

Get Started with CEPC Software

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Day 1

Subjects:

- Setup the software
- Try to simulate a particle in the detector, and reconstruct it
- Display the particle

Optional:

- Modify the detector model and visualize it
- Know how to read the database
- Simulate and reconstruct a ZH event using generator

Review

- How does the event you generated looks like?
- Difficulty you met?

Day 2

Subjects:

1. Know how to extract information from LCIO files
2. Read root files

Optional:

1. Try to make a processor reading information you are interested in

Analysis

- Read slcio file
 - dumpevent ~/CEPCTraining/Sample/Reco/Reco_e-_10GeV.slcio
 - MC code: <http://pdg.lbl.gov/2007/reviews/montecarlohpp.pdf>
 - TOO Complicated!!!
- Marlin processor
 - ~/CEPCTraining/Ana
 - 3 processors prepared
- LCIO functions: http://lcio.desy.de/v02-04-03/doc/doxygen_api/html/classEVENT_1_1LCObject.html

Analysis

- Source files
 - src: define the function of a processor
 - include: head files
- How to compile
 - mkdir build
 - cd build
 - cmake -C ..
 - make install
 - cd ..
 - source loadLDD.sh
- (Compilation needed when source code changed)
- To see what processor you have in the current environment:
 - Marlin -x > all.xml

Analysis

- Example:
 - Read MC particle information and Reco particle information
 - Marlin test.xml
 - `root -l MCTruth.root`

ROOT—Beginner commands

- Open a root file "file"
 - root file.root
- See what's in this file
 - .ls
- See what are the branches values of first entry in the tree "Tree"
 - Tree->Show(1)
- Draw a branche "Val" in "Tree"
 - Tree->Draw("Val")
- Open a browser
 - TBrowser *b

Analysis-How a processor works

- Description of parameters
- Init(): define the root file, tree, branches
- processEvent(): the core part, loop every event
 - Collections->Elements->Information
 - Ex: ArborPFOs->ReconstructedParticle->Energy
 - `LCCollection* col_recoP = evtP->getCollection("ArborPFOs");`
 - `ReconstructedParticle* a_recoP = dynamic_cast<ReconstructedParticle*>(col_recoP->getElementAt(i));`
 - `float Energy = a_recoP->getEnergy();`
 - Save information in the tree: `outputTree->Fill();`
- Write the root file: `tree_file->Write();`

Working Time

- Read the event you generated in Step1
- Try to run the HitMap processor prepared
- *Write a processor, save the cluster energy and cluster hit energy in the root file, draw hit collection efficiency
- Preparation for tomorrow:
 - <https://arxiv.org/pdf/1601.05352.pdf>
 - <https://arxiv.org/pdf/1712.09625.pdf>
- Enjoy!

Day 3

Subjects:

1. Calculate the recoil mass of $\mu\mu$ in $\mu\mu H$ events
2. Calculate the invariant mass of di-jets in $vvH(H \text{ to } gg)$ events

Optional:

1. Calculate the recoil mass of ee in eeH events
2. Calculate the invariant mass of di-jets in ZZ/WW events

Backup

backup

- <http://cepcsoft.ihep.ac.cn/guides/scratch/docs/local/#install-cepcenv>
- `apt-get install libtool*`
- `find / -name "libstdc++.so.6"`
- `cp /*/libstdc++.so.6 $CEPCSOFT/GCC/lib64/.`

Database

- `mysql -h 202.122.37.75 -uconsult -pconsult`
- `>show databases;`
- `>use models03;`
- `show tables;`
- `describe model;`
- `select * from model where name="CEPC_v4";`
- `select * from sub_detector where name="SEcal05";`
- `select * from sharing where driver="SEcal05";`
- <https://indico.ihep.ac.cn/event/4287/contribution/24/material/slides/0.pdf>

File Camera

Style | Guides | Clipping | Extras

Name _____

GLViewer::TGLSAViewer

Update behaviour _____

Ignore sizes

Reset on update

Update Scene

Camera Home

Max HQ draw time: 5000

Max LQ draw time: 100

Clear Color ▾

Light sources: _____ ▸

Top Bottom

Left Right

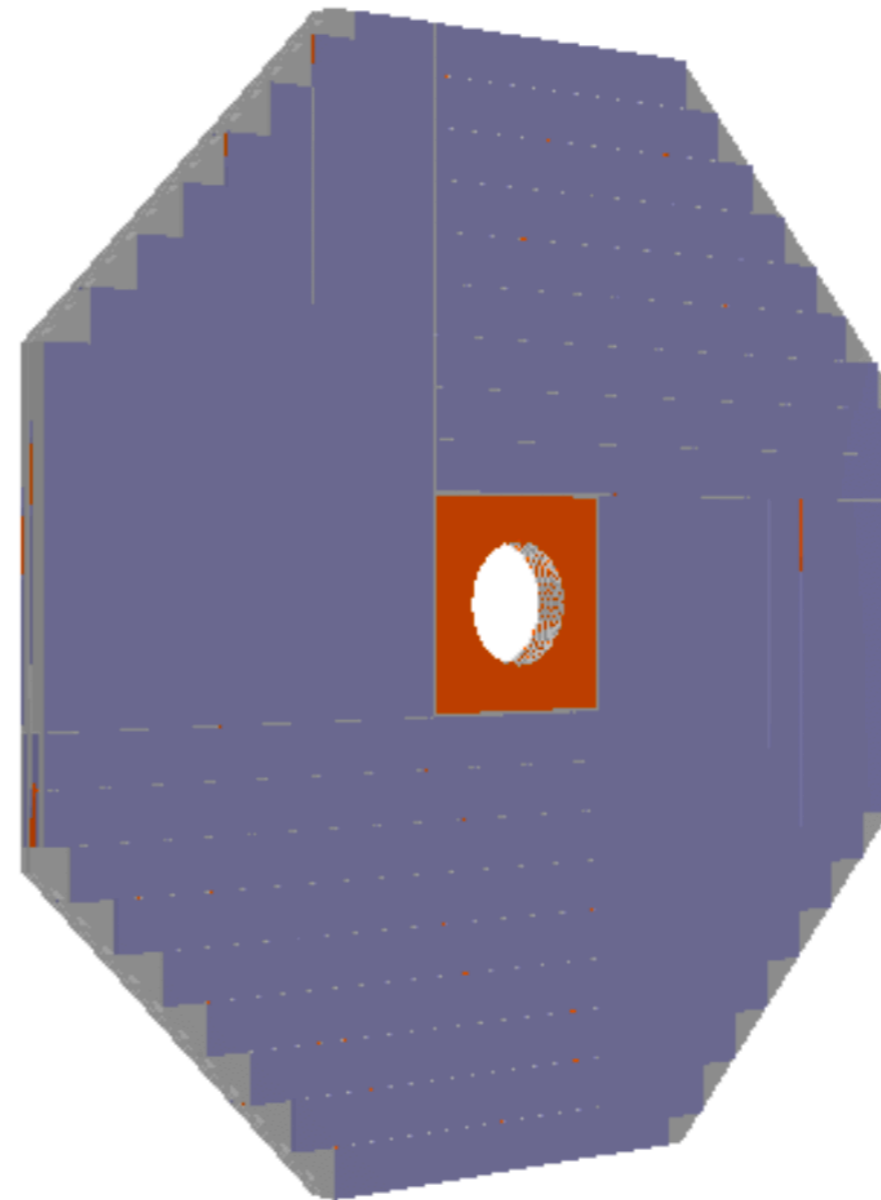
Front Specular

Point-size scale: 1.0

Line-width scale: 1.0

Wireframe line-width: 1.0

Outline line-width: 1.0



```
cepc@cepc-virtualbox:~/CEPC/Fatting/STMS$ root -l
root [0] TGeoManager::Import("EndCapLog.gdml")
Info in <TGeoManager::Import>: Reading geometry from file: EndCapLog.gdml
Info in <TGeoManager::TGeoManager>: Geometry GDMLImport, Geometry imported from
GDML created
Info in <TGeoManager::SetTopVolume>: Top volume is EndCapLog. Master volume is E
ndCapLog
Info in <TGeoNavigator::BuildCache>: --- Maximum geometry depth set to 100
Info in <TGeoManager::CheckGeometry>: Fixing runtime shapes...
Info in <TGeoManager::CheckGeometry>: ...Nothing to fix
Info in <TGeoManager::CloseGeometry>: Counting nodes...
Info in <TGeoManager::Voxelize>: Voxelizing...
Info in <TGeoManager::CloseGeometry>: Building cache...
Info in <TGeoManager::CountLevels>: max level = 3, max placements = 1119
Info in <TGeoManager::CloseGeometry>: 34320 nodes/ 10 volume UID's in Geometry i
mported from GDML
Info in <TGeoManager::CloseGeometry>: -----modeler ready-----
---
(class TGeoManager*)0x1608f10
root [1] gGeoManager->GetTopVolume()->Draw("ogl")
Info in <TCanvas::MakeDefCanvas>: created default TCanvas with name c1
root [2] TFile *f=new TFile("EndCap","recreate")
root [3] gGeoManager->Write()
(Int_t)35409
root [4] f->Close()
root [5]
```


ROOT—In Case

- <https://root.cern/>
- https://docs.google.com/presentation/d/189f0qsDEnMSk2R5KWLRPz2TdEV5kTfXH1VcuAra4cnU/edit#slide=id.g2a150e6c26_0_0