

HODOSCOPE TEST@JAEA

PROGRESS REPORT(20180124)

Korea Univ.
Wooseung Jung

NEW TEST CONDITION



**Scinti1 : MPPC both side
(with PMT amp (×4))**

**Scinti 2&3 : PMT both side
(H6612 fast PMT)**

**Scintillator : 15^L x 7^W x 1^T cm MPPC : 3050CS (0.3 x 0.3 cm)
(Shorter and wider) (Smaller area, same pixel size)**

Trigger condition - All coincidence (PMTs & MPPCs)

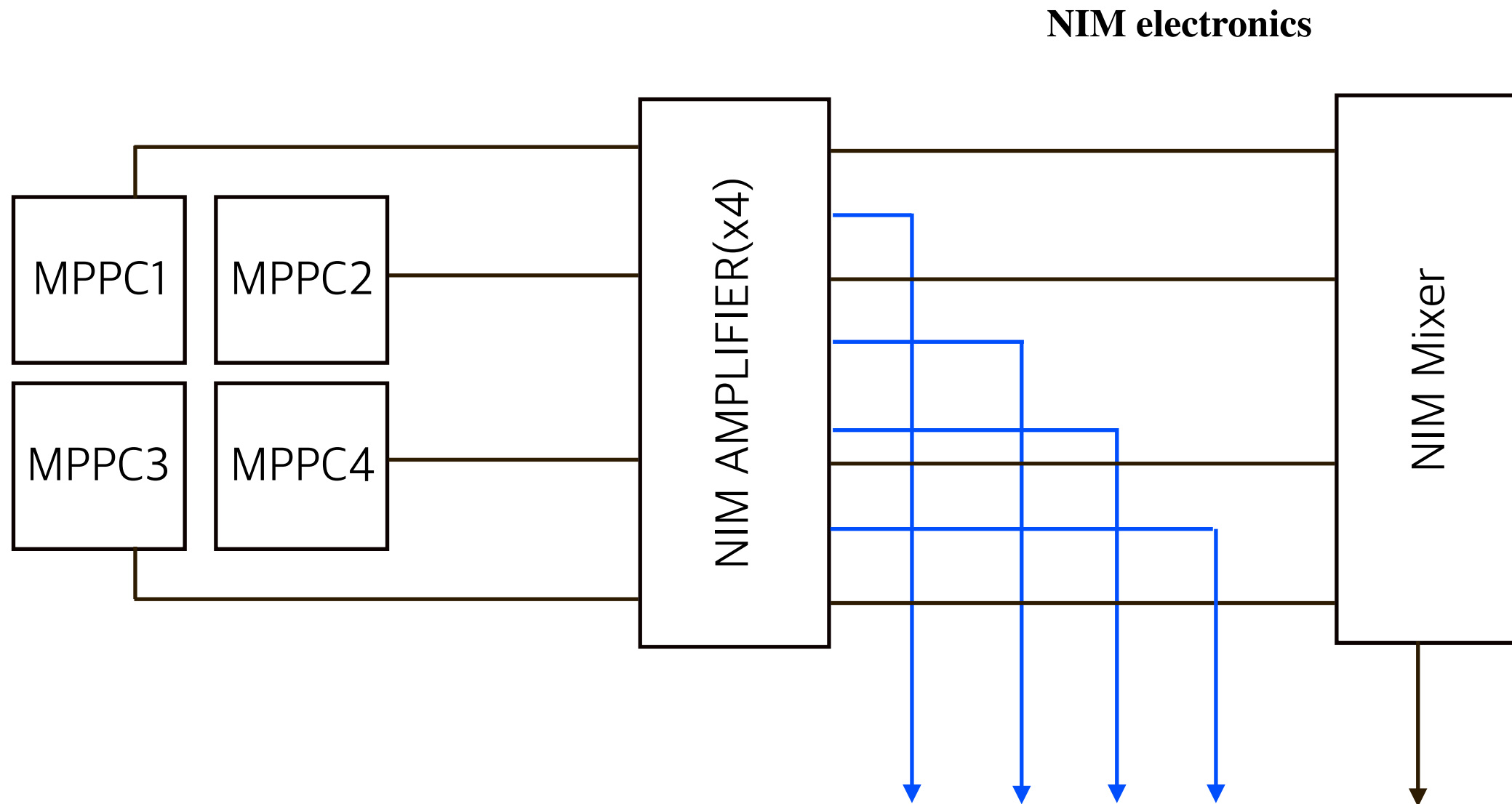
Trigger rate ~ 0.85 Hz

Channel map

scinti 1	MPPC Up	MPPC Down
scinti 2	PMT 1 Up	PMT 1 Down
scinti 3	PMT 2 Up	PMT 2 Down

SIGNAL FLOW

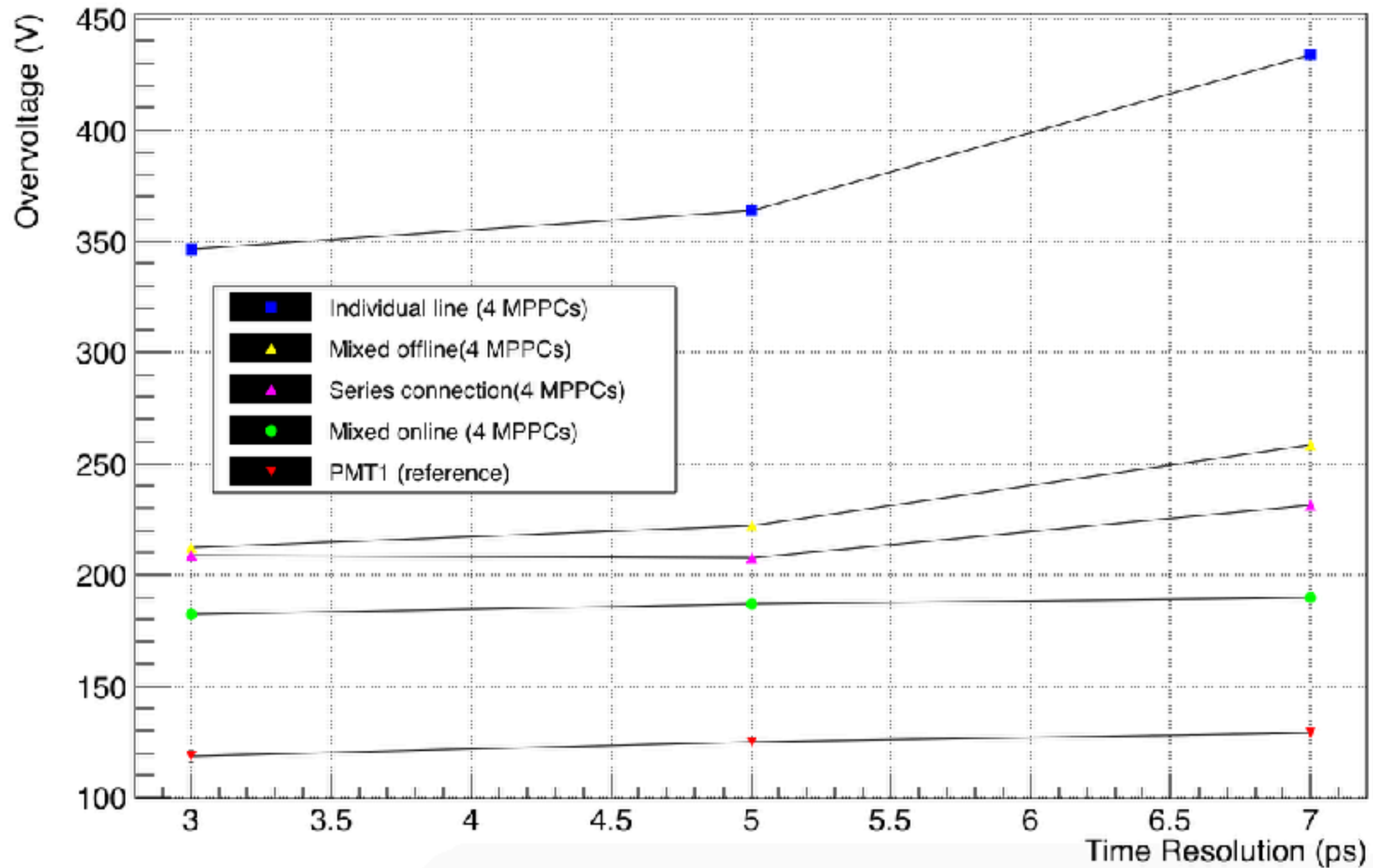
The number of MPPCs is four



The blue lines indicate that received each MPPC's data separately for offline mixing

TIME RESOLUTION

Four MPPCs data



TIME RESOLUTION

σ_{ij} : sigma of TOF distribution between i and j

err_{ij} : fitting error of σ_{ij}

$$Resolution_1 = \sqrt{\sigma_{12}^2 + \sigma_{31}^2 - \sigma_{23}^2}$$

$$Error_{Resolution_1} = \frac{\sqrt{\sigma_{12}^2 \times err_{12}^2 + \sigma_{23}^2 \times err_{23}^2 + \sigma_{31}^2 \times err_{31}^2}}{2 \times Resolution_1}$$

Event number ~17000

(ps)	over +3 V (~55 V) -value in manual	over +5 V (~57 V)	over +7 V (~59 V)
Mixed online	182 +/- 2	187 +/- 1	190 +/- 1
Mixed offline	212 +/- 1	222 +/- 2	258 +/- 1
Series connection	208 +/- 1	207 +/- 1	230 +/- 1

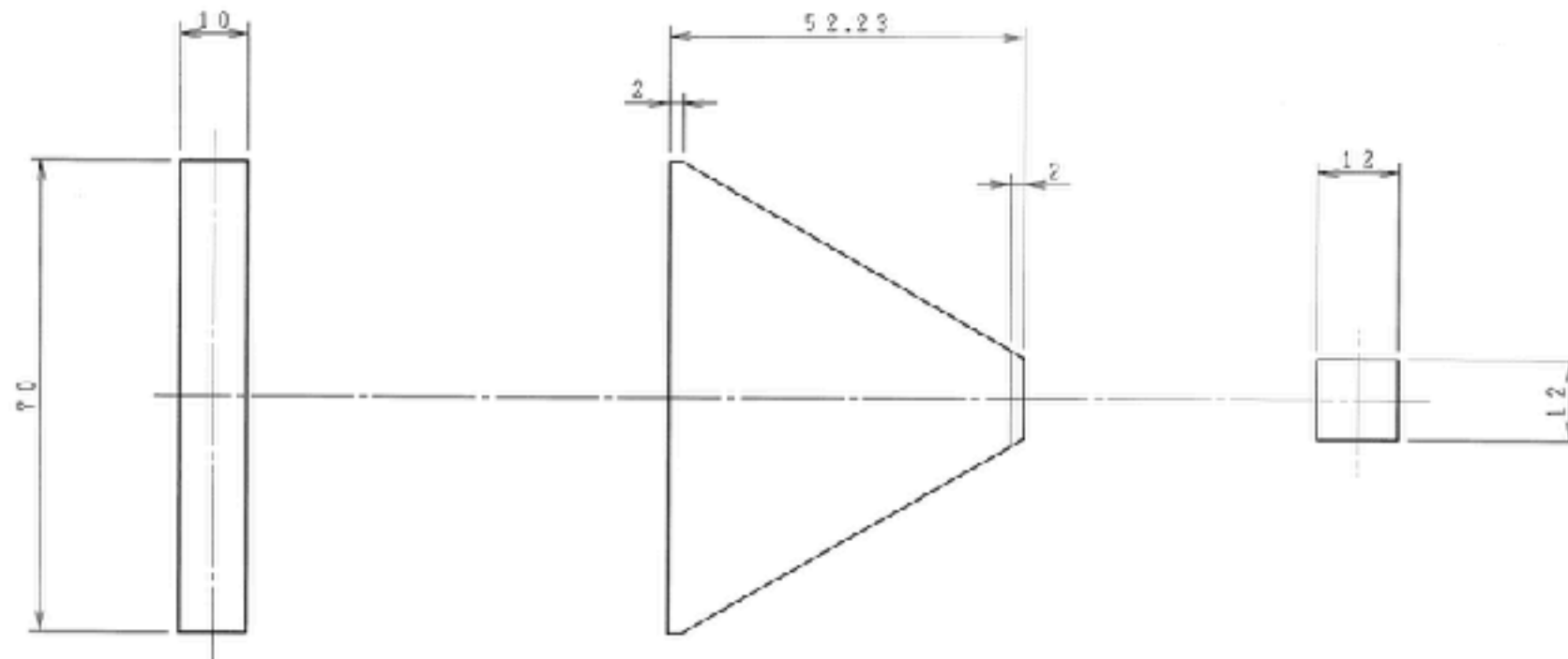
SUMMARY

- With four MPPCs, we can achieve time resolution around 180 ps.
- The Case of applying voltage separately is better than series connection.
- Online mixing by using NIM mixer is one of the good options

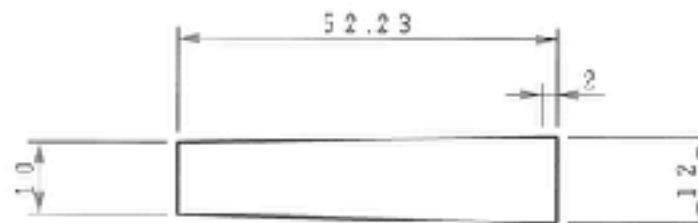
BACK UP

LIGHT GUIDE

MPPC side is wider



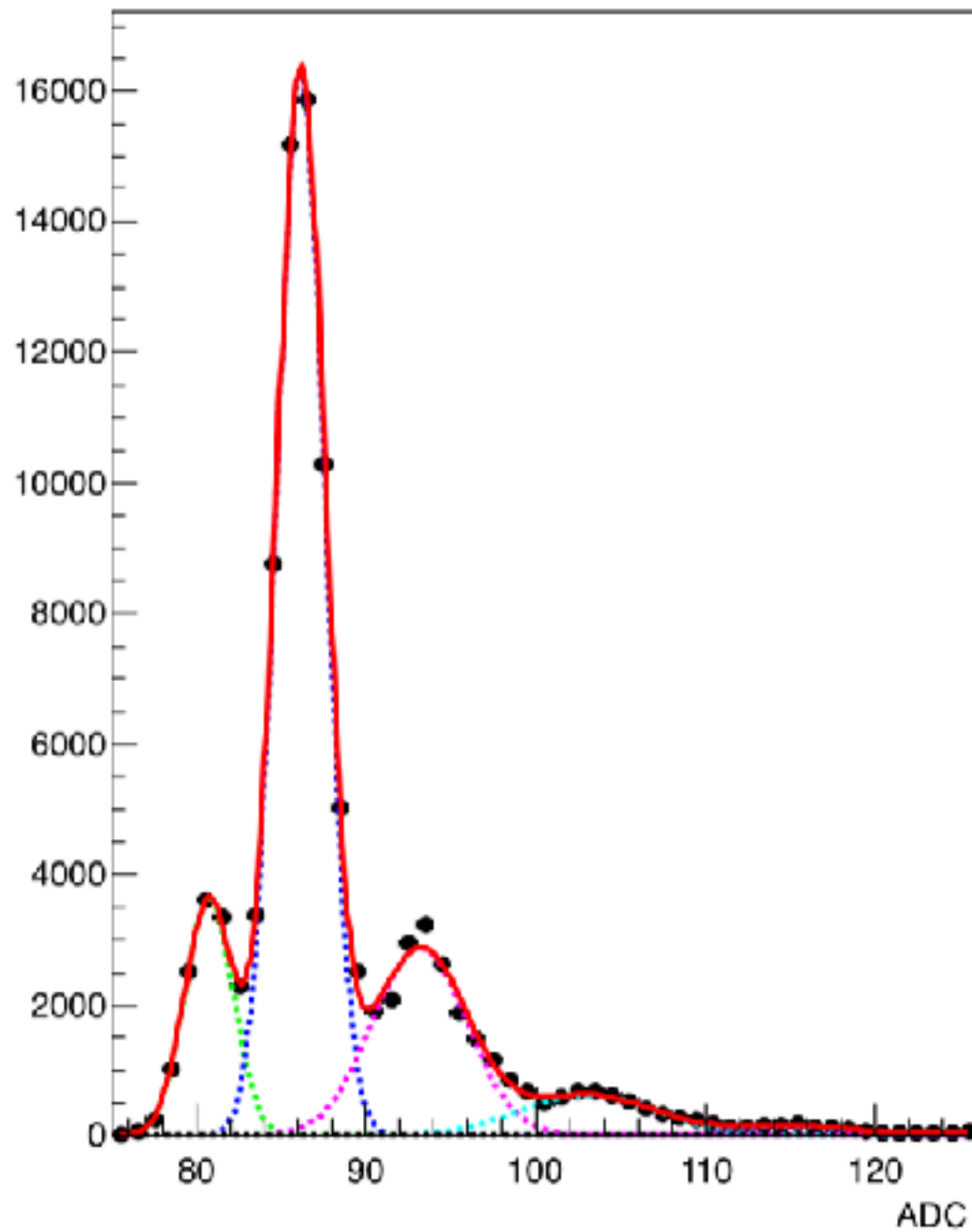
Scintillator side →



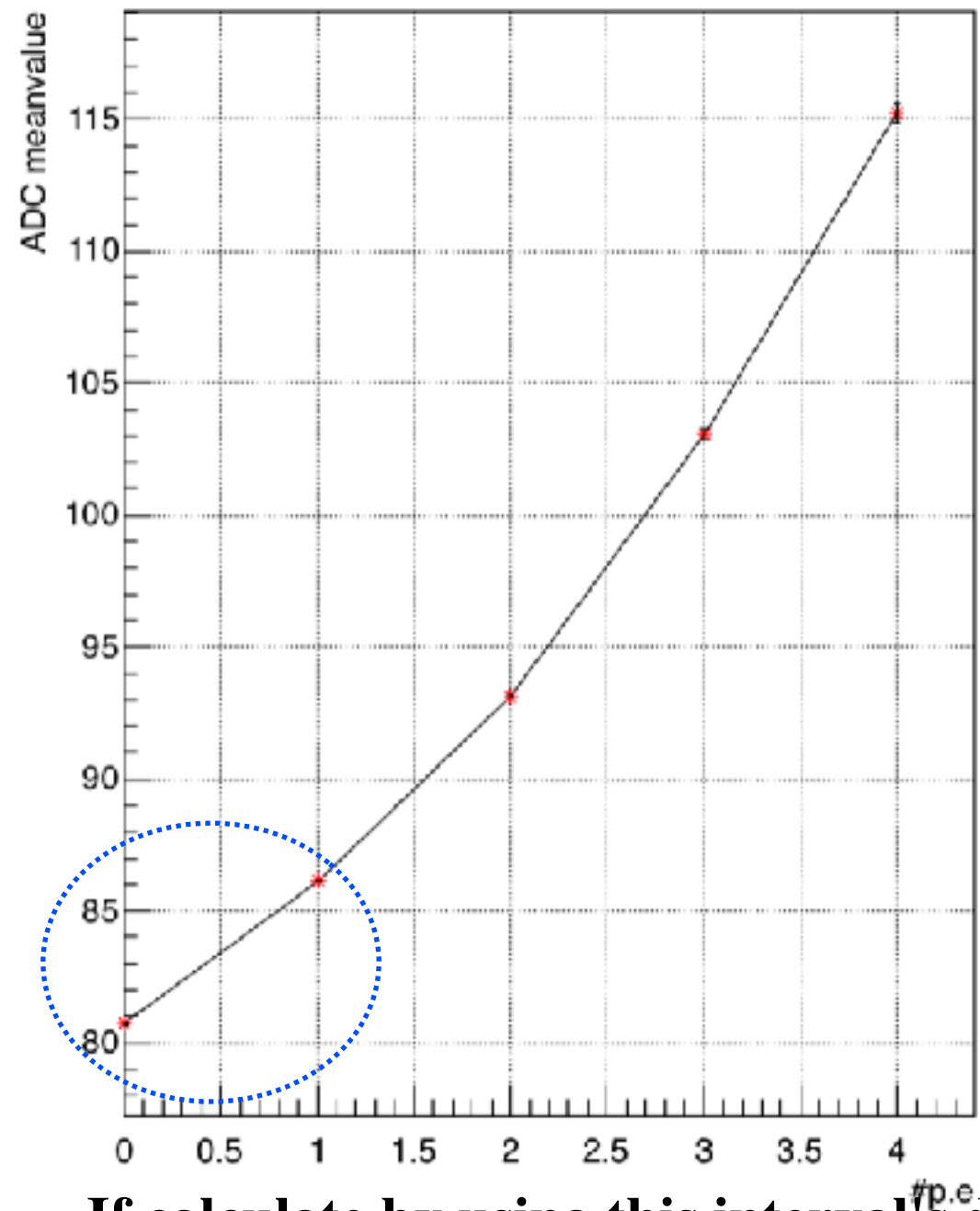
← MPPC side

OVERVOLTAGE : +3 V MPPC:UP

A RooPlot of "1ch/1pe_U_over3V.root"



Dark current test



If calculate by using this interval's data

\longleftrightarrow NPE \sim 270
 \longleftrightarrow NPE \sim 230

TIME RESOLUTION

3 V

4ch mixed offline
182.372 +/- 1.86614 ps

4ch individual
346.667 +/- 2.1707 ps

4ch mixed online
212.404 +/- 1.22651 ps

4ch series
208.62 +/- 1.04514 ps

5 V

4ch mixed offline
186.711 +/- 0.738109 ps

4ch individual
364.1 +/- 2.23445 ps

4ch mixed online
222.345 +/- 1.50468 ps

4ch series
207.625 +/- 1.44436 ps

7 V

4ch mixed offline
190.043 +/- 1.27687 ps

4ch individual
433.994 +/- 2.42719 ps

4ch mixed online
258.339 +/- 1.23145 ps

4ch series
231.628 +/- 1.09257 ps