

# **Channel classification instruction**

**Cheng-Wei Shih, Chia-Ming Kuo**

**National Central University, Taiwan**

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# Procedures

- Create a folder, make sure it has
  - run.sh
  - summary\_plot.c
  - calibration\_ana\_code\_multi.c
  - total\_file.txt
  - All .root files
- “total\_file.txt” is created by “ls fphx\_raw\_\*.root > total\_file.txt”
  - Please delete the text “.root” in total\_file.txt

## Example

```
[[5202011@chip01 INTT_multi_run_test]$ ls
calibration_ana_code_multi.c  fphx_raw_20210428-1331_0.root  fphx_raw_20210428-1658_0.root  run.sh
fphx_raw_20210428-1317_0.root  fphx_raw_20210428-1332_0.root  fphx_raw_20210428-1659_0.root  summary_plot.c
fphx_raw_20210428-1318_0.root  fphx_raw_20210428-1333_0.root  fphx_raw_20210428-1700_0.root  total_file.txt
fphx_raw_20210428-1320_0.root  fphx_raw_20210428-1335_0.root  fphx_raw_20210428-1702_0.root  total_file.txt~
fphx_raw_20210428-1321_0.root  fphx_raw_20210428-1652_0.root  fphx_raw_20210428-1703_0.root
fphx_raw_20210428-1322_0.root  fphx_raw_20210428-1654_0.root  fphx_raw_20210428-1704_0.root
fphx_raw_20210428-1324_0.root  fphx_raw_20210428-1656_0.root  fphx_raw_20210428-1706_0.root
```



```
File Edit Options Buffers Tools
fphx_raw_20210428-1317_0.root
fphx_raw_20210428-1318_0.root
fphx_raw_20210428-1320_0.root
fphx_raw_20210428-1321_0.root
fphx_raw_20210428-1322_0.root
fphx_raw_20210428-1324_0.root
fphx_raw_20210428-1331_0.root
fphx_raw_20210428-1332_0.root
fphx_raw_20210428-1333_0.root
fphx_raw_20210428-1335_0.root
fphx_raw_20210428-1652_0.root
fphx_raw_20210428-1654_0.root
fphx_raw_20210428-1656_0.root
fphx_raw_20210428-1658_0.root
fphx_raw_20210428-1659_0.root
fphx_raw_20210428-1700_0.root
fphx_raw_20210428-1702_0.root
fphx_raw_20210428-1703_0.root
fphx_raw_20210428-1704_0.root
fphx_raw_20210428-1706_0.root
-UU-:-----F1 total_file.txt
```

Content of “total\_file.txt”

# Procedures

- Before run the code, please modify “run.sh”

```
folder_direction="/home/5202011/INTT_cal/INTT_cal_test/INTT_multi_run_test3" ← Folder direction
number_of_file=20 ← Number of root files
merge_file_name="ppb2_l2_summary" ← Name of final merged root file

let number_for_final=number_of_file-1
for seed in $(seq 0 $number_for_final)
do

    cp calibration_ana_code_multi.c calibration_ana_code_multi_copy.c
    sed -i "s/data_index/${seed}/g" calibration_ana_code_multi_copy.c
    root -l -b -q calibration_ana_code_multi_copy.c\("${folder_direction}",1,true,false,0,true,false,false,true\)
    rm calibration_ana_code_multi_copy.c
done

hadd $merge_file_name.root */*_summary.root ← Merge all output files

root -l -b -q summary_plot.c\($number_of_file,\"$folder_direction\", \"$merge_file_name\")

#Variable of calibration_ana_code_multi.c :
#Variable 1 : TString, folder direction
#Variable 2 : int, port_ID,
#Variable 3 : bool, output the adc-ampl plot for each channel (should be true) → If “false” → no plots created, can be faster
#Variable 4 : bool, original unbond channel check (should be false)
#Variable 5 : int, overall ampl noise level check (0 can be good)
#Variable 6 : bool, output offset ampl distribution plot for each channel (should be true) → If “false” → no plot created, can be faster
#Variable 7 : bool, cout unbonded channel status @ without bias run. (should be false)
#Variable 8 : bool, cout wider gaus width channel @ with bias run. (should be false)
#Variable 9 : bool, output multi_run_status.txt (should be true)
```

- After modification, please run run.sh file → “. run.sh”
  - It takes ~ 15 mins to finish 20 root files.

# Procedures

- Two files and a lot folders will be created after the run
  - Two files : ppb2\_l2\_summary.root & multi\_run\_status.txt
    - P.S. before you **re-run** “. run.sh”(if needed), please delete these 2 files
- 2 final summary plots and un-functional channels status will be created and printed, examples are shown in next slide.
  - 2 final summary plots : Summary\_noise.pdf & Summary\_entry.pdf

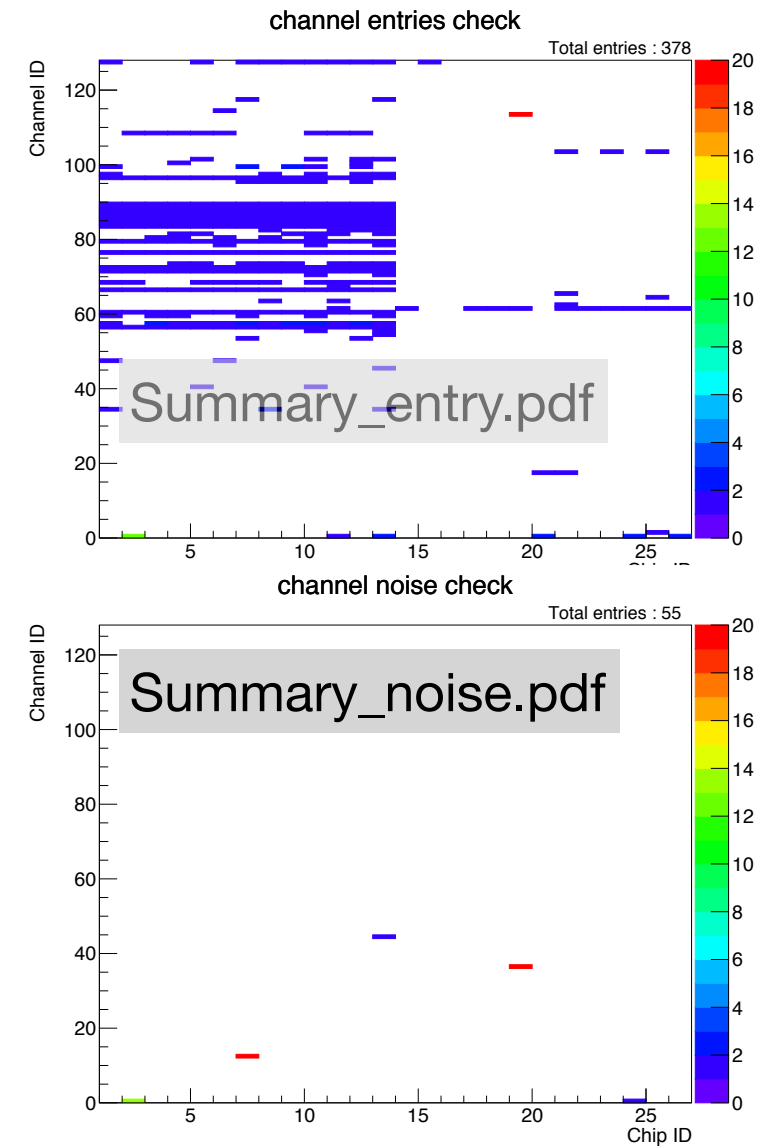
# Final overall results

```

Noise channel found, chip : 2 channel : 0 failed times : 13/20 ratio : 0.65
Noise channel found, chip : 7 channel : 12 failed times : 20/20 ratio : 1
Noise channel found, chip : 19 channel : 36 failed times : 20/20 ratio : 1
~~~~~
Noise channel, chip : 2 channel : 0
  failed in file index : 2 file name : fphx_raw_20210428-1320_0, gaus width : 46.9425
  failed in file index : 3 file name : fphx_raw_20210428-1321_0, gaus width : 78.376
  failed in file index : 4 file name : fphx_raw_20210428-1322_0, gaus width : 4.47558
  failed in file index : 5 file name : fphx_raw_20210428-1324_0, gaus width : 4.59855
  failed in file index : 6 file name : fphx_raw_20210428-1331_0, gaus width : 75.7756
  failed in file index : 7 file name : fphx_raw_20210428-1332_0, gaus width : 32.8639
  failed in file index : 8 file name : fphx_raw_20210428-1333_0, gaus width : 38.3274
  failed in file index : 11 file name : fphx_raw_20210428-1654_0, gaus width : 147.086
  failed in file index : 12 file name : fphx_raw_20210428-1656_0, gaus width : 127.588
  failed in file index : 14 file name : fphx_raw_20210428-1659_0, gaus width : 4.8683
  failed in file index : 15 file name : fphx_raw_20210428-1700_0, gaus width : 4.15262
  failed in file index : 17 file name : fphx_raw_20210428-1703_0, gaus width : 4.41939
  failed in file index : 19 file name : fphx_raw_20210428-1706_0, gaus width : 33.9221
~~~~~
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
Weird entries found, chip : 2 channel : 0 failed times : 12/20 ratio : 0.6
Weird entries found, chip : 19 channel : 113 failed times : 20/20 ratio : 1
~~~~~
Bad entries channel, chip : 2 channel : 0
  bad in file index : 2 file name : fphx_raw_20210428-1320_0, entries : 4410
  bad in file index : 3 file name : fphx_raw_20210428-1321_0, entries : 5820
  bad in file index : 5 file name : fphx_raw_20210428-1324_0, entries : 645
  bad in file index : 6 file name : fphx_raw_20210428-1331_0, entries : 7557
  bad in file index : 7 file name : fphx_raw_20210428-1332_0, entries : 2104
  bad in file index : 8 file name : fphx_raw_20210428-1333_0, entries : 4062
  bad in file index : 11 file name : fphx_raw_20210428-1654_0, entries : 20615
  bad in file index : 12 file name : fphx_raw_20210428-1656_0, entries : 17784
  bad in file index : 14 file name : fphx_raw_20210428-1659_0, entries : 569
  bad in file index : 15 file name : fphx_raw_20210428-1700_0, entries : 422
  bad in file index : 17 file name : fphx_raw_20210428-1703_0, entries : 467
  bad in file index : 19 file name : fphx_raw_20210428-1706_0, entries : 2125
~~~~~

```

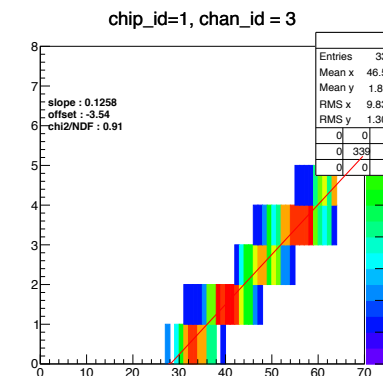
Principle : the less entries in the plot, the better performance it is



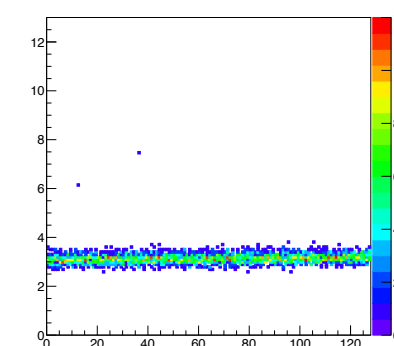
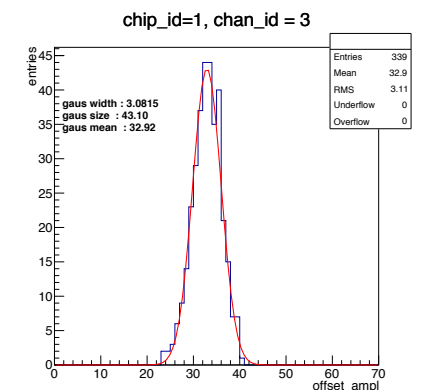
# Plot descriptions

There are a lot of plots in each folder created by “. run.sh”. Here I introduce some plots I frequently check

- chipX\_detail\_ampladc.pdf
  - Ampl - ADC response for single channel
  - 128 pages for 128 channels
- chipX\_detail\_amploffset.pdf
  - Ampl width distribution after offset, single channel.
  - 128 pages for 128 channels
- ampl\_adc\_width\_detial\_TH2.pdf
  - Overall gaus width status of half-ladder.
  - Entries of plot :  $128 \times 26 = 3328$



X axis : ampl,  
Y axis : ADC

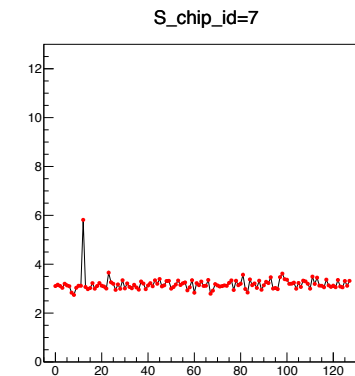


X axis : Channel,  
Y axis : Gaussian width

# Plot descriptions

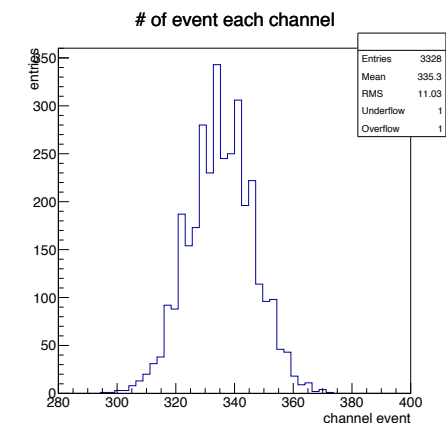
There are a lot of plots in each folder created by “. run.sh”. Here I introduce some plots I frequently check

- ampl\_adc\_width\_detial.pdf
  - Overall gaus width status of each chip
  - 26 pages in total
- channel\_entries.pdf
  - Distribution of # of events of each channel
  - Entries :  $26 \times 128 = 3328$



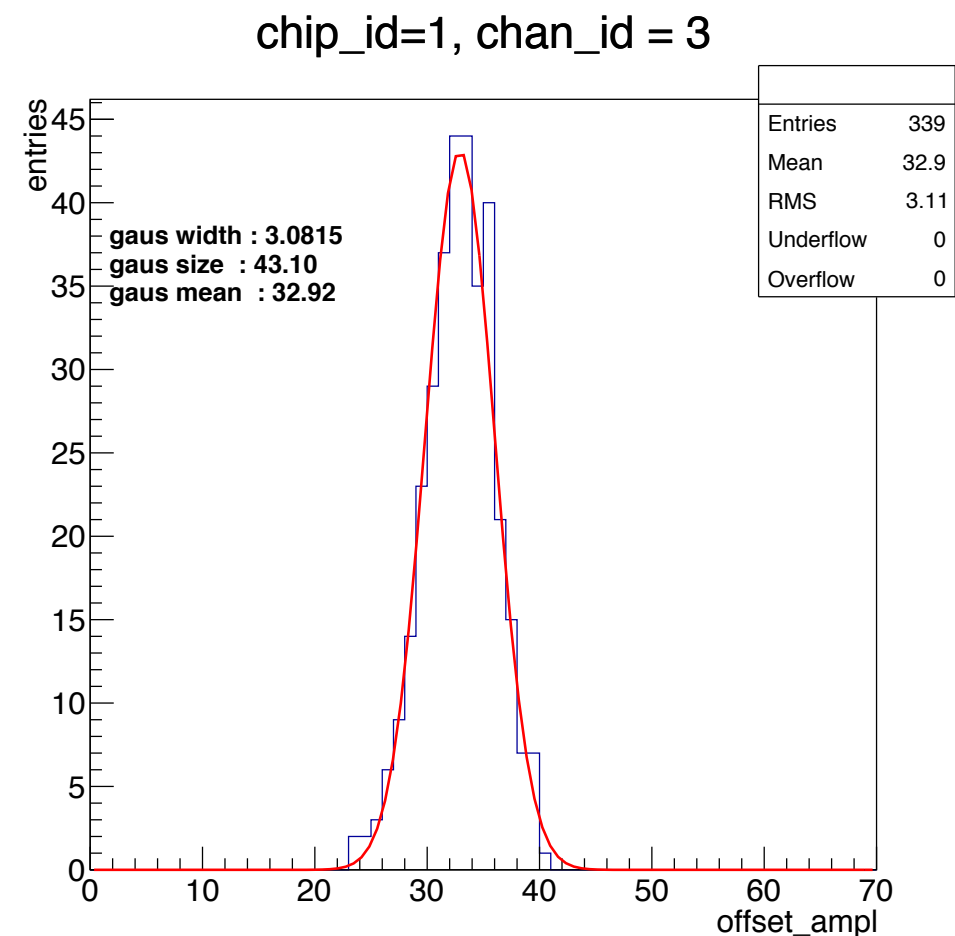
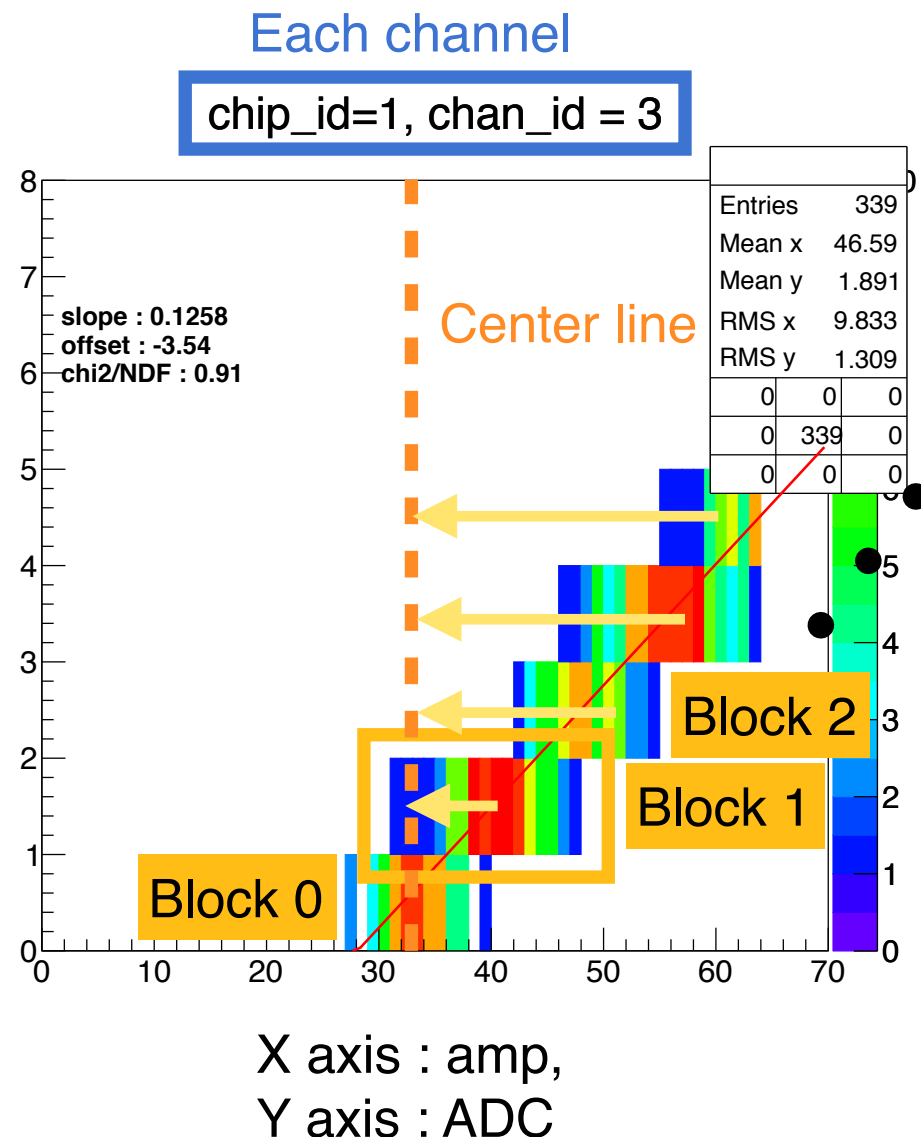
# of data points : 128

X axis : Channel,  
Y axis : Gaussian width



# Algorithm introduction

- For each channel of each chip :
  - Center line : mean of events in “Block 0” (ADC==0)
  - Center of the rest blocks are panned to center line.
    - Amount of movement : Mean of each block - center line
  - Each event is filled in TH1F, and fit with gaussian.

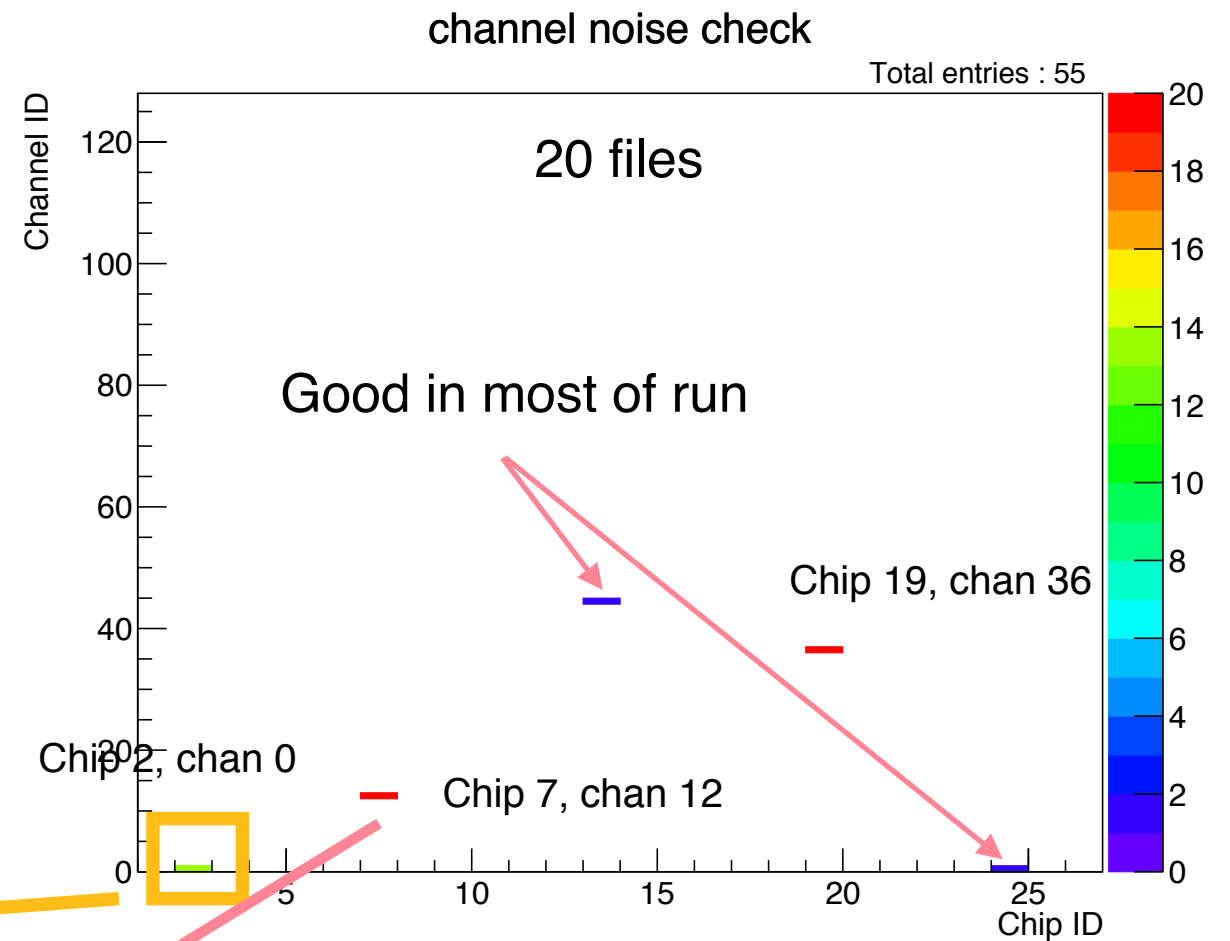
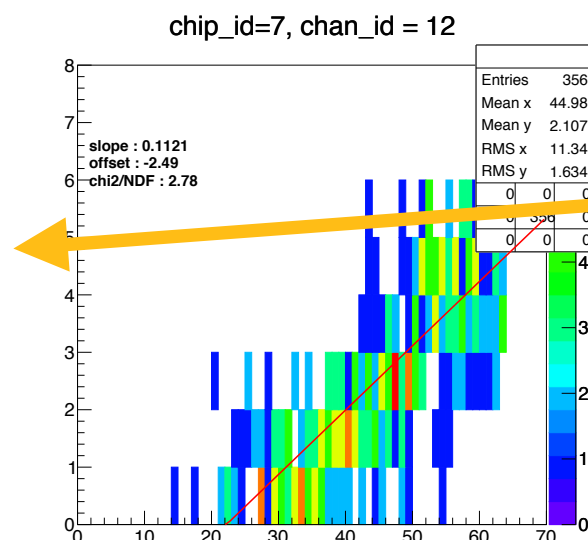
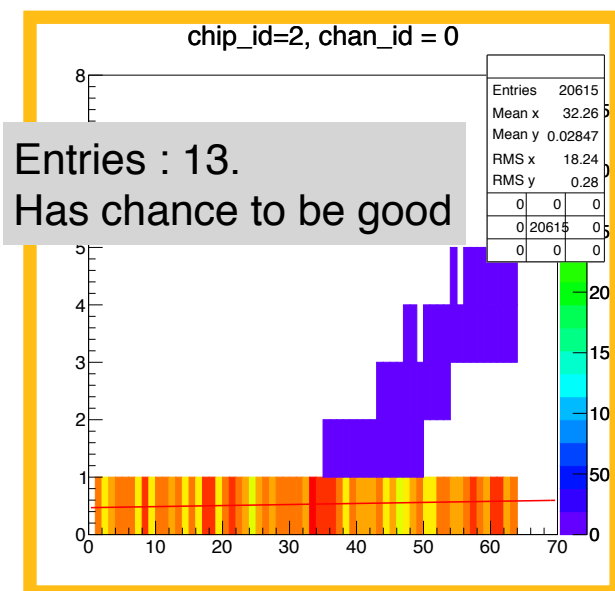
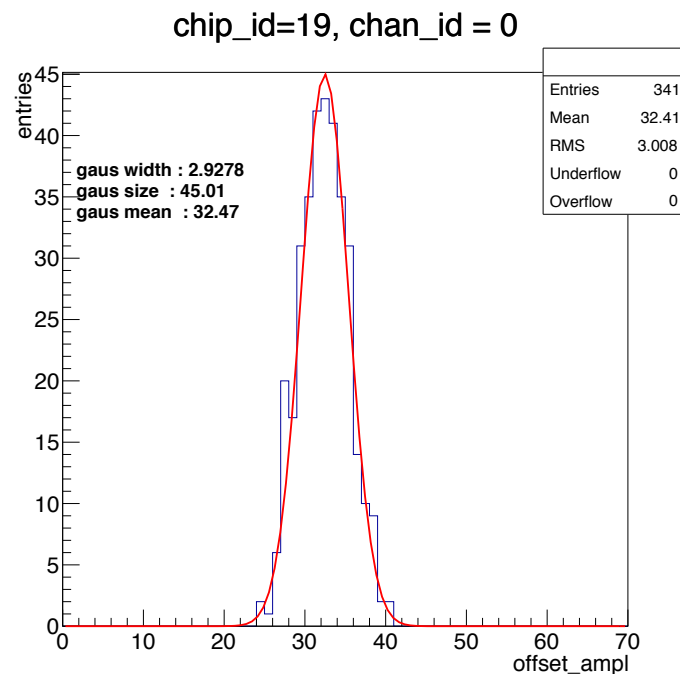




# Algorithm introduction

- Update of my algorithm, 2 criteria : noise and entries

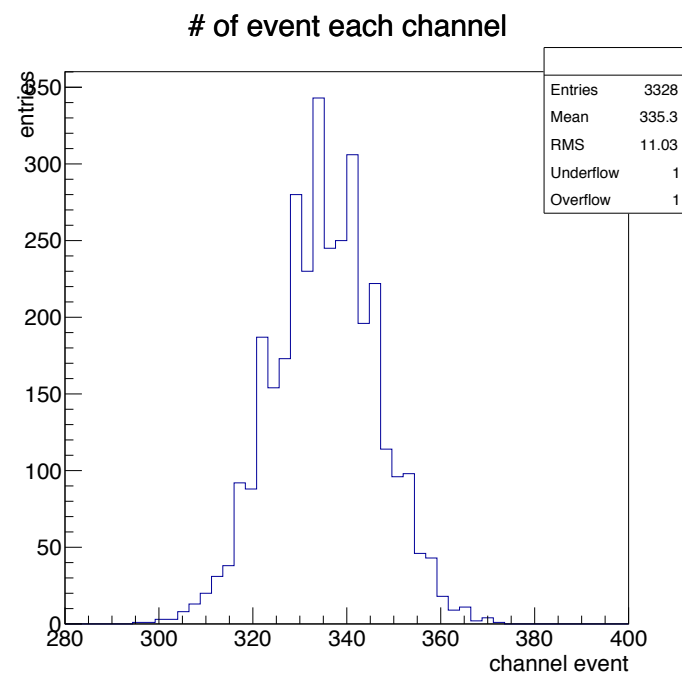
Gaus width > 4 will be shown in right plot



The less entries in plot, better performance it is.

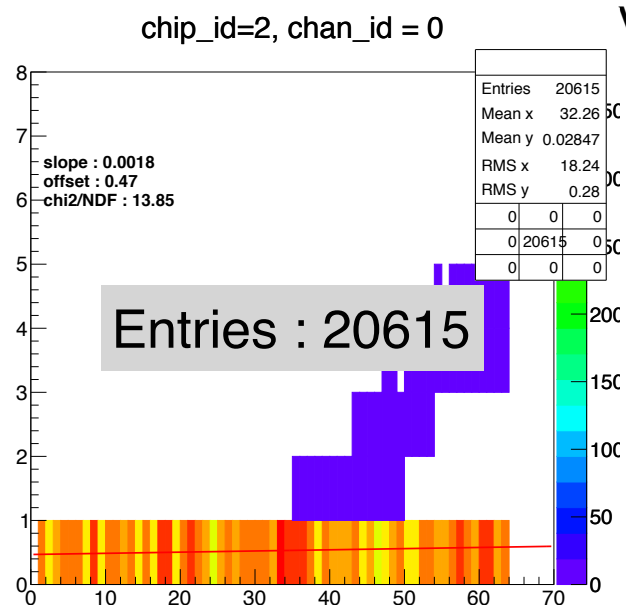
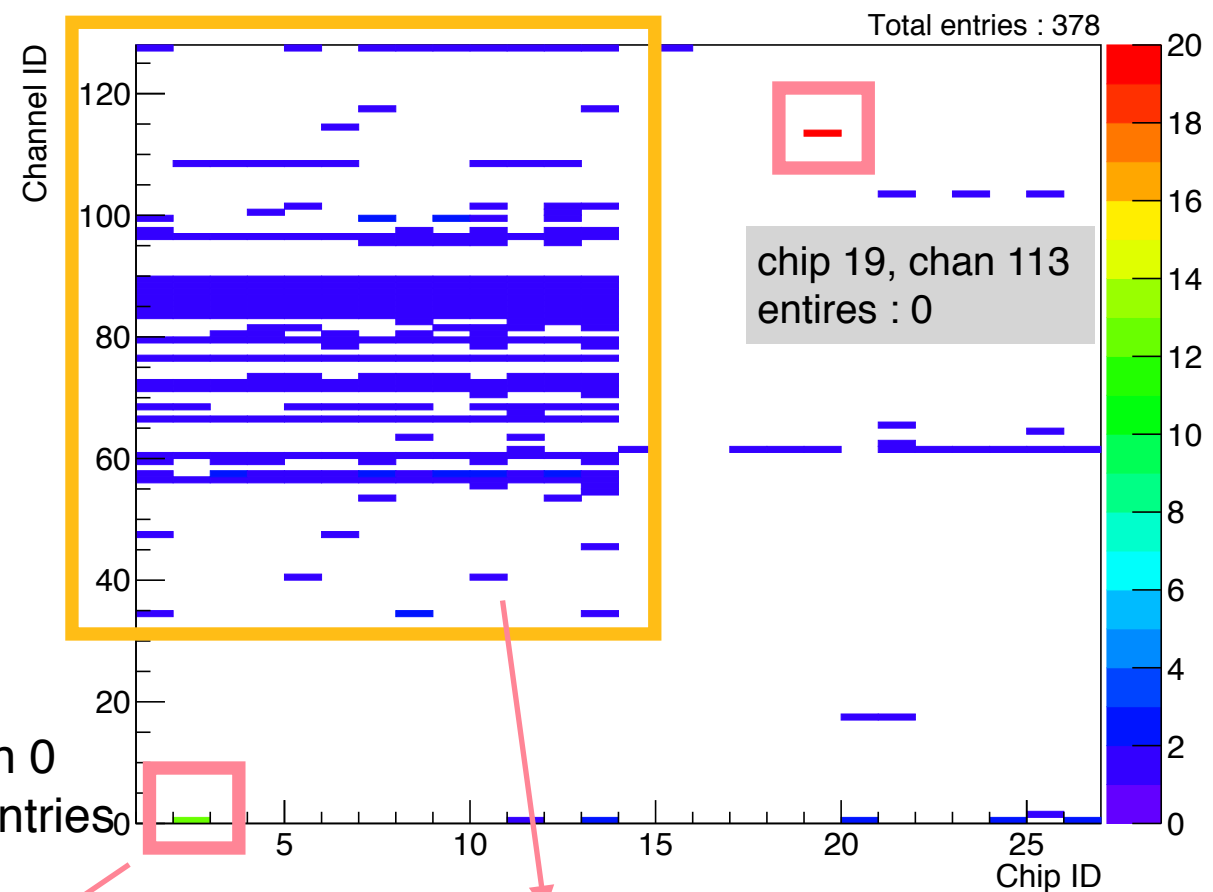
# Algorithm introduction

# of event of each channel ~ 330

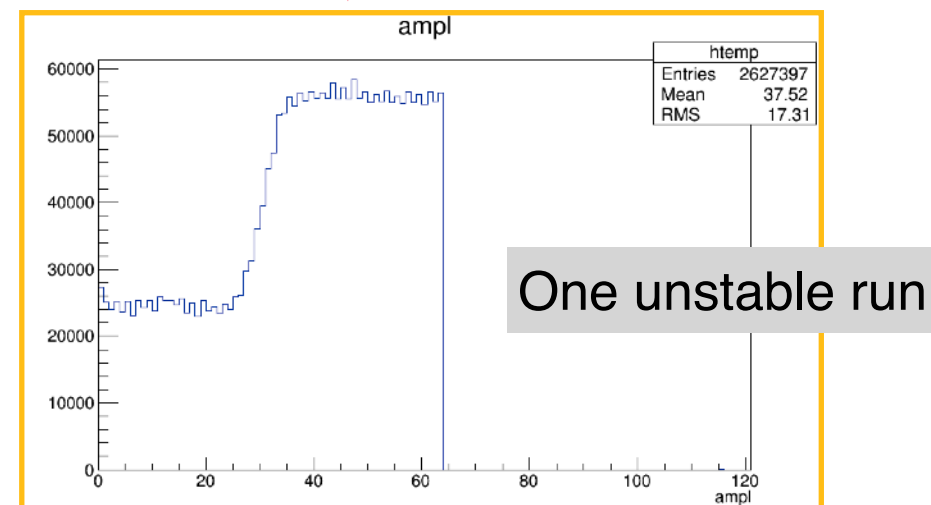


# of event > 400 or < 280 will be filled in the plot

channel entries check



chip 2, chan 0  
Very high entries



# Back up