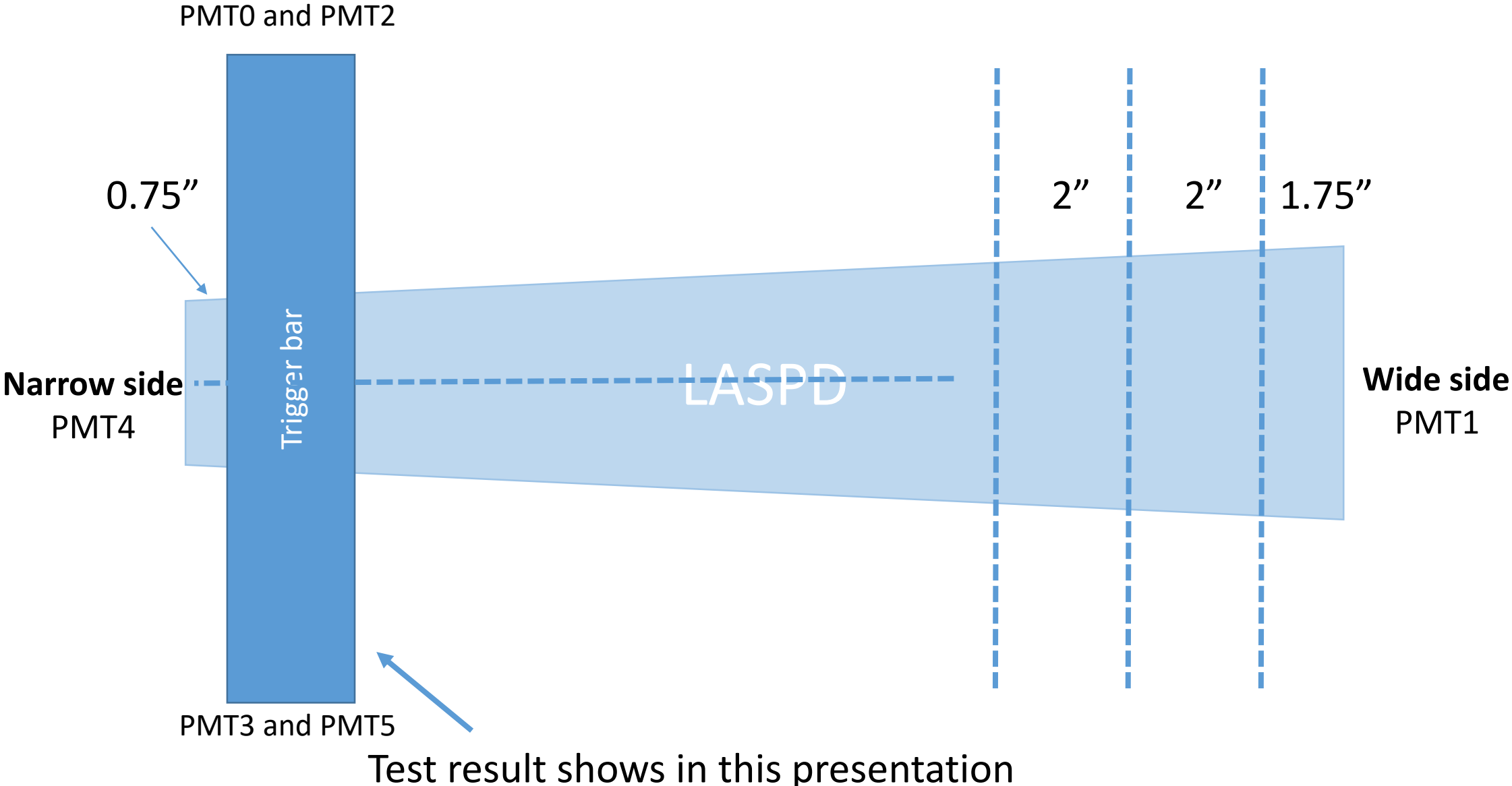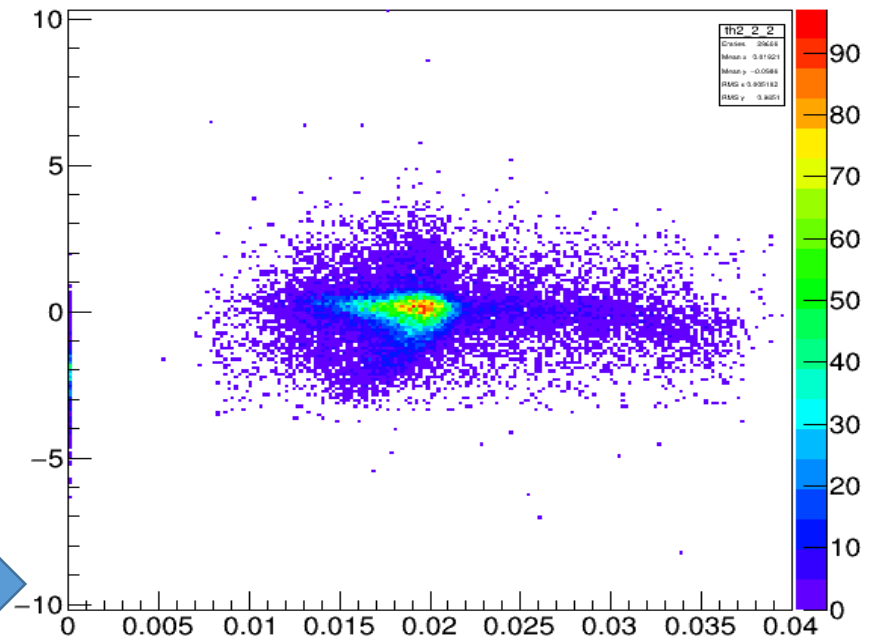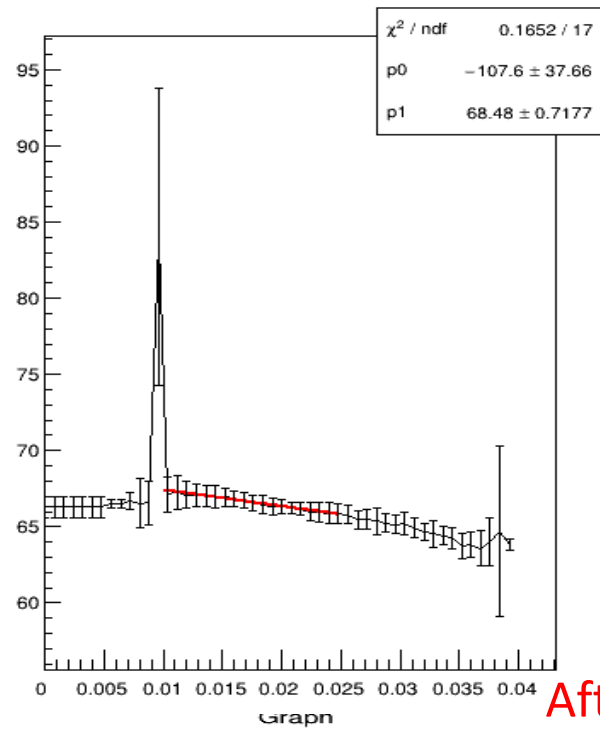# LASPD time resolution test update

Ye Tian(SDU), Jixie Zhang
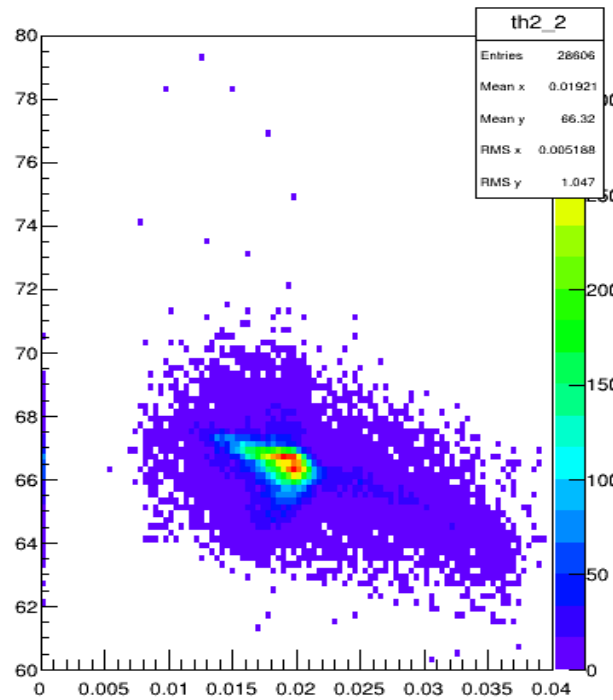
09/21/2017

Test setup
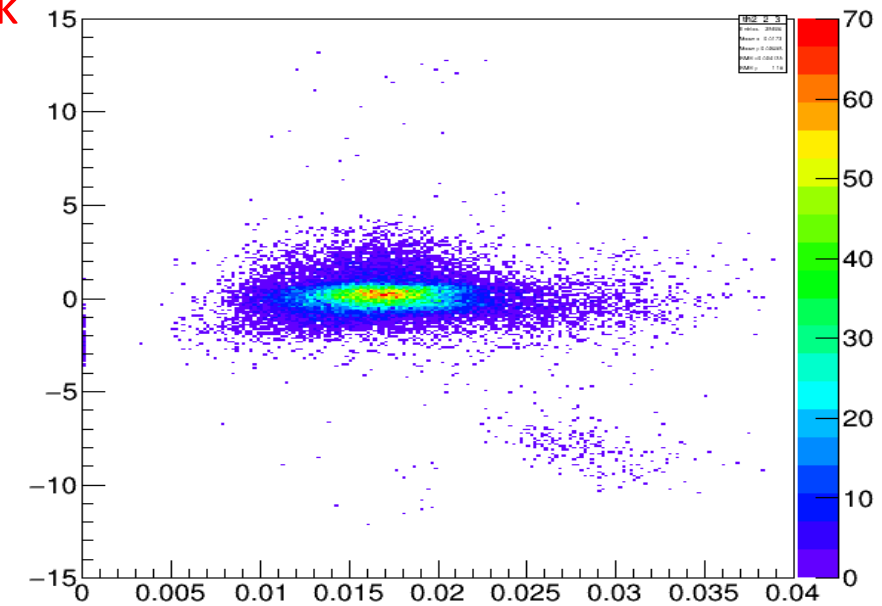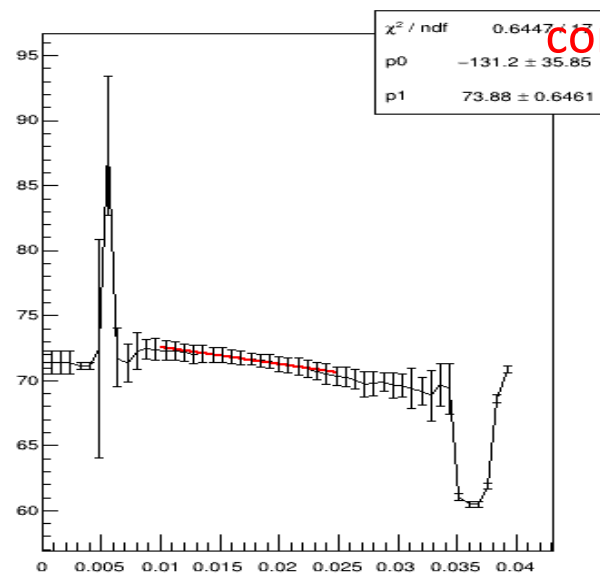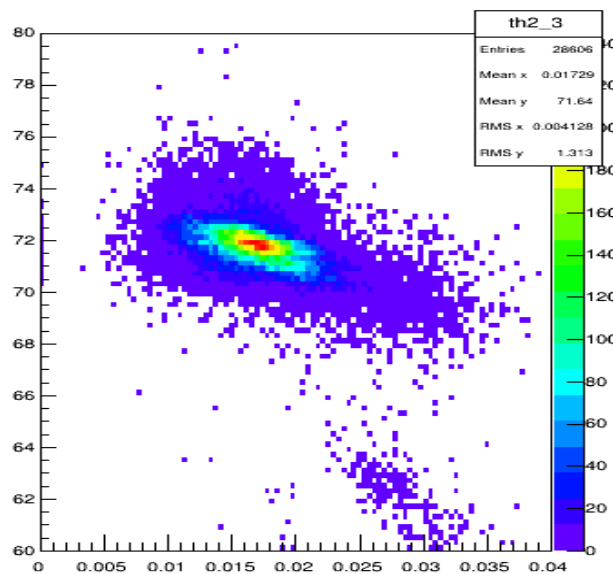
Low efficiency

Event rate: 3Hz

For run 1155

o Original events: 53000

o Pass (track==1) cut: 7323

o Pass (triggered by main trigger) cut: 1189

o With signal in SPD cut: 399

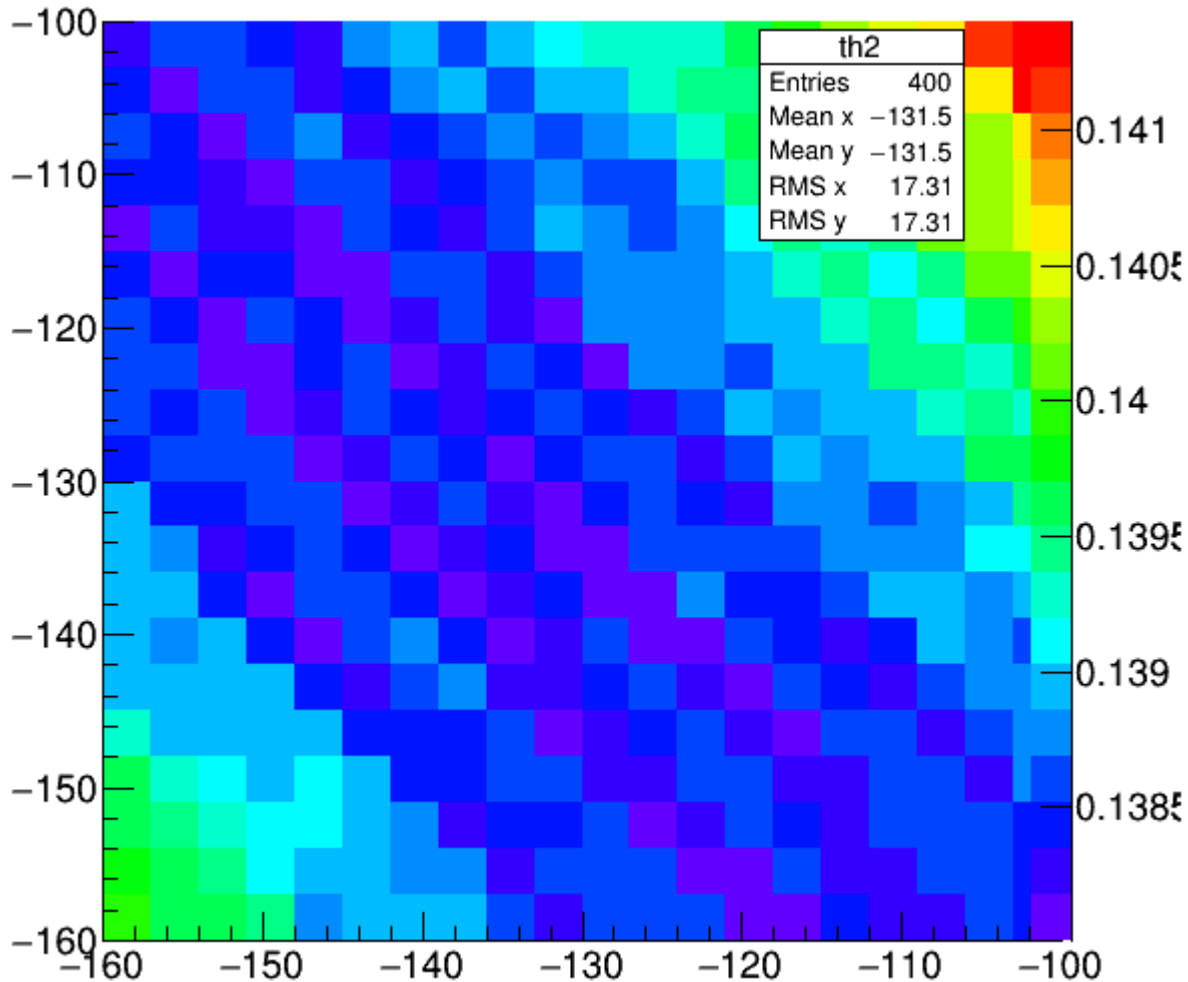o FADC low signal cut: 280

Time walk correction   X axis: $1/\sqrt{FADC\ channel}$, Y axis: time(ns)
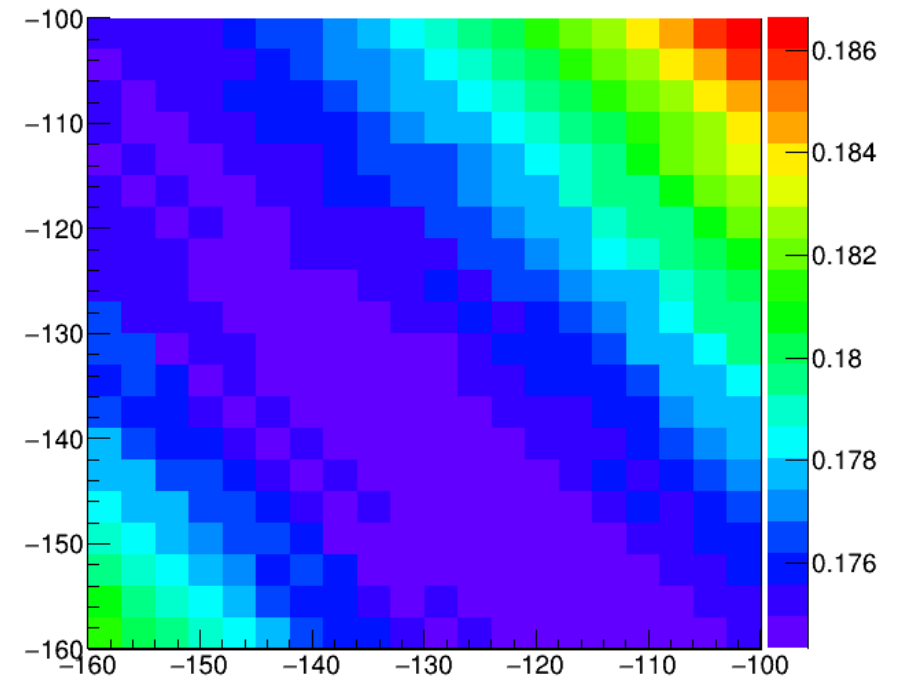

After time walk correction

Time walk correction for trigger bar

X and Y axis are slopes of two PMTs in trigger bar, time resolution unit: ns
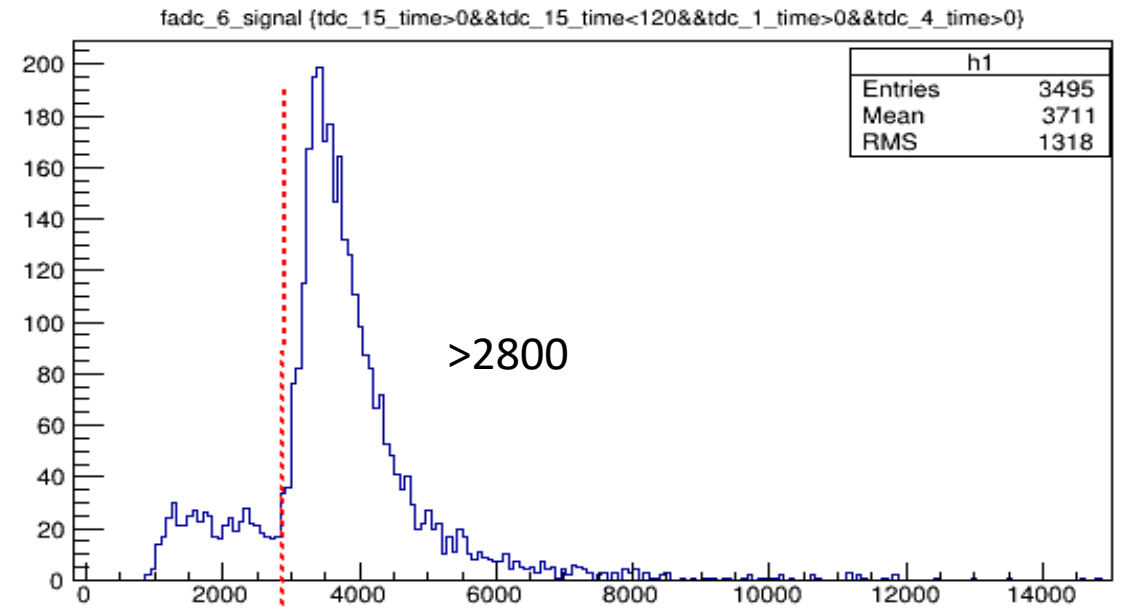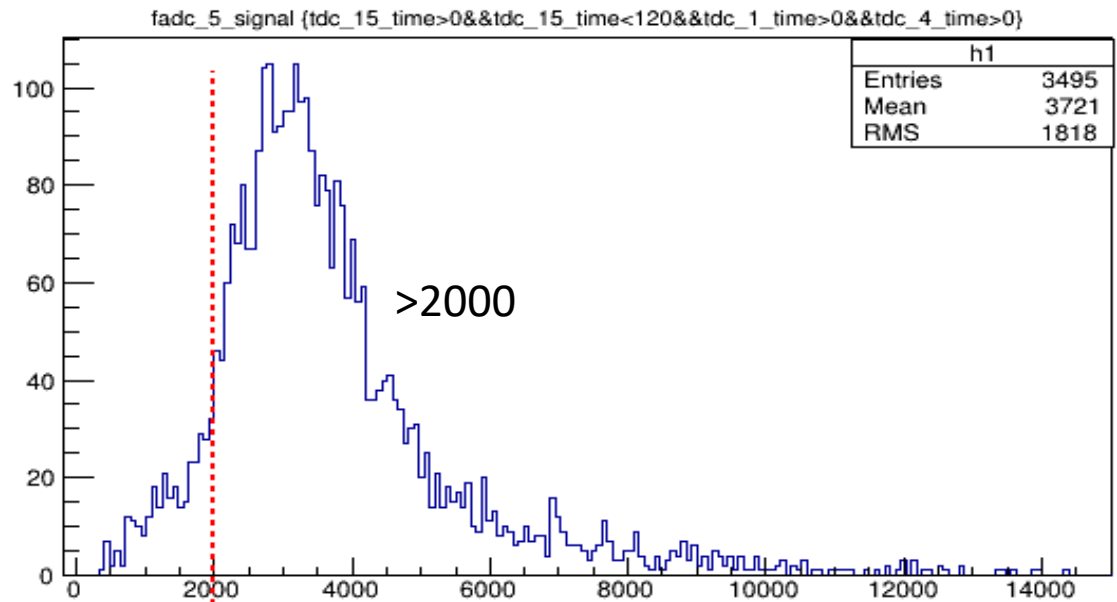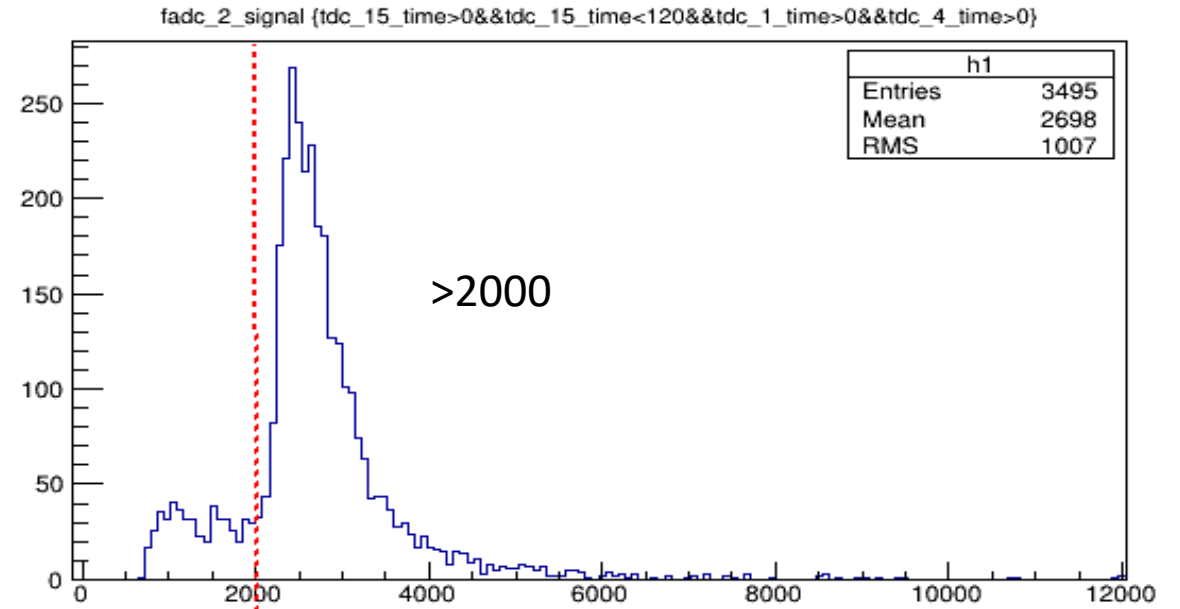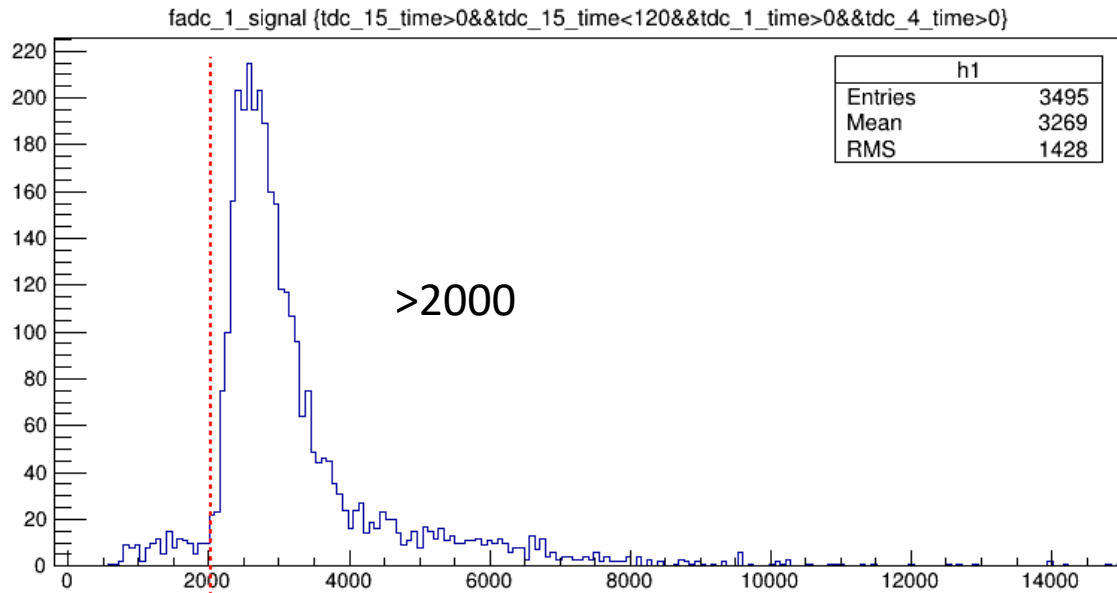
- Time resolution is calculated as

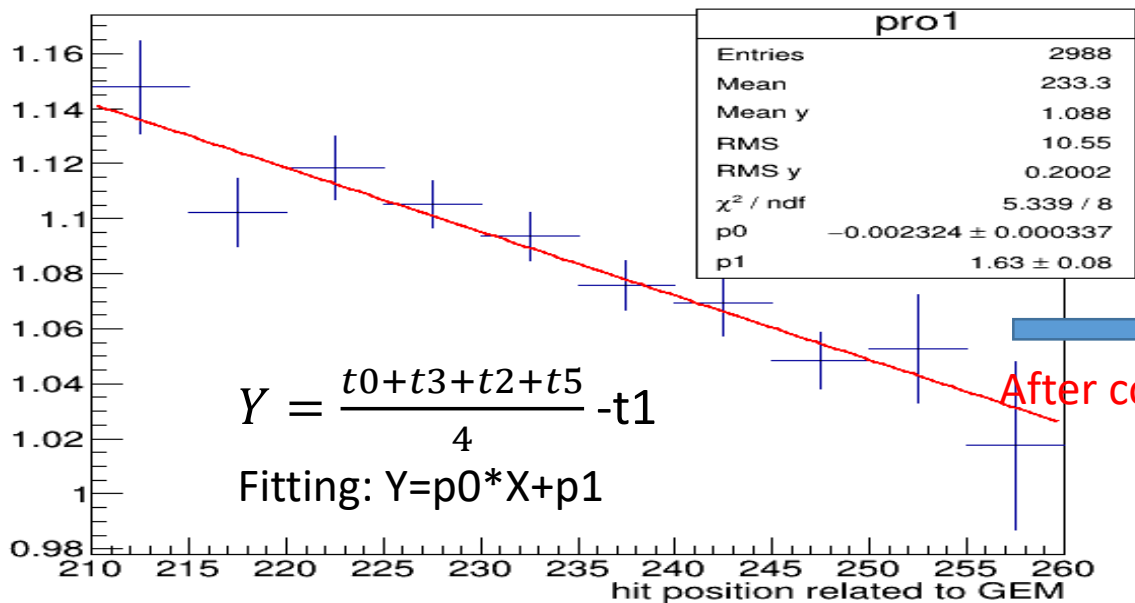$$T = \frac{t0 + t3 + t2 + t5}{4} - \frac{t1 + t4}{2}$$

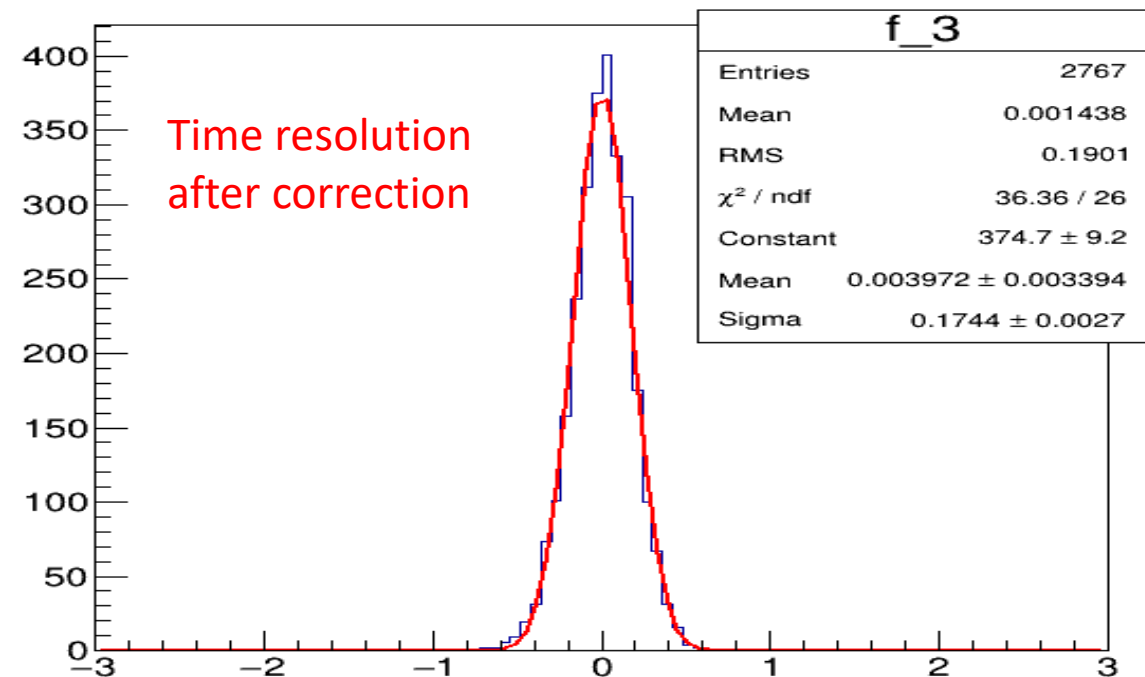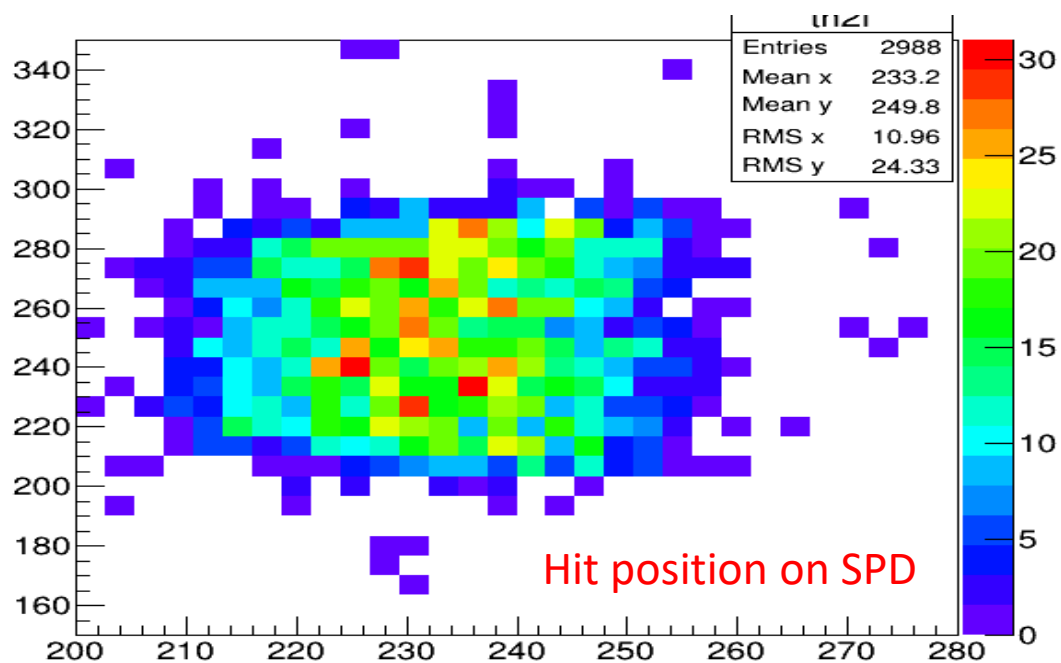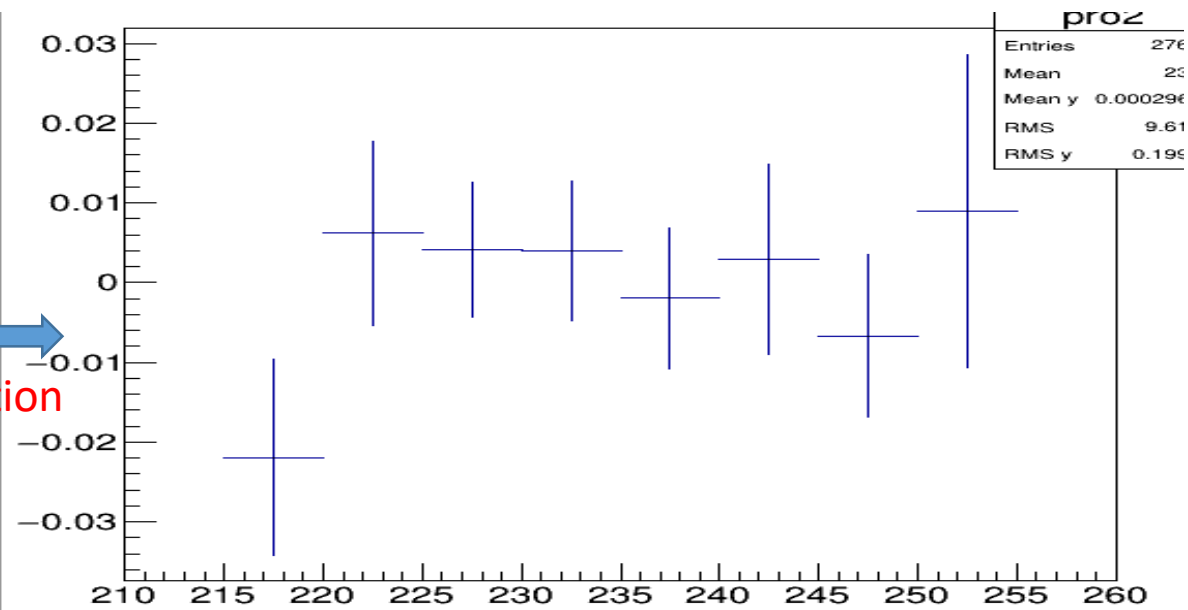Result without FADC integral signal cut

FADC channel Integral cut
need all 6 PMTs satisfy the cut

Time resolution of single PMT readout(wide side)

$$Y = \frac{t0+t3+t2+t5}{4} - t1$$

Fitting: Y=p0*X+p1

After correction

pro1
Entries	2988
Mean	233.3
Mean y	1.088
RMS	10.55
RMS y	0.2002
χ^2 / ndf	5.339 / 8
p0	-0.002324 ± 0.000337
p1	1.63 ± 0.08

hit position related to GEM

pro2
Entries	276
Mean	23
Mean y	0.000296
RMS	9.61
RMS y	0.199

Hit position on SPD

Entries	2988
Mean x	233.2
Mean y	249.8
RMS x	10.96
RMS y	24.33

Time resolution after correction

f_3
Entries	2767
Mean	0.001438
RMS	0.1901
χ^2 / ndf	36.36 / 26
Constant	374.7 ± 9.2
Mean	0.003972 ± 0.003394
Sigma	0.1744 ± 0.0027

Time resolution of single PMT readout(narrow side)

$$Y = \frac{t0+t3+t2+t5}{4} - t4$$