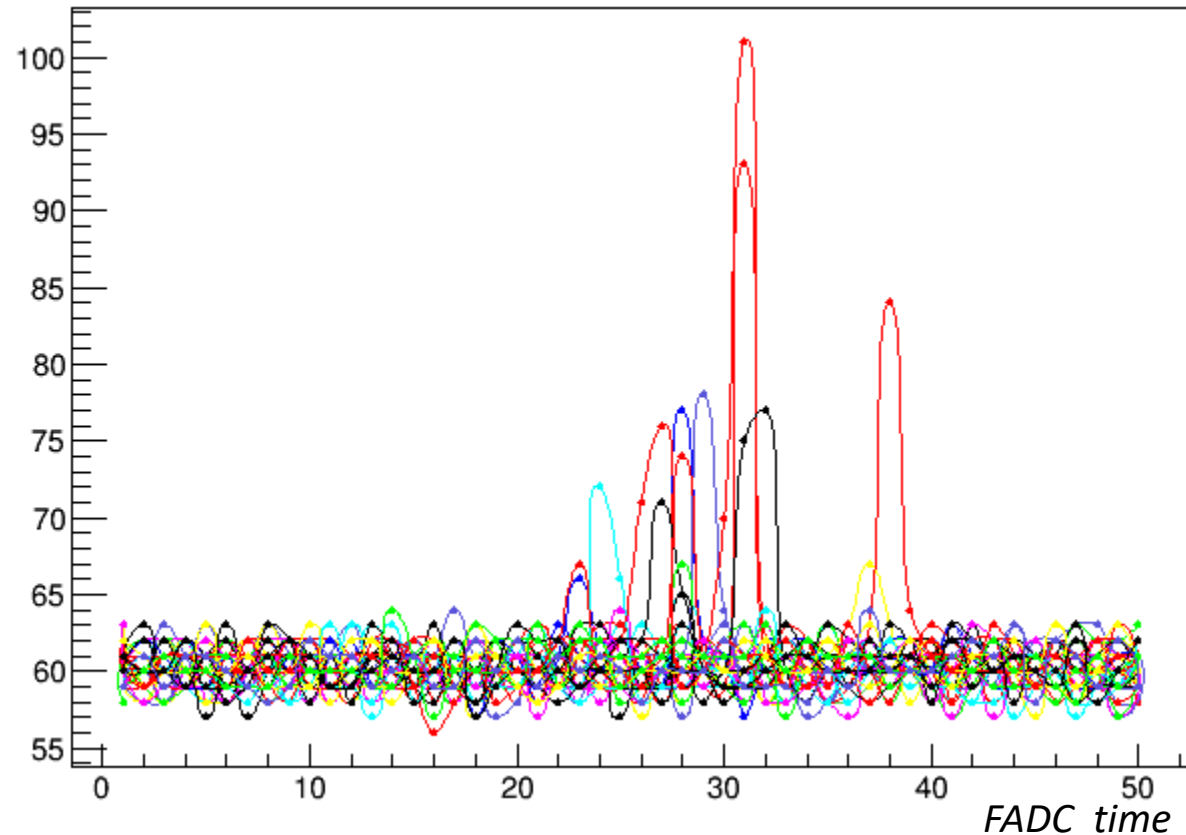# SPE(single photon electron) test

- Single photon is emitted from LED, which is drove by pulse generator. The pulse generator is adjusted to create pulse as short as possible.

- The PMT in test is the third PMT from SDU with HV 1500V(base changed, not sure the gain)

- Make sure only a small part of events has signal.

- Take SPE data from FADC.

FADC time
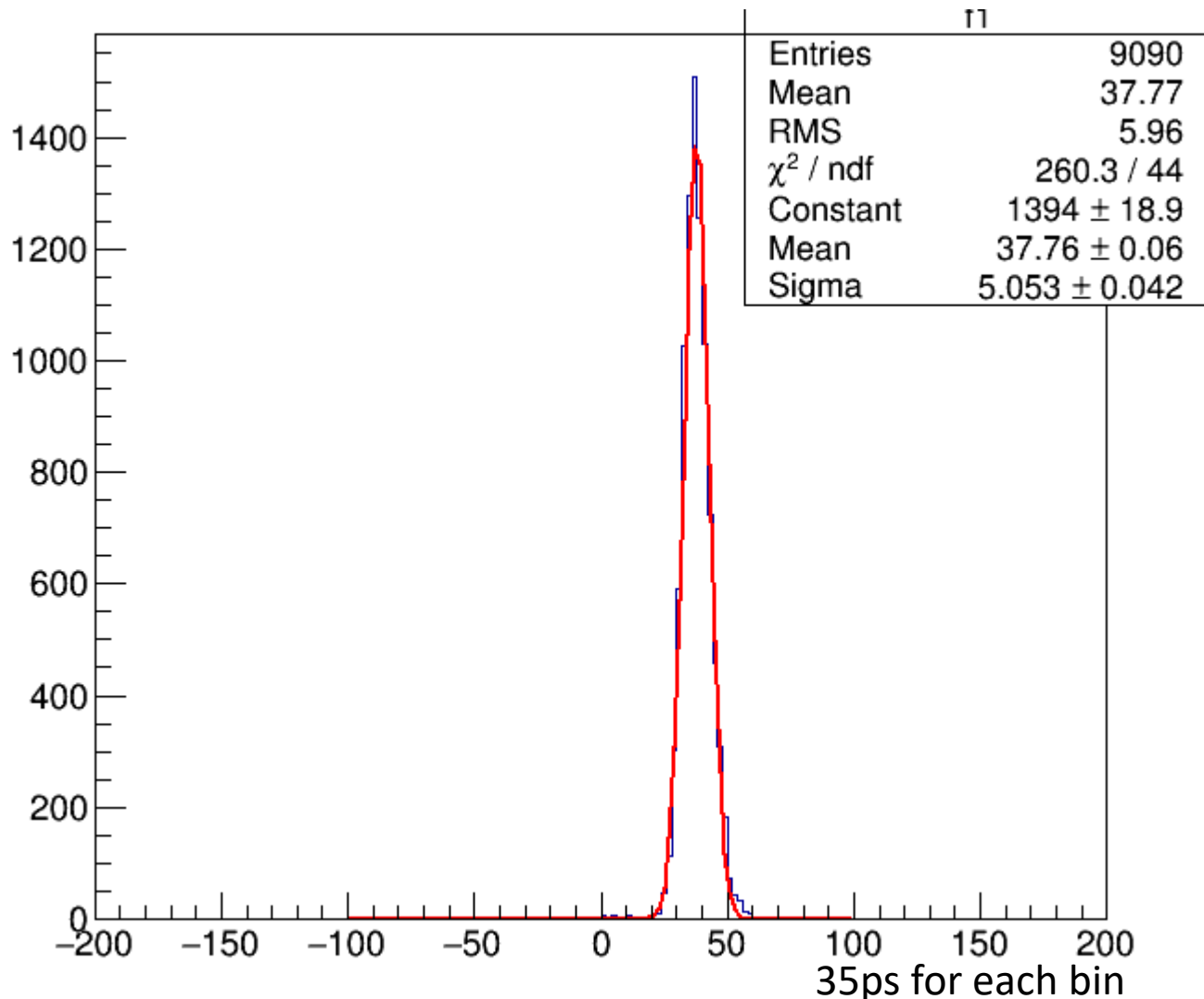
Wave form from FADC

SPE test result and problem
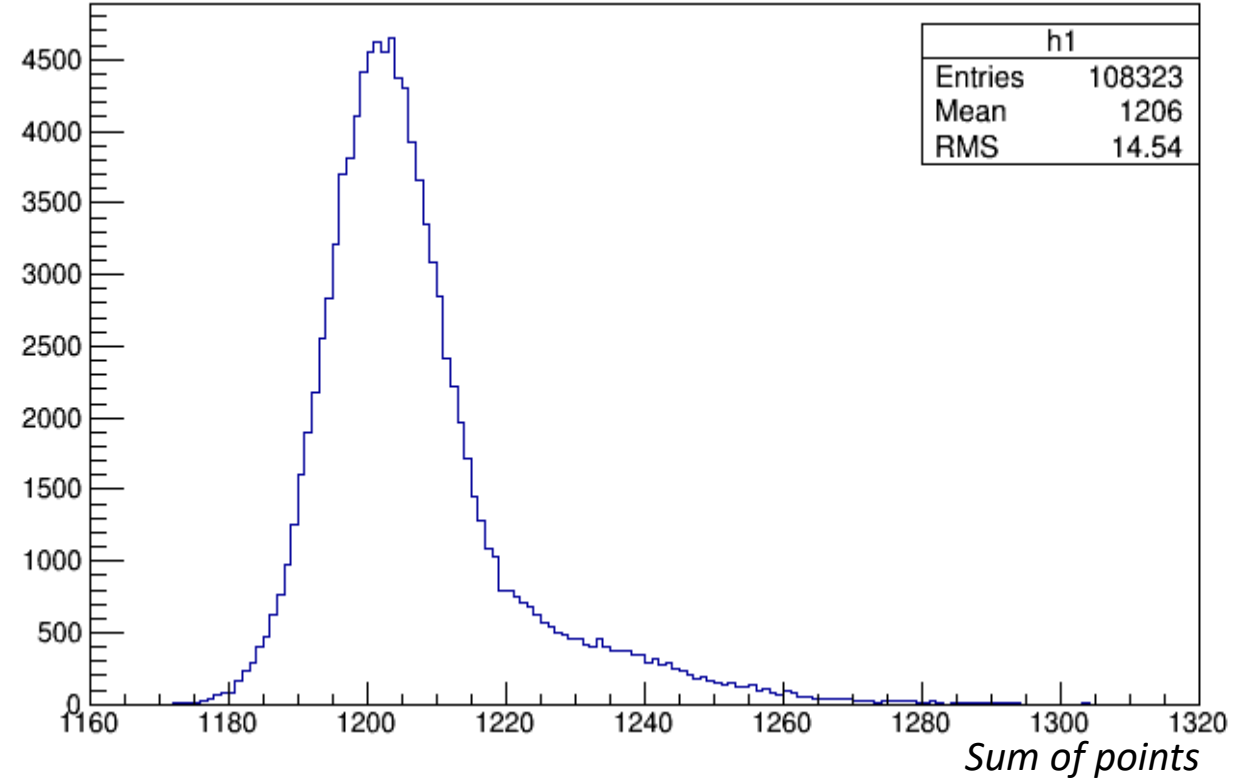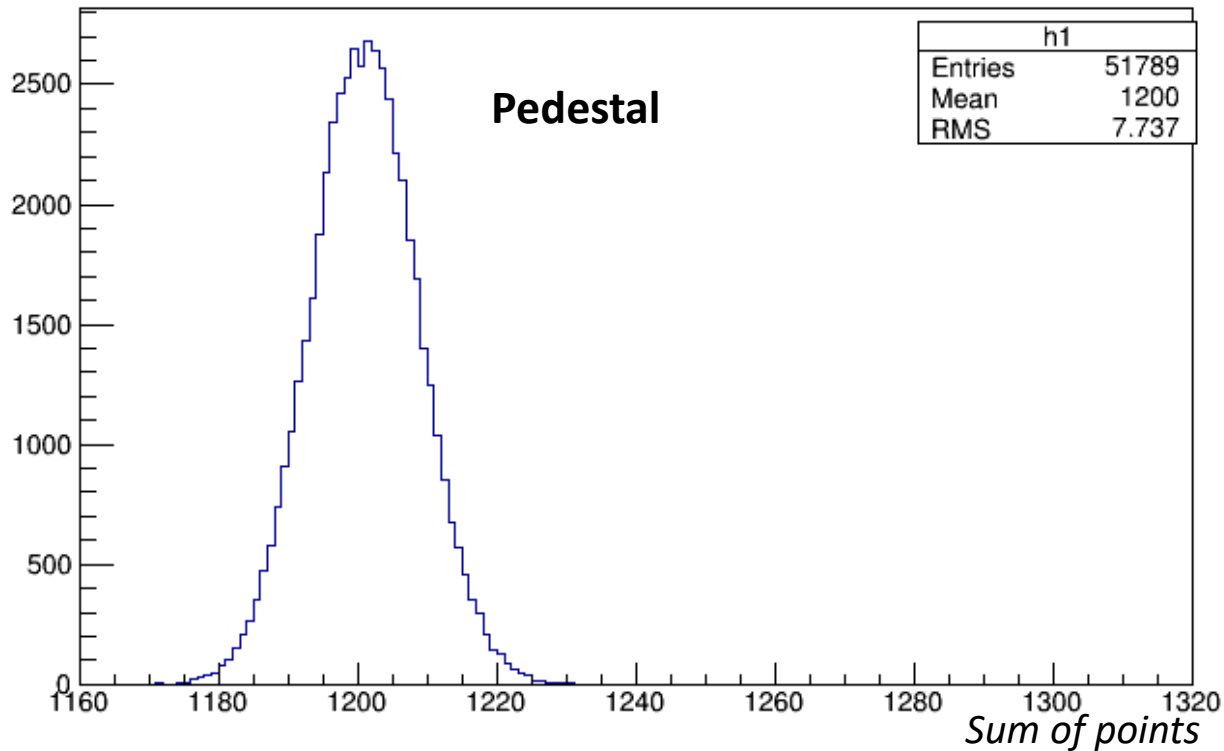
- Assuming the signal 35 bin, the gain will be:

$$Gain = \frac{1V}{50\Omega * 4000(bin)} * \frac{4ns}{e} * 35 = 4.375*10^6$$

To measure the gain, increase the HV or use more accurate QDC(change FADC full range to 0.5V?)

Time resolution get worse since new setting

t1

Entries	9090
Mean	37.77
RMS	5.96
χ^2 / ndf	260.3 / 44
Constant	1394 ± 18.9
Mean	37.76 ± 0.06
Sigma	5.053 ± 0.042

35ps for each bin

- The time resolution from three bar method get worse, sigma changed from 3bin to 5bin.
- Including both the tests of trigger bar is vertical and parallel.
- The only difference is adding more channel(cross talk?) and add another logic module
- Need to check again