

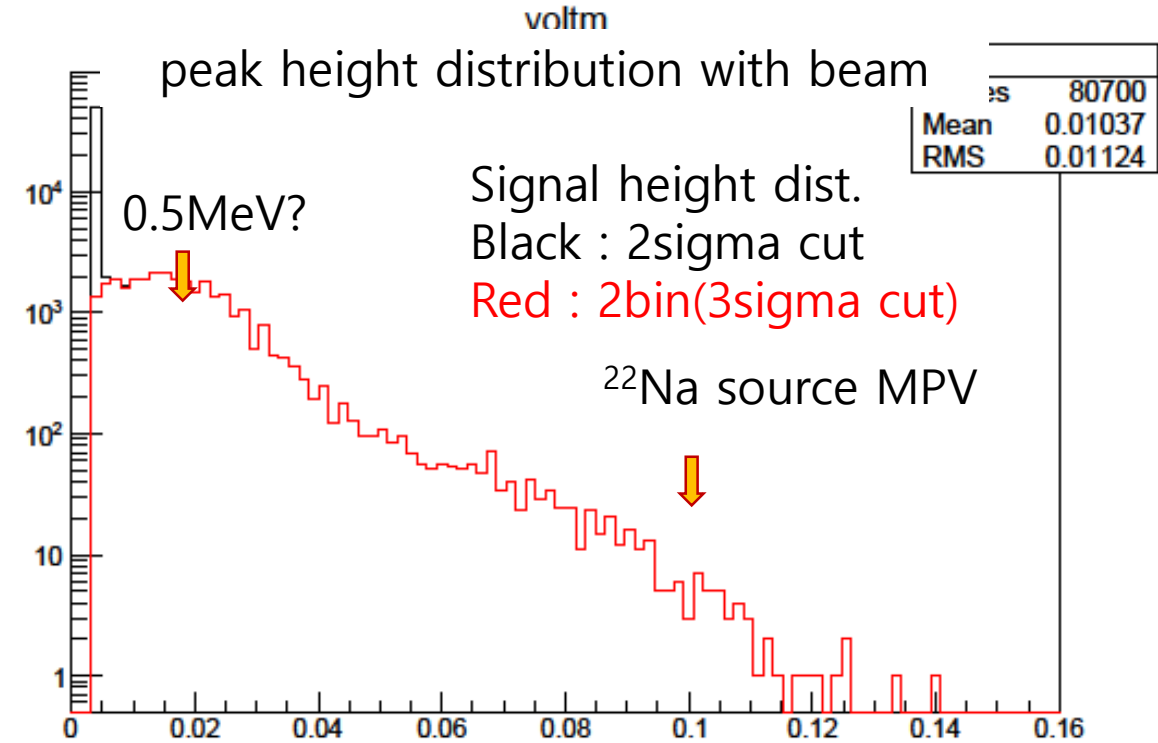
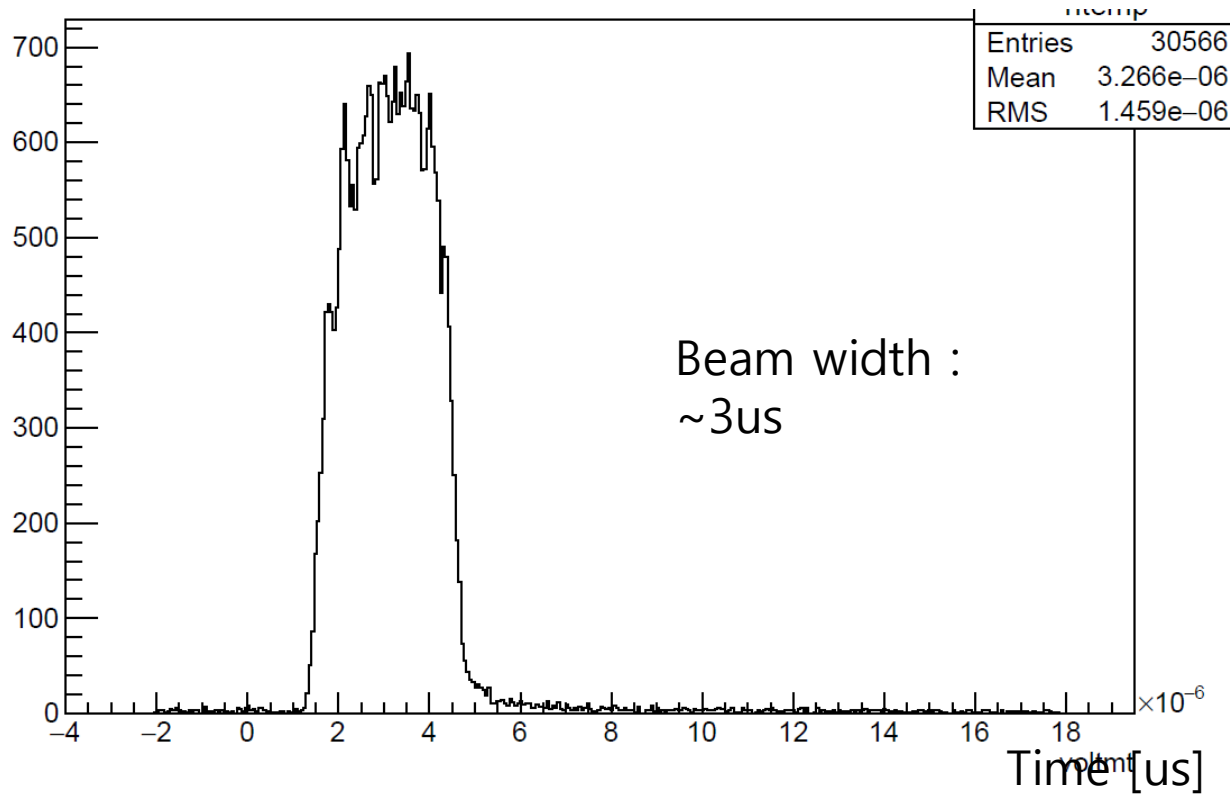
Positronium intensity measurement preparation (GBAR)

SNU

Bongho Kim

At last week

count

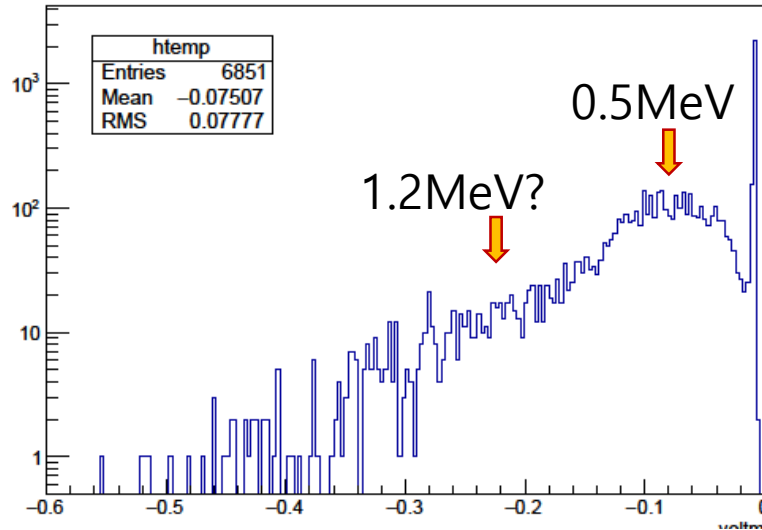


- Positron bunch beam is measure by PWO detector.
- MPV of 0.5MeV is decreased by B-field.

Data taken with different setup

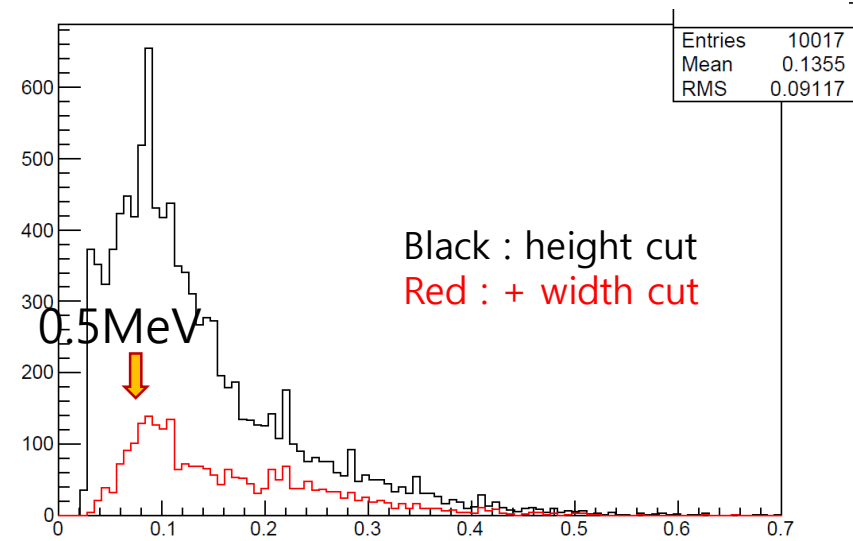
- 31th, Jan : ^{22}Na source test to check PWO detector performance compared with last year data.

peak height distribution with ^{22}Na source with coincidence at last time

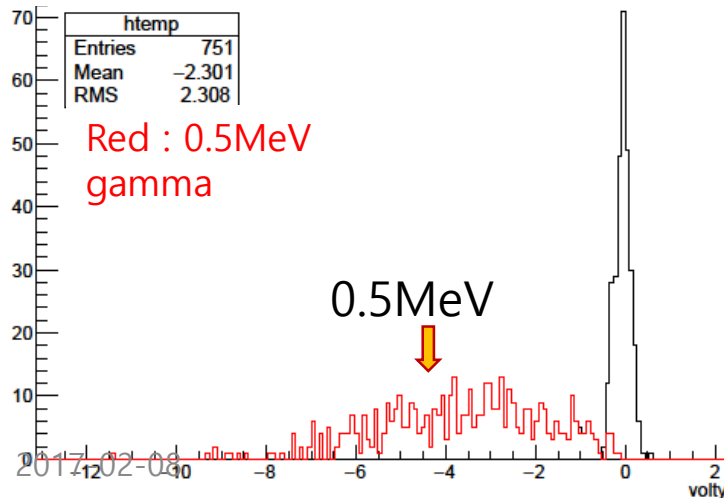


Sorry, sign is opposite

peak height distribution with ^{22}Na source

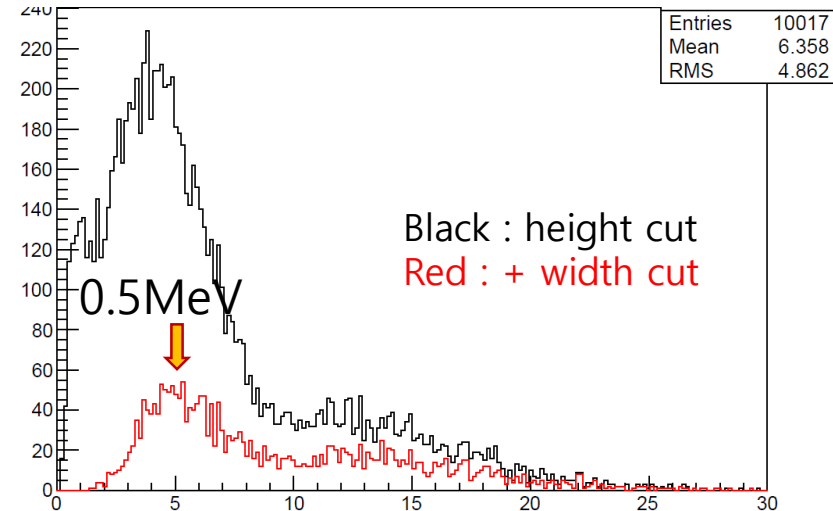


peak charge distribution with ^{22}Na source with coincidence at last time



Sorry, sign is opposite

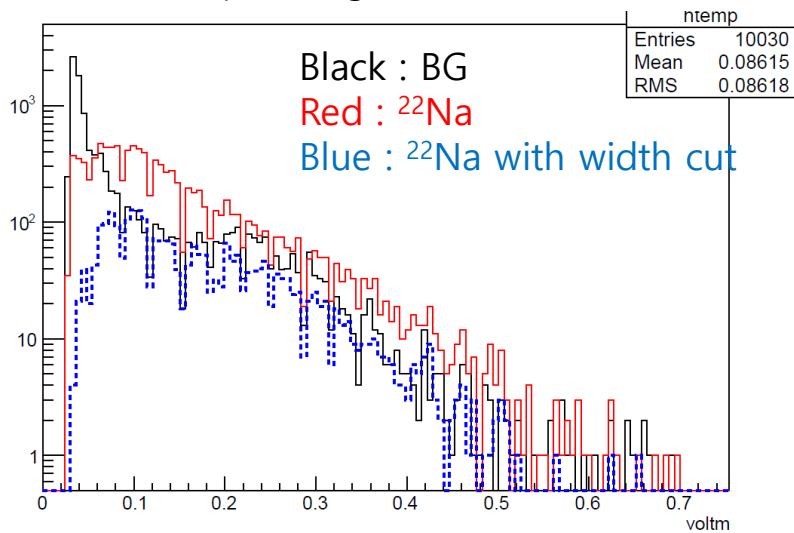
peak charge distribution with ^{22}Na source



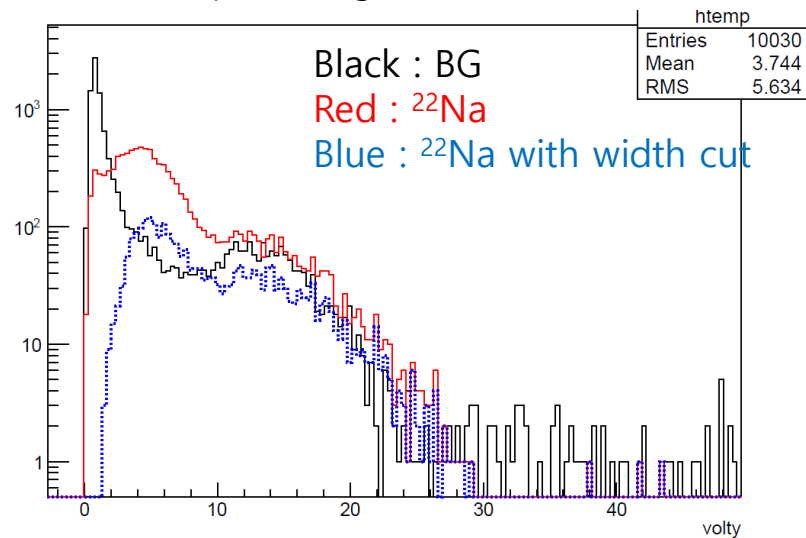
Data taken with different setup

- ^{22}Na data and no source data is compared **without scale factor**

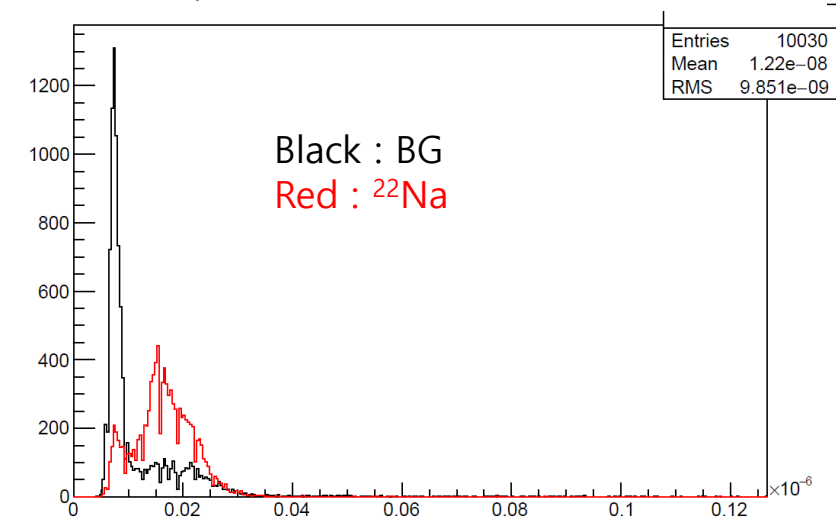
peak height distribution



peak charge distribution



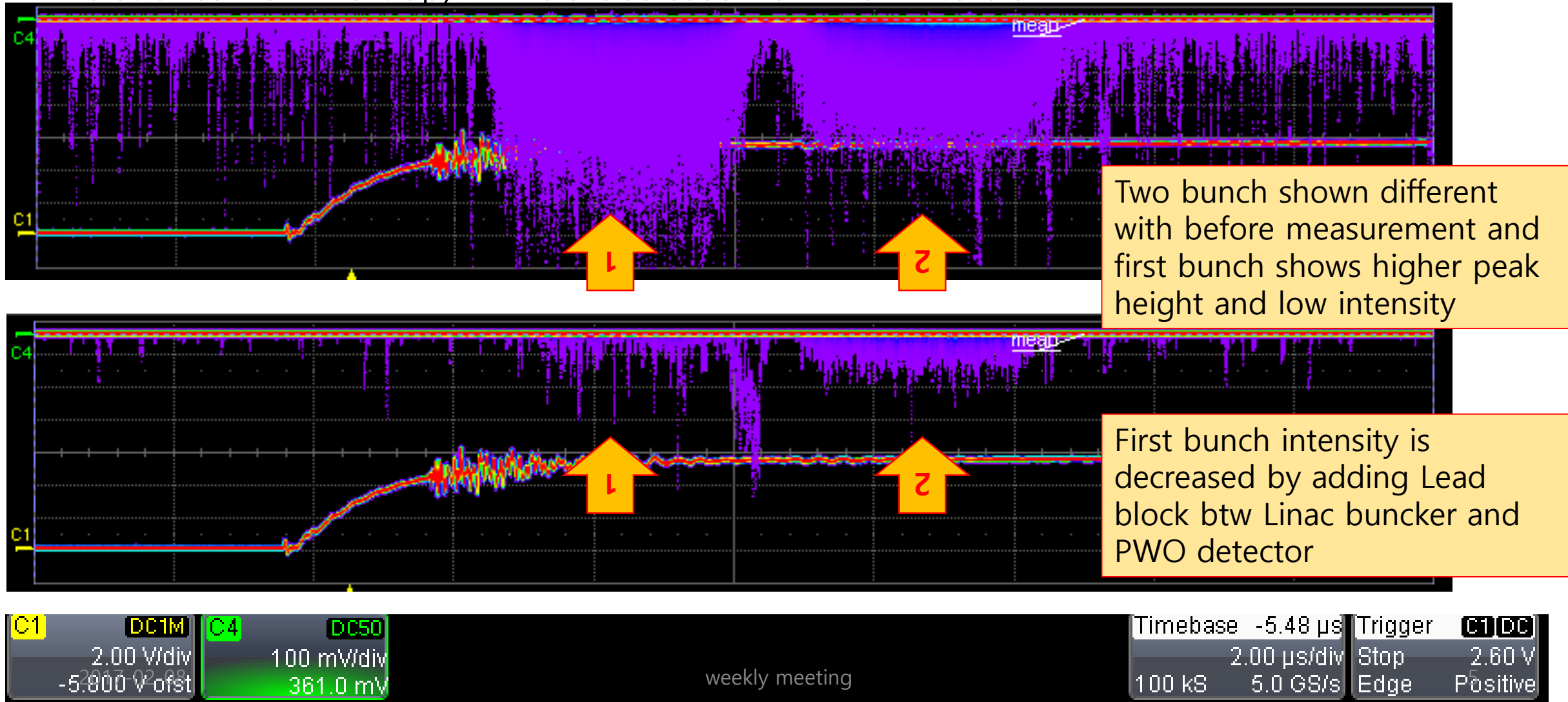
peak width(90%) distribution



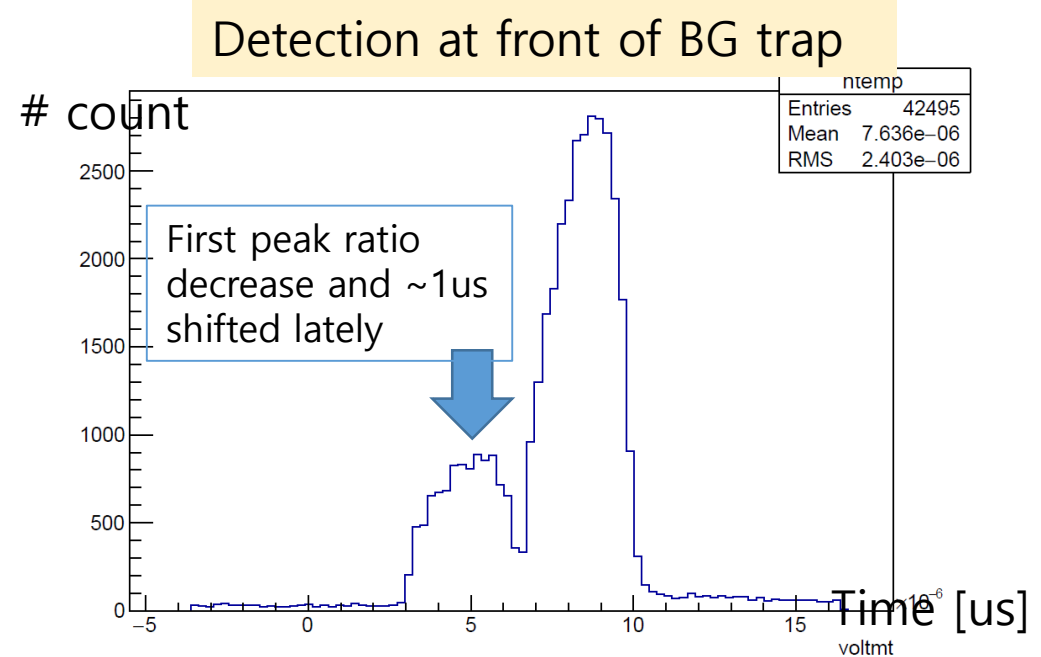
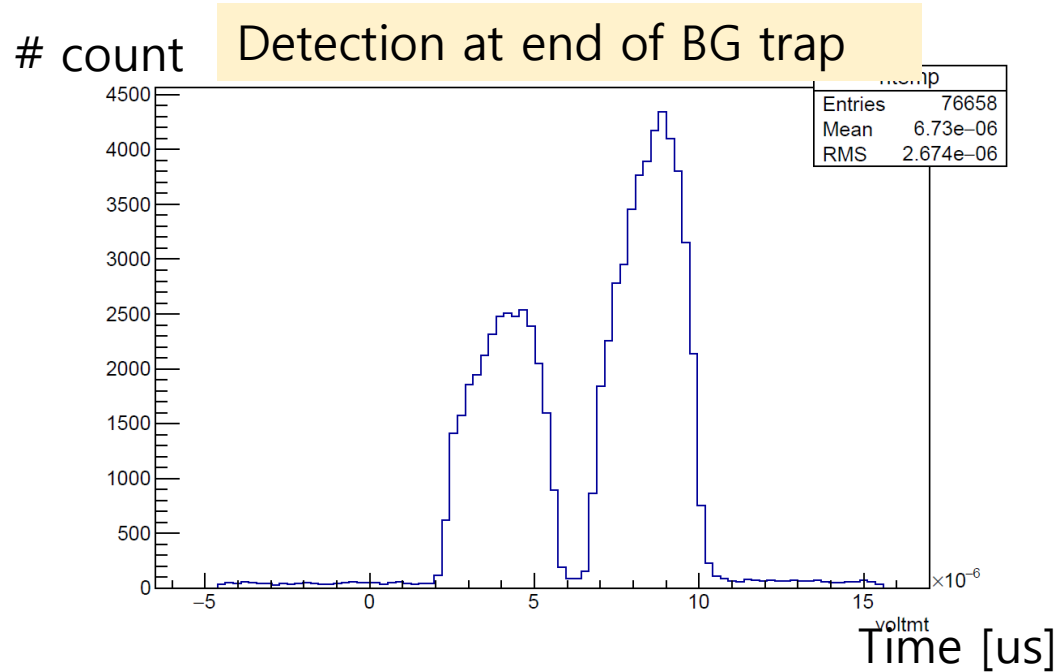
- Na source data is compared with no source data without scale factor.
- Big difference is shown for signal width (0.1 x max height point)
- Rough cut for beam data analysis is selected and expected peak height and charge will be compared with this data.
- Because of 1.2MeV gamma event, 0.5MeV MPV can be shifted a little.

Data taken with different setup

- 2nd~6th, Feb : Beam bunch data taken after reinstall PWO in different position (1.1m distance from BG trap) : B-field decrease from 2.6mT to 0.6mT



Data taken with different setup

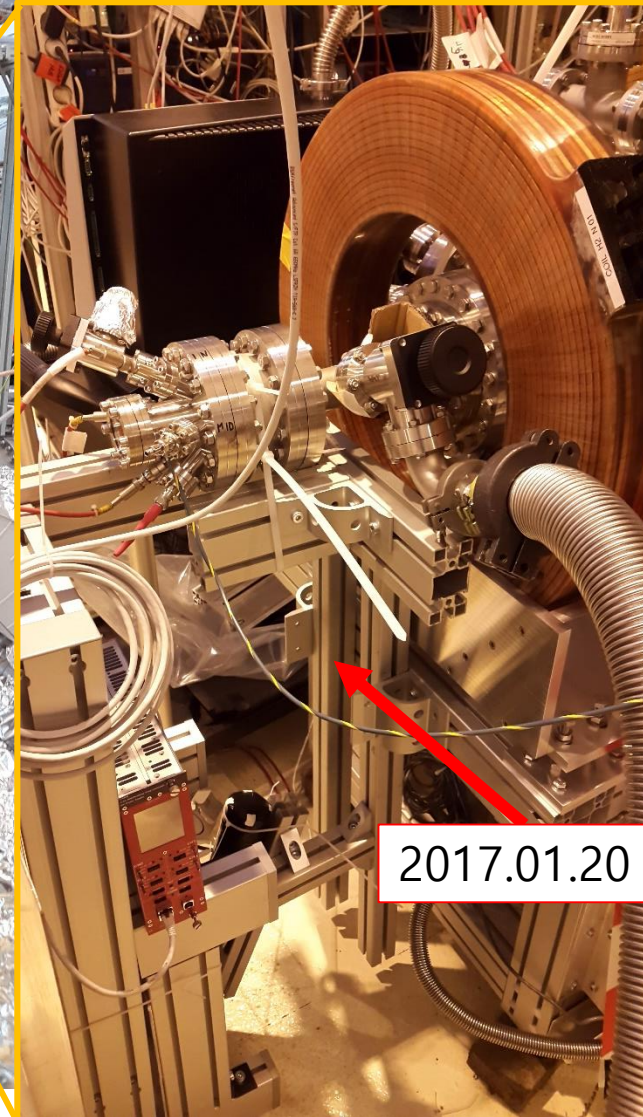
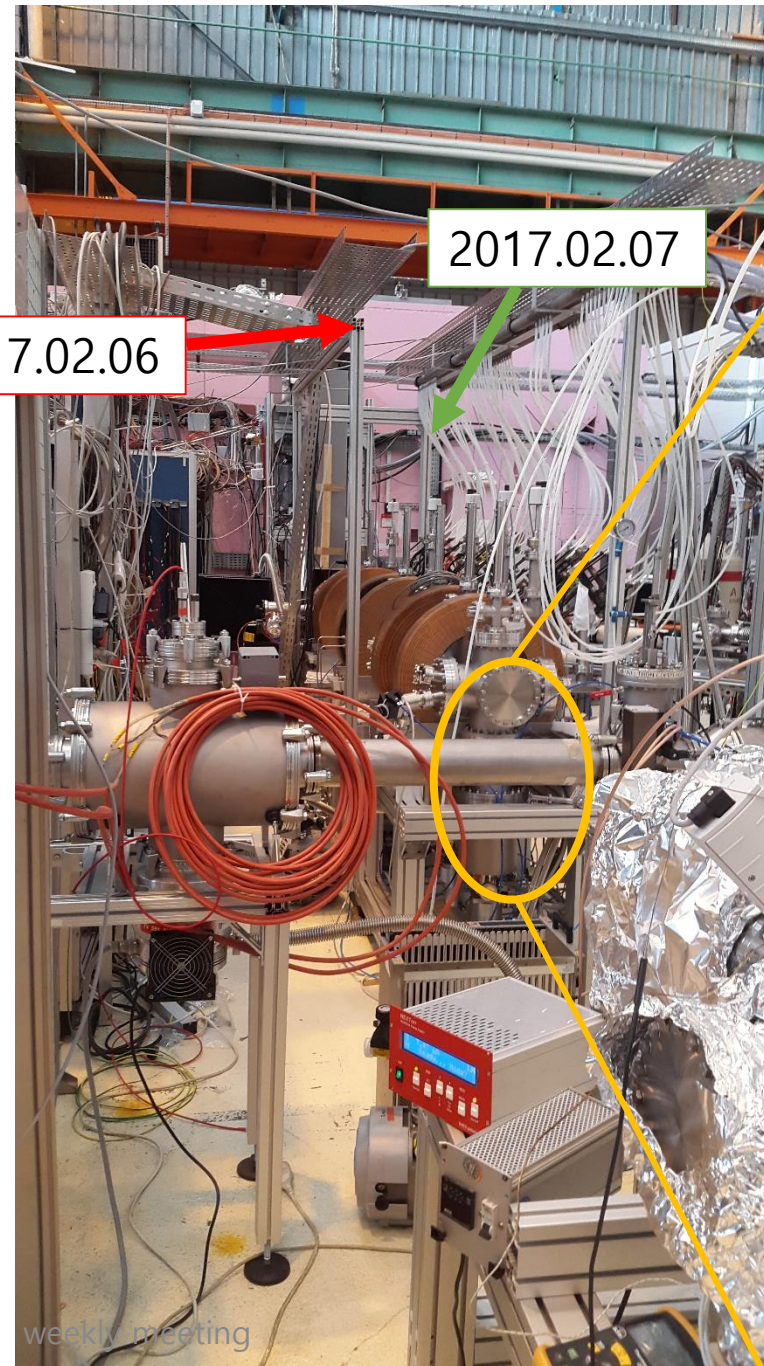


- With lead block option, we thought that many gamma background come from linac bunker with higher energy (MeV order) because time difference is about 4~5us and this is matched with expected time delay for 50eV positron (~8m distance).
 - But at 7th Feb, PWO detector was tested in front of BG trap(0.2~0.3mT) which is 2~3m near to linac bunker and first bunch move to late time and ratio is decreased.
- Background would be generated from BG trap.
- Need to be investigated.

Detector position

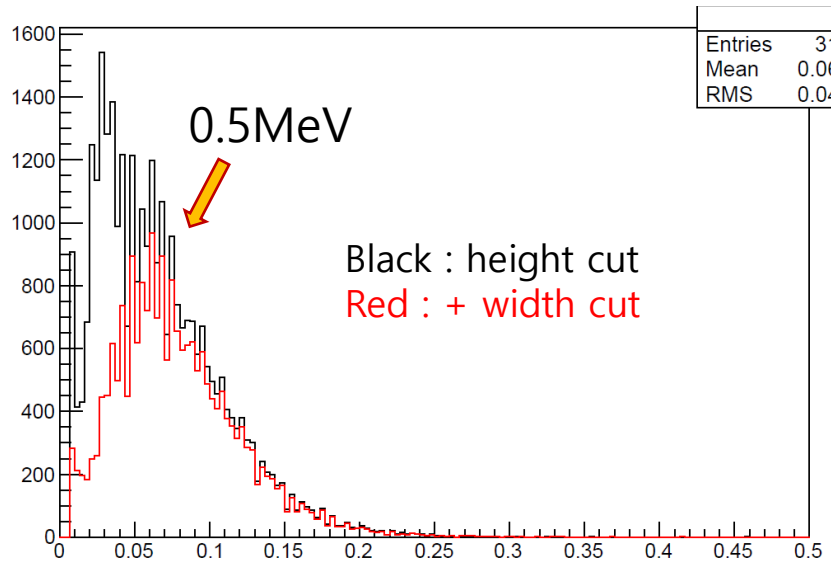
- From Jan to 6th Feb, PWO detector is in end of BG trap.
- Before Feb, PWO detector was hided below BG trap.
- From 1st to 6th Feb, PWO detector is in 2m height position to avoid B-field.
- 7th Feb, PWO detector is moved to front of BG trap with similar height as before.

2017-02-08

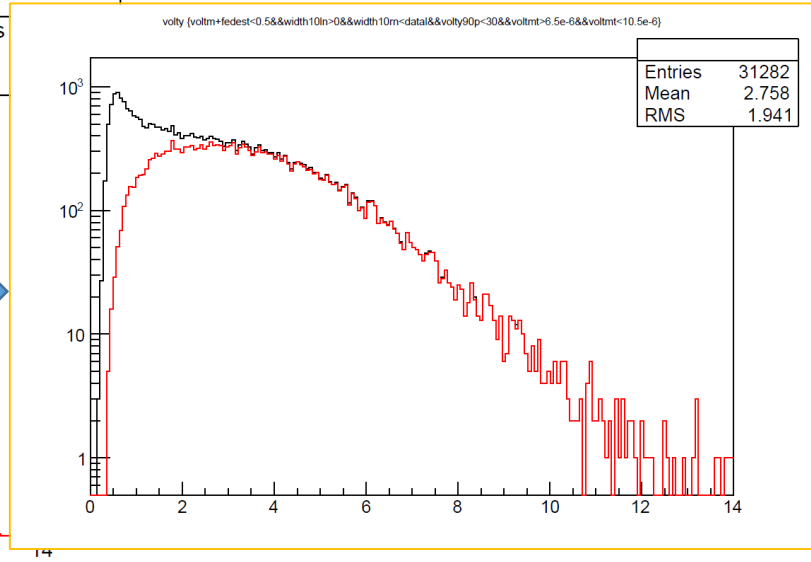
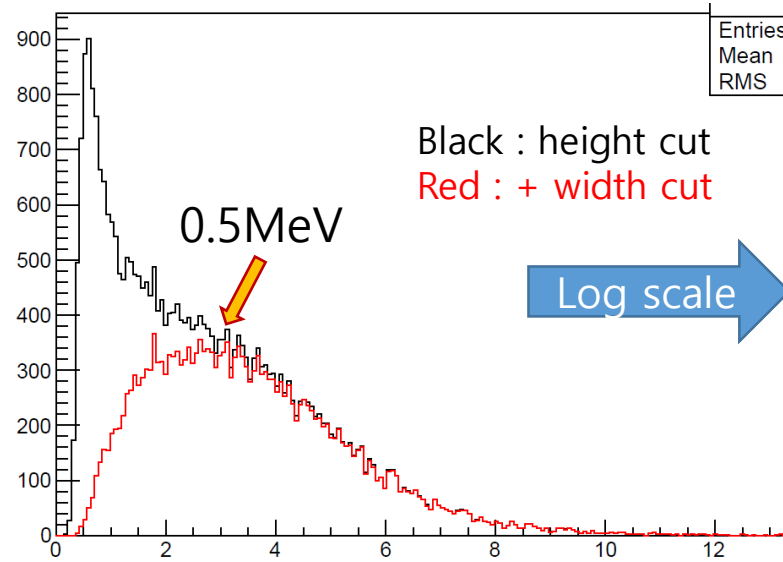


Data taken with different setup

peak height distribution with positron beam



peak charge distribution with positron beam



- Signal selection :
 - height > $3\sigma(3 \times 0.00235V)$ for 3 bins (inside $\pm(0.1 \times \text{height time} + 10ns)$)
 - Width($0.1 \times \text{height}$) > 20ns
 - Time window : 6.5us~10.5us (second bump only)
- Peak charge and height both are lower than ^{22}Na source
 - Possible reason : energy loss from beam pipe (2mm thickness(?))
 - Linac noise can ruin signal
 - Beam background ?

To do list

- PWO detector calibration will be continued.
- Simulation for positronium need to be done to check detection for changed target geometry.
- Try to prepare simulation frame work mail draft.
- Simulation for anti-proton tracker need to be done.

appendix

