Positronium intensity measurement preparation (GBAR)

SNU

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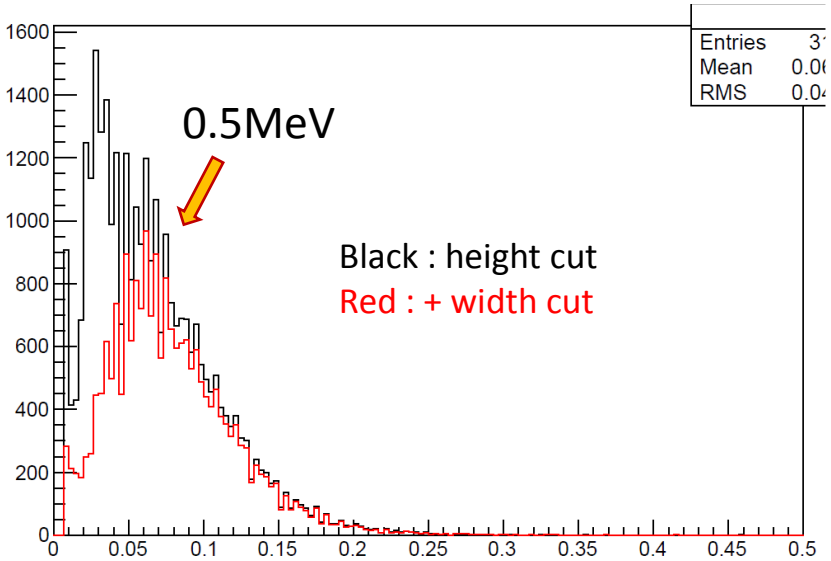
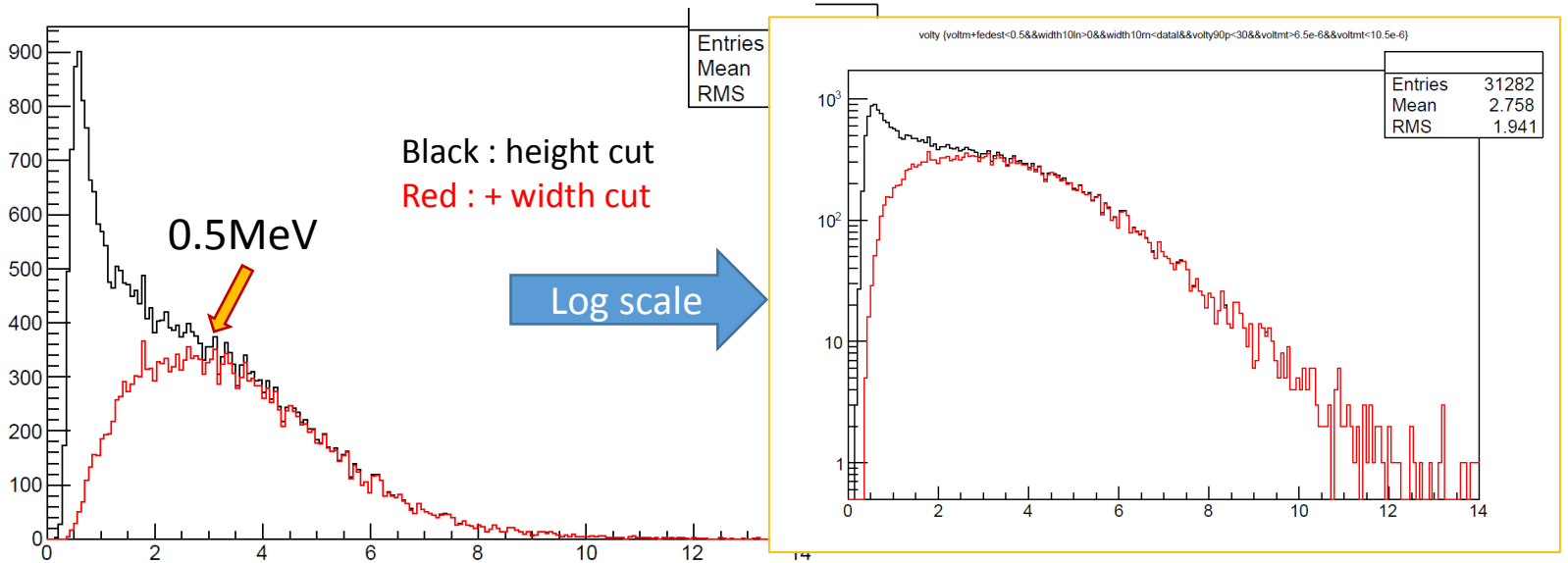
At last week

peak height distribution with positron beam



peak charge distribution with positron beam



- Signal selection :

- height > 3sigma(3x0.00235V) for 3 bins (inside ±(0.1xheight time +10ns))
- Width(0.1xheight) > 20ns
- Time window : 6.5us~10.5us (second bump only)

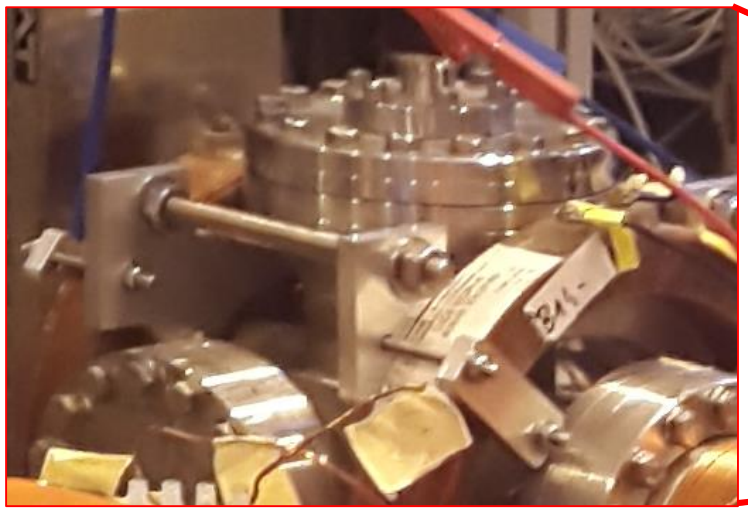
- Peak charge and height both are lower than ^{22}Na source

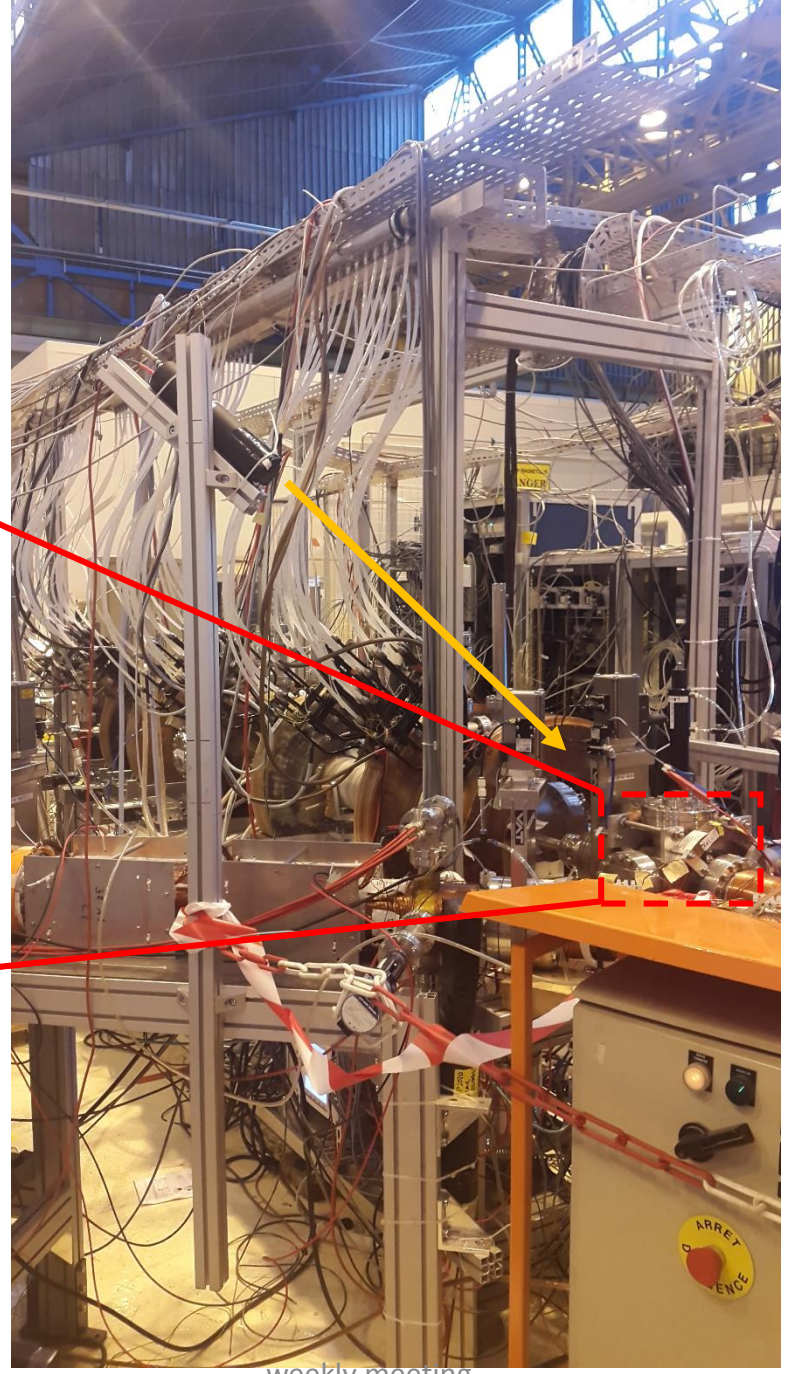
→Possible reason : energy loss from beam pipe (2mm thickness(?))

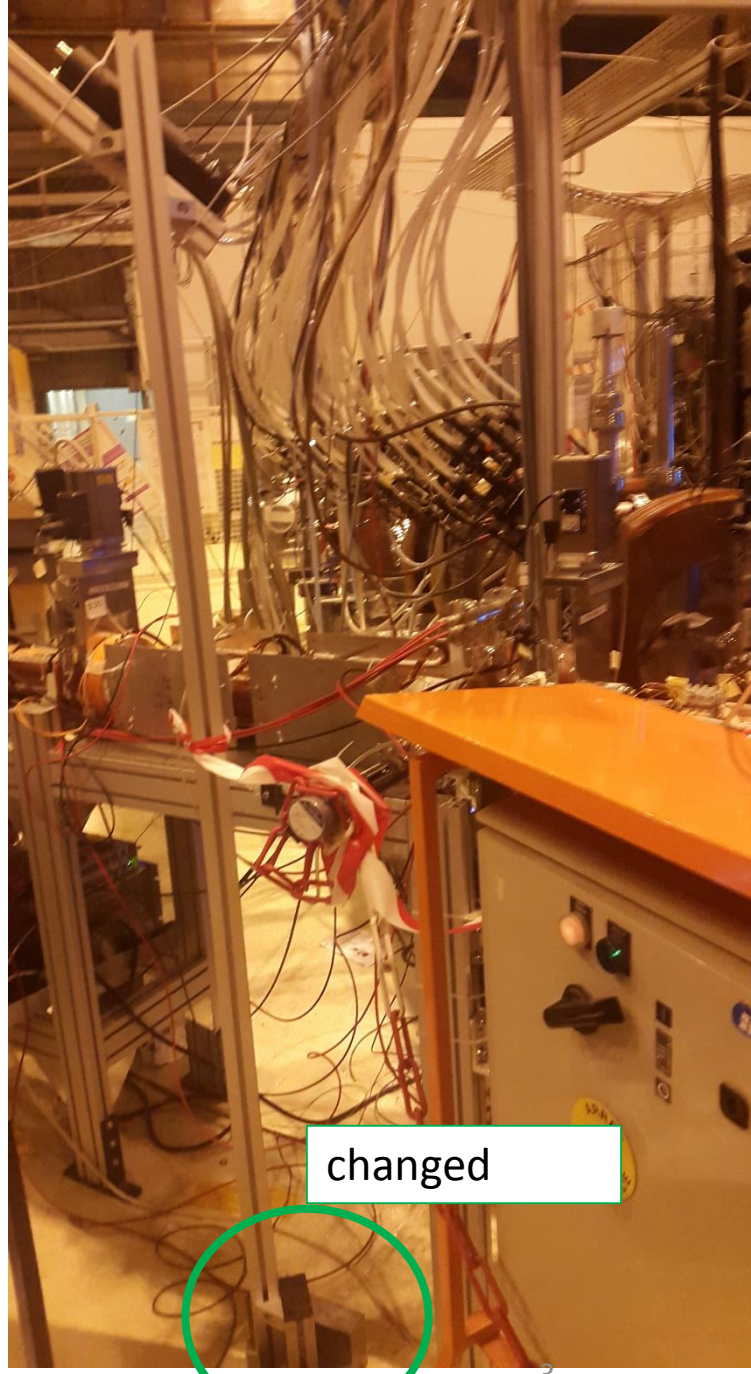
→Linac noise can ruin signal

→Beam background ?

Setup changed





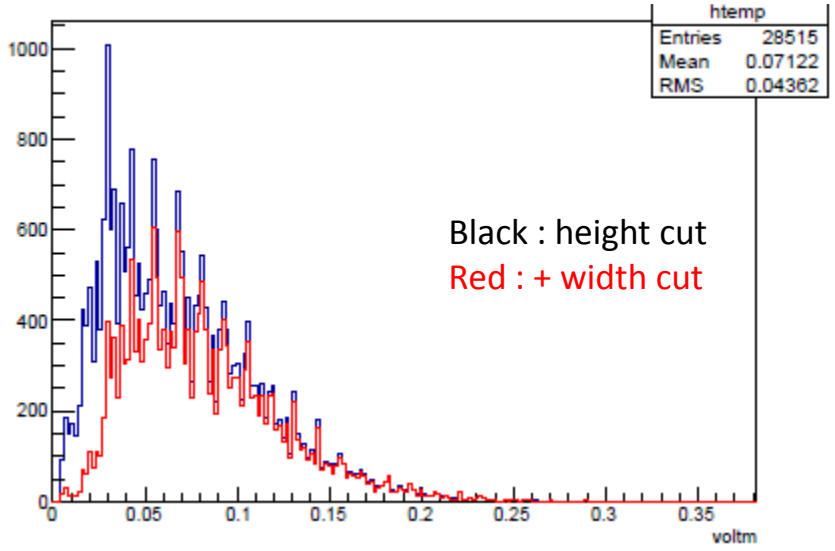


changed

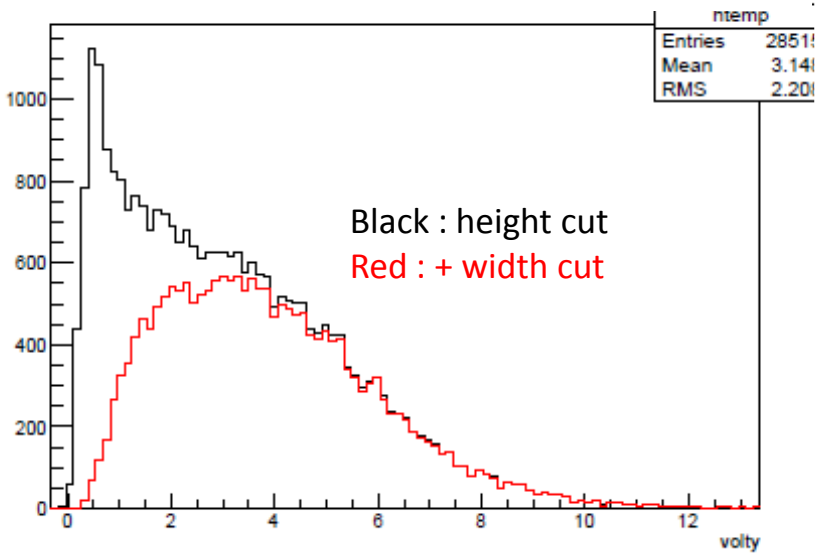
- At last time, PWO detector direction is tilted compared with annihilation part.
- PWO angle is changed to see annihilation point.

Setup changed

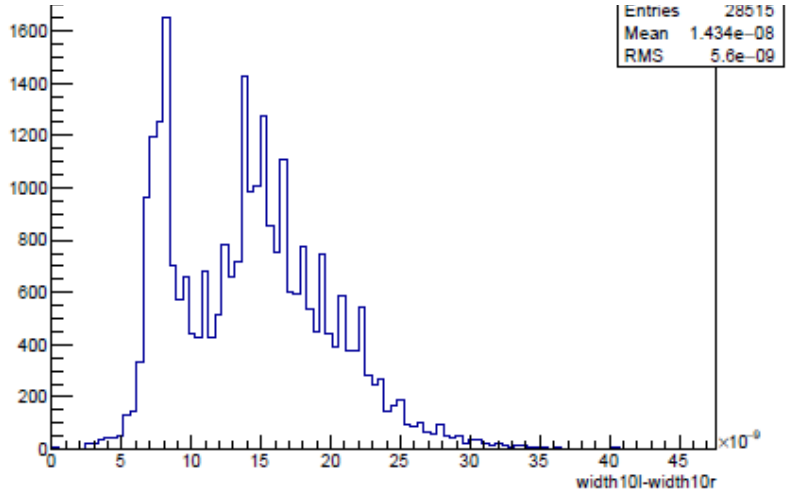
peak height distribution



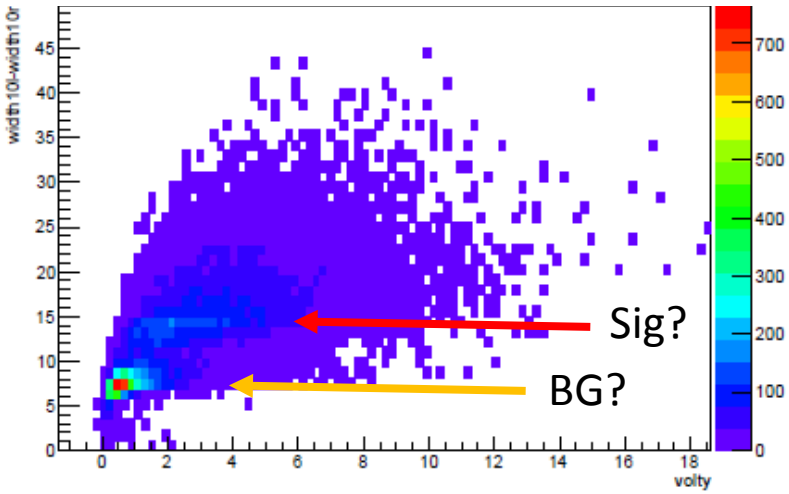
peak charge distribution



peak width(90%) distribution



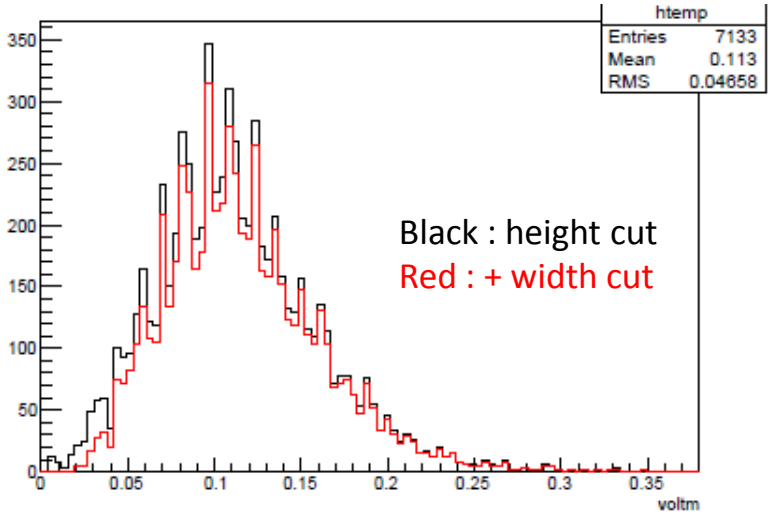
peak charge vs peak width(90%) distribution



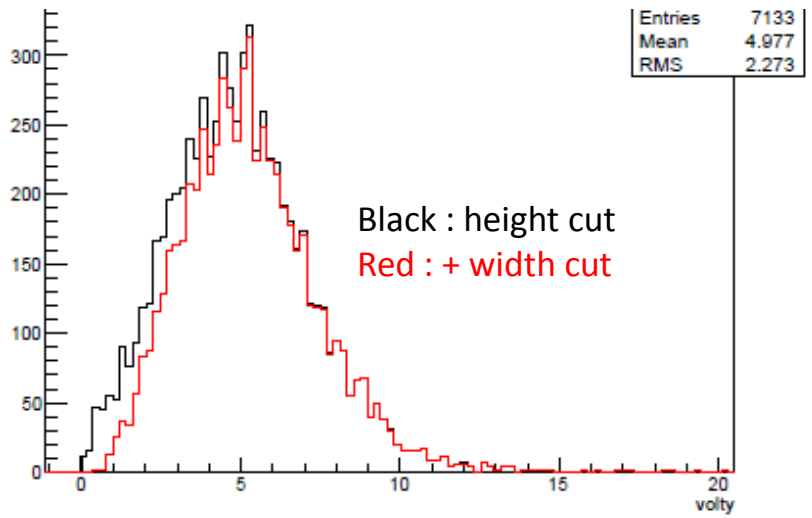
- Result is same as before..
- Signal finding algorithm was checked but no big improvement.
- Same BG(?) is shown(Beam BG? Or Compton scattered gamma?)
- I check several signal shape in BG region but it looks like signal..(single peak)

Highest signal only per bunch

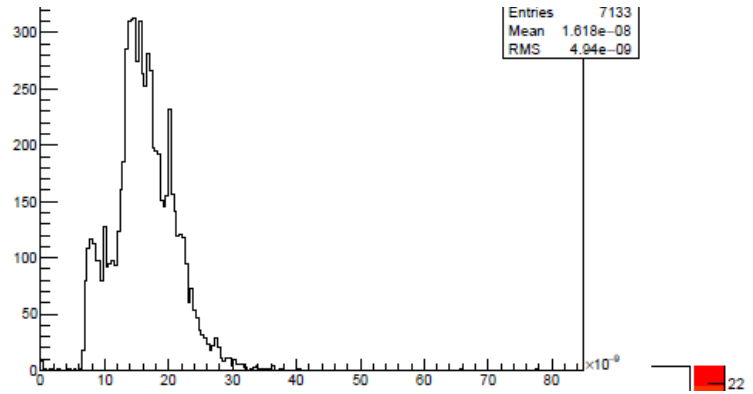
peak height distribution



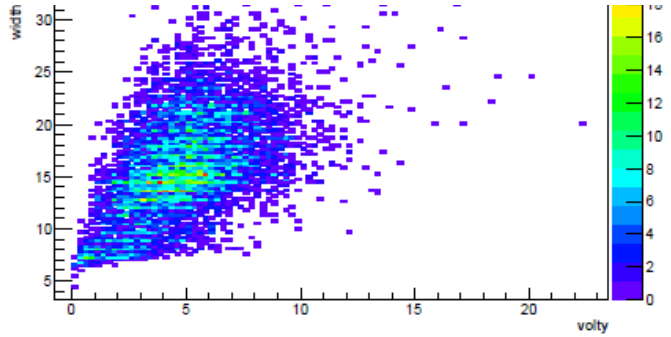
peak charge distribution



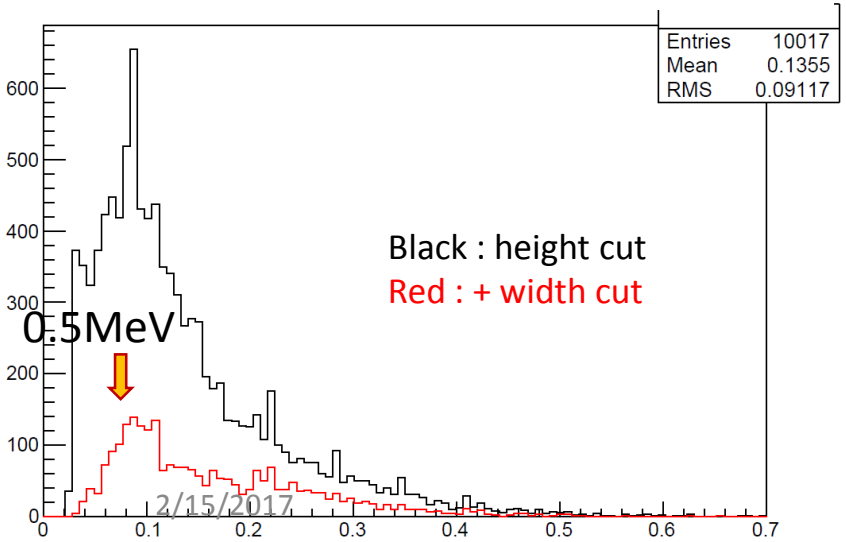
peak width(90%) distribution



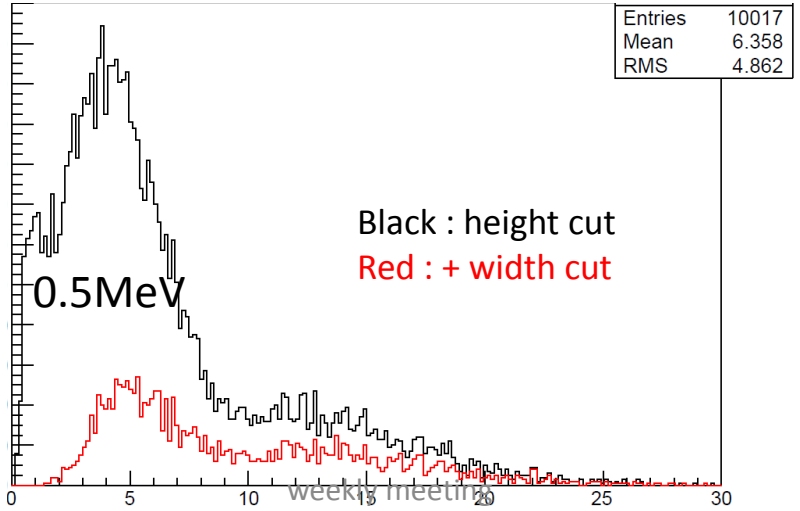
peak charge vs peak width(90%) distribution



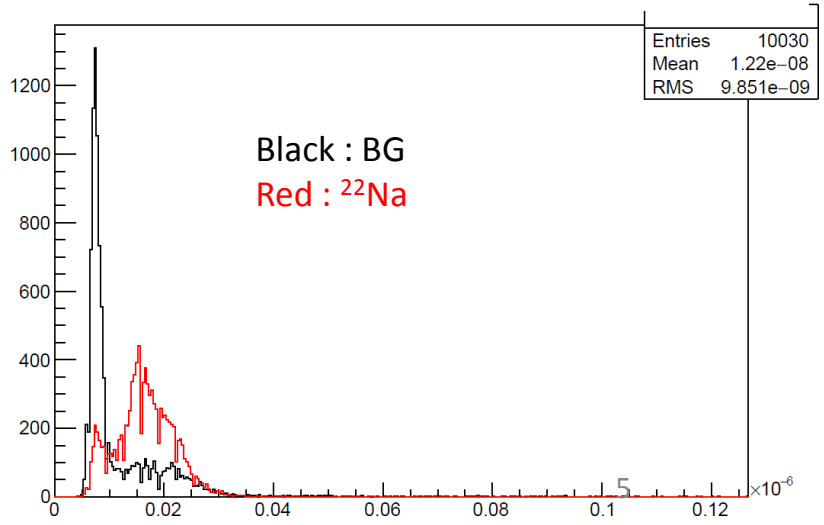
peak height distribution with 22Na source

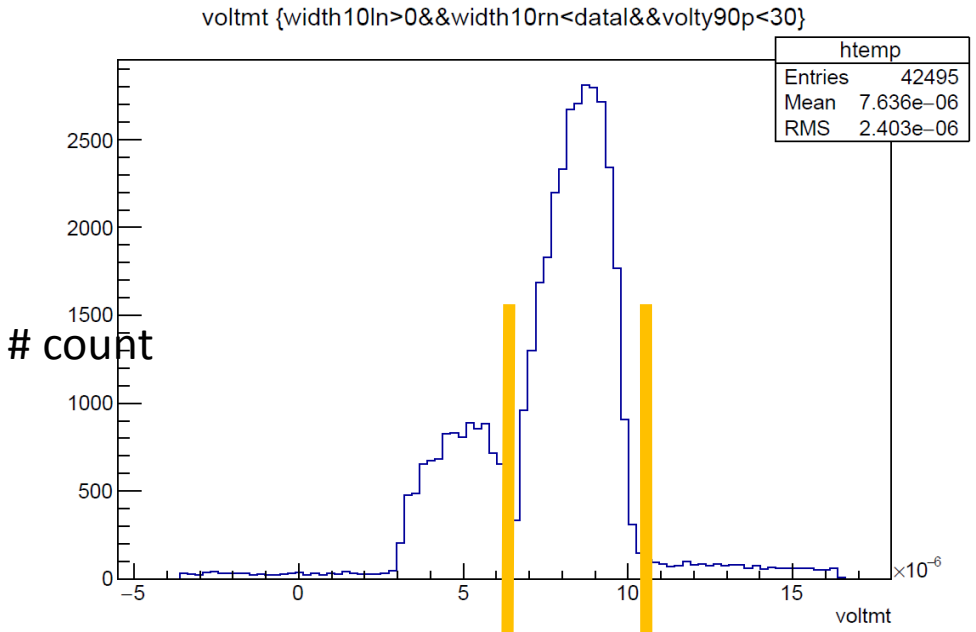


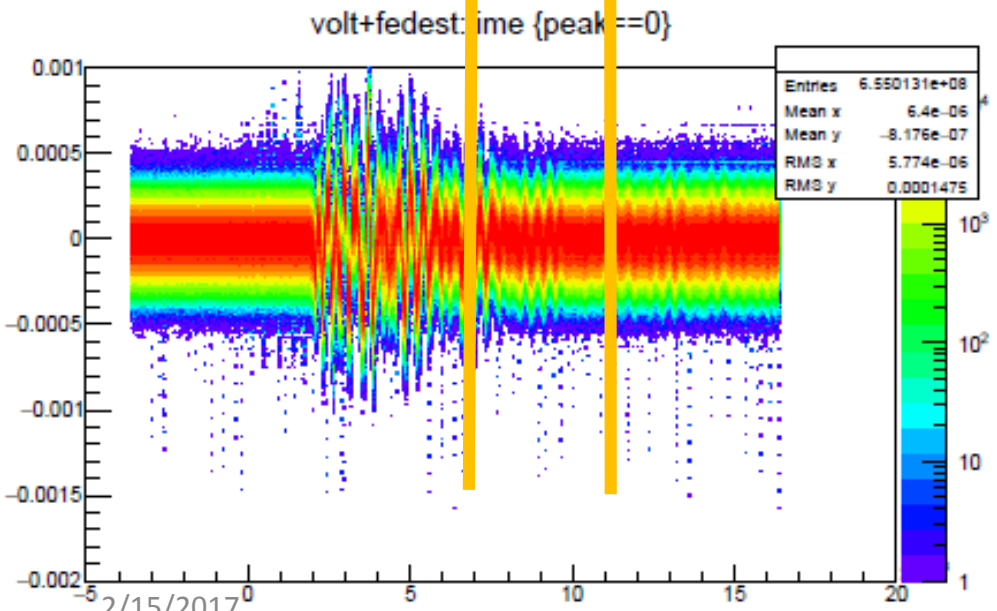
peak charge distribution with 22Na source

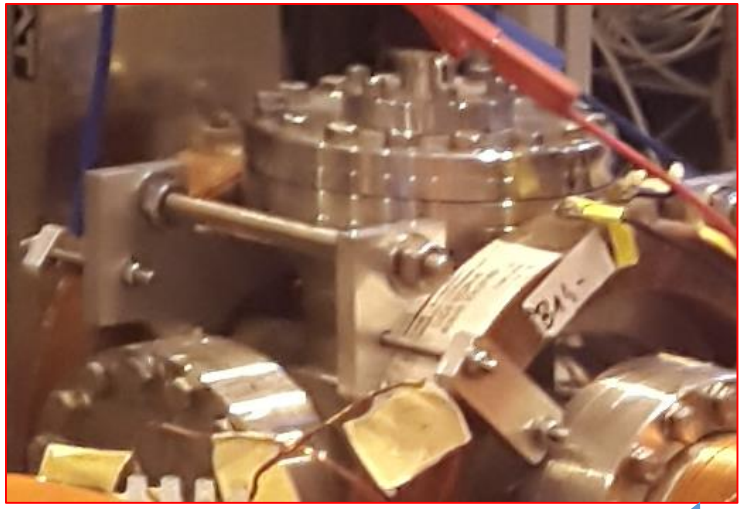


peak width(90%) distribution









- Fedestal fluctuation is checked but effect is negligible.
- Because of obstables near annihilation point, comptom scattered gamma can be measure.

(But BG is two times higher than signal)

So …

- How can we understand this huge BG to calibrate signal only.
- Take data without beam annihilation in detection point? (remove target in detection region)
- Lead block in front of PWO detector to block signal and check BG amount?
- Any good idea?