

# Gain and dark rate measurement status report

11/01/2019

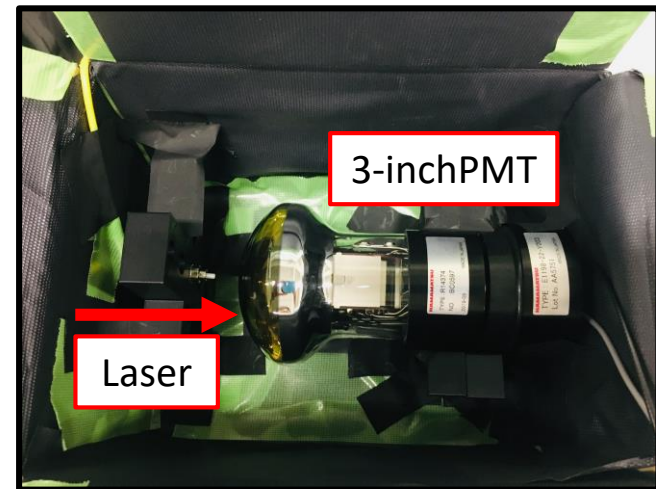
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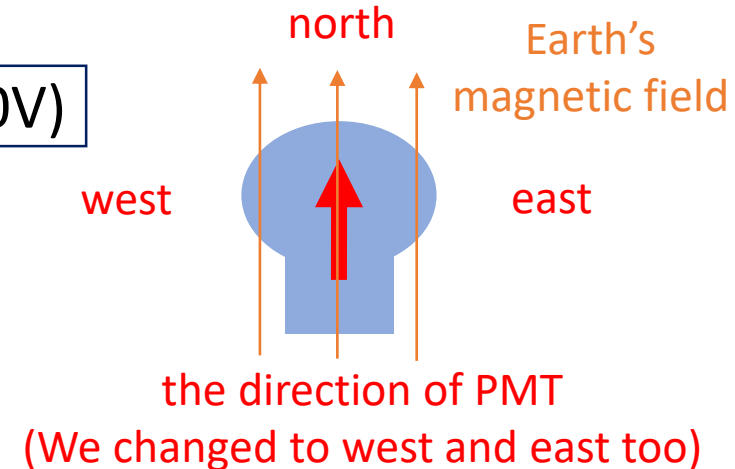
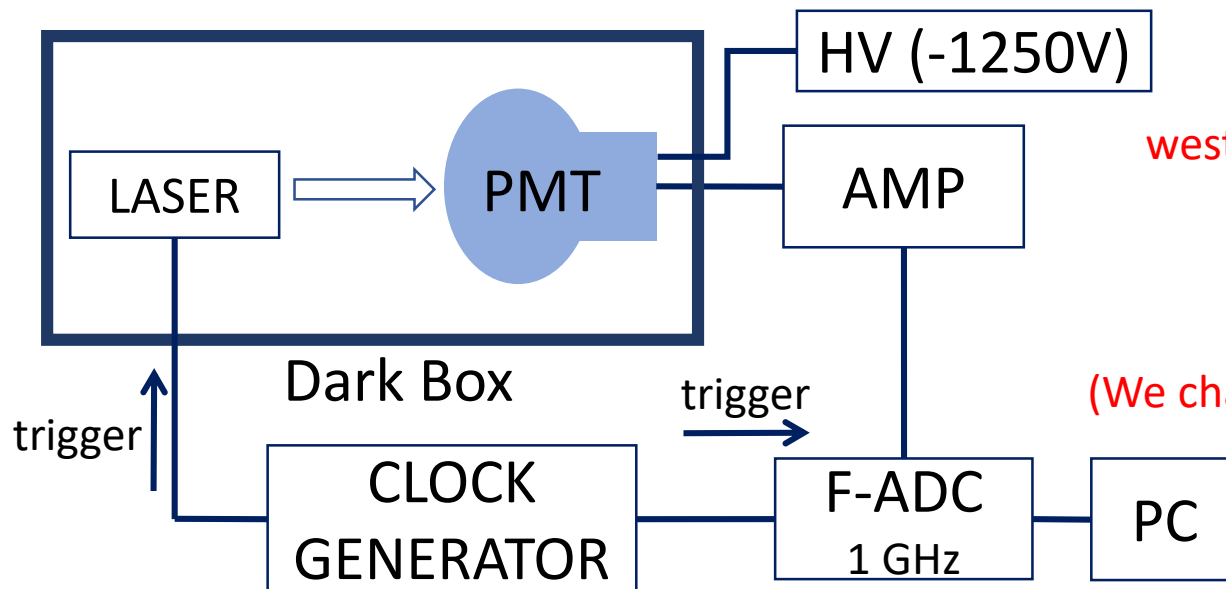
# Gain measurement

Until this week...

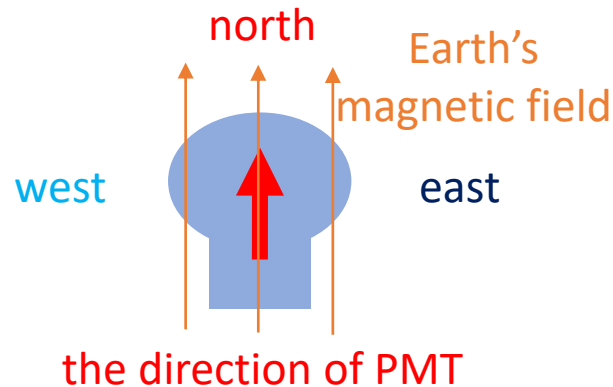
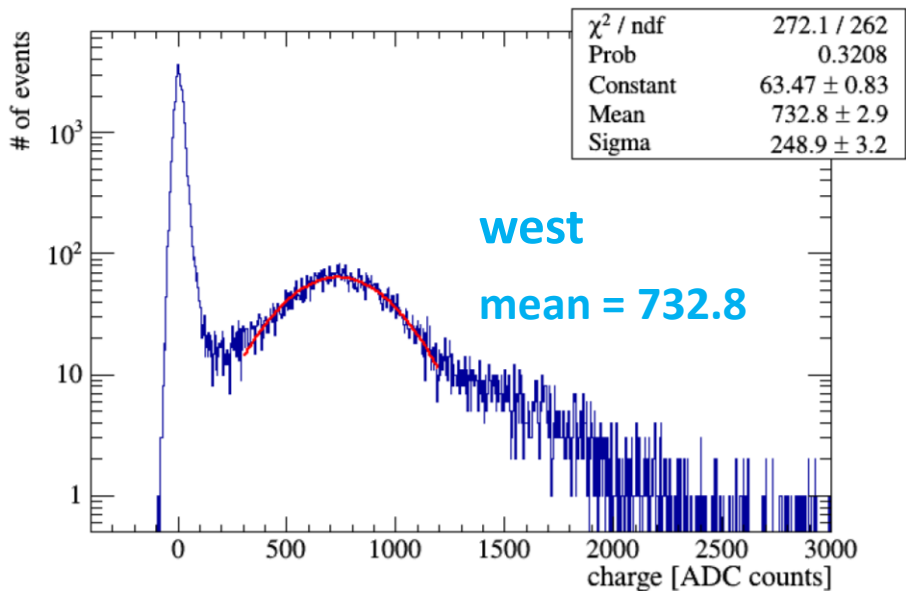
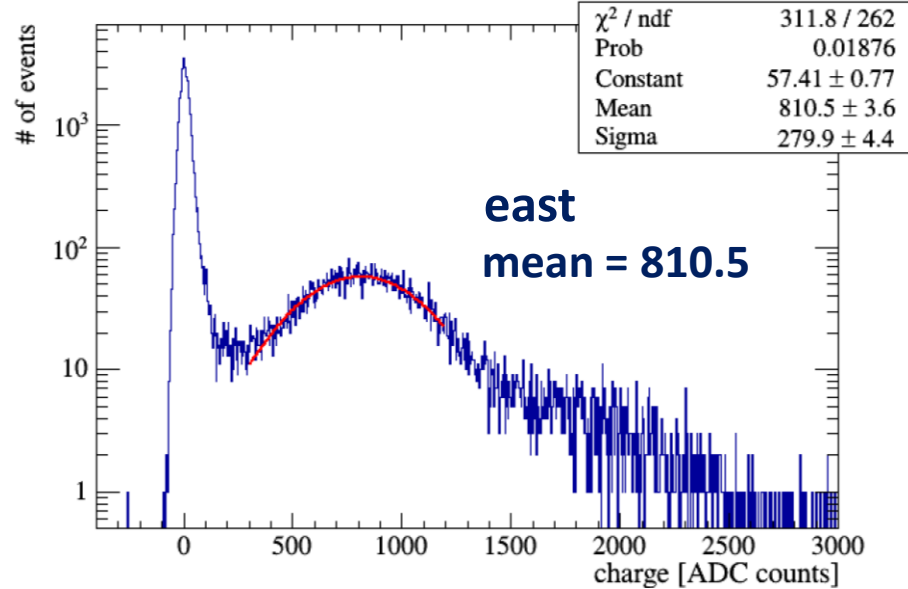
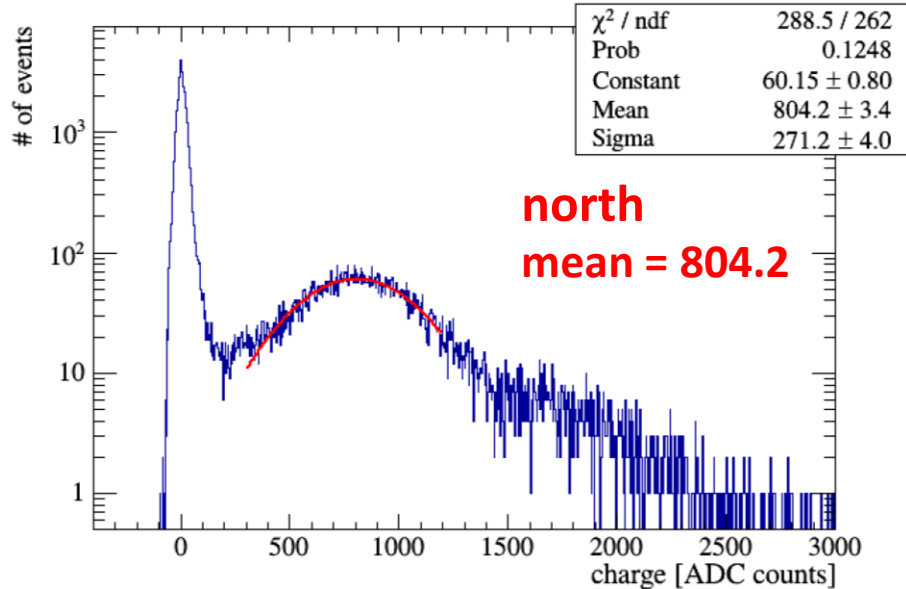
- We have measured the gain by F-ADC in three types of 3-inch PMT's directions to the Earth's magnetic field to compare with Inomoto-san's report.



setup (for gain measurement)



# Gain measurement

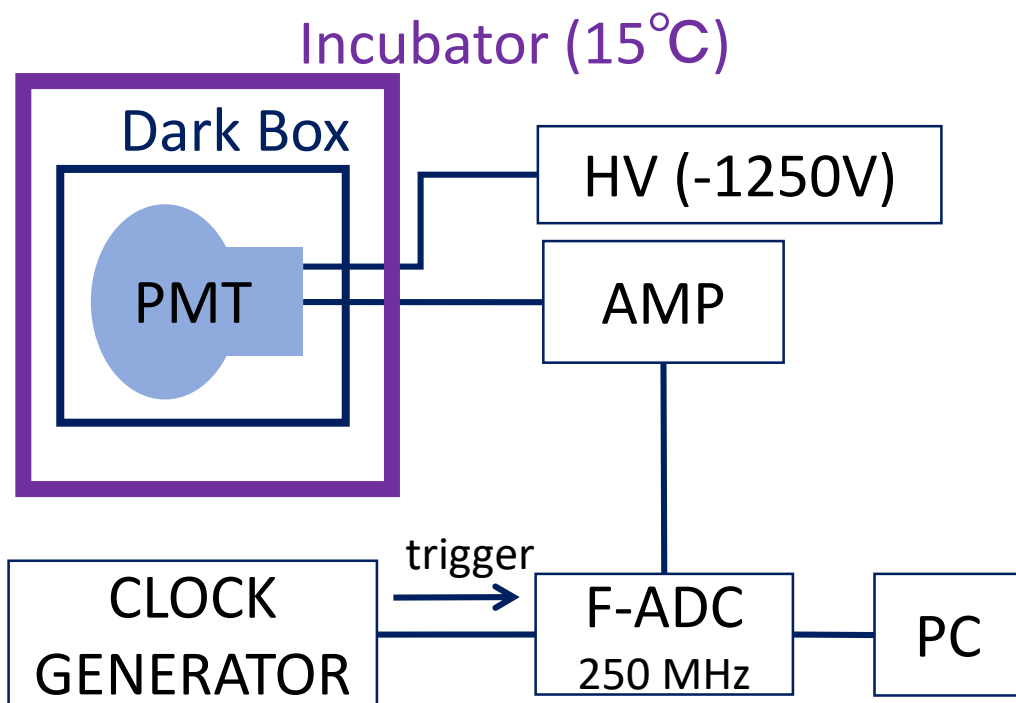


- The gain variation was about 10%, but not so much between north and east.

# Dark rate measurement

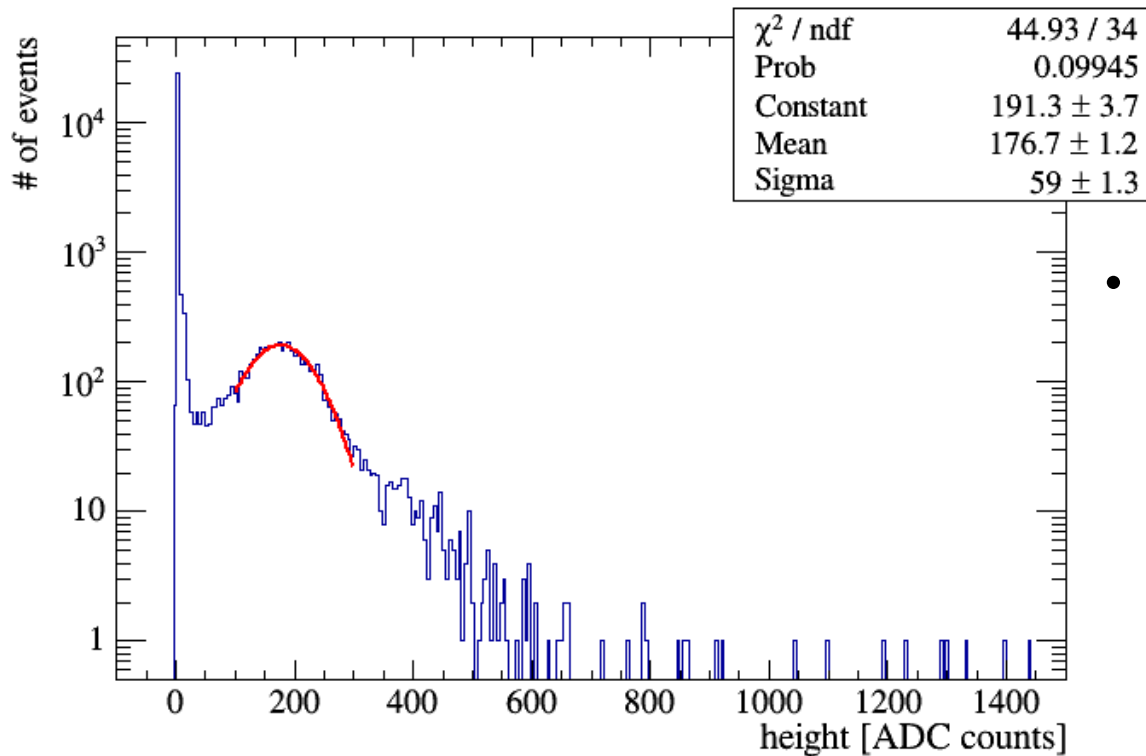
- We measured dark rate of 3-inch PMT (Hamamatsu's) by F-ADC, keeping the temperature at 15 °C with incubator.
- Trigger is generated by clock signals, and we counted the PMT signals synchronized with them.

setup (for dark rate measurement)



Incubator

# Dark rate measurement



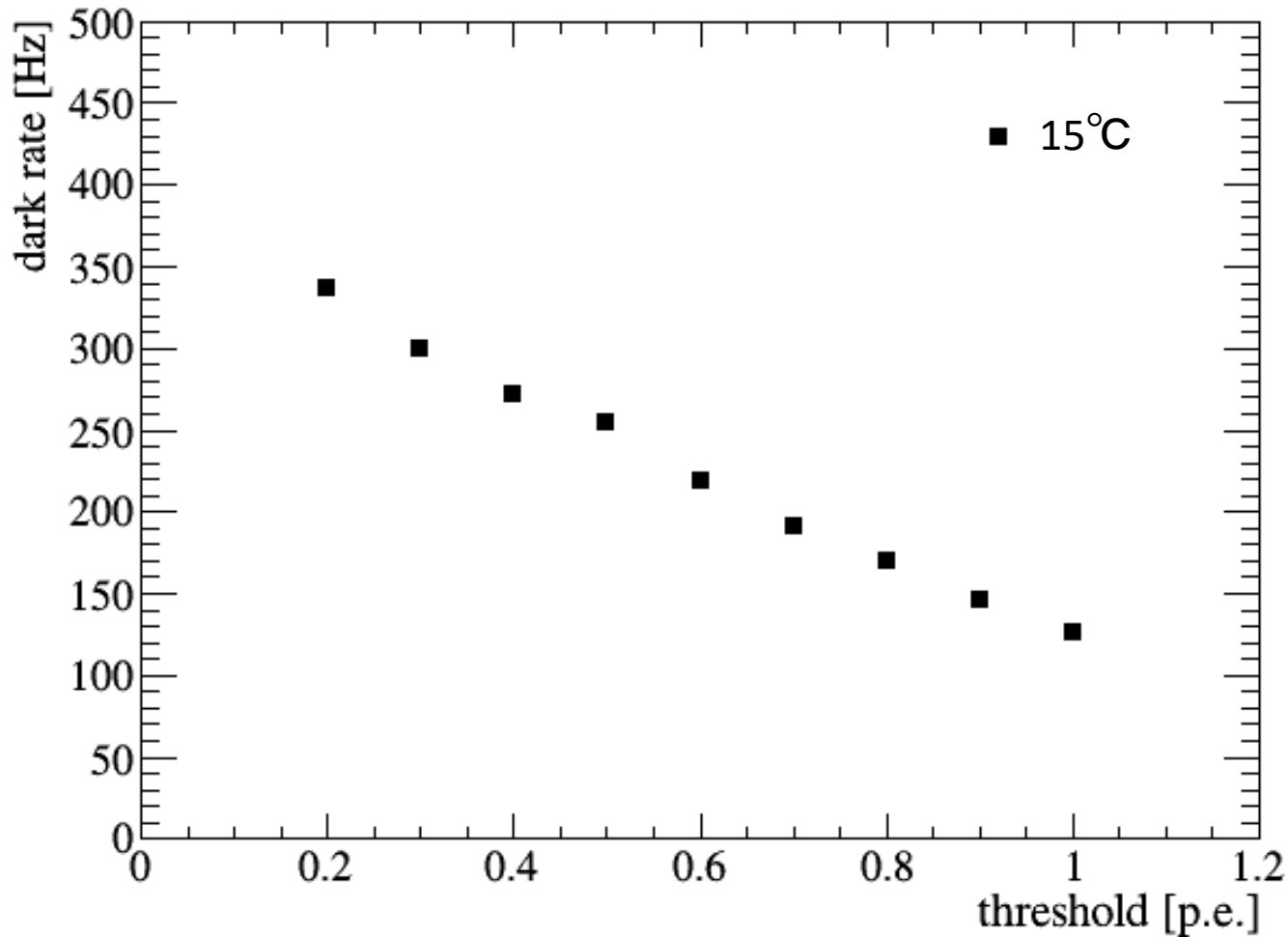
- The threshold for dark noise is based on the gain at 15°C ( left graph ).

- We defined the dark rate as below,

$$\text{the dark rate} = \frac{\text{the counted number of PMT signal}}{\text{time triggered by clock signal}}$$

- Changing the threshold height from 0.2 p.e. to 1 p.e., we counted the dark noise signals above the threshold.

# Dark rate measurement



- The dark rate was few hundreds Hz.
- The higher threshold height we changed, the lower dark rates were found.

# Summary

- We found that the gain changed in three directions as Inomoto-san had already found.
- We measured the dark rate by using F-ADC, and that was reasonable.

# Future plan

- I will measure the after pulse property and dark rate of Chinese PMT, and compare with that of Hamamatsu's one.

# Back up

## Event example

