Channel classification instruction v2

Cheng-Wei Shih, Chia-Ming Kuo

National Central University, Taiwan

2021/5/27

Procedures

- Create a folder, make sure it has
  - run.sh
  - summary_plot.c
  - calibration_ana_code_multi.c
  - check_chip_prototypeMaximam_new.c
  - All "**.dat**" files (not .root file)

Example

Procedures

- Before run the code, please modify "run.sh"


```
folder_direction="/home/5202011/INTT_cal/INTT_cal_test/INTT_multi_run_v2_test"    ← Folder direction
number_of_file=15                                    Number of root files
merge_file_name="aaa_test_summary"  Name of final merged root file
module_ID=2                          ← Module ID

rm multi_run_status.txt
rm $merge_file_name.root
echo 1
sleep 15


ls *.dat > dat_file.txt
sleep 15

let number_for_final=number_of_file-1


for seed in $(seq 0 $number_for_final)
do
        cp check_chip_prototypeMaximam_new.c check_chip_prototypeMaximam_new_copy.c
        sed -i "s/data_index/${seed}/g" check_chip_prototypeMaximam_new_copy.c
        root -l -b -q check_chip_prototypeMaximam_new_copy.c\($module_ID\)
        rm check_chip_prototypeMaximam_new_copy.c
        sleep 15
done

ls *.root > total_file.txt
sleep 15

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\(\"$folder_direction\",$module_ID,true,false,0,true,false,false,true\)
    rm calibration_ana_code_multi_copy.c
    sleep 15
done

sleep 15
hadd $merge_file_name.root */*_summary.root        ← Merge all output files

sleep 15
root -l -b -q summary_plot.c\($number_of_file,\"$folder_direction\",\"$merge_file_name\"\)
```

Procedures

Variable 3 & 6 : if "false" -> no plots created, can be faster

```
#Variable of calibration_ana_code_multi.c :
#Variable 1 : TSting,  folder direction
#Variable 2 : int,     port_ID,
#Variable 3 : bool,    output the adc-ampl plot for each channel (should be true)
#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)
#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

- 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
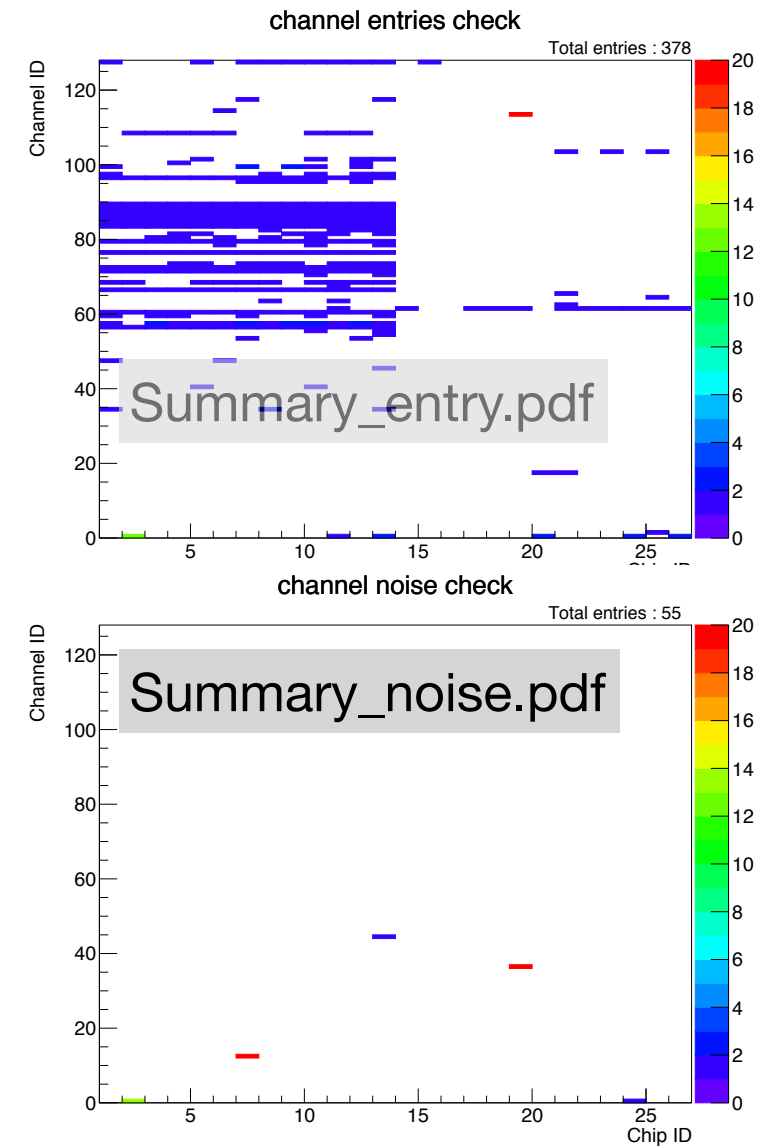
channel entries check

Summary_entry.pdf

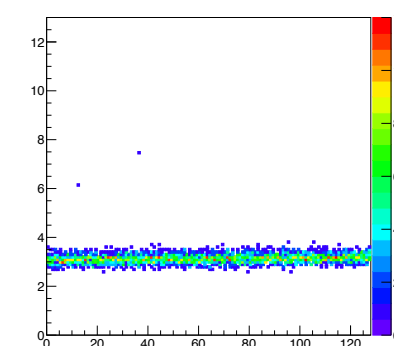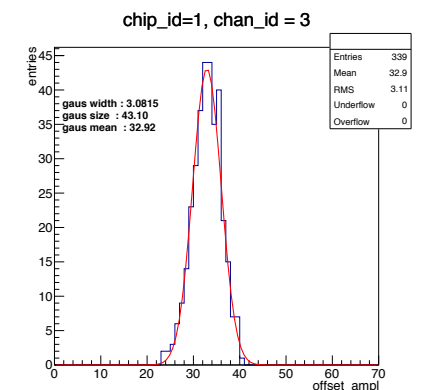channel noise check

Summary_noise.pdf

Plot descriptions

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

- chip**X**_detail_ampladc.pdf
  - Ampl - ADC response for single channel
  - 128 pages for 128 channels

X axis : ampl,
Y axis : ADC

- chip**X**_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*26 = 3328
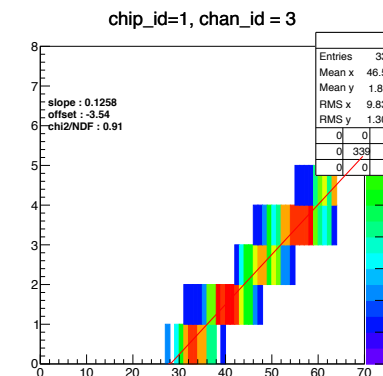
X axis : Channel,
Y axis : Gaussian width

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
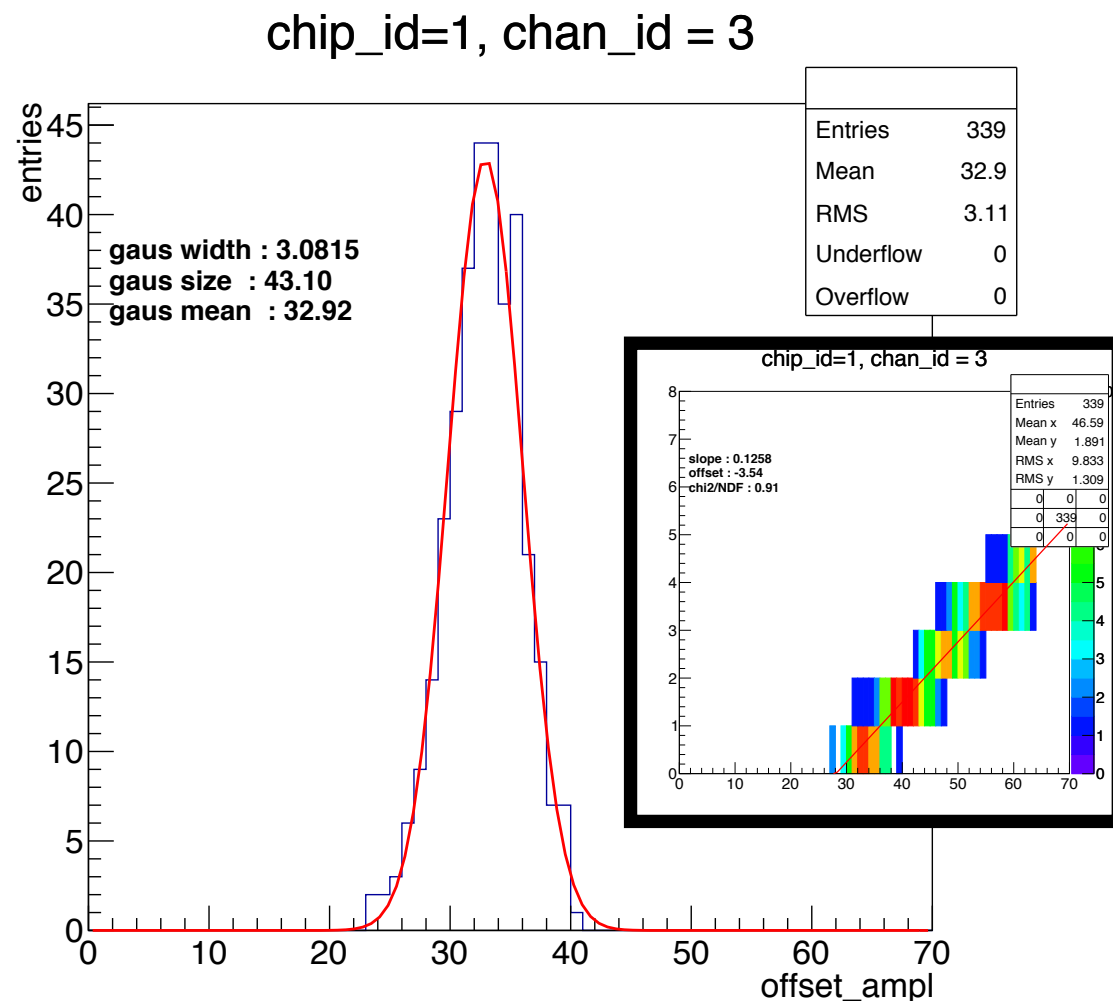 - Distribution of # of events of each channel
  - Entries : 26*128 = 3328
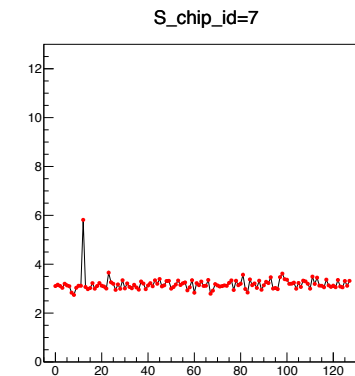
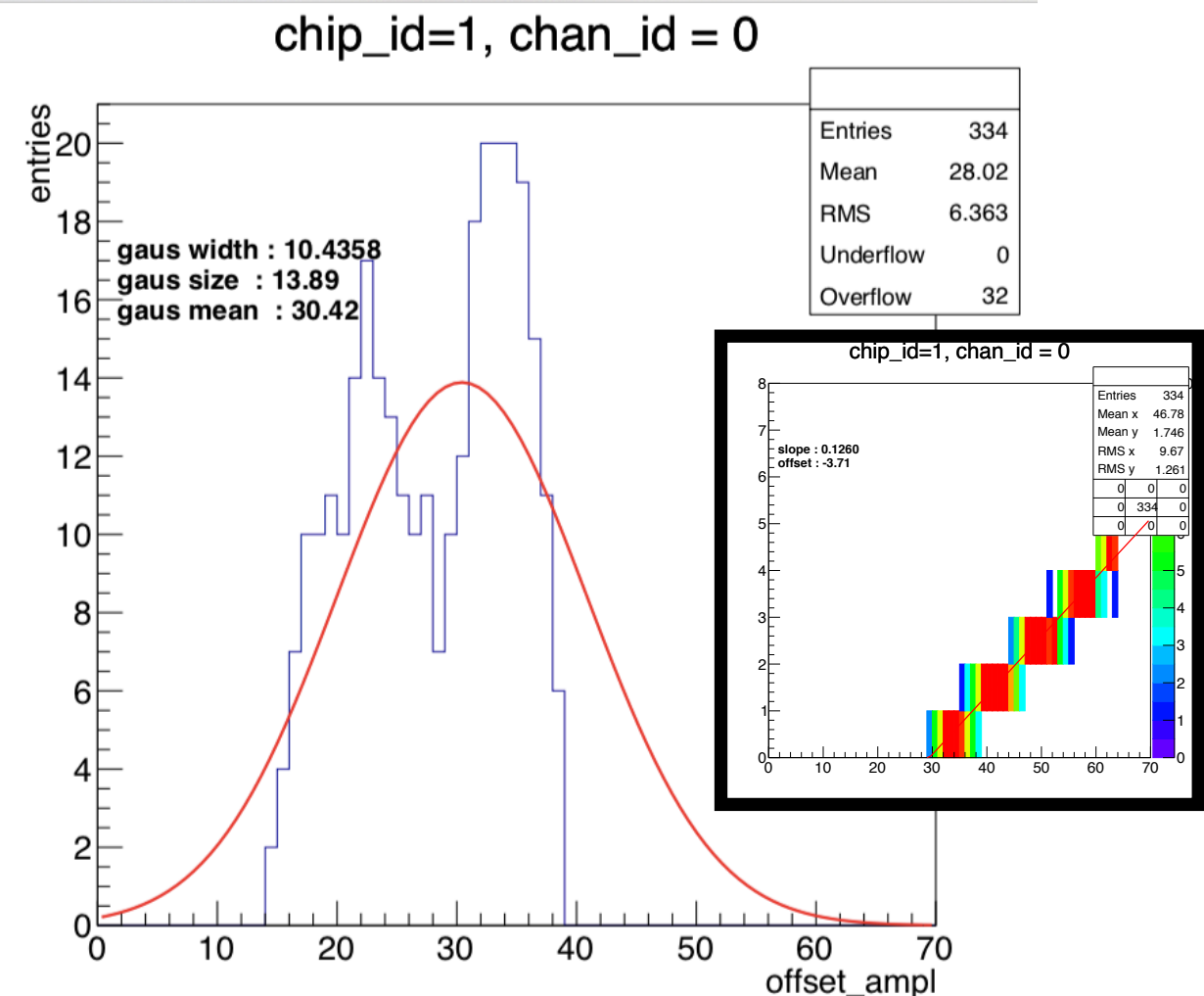# of data points : 128

X axis : Channel,
Y axis : Gaussian width
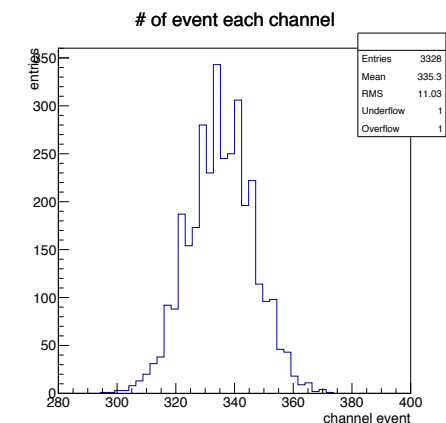
Attention !

- When you check "chipX_detail_amploffset.pdf", if the distribution is not reasonable (For example : double or triple peaks, left plot). Please let me know.
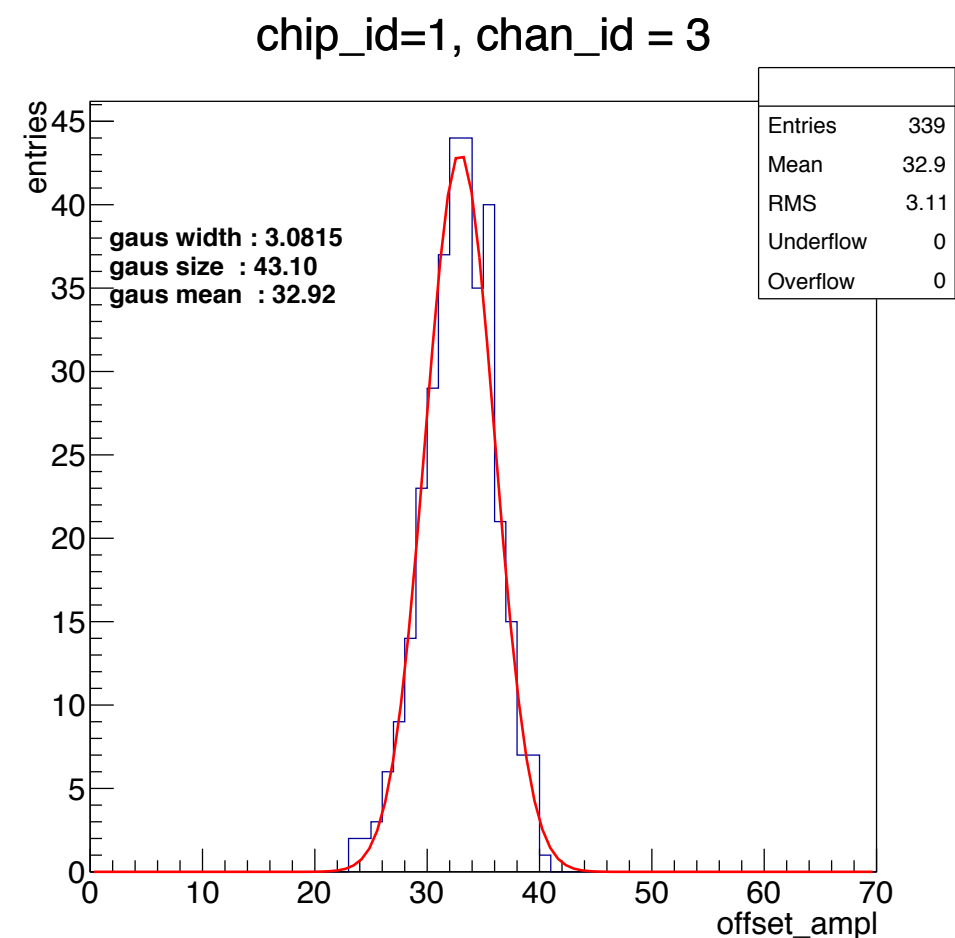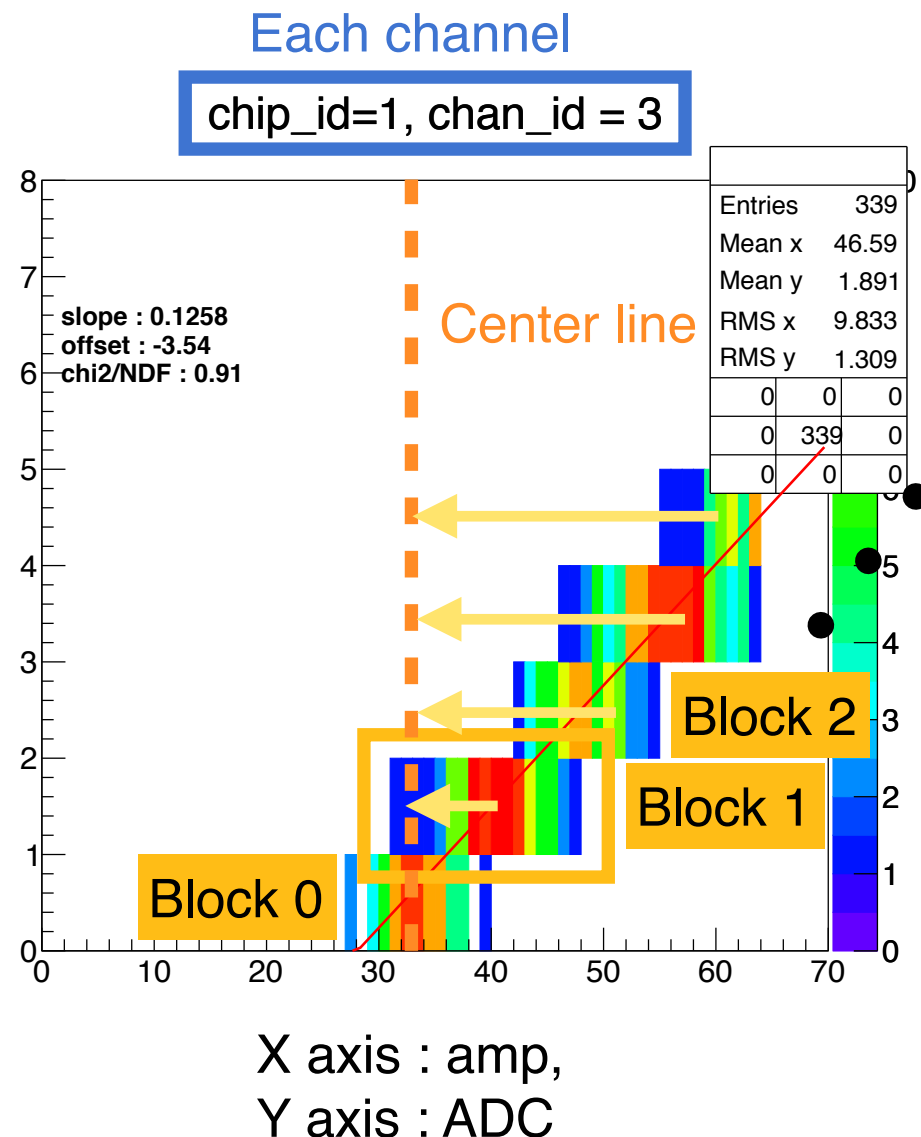- It is a bug, and has been solved already.

Correct one

Bug case,
The amtpl-adc distribution is good, but it has a bug when filling the event in TH1F
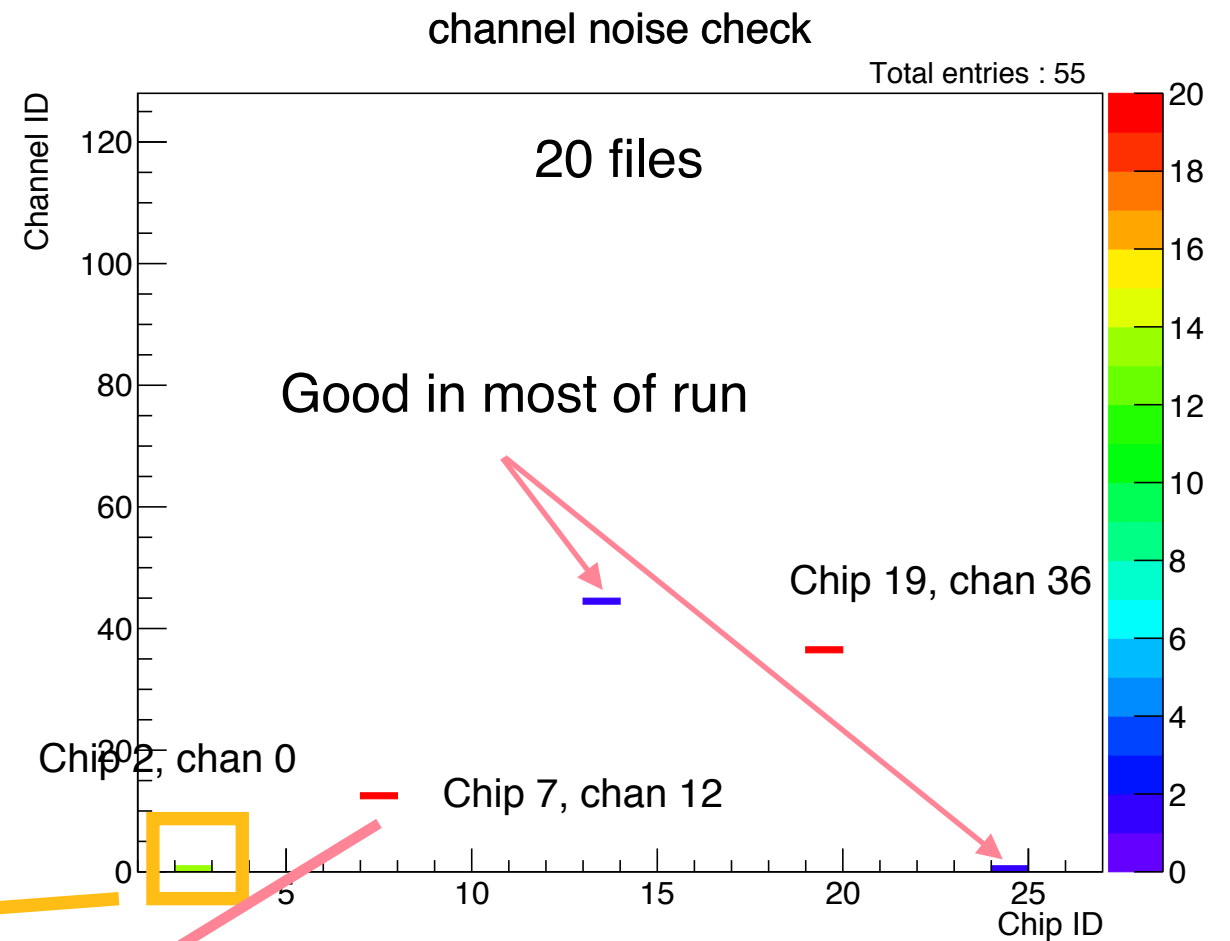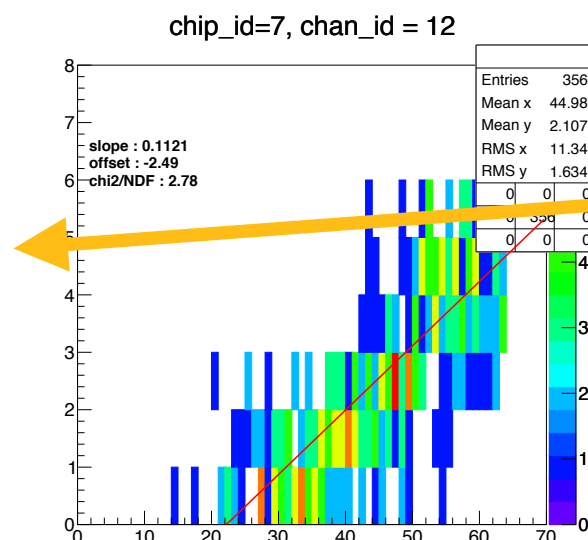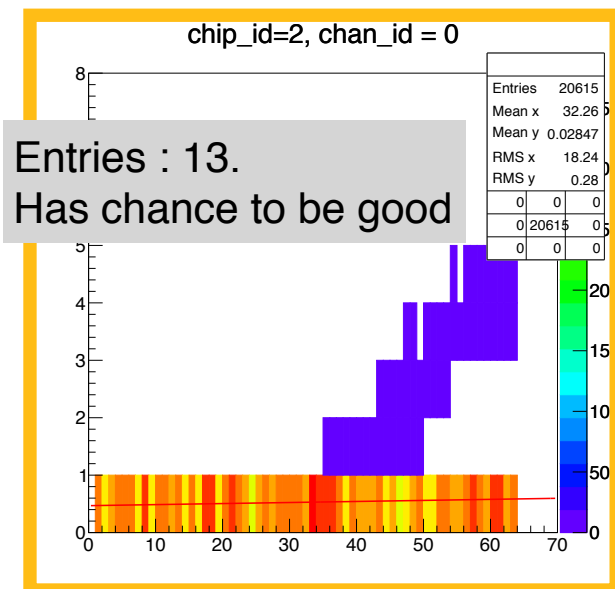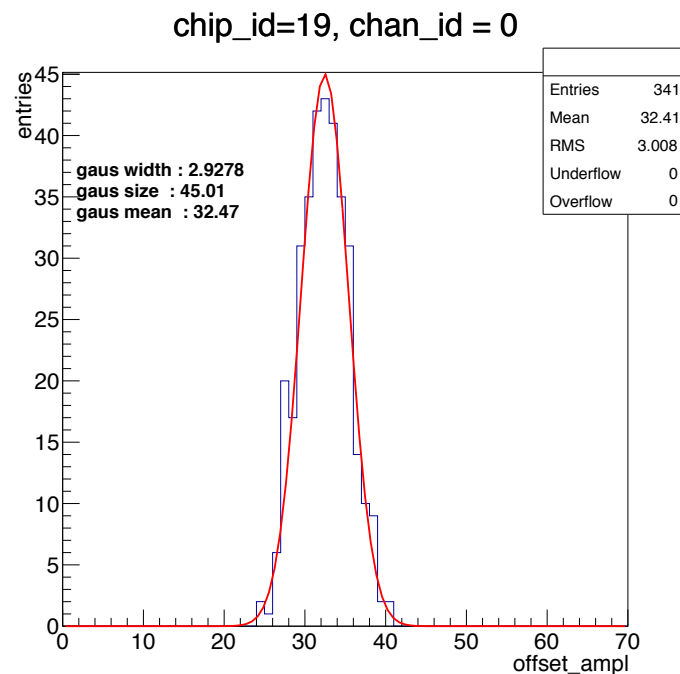
Algorithm introduction

- 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.

Each channel

chip_id=1, chan_id = 3

slope : 0.1258
offset : -3.54
chi2/NDF : 0.91

Center line

Entries	339
Mean x	46.59
Mean y	1.891
RMS x	9.833
RMS y	1.309

0	0	0
0	339	0
0	0	0

Block 2

Block 1

Block 0

X axis : amp,
Y axis : ADC

chip_id=1, chan_id = 3

gaus width : 3.0815
gaus size : 43.10
gaus mean : 32.92

Entries	339
Mean	32.9
RMS	3.11
Underflow	0
Overflow	0

entries

offset_ampl

Algorithm introduction

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

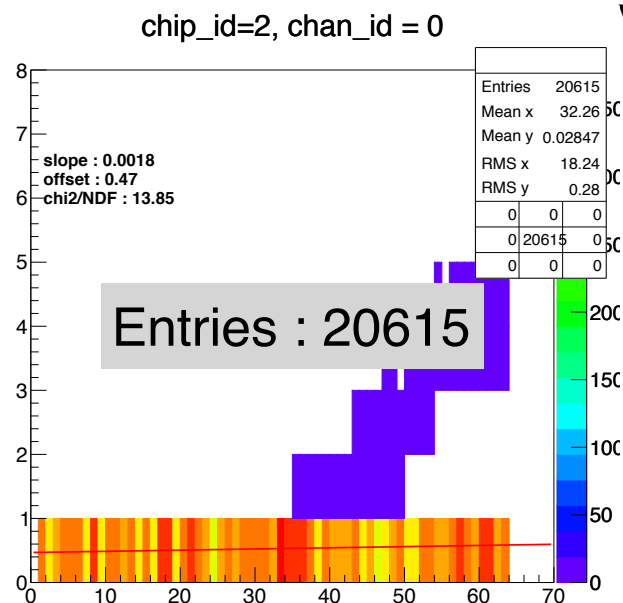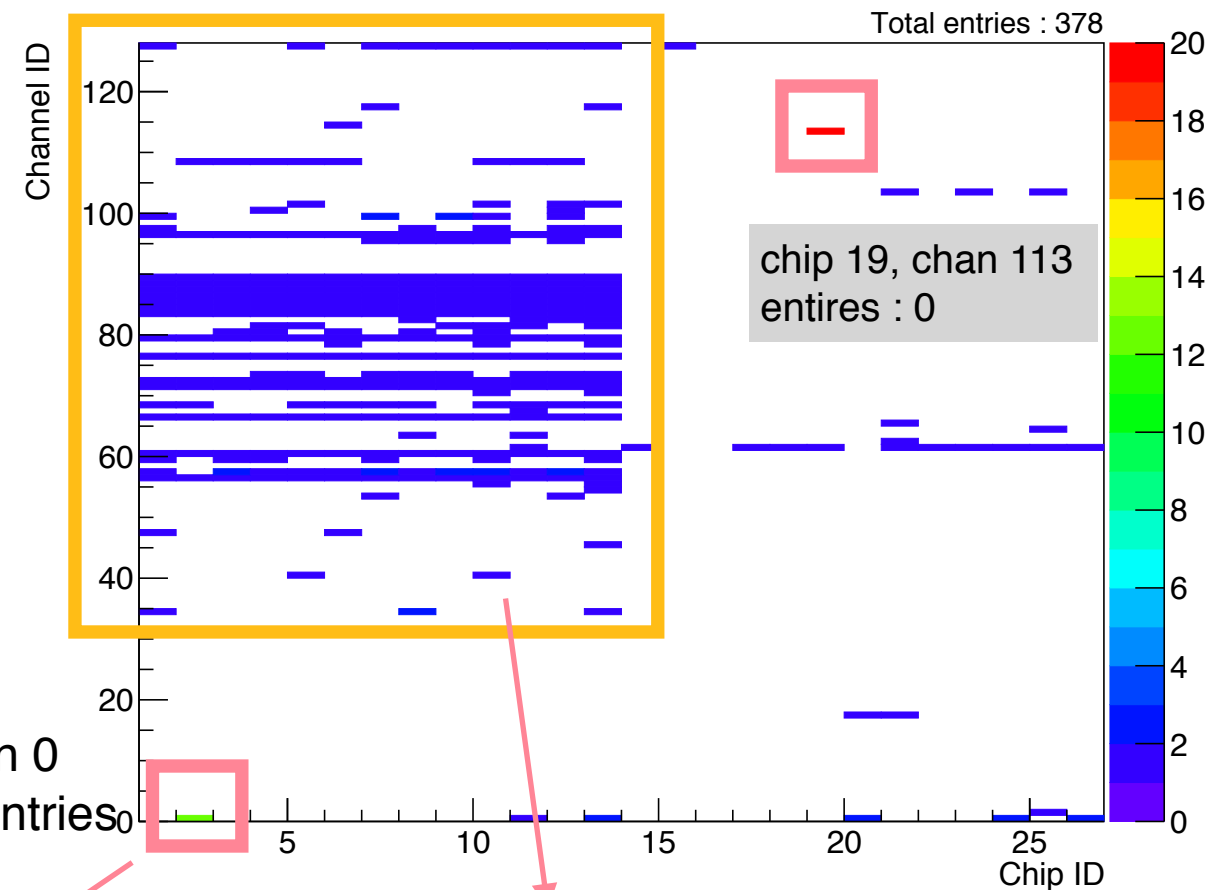Gaus width > 4 will be shown in right plot

Algorithm introduction

of event of each channel ~ 330
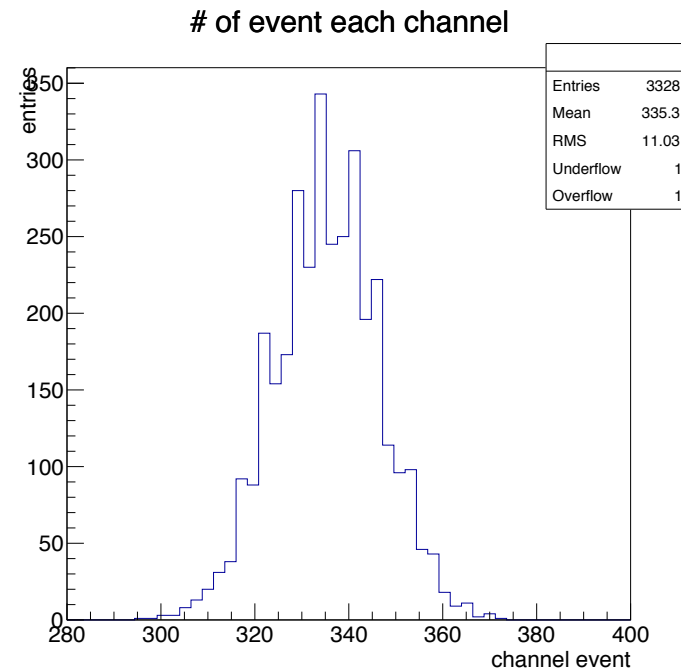
# of event > 400 or < 280 will be filled in the plot

chip 19, chan 113
entires : 0

chip 2, chan 0
Very high entries

Entries : 20615

One unstable run

Back up