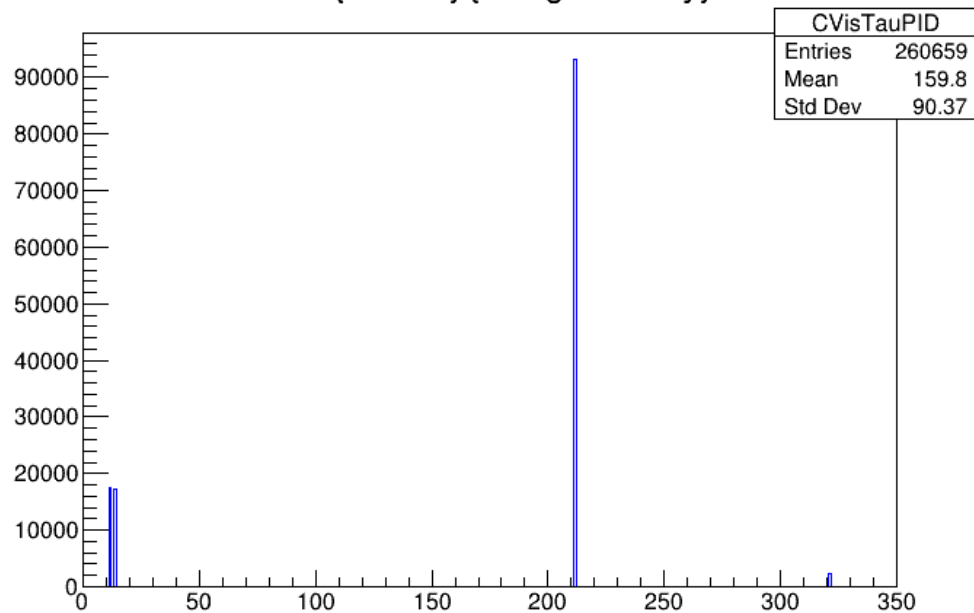
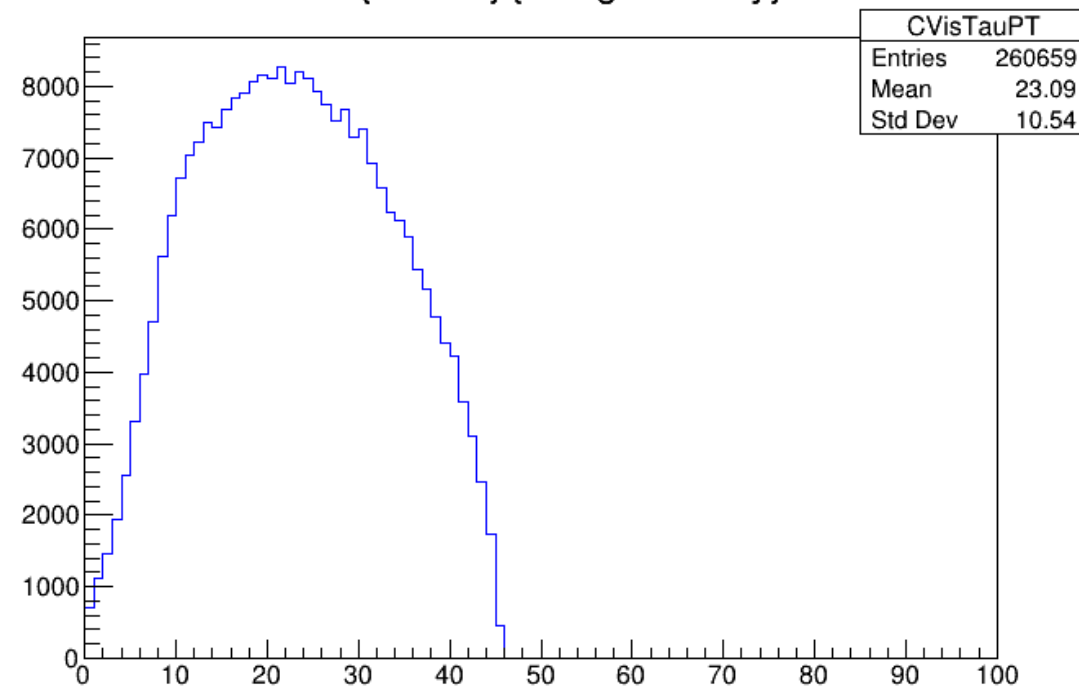


Charged

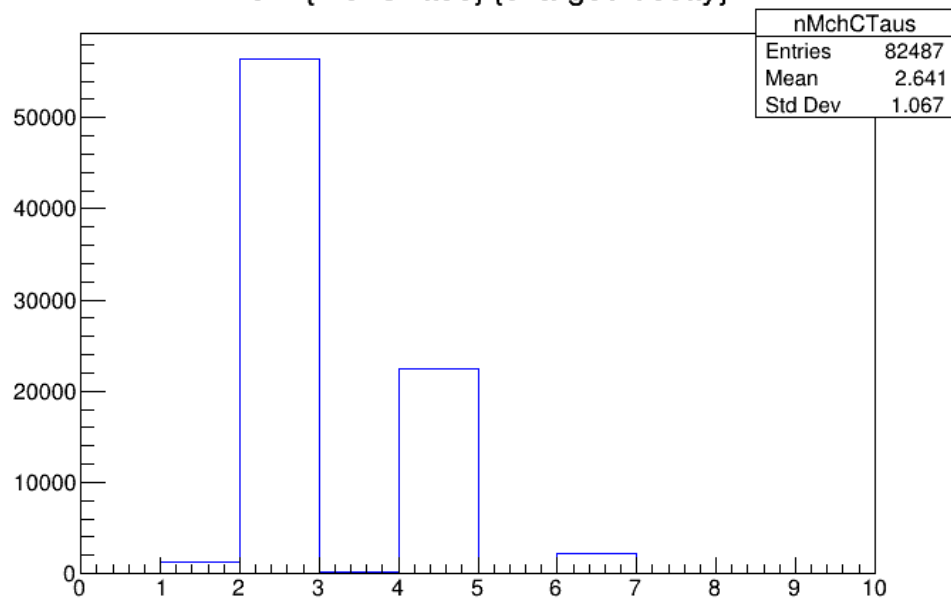
PID {VisTau} {charged decay}



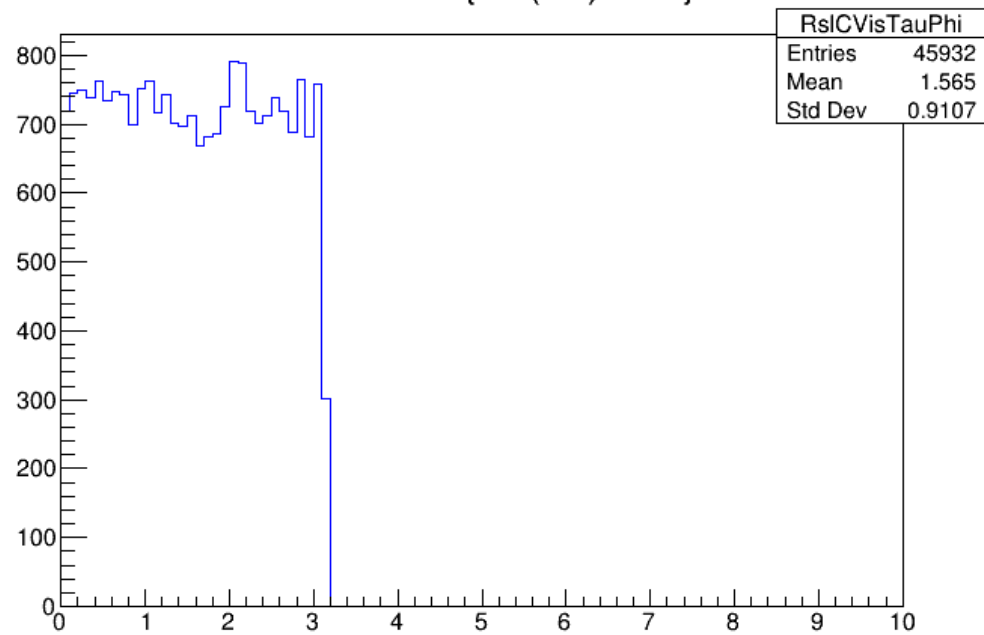
PT {VisTau} {charged decay}



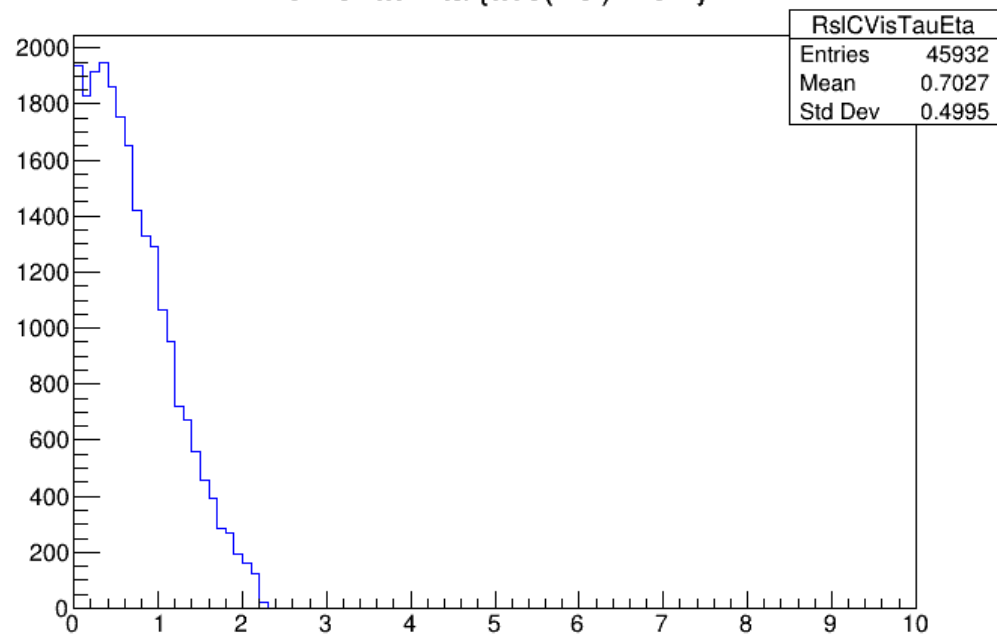
Num {MchCTaus} {charged decay}



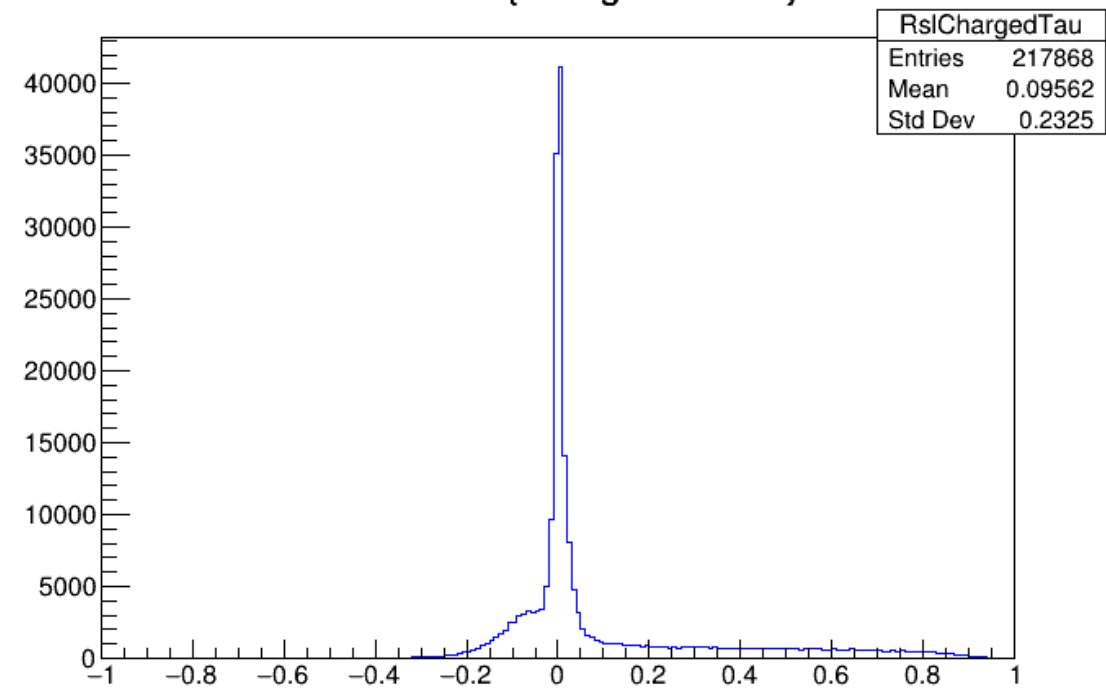
CVisTau Phi {abs(Rsl) &gt; 0.2}



CVisTau Eta {abs(Rsl) &gt; 0.2}

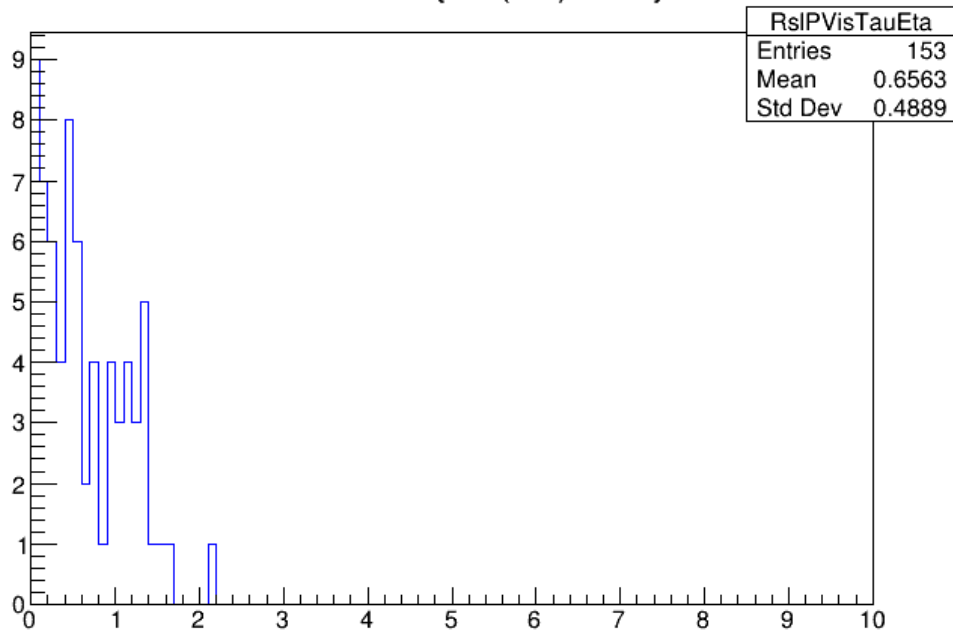


Resolution {ChargedTau PT}

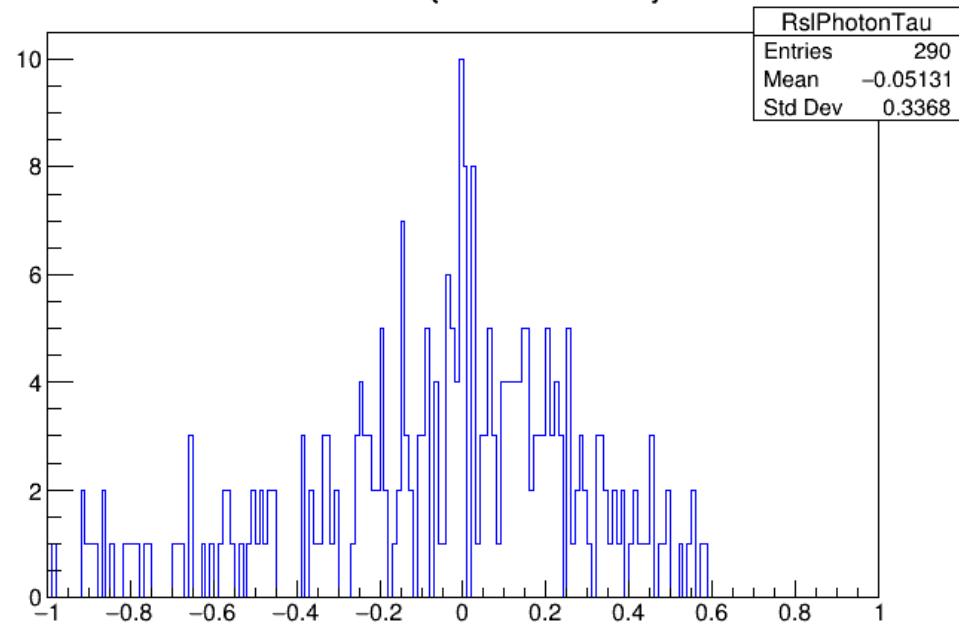


# Photon

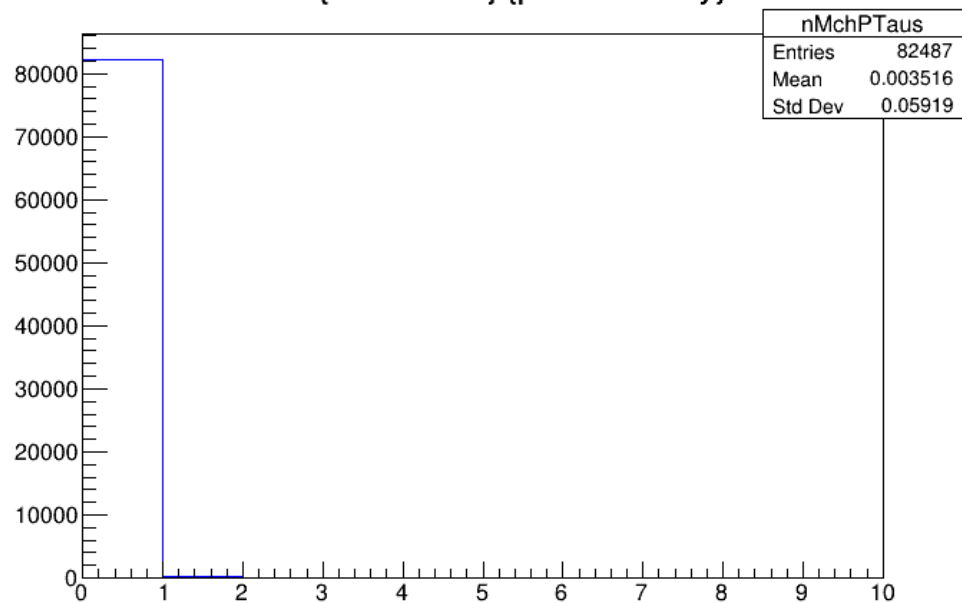
PVisTau Eta {abs(Rsl) &gt; 0.2}



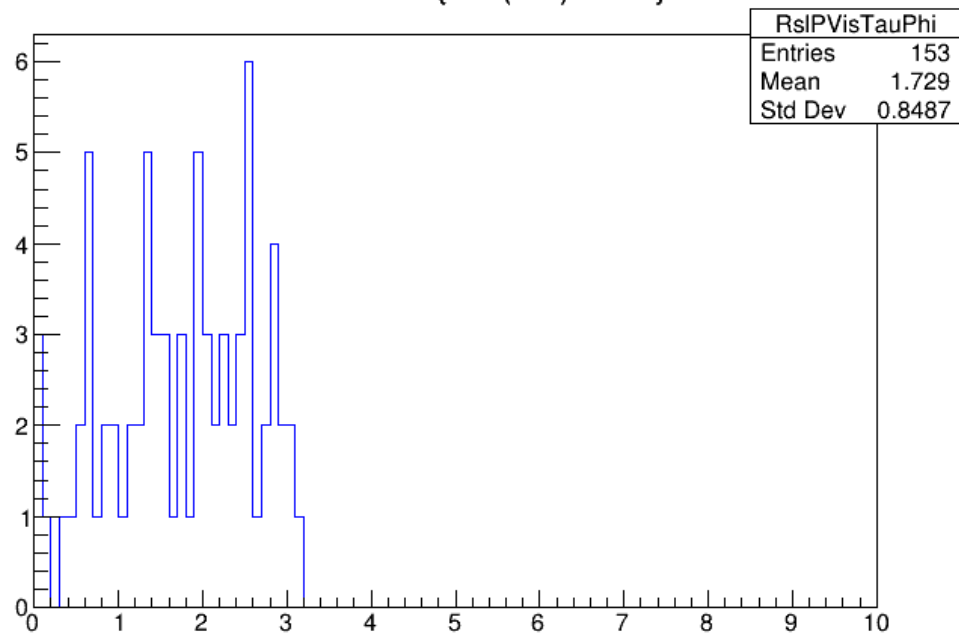
Resolution {PhotonTau PT}



Num {MchPTaus} {photon decay}

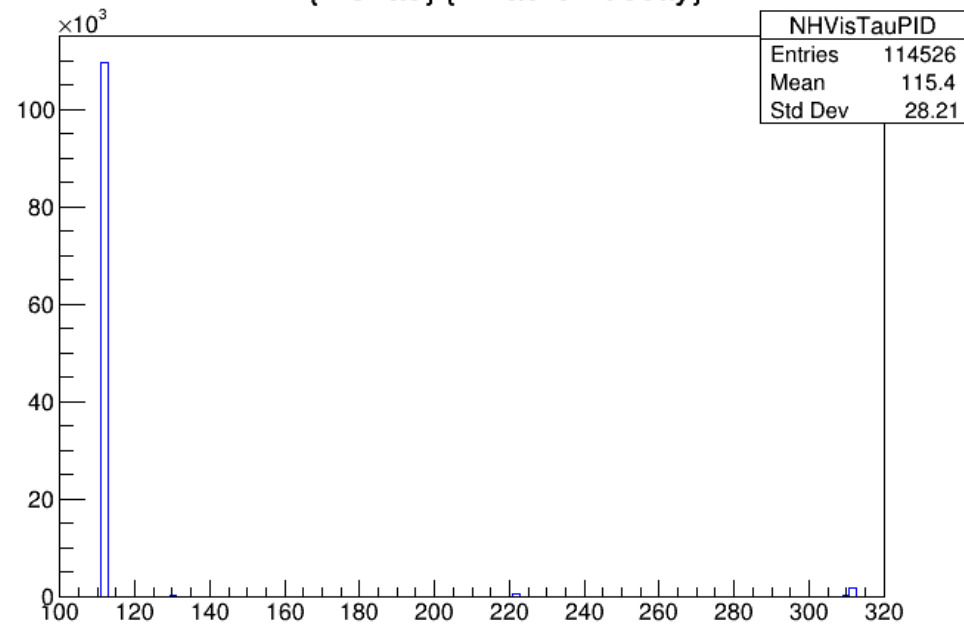


PVisTau Phi {abs(Rsl) &gt; 0.2}

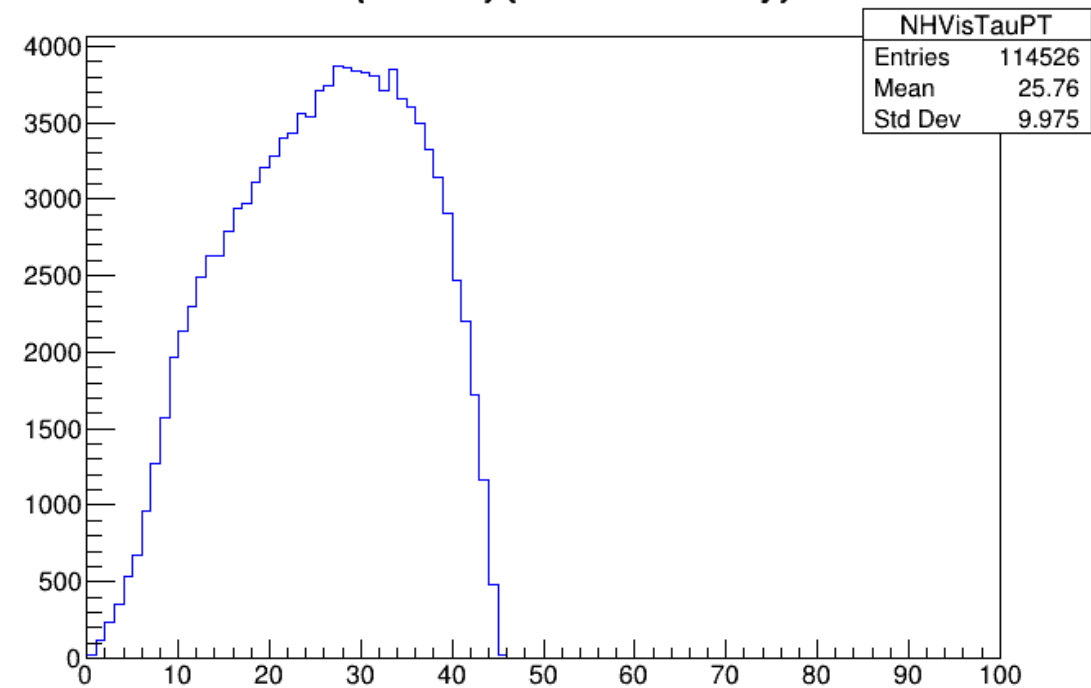


NHadron

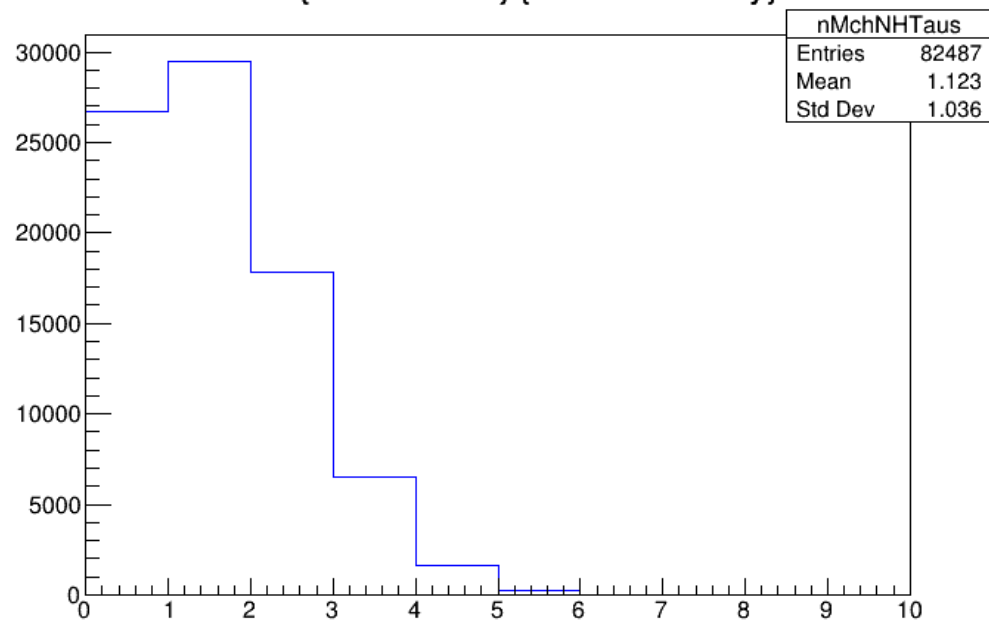
PID {VisTau} {NHadron decay}



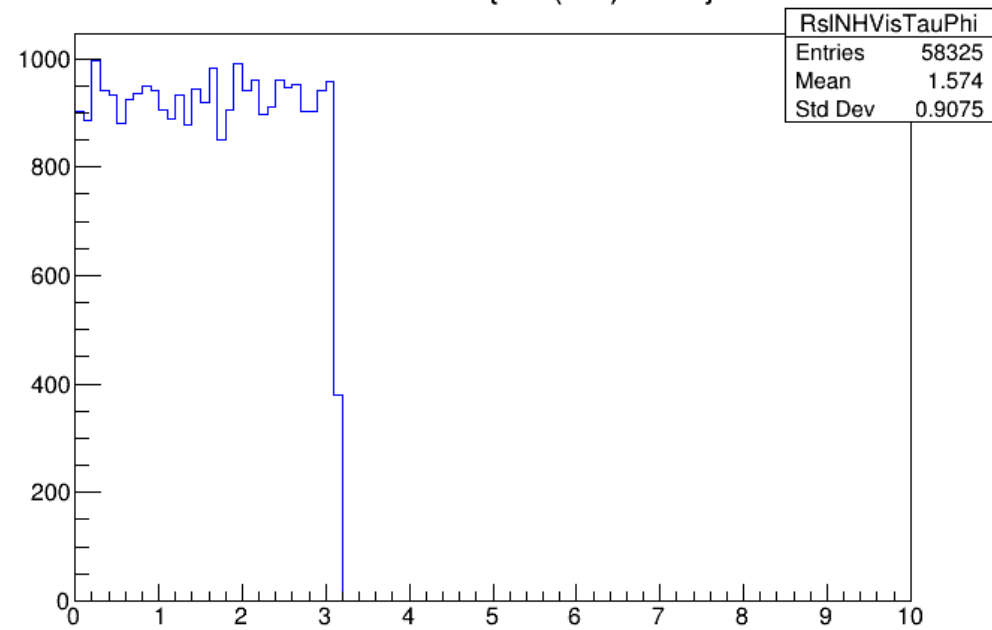
PT {VisTau} {NHadron decay}



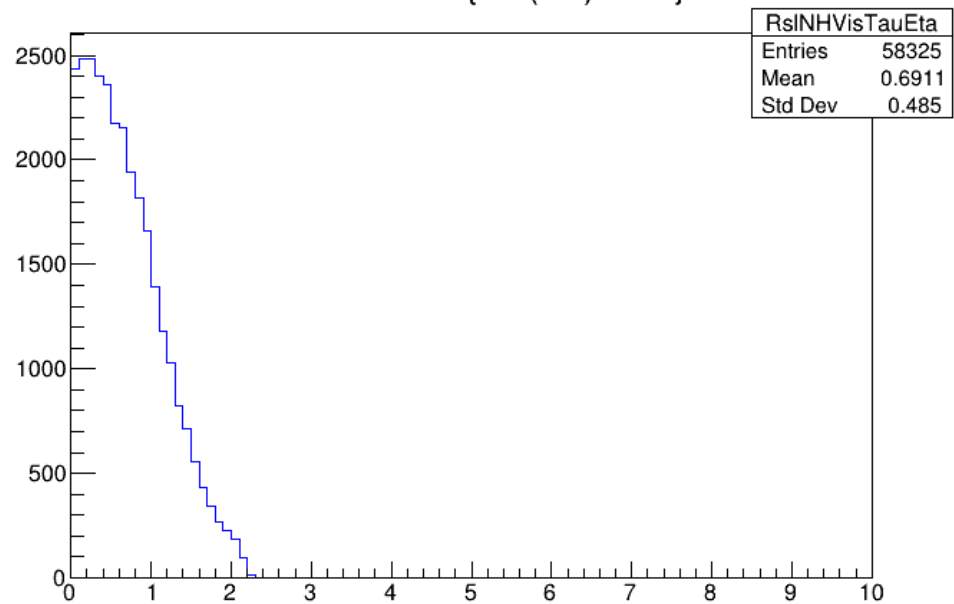
Num {MchNHTaus} {NHadron decay}



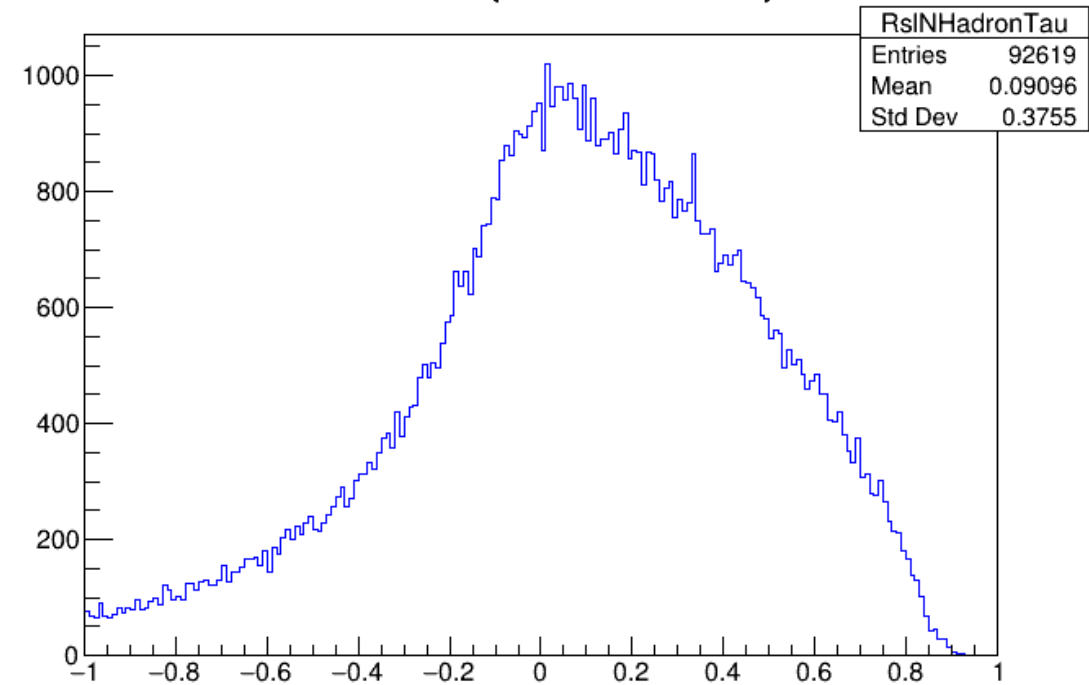
NHVisTau Phi {abs(Rsl) &gt; 0.2}



NHVisTau Eta {abs(Rsl) &gt; 0.2}



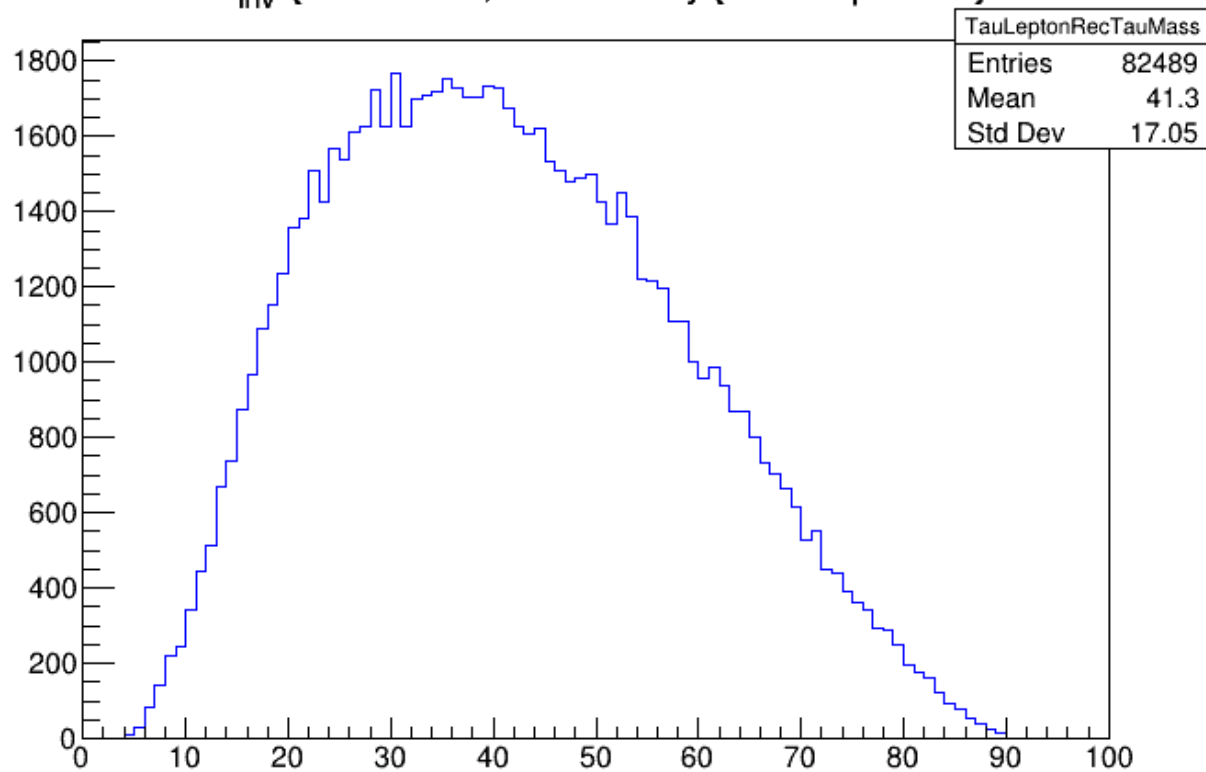
Resolution {NHadronTau PT}



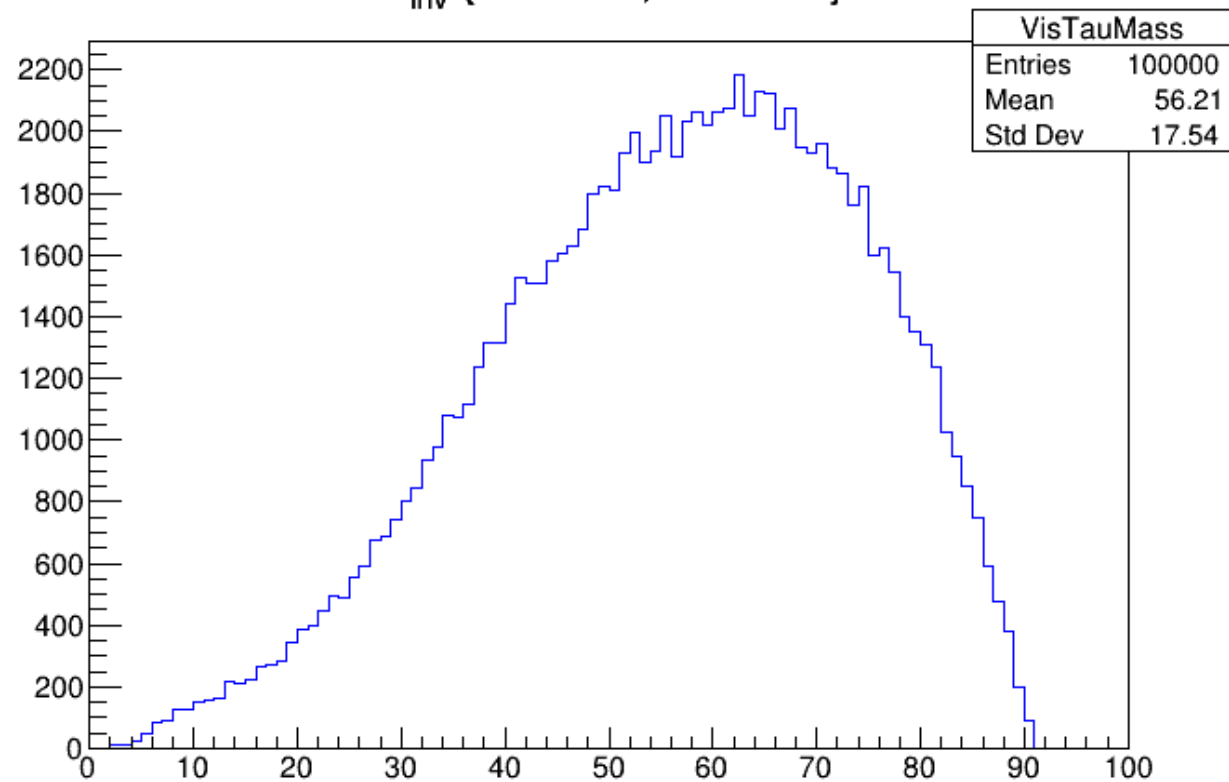
Resolution (before/after loop changes)

# Before

$M_{\text{inv}} \{\text{RecTau1}, \text{RecTau2}\} \{\text{TauLepton.h}\}$

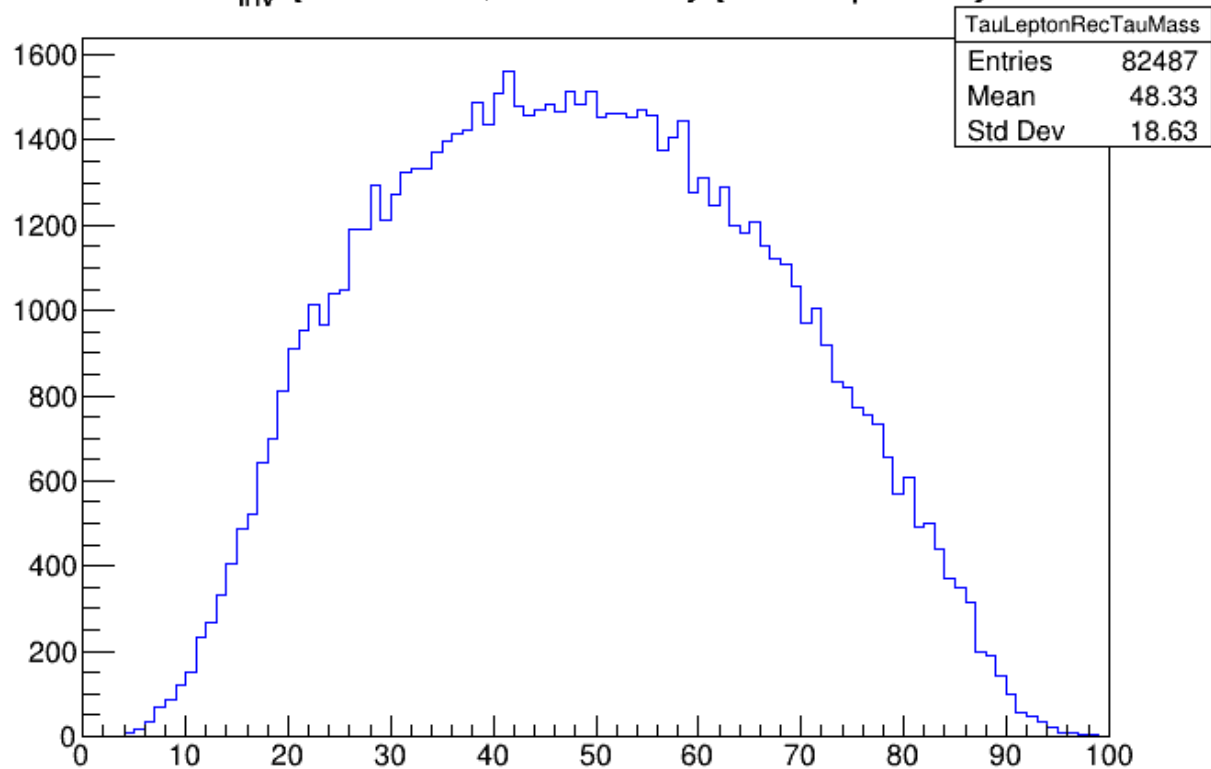


$M_{\text{inv}} \{\text{VisTau1}, \text{VisTau2}\}$

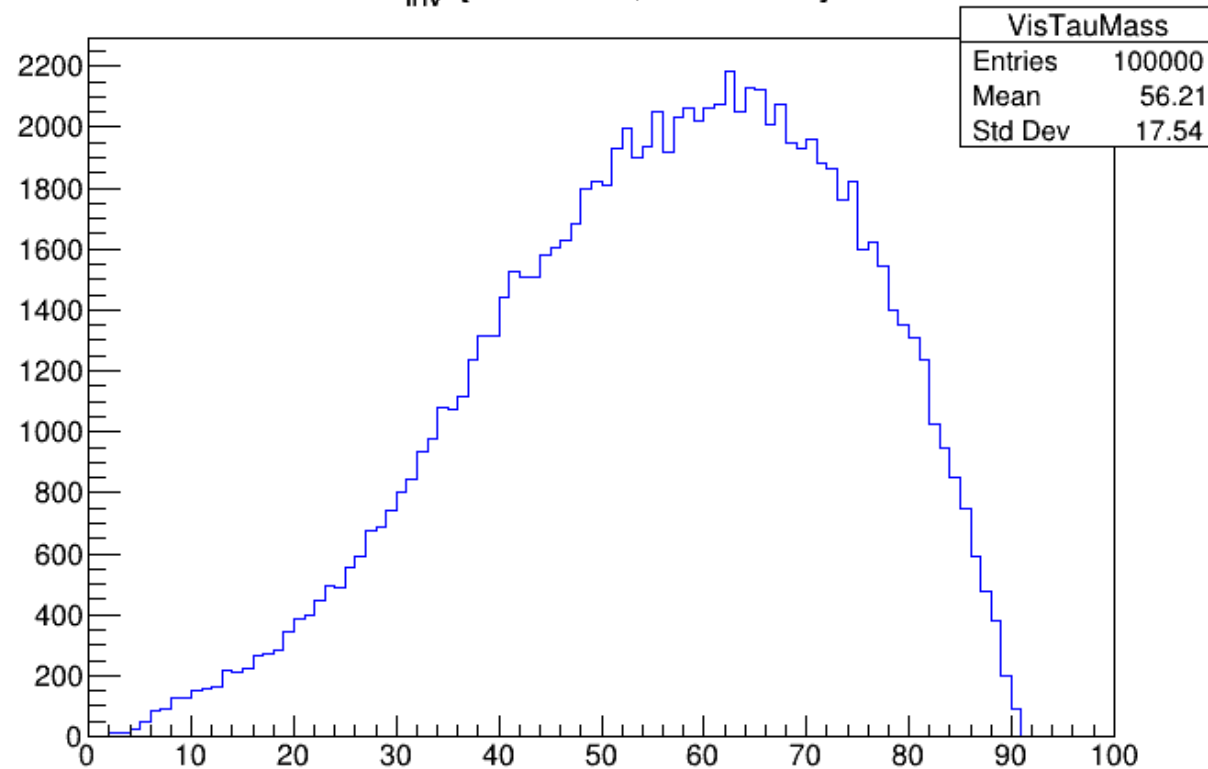


# after

$M_{\text{inv}} \{ \text{RecTau1}, \text{RecTau2} \} \{ \text{TauLepton.h} \}$

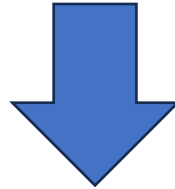


$M_{\text{inv}} \{ \text{VisTau1}, \text{VisTau2} \}$



# Delphes changes (ECAL resolution formula)

```
set ResolutionFormula {  
    (abs(eta) <= 3 )      * sqrt(energy^2*0.01^2 + energy*0.17^2  
}
```



- ```
set ResolutionFormula {  
    (abs(eta) <= 3 )      * sqrt(energy^2*0.01^2 + energy*0.17^2)+  
    (abs(eta) > 3 && abs(eta) <= 4 ) * sqrt(energy^2*0.01^2 + energy*0.17^2)  
}
```

# Delphes issue in Madgraph script

```
import model sm
define q = u d s c b t
define q~ = u~ d~ s~ c~ b~ t~
generate e+ e- > z > ta+ ta-
output c3-z-91
launch
shower=Pythia8
detector=Delphes
set ebeam1 45.59
set ebeam2 45.59
set polbeam1 0.00
set polbeam2 80.0
set nevents 100000
set iseed 1823323
```

```
/nfs_scratch/cnee/2023-06-13/Madgraph-Pythia-Delphes-Studies/delphes_card_C3.tcl
```

```
[cnee@login06 c3-z-91]$ ls -ltr Events/run_01/
total 71400
-rw-rw-r-- 1 cnee cnee 3912850 Jul 24 00:20 unweighted_events.lhe.gz
-rw-rw-r-- 1 cnee cnee 5706 Jul 24 00:20 tag_1_pythia8.cmd
-rwxr--r-- 1 cnee cnee 286 Jul 24 00:20 run_shower.sh
-rw-rw-r-- 1 cnee cnee 774081 Jul 24 00:22 tag_1_pythia8.log
-rw-rw-r-- 1 cnee cnee 27689 Jul 24 00:22 tag_1_djrs.dat
-rw-rw-r-- 1 cnee cnee 27681 Jul 24 00:22 tag_1_pts.dat
-rw-rw-r-- 1 cnee cnee 45204 Jul 24 00:22 run_01_tag_1_banner.txt
-rw-r--r-- 1 cnee cnee 1622 Jul 24 00:22 tag_1_delphes_events.root
-rw-rw-r-- 1 cnee cnee 2867 Jul 24 00:22 tag_1_delphes.log
-rw-rw-r-- 1 cnee cnee 68232894 Jul 24 00:23 tag_1_pythia8_events.hepmc.gz
-rw-rw-r-- 1 cnee cnee 45205 Jul 24 11:02 run_01_tag_2_banner.txt
-rw-r--r-- 1 cnee cnee 1622 Jul 24 11:02 tag_2_delphes_events.root
-rw-rw-r-- 1 cnee cnee 2867 Jul 24 11:02 tag_2_delphes.log
```