



CEPC Performance RefTDR meeting

Jets & Clusters

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- Please use latest master release.
- Software team just provided latest 25.1.0 with Endcap included
- Currently verification getting done before starting mass sample generation
- Other processes and generators under study by Nazima

```
192.168.50.114@tcp:/cefs      3.7P  3.2P  356T  91% /cefs
```

- Limited /cefs disk quota. 800T->356T available.

Sample Requirements for TDR note

Endcap fixed: Software group promised it for this week and delivered

Ecal 10*10mm.

Assuming no big changes in detector level.

Following samples are almost ready.

For ttbar, Vcs/Vcb, LLP, weak mixing angle, need analyzer to participate.

Process @ c.m.e	Domain	Relevant Det. Performance
Z→μμ	Z	lepton ID, tracking
H→γγ	qqH	photon ID, EM resolution
Higgs recoil	ℓℓH	Lepton ID, track dP/P
H→ss	vvH @ 240 GeV	PID, Vertexing, PFA + JOI
H→inv	qqH	Higgs/NP
Vcs/Vcb	WW→ℓvqq @ 240/160 GeV	Flavor
H→LLP	ℓℓH	NP
		TPC, TOF, calo, muon detectors
H→μμ	qqH	Higgs
Top mass & width	Threshold scan @ 360 GeV	EW
Weak mixing angle	Z→bb @ 91.2 GeV	EW

Signal Process	Sample Stats	Bkg Process	Stats
Z→mm@91.2GeV	100k	ee→mm@91.2	In barrel nearly bkg free.
H→yy Z→qq	100k	ee→qqy, ee→WW/ZZ→qqy	
Z→ll, Hrecoil	100k	ee→WW/ZZ→ll+qq	
Z→vv, H→ss	100k	ee→(WW/ZZ)→qq	
Z→qq, H→invisible	100k	ee→(WW/ZZ)→qq	
Z→qq, H→mm	100k	ee→(WW/ZZ)→ll+qq	

-> Generally, for bkg, need 240GeV, ee→qq(γ); ee→WW/ZZ→(qq)qq; ee→WW/ZZ→ll(same flavor)+qq.

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Re-calibration needed for distributions after new CEPCSW update (PID, Vertex Fit)

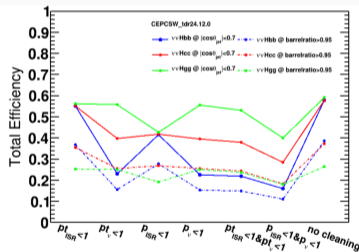
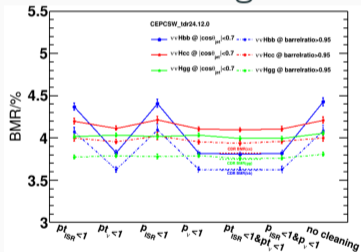
Timescale: Mid-February?

Some channels are starting (photon, muon)

Endcap being ready so better samples coming soon + increase in preliminaries results for BMR in barrel

Analysis tools (now PID available, Still need isolated objects, vertex, flavor tagging.)

Event cleaning results consistent with CDR.



Efficiency cutflow/%	ZH → vv gg	ZH → vv bb	ZH → vv cc
$\Sigma p_{t,ISR} < 1\text{GeV}/c$	95.3	95.4	95.4
$\Sigma p_{t,v} < 1\text{GeV}/c$	89.8	39.3	66.6
$ \cos\theta_{jet} < 0.7$	53.1	22.0	38.0
BMR/%	3.99 ± 0.02	3.81 ± 0.03	4.10 ± 0.02
$ \cos\theta_{jet}^{truth} < 0.7$	48.5	20.8	35.9
BMR/%	3.97 ± 0.02	3.76 ± 0.03	4.07 ± 0.02
barrelratio > 0.95	23.9	15.0	24.4
BMR/%	3.76 ± 0.02	3.62 ± 0.03	3.94 ± 0.03

Event display (by Zeng Yujie & You Zhengyun)

- Slides
- Version to use: <https://code.ihep.ac.cn/zhangkl/phoneix>

phoneix

CEPC Ref-TDR Event Display Tool. Maintained by Yujie Zeng, migration to code.ihep.ac.cn by Kalli

Phoneix: <https://github.com/HSF/phoneix>

Start with python: `python -m http.server 8080 --directory=phoneix-app-root-path`

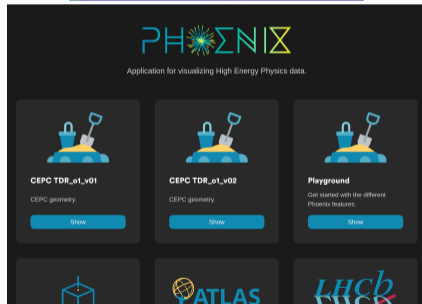
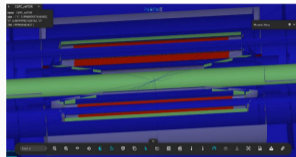
Then get access Phoneix with: `http://localhost:8080`

Choose CEPC. And load CEPC ref-TDR geometry: `CEPC_refTDR.root`

Two jsons attached: `tops_cld.edm4hep.json` from Fcc. With VertexJets objects; `rec_E9L_bb_00389.edm4hep.json` from CEPC `ee->vv+bb`.

Further functions under developing.

- Latest geometry applied;
- Enough for general purpose

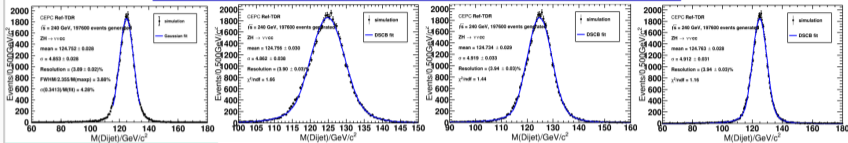


Interactive web app

Thank you!

Back-up

ZH → νcc barrelratio > 0.95 With pt event cleaning



FWHM 0.5GeV/bin
Unbinned Gaussian fit
Count 68.26% region

Unbinned DSCB fit -> Shrink fit range
Efficiency: 24.4% -> 24.3% -> 24.1%

Unbinned DSCB fit
(now)

- Now BMR is **3.94%**
- Shrink fit range: lose ~1% event to improve BMR improves to **3.90%**
- **Gaussian** to fit peak: BMR improves to **3.89%**
- **Binned FWHM**: BMR improves to **3.88%**
- **Count 68.26% region** around fit mass point: full region not gaussian, decreases to **4.28%**

2025/1/7

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