

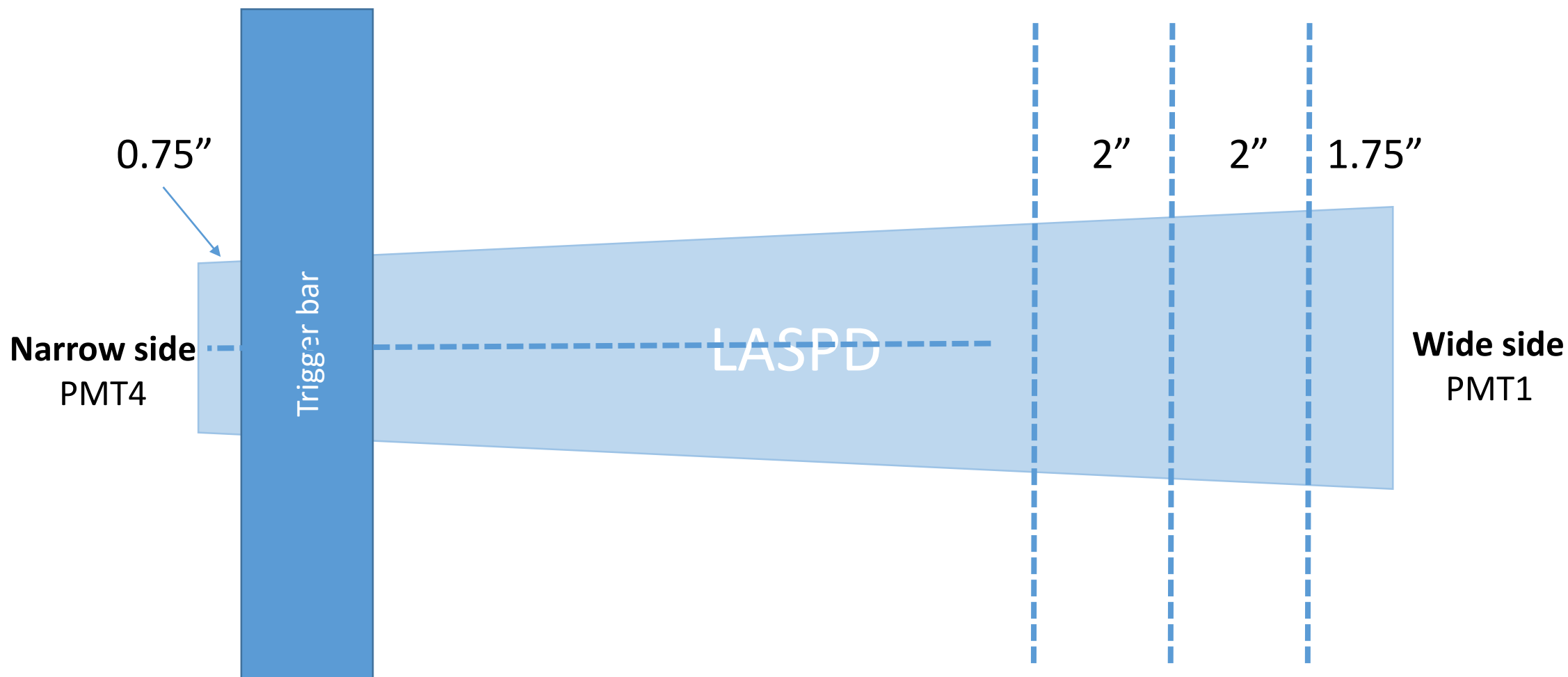
LASPD time resolution test update

Ye Tian(SDU), Jixie Zhang

09/28/2017

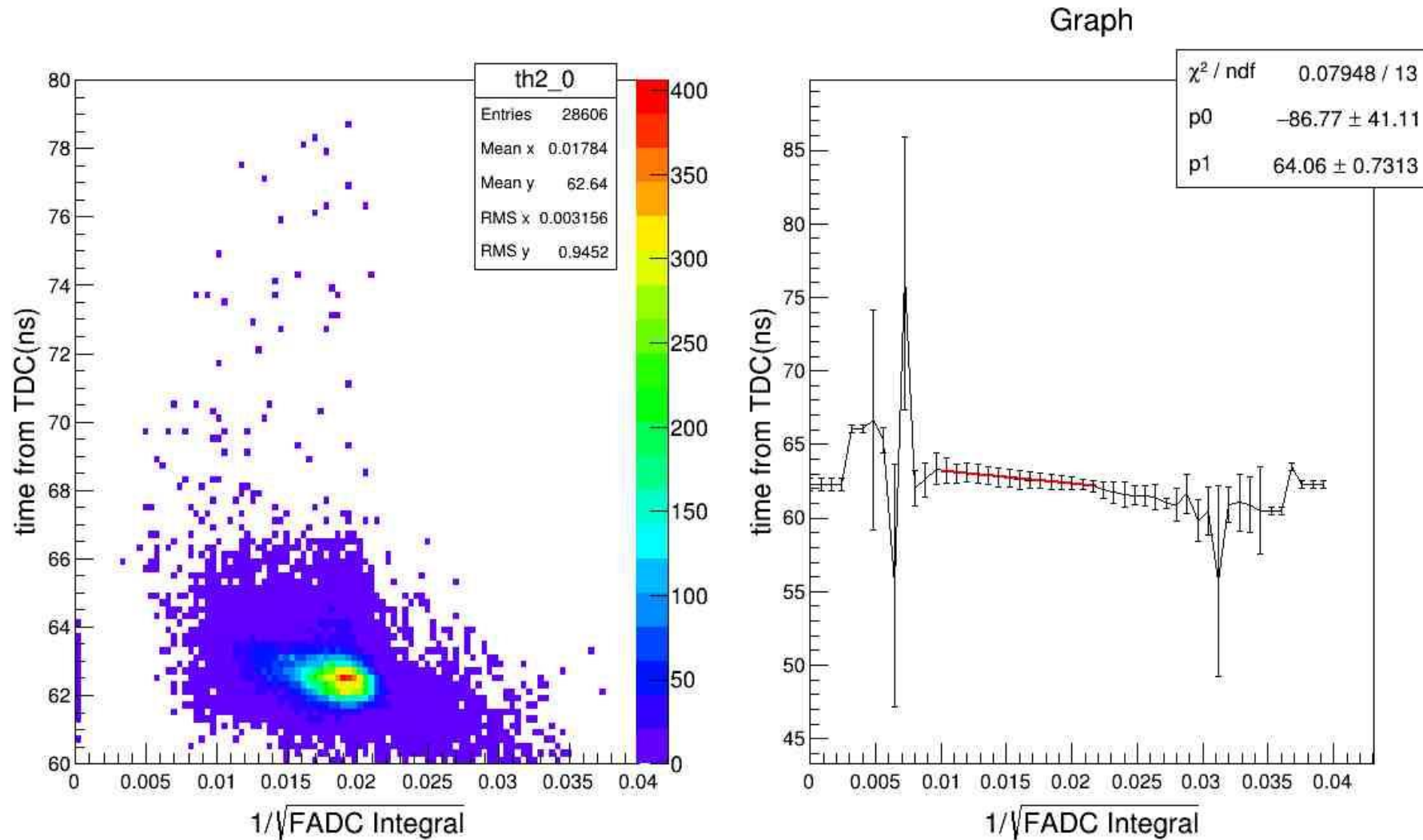
Test setup

PMT0(top) and PMT2(bottom)



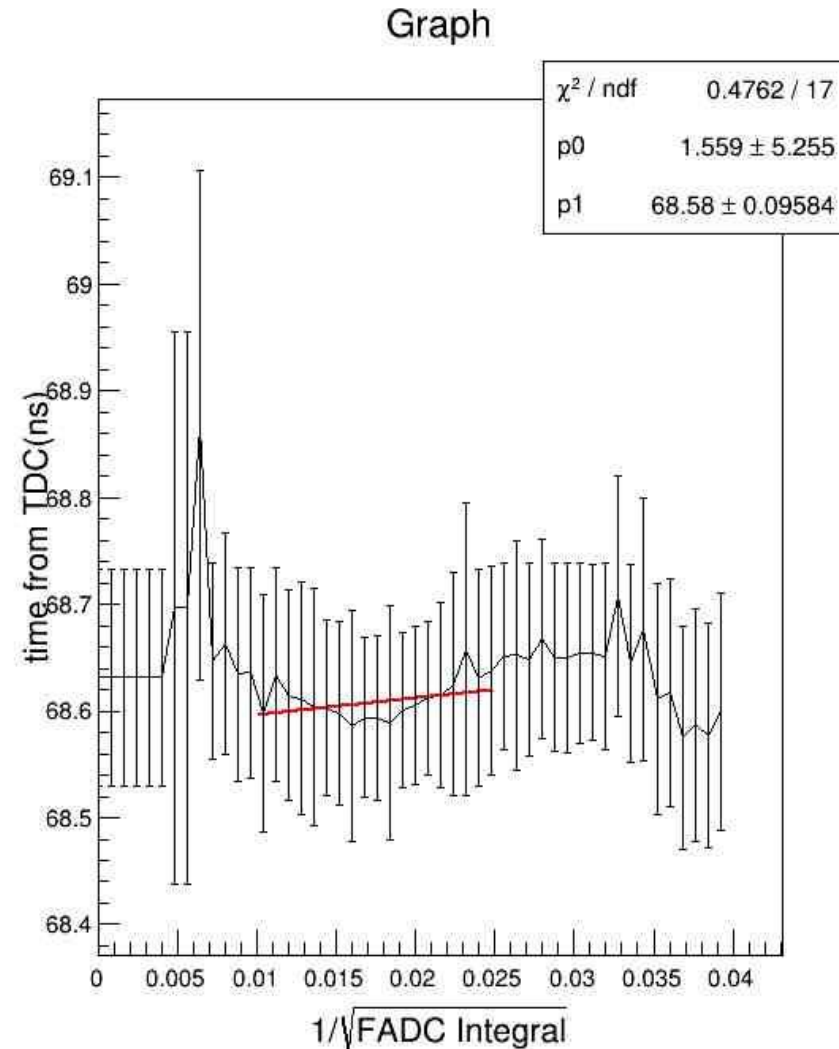
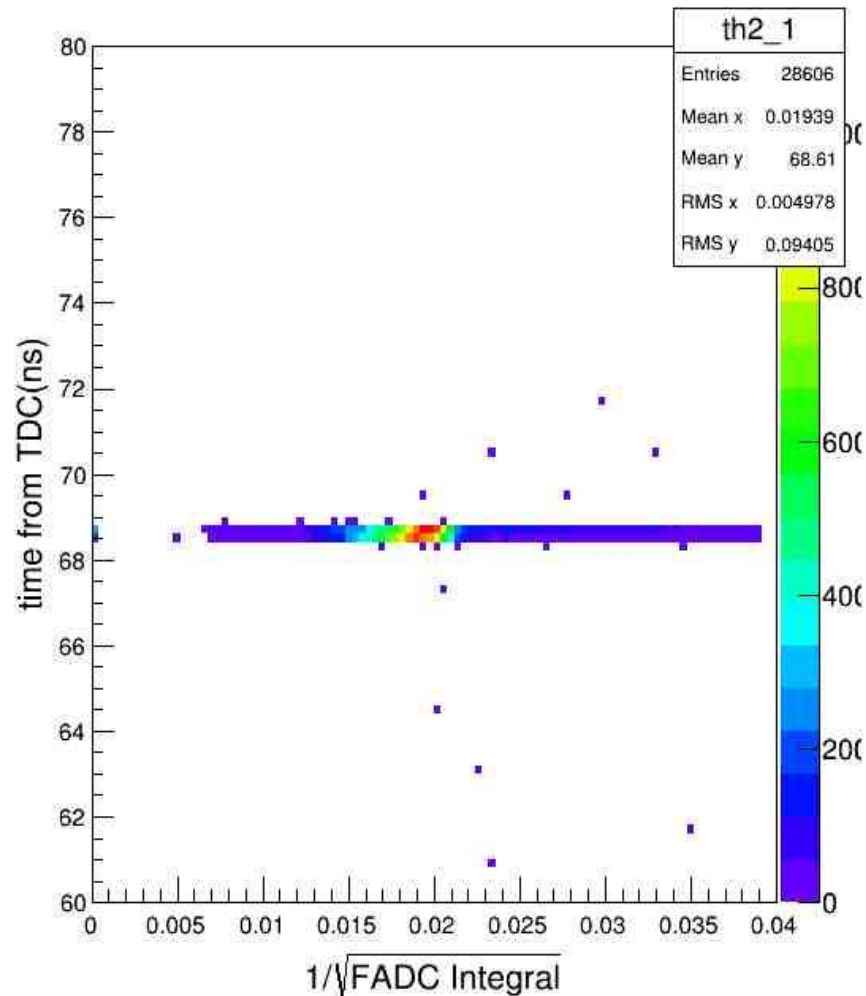
PMT3(top) and PMT5(bottom)

Time walk correction for non-trigger bar

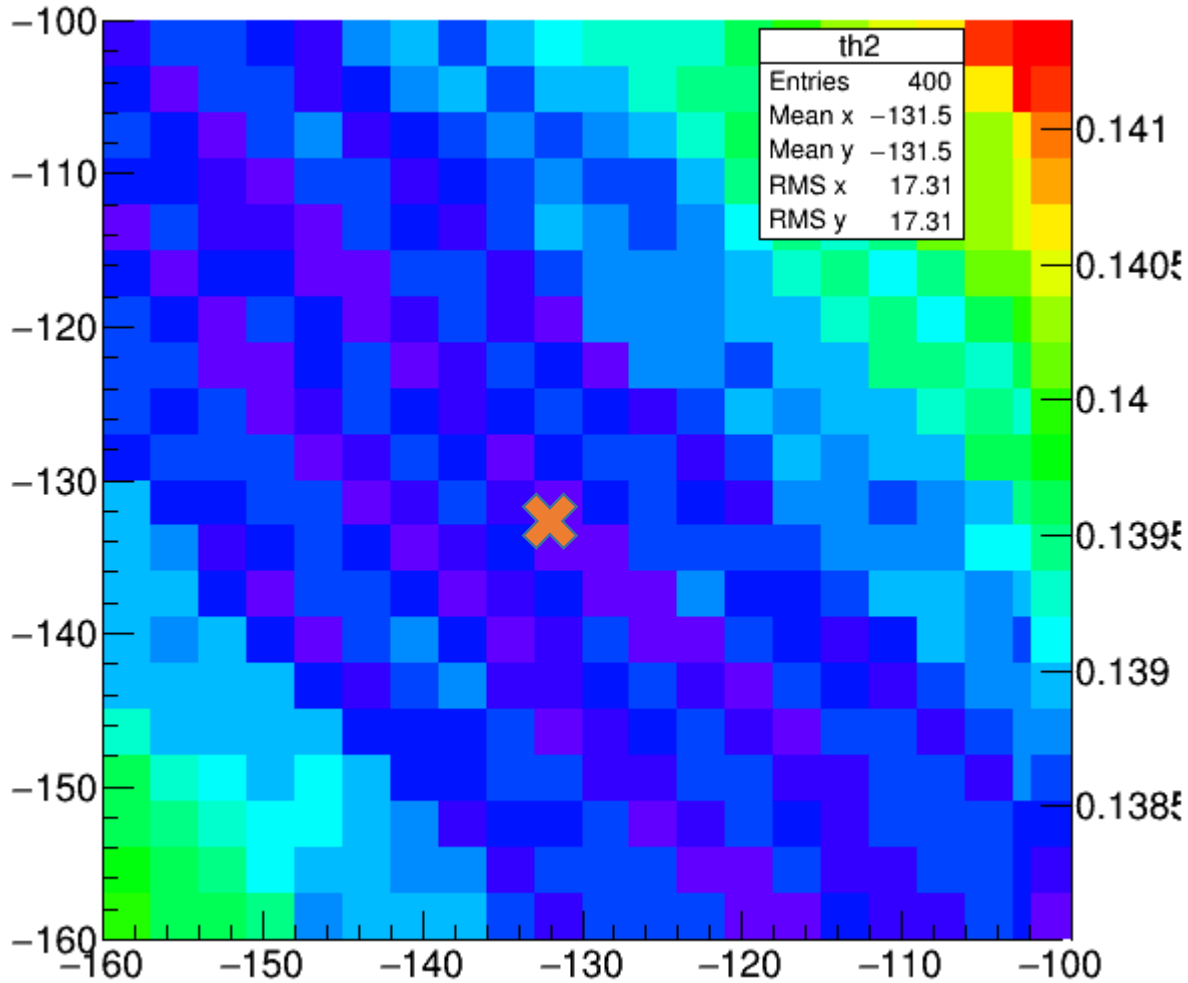


Time vs. $1/\sqrt{FADC\ channel}$ for trigger bar(top)

The same method but not work.



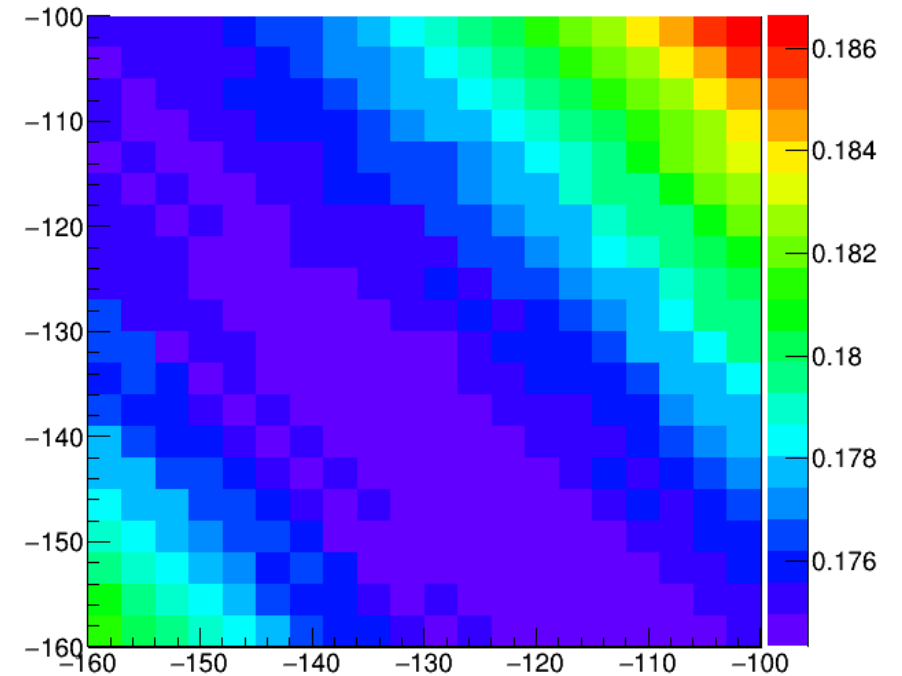
Time walk correction for trigger bar(top)



X and Y axis are slopes of two PMTs in trigger bar,
time resolution unit: ns

- Time resolution is calculated as

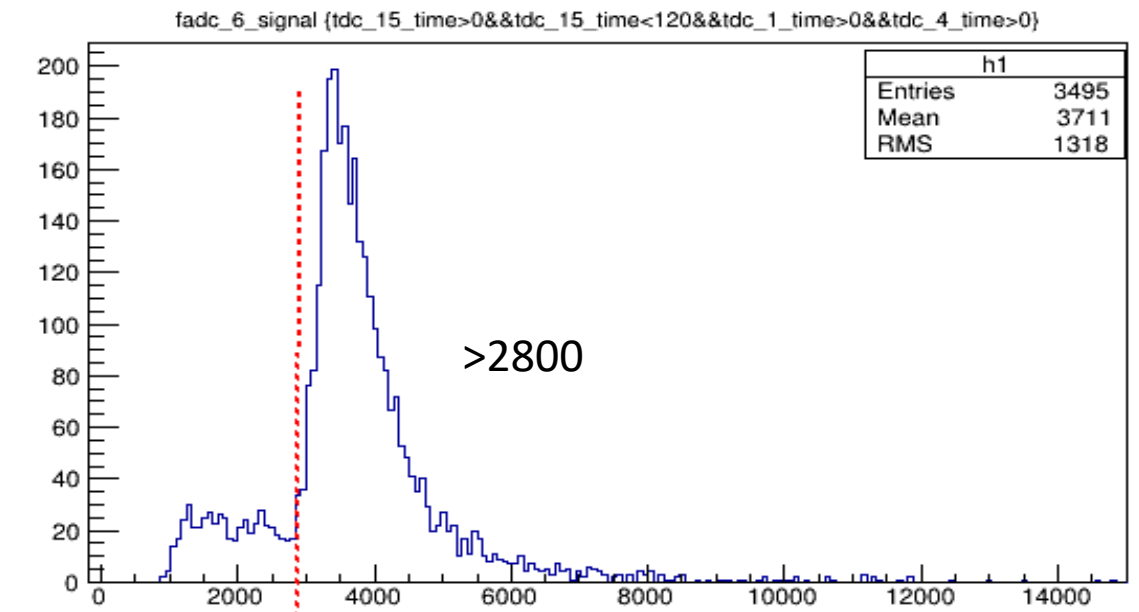
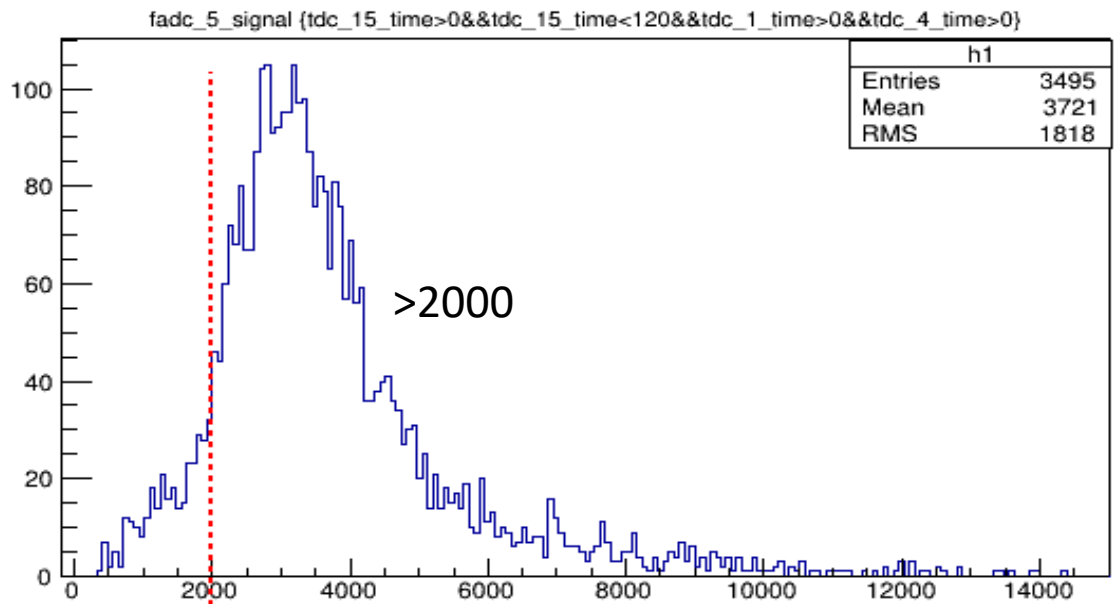
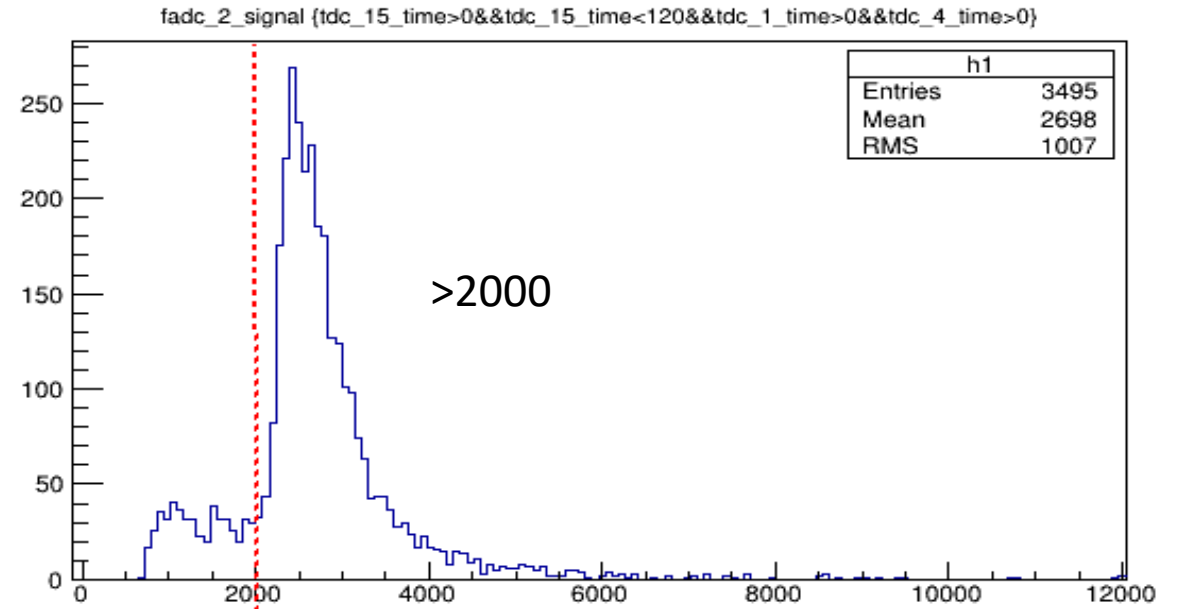
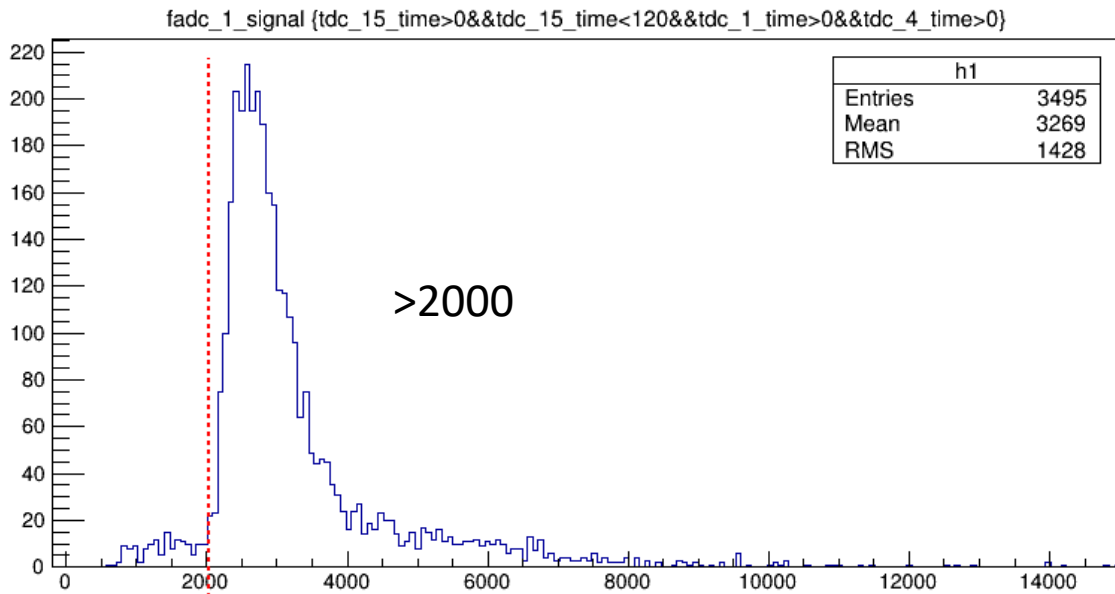
$$T = \frac{t_0 + t_3 + t_2 + t_5}{4} - \frac{t_1 + t_4}{2}$$



Result without FADC integral signal cut

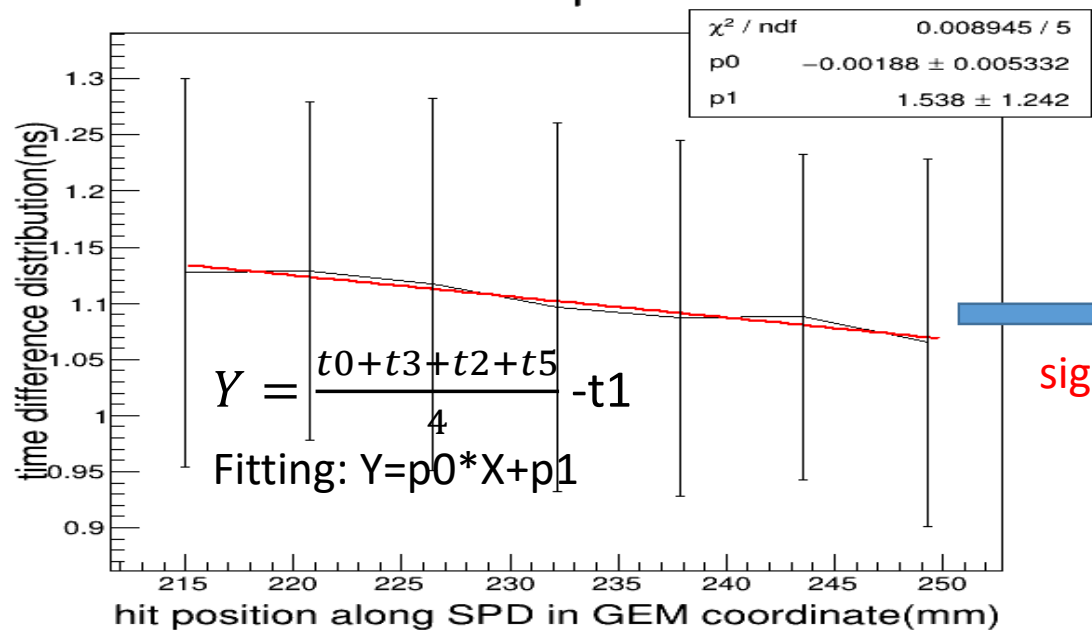
FADC channel Integral cut

need all 6 PMTs satisfy the cut

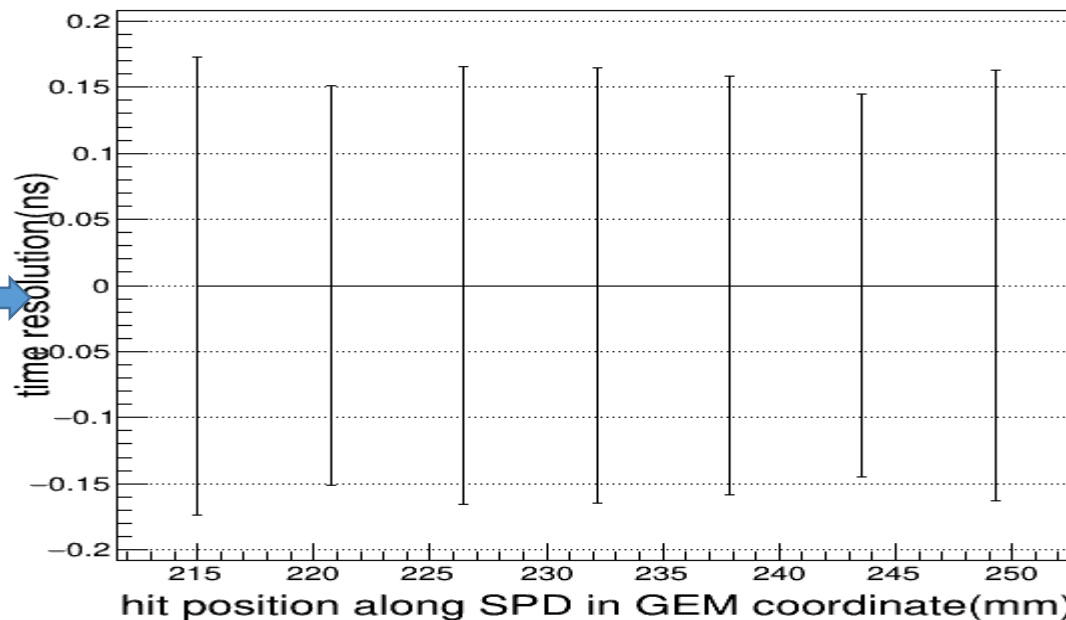


Time resolution of single PMT readout(wide side, right)

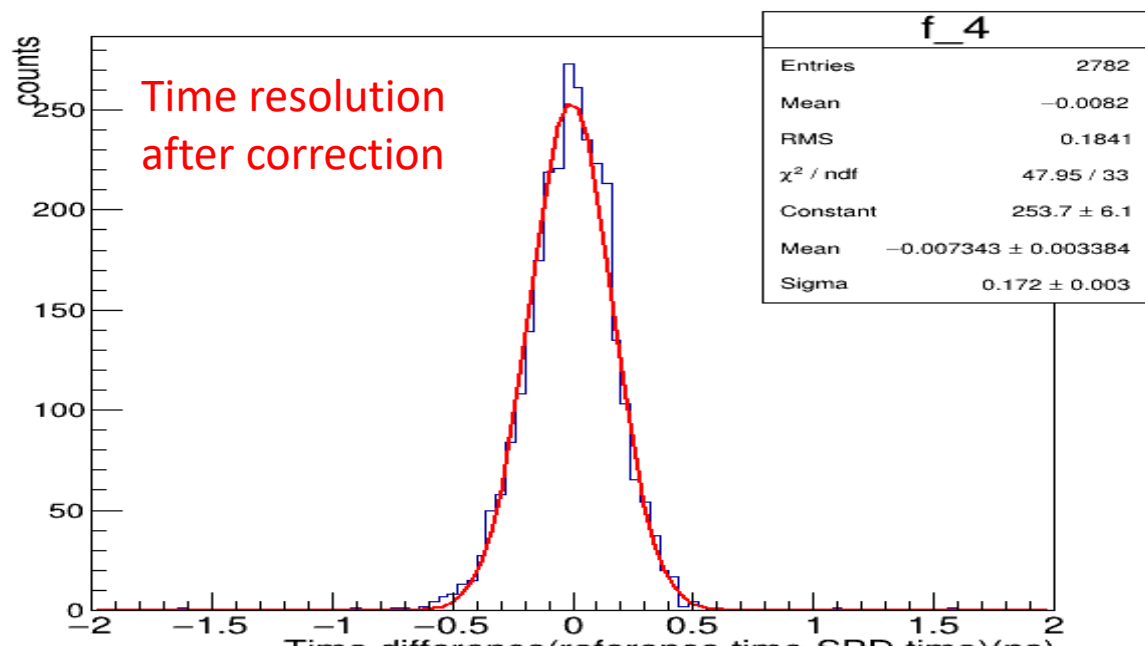
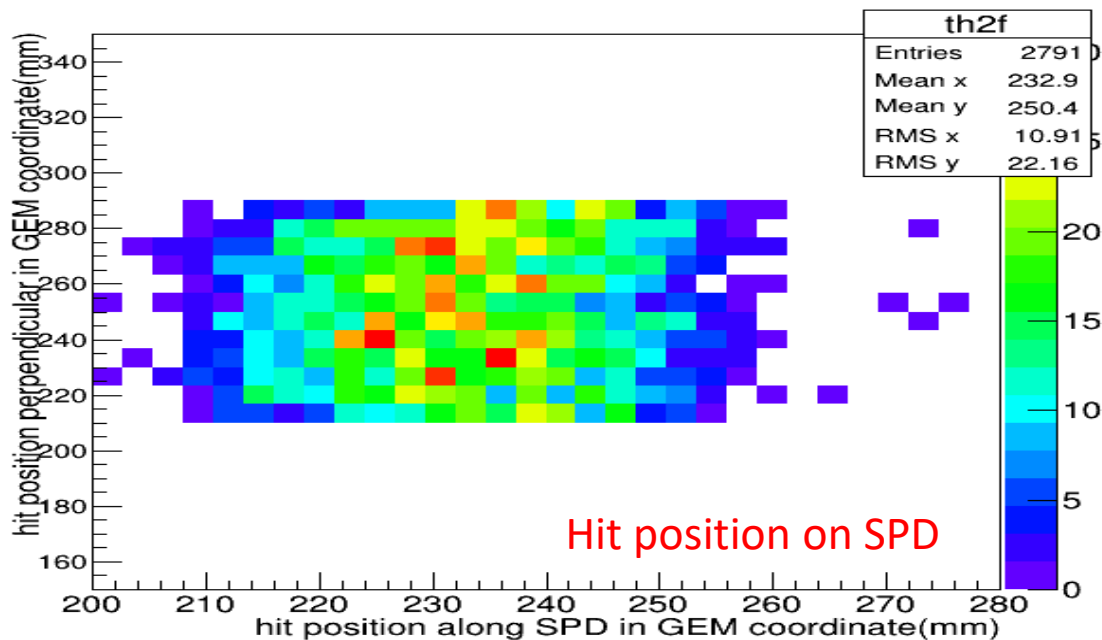
Graph



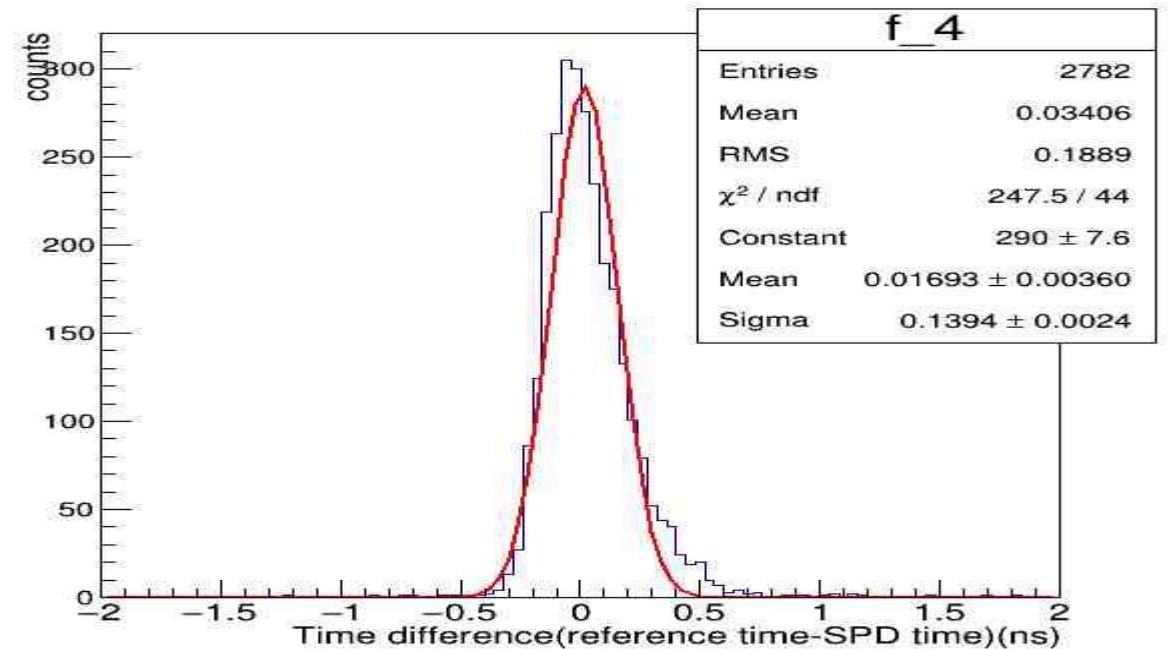
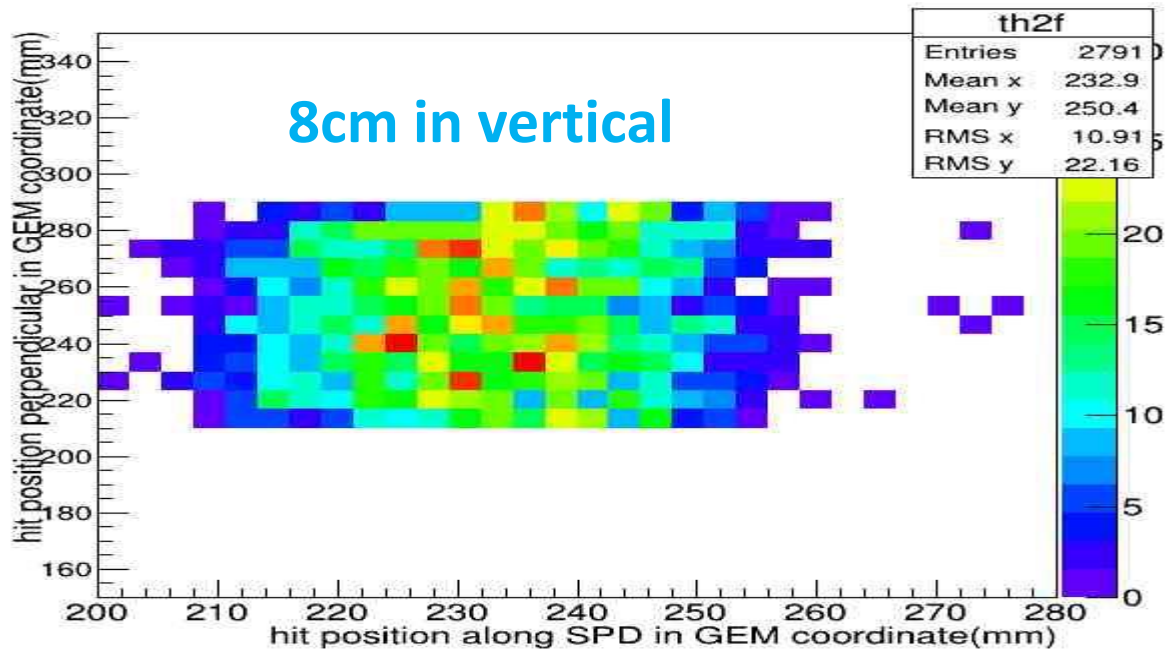
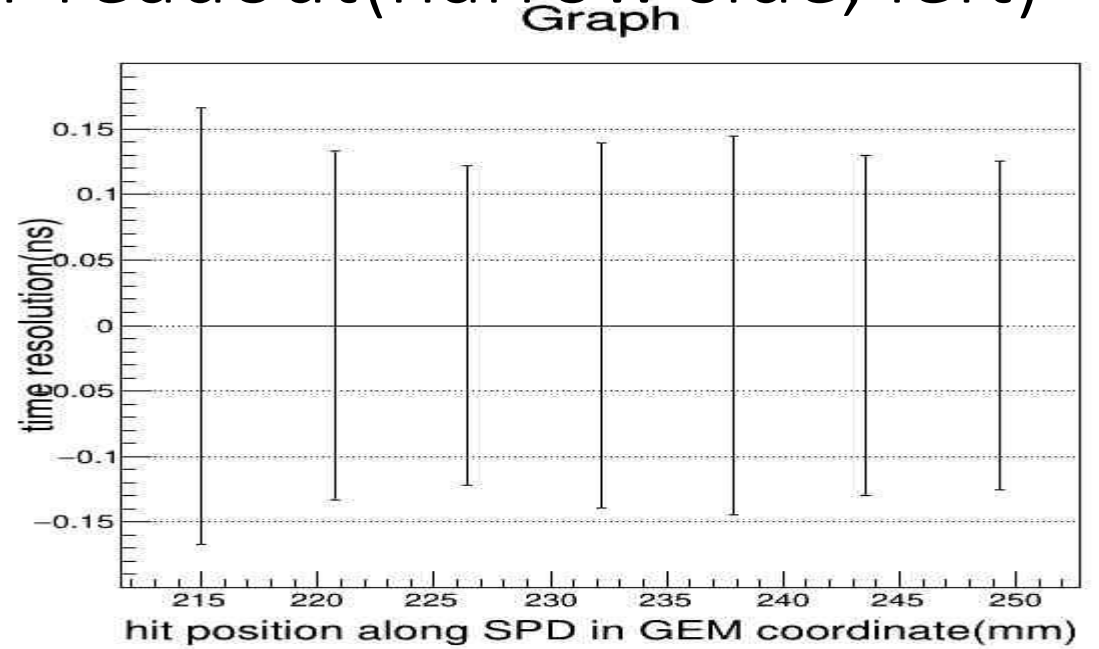
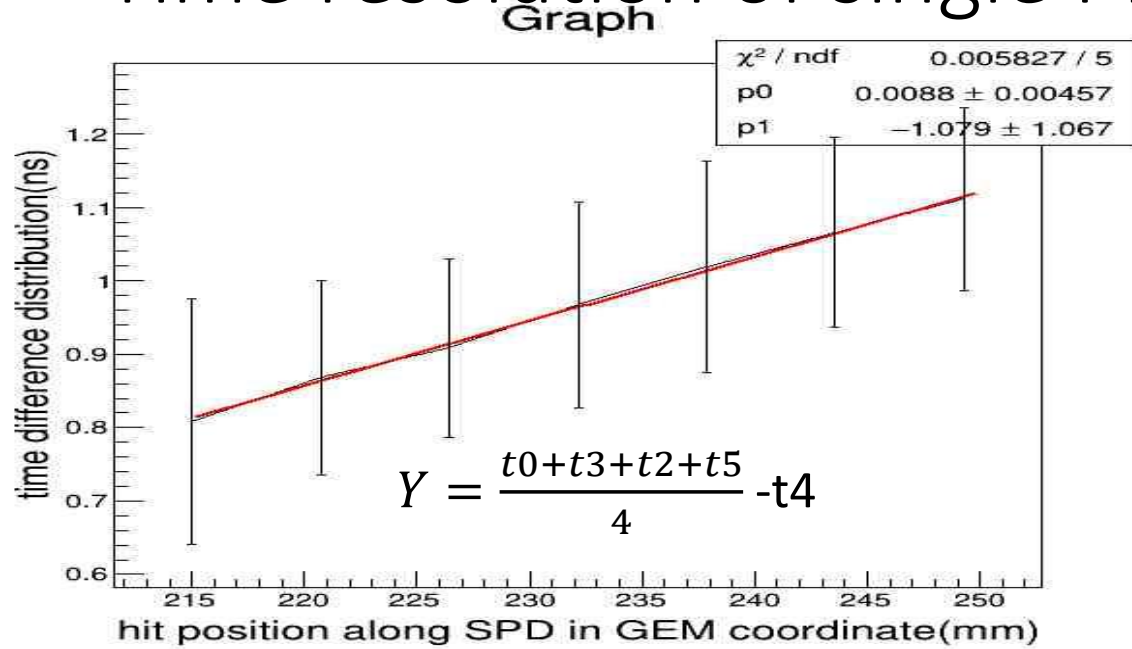
Graph



sigma

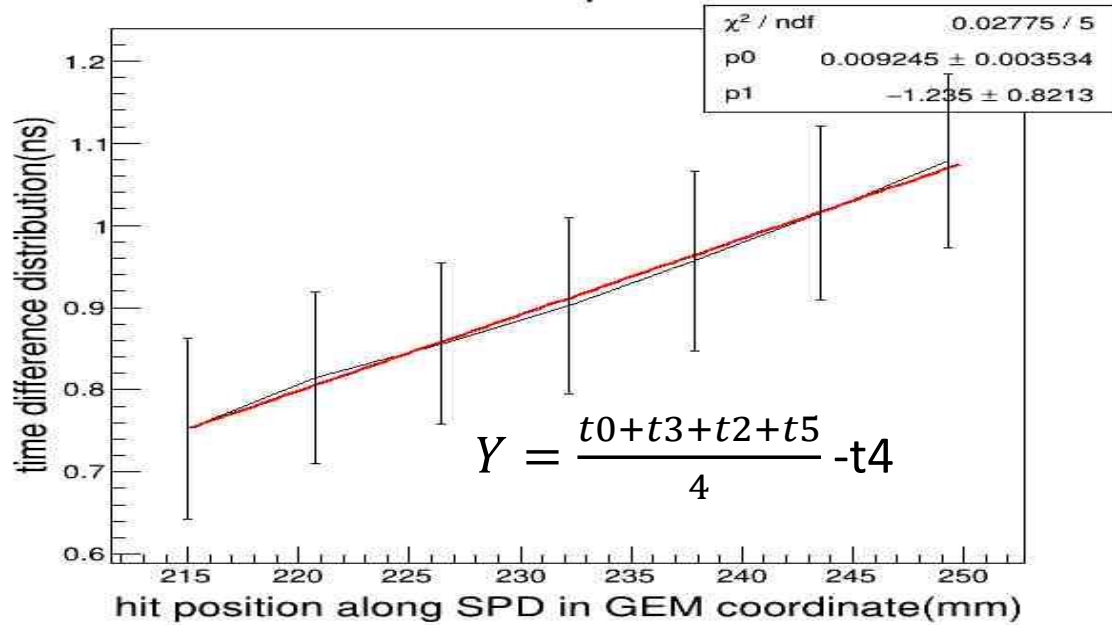


Time resolution of single PMT readout(narrow side, left)

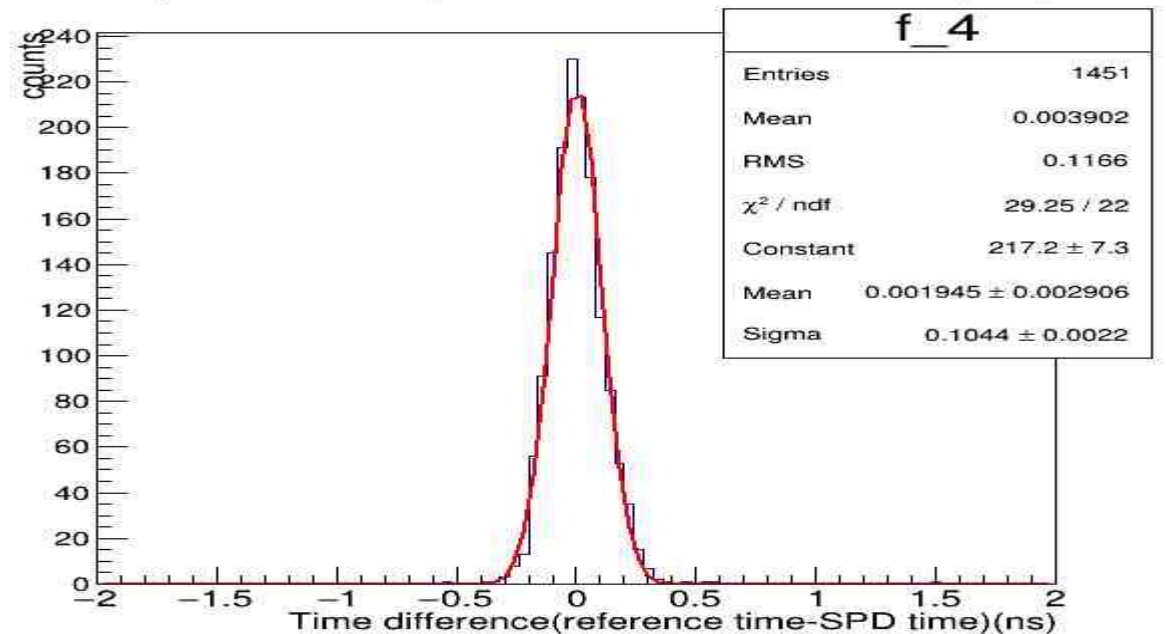
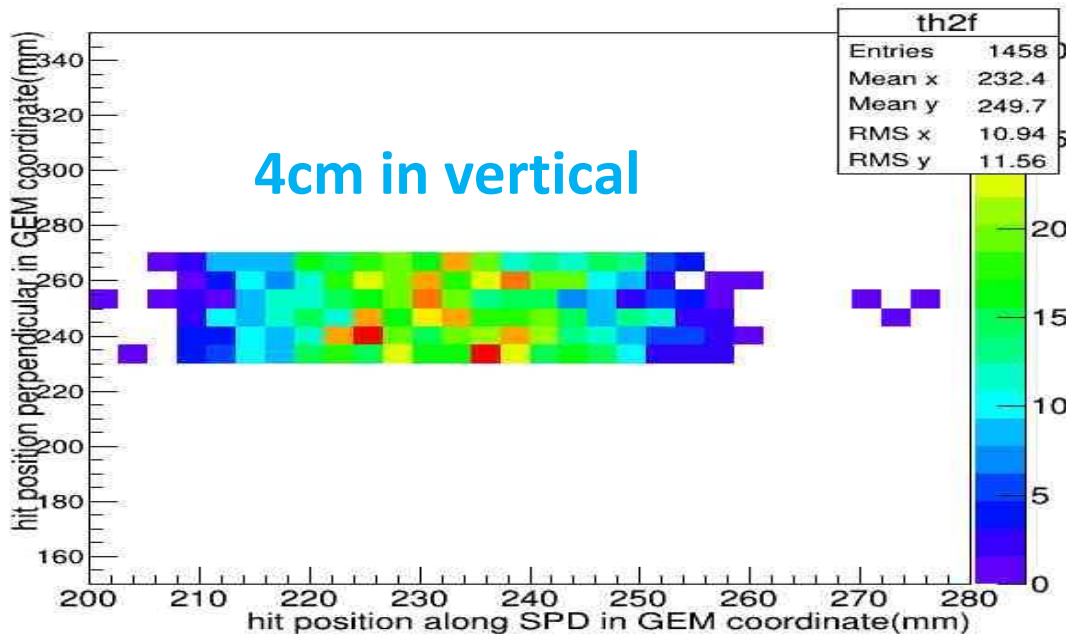
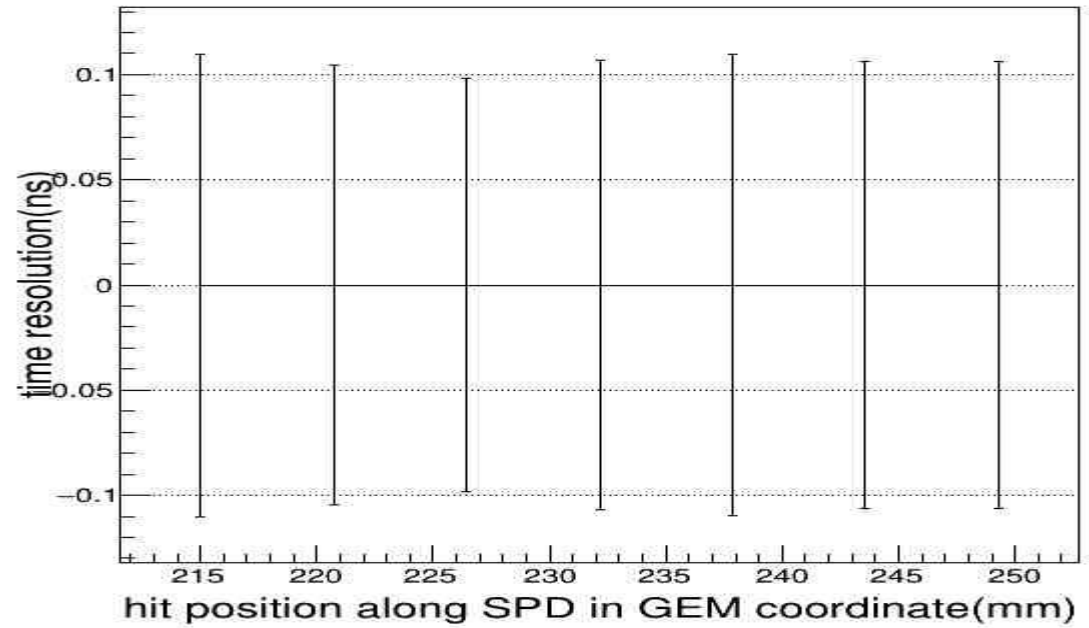


Narrow side(near) add Y direction cut(from 8cm to 4cm)

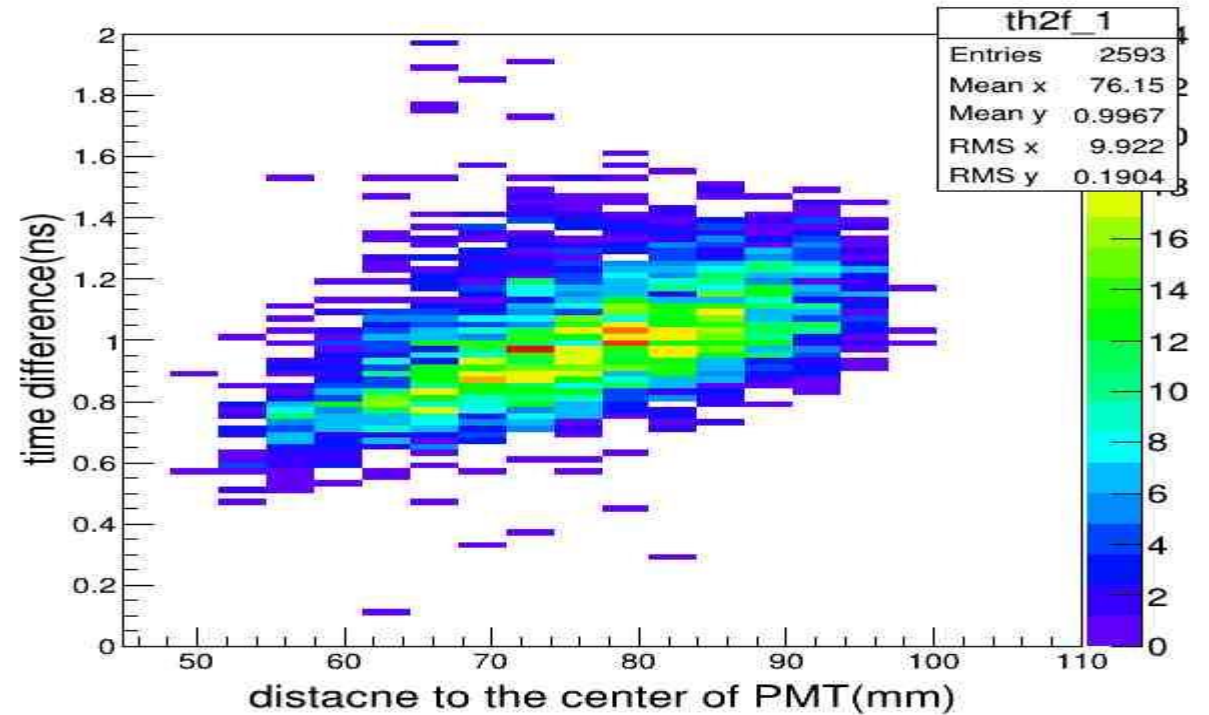
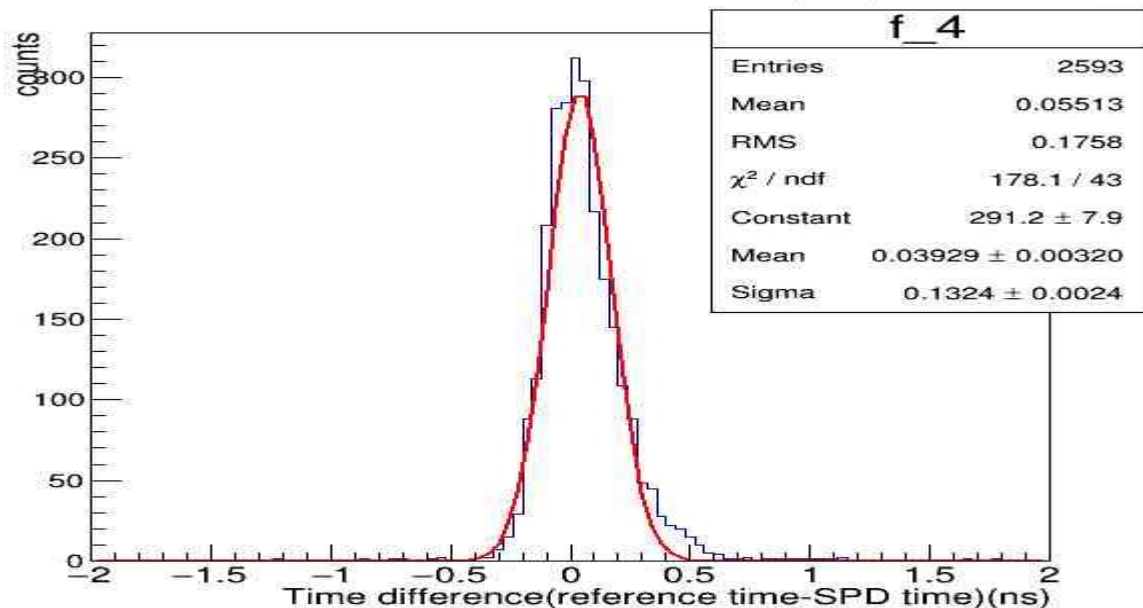
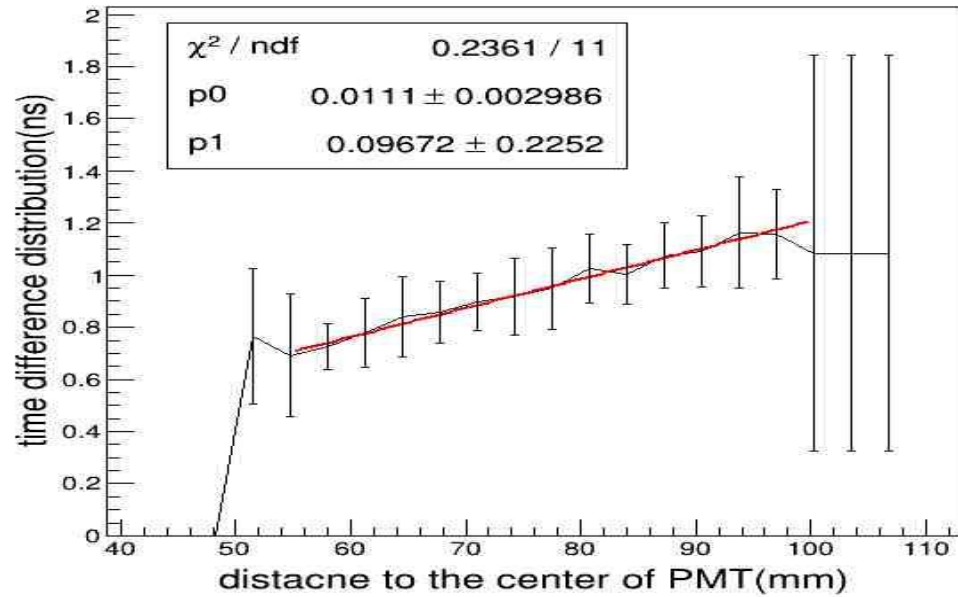
Graph



Graph

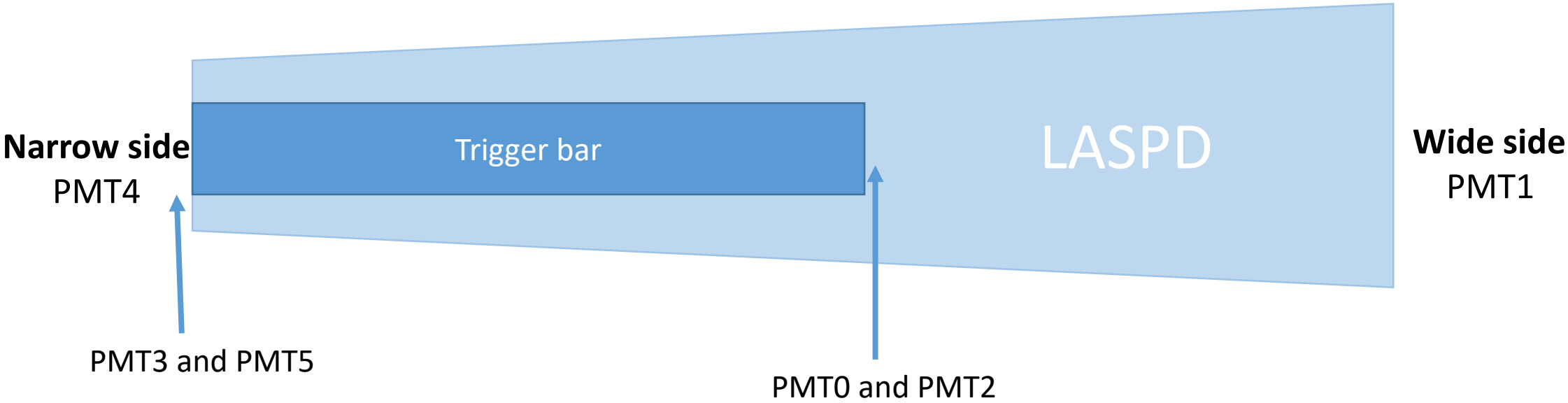


Narrow side(near) consider hit distance to PMT(8cm cut data) Graph



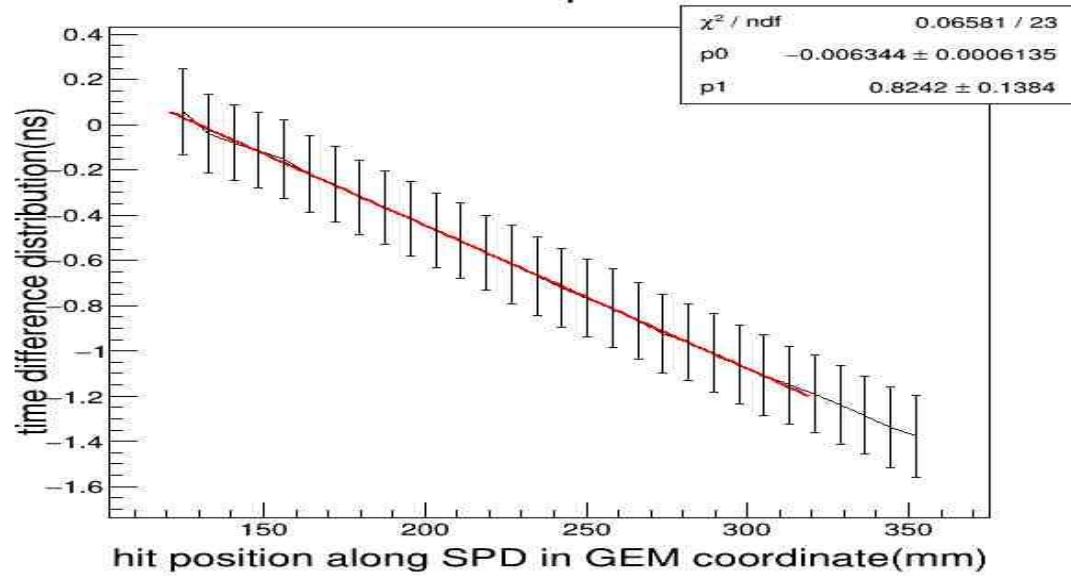
The distance between PMT window and first dynode which is about 3cm is considered in calculation, and the time resolution result is just a little better.

Parallel test setup

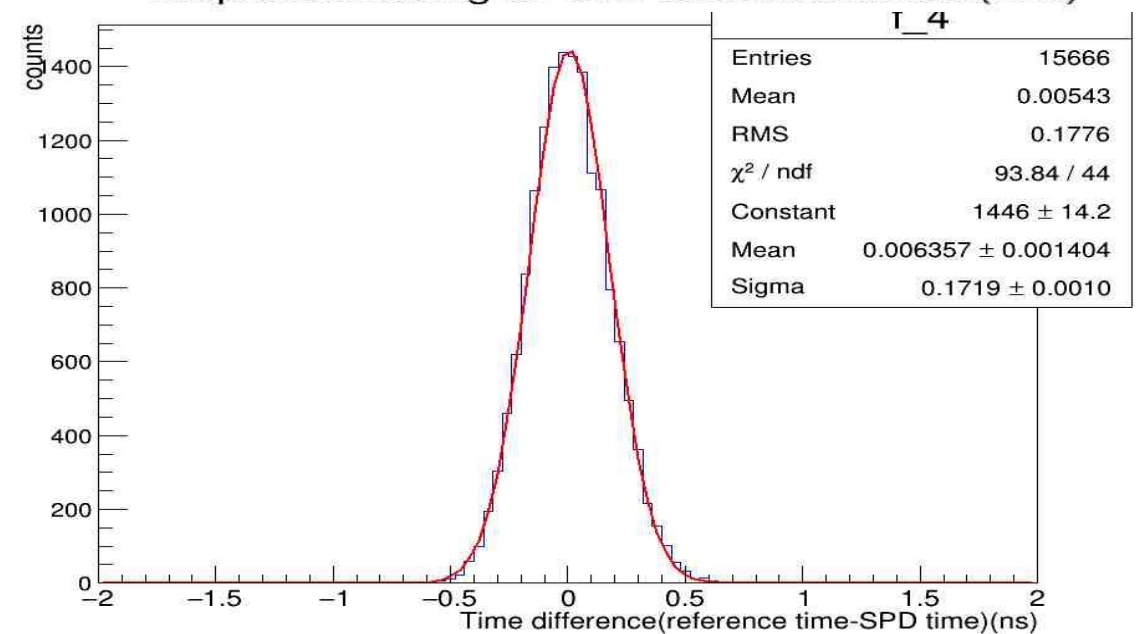
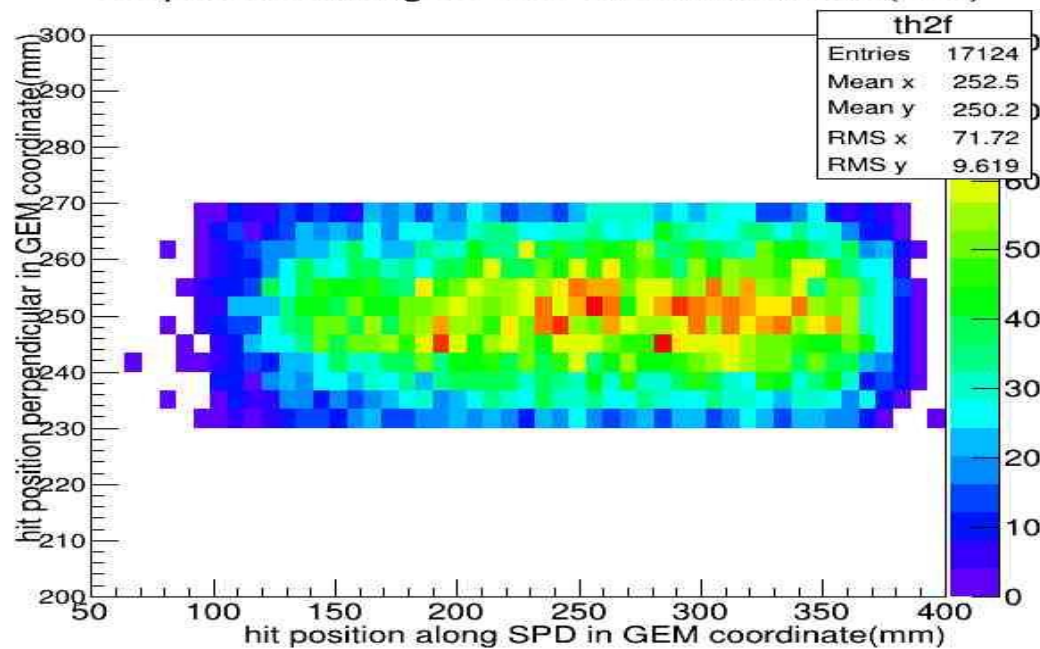
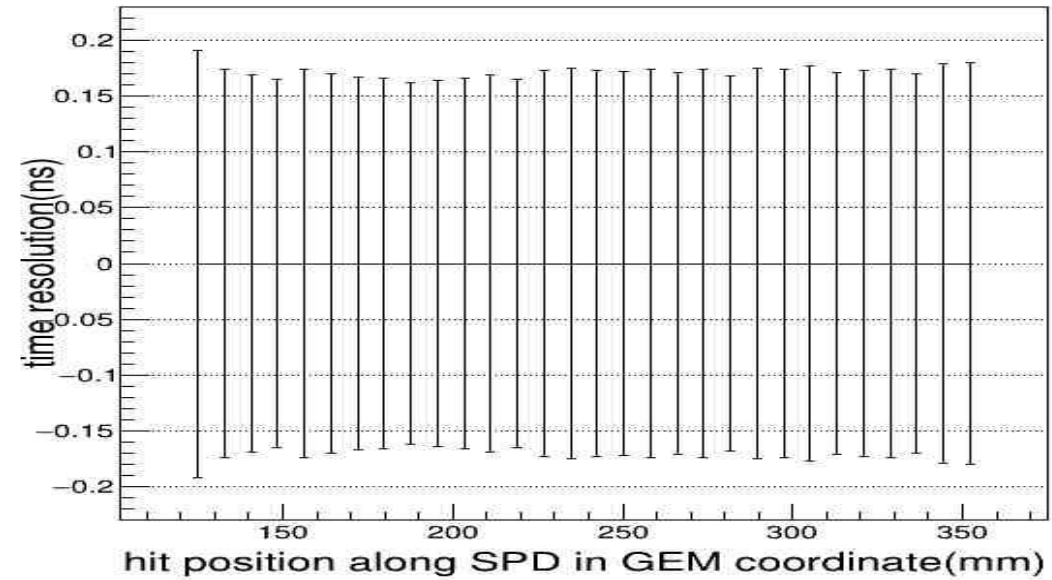


Time resolution of single PMT readout(wide side)

Graph

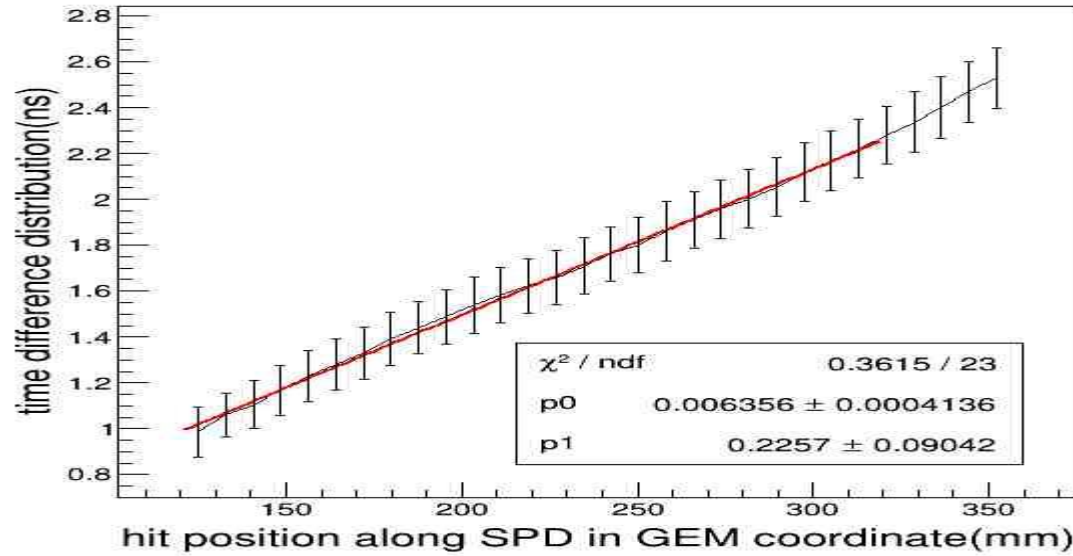


Graph

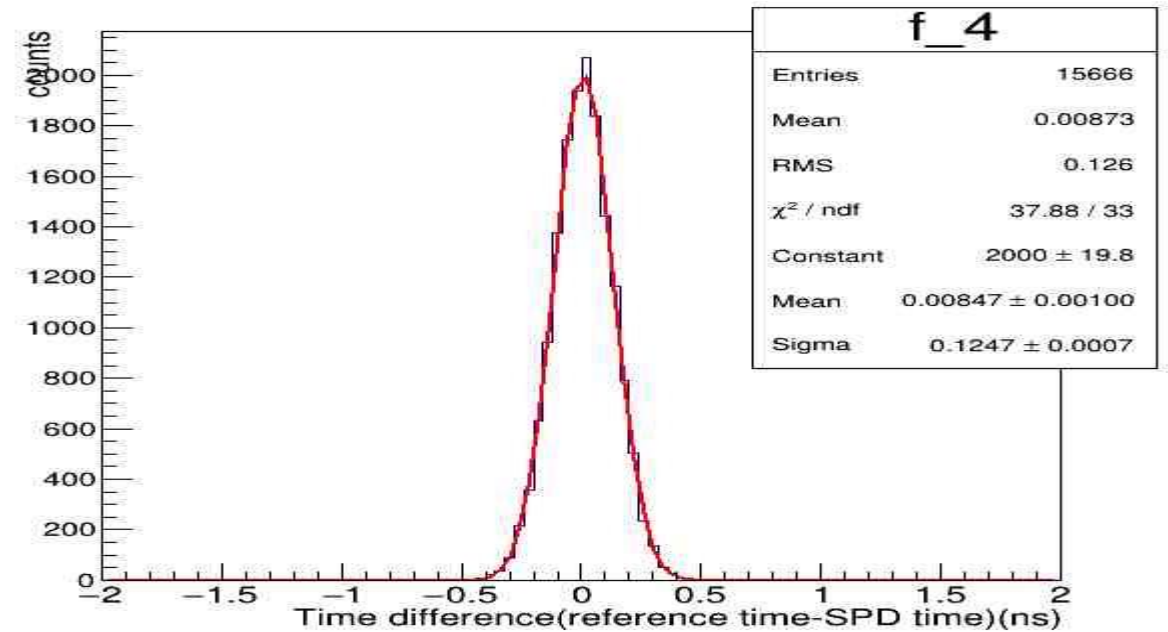
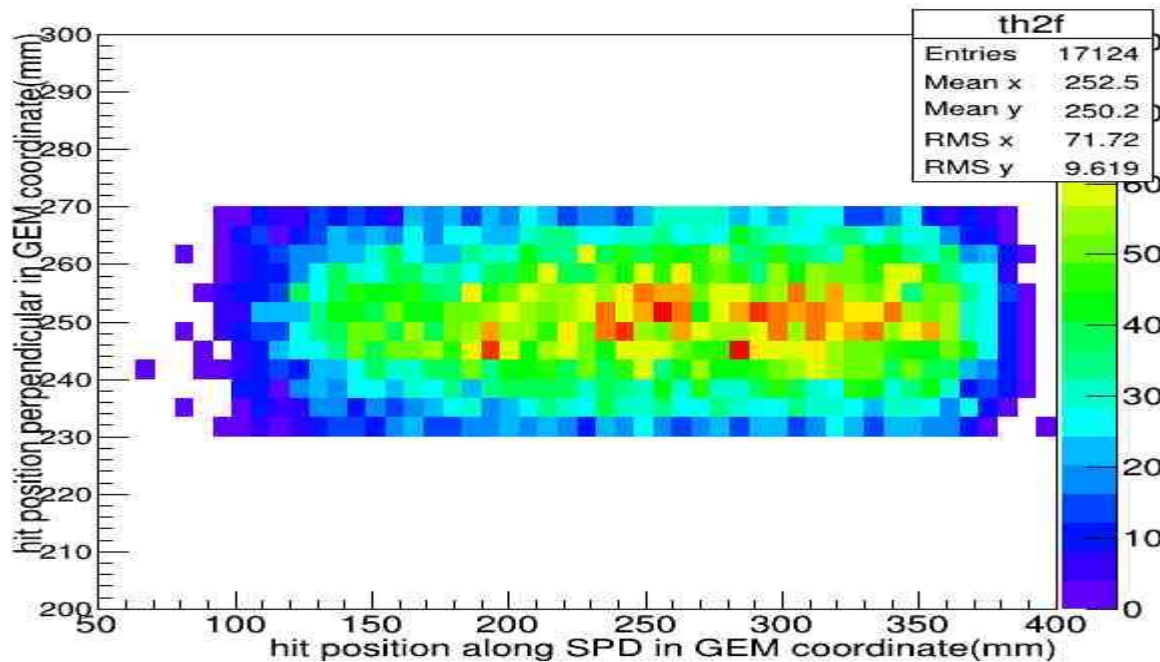
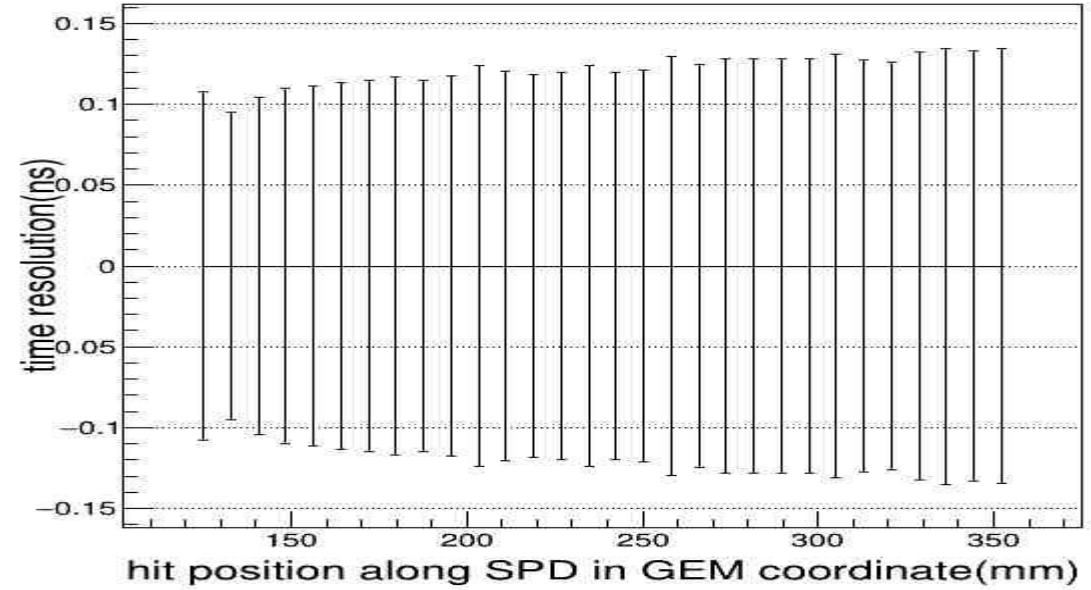


Time resolution of single PMT readout(narrow side)

Graph

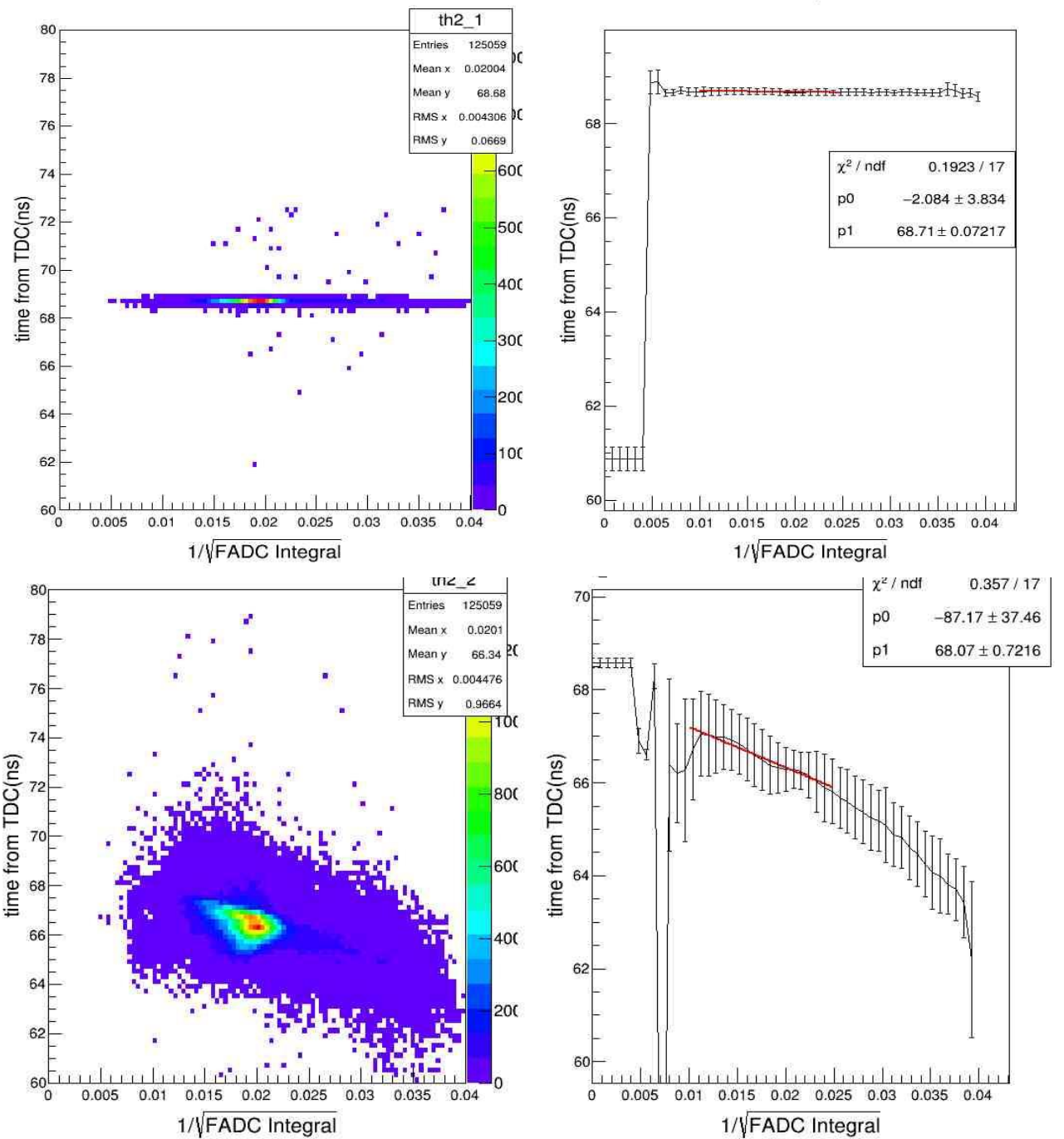
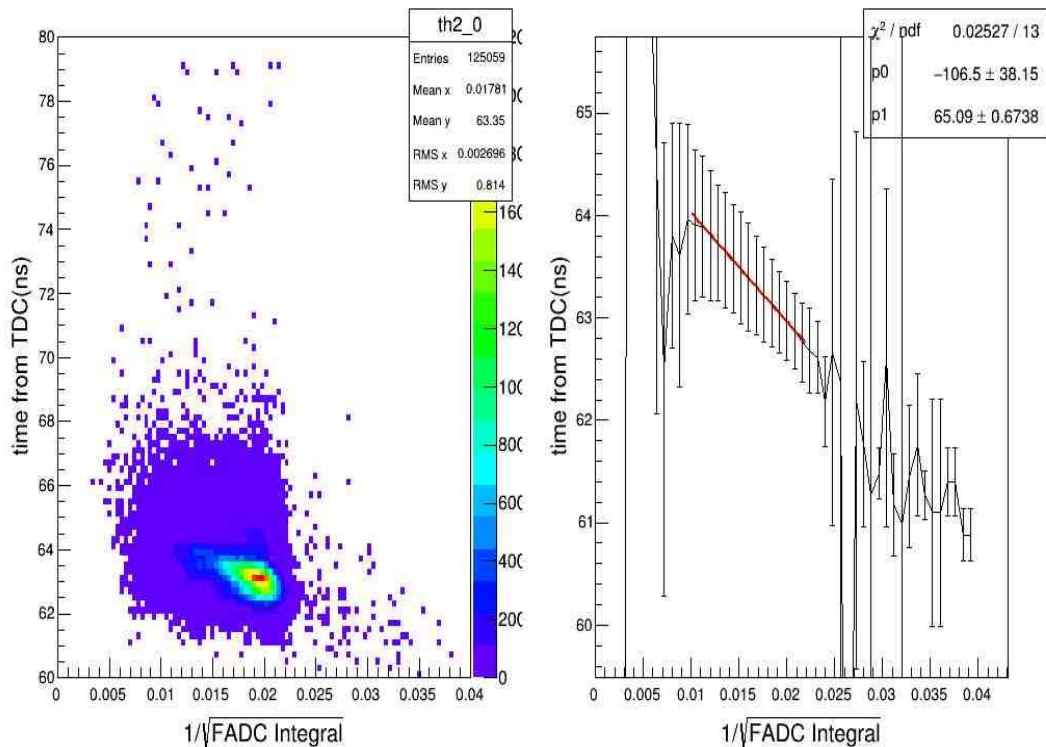


Graph



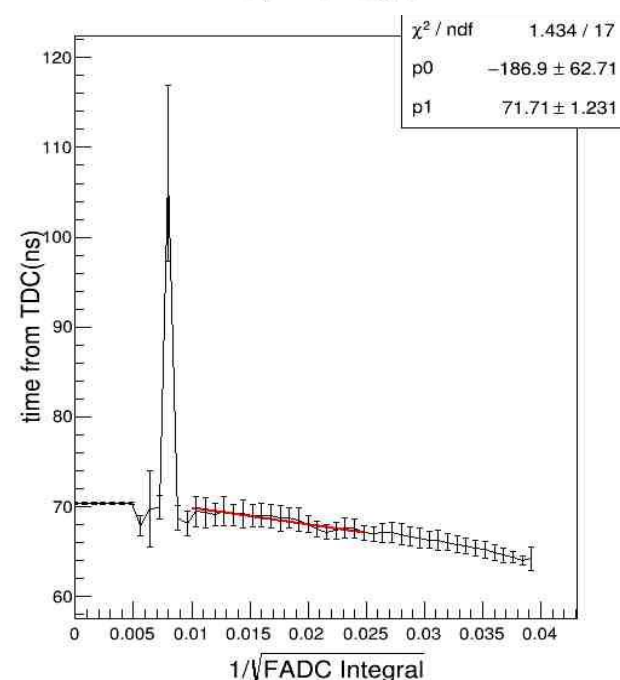
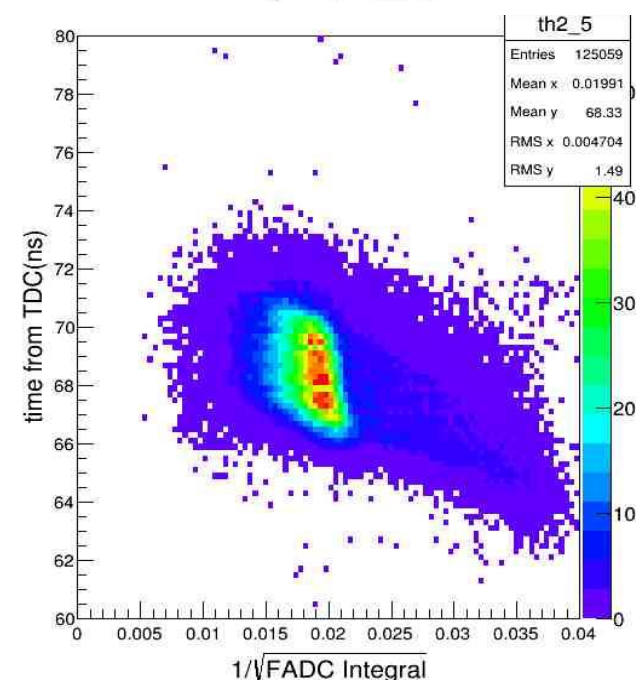
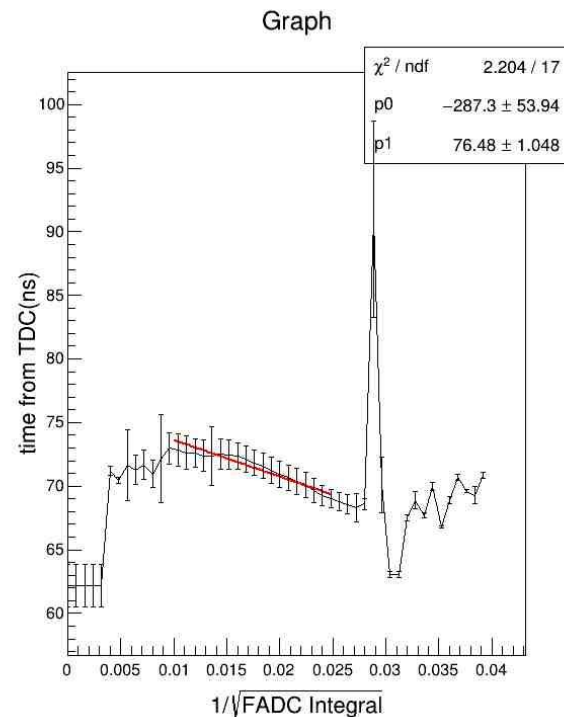
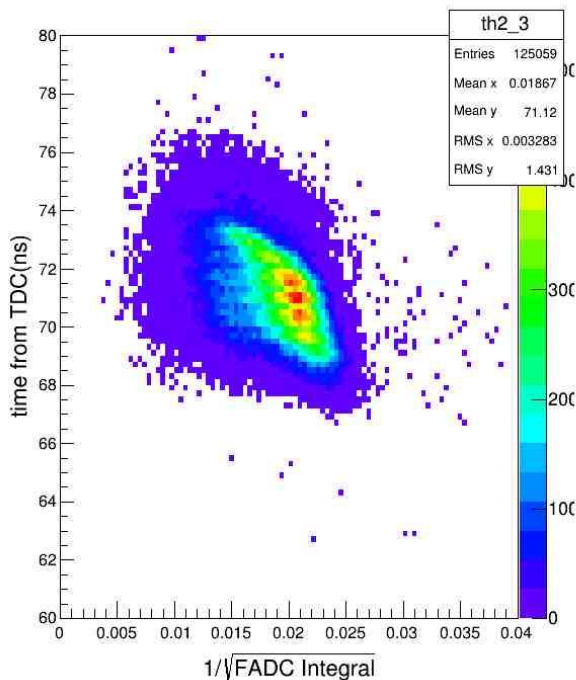
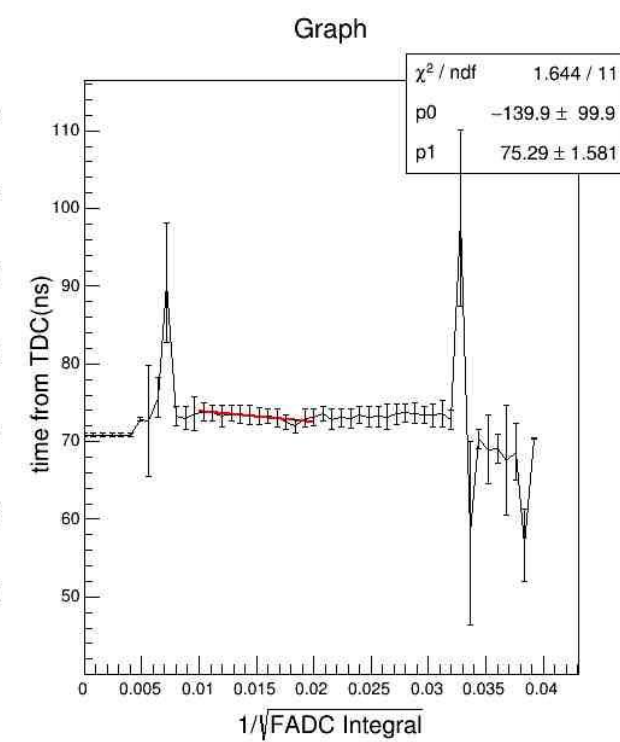
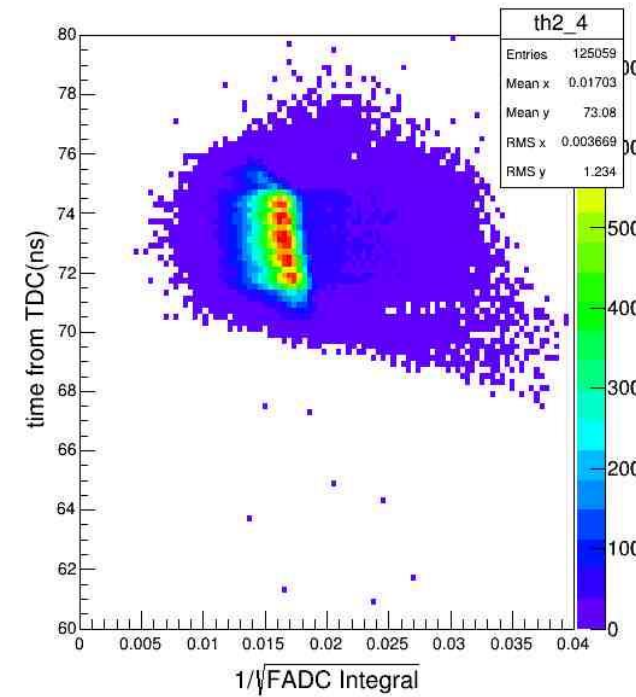
Time walk for PMTs at trigger PMT side

Since the incidence angle of comic ray is small, so the time distribution is narrow.



Time walk for PMTs at trigger PMT side

Not like trigger PMT side, the time distribution of these PMTs are hit position related.



Raw histogram of hit position vs. time difference

left: 8cm cut in y direction

right: 4cm cut in y direction

