

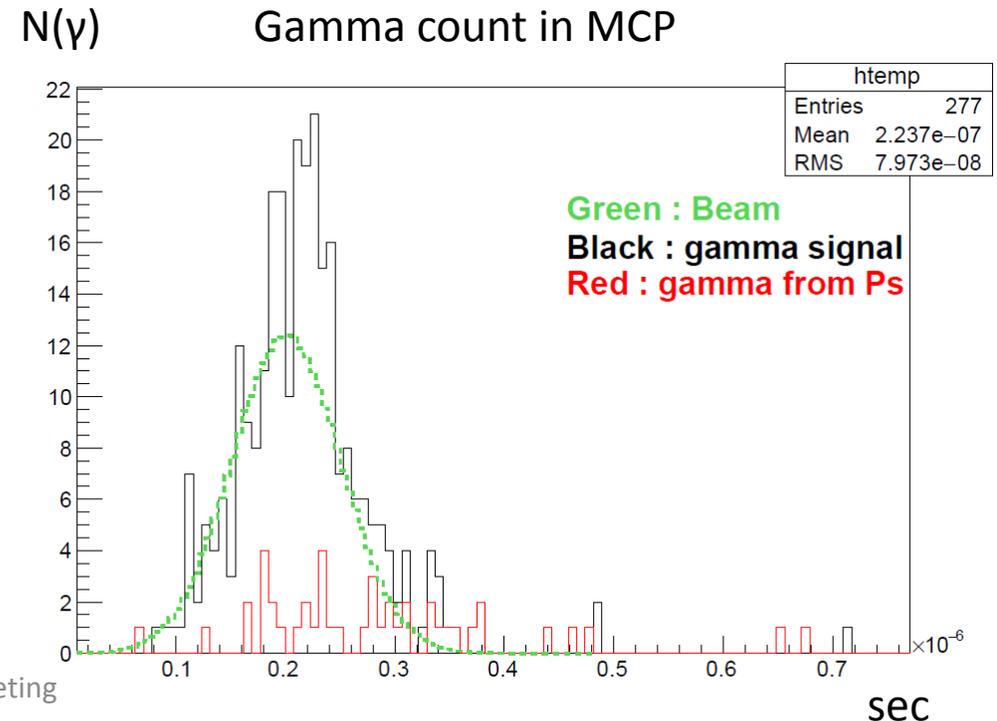
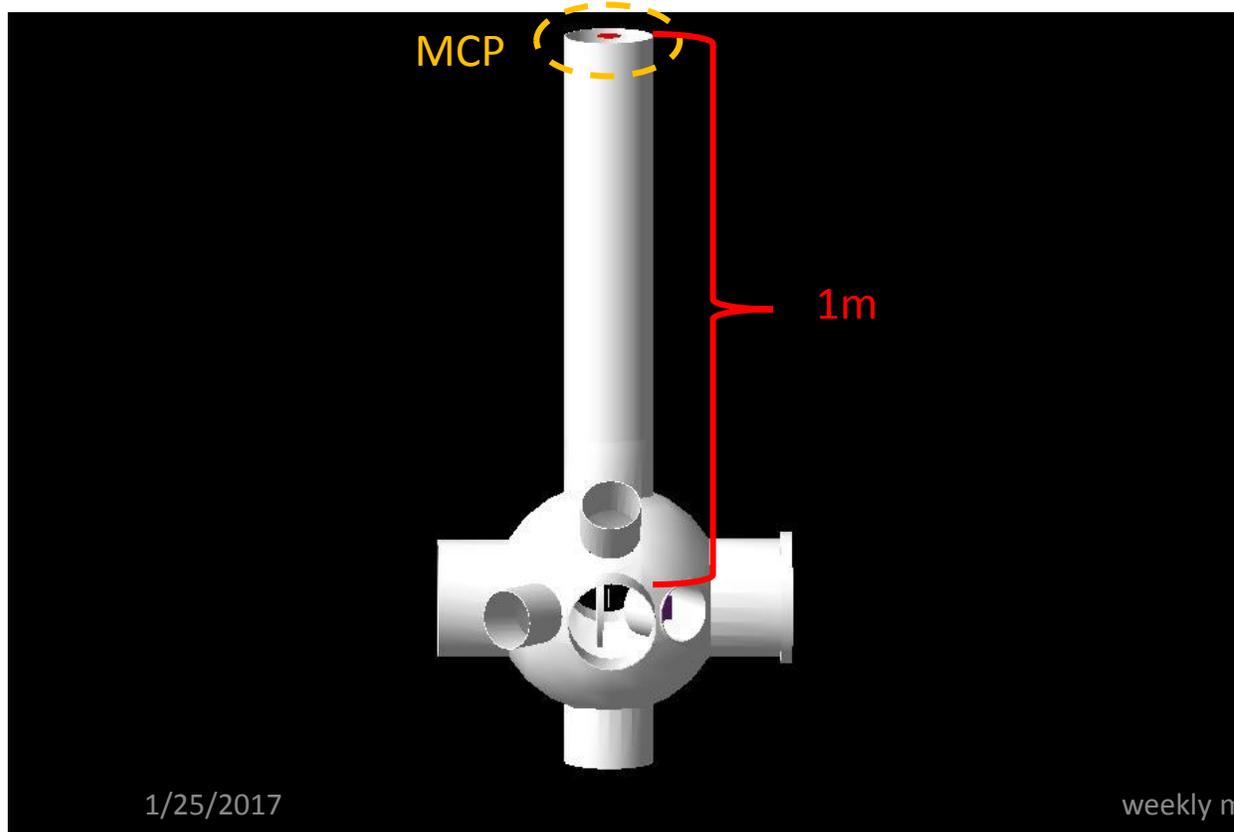
# Positronium intensity measurement preparation (GBAR)

SNU

Bongho Kim

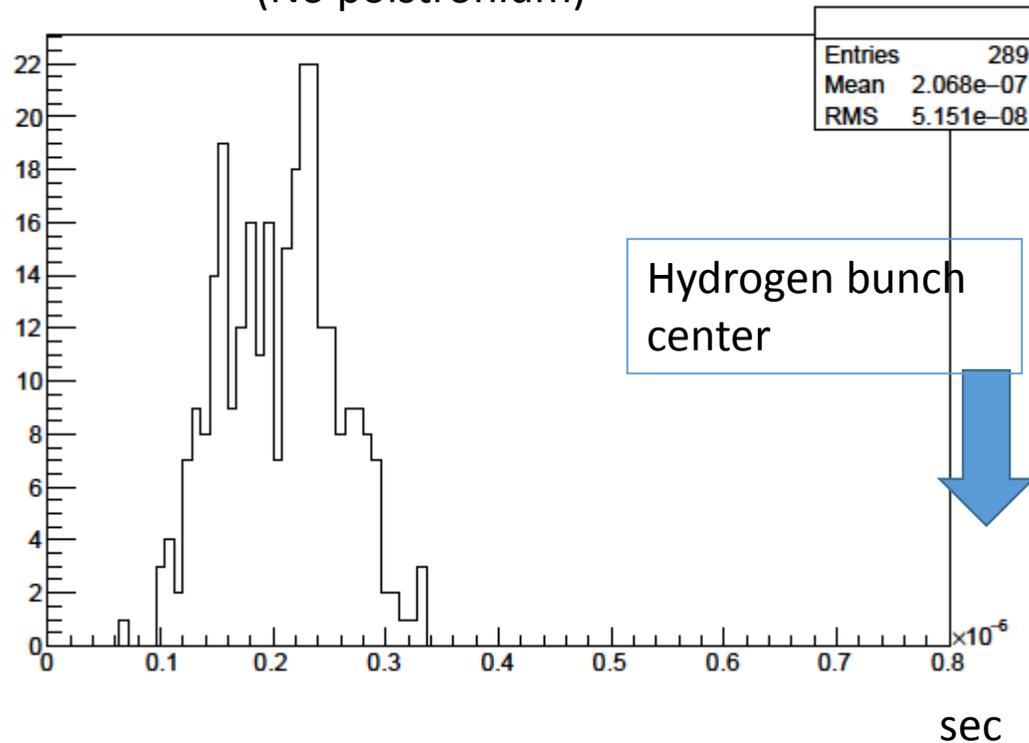
# Simulation for gamma background check

- For  $1.e6$  positron beam, 277# gamma hit the MCP and 44# are come from Ortho-positronium annihilation.
- Delayed gamma from O-Ps can be background for H signal at MCP.
- For 10keV P beam,  $v = 1.385e+6m/s$  (0.72us) → High statistics check required.

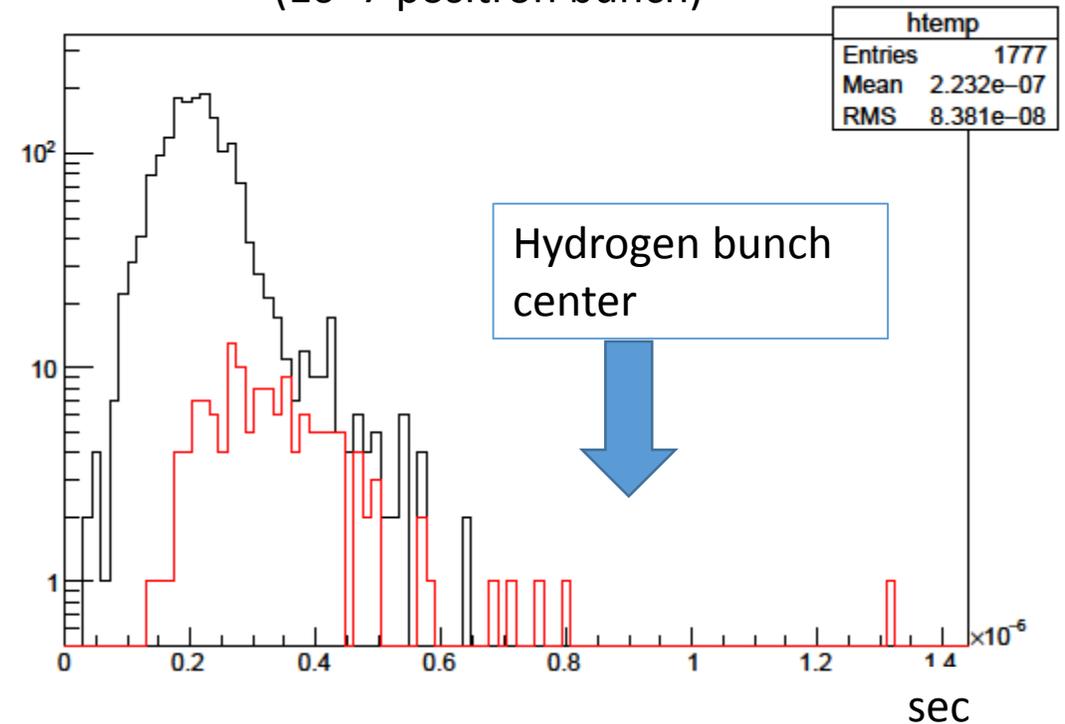


# Simulation for gamma background check

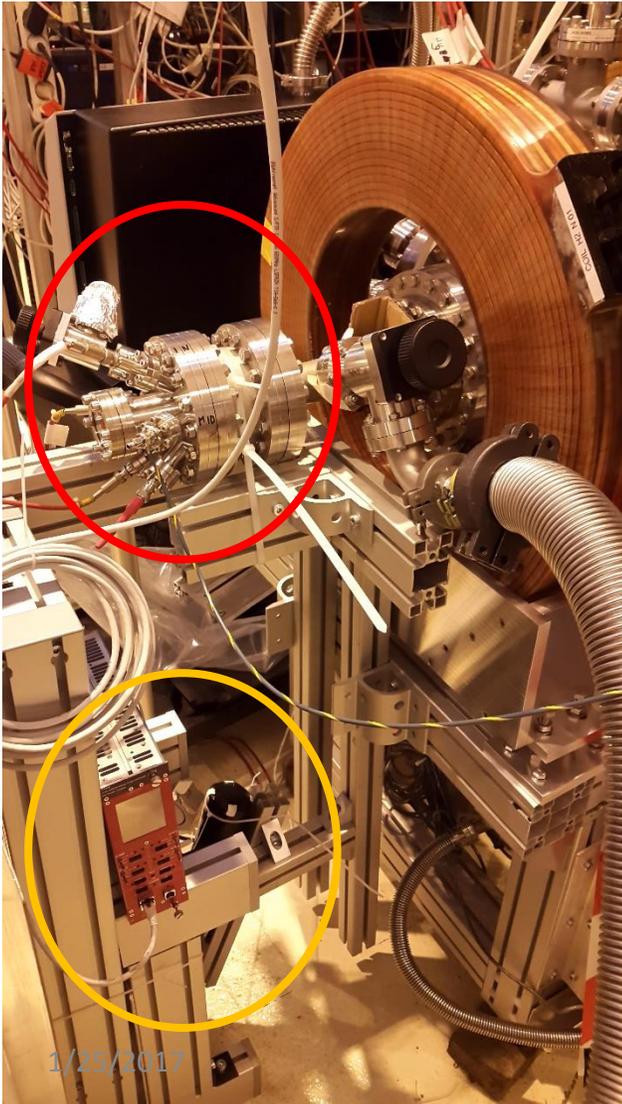
Gamma count in MCP  
(No positronium)



Gamma count in MCP  
( $10^7$  positron bunch)



# PWO detector test with positron bunch



- 100~1000e<sup>+</sup>/bunch are expected
- The detector acceptance is about 0.03% which is good for single gamma detection
- Main purpose : Signal intensity measurement for 0.5MeV gamma (efficiency is already checked by 100%)  
→ Intensity check with different voltage
- Help to take a picture for gamma background for MCP detector(?)

# PWO detector calibration

## Signal information

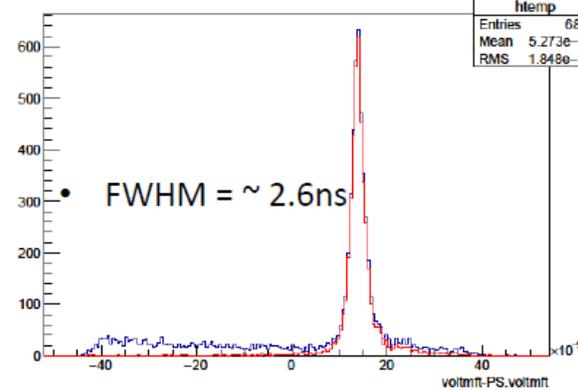
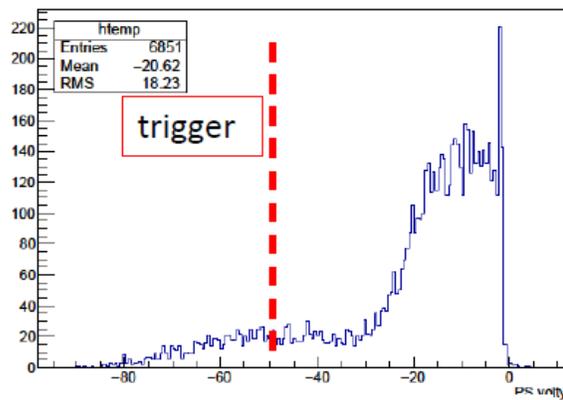
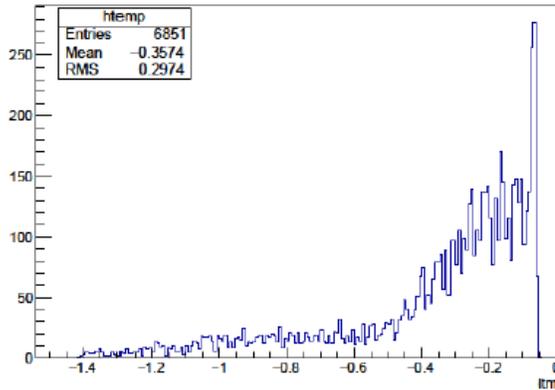
2016-08-04 slide

Select time at 10% height of raw signal

PS peak height distribution

PS charge height distribution

$\Delta t$  distribution

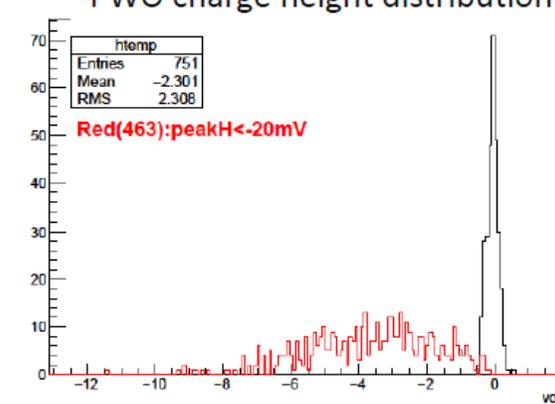
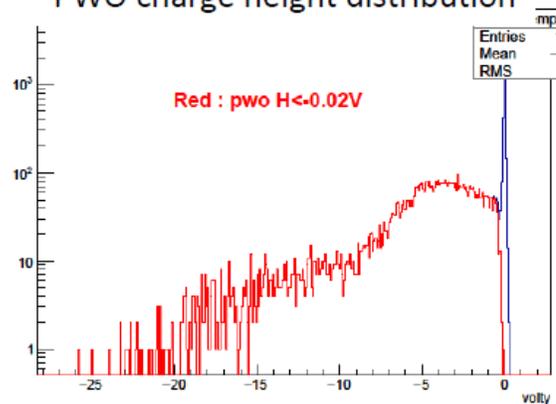
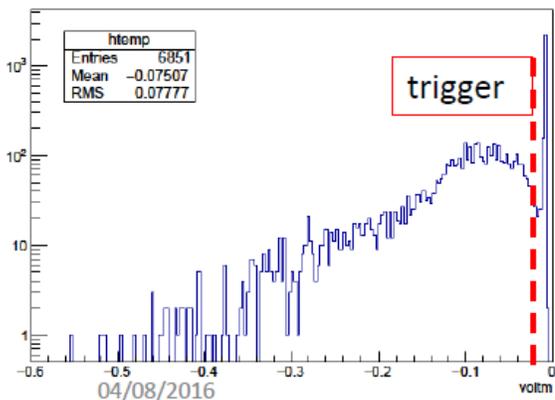


- At that time 0.5MeV gamma and 1.2MeV gamma from  $^{22}\text{Na}$  source were not perfectly distinguished.

PWO peak height distribution

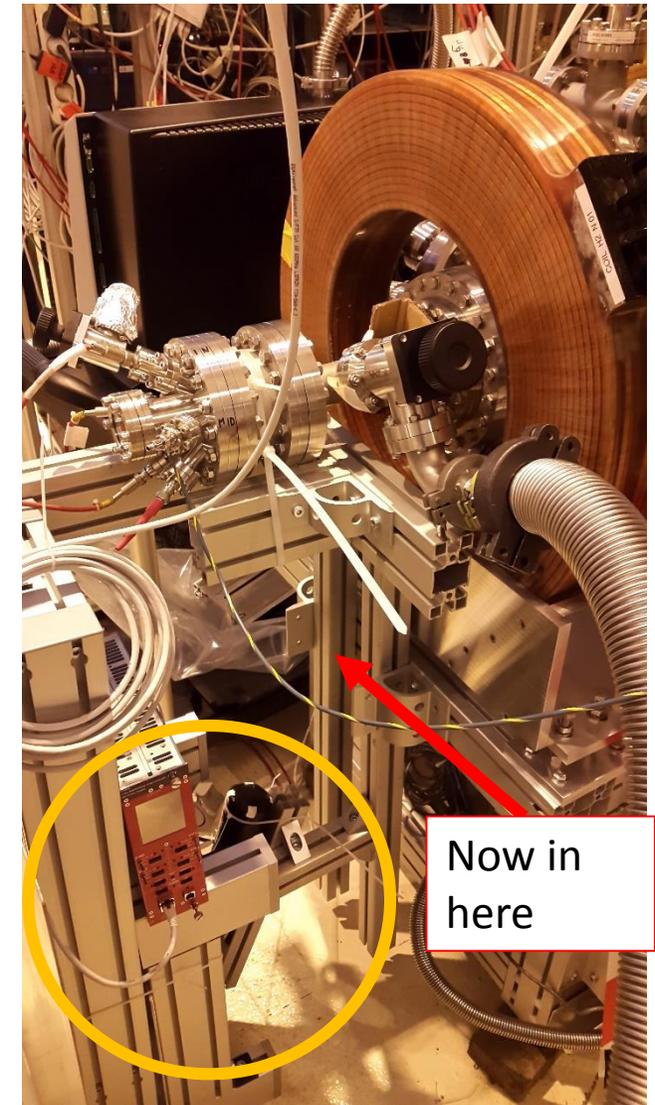
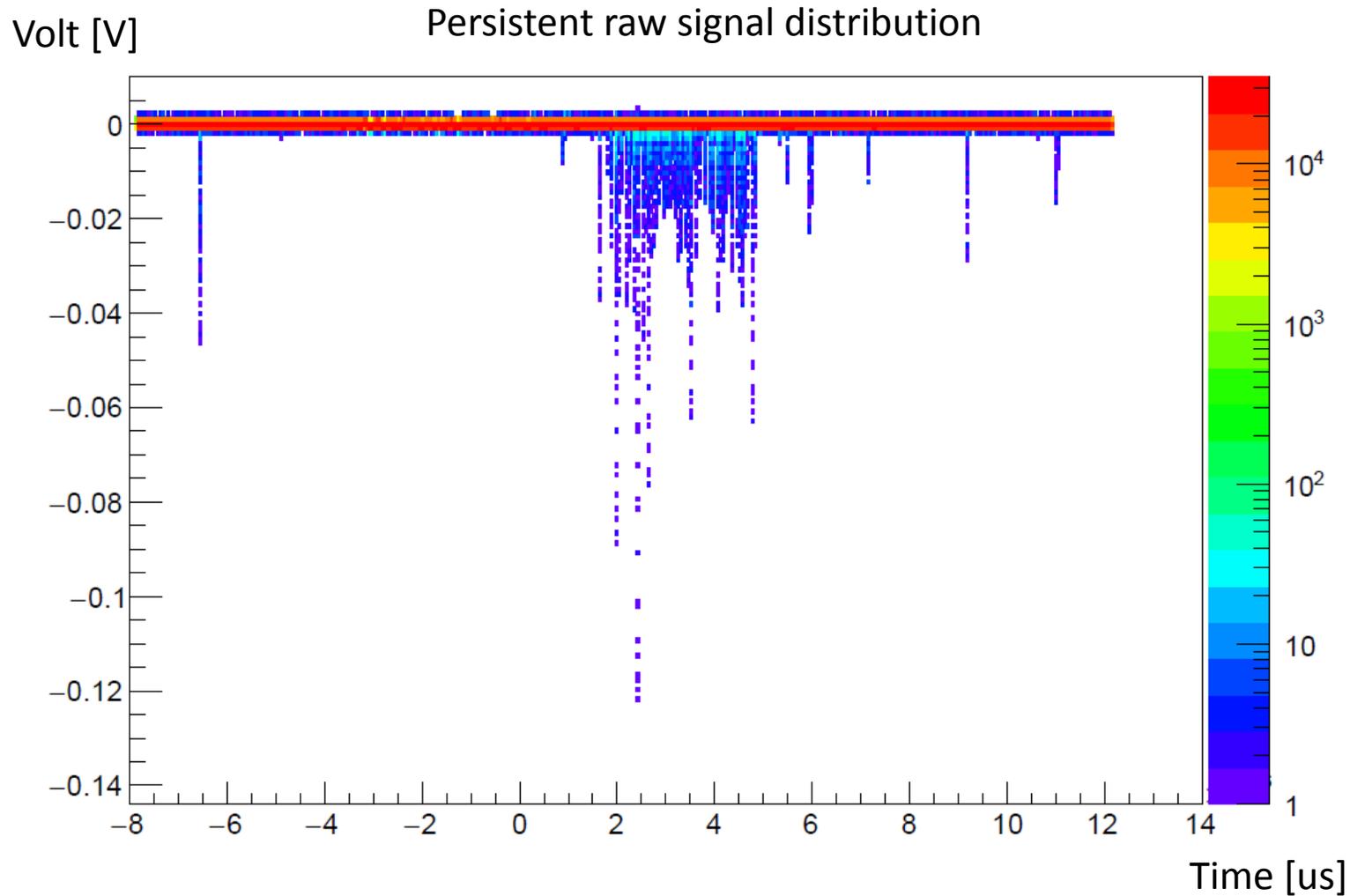
PWO charge height distribution

PWO charge height distribution



→ Gamma measurement by positron annihilation in beam line is being prepared.

# Part of taken data

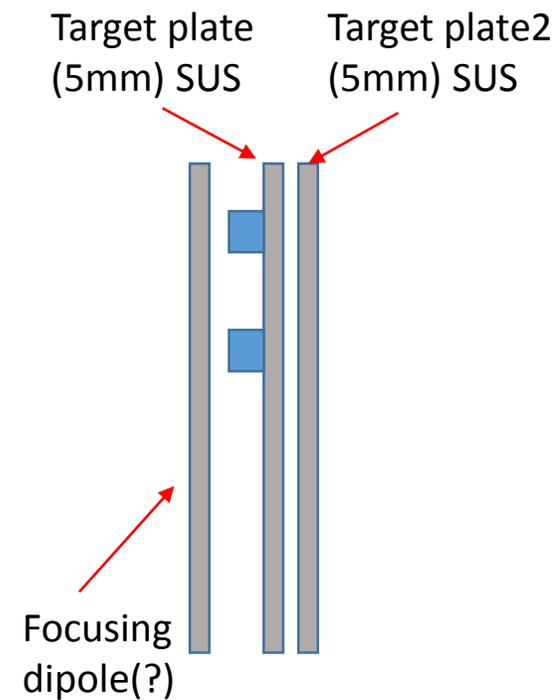
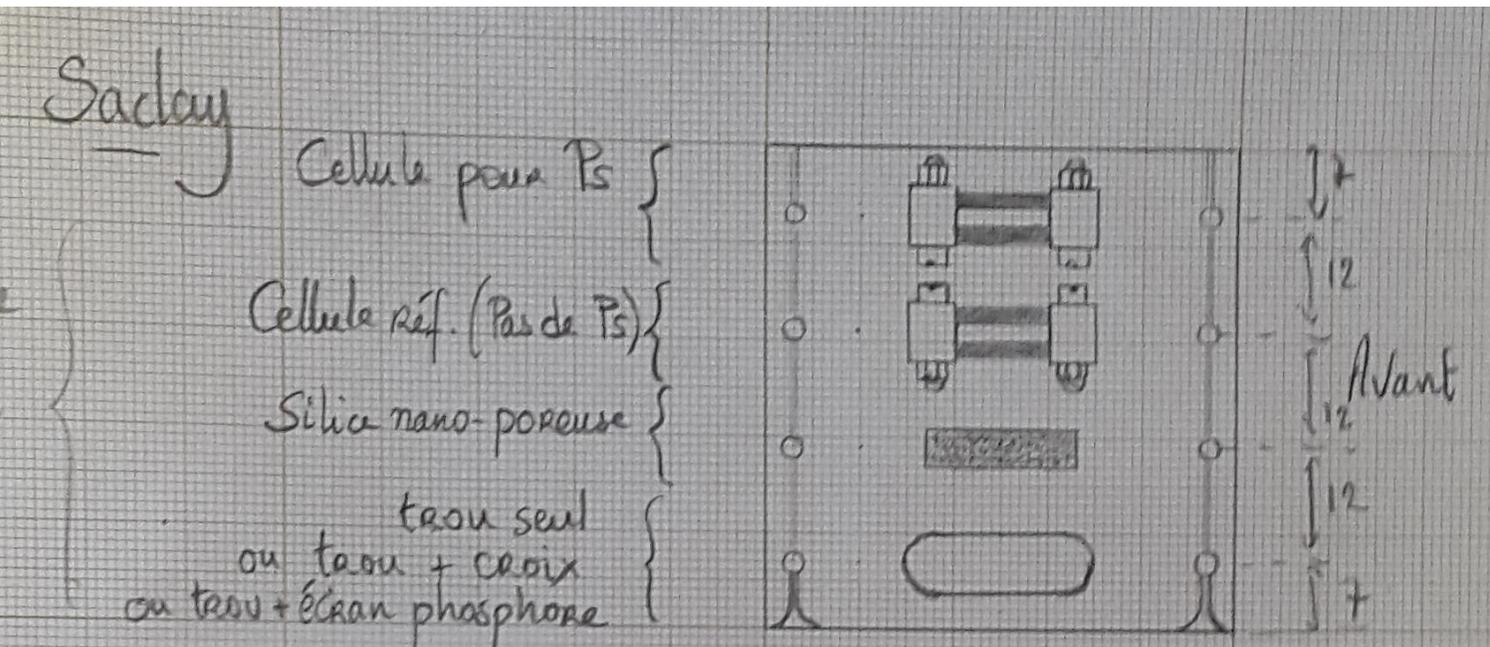


# PWO calibration study

- Part of data taken with HV (-2kV) with CCD camera
  - oscilloscope speed is limited by sample size
  - To increase speed, ~20us time window with binary file format is used.
  - file changing code from binary file to root file is made (Lecroy)
- Data analysis will be done and compared with last data result.

# Sample holder design changed

Front view (from Polyne)



- I need to check changed sample holder effect in simulation.
- If sample holder thickness is critical, I will suggest them to change material..
- Escaped positronium distribution would be also changed.
- Simulation geometry change is ongoing

# Status is CEA Saclay

- Linac is working 😊 and  $10^6$  positron has beend delivered from last week.
- Buffer gas trap tunning, MCP test with gamma signal is ongoing

# To do list

- PWO detector data analysis.
- Simulation check for positronium and anti-proton tracker.
- Help antion project
  - Help babara's analysis of MCP+CCD signal.
  - Help to test and to install electrode & buncher