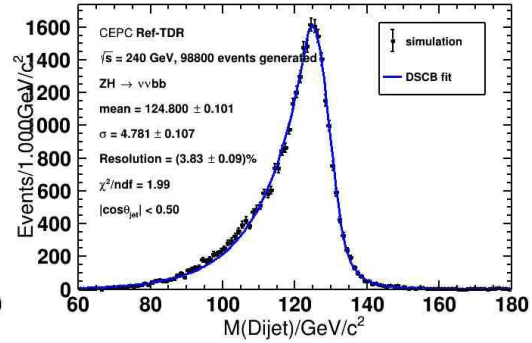
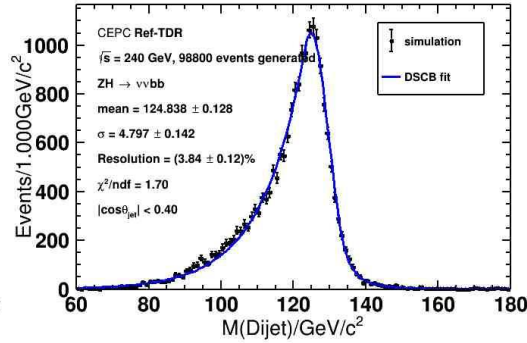
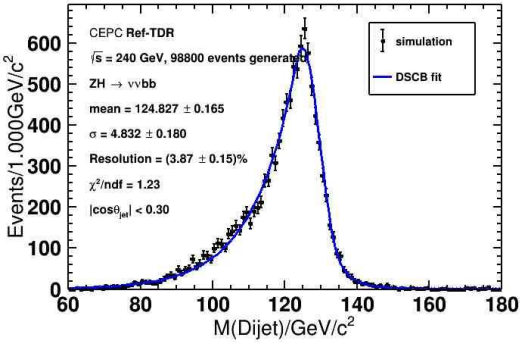


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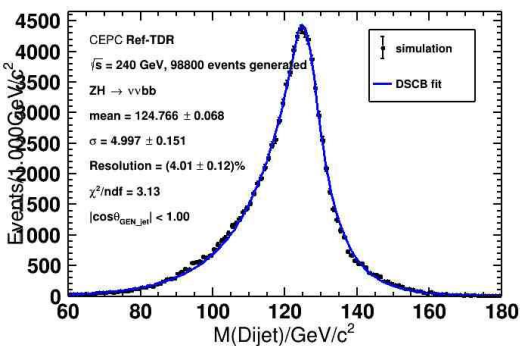
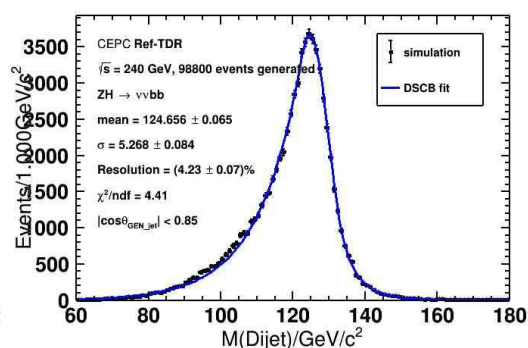
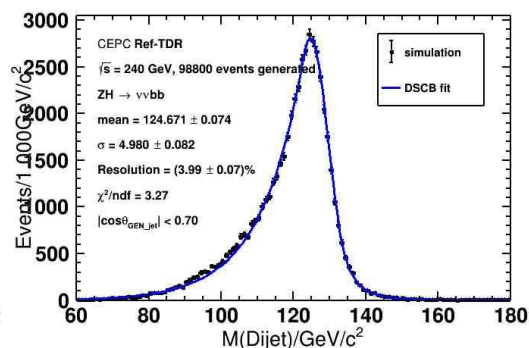
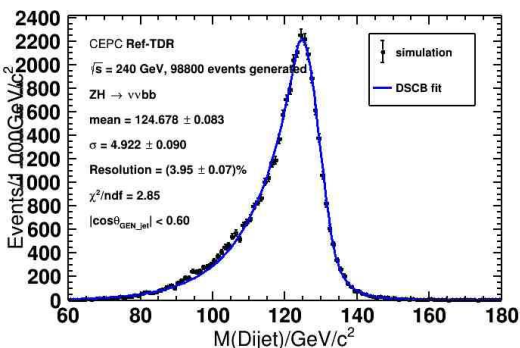
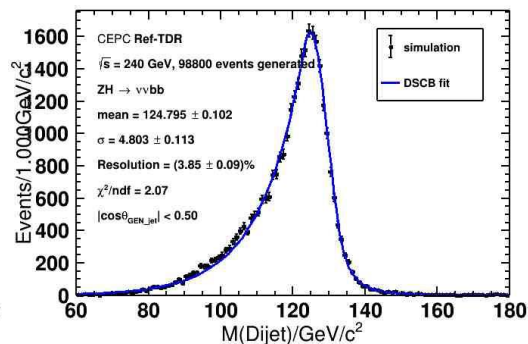
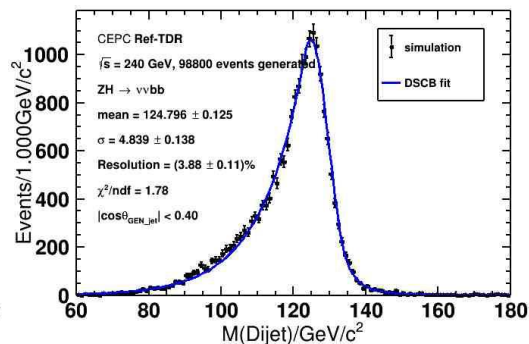
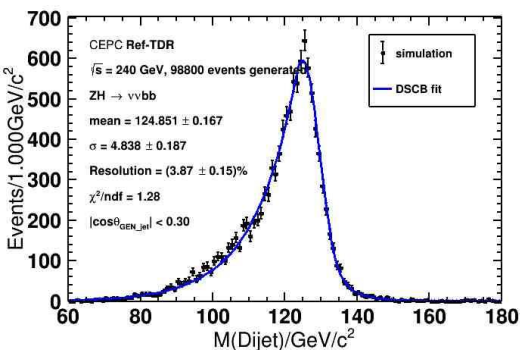


- ❖ Fit plots of 25.1.0

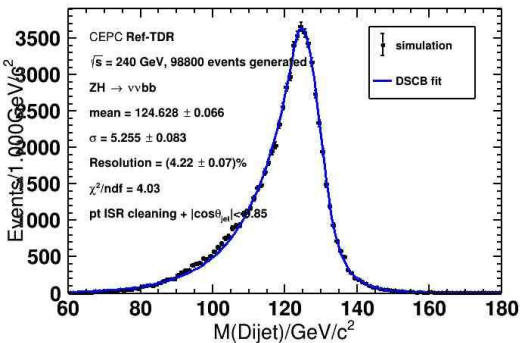
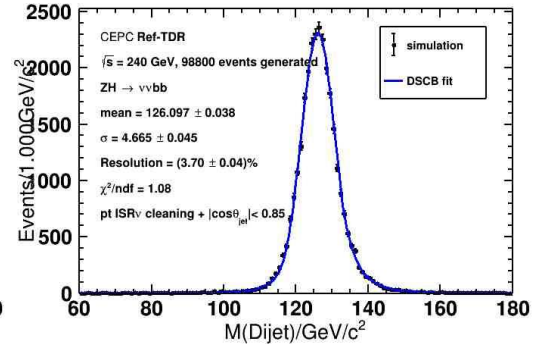
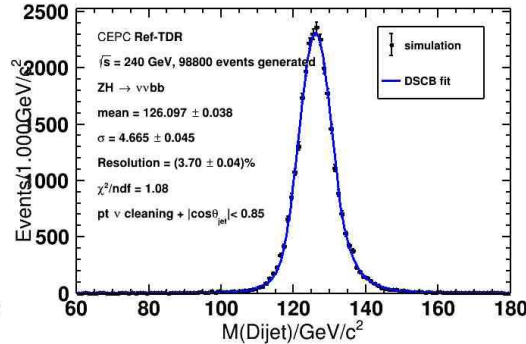
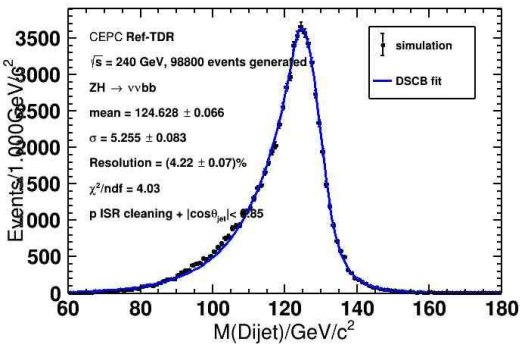
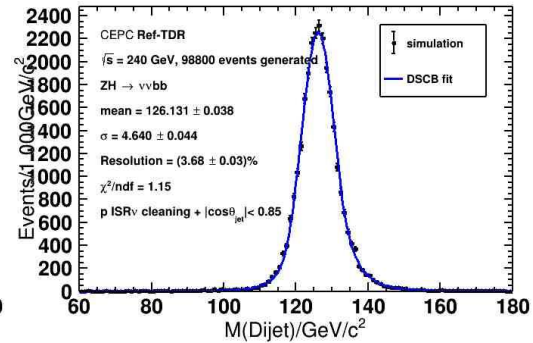
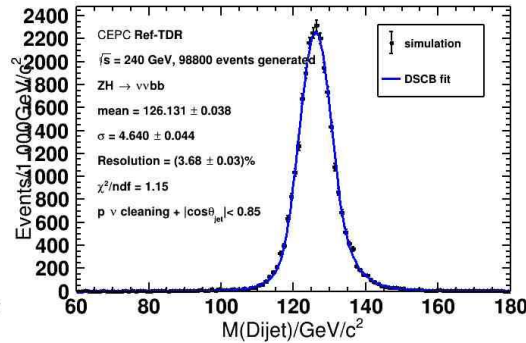
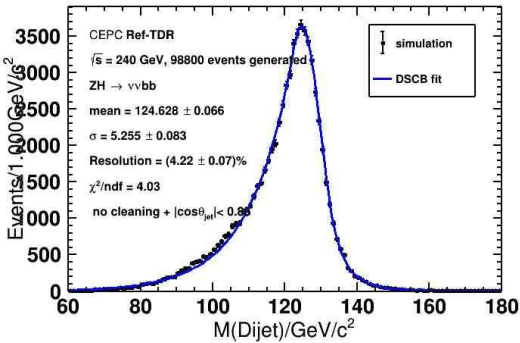
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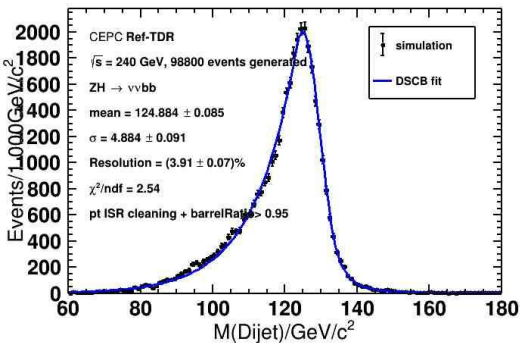
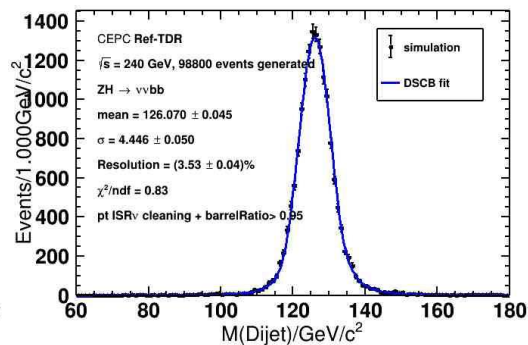
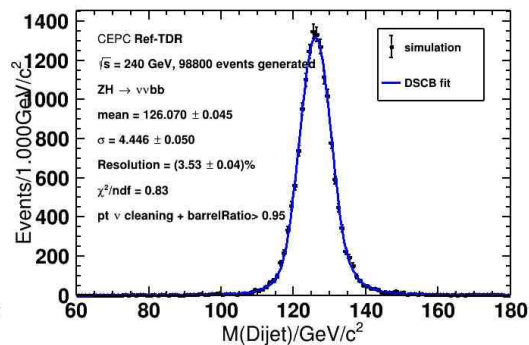
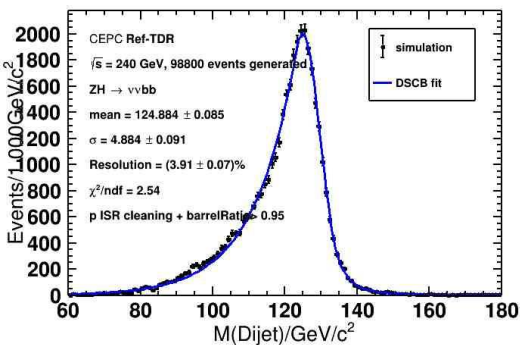
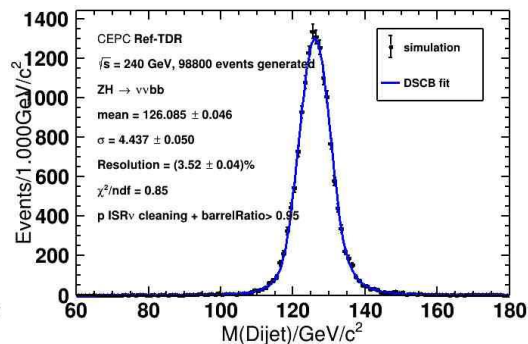
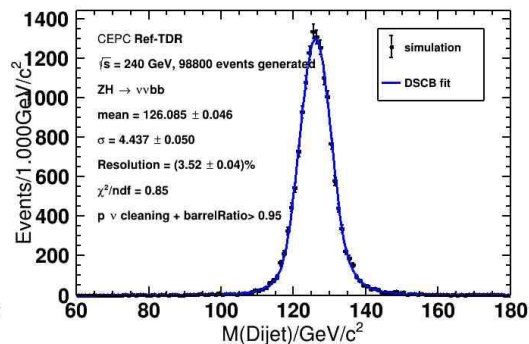
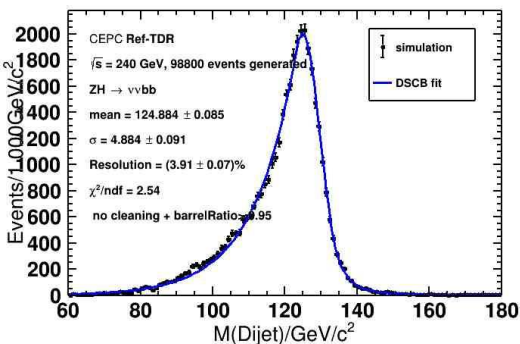
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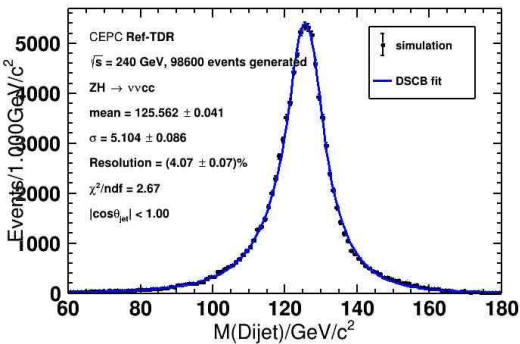
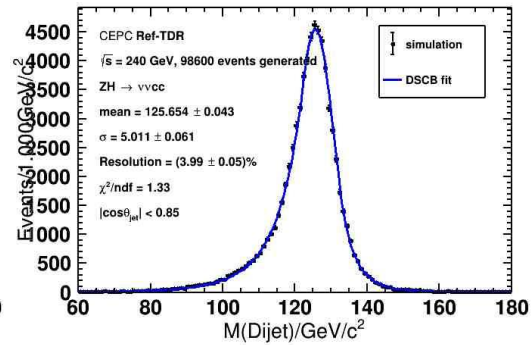
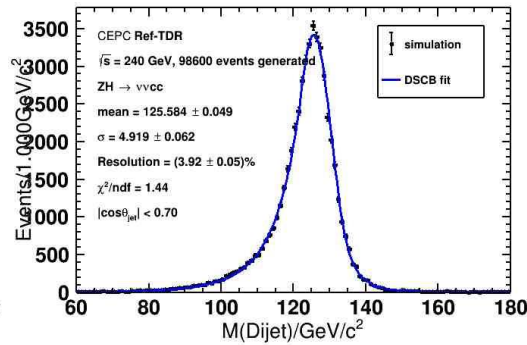
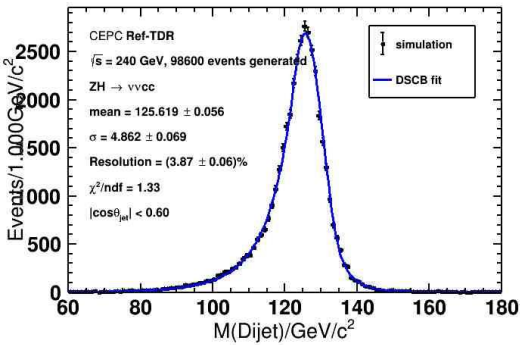
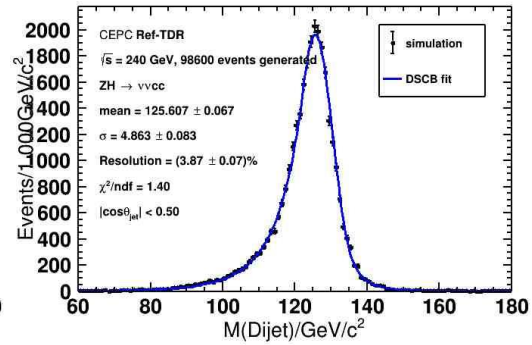
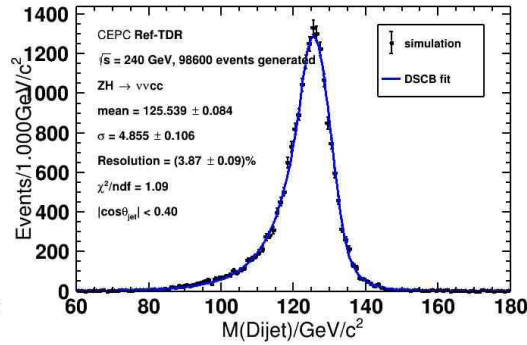
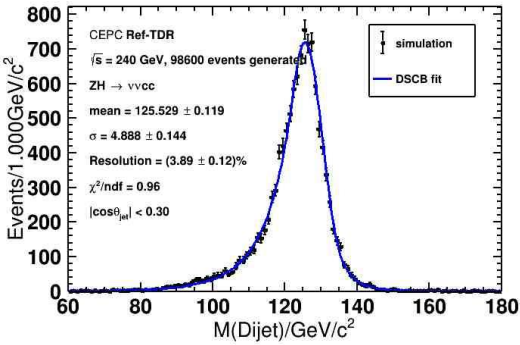
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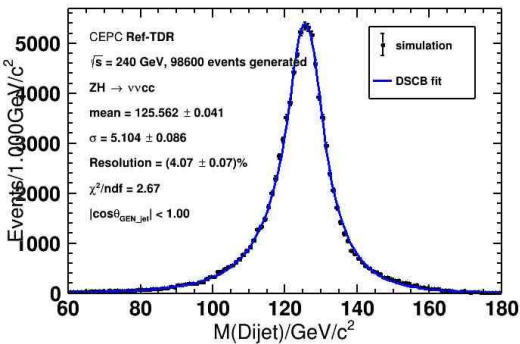
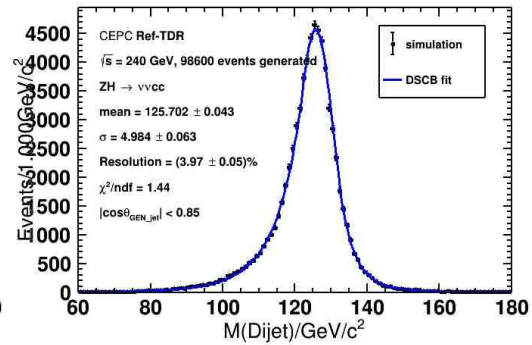
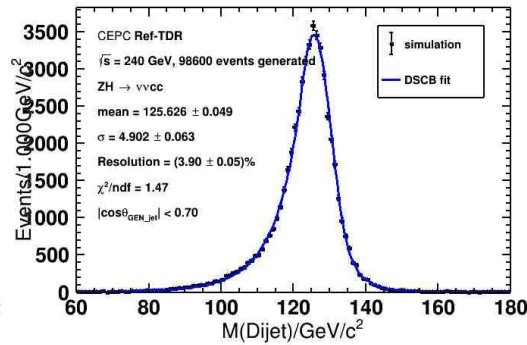
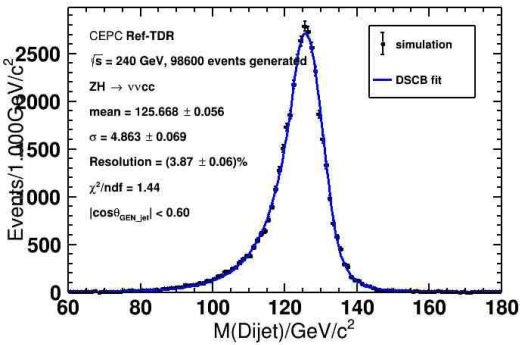
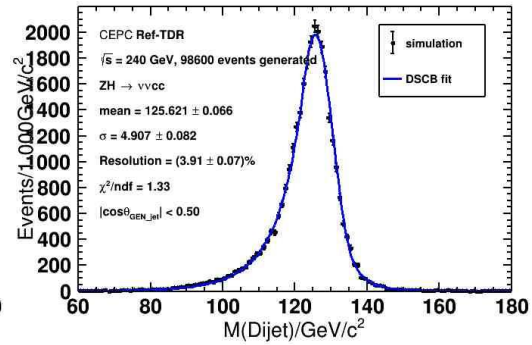
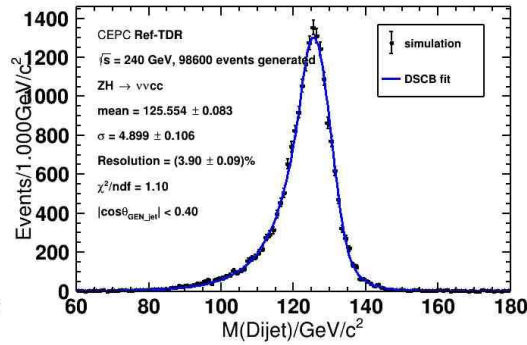
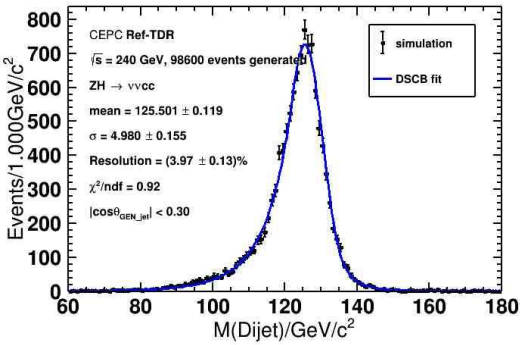
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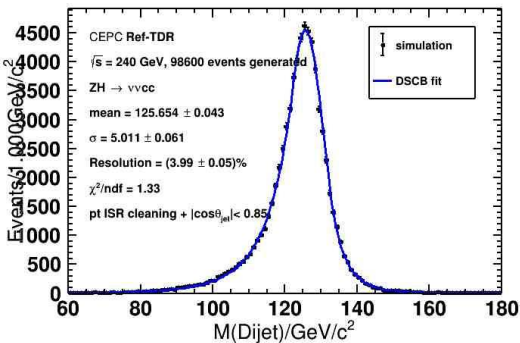
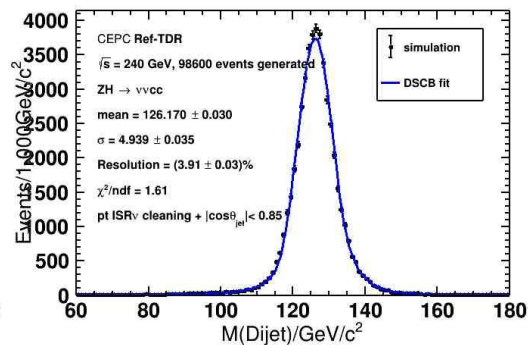
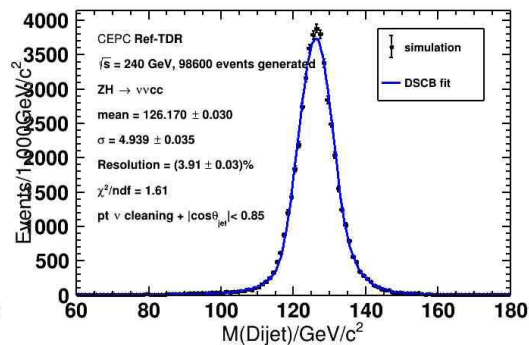
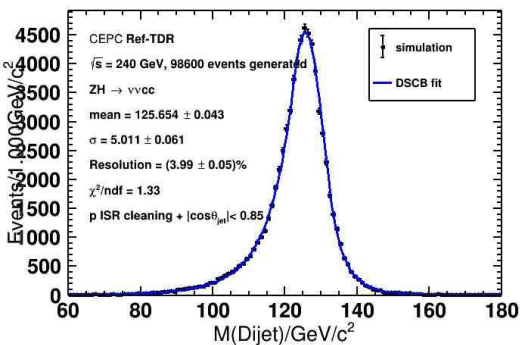
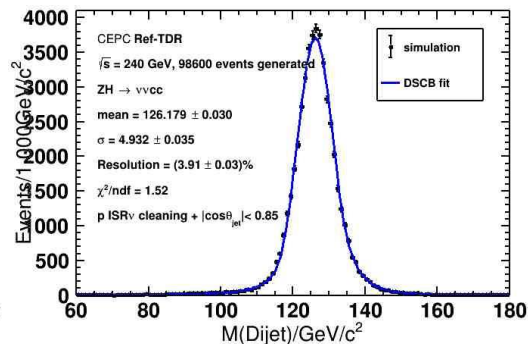
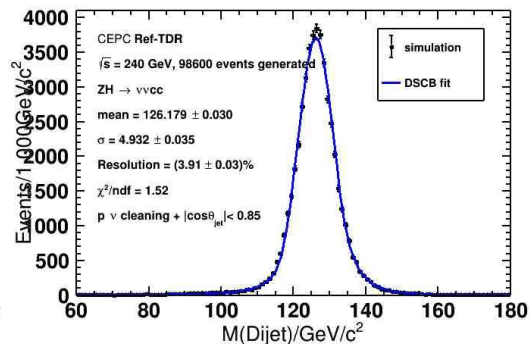
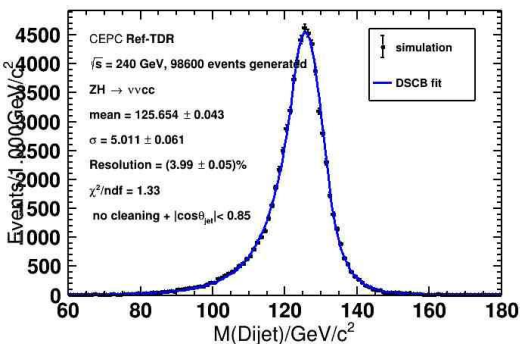
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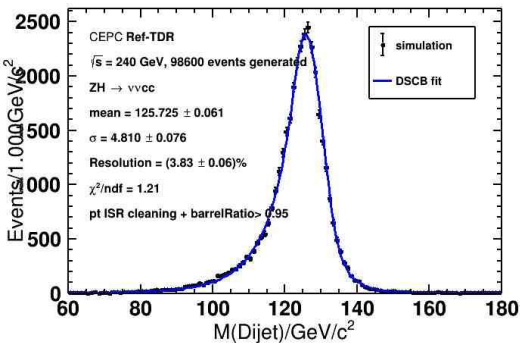
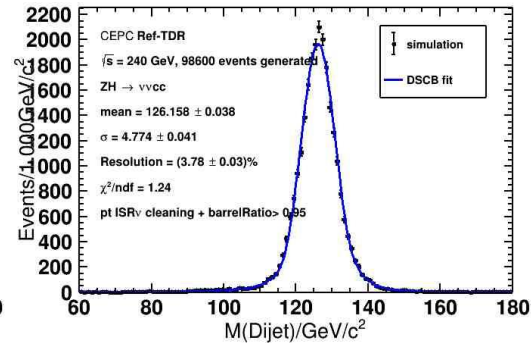
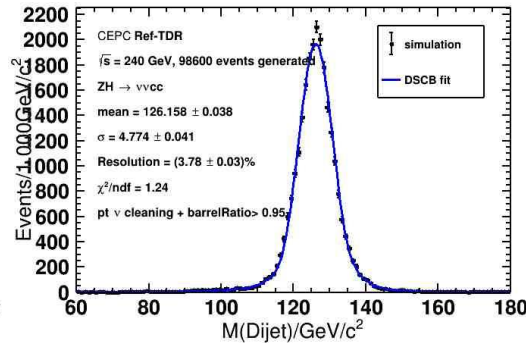
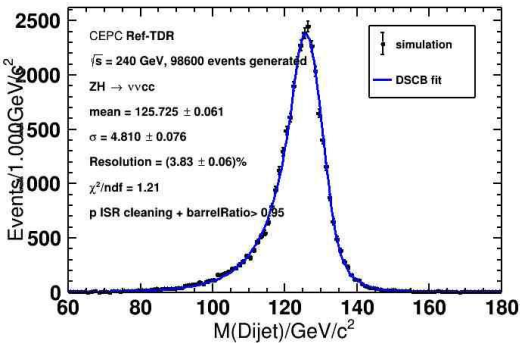
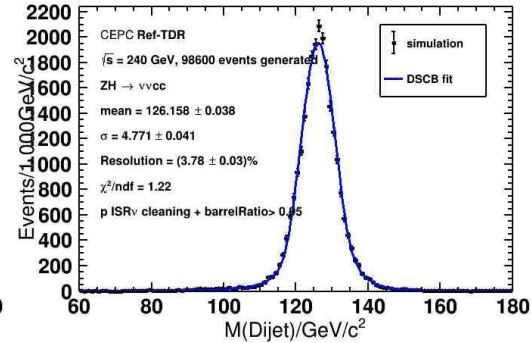
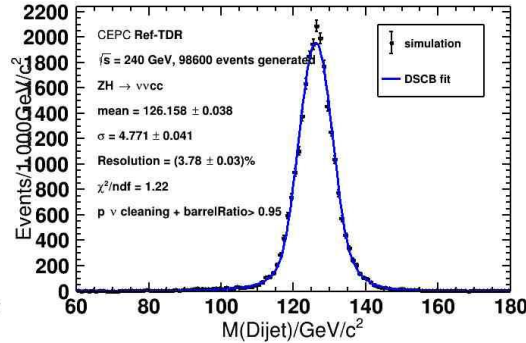
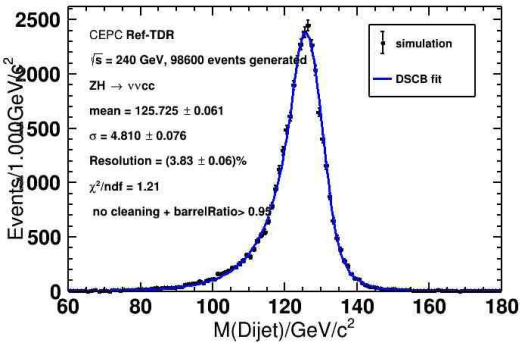
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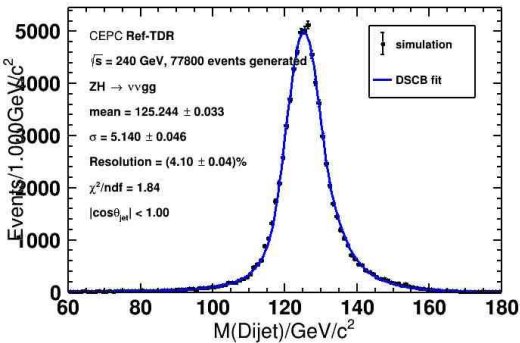
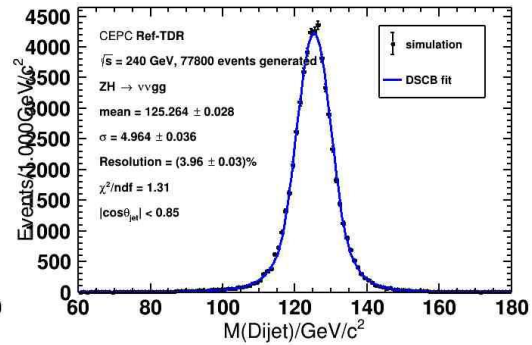
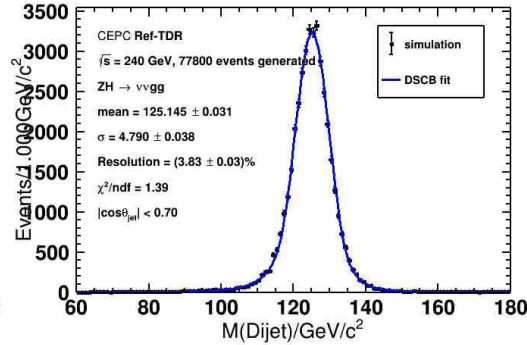
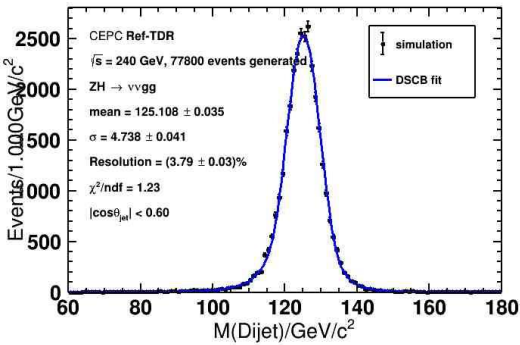
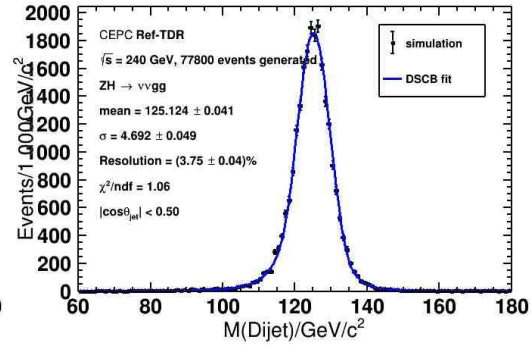
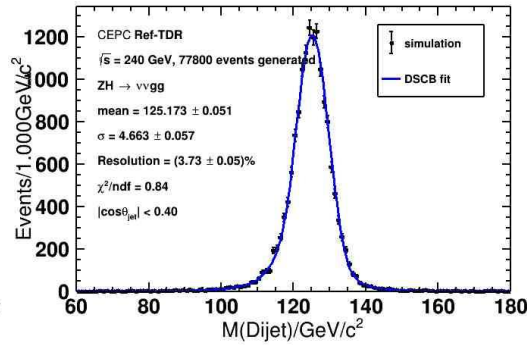
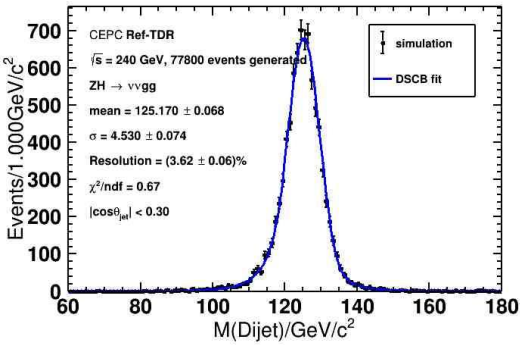
vvcc--jet event cleaning



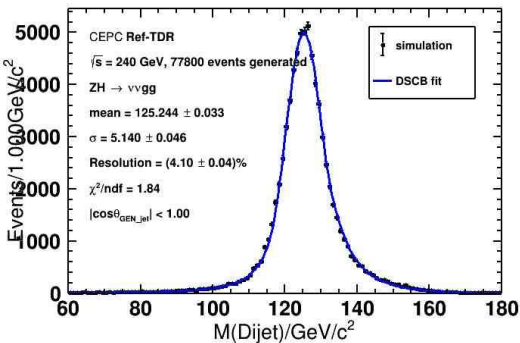
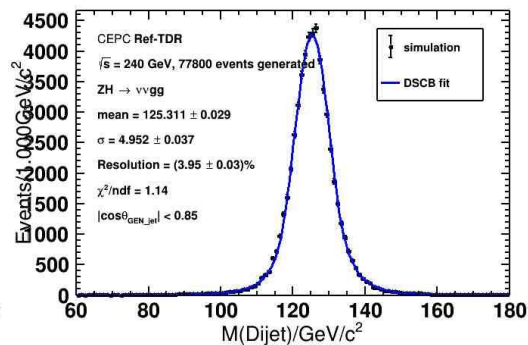
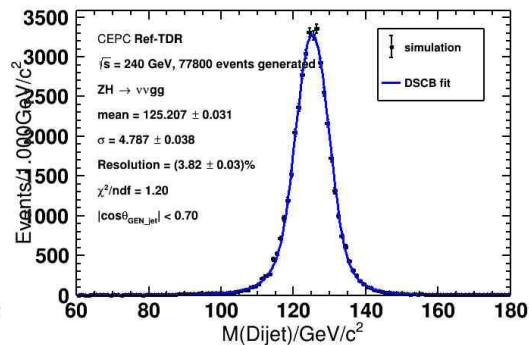
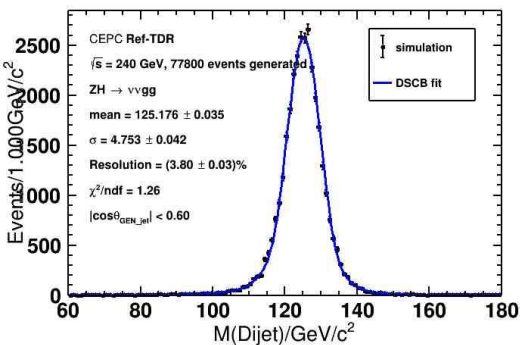
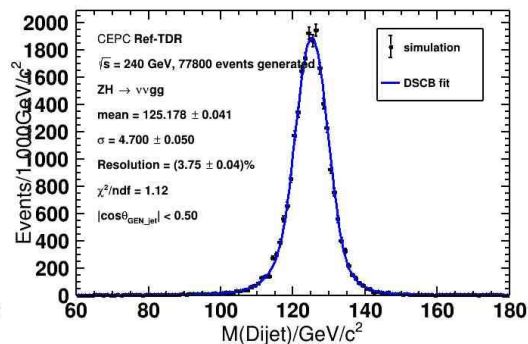
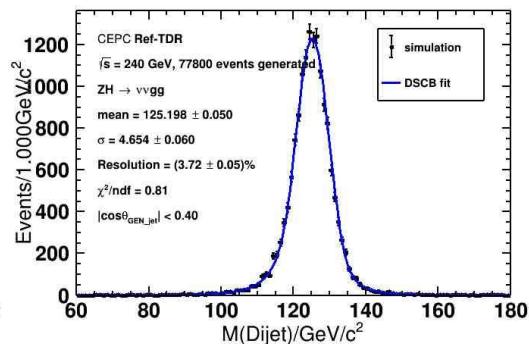
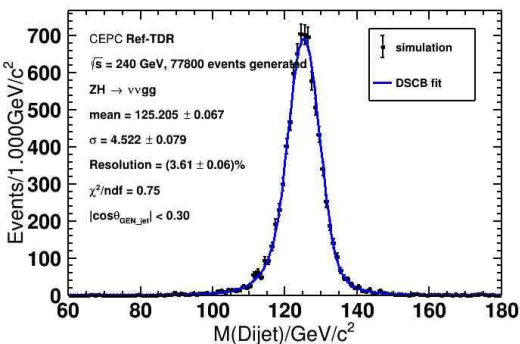
vvcc--barrelRatio event cleaning



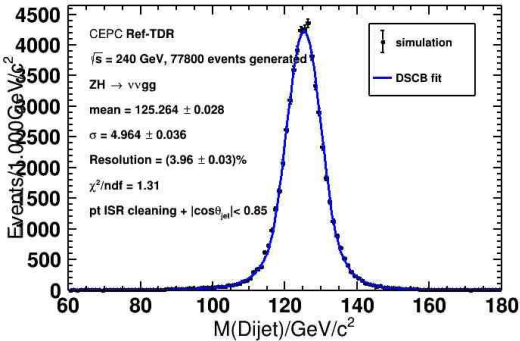
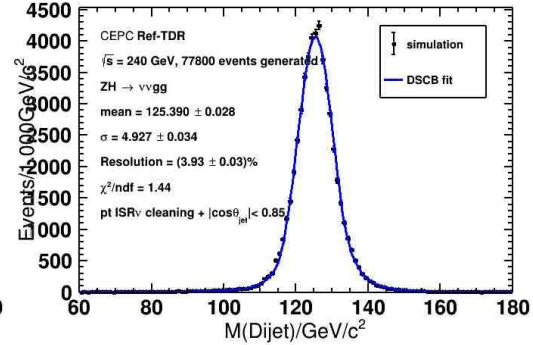
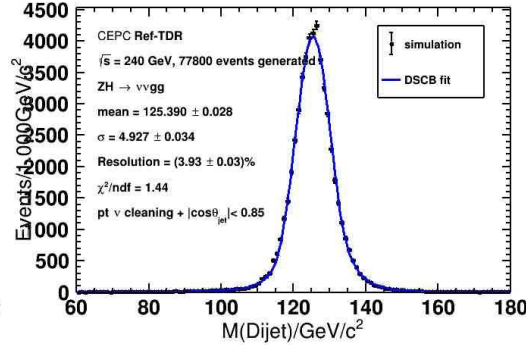
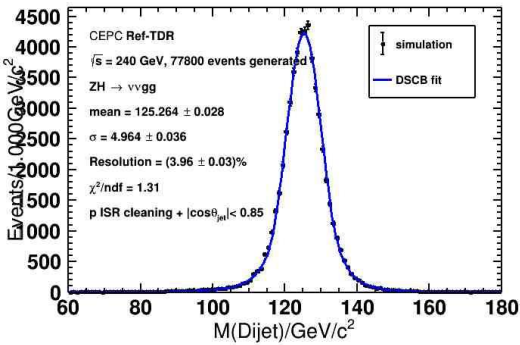
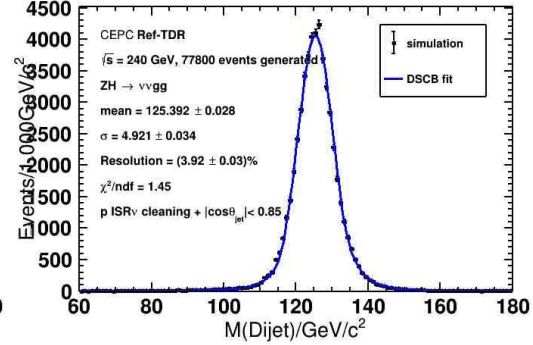
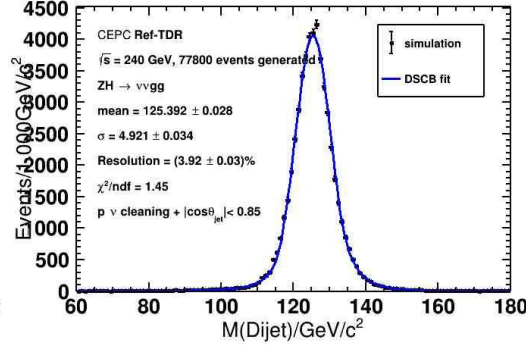
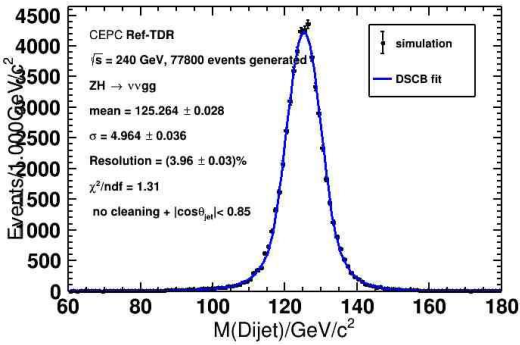
vvgg--jetcut



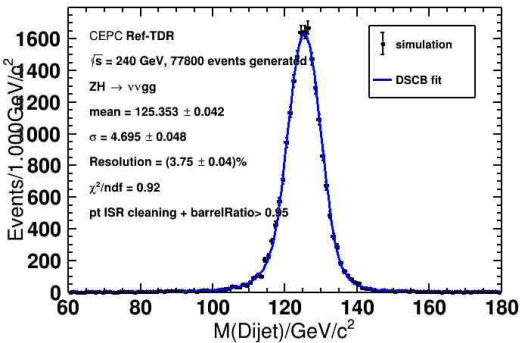
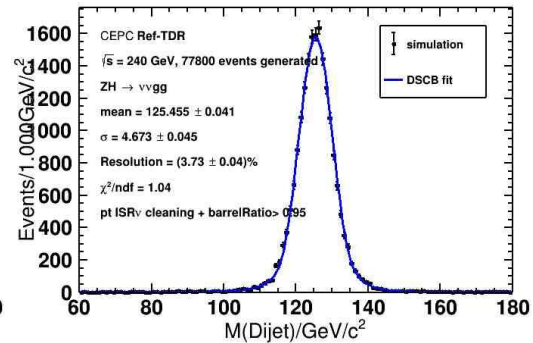
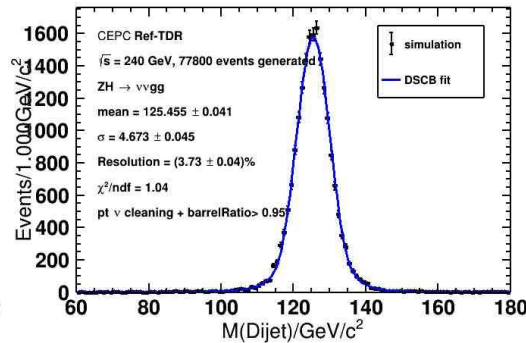
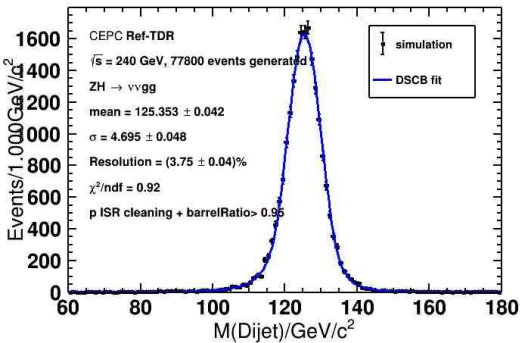
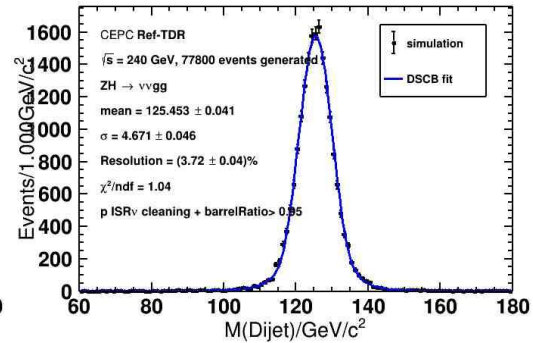
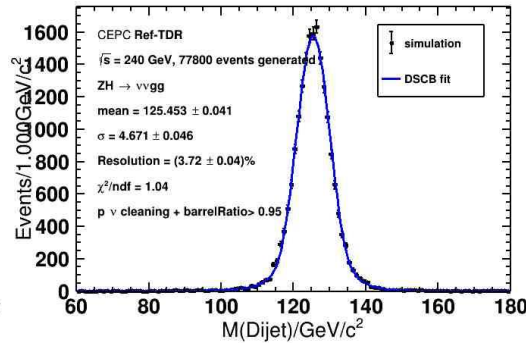
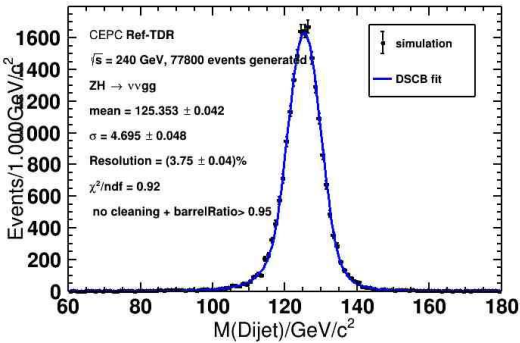
vvgg--genjetcut



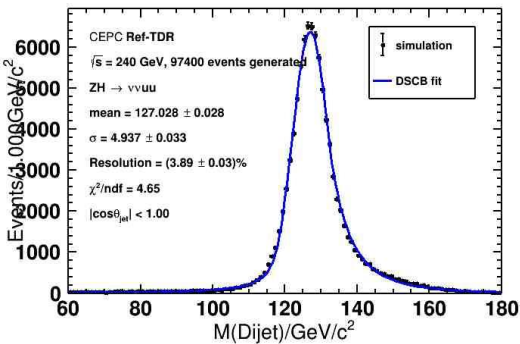
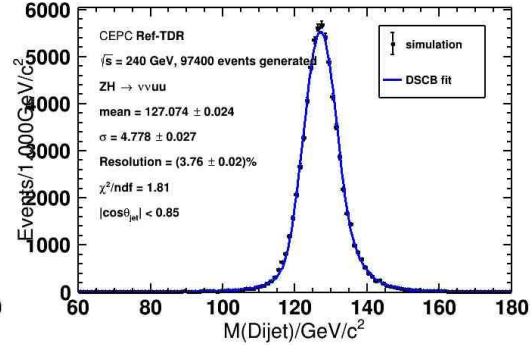
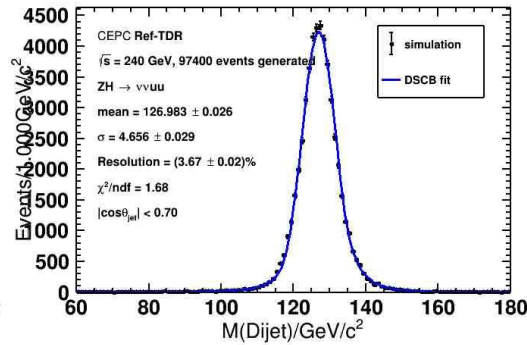
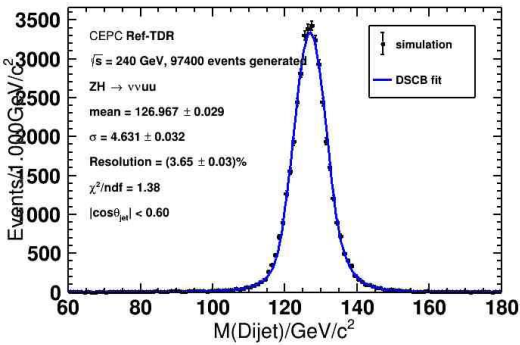
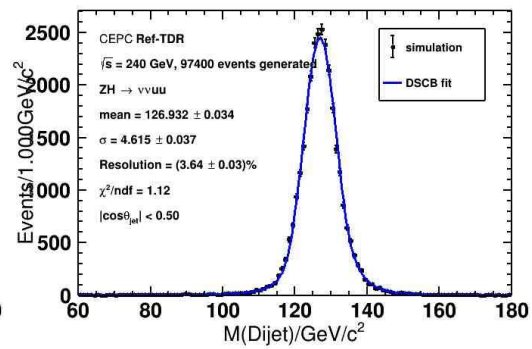
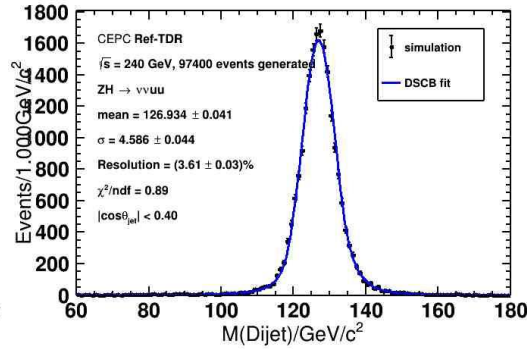
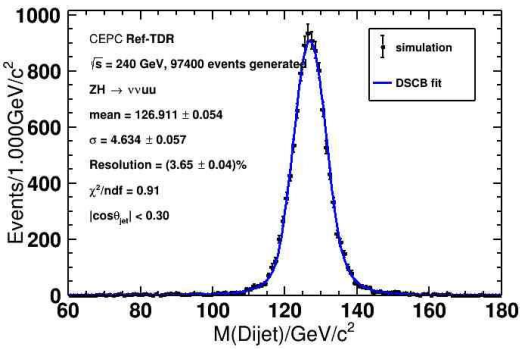
vvgg--jet event cleaning



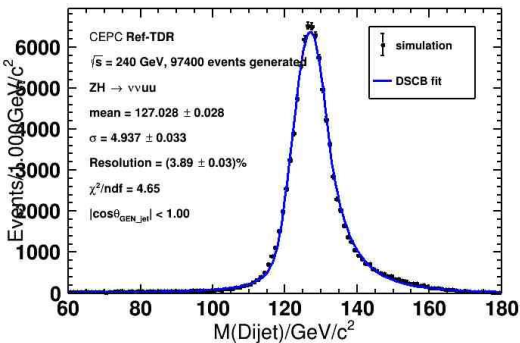
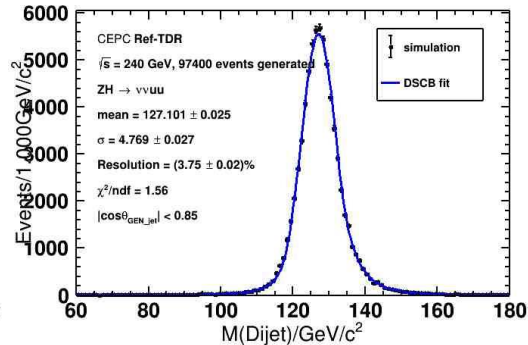
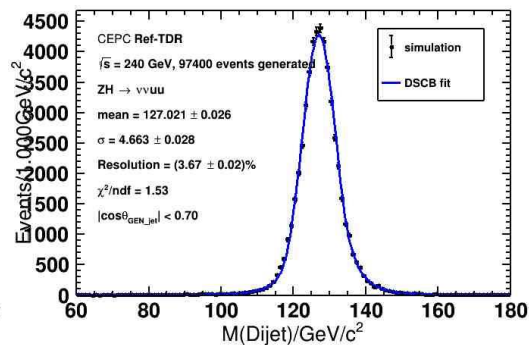
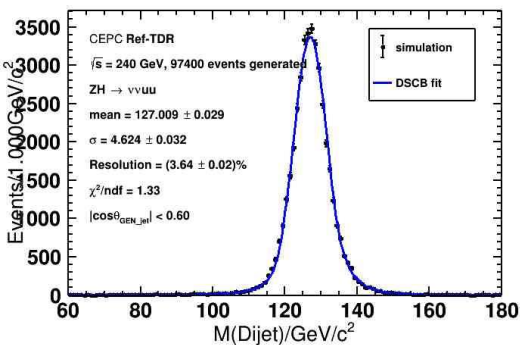
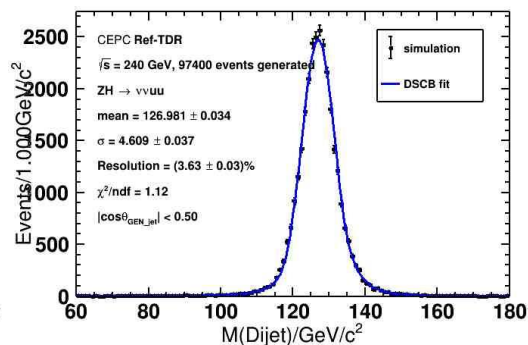
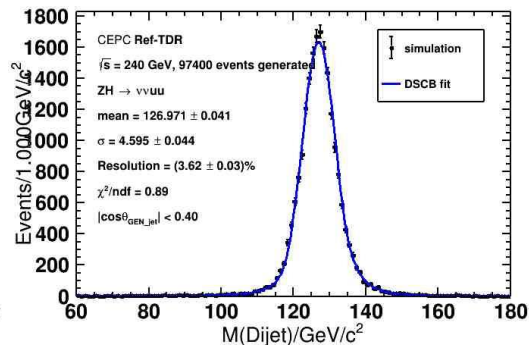
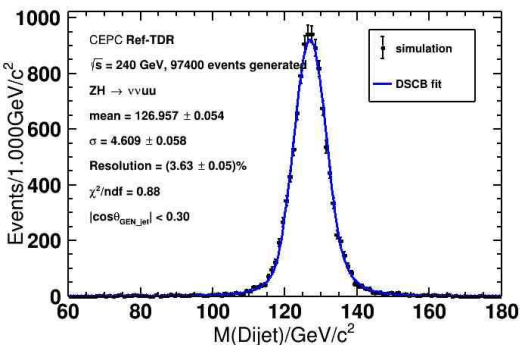
vvgg--barrelRatio event cleaning



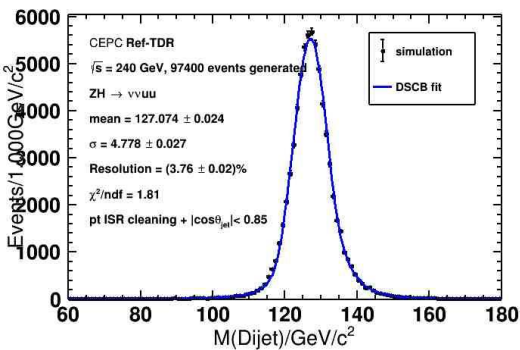
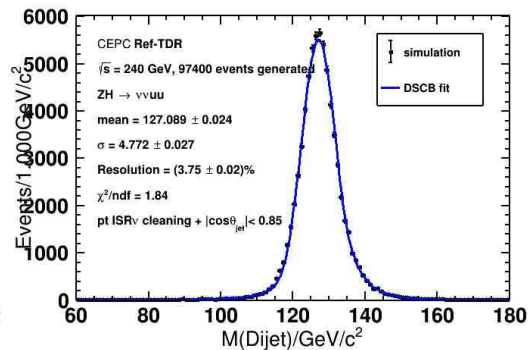
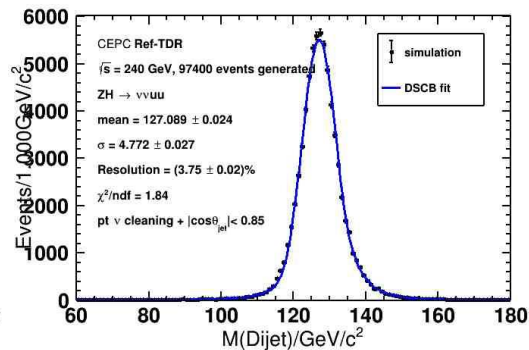
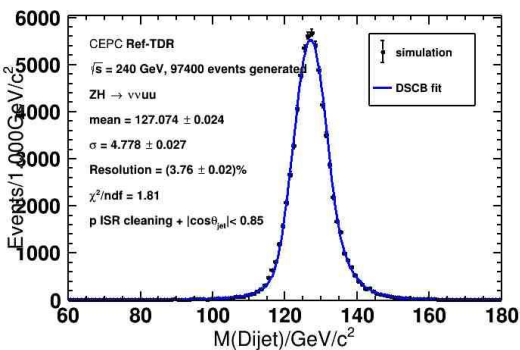
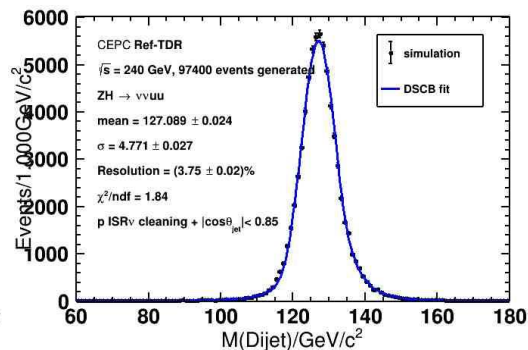
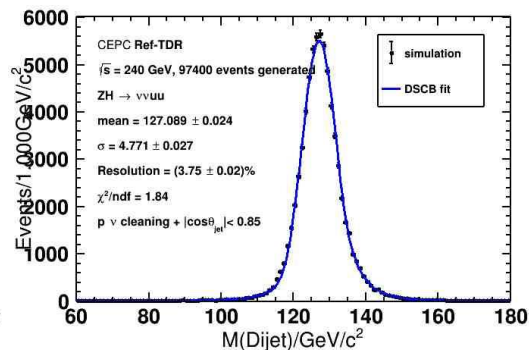
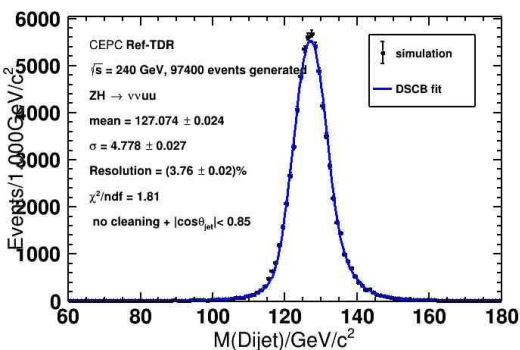
vvuu--jetcut



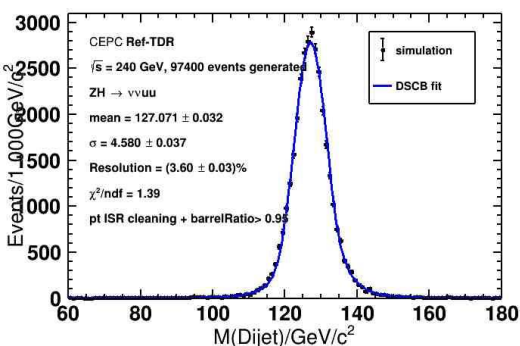
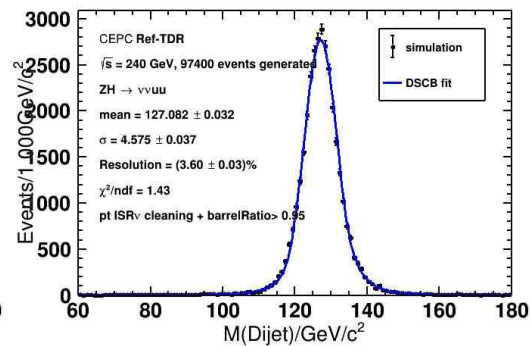
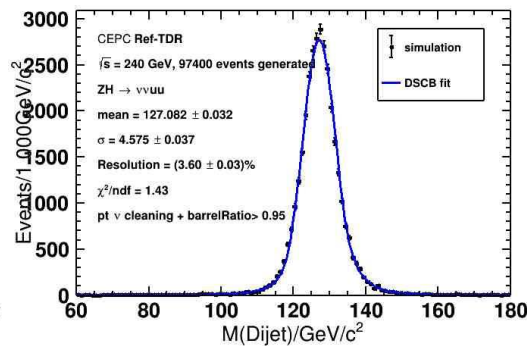
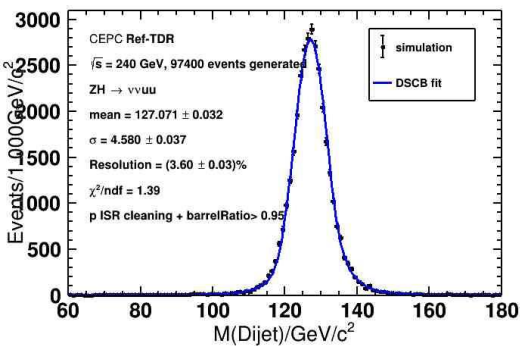
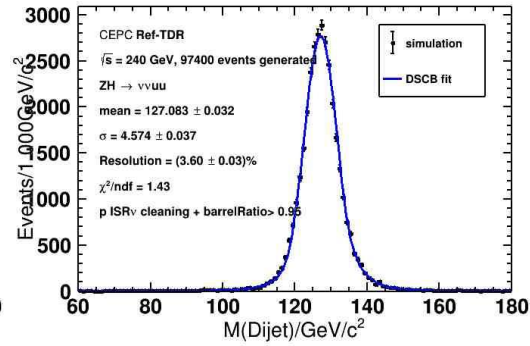
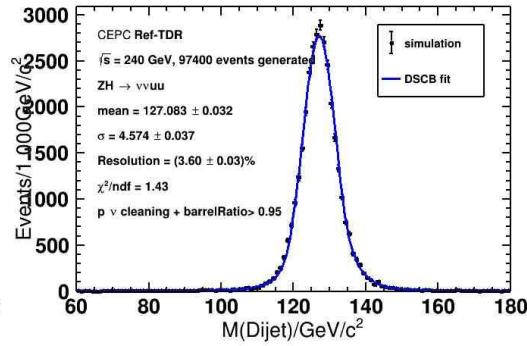
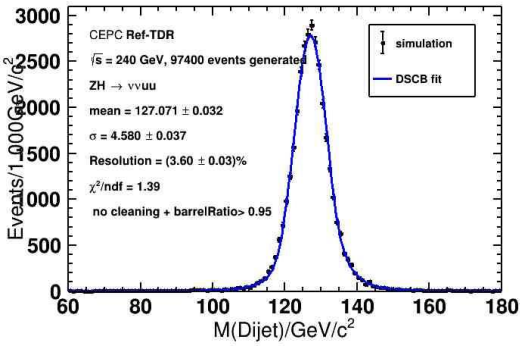
vvuu--genjetcut



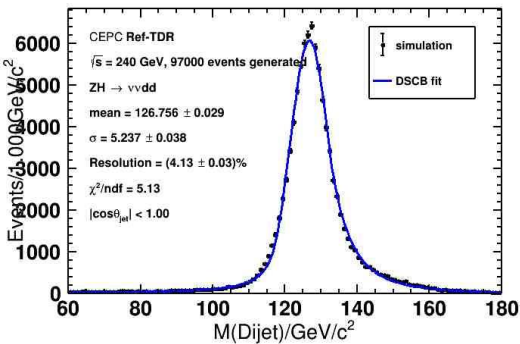
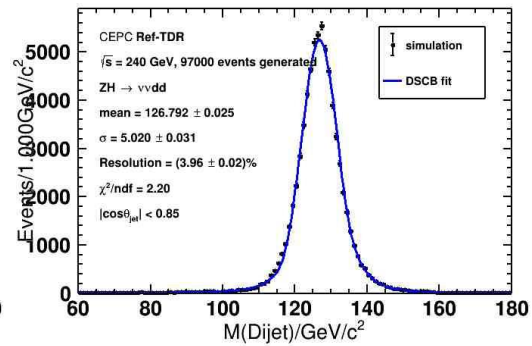
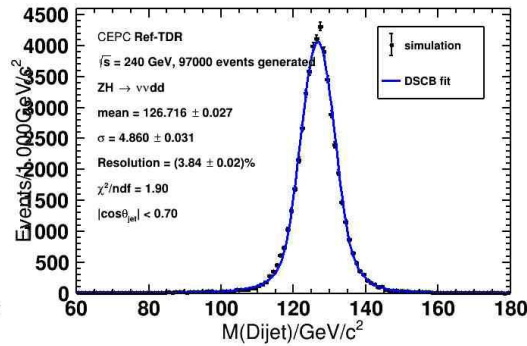
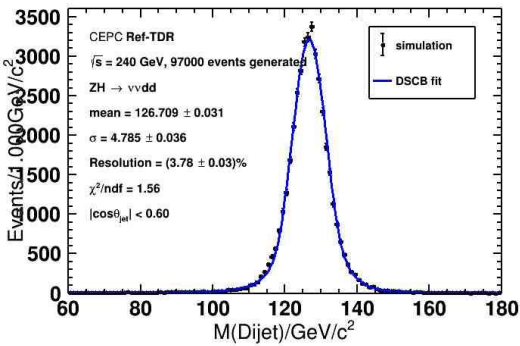
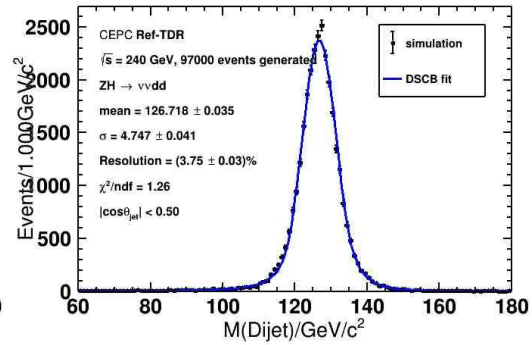
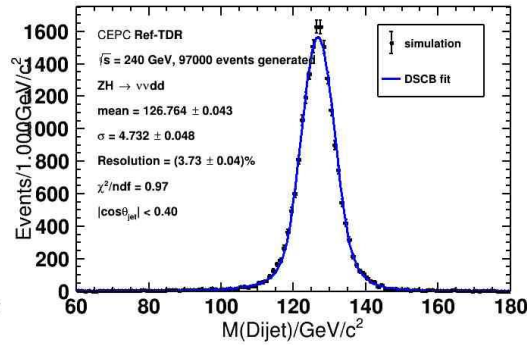
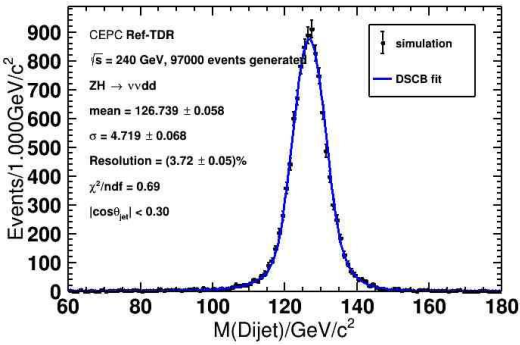
vvuu--jet event cleaning



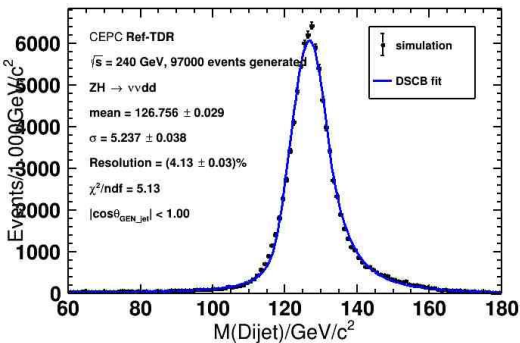
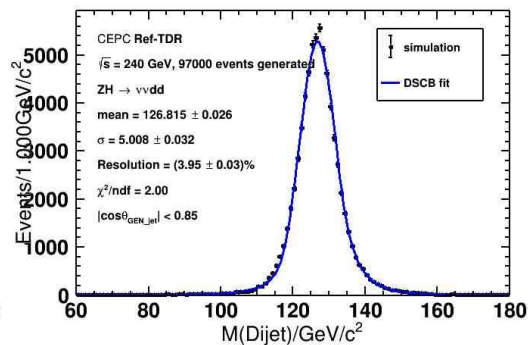
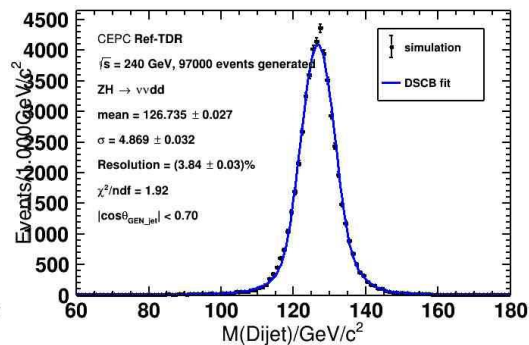
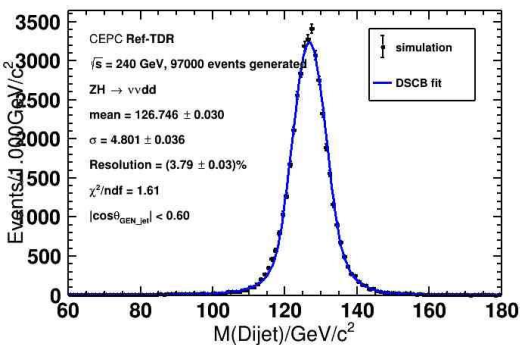
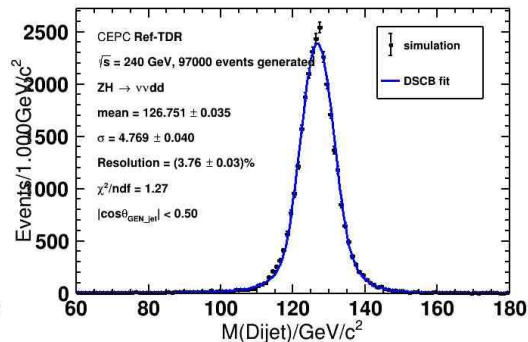
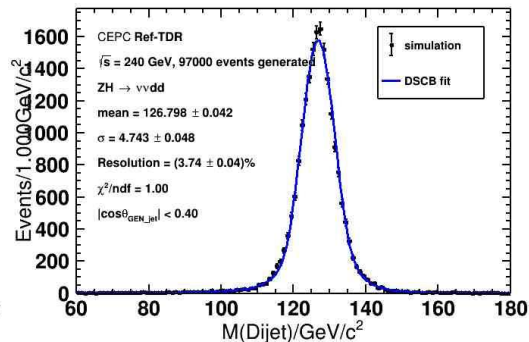
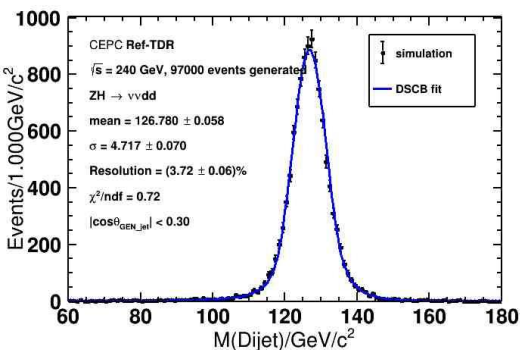
vvuu -- barrelRatio event cleaning



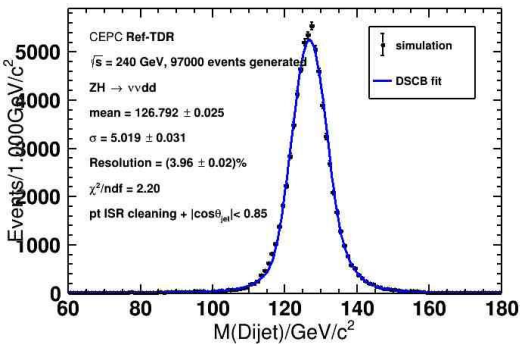
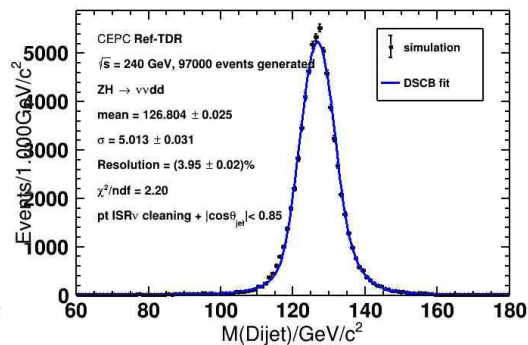
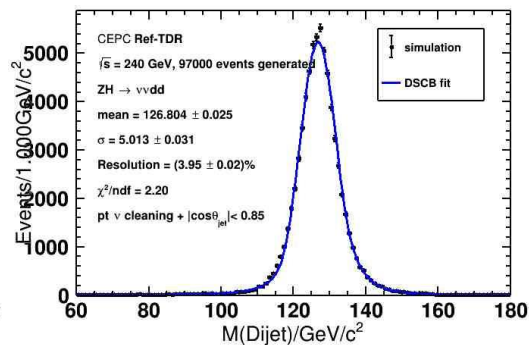
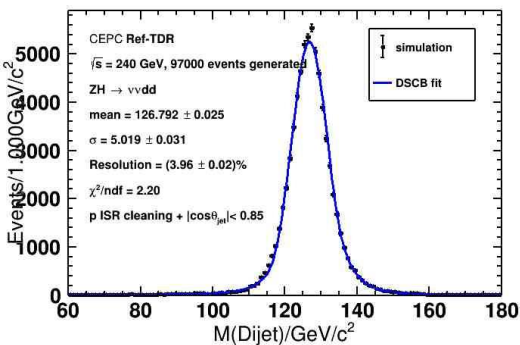
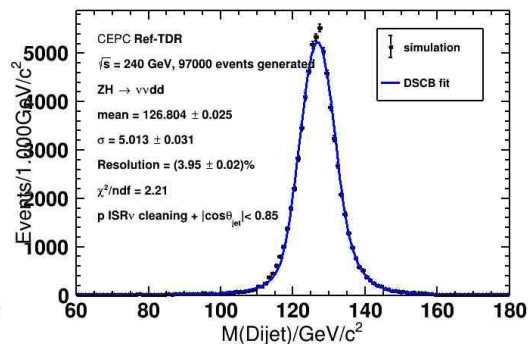
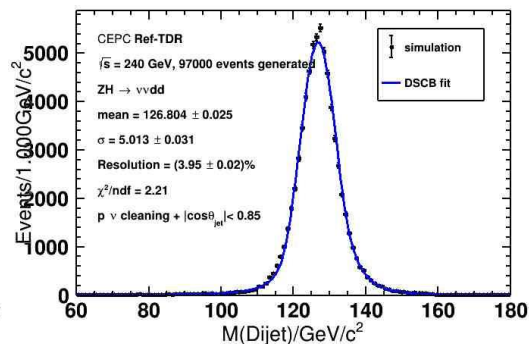
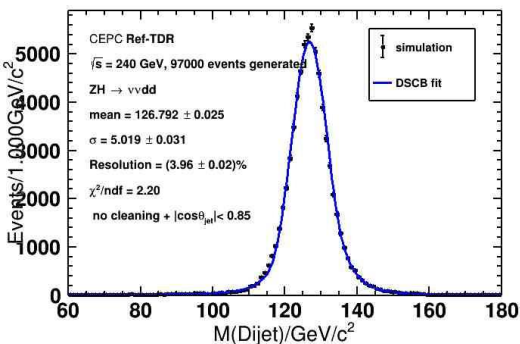
vvdd--jetcut



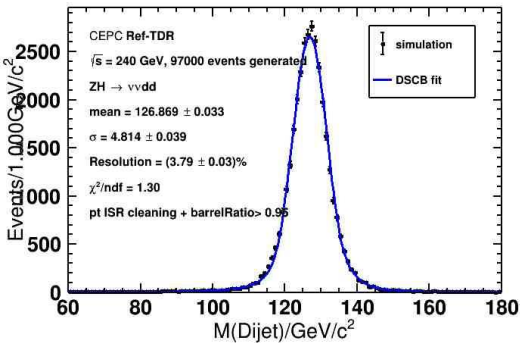
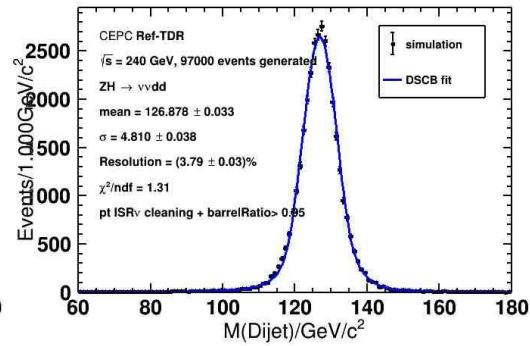
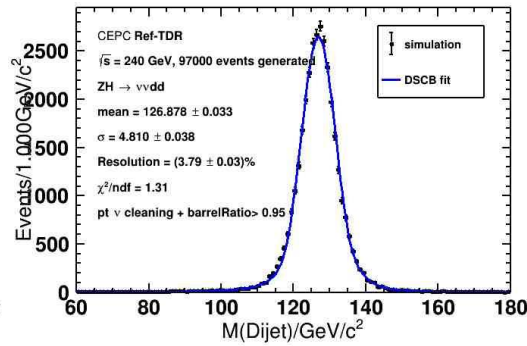
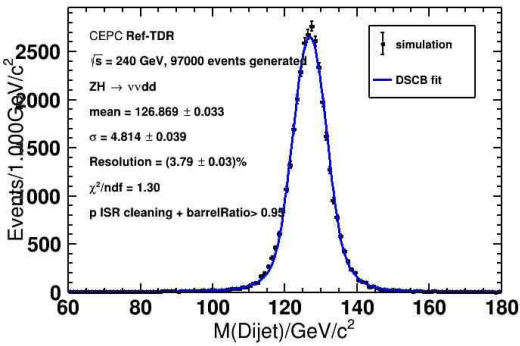
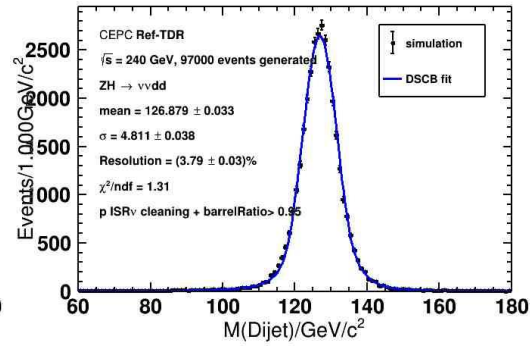
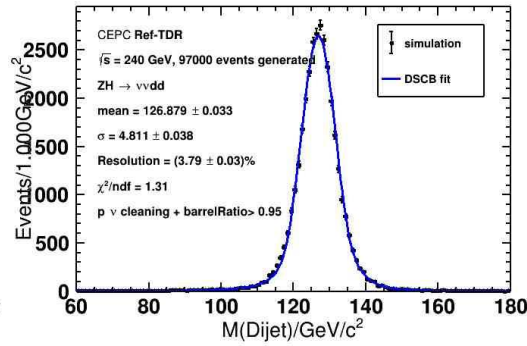
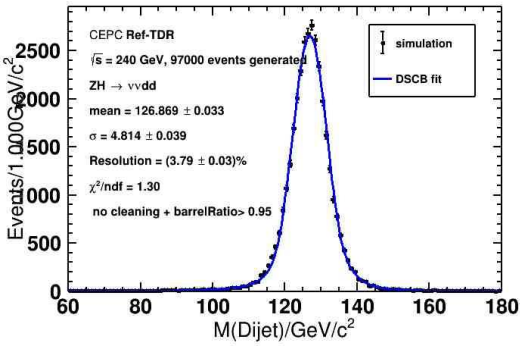
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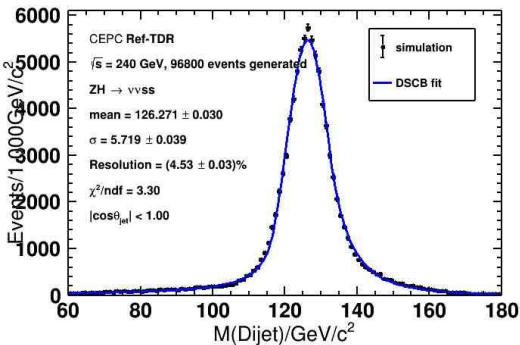
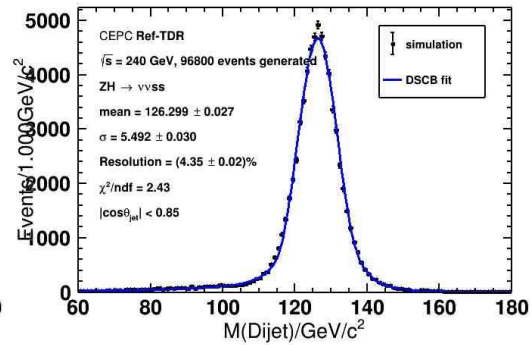
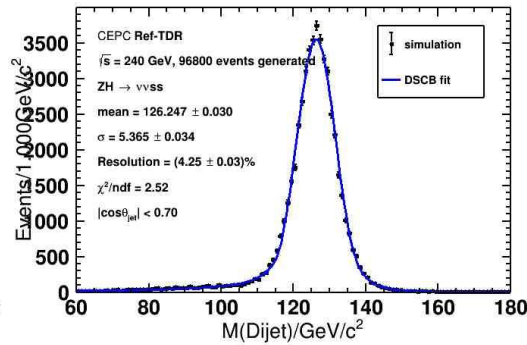
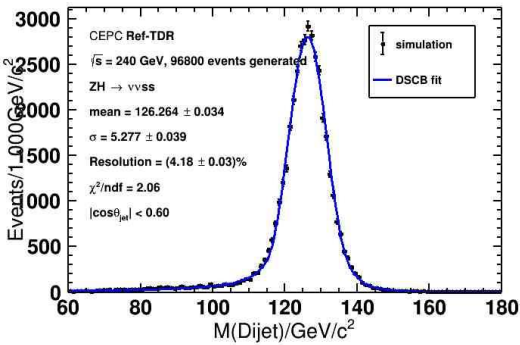
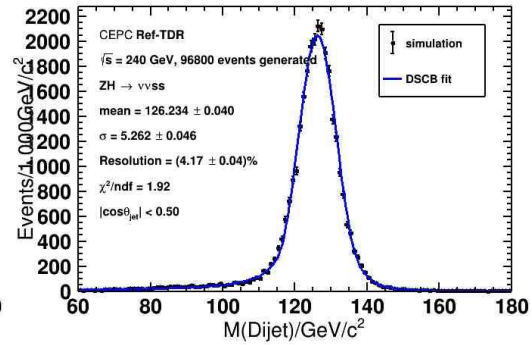
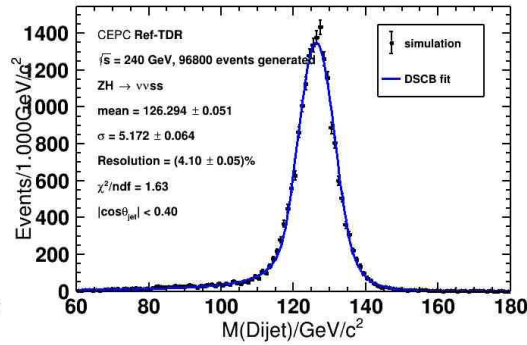
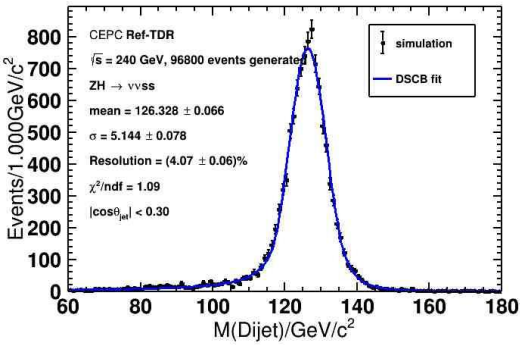
vvdd--jet event cleaning



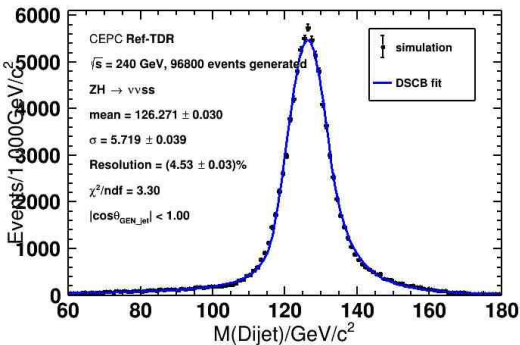
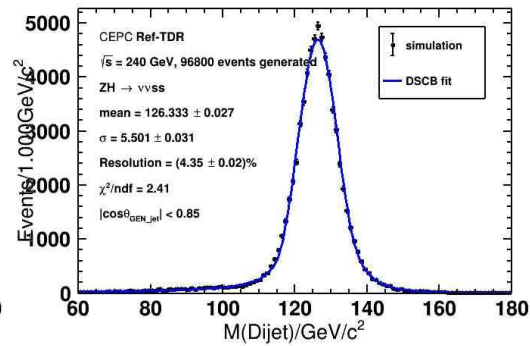
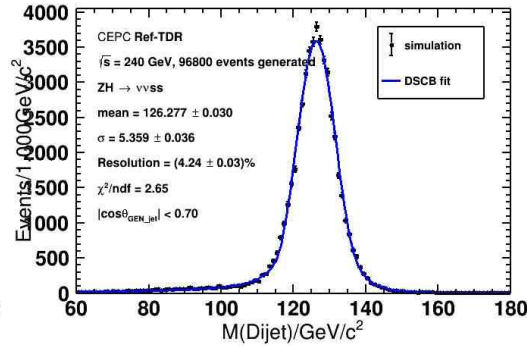
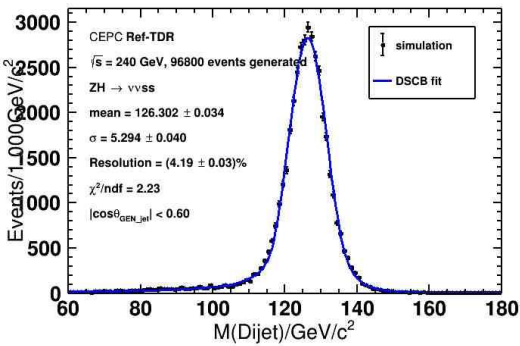
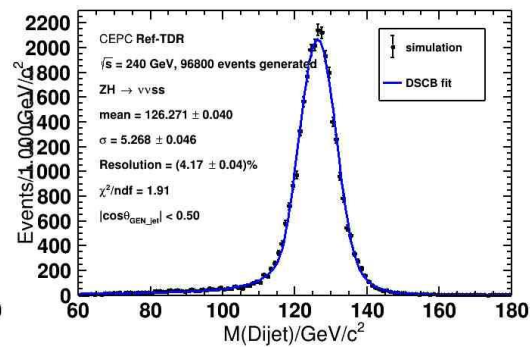
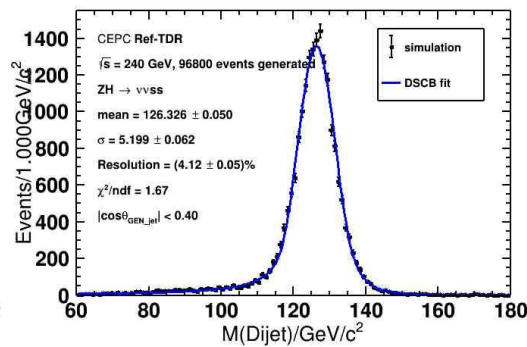
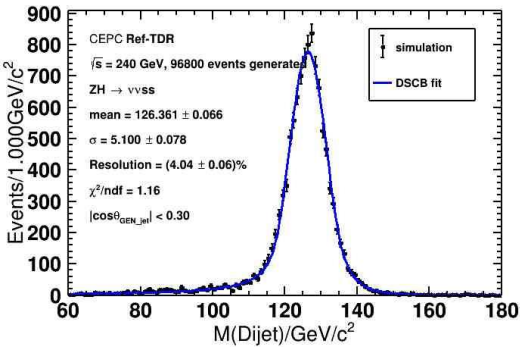
vvdd -- barrelRatio event cleaning



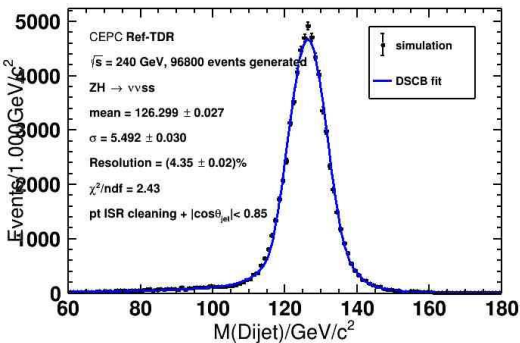
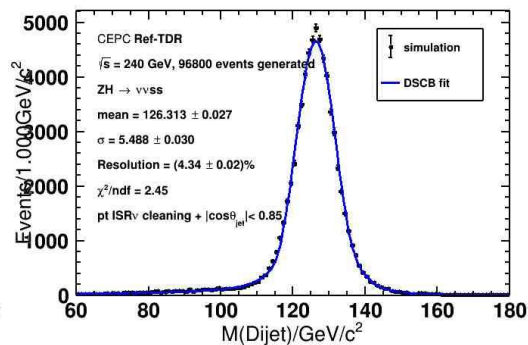
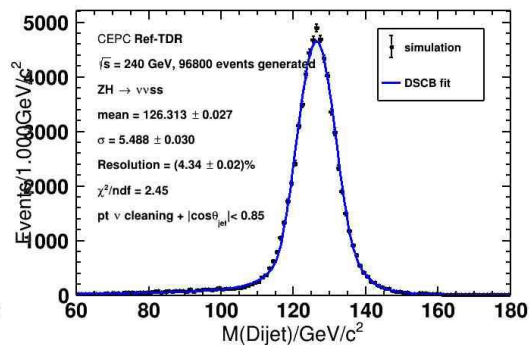
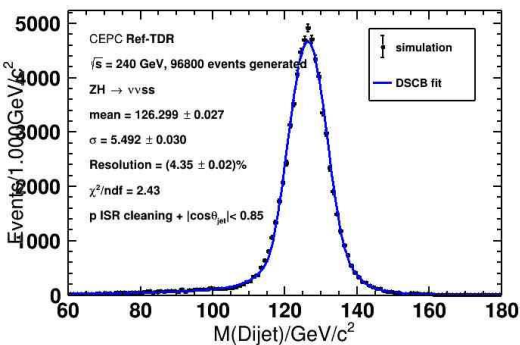
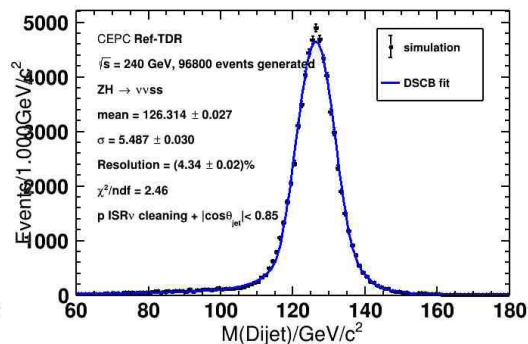
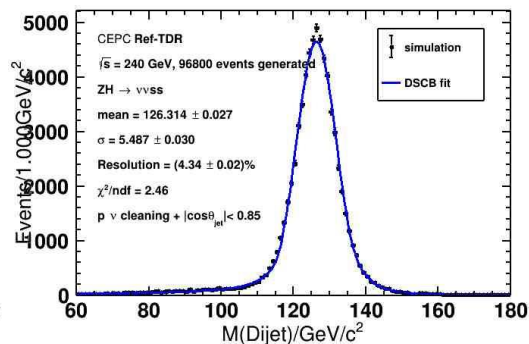
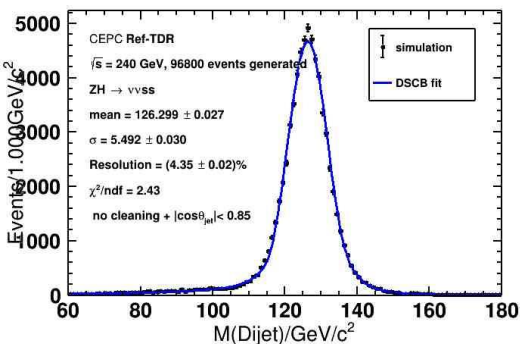
vvss--jetcut



vvss--genjetcut



vvss--jet event cleaning



vvss -- barrelRatio event cleaning

