CEPC Jet&Clusters

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- Samples
- Vertex
- TDR

CEPC sample/release

- Latest master release.
  - Need 6GB memory, speed slower.
- H->qq, Z->qq, WW/ZZ->4q sample available under
  - /cefs/higgs/zhangkl/Production/2412/
  - /cefs/higgs/guofy/CEPCSW_tdr24.12.1/performance/JER_eeqq
  - New PID, vertex fit in latest: /cefs/higgs/zhangkl/Production/24122
- Other processes and generators under study @Nazima

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

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

MCParticle Parent/Daughter Pointer

- Bug: MCParticle container will lose pointer relationship in copy.
  - MCParticle-> getDaughters(0)->getPDG()
  - Essential for mc topology.
  - If “keep *” all the time, no this issue.
  - Reported to software group.

```
JetOrigin            INFO  id:  620d5704
 PDG : 25
 generatorStatus : 2
 simulatorStatus : 0
 charge : 0
 time : 0
 mass : 125
 vertex : 0 0 0
 endpoint : 0 0 0
 momentum : -21.8565 21.5034 -27.6322
 momentumAtEndpoint : 0 0 0
 spin : 0 0 0
 colorFlow : 0 0
 parents :
 daughters : ffffffff-1
```

```
id:  620d57088
PDG : -14
generatorStatus : 0
simulatorStatus : 1073741824
charge : 0
time : 6.46358
mass : 0
vertex : -1160.4 68.2995 -1437.91
endpoint : -6312.01 -4567.78 -10000
momentum : -0.192624 -0.173348 -0.320146
momentumAtEndpoint : -0.192624 -0.173348 -0.320146
spin : 0 0 0
colorFlow : 0 0
parents :  620d57041
daughters :

id:  620d57089
PDG : 13
generatorStatus : 0
simulatorStatus : 1073741824
charge : -1
time : 6.46358
mass : 105.658
vertex : -1160.4 68.2995 -1437.91
endpoint : -422.527 -646.651 -3417.13
momentum : -0.406967 -0.317798 -0.551624
momentumAtEndpoint : -0 -0 0
spin : 0 0 0
colorFlow : 0 0
parents :  620d57041
daughters :
```

Sample Requirement for TDR note

No endcap;
Ecal 10*10mm.
Also we assume there are no big change 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@ 91.2 GeV	Z	lepton ID, tracking
H→γγ	qqH	Higgs	photon ID, EM resolution
Higgs recoil	ℓℓH	Higgs	Lepton ID, track dP/P
H→ss	νν̄H @ 240 GeV	Higgs	PID, Vertexing, PFA + JOI
H→inv	qqH	Higgs/NP	PFA, MET
Vcs/Vcb	WW→ℓνqq @ 240/160 GeV	Flavor	PFA, JOI + PID (lepton, tau)
H→LLP	ℓℓH	NP	TPC, TOF, calo, muon detectors
H→μμ	qqH	Higgs	lepton ID, tracking, OTK
Top mass & width	Threshold scan @ 360 GeV	EW	Beam energy
Weak mixing angle	Z→bb @ 91.2 GeV	EW	JOI

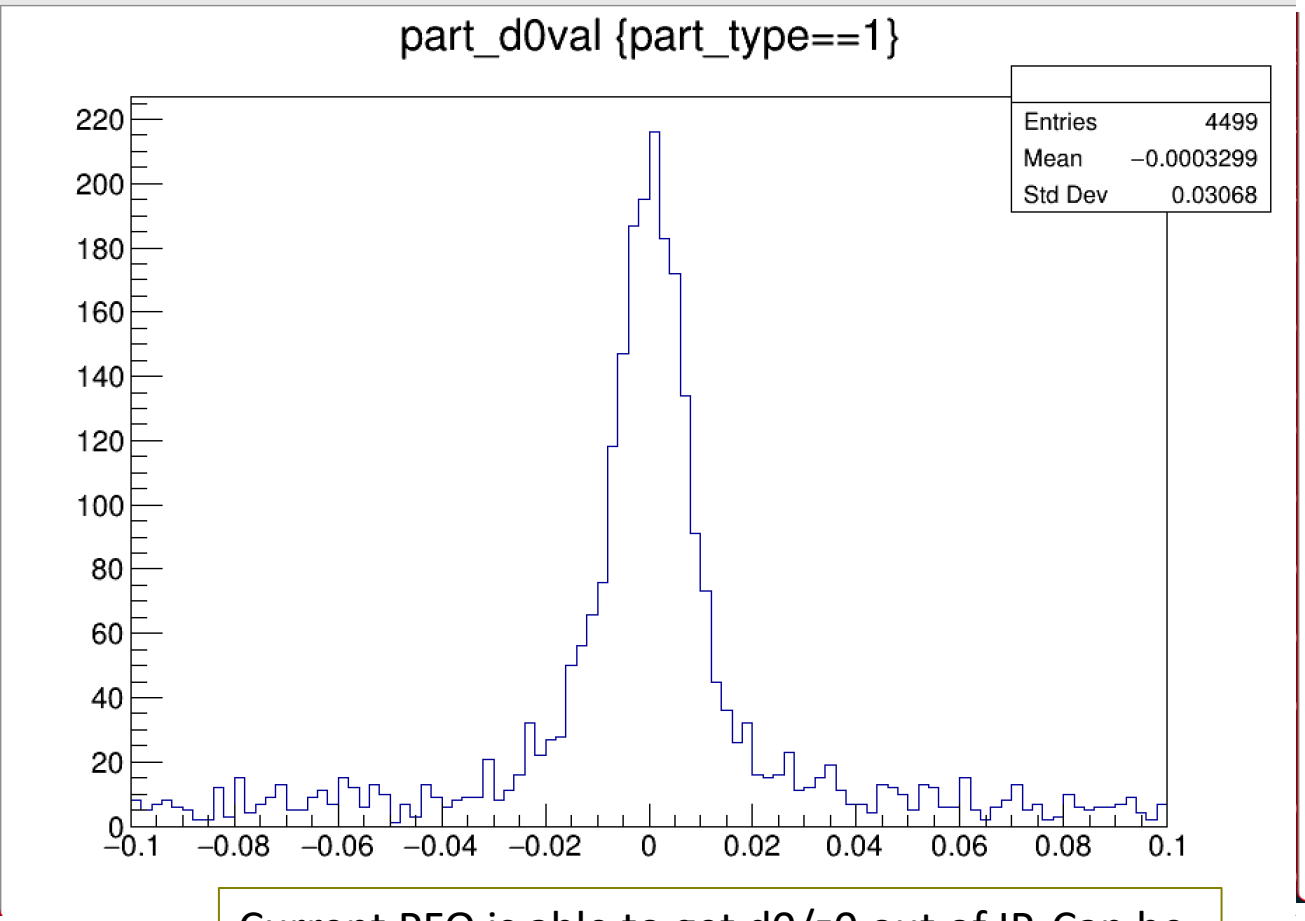
Signal Process	Sample Stats	Bkg Process	Stats
Z->mm@91.2GeV	100k	ee->mm@91.2	In barrel nearly bkg free.
H->yy Z->qq	100k	ee->qqy, ee->WW/ZZ->qqy	
Z->ll, Hrecoil	100k	ee->WW/ZZ->ll+qq	
Z->vv, H->ss	100k	ee->(WW/ZZ)->qq	
Z->qq, H->invisible	100k	ee->(WW/ZZ)->qq	
Z->qq, H->mm	100k	ee->(WW/ZZ)->ll+qq	

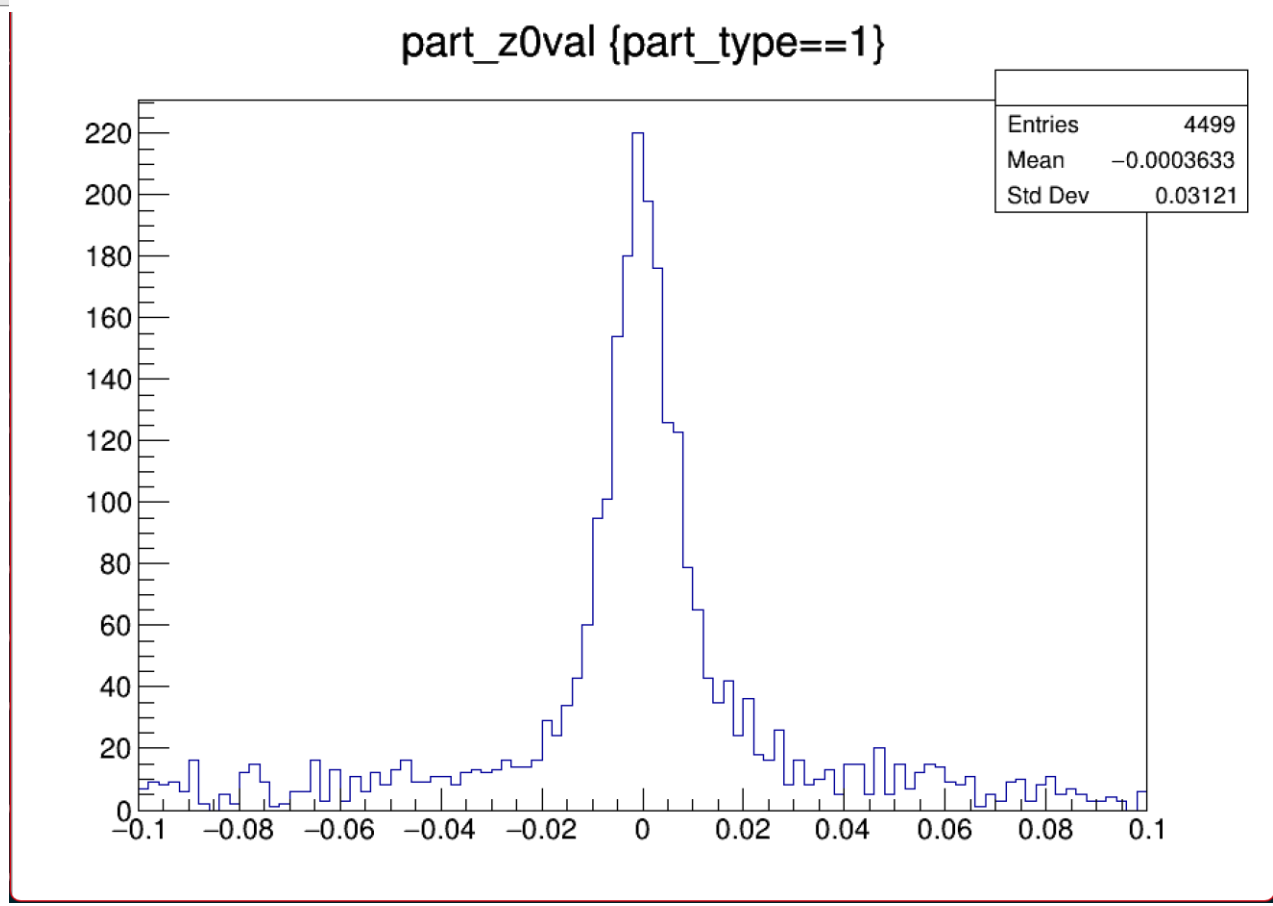
Generally, for bkg, need 240GeV, ee->qq(y); ee->WW/ZZ->(qq)qq; ee->WW/ZZ->ll(same flavor)+qq.

D0, Z0 without vertex fit

ZH->vvbb, 200 events. For PFOs with tracks and truth matched.
Unit: mm; 0.1mm=100um. Vertex baseline position resolution: 3um.

After fix, now d0, z0 value can be read correctly.





Current PFO is able to get d0/z0 out of IP. Can be very far. Even to ~1.2m.

Will further check with ChenGuang with Vertex fit.

Towards TDR

Provide the post-calibration distribution?

Timescale;

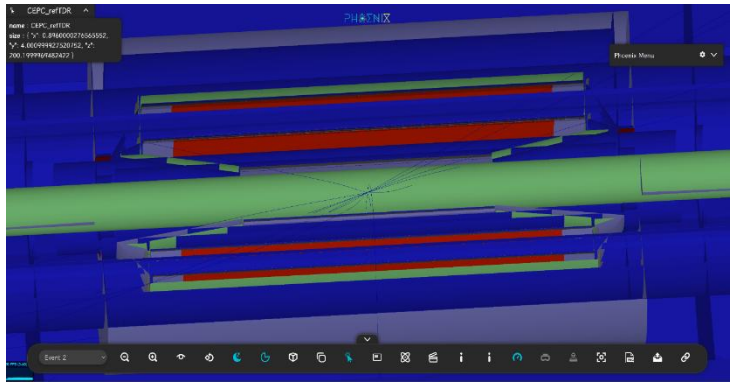
Some channel can start (photon, muon)

Some still missing (endcap, MET)

Analysis tools (now PID available,

Still need isolated objects, vertex, flavor tagging.)

Event display



@Zeng Yujie, You Zhengyun

- His slides
- Version to use: https://code.ihep.ac.cn/zhangkl/phoneix
- Latest geometry applied;
- Enough for general purpose.

README.md

phoneix

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

Phoneix: https://github.com/HSF/phoenix

Start with python: python -m http.server 8080 --directory=phoenix-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_E91_bb_00389.edm4hep.json from CEPC ee->vv+bb.

Further functions under developing.