Isolated Object Removel

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Basic Idea of Isolated Object Removal

- What objects to be removed ?

    - Photons

    - Electrons

    - Muons

- Collections after removing particles – will be used as input for JetClustering Algorithm

- Test Samples:

    - $e^+e^- \rightarrow ZH \rightarrow \mu\mu + invisible$

    - $e^+e^- \rightarrow ZH \rightarrow qq + \mu\mu$

    - /cefs/higgs/zhangkl/Production

Basic Criteria of Isolated Object

- Target :
  - e / μ / γ Seperation

- Table of criteria (Thanks Hengne and Kaili for providing parameters)

Objects	Charge/Track	E_{CAL}/E_{Total}	E_{Total}/P_{Track}	P_T
Electron	✓	> 0.6	> 0.9	5 GeV
Muon	✓	< 0.3	< 0.3	5 GeV
Photon	✗	-	-	10 GeV

- More selections to be determined

Framework Description

- A standalone folder is created specially for OverlapRemoval (in parrellal with JetClustering folder)

- Input Collection

  - CyberPFO

- Output Collection

  - Photon

  - Electron

  - Muon

  - Jet (particle failed all identification criteria will be considered as jet candidate)

- Save output information into ROOT file

Discussion

- Best Strategy About the OverlapRemoval Code

  - Option one: Work as a standardalone folder in parrellal with JetClustering

  - Option two: Work as an internal function inside of JetClustering

- Further works

  - Fixed track issue : Can not extract momentum or energy information

  - Further enhance particle identification

  - Throw into Jet Clustering Algorithm and compare with current results w/o removing isolated objects

Run script

```python
import os, sys
from Gaudi.Configuration import *

########### K4DataSvc ###########
from Configurables import k4DataSvc
podioevent = k4DataSvc("EventDataSvc", input="/cefs/higgs/zhangkl/Production/E240_mmHinclusive/Combined/rec_E240_mmHinclusive_00001.root")
################################

########### CEPCSWData ###########
cepcswdatatop = "/cvmfs/cepcsw.ihep.ac.cn/prototype/releases/data/latest"
################################

########### Podio Input ##########
from Configurables import PodioInput
# inp = PodioInput("InputReader")
inp = PodioInput("InputReader", collections=[
                "CyberPFO" ])
################################

from Configurables import ObjectRemoval
objectremoval = ObjectRemoval("ObjectRemoval")
objectremoval.OR_PFOcollection = "CyberPFO"
# objectremoval.OR_Trkcollection = "CompleteTracks"
# objectremoval.OR_ECalBcollection = "RecECALBarrel"
# objectremoval.OR_HCalBcollection = "RecHCALBarrel"
objectremoval.OR_outputfile = "/cefs/higgs/danningliu/PID/Run/TestRun_ObjectRemoval_00001.root"
objectremoval.OR_photon_pt = 10
objectremoval.OR_electron_pt = 5
objectremoval.OR_muon_pt = 5
objectremoval.OR_eta = 2.07
################################

from Configurables import ApplicationMgr
ApplicationMgr(
    TopAlg=[inp, objectremoval],
    EvtSel="NONE",
    EvtMax=10,
    ExtSvc=[podioevent],
    OutputLevel=DEBUG
)
```