

CEPC Jet&Clusters

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new Release



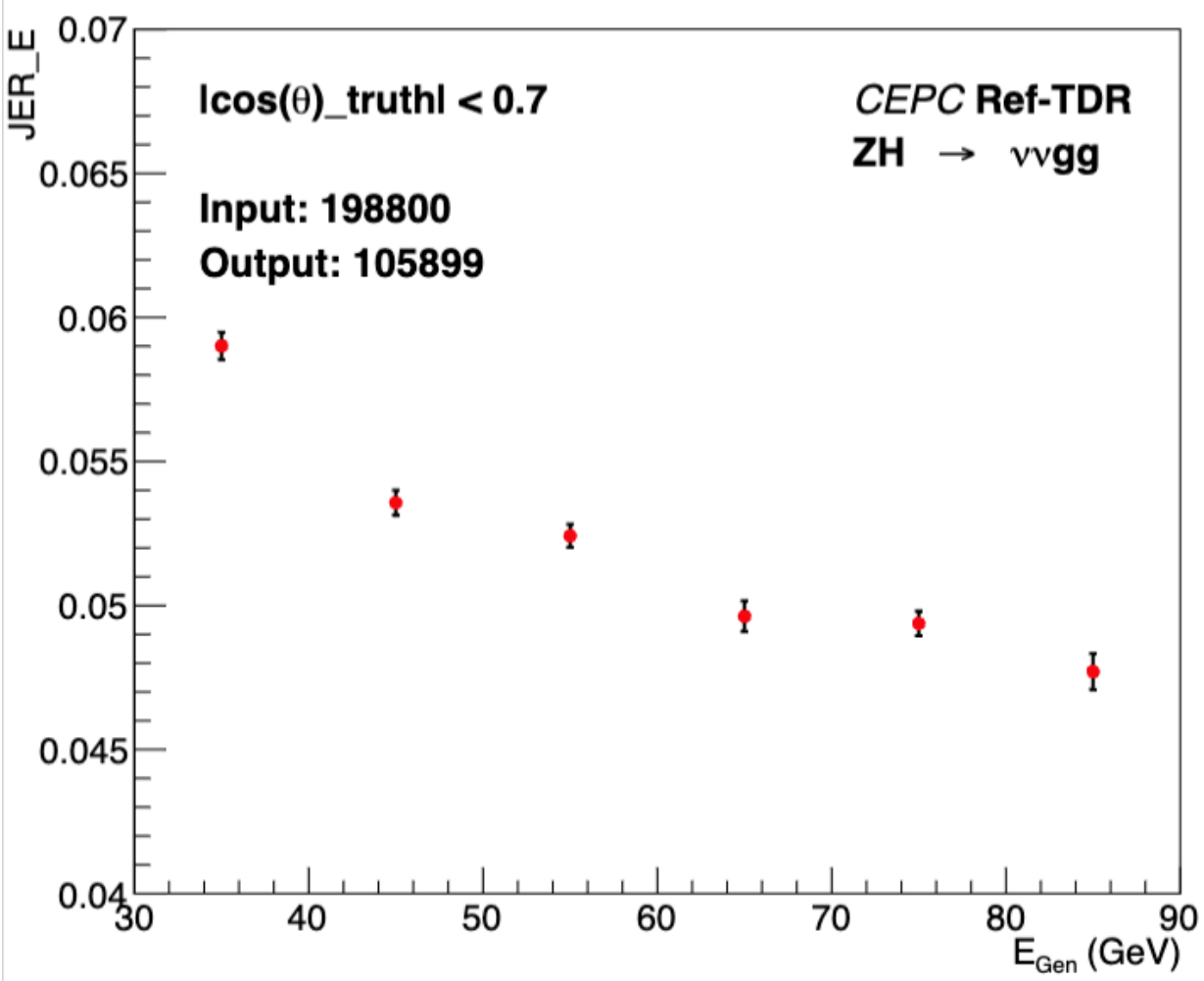
- Hcal but fixed
 - Please use fix 48bcef3d instead of 24.12.0.
- Sample under generation
 - Need 6GB memory, speed slower.
 - H->qq and Z->qq sample available under /cefs/higgs/zhangkl/Production/job

Jet performance

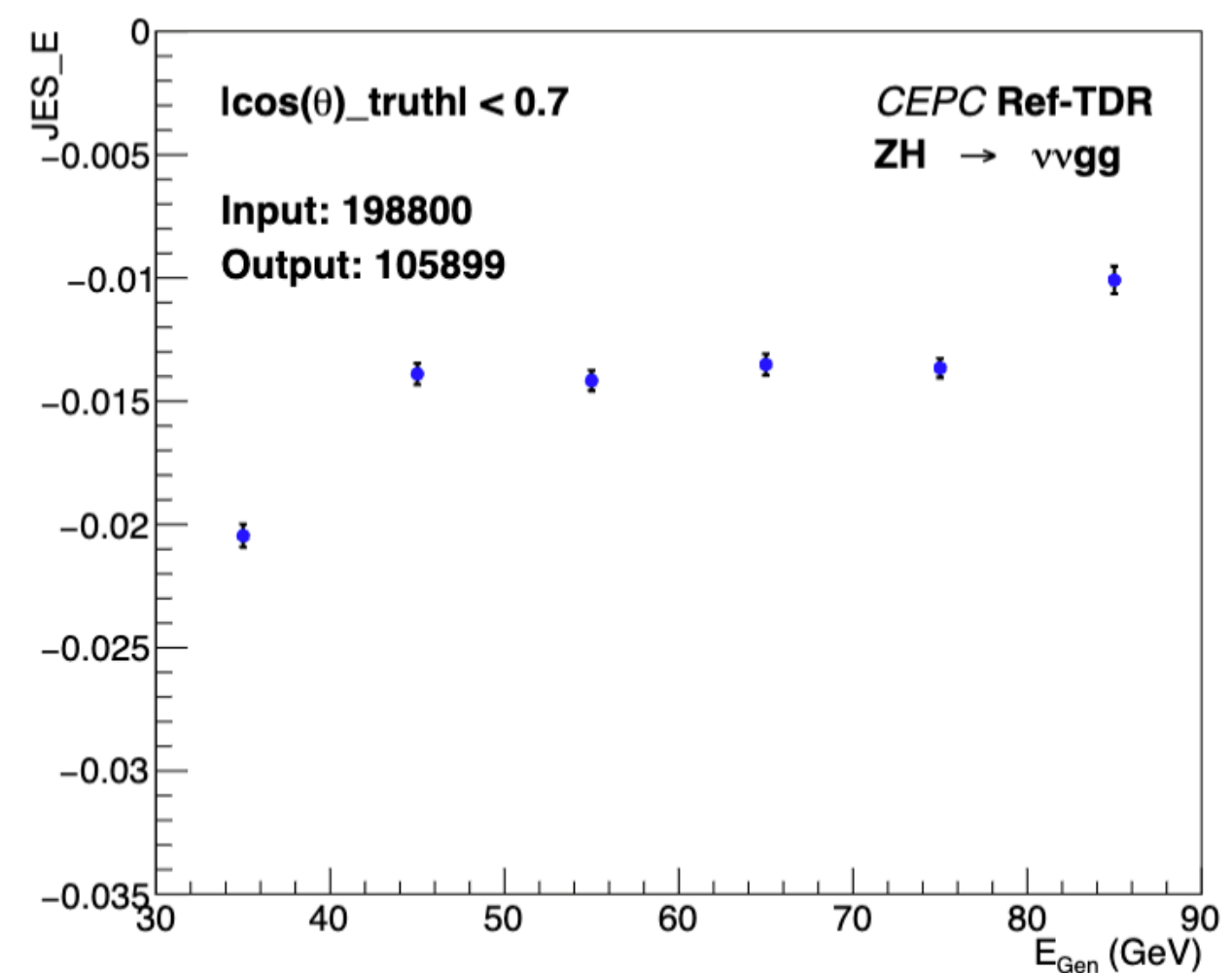


Significantly improved compared to 24.10.
JES slightly smaller than 0 due to neutrinos.
JER $\sim 4.8\%$.

JER

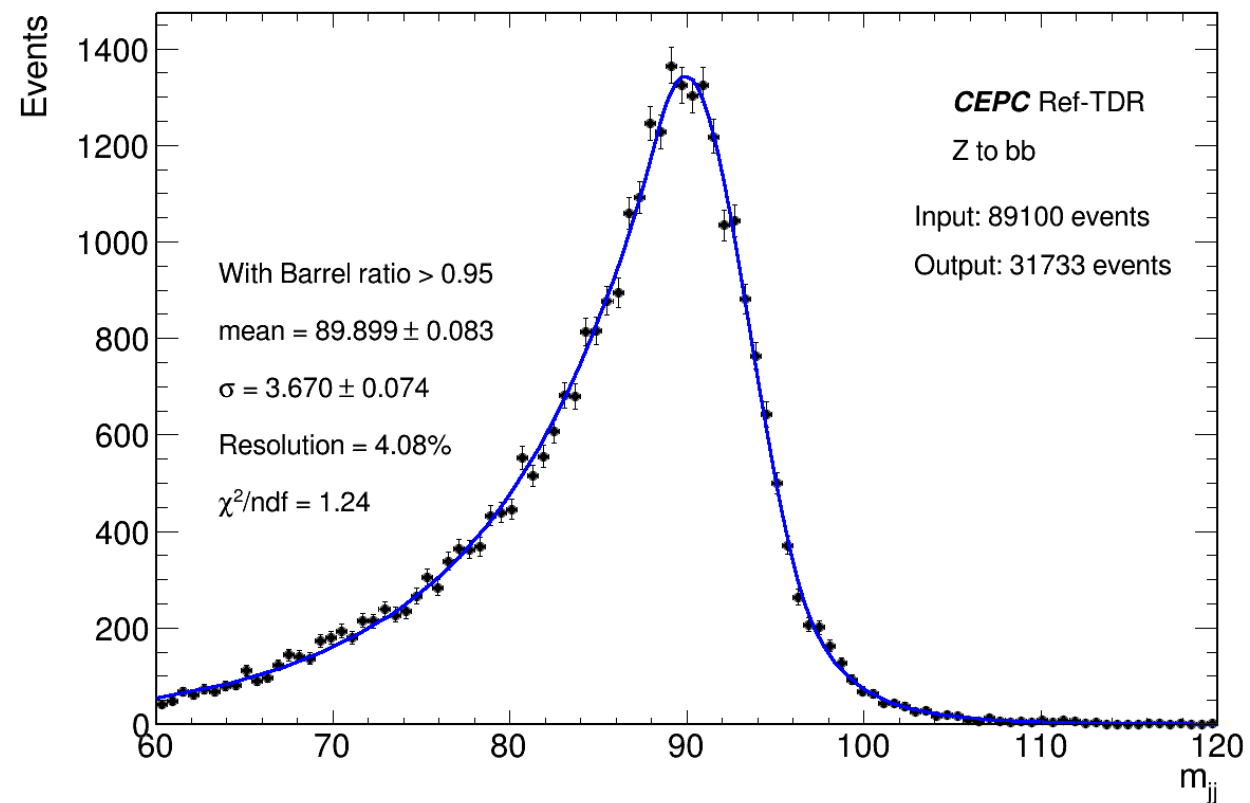
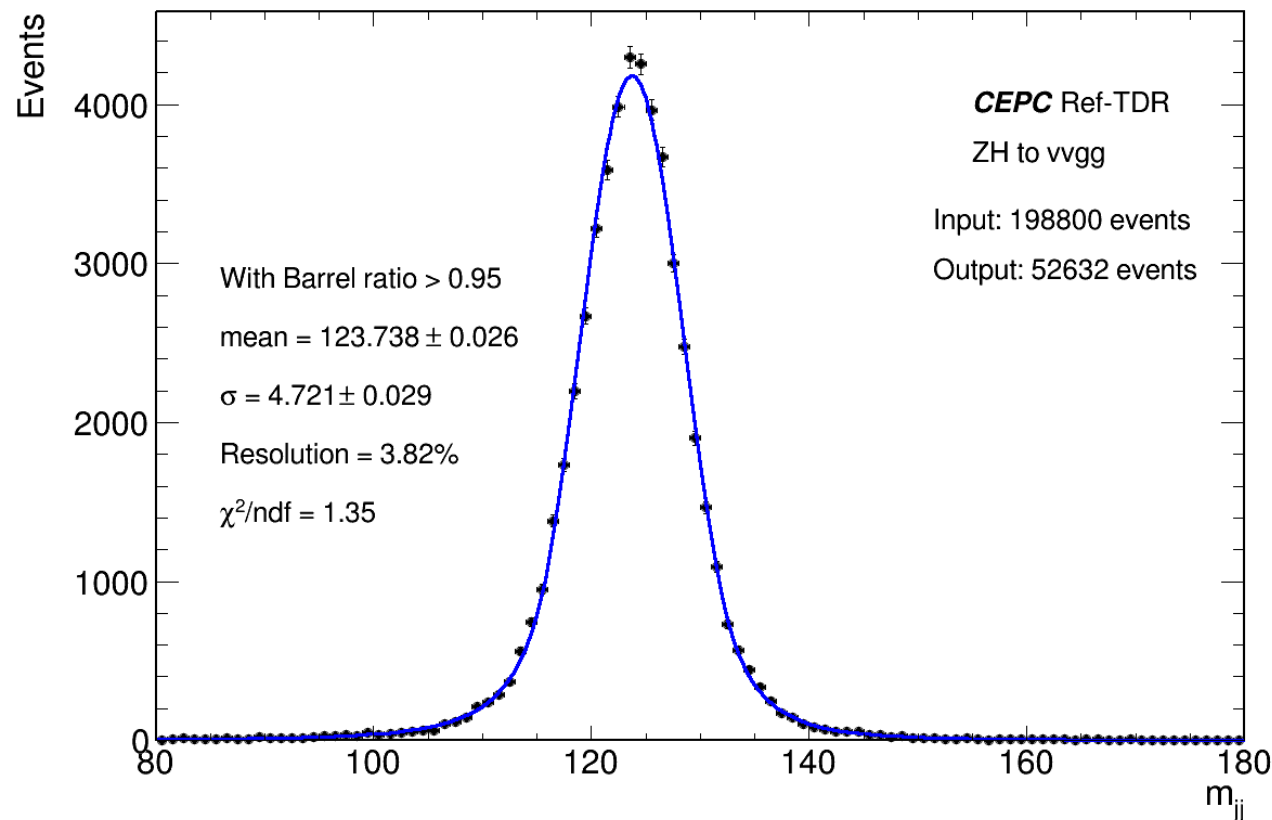


JES



BMR: barrel ratio

Use selection “barrel ratio > 0.95”, require $E_{mc, |\cos \theta| < 0.85} / E_{mc} > 0.95$
 This cut is more efficient than $|\cos \theta_{truth}| < 0.7$. (eff 50% to ~25%).
 BMR 3.8% can be achieved, consistent with Fangyi.



BMR: Compared with CDR.

Event cleaning efficiency same as CDR.

BMR result bb/cc/gg consistent with CDR(bb>gg>cc), but worse 0.2%.

Here results can be further improved using barrel ratio.

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%

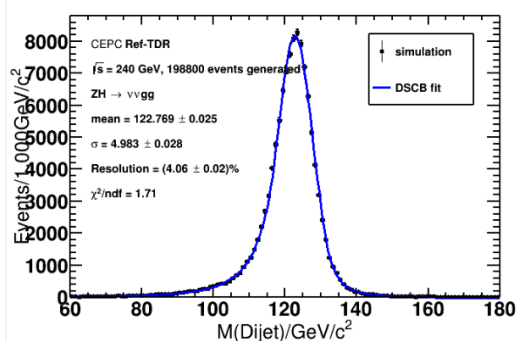
[CDR reference](#)

Process		$ZH \rightarrow \nu\nu gg$	$ZH \rightarrow \nu\nu bb$	$ZH \rightarrow \nu\nu cc$
Cumulative efficiency /%	$\Sigma Pt_{ISR} < 1\text{GeV}/c$	95.3	95.3	95.4
	$\Sigma Pt_\nu < 1\text{GeV}/c$	89.8	39.5	66.5
	$ \cos\theta_{jet} < 0.7$	53.1	22.0	38.0
DSCB BMR/%		3.99 ± 0.02	3.84 ± 0.04	4.04 ± 0.03

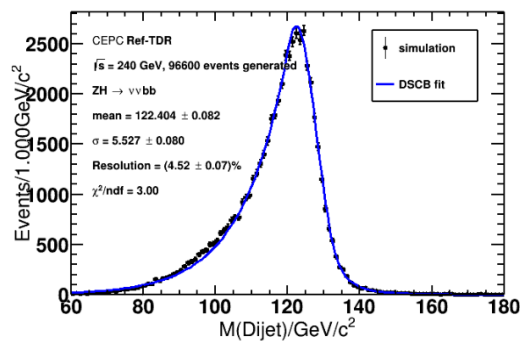
❖ Comparison between [CDR reference](#) and current results

- Efficiencies of event cleaning match for $ZH \rightarrow \nu\nu gg/\nu\nu bb/\nu\nu cc$
- BMR for $ZH \rightarrow \nu\nu gg/\nu\nu bb/\nu\nu cc$ is worse by 0.24%/0.21%/0.22%

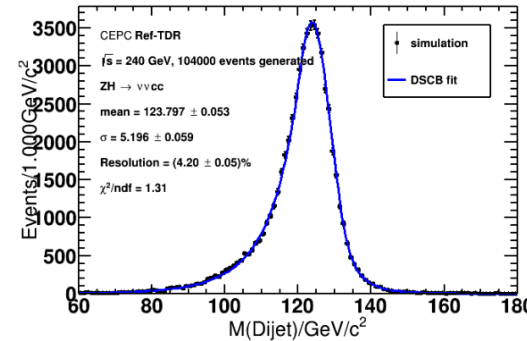
BMR: Event cleaning



$ZH \rightarrow \nu\nu gg$

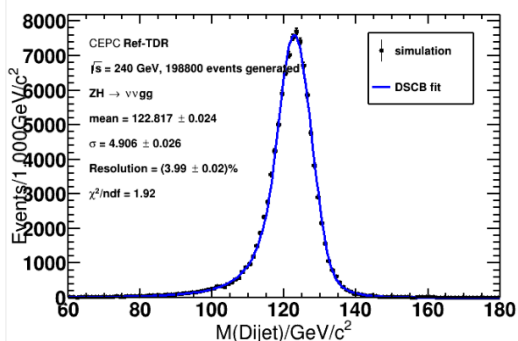


$ZH \rightarrow \nu\nu bb$

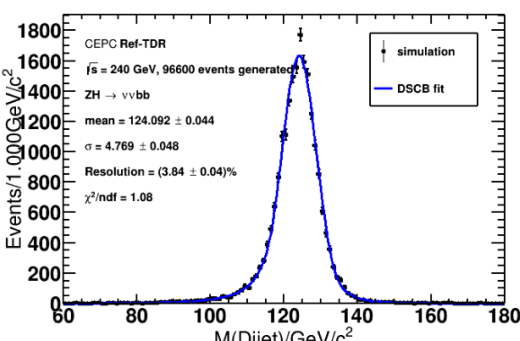


$ZH \rightarrow \nu\nu cc$

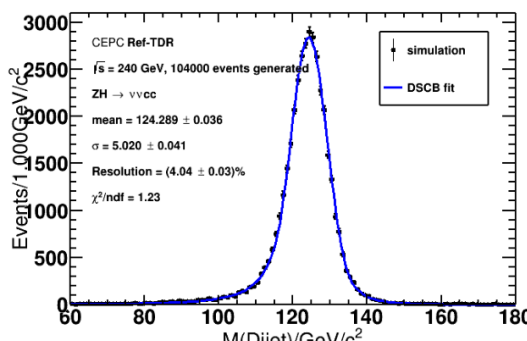
Without event cleaning



$ZH \rightarrow \nu\nu gg$



$ZH \rightarrow \nu\nu bb$



$ZH \rightarrow \nu\nu cc$

With event cleaning

$$\Sigma |P t_{ISR}| < 1 \text{ GeV}/c$$

$$\Sigma |P t_{\nu}| < 1 \text{ GeV}/c$$

$$|\cos \theta_{jet}| < 0.7$$

2024/12/6

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Photon Performance: Convention ratio



~8% photons converted before Ecal.

