

# sPHENIX INTT - beam test dependency study

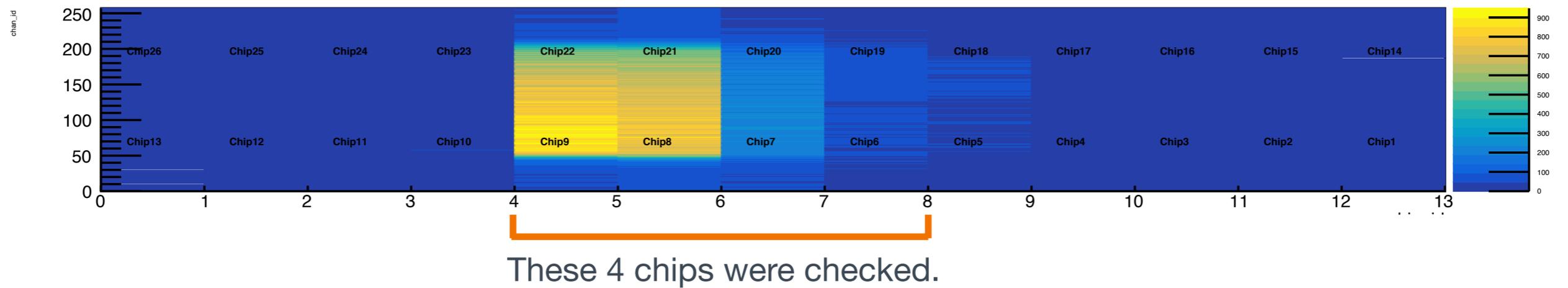
Cheng-Wei Shih & Chia-Ming Kuo

National Central University

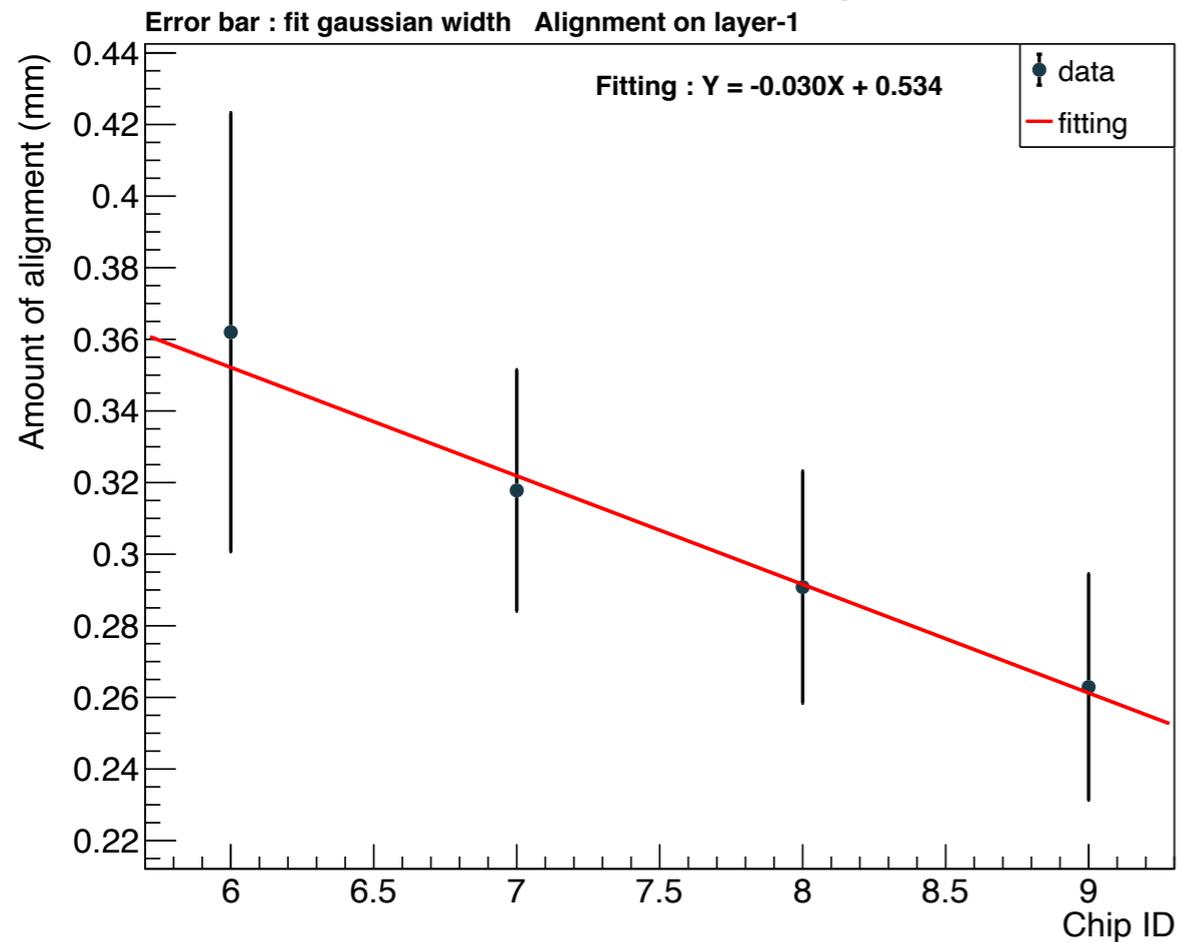
2022/9/29



# Run 52



run52, chip dependency of alignment

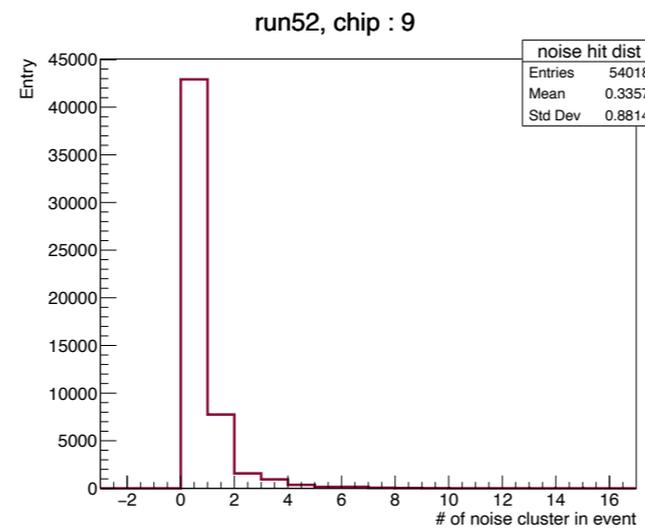
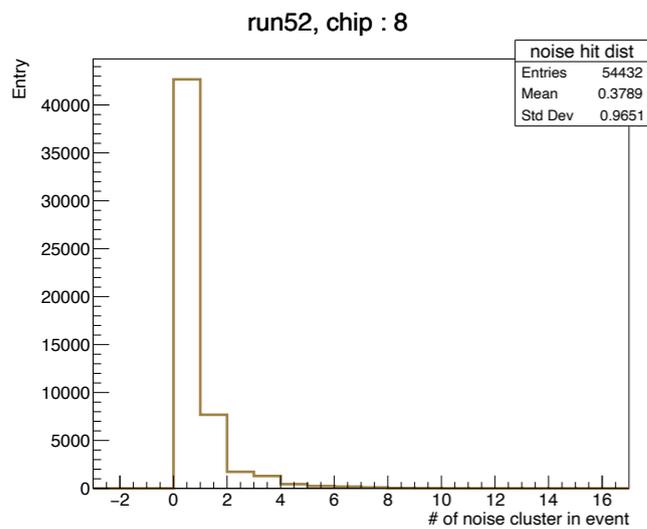
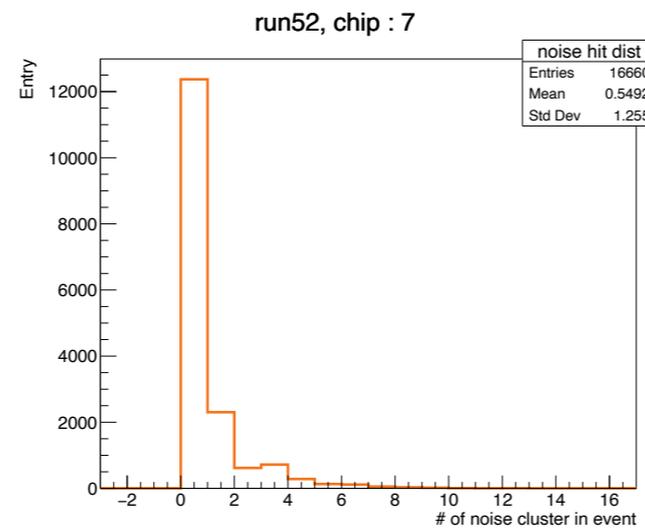
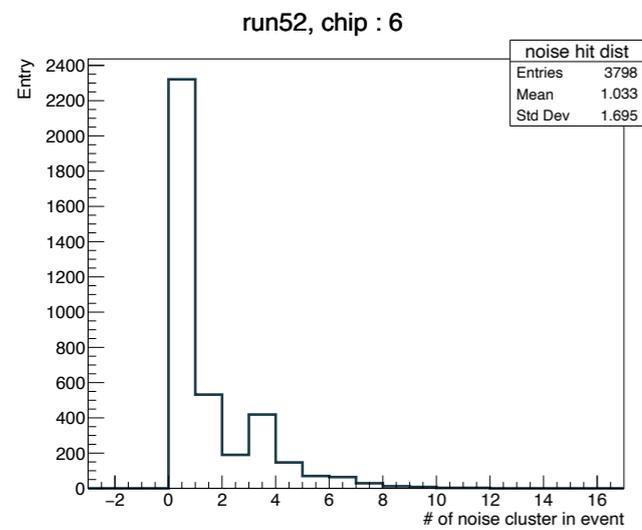


Low statistic

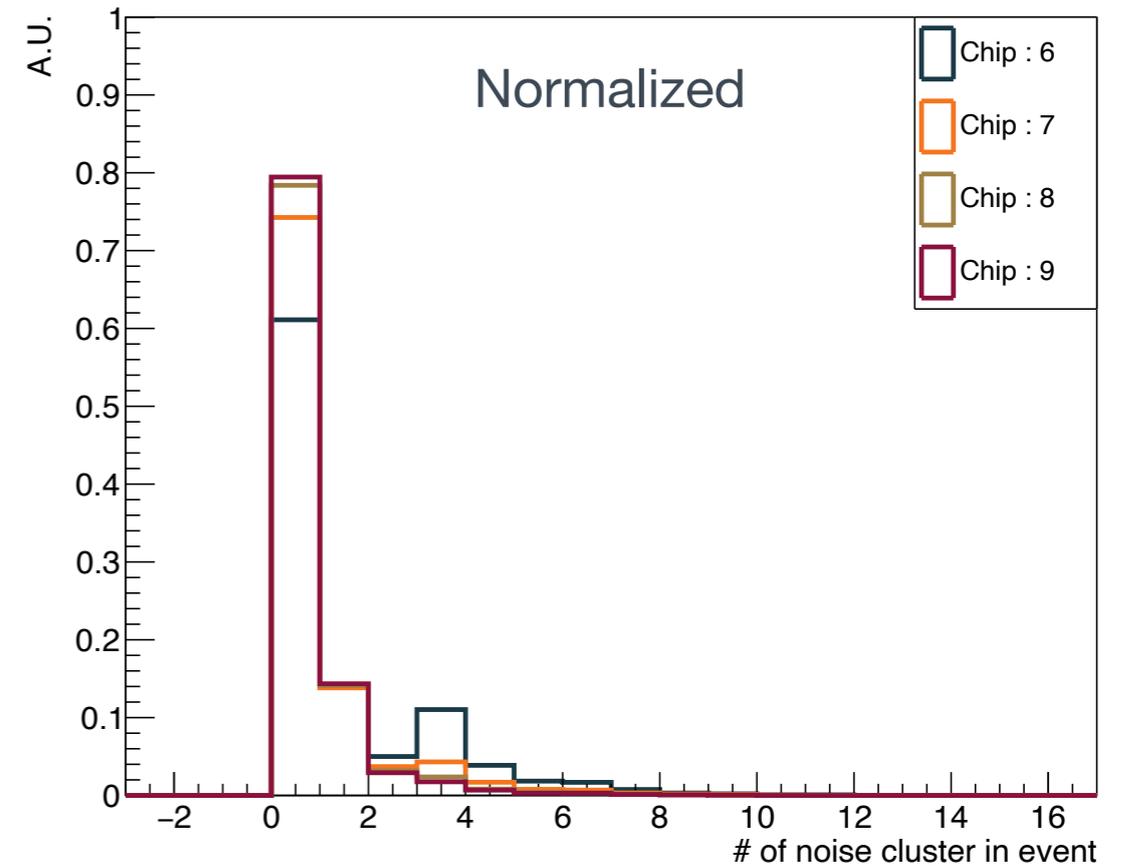
Run ID	effi. L0 (%)	effi. L1 (%)	effi. L2 (%)
52, U6	$99.04^{+0.16}_{-0.19}$	$98.80^{+0.18}_{-0.20}$	$89.24^{+0.48}_{-0.50}$
52, U7	$99.62^{+0.05}_{-0.05}$	$99.36^{+0.06}_{-0.07}$	$98.90^{+0.08}_{-0.09}$
52, U8	$99.73^{+0.02}_{-0.02}$	$99.60^{+0.03}_{-0.03}$	$99.00^{+0.04}_{-0.04}$
52, U9	$99.82^{+0.02}_{-0.02}$	$99.76^{+0.02}_{-0.02}$	$98.49^{+0.05}_{-0.05}$

# Run 52, noise level

Linear

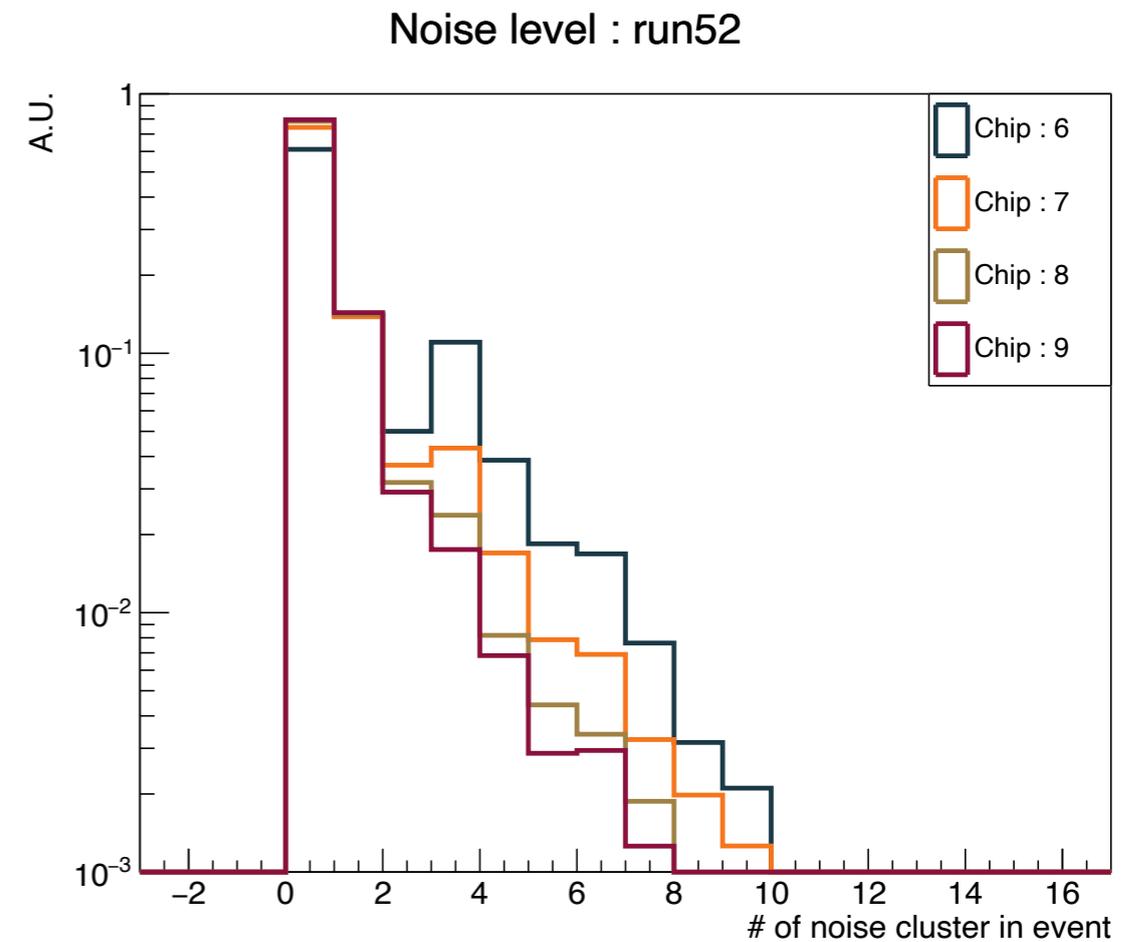
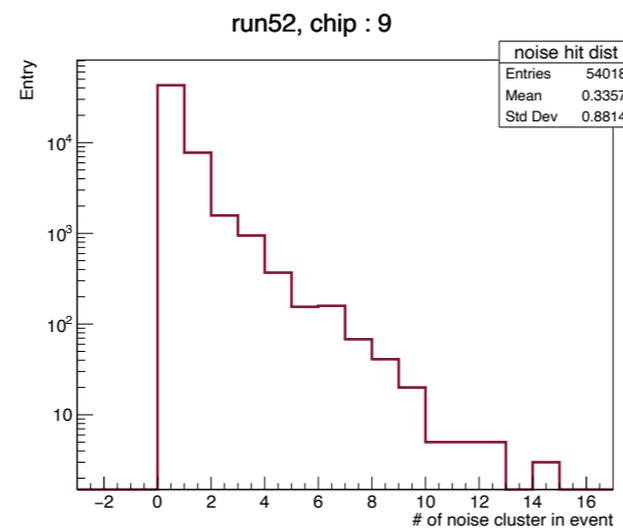
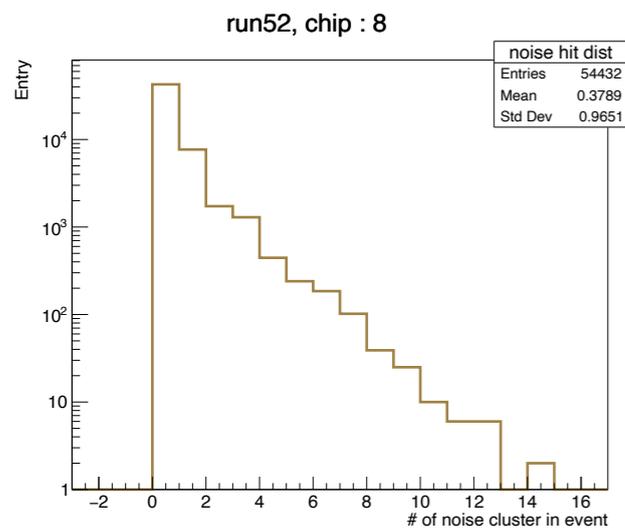
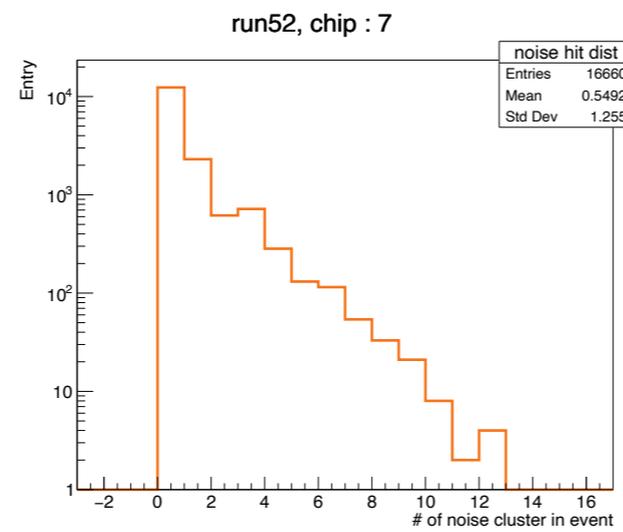
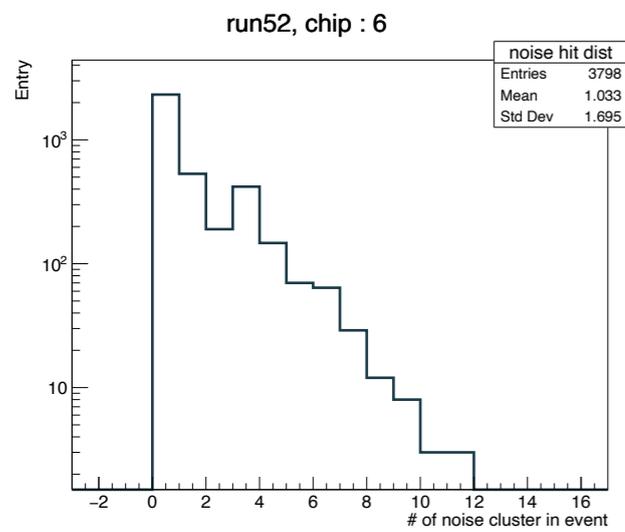


Noise level : run52

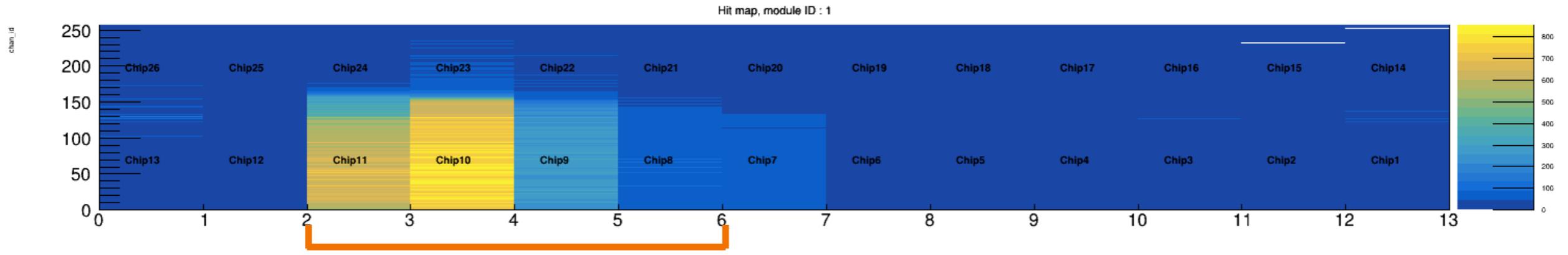


# Run 52, noise level

Log

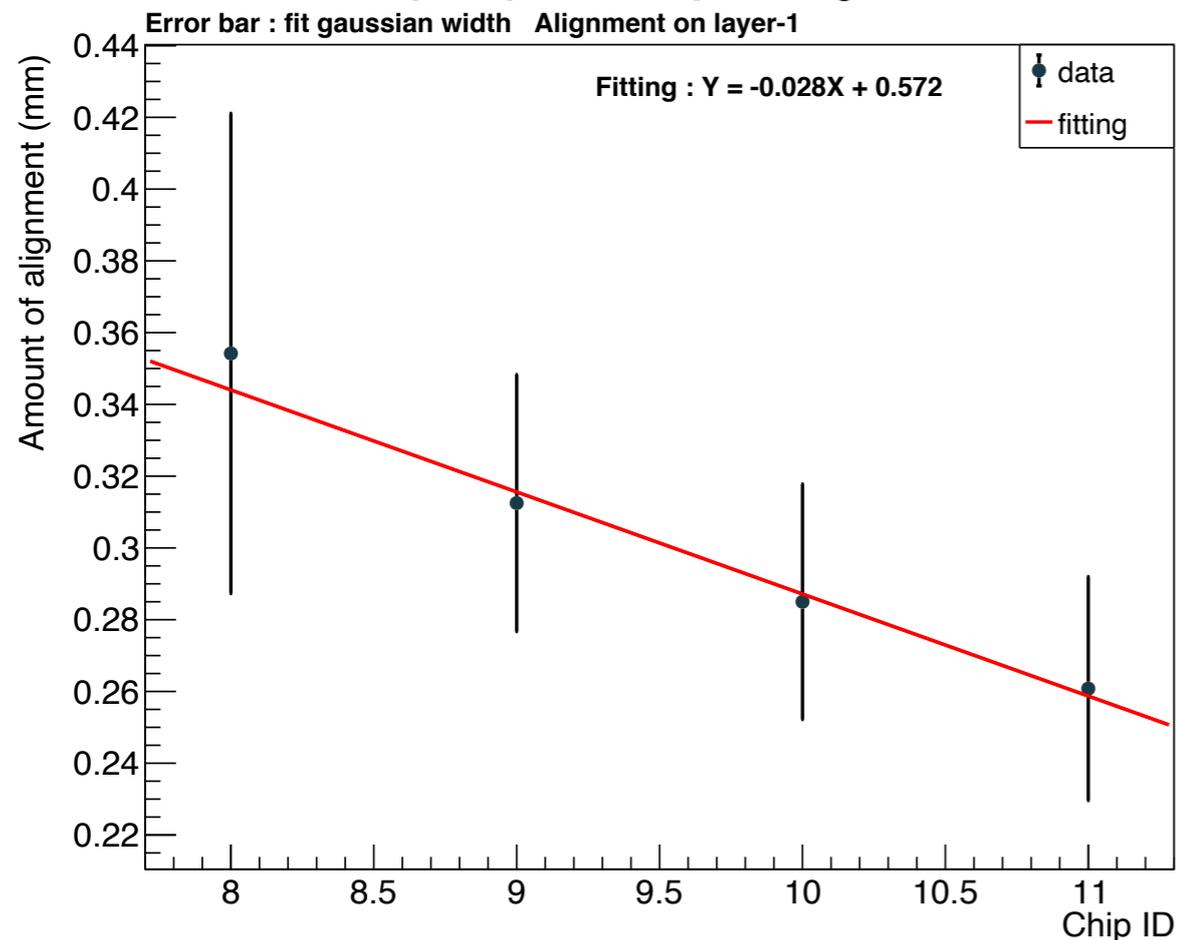


# Run 89



These 4 chips were checked.

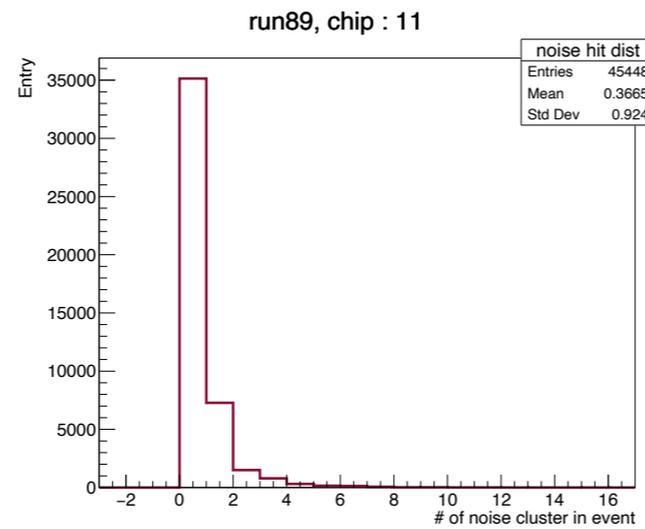
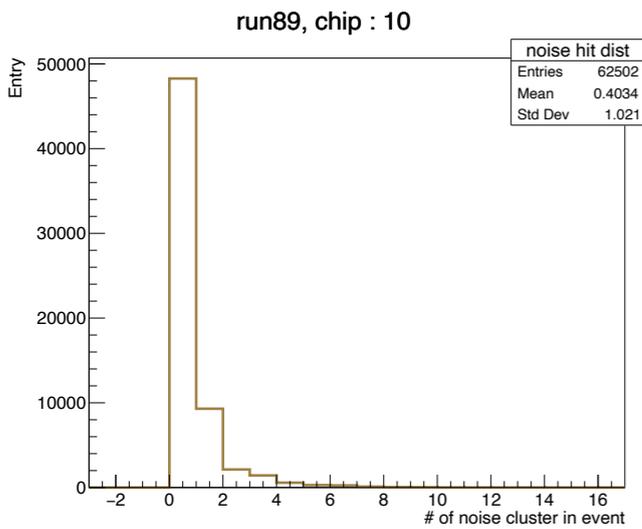
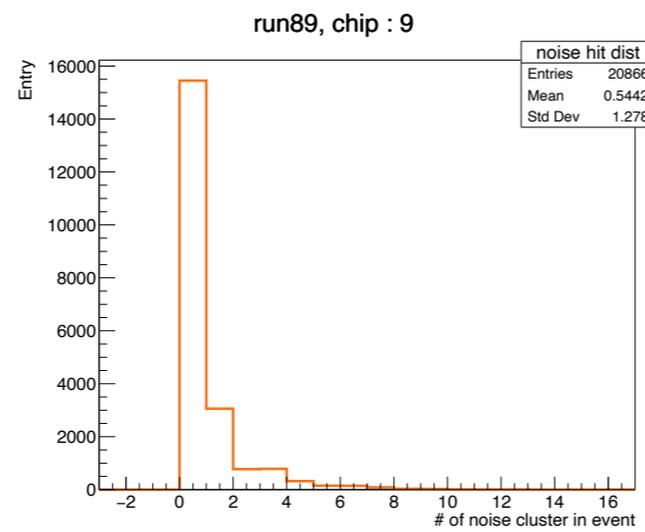
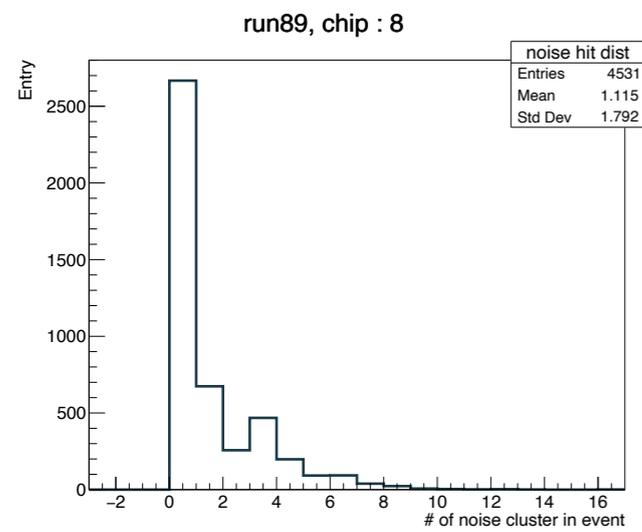
run89, chip dependency of alignment



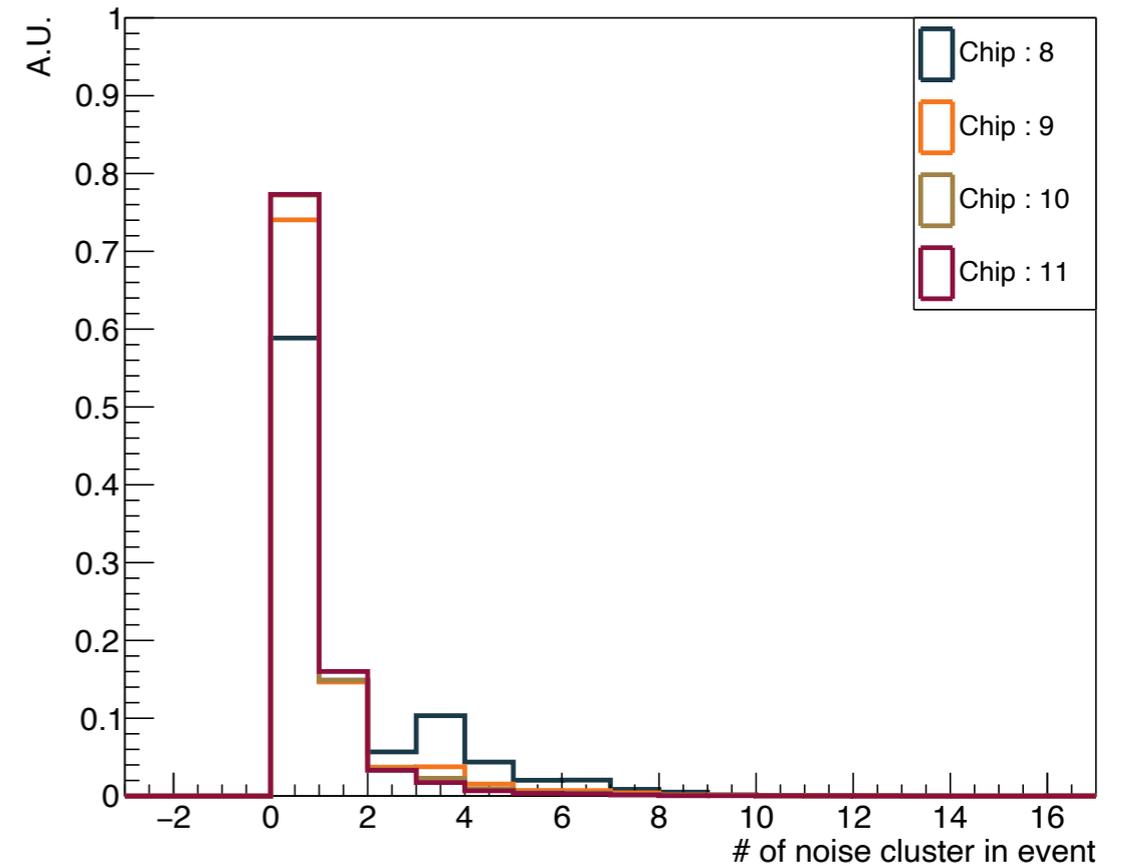
Run ID	effi. L0 (%)	effi. L1 (%)	effi. L2 (%)
89, U8	$98.69^{+0.17}_{-0.19}$	$99.10^{+0.14}_{-0.16}$	$97.76^{+0.22}_{-0.24}$
89, U9	$99.37^{+0.05}_{-0.06}$	$99.57^{+0.05}_{-0.05}$	$98.80^{+0.08}_{-0.08}$
89, U10	$99.62^{+0.02}_{-0.03}$	$99.78^{+0.02}_{-0.02}$	$99.16^{+0.04}_{-0.04}$
89, U11	$99.58^{+0.03}_{-0.03}$	$99.82^{+0.02}_{-0.02}$	$98.91^{+0.05}_{-0.05}$

# Run 89, noise level

Linear

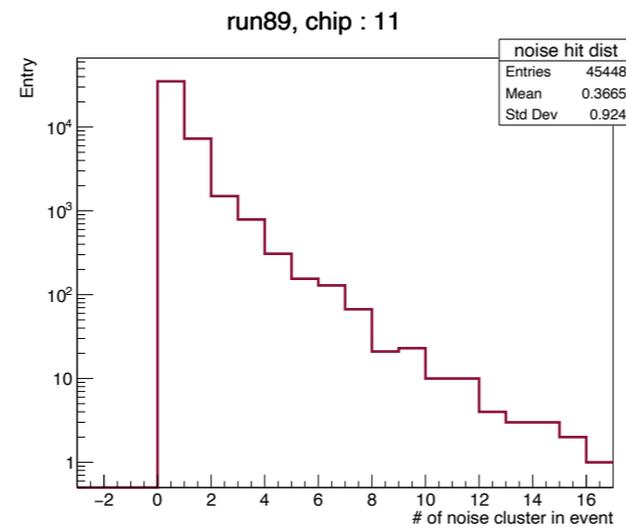
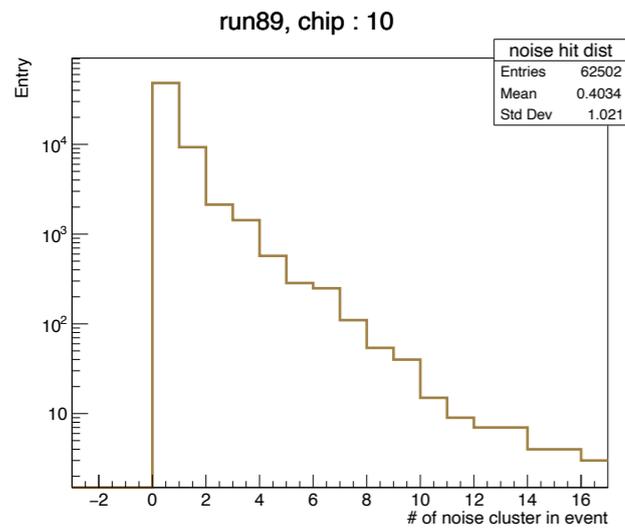
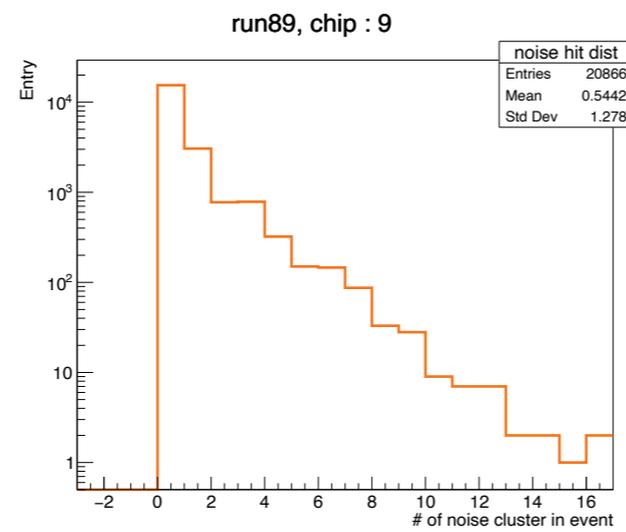
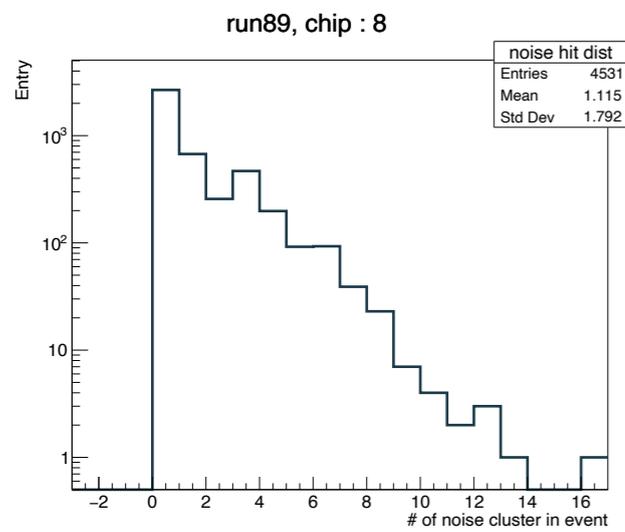


Noise level : run89

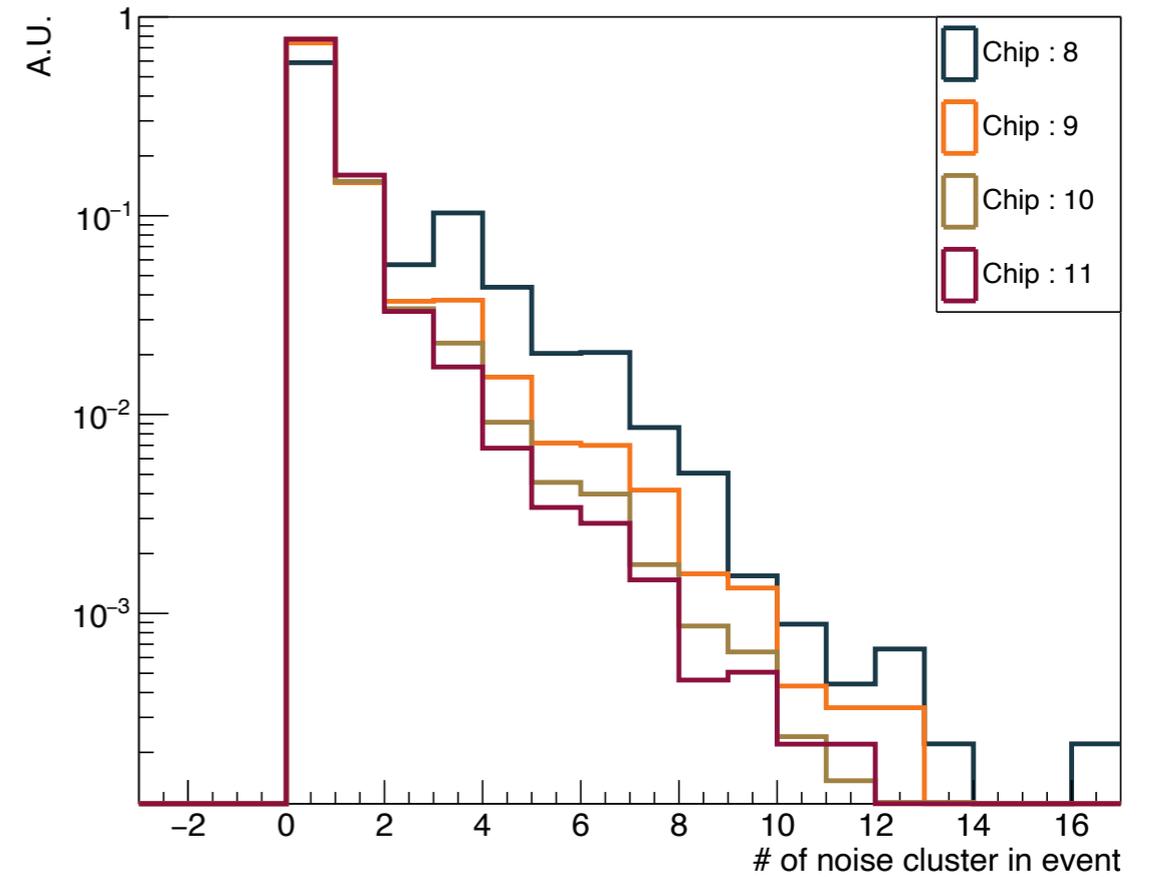


# Run 89, noise level

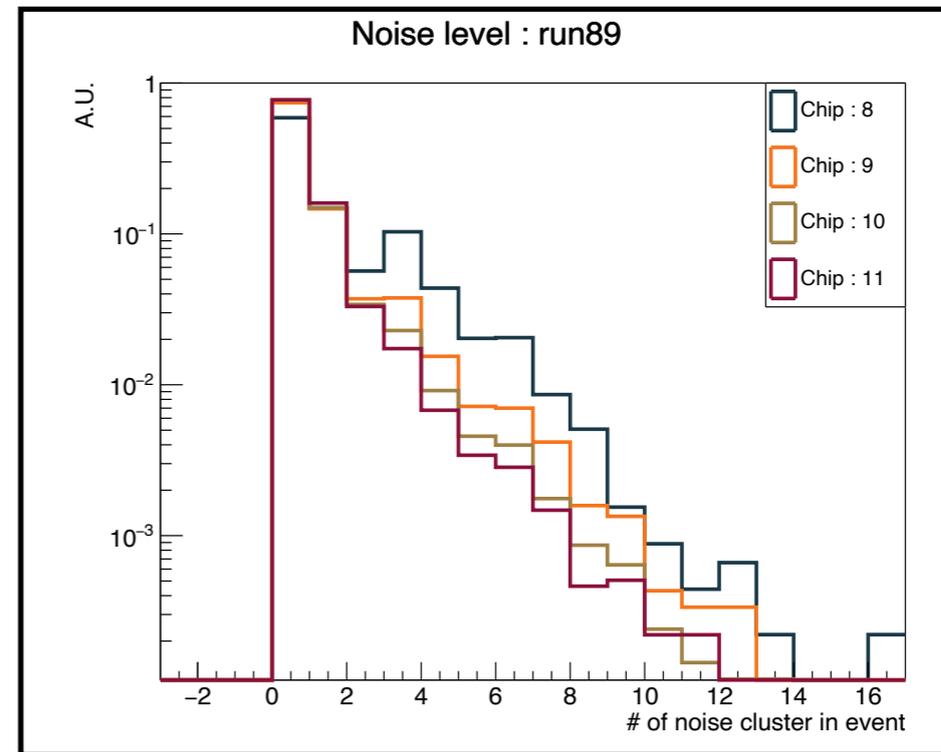
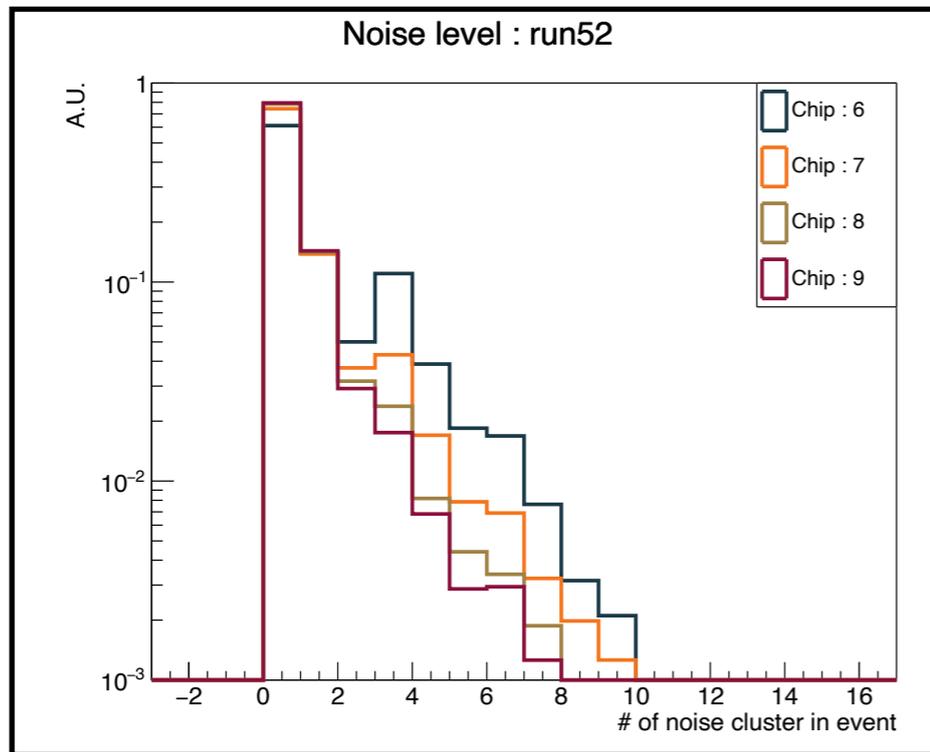
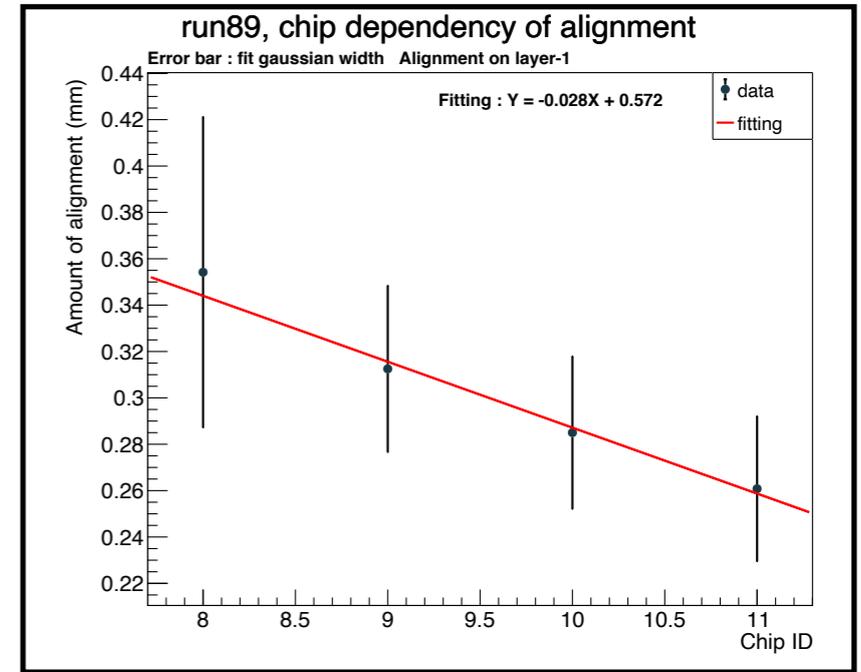
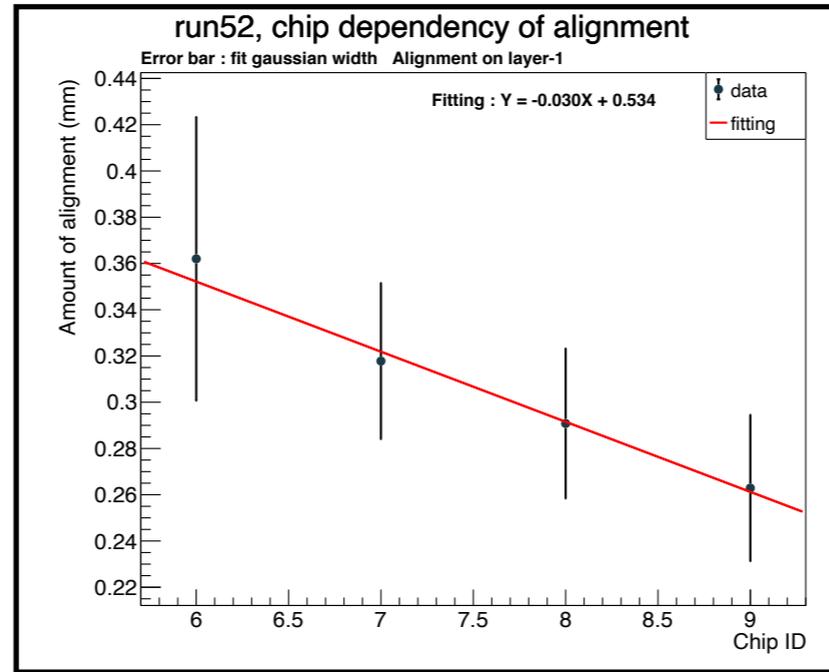
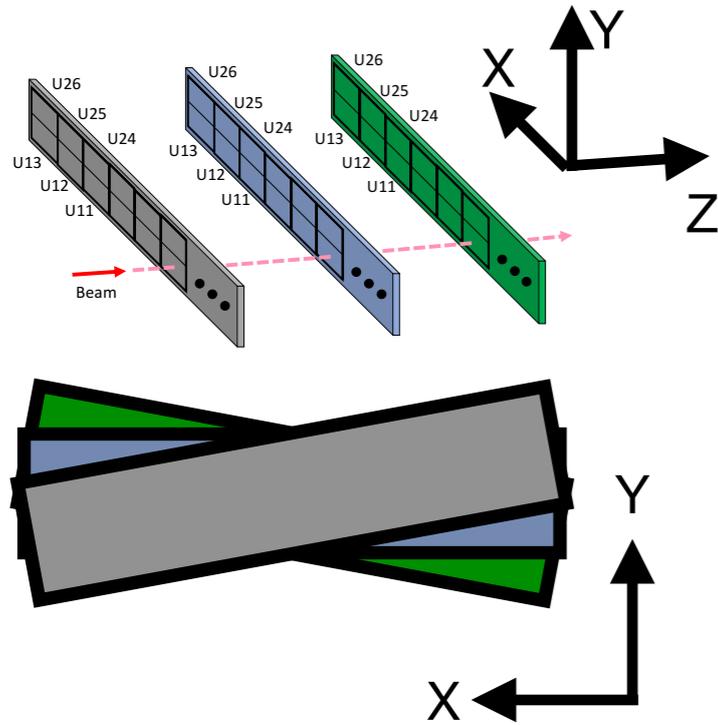
Log



Noise level : run89



# Comparison



# Summary

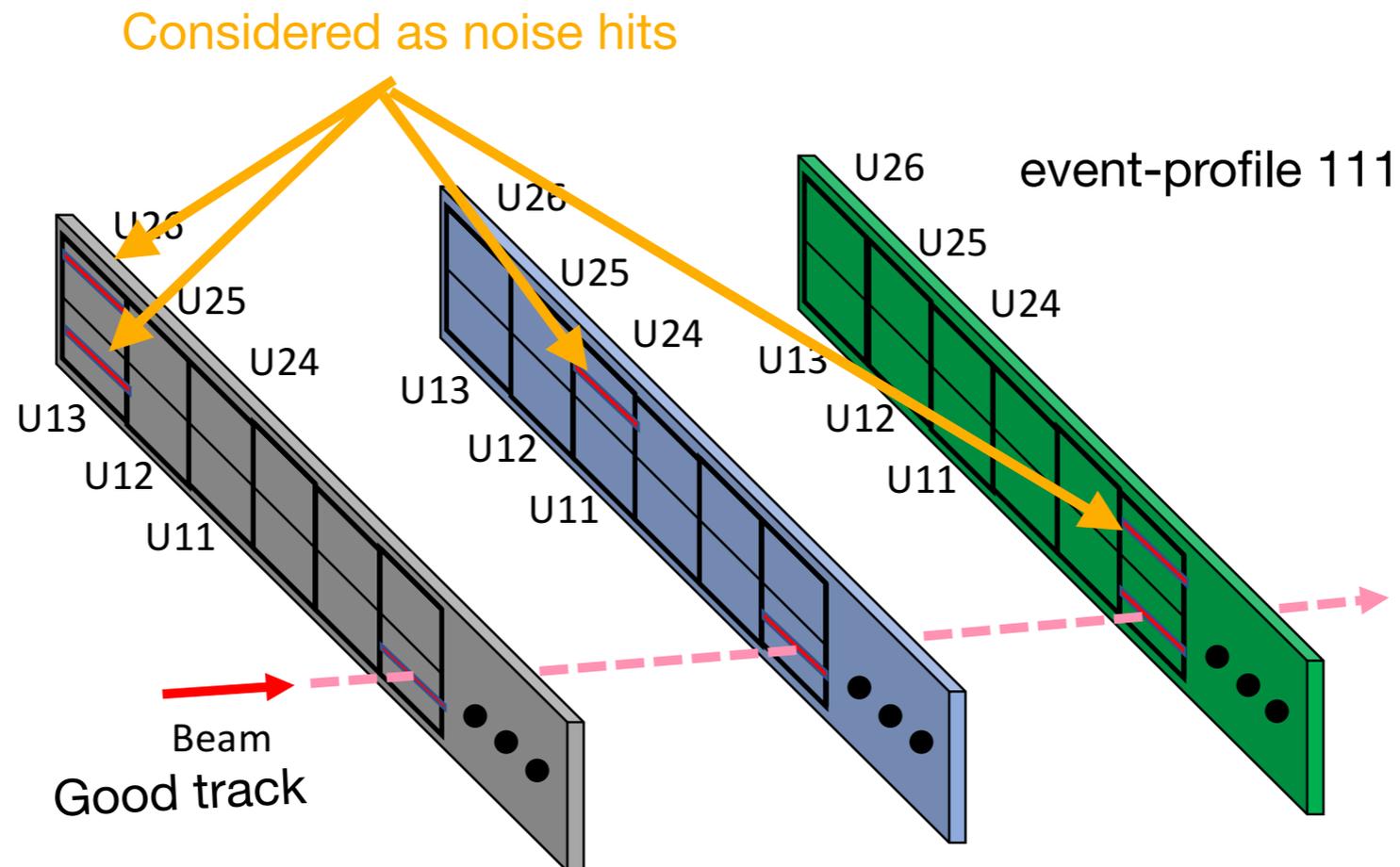
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- 4 of the chips of run 52 and run 89 were checked.
- The slopes of the alignment-chip correlation of both runs are similar.
  - In the beam test, the ladders were tilted.
- The run89 is noisier than the run52.

**Back up**

# Noise level estimation

Try estimate the noise dist. by data



Only check the good track events  
In the example, total cluster : 7

# Run52, table of run parameters

---

Run	chip	alignment	alignment layer	window size
Run 52	6	-0.3620	1	0.3304
Run 52	7	-0.3178	1	0.2774
Run 52	8	-0.2908	1	0.1374
Run 52	9	-2.629E-01	1	0.1364



# Run52, detection efficiency

Run52 U6

```
run file : run52_no_clone_filter_all_int_1000_chip_6
layer 3 final counting :
N_HHH : 3798
N_LHH : 37
N_HLH : 46
N_HHL : 458
N_LLL : 1752
====3-layers====efficiency results=====
99.03520      +0.15736      -0.18504
98.80333      +0.17503      -0.20230
89.23872      +0.47732      -0.49621
====3-layers====efficiency results=====
```

Run52 U7

```
run file : run52_no_clone_filter_all_int_1000_chip_7
layer 3 final counting :
N_HHH : 16660
N_LHH : 63
N_HLH : 107
N_HHL : 186
N_LLL : 4334
====3-layers====efficiency results=====
99.62327      +0.04727      -0.05358
99.36184      +0.06144      -0.06761
98.89588      +0.08050      -0.08652
====3-layers====efficiency results=====
```

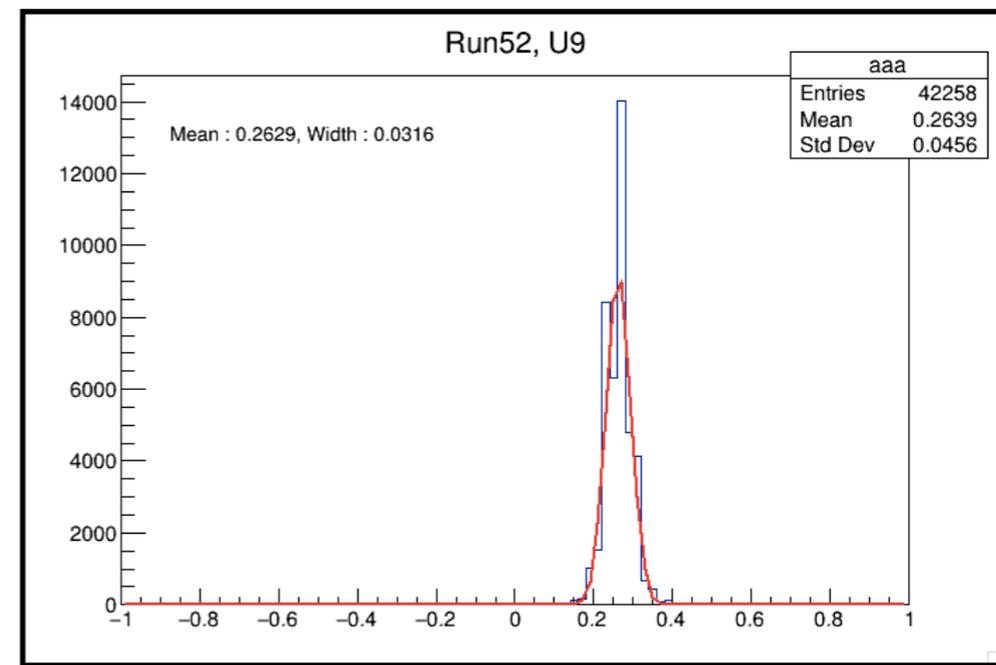
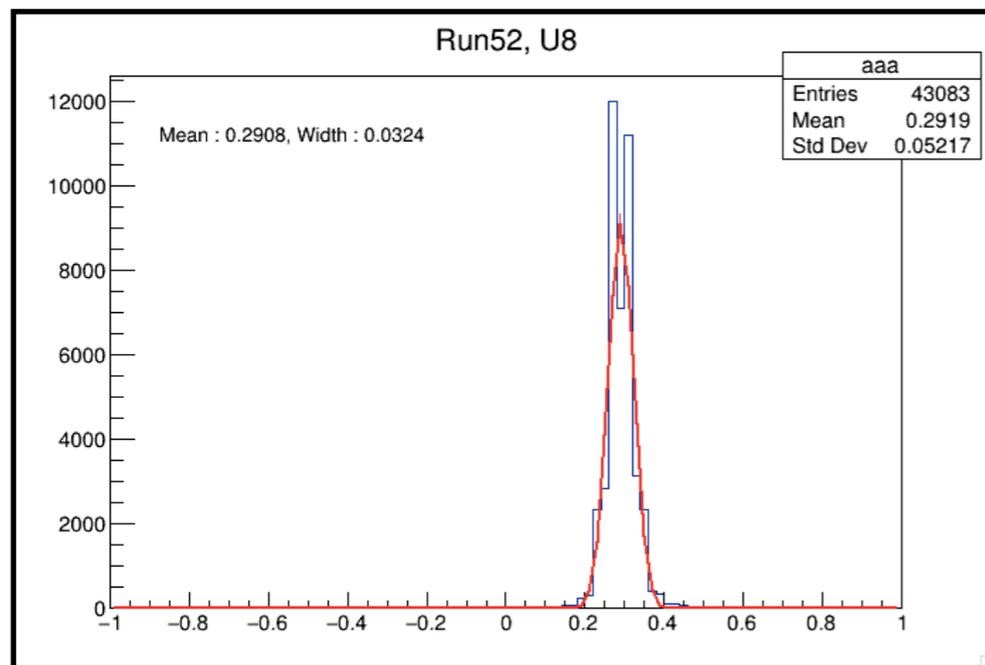
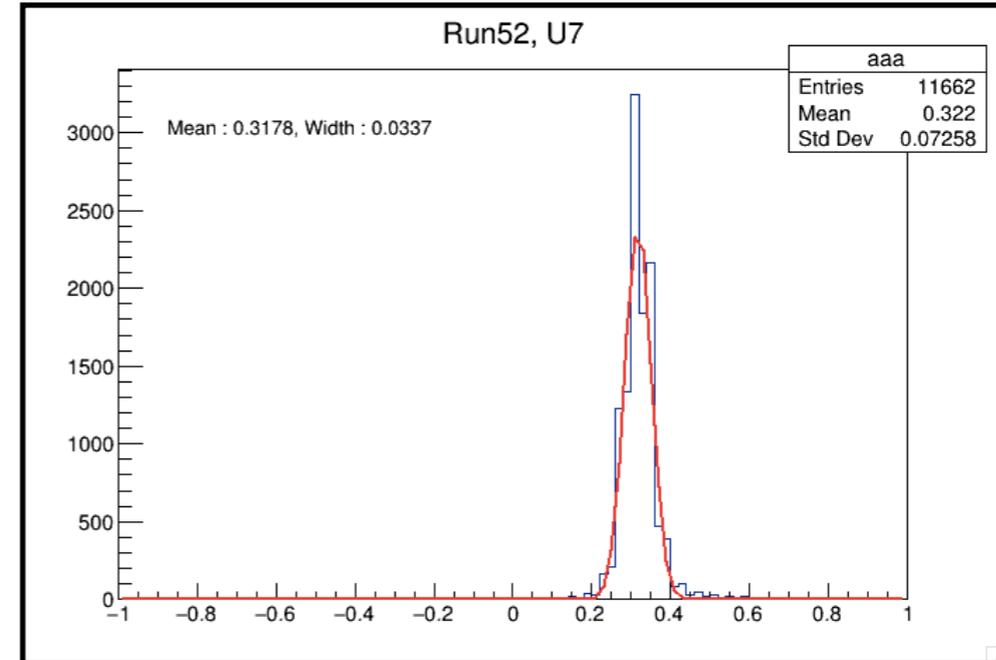
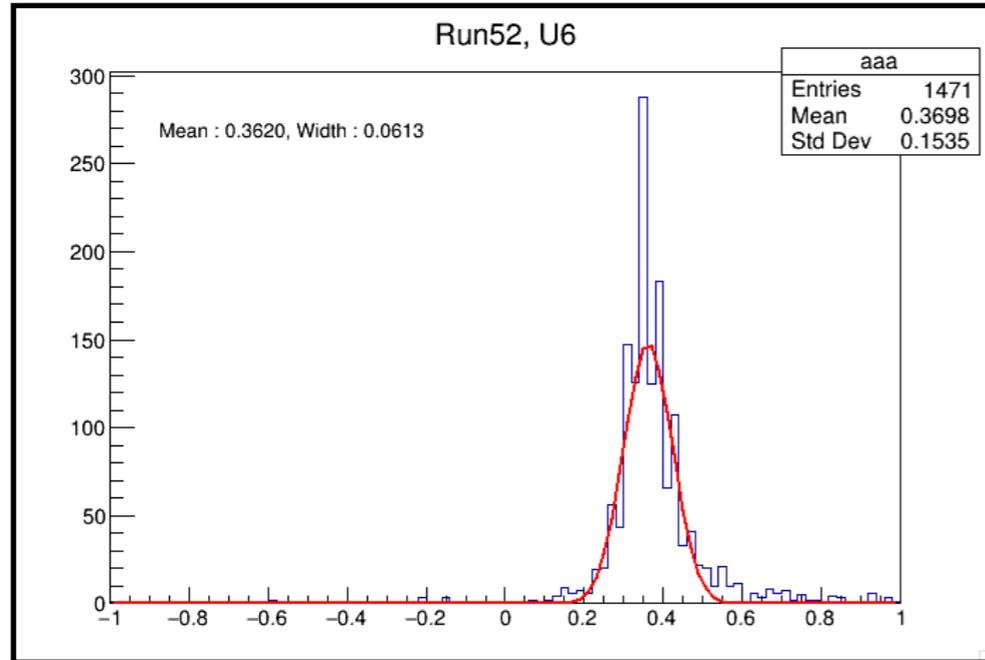
Run52 U8

```
run file : run52_no_clone_filter_all_int_1000_chip_8
layer 3 final counting :
N_HHH : 54432
N_LHH : 150
N_HLH : 217
N_HHL : 550
N_LLL : 11633
====3-layers====efficiency results=====
99.72518      +0.02239      -0.02428
99.60292      +0.02689      -0.02877
98.99967      +0.04245      -0.04427
====3-layers====efficiency results=====
```

Run52 U9

```
run file : run52_no_clone_filter_all_int_1000_chip_9
layer 3 final counting :
N_HHH : 54018
N_LHH : 95
N_HLH : 131
N_HHL : 829
N_LLL : 10243
====3-layers====efficiency results=====
99.82444      +0.01797      -0.01990
99.75807      +0.02109      -0.02301
98.48852      +0.05211      -0.05391
====3-layers====efficiency results=====
```

# Run52, alignment distributions of 4 chips



# Run89, table of run parameters

---

Run	chip	alignment	alignment layer	window size
Run 89	8	-0.3542	1	0.3316
Run 89	9	-0.3125	1	0.2824
Run 89	10	-0.2850	1	0.149
Run 89	11	-0.2608	1	0.1444

# Run89, detection efficiency

```
run file : run89_no_clone_filter_all_int_1000_chip_8
layer 3 final counting :
  N_HHH : 4531
  N_LHH : 60
  N_HLH : 41
  N_HHL : 104
  N_LLL : 2736
====3-layers====efficiency results=====
98.69310      +0.16741      -0.19000
99.10324      +0.13903      -0.16220
97.75620      +0.21765      -0.23928
====3-layers====efficiency results=====
```

```
run file : run89_no_clone_filter_all_int_1000_chip_9
layer 3 final counting :
  N_HHH : 20866
  N_LHH : 133
  N_HLH : 91
  N_HHL : 254
  N_LLL : 6722
====3-layers====efficiency results=====
99.36664      +0.05471      -0.05961
99.56578      +0.04536      -0.05034
98.79735      +0.07501      -0.07978
====3-layers====efficiency results=====
```

```
run file : run89_no_clone_filter_all_int_1000_chip_10
layer 3 final counting :
  N_HHH : 62502
  N_LHH : 238
  N_HLH : 136
  N_HHL : 531
  N_LLL : 19361
====3-layers====efficiency results=====
99.62066      +0.02453      -0.02616
99.78288      +0.01858      -0.02024
99.15758      +0.03641      -0.03800
====3-layers====efficiency results=====
```

```
run file : run89_no_clone_filter_all_int_1000_chip_11
layer 3 final counting :
  N_HHH : 45448
  N_LHH : 192
  N_HLH : 81
  N_HHL : 501
  N_LLL : 16869
====3-layers====efficiency results=====
99.57932      +0.03028      -0.03253
99.82209      +0.01971      -0.02202
98.90966      +0.04845      -0.05063
====3-layers====efficiency results=====
```

# Run89, alignment distributions of 4 chips

