

Reconstruction HandOn

Exercise

1. Run reconstruction with DecodeMC executable for 12C_200 experiment when:
 - Changing the active detectors
 - Changing the global parameters➔ have a look at the output root file
2. Read back the L0 reconstruction tree for VTX tracks and fill a histogram with the number of clusters in a track per event
3. Do the same for VTX clusters.
4. Run reconstruction for ST+BM+TW
5. Read back TW reconstruction point information and fill a histogram with TW reconstructed point position (X and/or Y)

Exercise

6. Run reconstruction with DecodeMC executable for 16O_200 experiment with TGT+VTX on.
7. Read back the L0 reconstruction tree for VTX tracks and fill a histogram with the number of clusters in a track per event
➔ compare with 12C_200 experiment

Answer 1

• Command line:



```
. . .  
EnableTree:      y  
EnableHisto:    y  
EnableTracking:  y  
  
EnableSaveHits: n  
EnableRootObject: n  
EnableTofZmc:   n  
EnableTofCalBar: n  
  
. . .  
IncludeDI:      n  
IncludeST:      n  
IncludeBM:      n  
IncludeTG:      y  
IncludeVT:      y  
IncludeIT:      n  
IncludeMSD:     n  
IncludeTW:      n  
IncludeCA:      n  
. . .
```

→ Set global parameters

▶ `DecodeMC -in 12C_C_200_1.root -out 12C_C_200_L0Out.root -nev 1000 -exp 12C_200 -run 1`

Answer 1

Printout:

```
===== Input Parameters =====  
Global debug level: 0  
Detectors included:  
- Target - Vertex -  List of active detectors  
  
Warning in <TGeoIdentity::RegisterYourself>: cannot register without geometry  
Info in <TGeoManager::TGeoManager>: Geometry FOOT, FOOT Geometry created  
  
In file ./geomaps/12C_200/TAGdetector.geo the following beam parameters for a 12C beam have been  
set:  
BeamEnergy:      0.200 GeV/u  
BeamAtomicMass:  12  
BeamAtomicNumber: 6  Target/beam info  
BeamMaterial:    "C"  
  
TargetMaterial:  "C"  
TargetThickness: 0.500 cm  
  
Warning in <TAGactTreeReader::Open(>: No object named 'runinfo' found
```

Answer 1

Printout:

TAGroot:		
Known Actions:		
name	type	
locRecFile	TAGactTreeWriter	
actGeoTrafo	TAGgeoTrafo	
actCamMan	TAGcampaignManager	
actEvtReader	TAGactTreeReader	
eveActNtuMc	TAMcactNtuEve	
vtActNtu	TAVTactNtuMC	
vtActNtuMc	TAMcactNtuVtx	
vtActClus	TAVTactNtuClusterF	
vtActTrack	TAVTactNtuTrackF	
vtActVtx	TAVTactNtuVertexPD	
Known ParaDsc's:		
name	type	
tgGeo	TAGparGeo	
vtGeo	TAVTparGeo	
vtConf	TAVTparConf	
Known DataDsc's:		
name	type	produced by
eveMc	TAMcntuEve	eveActNtuMc
vtRaw	TAVTntuRaw	vtActNtu
vtMc	TAMcntuHit	vtActNtuMc
vtTrack	TAVTntuTrack	vtActTrack
vtVtx	TAVTntuVertex	vtActVtx
vtClus	TAVTntuCluster	vtActClus
Required Actions:		
actEvtReader	TAGactTreeReader	
eveActNtuMc	TAMcactNtuEve	
vtActNtuMc	TAMcactNtuVtx	
locRecFile	TAGactTreeWriter	
vtActNtu	TAVTactNtuMC	
vtActClus	TAVTactNtuClusterF	
vtActTrack	TAVTactNtuTrackF	
vtActVtx	TAVTactNtuVertexPD	

→ List of actions

→ List of parameters

→ List of containers

→ List of required actions

Answer 1

Printout:

```
Loaded Event:: 0
Loaded Event:: 100
Loaded Event:: 200
Loaded Event:: 300
Loaded Event:: 400
Loaded Event:: 500
Loaded Event:: 600
Loaded Event:: 700
Loaded Event:: 800
Loaded Event:: 900
TAGactTreeWriter: TAGactTreeWriter 'locRecFile'
branch name      index/type  bt bid  tot size file size  comp  frac
tree:tree        -- tree ----  90870.6k 18272.4k  4.97
vtclus.          -- branch --  0  -2  24917.8k  3770.7k  6.61  20.6%
vttrack.         -- branch --  0  -2  20775.5k  3394.2k  6.12  18.6%
vtvtx.           -- branch --  0  -2  20853.5k  3433.8k  6.07  18.8%
mctrack.         -- branch --  0  -2  21944.4k  6517.9k  3.37  35.7%
mcvt.            -- branch --  0  -2   3356.1k  1689.4k  1.99   9.2%
Real time 0:00:16, CP time 16.000
```

Number of events

List of branches in Tree

Answer 1

• From root file:

▶ root 12C_C_200_L0Out.root

Histograms directory for VT

```
root [1] .ls
TFile** 12C_C_200_L0Out.root
TFile* 12C_C_200_L0Out.root
KEY: TDirectoryFile VT;1 VT
KEY: TTree tree;1 TAGactTreeWriter - Tree writer
KEY: TAGrunInfo runinfo;1
```

Tree of FOOT

```
root [2]runinfo->Print()
```

Run info

```
root [3] VT->cd()
root [4] .ls
```


Answer 2

From tree:

```
void PlotVtxTrackCluster(TString nameFile = "12C_C_200_L00ut.root", TString expName = "12C_200",
                        Int_t runNumber = 1)
{
    GlobalPar::Instance(expName);           Read global parameters
    GlobalPar::GetPar()->Print();

    TAGroot tagr;

    TAGcampaignManager* campManager = new TAGcampaignManager(expName);   Initialise campaign
    campManager->FromFile();

    TAGparaDsc* parGeoVtx = new TAGparaDsc(TAVTparGeo::GetDefParaName(), new TAVTparGeo());
    TAVTparGeo* pGeoMap = (TAVTparGeo*)parGeoVtx->Object();                Load VTX parameters
    TString parFileName = campManager->GetCurGeoFile(TAVTparGeo::GetBaseName(), runNumber);
    pGeoMap->FromFile(parFileName);

    TAVTntuTrack *vtTrack = new TAVTntuTrack();
    TAGdataDsc* vtTrck = new TAGdataDsc("vtTrck", vtTrack);
    TAGactTreeReader* vtActReader = new TAGactTreeReader("vtActEvtReader"); Set VTX track branch
    vtActReader->SetupBranch(vtTrck, TAVTntuTrack::GetBranchName());
    vtActReader->Open(nameFile);

    tagr.AddRequiredItem(vtActReader);   Required action

    . . .
    // histograms definition
}
```

Answer 2

From tree:

```
tagr.BeginEventLoop();

Int_t ev = 0;                                Enters event loop

while (tagr.NextEvent()) {

    Int_t nTrack = vtTrack->GetTracksN();

    for(Int_t i = 0; i < nTrack; ++i) {
        TAVTtrack* track = vtTrack->GetTrack(i);
        if (!track) continue;                Extract track info
        Int_t nclus = track->GetClustersN();

        // fill histograms
    }
    ev++;
}

tagr.EndEventLoop();

// plot histograms
...
}
```



End