

Usage of Arbor PID

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PID code implementation

- Arbor source code:
/cefs/tmp_storage/binsong/job_arborv3/SPPC_CEPC
Simple/Arbor_16_HGC
- Main PID function: ClusterFlag() in
src/PluginMatch/ArborToolLCIO.cc
- usage of this function: in BushConnect.cc line
966 and 967

```
int LeptonID = ClusterFlag(b_Clu, Mom.Mag(), evtPP);  
chargeparticle->setType(LeptonID);
```

How to get the PID in your analysis

- Use the `getType()` function:

```
ReconstructedParticle *a_RecoP = .....;  
int PID = a_RecoP->getType();
```

Just for Charge particle now, get returned value
could be 13,-13,11,-11,211,-211

For neutral particle, the value is always 22,

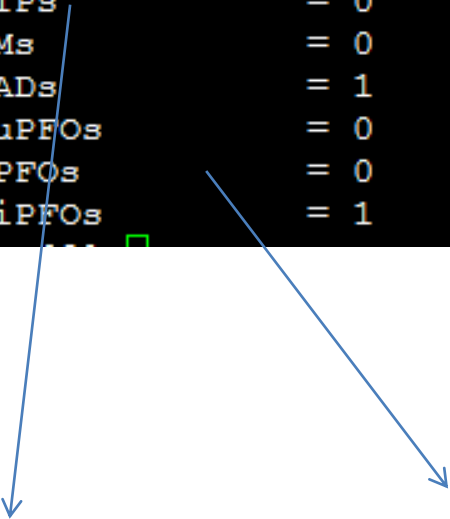
PID optimization package

- Path:
/scratchfs/higgs/binsong/Soft/Personal/SinglePartAna/
- This toolkit give you all the parameters used in the PID.
- Macro: steer/DisSPPC.steer
- input: slcio files after reconstruction.
- Output root file: three branch(Evt, ChPFO, Hit)

```
[binsong@lxslc601 steer]$ root -l DiaSPPC.root
root [0]
Attaching file DiaSPPC.root as _file0...
root [1] .ls
TFile**          DiaSPPC.root
  TFile*         DiaSPPC.root
    KEY: TTree   Evt;1   Evt
    KEY: TTree   ChPFO;1 ChPFO
    KEY: TTree   Hit;1   Hit
```

```
root [2] Evt->Show(1)
=====> EVENT:1
EventNr      = 1
Num          = 1
ThetaMC     = 0.174969
THEn        = 110.976
TCEn        = 100.993
LCEn        = 60.8151
nCH         = 1
nMIPs       = 0
nEMs        = 0
nHADs       = 1
nMuPFOs     = 0
nEPFOs      = 0
nPipFOs     = 1
```

```
root [3] ChPFO->Show(1)
=====> EVENT:1
EventNr      = 1
Num          = 1
TrkEn       = 100.139
Type        = 211
ThetaMC     = 0.174969
Charge       = 1
EClu        = 100.993
EE_Clu      = 88.6587
EH_Clu      = 12.3347
NH_ECAL     = 573
NH_ECALF6   = 293
NH_ECALL10  = 280
NH_HCAL     = 133
FD_ECAL     = 0.711763
FD_ECALF6   = 0.890197
FD_ECALL10  = 0.568771
FD_HCAL     = 0.121027
FD_all      = 0.541721
minDepth    = 12.6499
maxDepth    = 623.65
CluFlagID   = 211
CluDepth    = 648.558
SDTheta     = 0.00305268
avEnDisHtoL = 18.9981
```



PID in rec file

PID in the toolkit

- PID cut: DiaSPPC.cc line 442 to line 463

```
bool cutmus[6];

cutmus[1] = _FD_HCAL >= 0;

cutmus[2] = (_cluDepth > 600 || _TrkEn < 1.5);

cutmus[3] = _cluDepth/_EClu > 30;

cutmus[4] = _FD_HCAL/(_HcalNHit/_EClu) < -0.1*abs(_FD_ECALF6-_FD_ECALL10)/2.5+0.012+_TrkEn/3000.;

cutmus[5] = (_avEnDisHtoL*_TrkEn < 320 || _TrkEn > 50);

bool cutmu = cutmus[1] && cutmus[2] && cutmus[3] && cutmus[4] && cutmus[5];

bool cutes[4];

cutes[1] = _FD_all > 0.6/200.*_cluDepth;

cutes[2] = log10(_EcalNHitF6+2*_EcalNHitL10) > 1-0.3/_TrkEn;

cutes[3] = (_FD_ECALF6 > 0.4*(log10(_EcalNHitF6+2*_EcalNHitL10)-0.85) || _TrkEn > 80);

bool cute;

cute = cutes[1] && cutes[2] && cutes[3];
```

For different geometry, the cut may be different.

Usage of this package

- Copy the package to your own path.
- Compile by Hfcamke, cmake install
- Add the lib file to your marlin dll.
- Run: Marlin steer/DiaSPPC.steer