CEPC Jet&Clusters

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New tutorial based in 25.1

- https://code.ihep.ac.cn/zhangkl/cepcsw_tutorial

- For CEPCSW env, sample, analysis

- Please share to new comers.

CEPWSW latest

- Latest Release 25.1.1

- Memory usage:
  - sim, digi, trk ~6GB. rec: 8GB.
  - New samples are generated in different step to reduce memory usage.

- Path: /cefs/higgs/zhangkl/Production/2501
  - Current sample with Endcap calorimeter, with ISR.
  - Last week, samples are generated wiout out ISR. Now fixed.

- Cefs now ~1.2PB free.

BMR

Physics level: without event cleaning
Detector level: with event cleaning |Pt_isr|,|Pt_v|<1GeV.
Results for |cos_theta|<0.85.

This result consists with CDR result and a little bit better than 24.12(No Endcap).

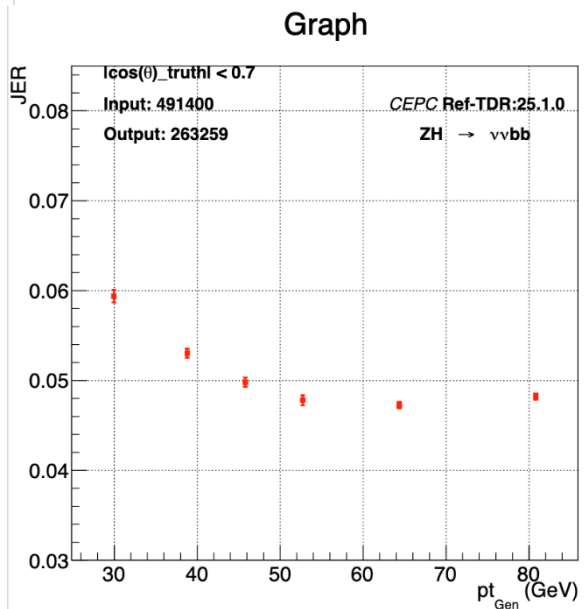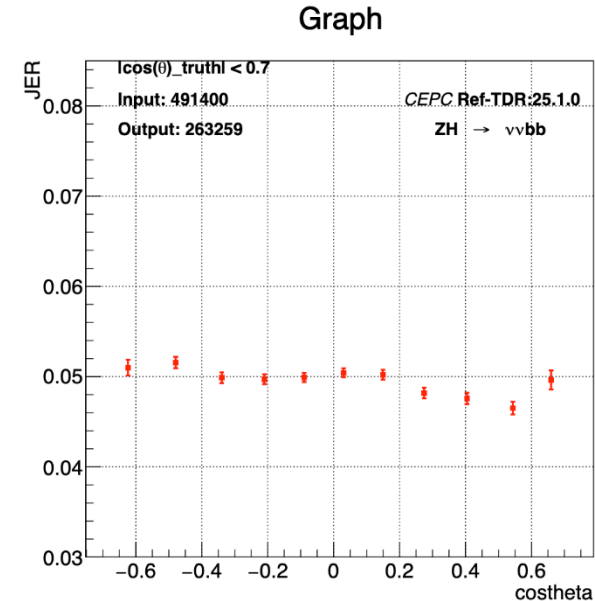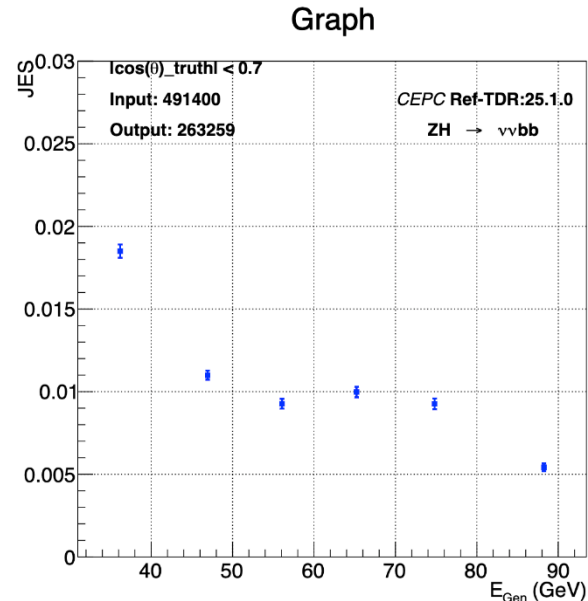| Case	process	$ZH \rightarrow vvgg$	$ZH \rightarrow vvbb$	$ZH \rightarrow vvcc$	$ZH \rightarrow vvuu$	$ZH \rightarrow vvdd$	$ZH \rightarrow vvss$
Physical level	BMR/%	3.96 ± 0.03	4.22 ± 0.07	3.99 ± 0.05	3.76 ± 0.02	3.96 ± 0.02	4.35 ± 0.02
	Efficiency/%	73.1	73.7	73.7	73.8	73.8	73.7
Detector level	BMR/%	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

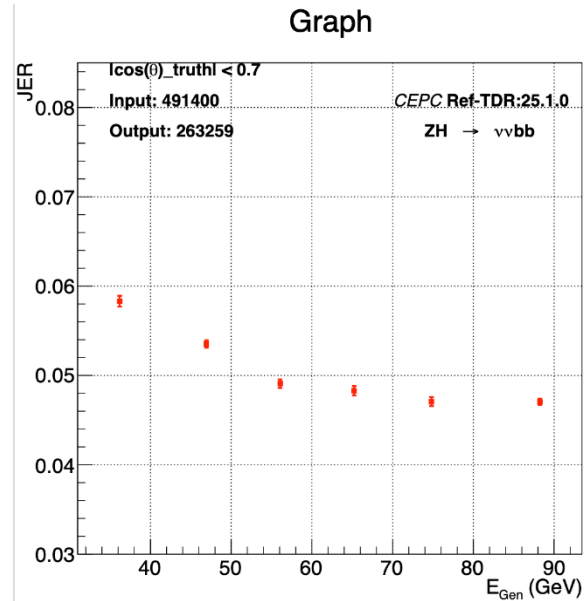# BMR, cut at different cos, @25.1.0
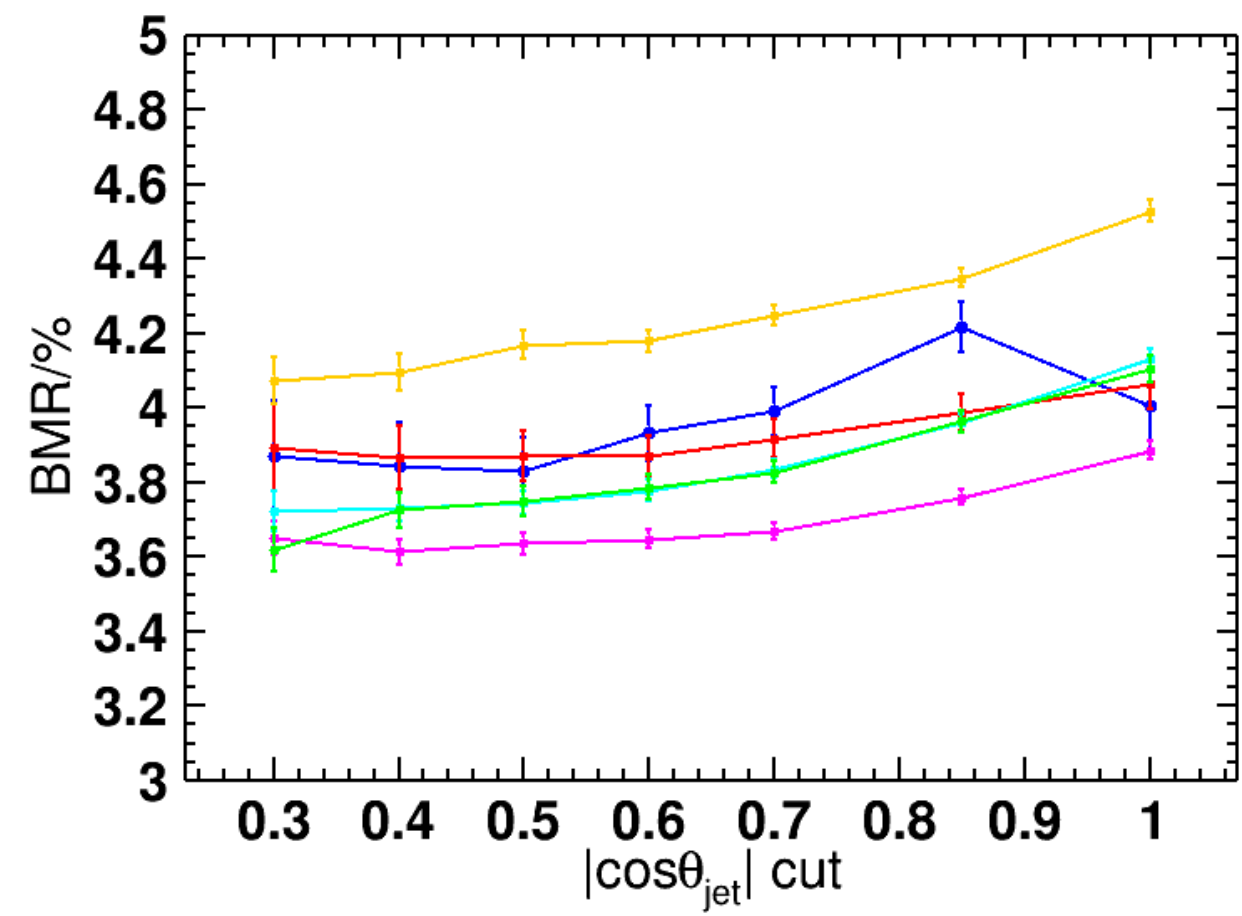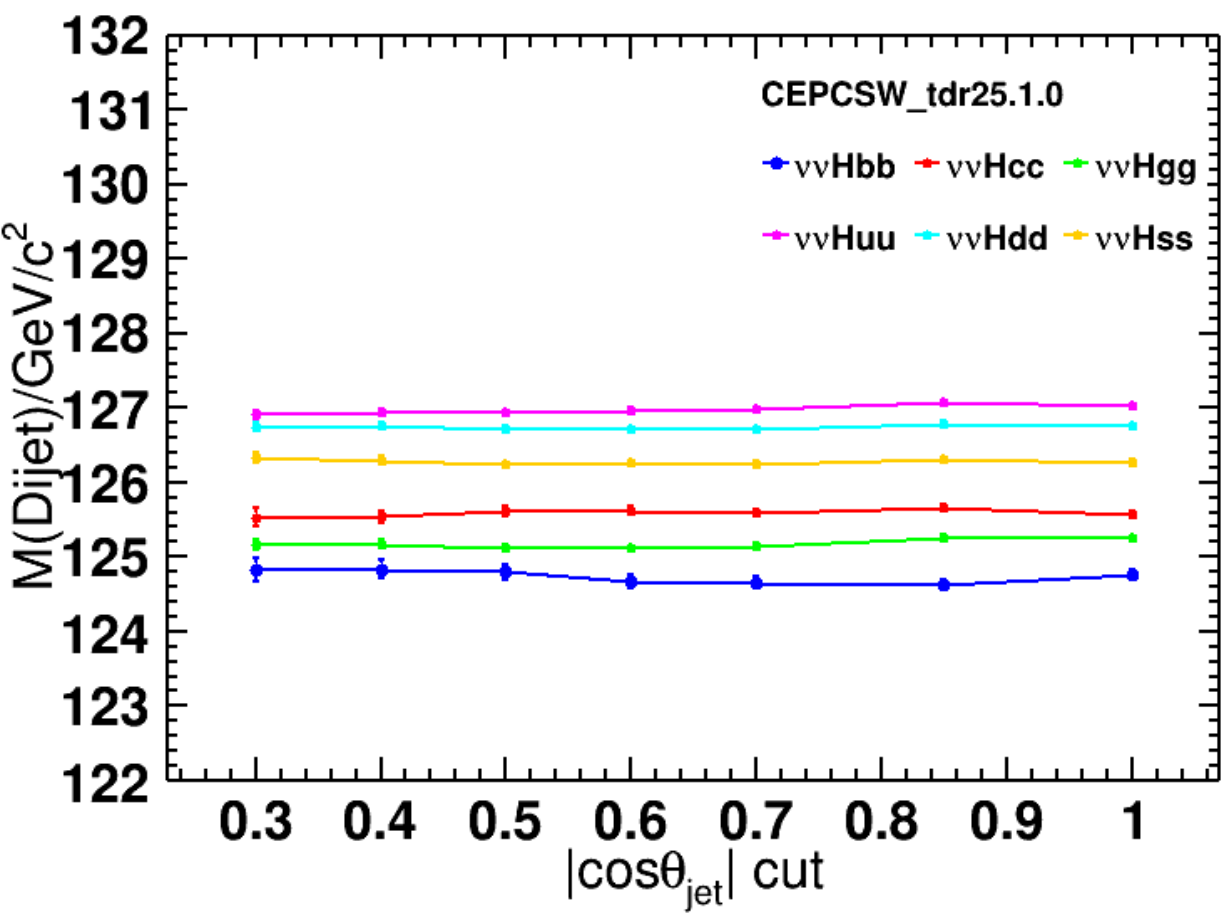
JER/JES on ZH->vvbb

@Yingqi
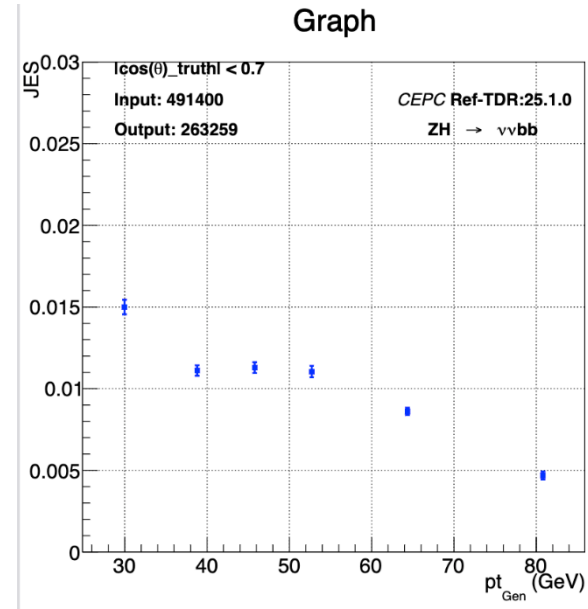
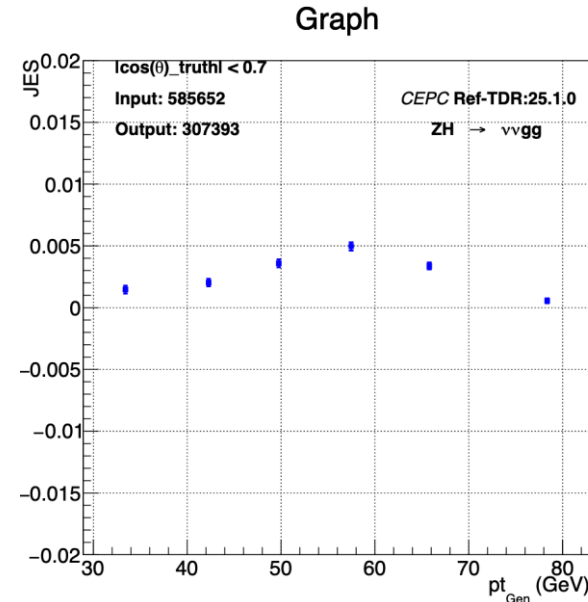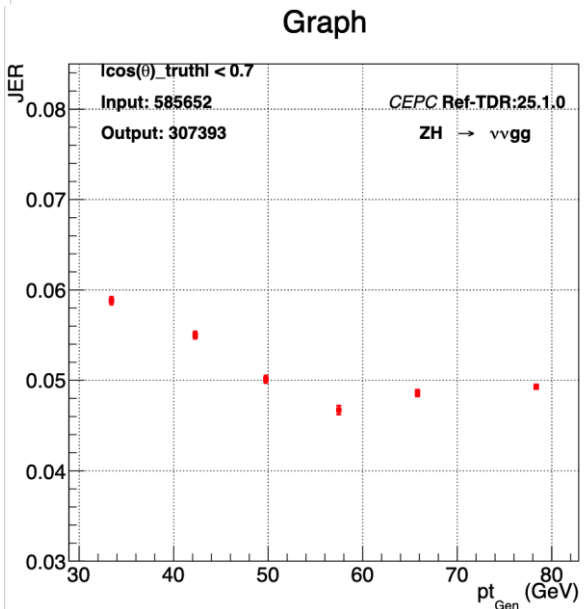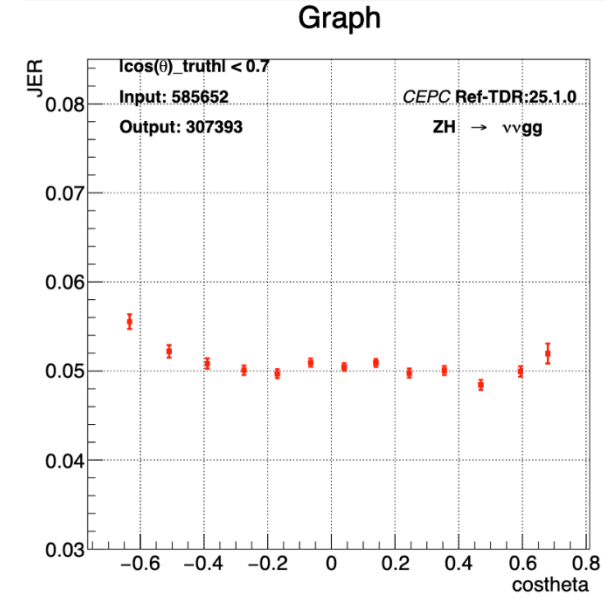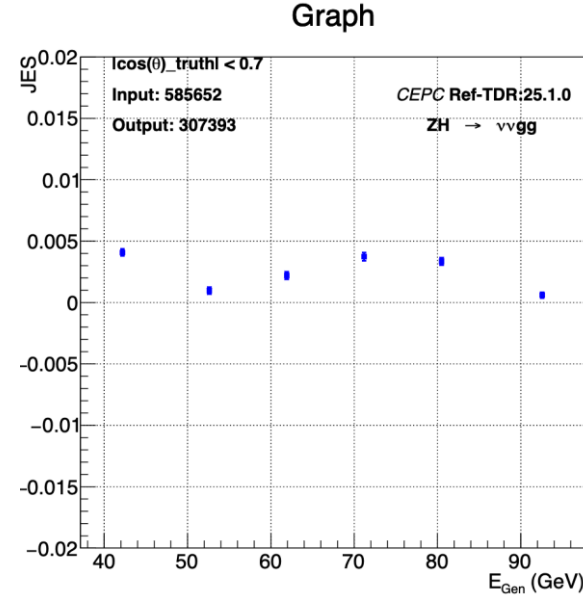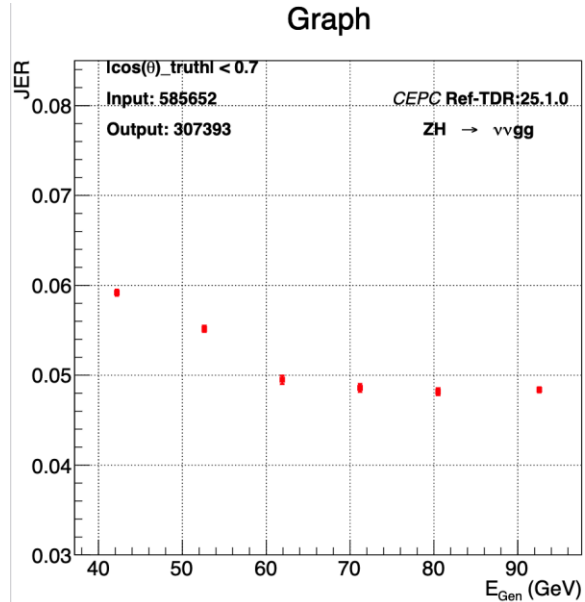With Endcap, the JER E=70GeV bump disappears.

Possible reason: high energy bb jets has large width extend to endcap?

Still under tuning.

Kaili

JER/JES on ZH->vvgg

@Yingqi

Current JES for bb and gg are positive. Will use recalibration to fix the scale issue.

The Jet performance are in expectation and ready for TDR document.

Endcap quick study

- In RefTDR, barrel calo and endcap calo are continuous.

- Overlap and both contribute to ~cos theta 0.75-0.85 region.

- Angular specified study is undertaking in mono-photon gun study @Reda

    - Jet has large width so impossible to tag endcap only performance

    - Endcap shows *better* resolution and *different* scale factors other than barrel.

    - Photon convention rate (~30%) high in endcap than barrel (9%) due to material budget.

    - May need further tuning and validation.

Backups

M_yy resolution

Barrel + Endcap

mean = 125.021 ± 0.023

σ = 0.970 ± 0.049

Resolution = 0.78%

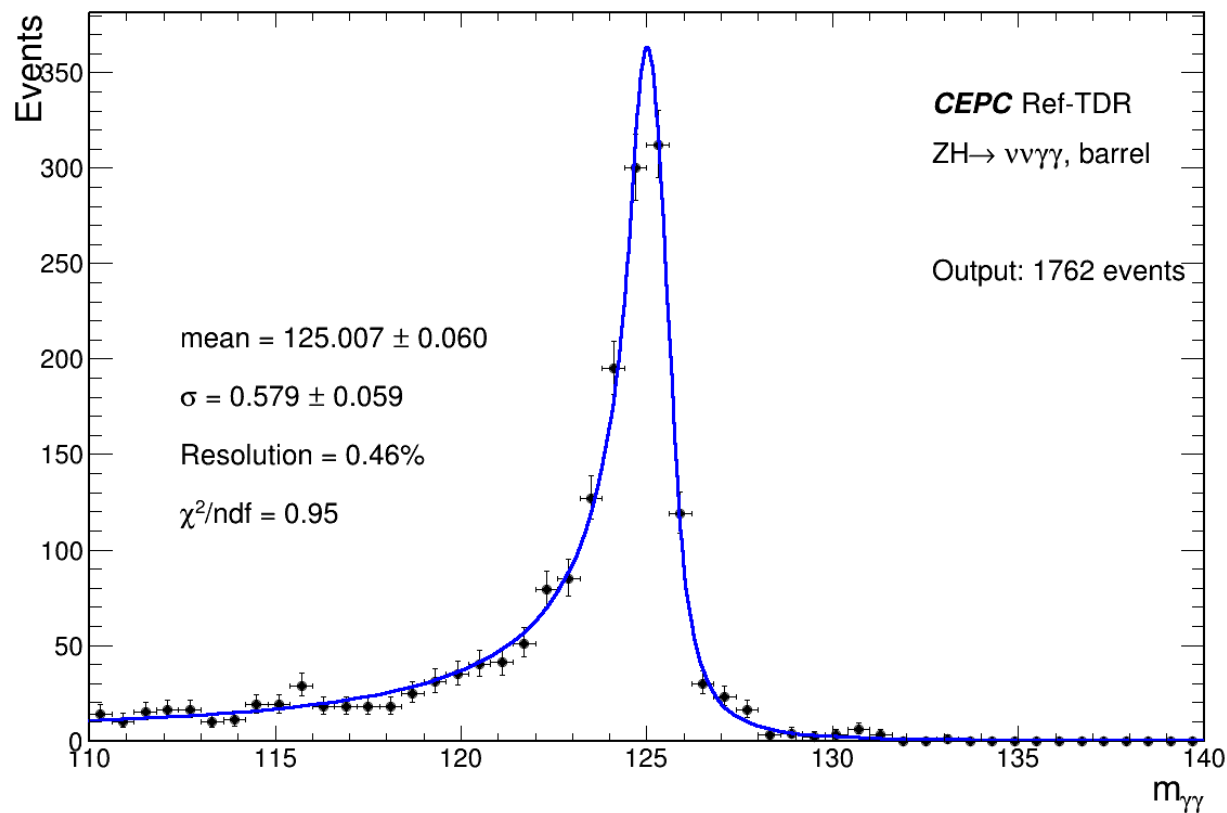χ^2/ndf = 3.83

CEPC Ref-TDR

ZH→ ννγγ

Output: 14157 events
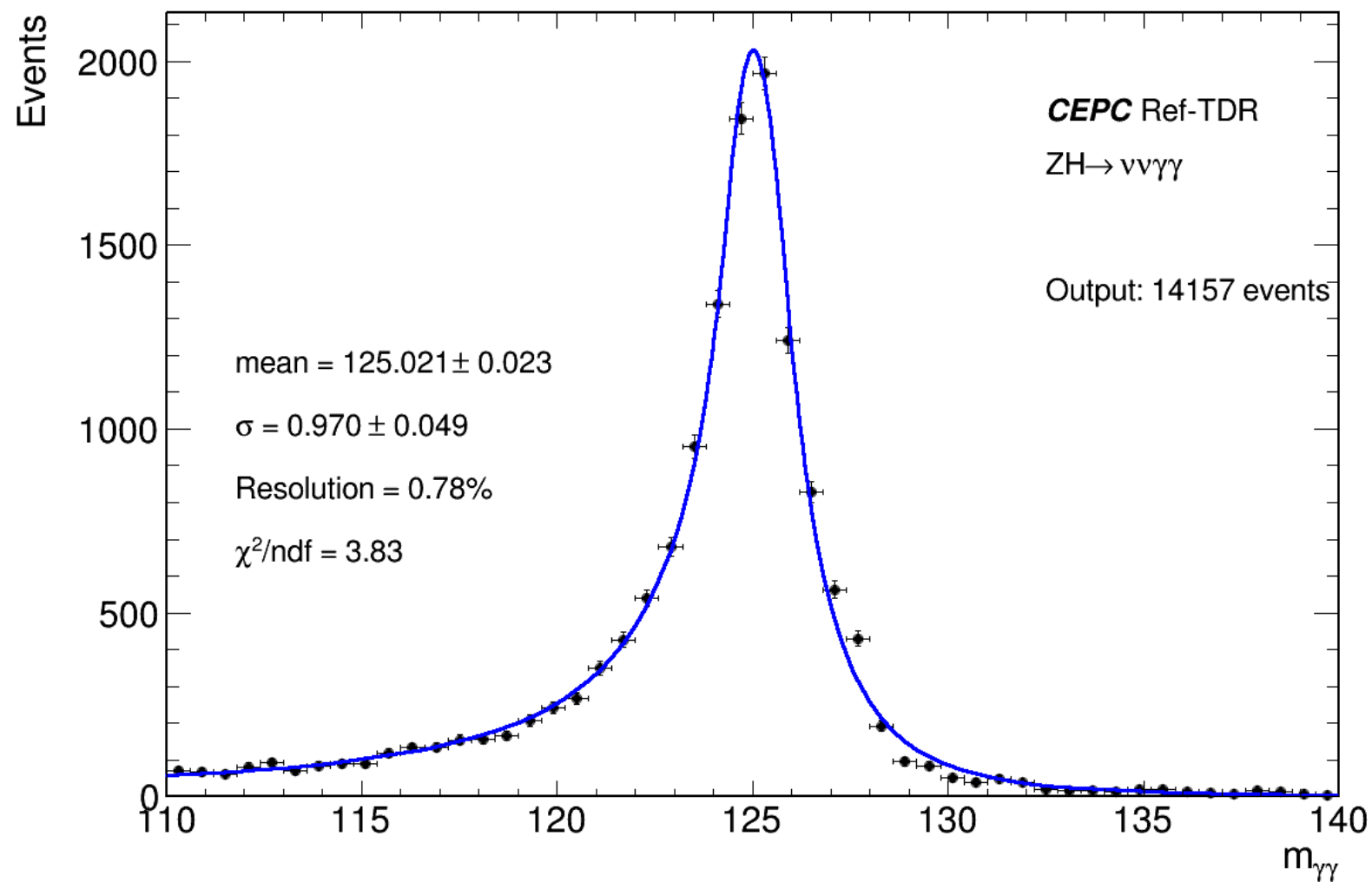
Barrel resolution

Both γ1, γ2 costheta<0.85

Before tdr25.1, only barrel

Latest

CEPC Ref-TDR

ZH→ ννγγ, barrel

Output: 1762 events

mean = 125.007 ± 0.060

σ = 0.579 ± 0.059

Resolution = 0.46%

χ^2/ndf = 0.95

CEPC Ref-TDR

ZH→ ννγγ

both barrel

Output: 10885 events

mean = 124.972 ± 0.030
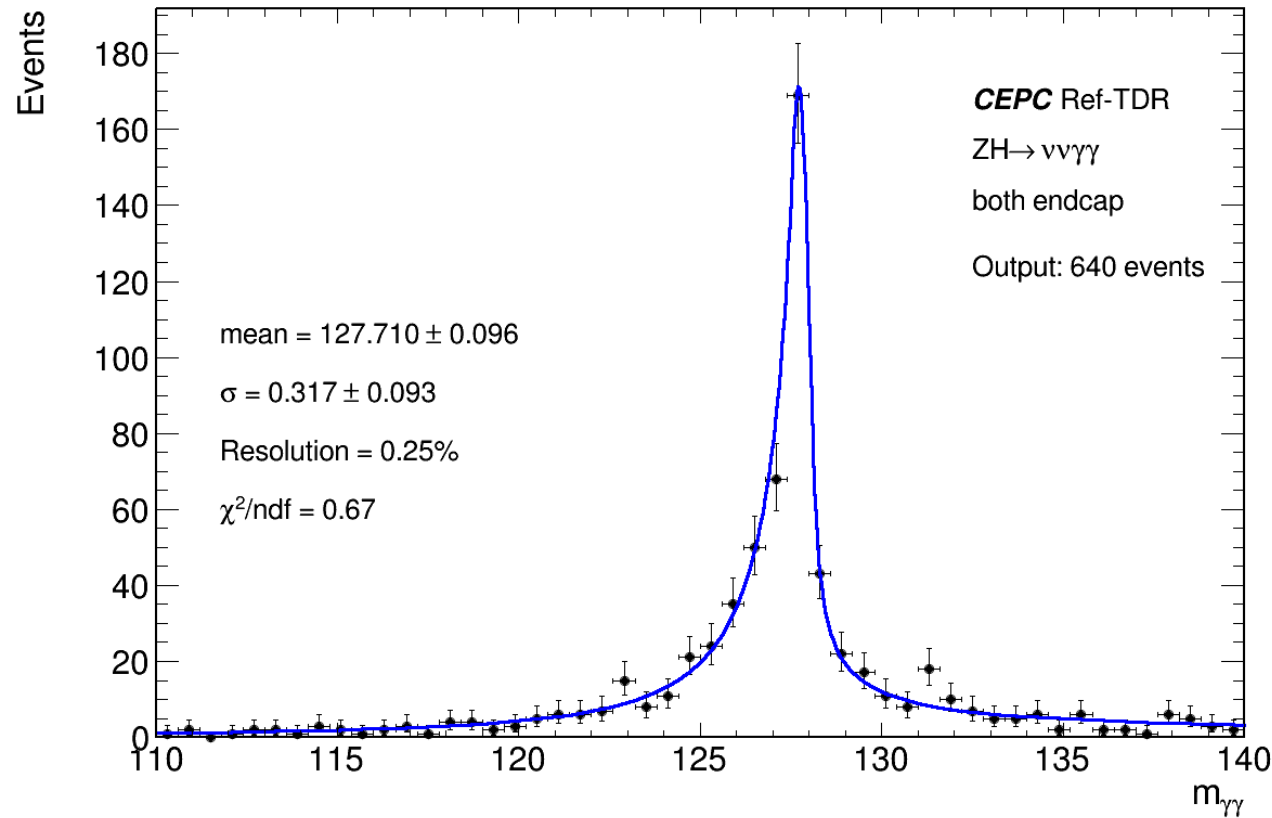
σ = 0.722 ± 0.038

Resolution = 0.58%

χ^2/ndf = 1.78
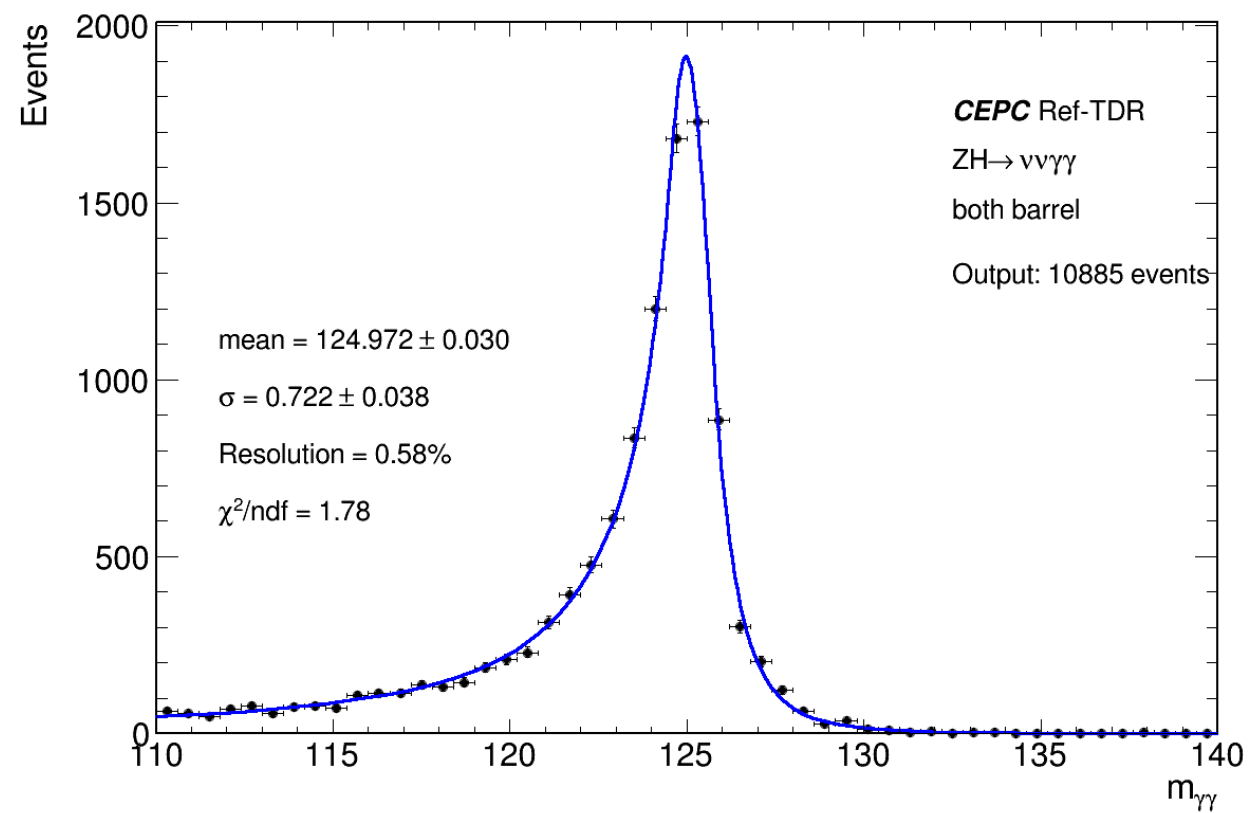
From PFA group, barrel BMR reduced from 3.8% to 4.2%. Also found in diphoton channel. By 25%.

Endcap resolution

Both y1, y2 costheta>0.85

CEPC Ref-TDR
ZH→ ννγγ
both endcap

Output: 640 events

mean = 127.710 ± 0.096

σ = 0.317 ± 0.093

Resolution = 0.25%

χ^2/ndf = 0.67
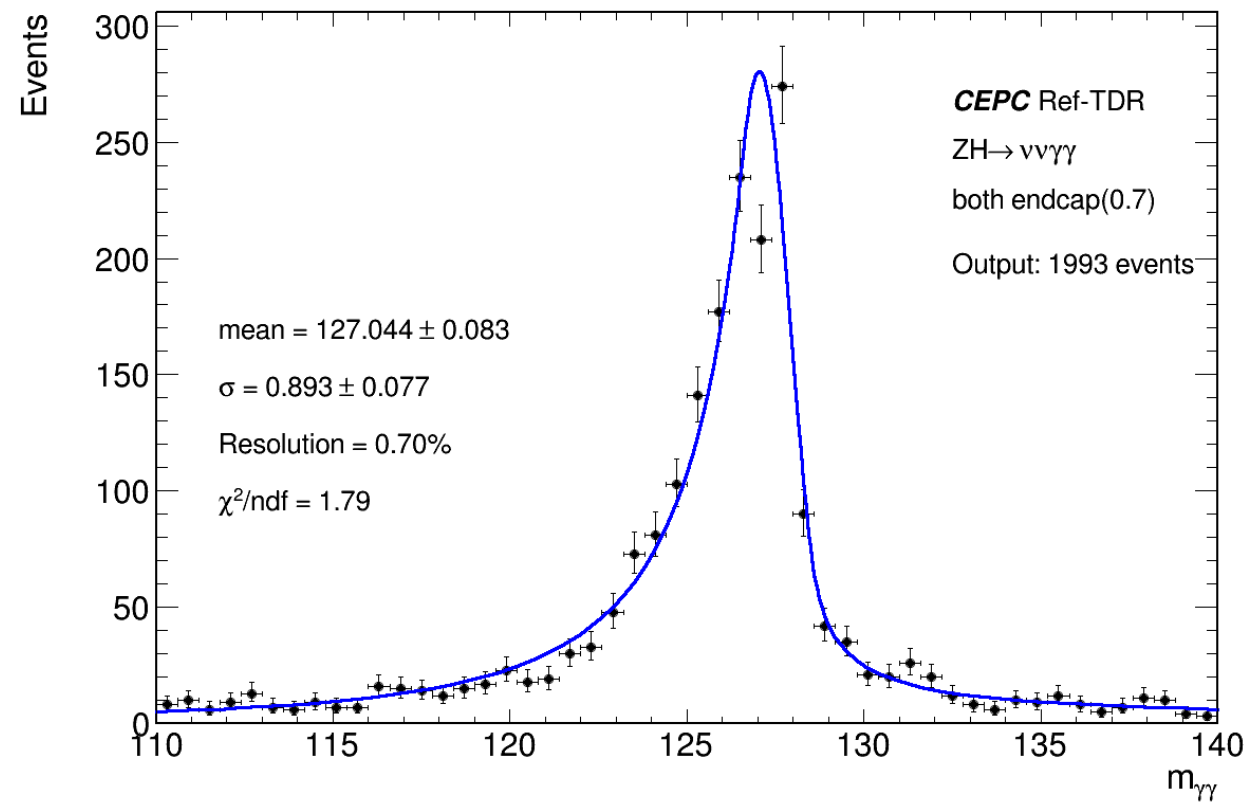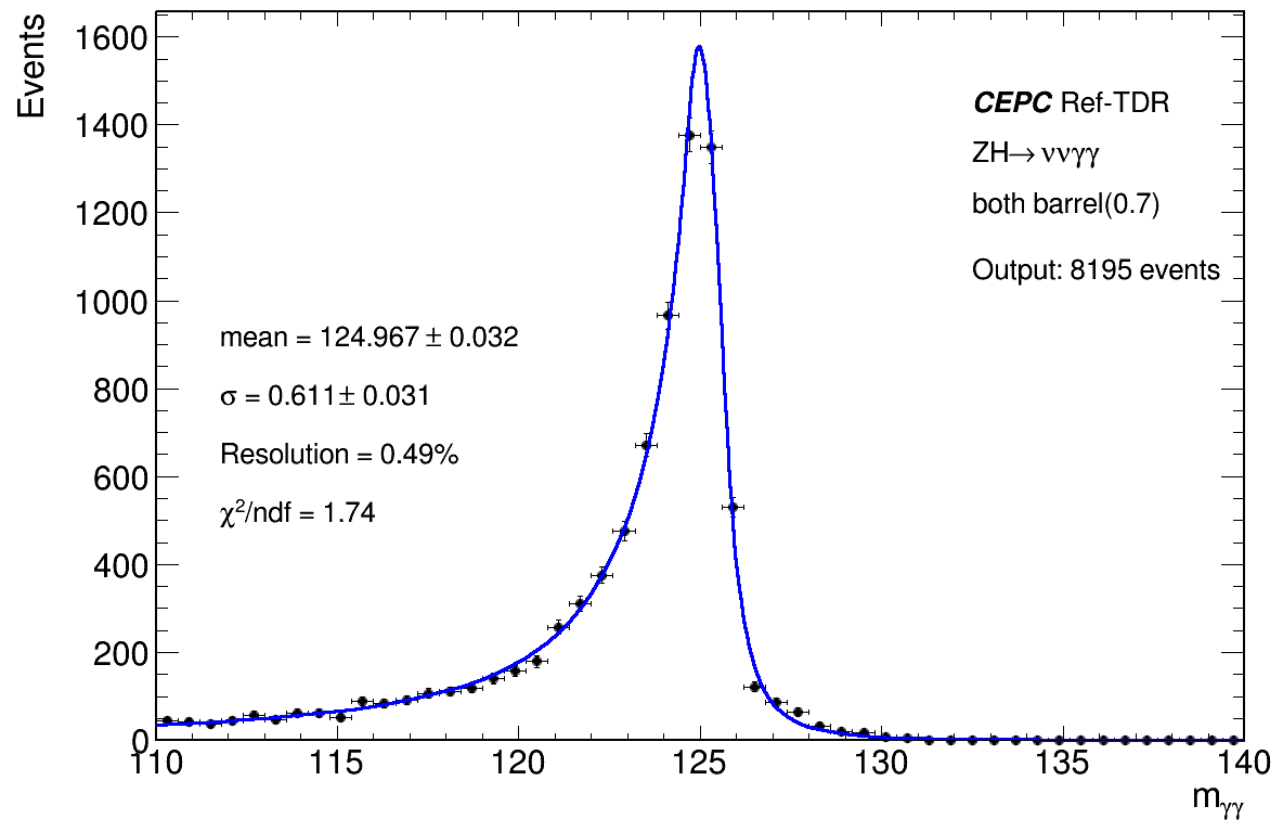
- Endcap with better resolution.
  - Better than barrel

- Right side tail

- Mean value->Calibration.

- We have endcaps. But may need further validations.

Angle at costheta 0.7

Past no endcap   0.46%
Now barrel (<0.85) 0.58%
Now barrel (<0.7)   0.49%

Now Endcap (>0.85)   0.25%
Now Endcap (>0.7)   0.70%

CEPC Ref-TDR

ZH→ ννγγ

both barrel(0.7)

Output: 8195 events

mean = 124.967 ± 0.032

σ = 0.611± 0.031

Resolution = 0.49%

χ²/ndf = 1.74

CEPC Ref-TDR

ZH→ ννγγ

both endcap(0.7)

Output: 1993 events

mean = 127.044 ± 0.083

σ = 0.893 ± 0.077

Resolution = 0.70%

χ²/ndf = 1.79

The "crack" region (both barrel calo and endcap calo contributed) need further study.