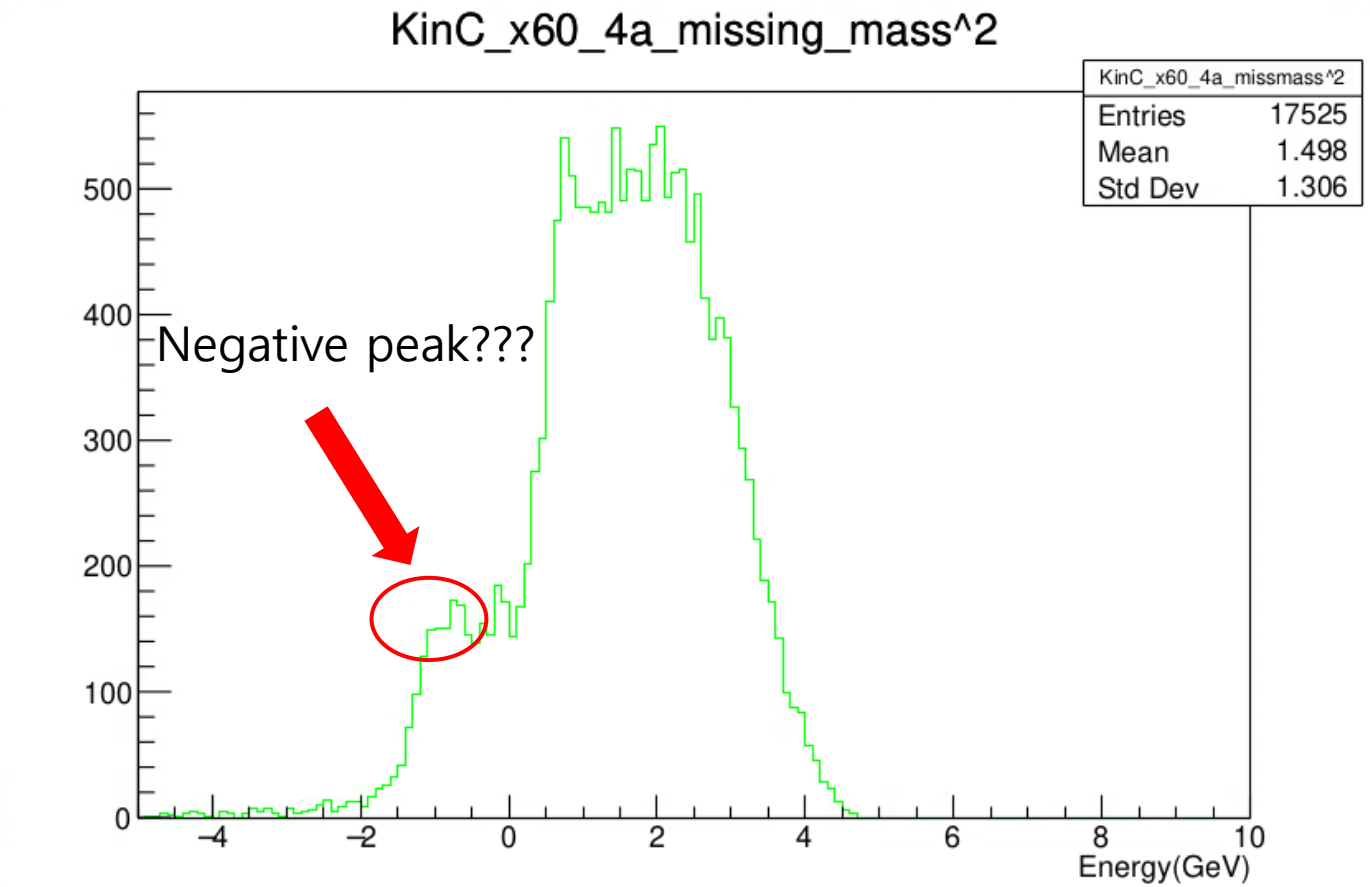
Draw Inv mass & MM2 in Skim Files

Taehee Song

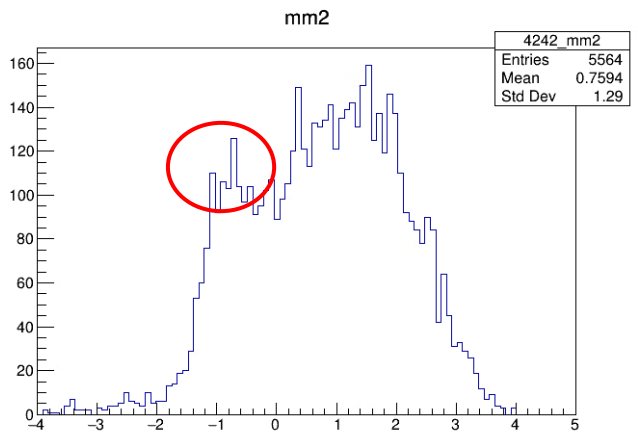
Problem

4242, 4244, 4245, 4248, 4249 Runs

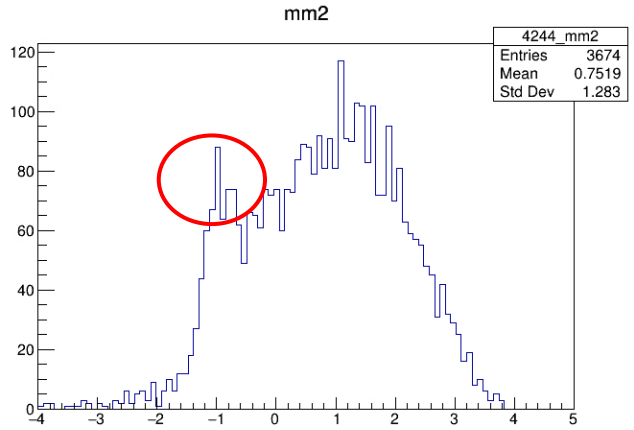


Compare each runs

4242 run

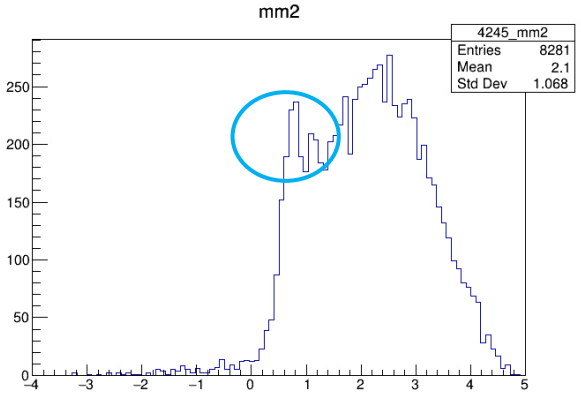


4244 run

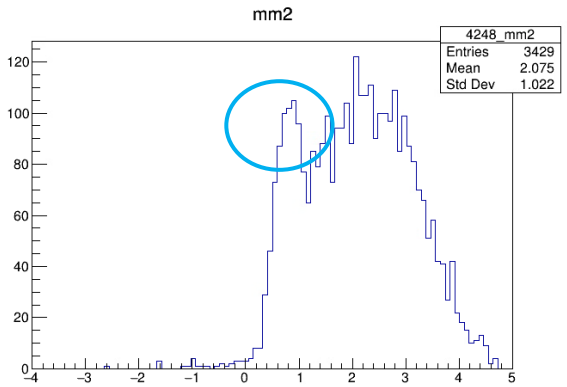


Runs drawn incorrectly

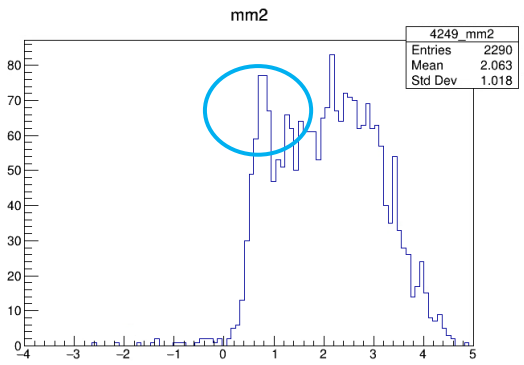
4245 run



4248 run



4249 run

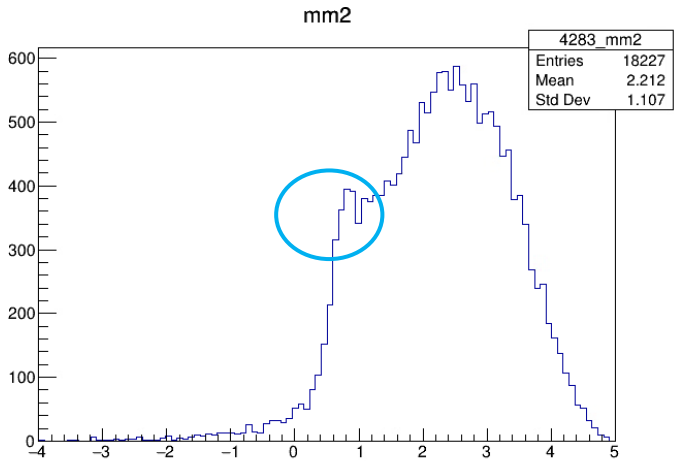


Well drawn Runs

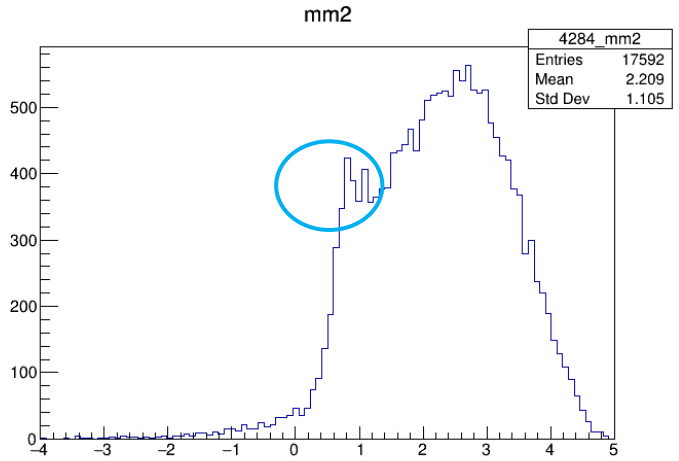
2024-04-01 月曜日

Add 4283,4284 Runs

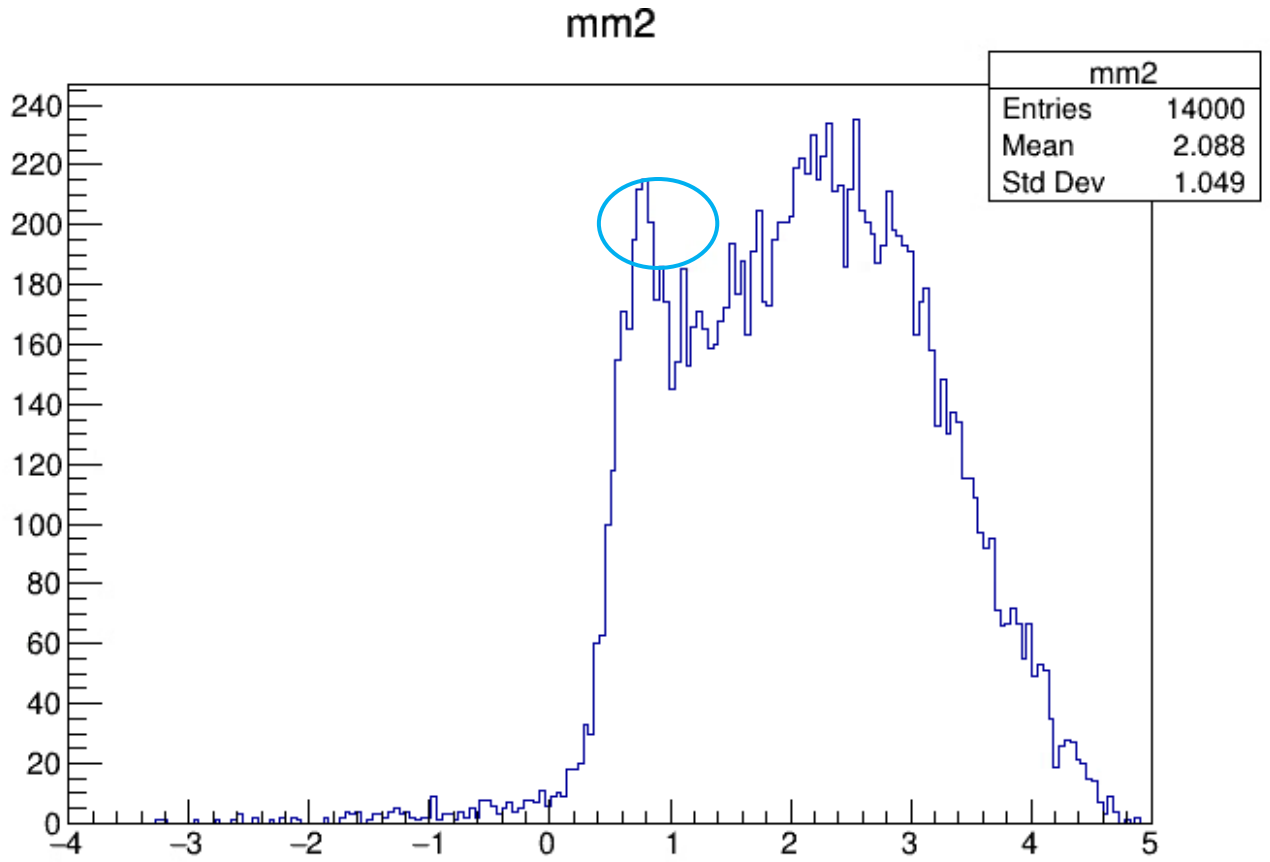
4283 run



4284 run



4245, 4248, 4249 Runs



Used run and Kinematic

KinC_x_60_3:1990,1991,1992,1993

KinC_x_60_3′: 2795,2796,2797,2798,2799,2800,2801

Kin_x_36_3: 2072,2082,2085,2159

KinC_x_60_2: 3515,3516,3518,3519,3520,3629,3630,3631,3632

KinC_x_60_2′: 3575,3576,3579,3613,3614,3615,3648,3649,3650,3651

Kin_x_36_5: 3774,3778,3779

KinC_x36_5′: 4011,4012,4013,4014,4015

KinC_x50_2′: 3794,3796,3797,3798,3848

KinC_x50_2″: 3820,3823,3824,3825,3826

KinC_x50_3′: 3919,3920,3940,3941

KinC_x50_3″: 3953,3954,3957,3958,3962

KinC_x60_3a: 4064,4065,4066,4067,4068

KinC_x60_3b: 4088,4089,4090,4091,4092

KinC_x60_4a: 4245,4248,4249

KinC_x60_4b: 4263,4266,4267

Kin_x_36_6: 4864,4865,4866,4867,4868

What's different from last time?

1. Change Cluster time cut

➡ Solved the problem of small of events in a specific runs.

Apply ±2 cut from Maximum value

1. Change Cluter Z position

The ClusZ value of certain runs is incorrect.

Create and use constants directly.

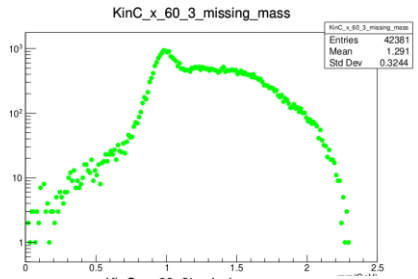
```
int z = 300;

if (RunNo > 3700) {
    z = 400;
}

if (RunNo > 4633) {
    z = 600;
}

if (RunNo > 4965) {
    z = 400;
}

if (RunNo > 5350) {
    z = 300;
}
```

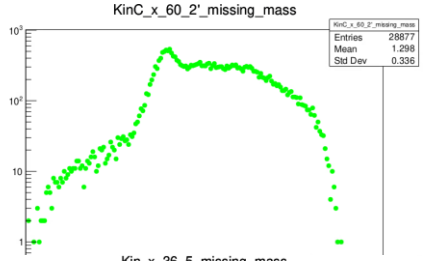
E.g.
4064 Run have 400cm

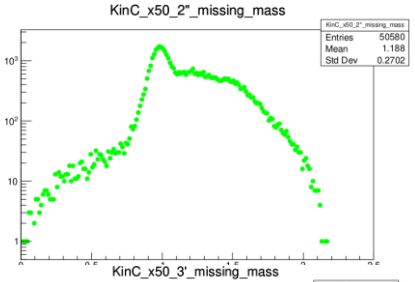
Row	Instance	NPS.cal.c
0	0	300
0	1	300
0	2	300
0	3	300
0	4	300
0	5	300
0	6	300
1	0	300
1	1	300
1	2	300
2	0	300
2	1	300
2	2	300
2	3	300
3	0	300
3	1	300
3	2	300
3	3	300
3	4	300
3	5	300
3	6	300
4	0	300
4	1	300
5	0	
6	0	300

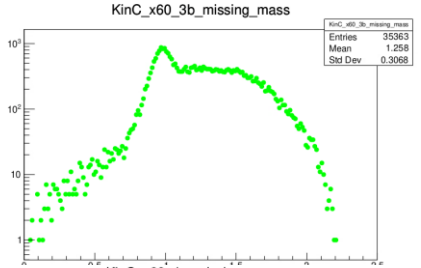
NPS.cal.clusZ of 4064 Run.

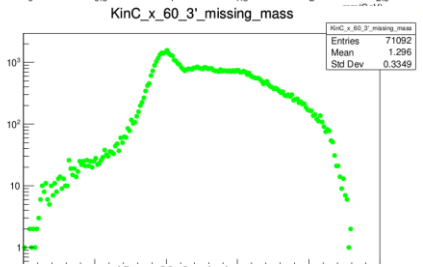
Result: Draw missing mass

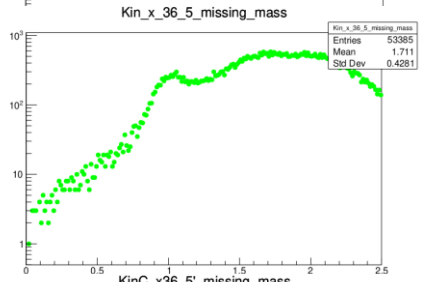


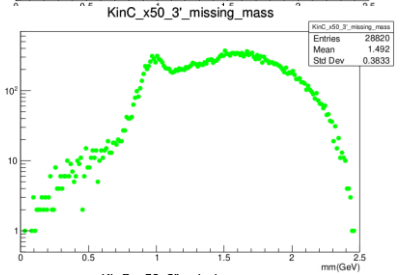


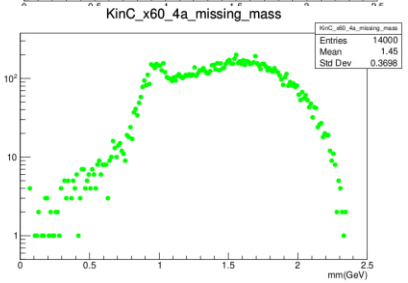


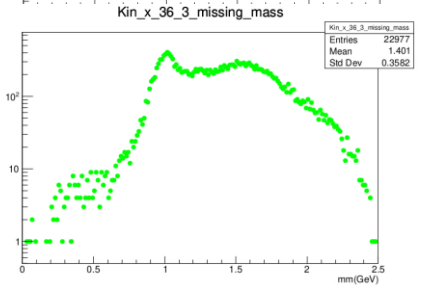


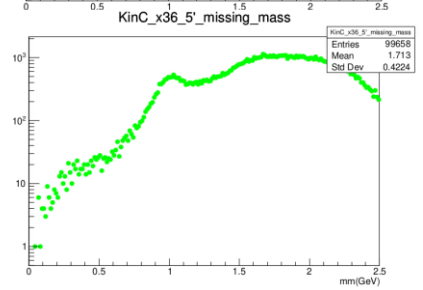


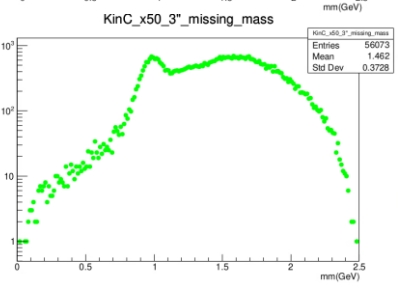


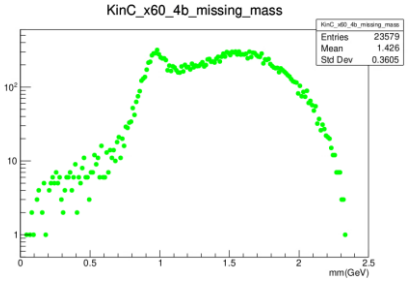


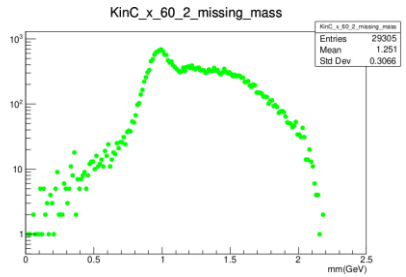


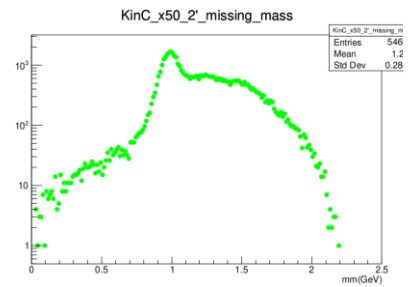


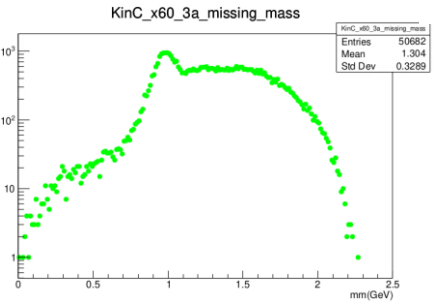


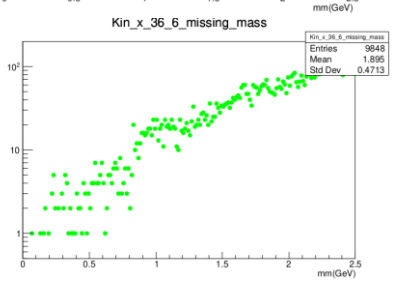












Make plots 1721 run to 5463 run

- Found good runs using Peter's text file.
- Runs with amu other than 1.01, 2.01, or 26.98 were not used.
- When using the jcache get command
- for certain files, a message appears saying "not in tape library".
- Files with additional errors were not used

(Detailed information is provided on the next page.)

```
1729 10.538 20.58 1.01 300 0.940815
1730 10.538 20.58 1.01 300 0.940815
1731 10.539 20.58 1.01 300 0.940815
1732 10.539 20.58 1.01 300 0.940815
1733 10.539 20.58 1.01 300 0.940815
1735 10.539 20.58 2.01 300 0.936157
```

Part of Peter's txt file that I modified
[Run Number, beamEne, NPS angle, target(amu), clusZ,target(GeV)]

Various errors in files

```
ifarm1801.jlab.org> root nps_hms_skim_5149_1_-1.root
   ------------------------------------------------------------------
  | Welcome to ROOT 6.22/06                        https://root.cern |
  | (c) 1995-2020, The ROOT Team; conception: R. Brun, F. Rademakers |
  | Built for linuxx8664gcc on Nov 27 2020, 15:14:08                 |
  | From tags/v6-22-06@v6-22-06                                      |
  | Try '.help', '.demo', '.license', '.credits', '.quit'/'.q'       |
   ------------------------------------------------------------------

root [0]
Attaching file nps_hms_skim_5149_1_-1.root as _file0...
Warning in <TFile::Init>: file nps_hms_skim_5149_1_-1.root probably not closed, trying to recover
Warning in <TFile::Init>: no keys recovered, file has been made a Zombie
(TFile *) nullptr
root [1] .q
```

5149 A message appears saying that run is a zombie file.

I don't know if it's because I didn't close the file properly.

```
Read the /lustre19/expphy/cache/hallc/c-nps/analysis/online/replays/production/nps_hms_skim_4745_1_-1.root.
#0  0x00007f3fe661060c in waitpid () from /lib64/libc.so.6
#1  0x00007f3fe658df62 in do_system () from /lib64/libc.so.6
#2  0x00007f3fe761eb54 in TUnixSystem::StackTrace() () from /u/apps/root/6.22.06/root/lib/libCore.so.6.22
#3  0x00007f3fe1920258 in cling::MultiplexInterpreterCallbacks::PrintStackTrace() () from /u/apps/root/6.22.06/root/lib/lib
Cling.so
#4  0x00007f3fe191f673 in cling_runtime_internal_throwIfInvalidPointer () from /u/apps/root/6.22.06/root/lib/libCling.so
#5  0x00007f3fe7e546f0 in ?? ()
#6  0x0000000000000049 in ?? ()
#7  0x0000000000000030 in ?? ()
#8  0x00007f3fd3182c88 in ROOT::GenerateInitInstanceLocal(std::vector<std::unique_ptr<TF1AbsComposition, std::default_delet
e<TF1AbsComposition> >, std::allocator<std::unique_ptr<TF1AbsComposition, std::default_delete<TF1AbsComposition> > > > cons
t*)::isa_proxy () from /u/apps/root/6.22.06/root/lib/libHist.so.6.22.06
#9  0x0000000000000001 in ?? ()
#10 0x0000000000000000 in ?? ()

 *** Break *** segmentation violation


==========================================================
There was a crash.
This is the entire stack trace of all threads:
==========================================================
#0  0x00007f3fe661060c in waitpid () from /lib64/libc.so.6
#1  0x00007f3fe658df62 in do_system () from /lib64/libc.so.6
#2  0x00007f3fe761eb54 in TUnixSystem::StackTrace() () from /u/apps/root/6.22.06/root/lib/libCore.so.6.22
```

Segmentation violation error occurs only in 4745run.

Add ClusT Info

- Calculate the maximum cluster time of the NPS.cal.clusT branch in the range of 1721 run to 5463 run

- Use ± 2 of the maximum value as a cut

  (May change in the future)

```
Read the /lustre19/expphy/cache/hallc/c-nps/analysis/online/replays/production/nps_hms_skim_5342_1_-1.root.
149
Read the /lustre19/expphy/cache/hallc/c-nps/analysis/online/replays/production/nps_hms_skim_5343_1_-1.root.
149
Read the /lustre19/expphy/cache/hallc/c-nps/analysis/online/replays/production/nps_hms_skim_5356_1_-1.root.
145.667
Read the /lustre19/expphy/cache/hallc/c-nps/analysis/online/replays/production/nps_hms_skim_5357_1_-1.root.
145.667
Read the /lustre19/expphy/cache/hallc/c-nps/analysis/online/replays/production/nps_hms_skim_5358_1_-1.root.
145.667
Read the /lustre19/expphy/cache/hallc/c-nps/analysis/online/replays/production/nps_hms_skim_5359_1_-1.root.
145.667
Read the /lustre19/expphy/cache/hallc/c-nps/analysis/online/replays/production/nps_hms_skim_5360_1_-1.root.
145.667
Read the /lustre19/expphy/cache/hallc/c-nps/analysis/online/replays/production/nps_hms_skim_5361_1_-1.root.
145.667
Read the /lustre19/expphy/cache/hallc/c-nps/analysis/online/replays/production/nps_hms_skim_5362_1_-1.root.
145.667
Read the /lustre19/expphy/cache/hallc/c-nps/analysis/online/replays/production/nps_hms_skim_5363_1_-1.root.
```

This is a screenshot of the code that generates the maximum value of clusT in action.

(It took more than a day!)

Next plan

- Currently, three plots are being drawn divided by LD2, LH2, and Dummy target.

  (Still running the code, Probably finished before Thursday)

- After drawing 3 plots, plots with the same kinematics will be combined and drawn (drawing with 3 targets).

- generate pi0 yield using the given information.