Status Report

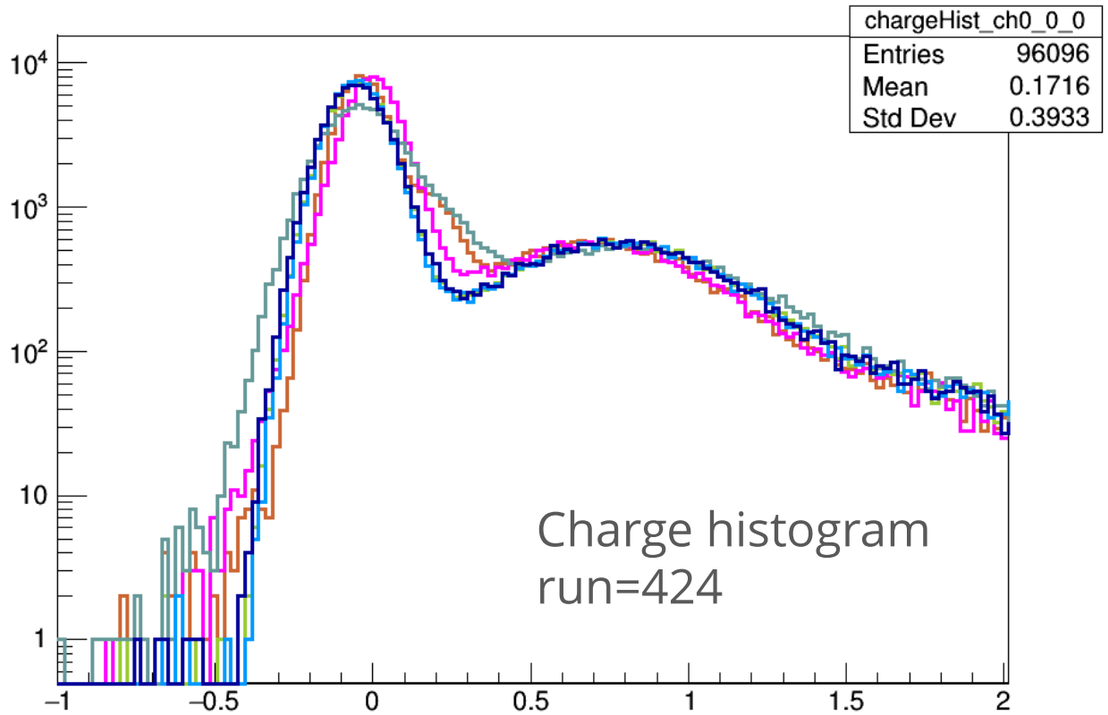
January 11th, 2019

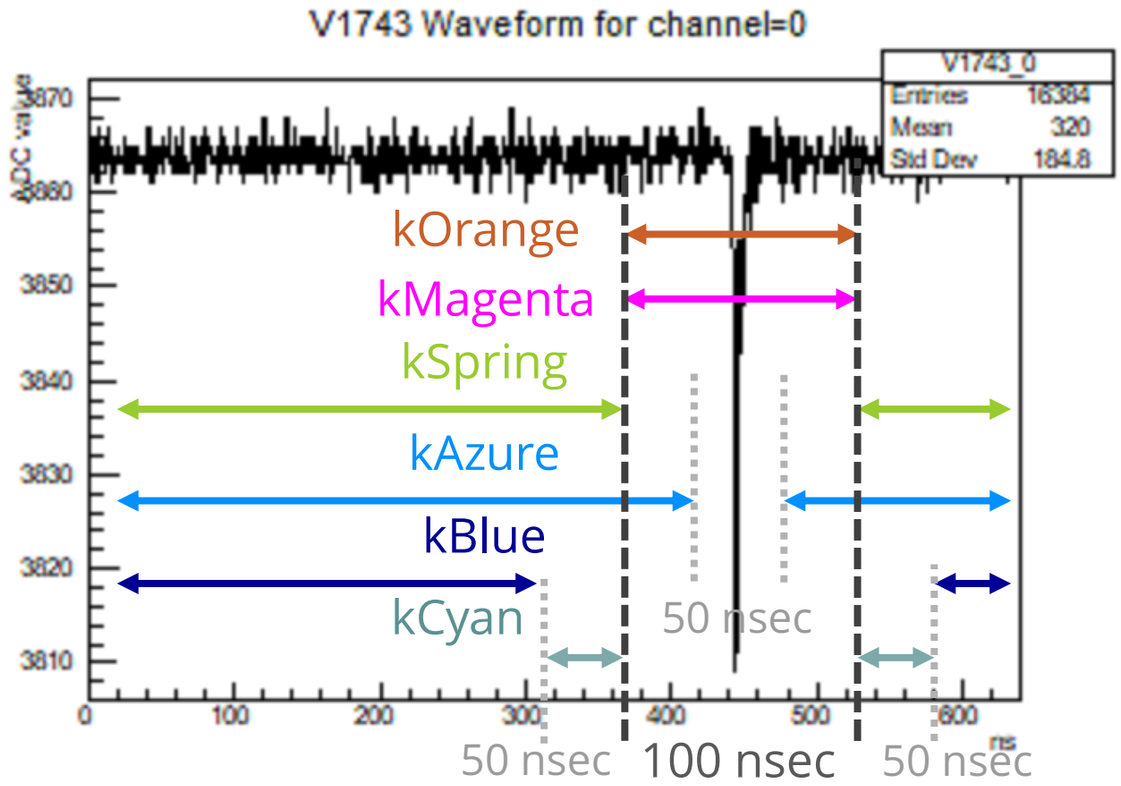
Haruya Morikawa
Tokyo Institute of Technology

What I have done

- Change CalculatePedestal()
- We have all Gain/Peak-to-Valley/TTS.
  - for BC0035/38 Negative/Positive HV
  - all data used the new noise calculation (Calculate Pedestal)
  - BC0038 Negative meas. had used the smaller lens -> need re-meas.
- TTS vs #pe plots @+/-1200/1250V
- Stability

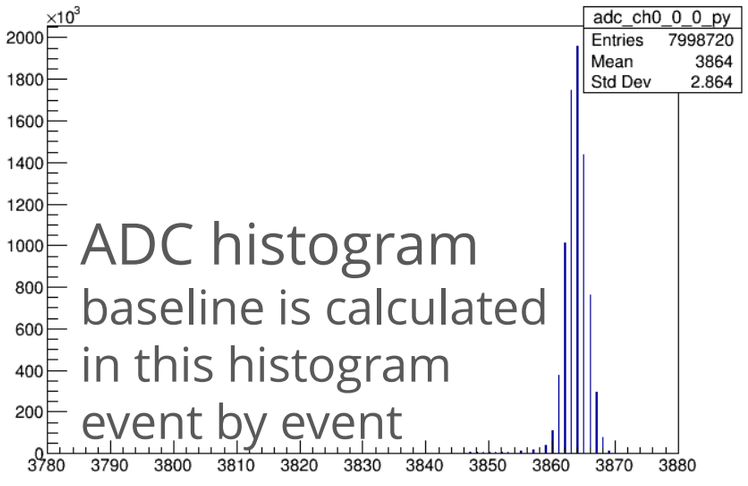
CalculatePedestal()



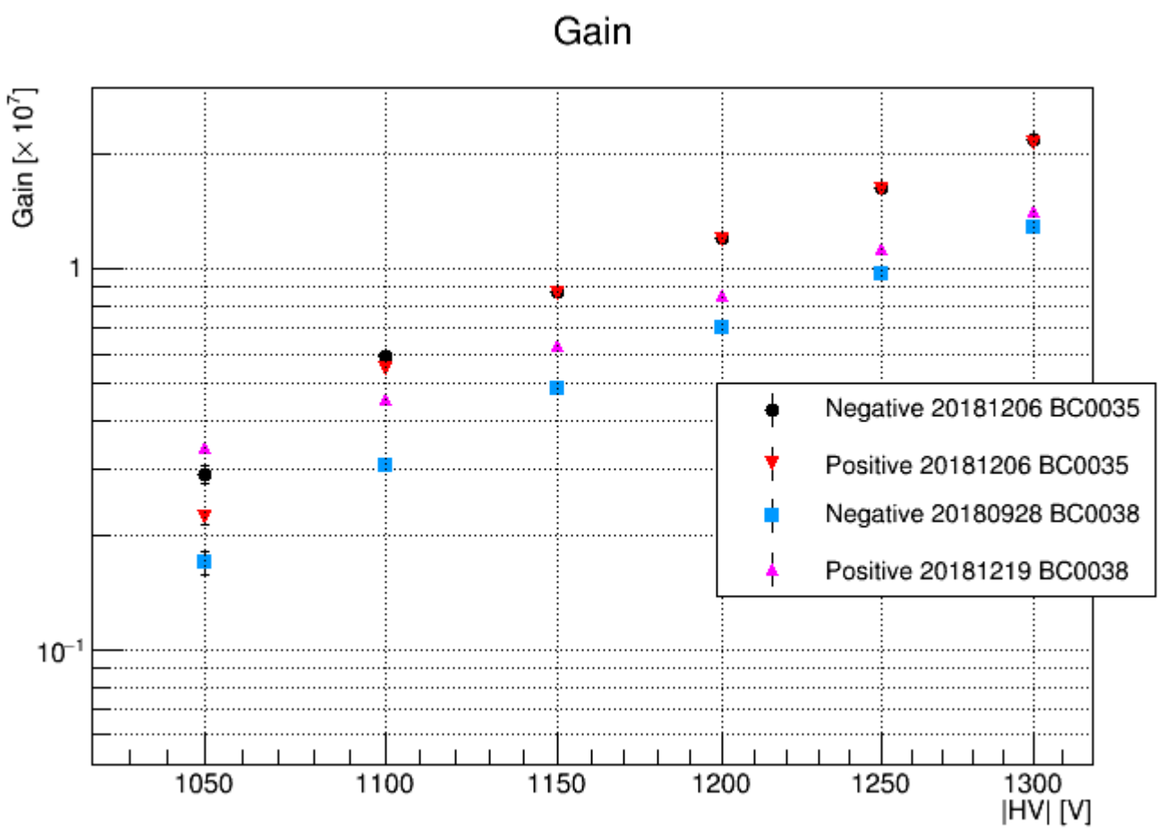


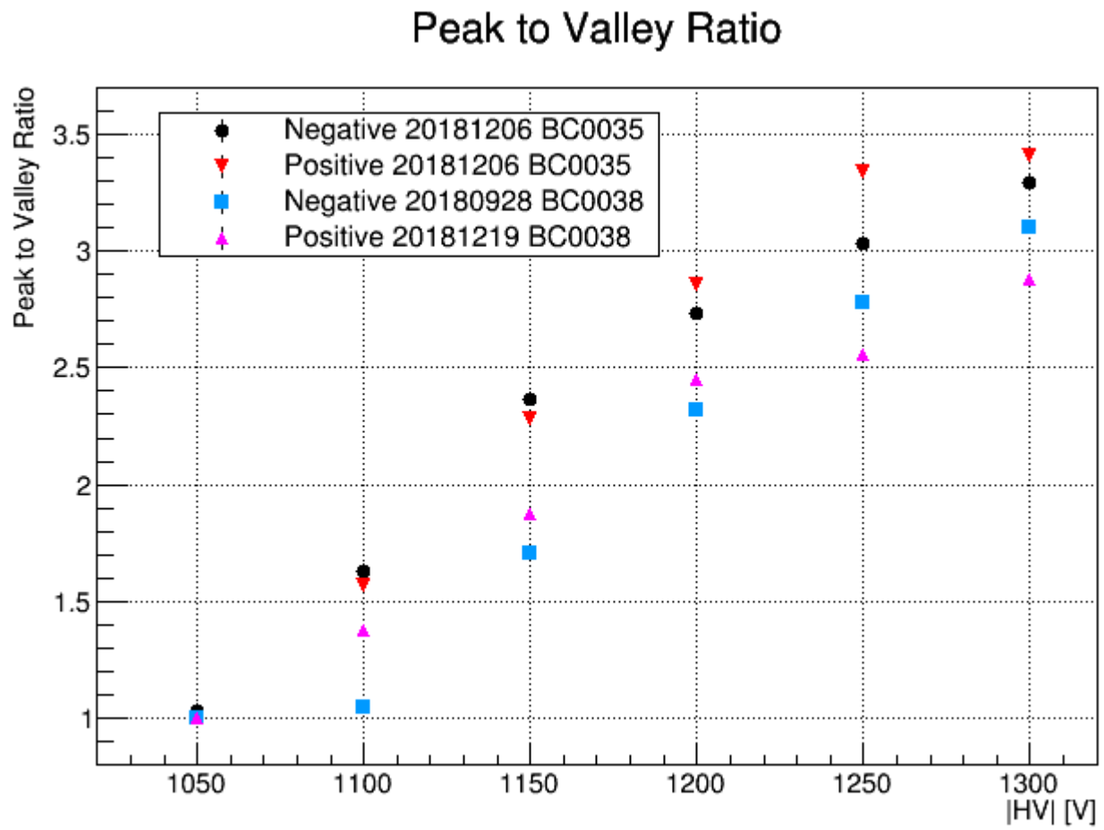
Which data will be filled when creating ADC histogram:

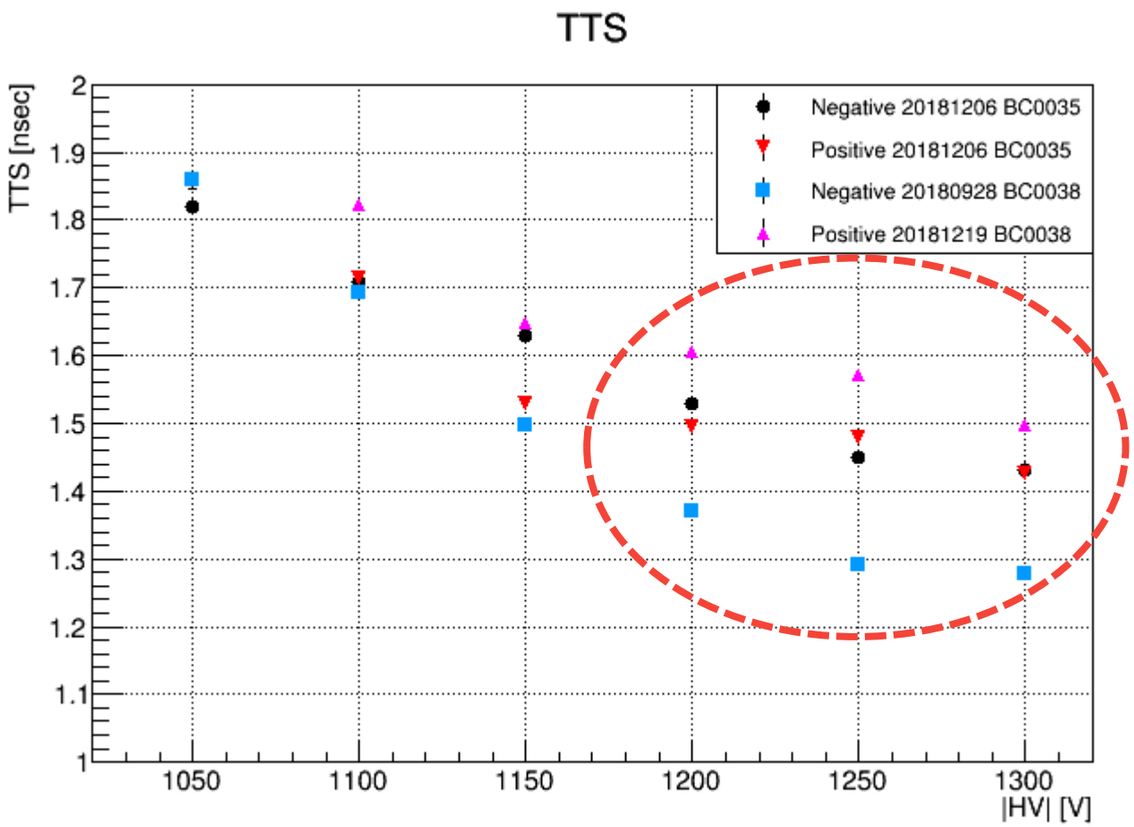
- kOrange+5: Previous method 100 nsec (not Gaussian fit)
- kMagenta: Gaussian fit
- kSpring+5: Exclude 100 nsec (not Gaussian fit) -> Adopt
- kAzure+7: Exclude 50 nsec (not Gaussian fit)
- kBlue+2: Exclude 200 nsec (not Gaussian fit)
- kCyan-5: Both sides 50 nsec each (not Gaussian fit)



Gain/Peak-to-Valley/TTS



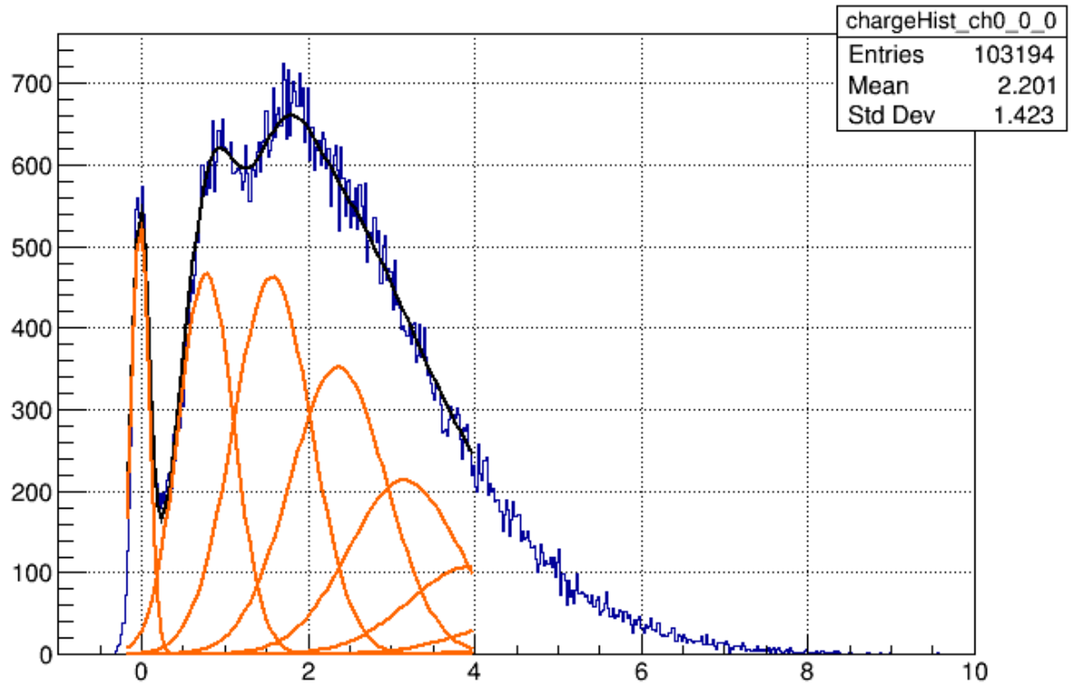




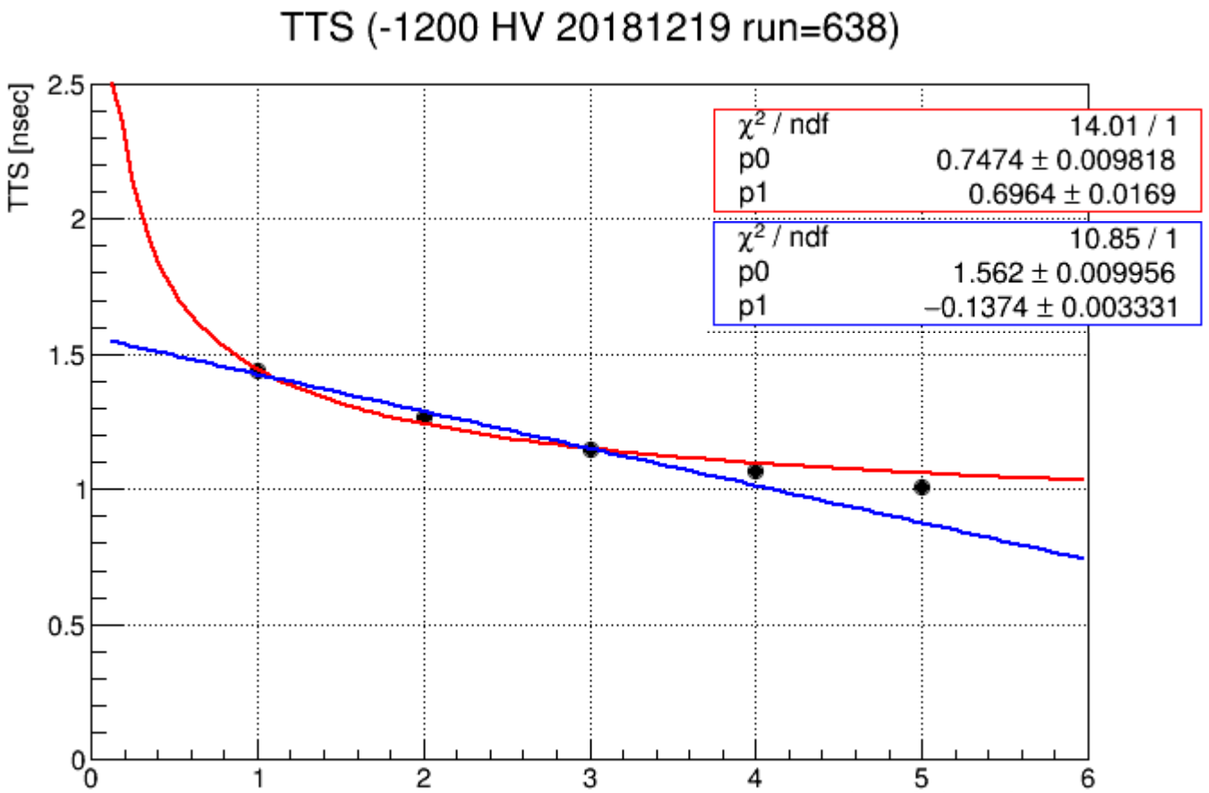
- TTS: not good.
  - due to the smaller lens?
  - the measurement in Sep. used the smaller lens.
  - other measurement used the larger one.

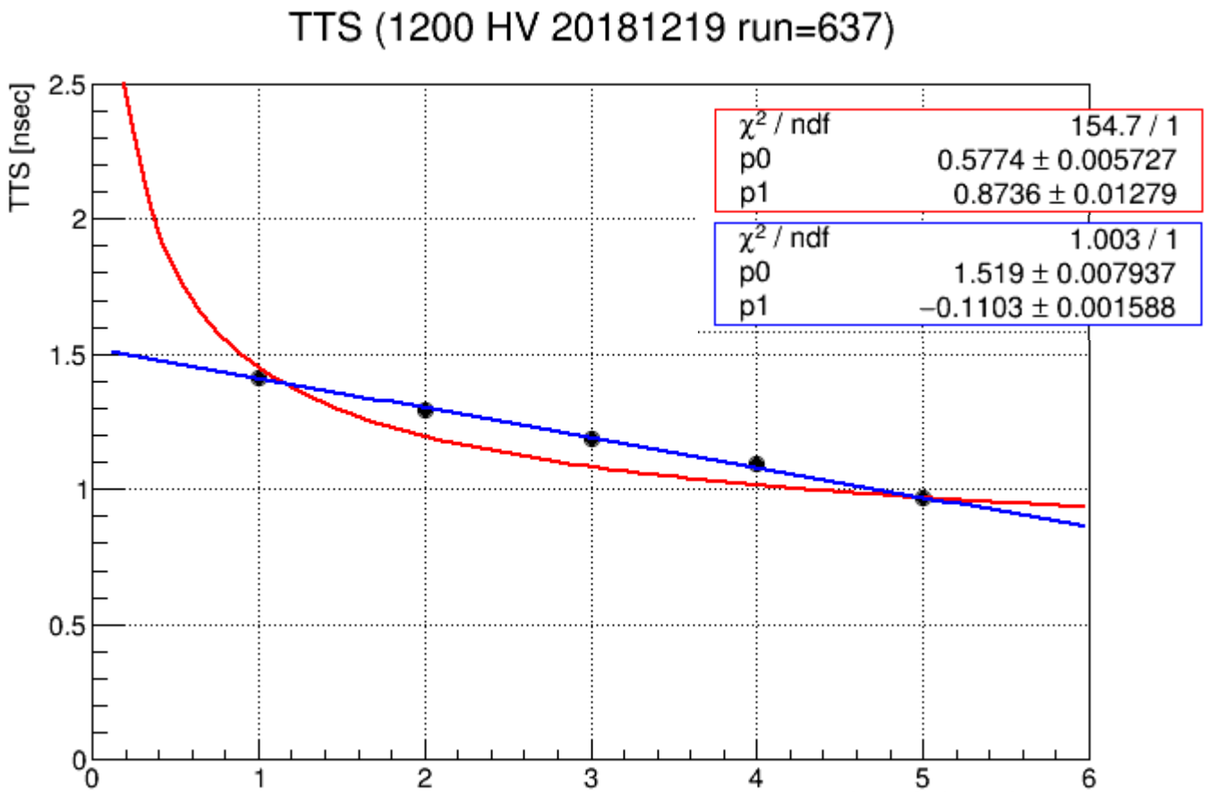
TTS vs #pe plots

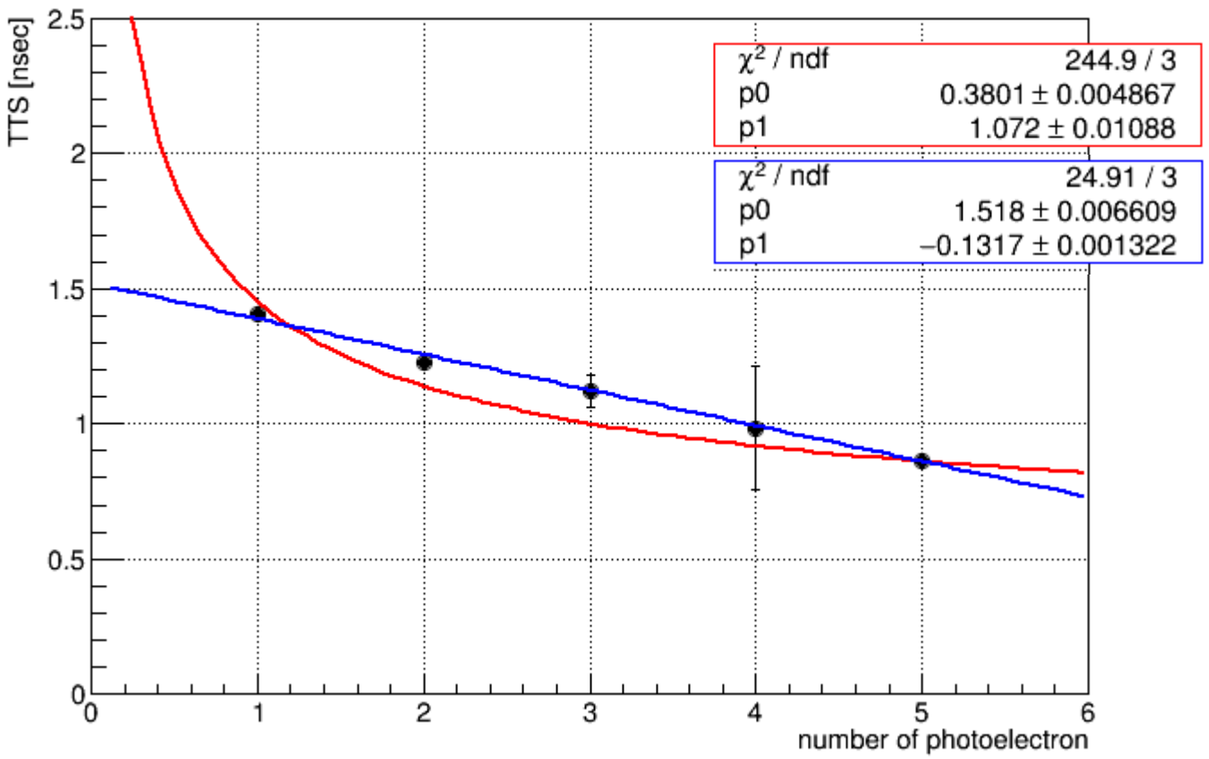
- When creating a histogram of TT of n>1 pe, the corresponding events are extracted to satisfy $nQ_1 \pm 0.5\sigma_1$, where Q_1 and σ_1 are mean and sigma of 1 pe peak.
- I didn't consider the overlap effect of n pe peaks.
  - is this the reason why 1/sqrt(x) fit had failed?
- the function domain is inadequate at TTS of 5pe.
  - but if it was enough, 4pe peak should have quite overlapped with 5pe peak.

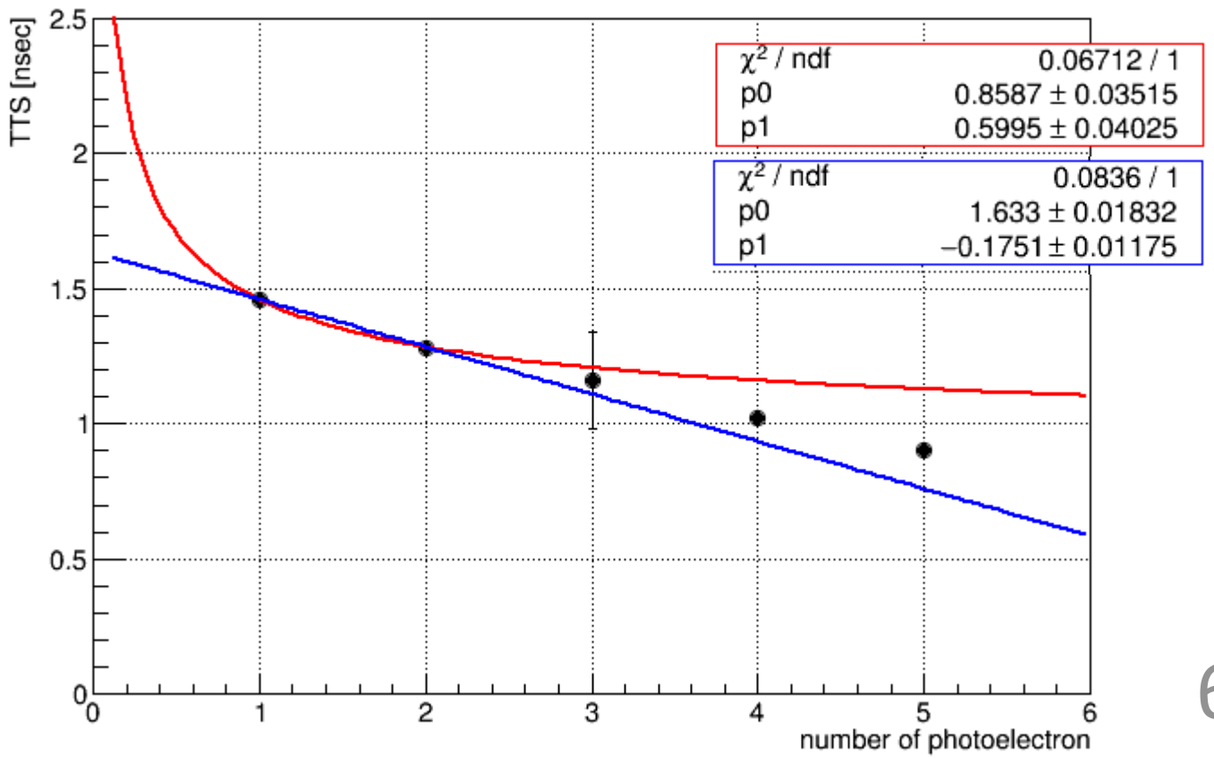


BC0038: p[0]+p[1]/√x, p[0]+p[1]*x

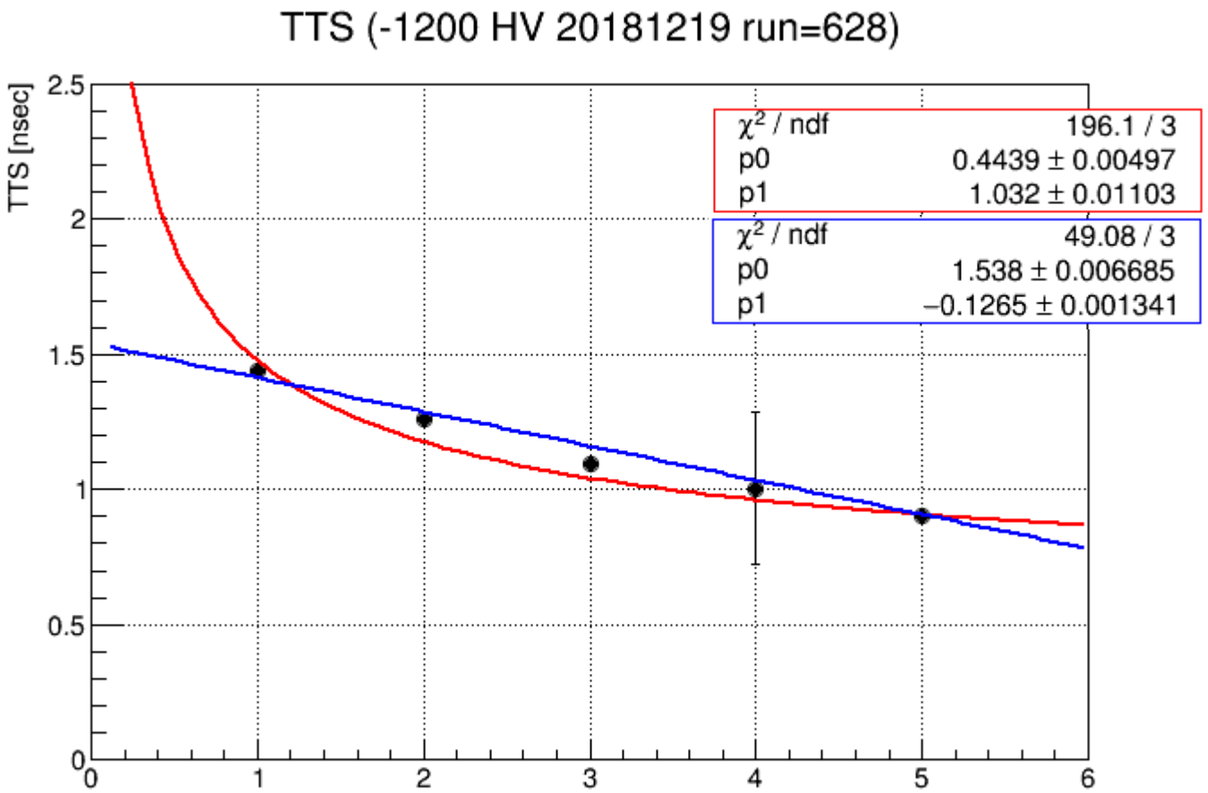


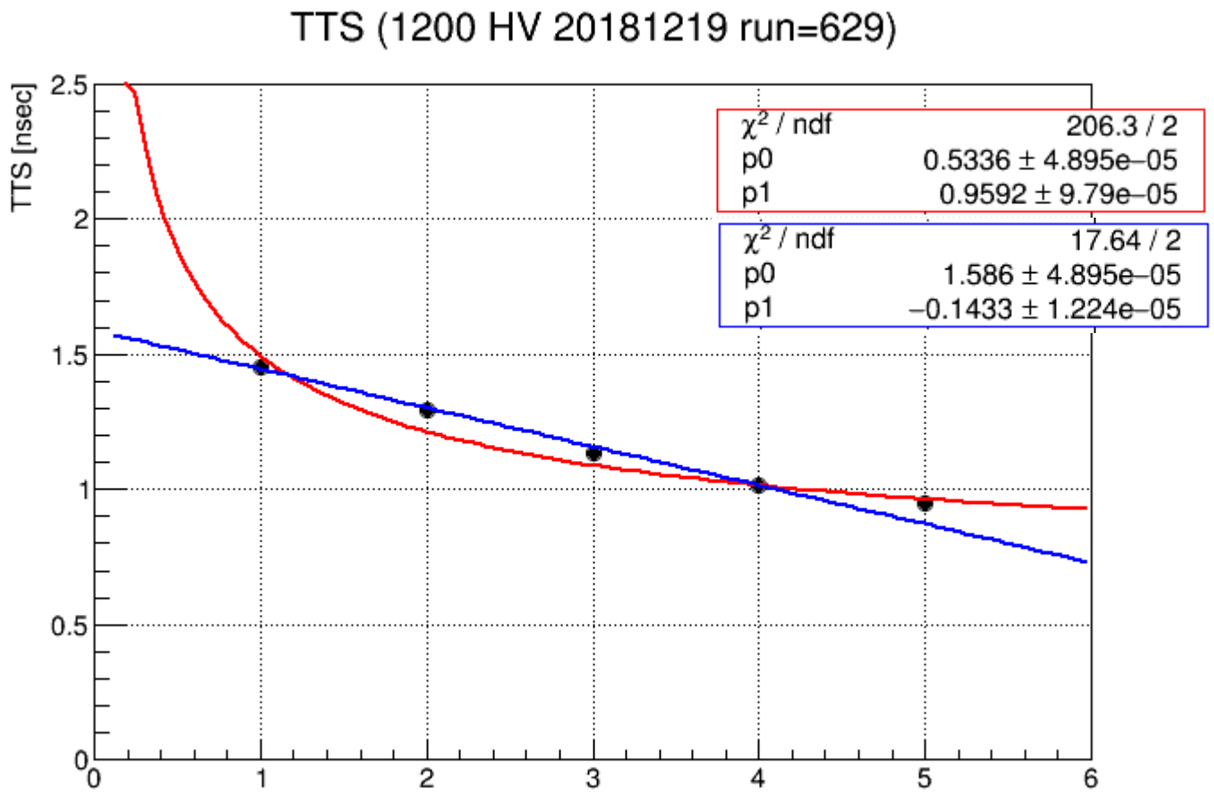


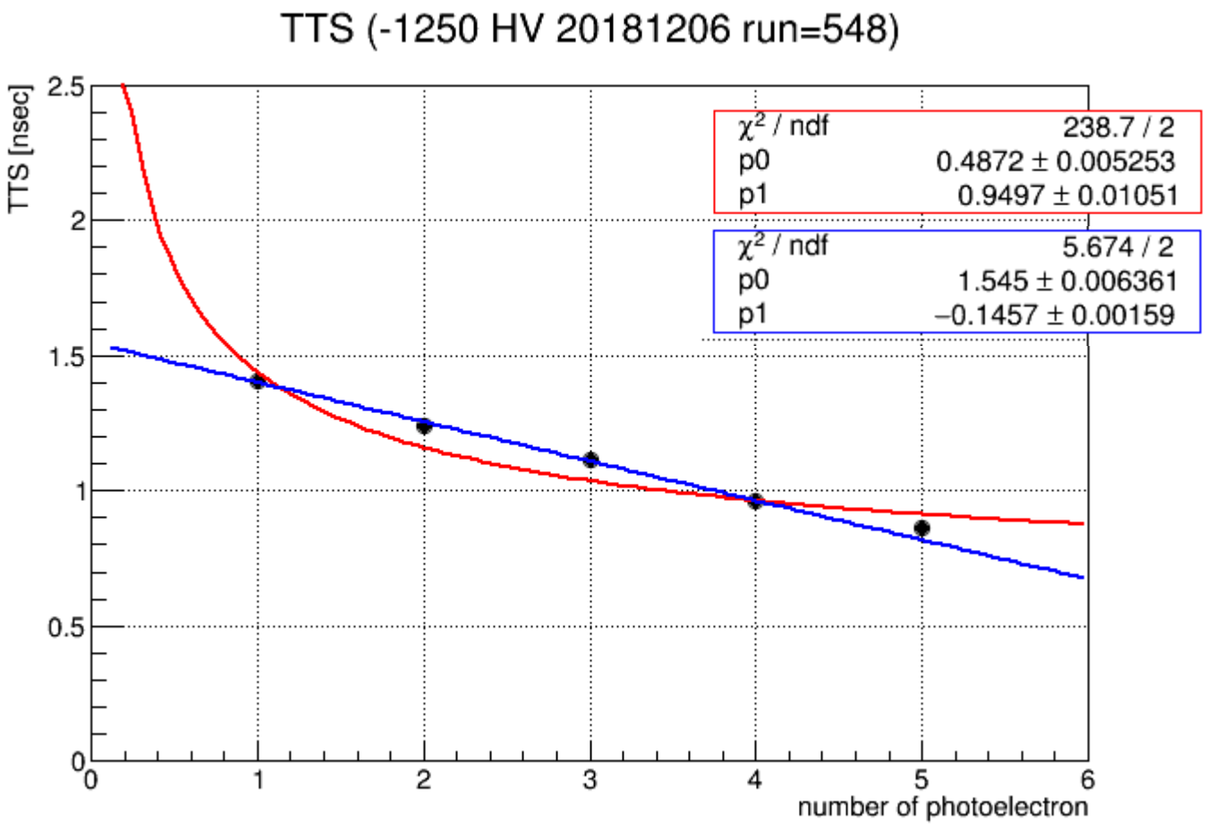


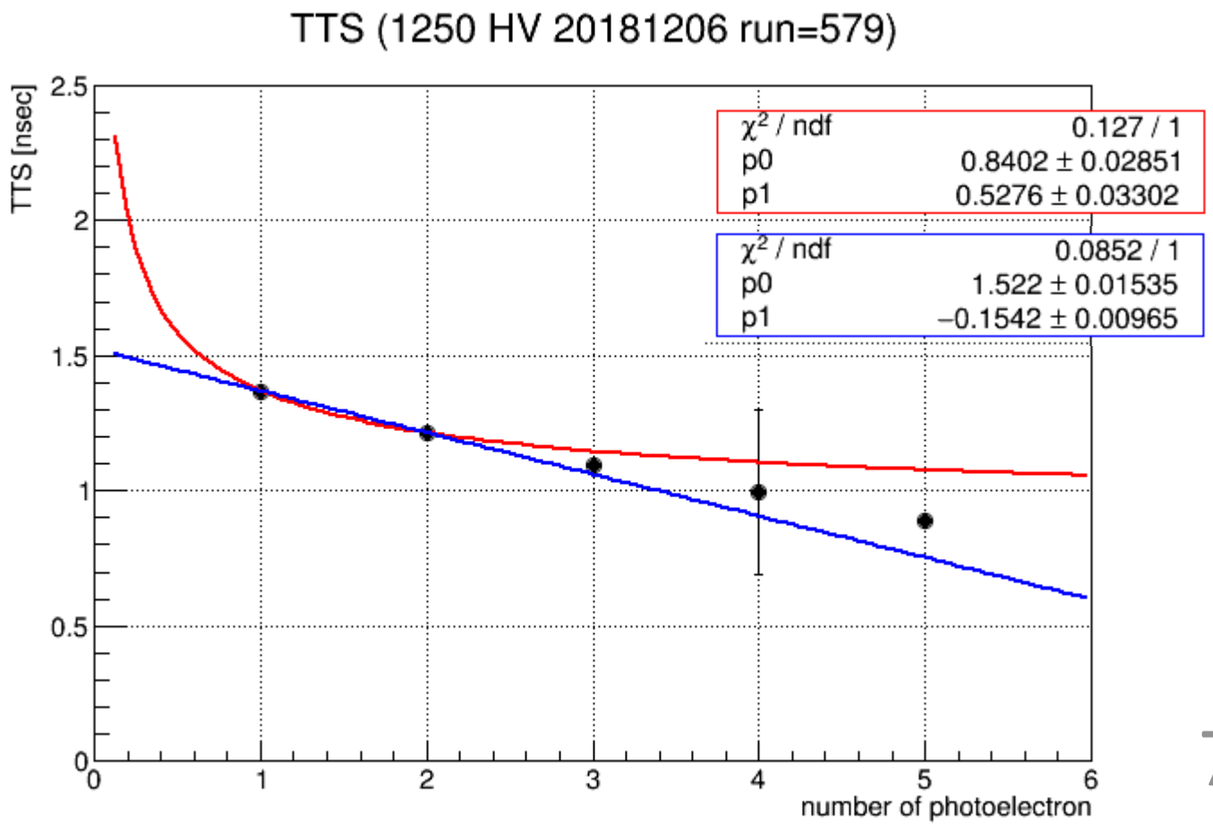


BC0035: p[0]+p[1]/√x, p[0]+p[1]*x

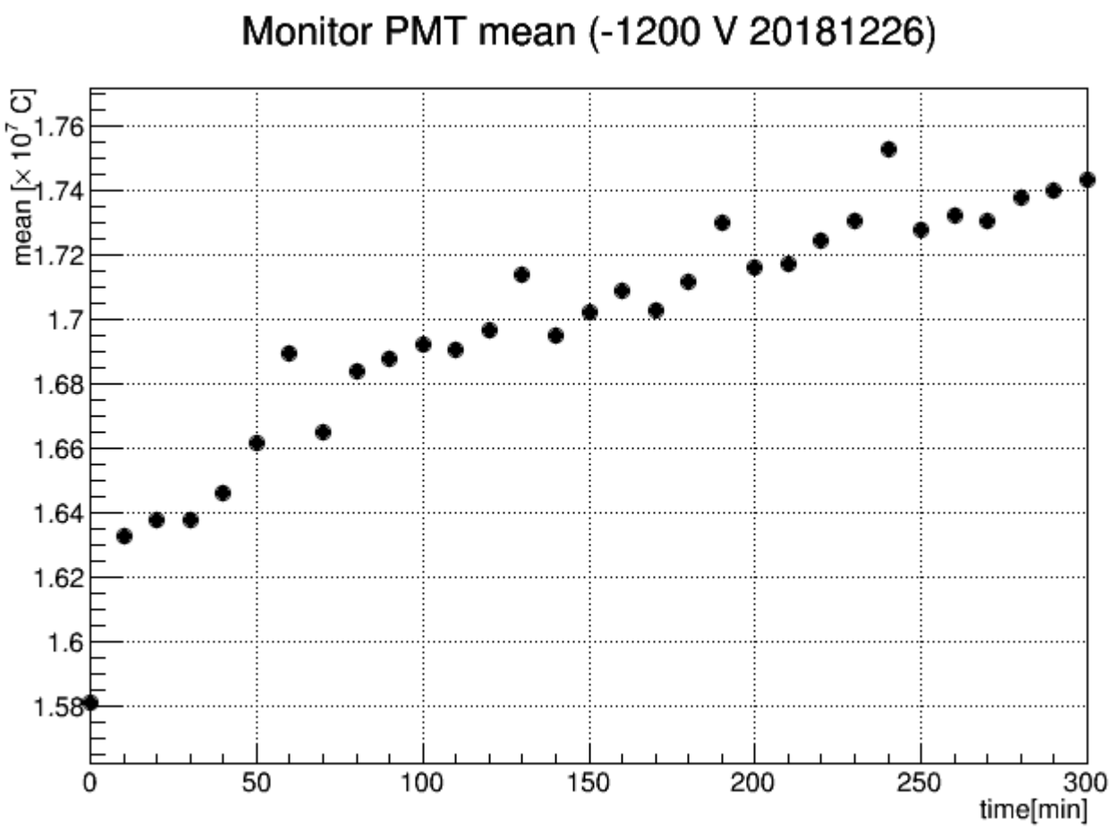


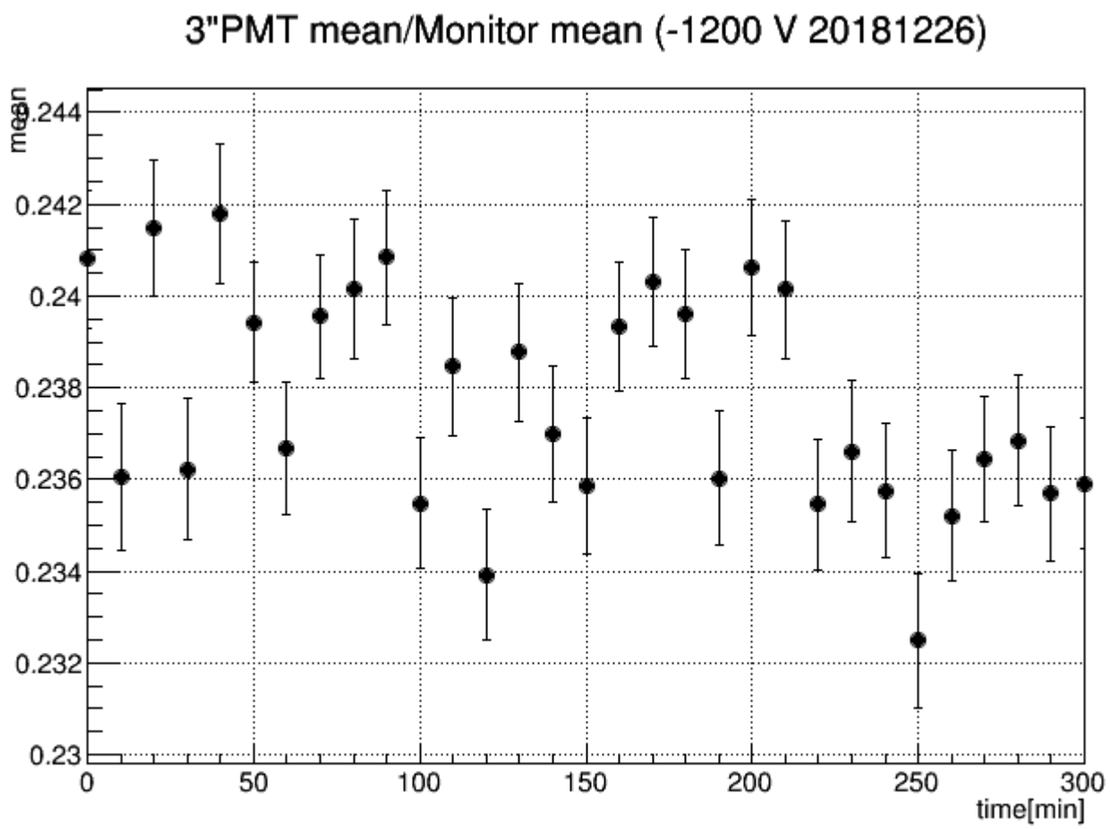


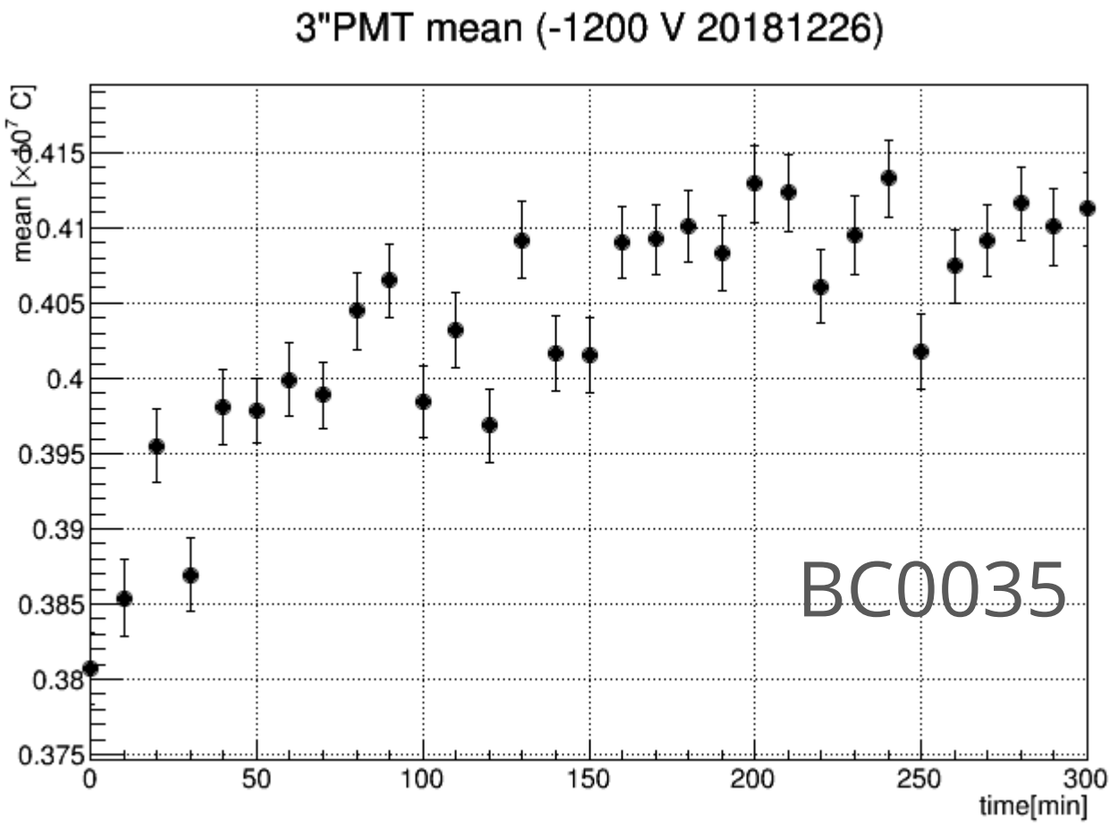




Stability: Histogram Mean

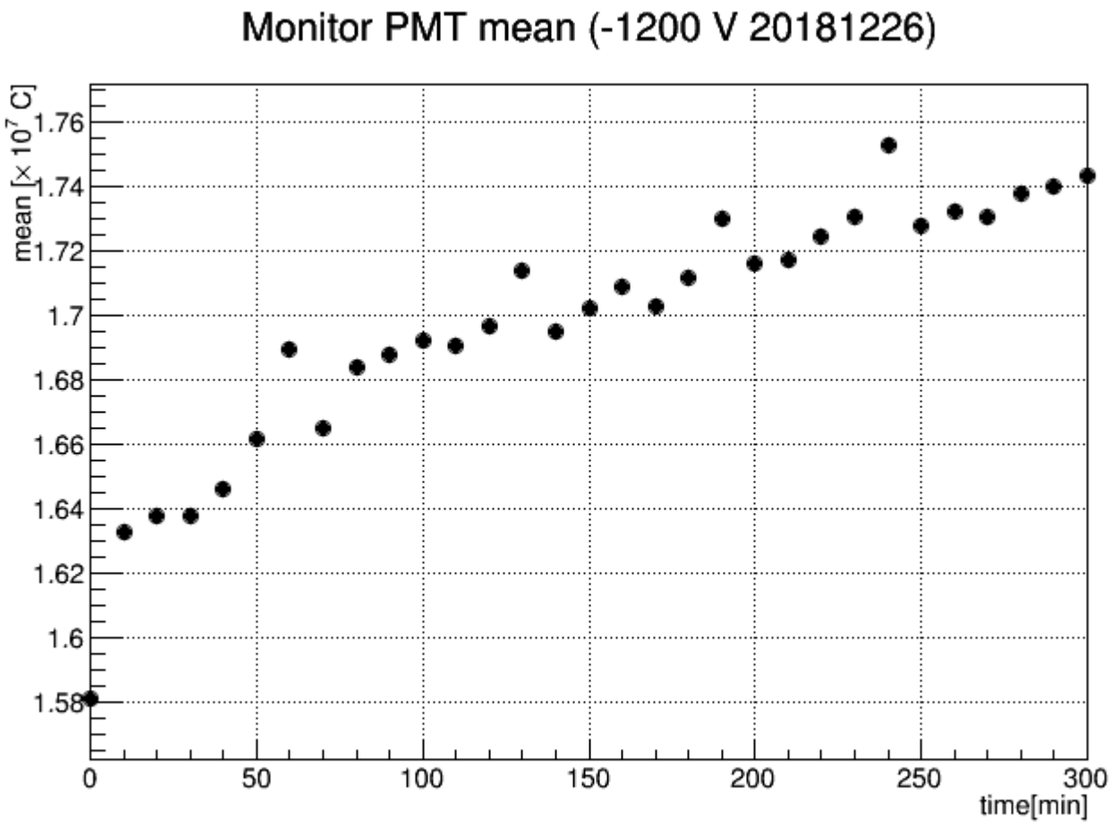


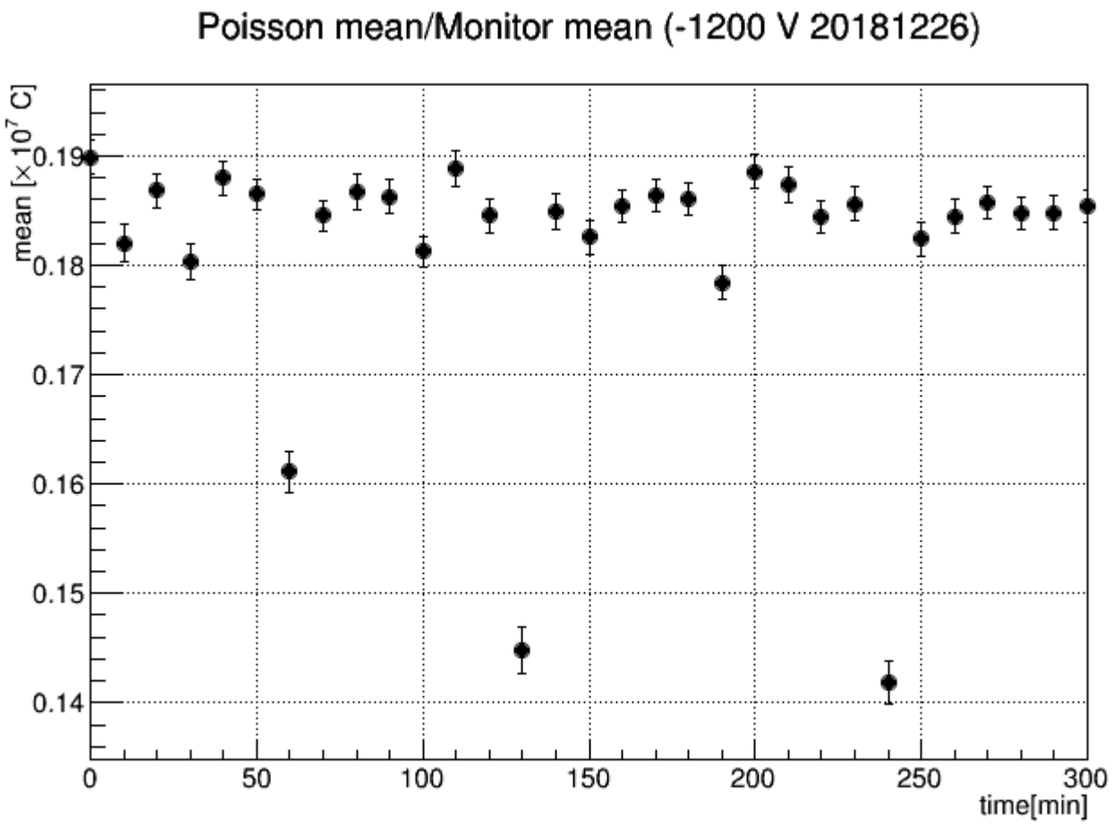


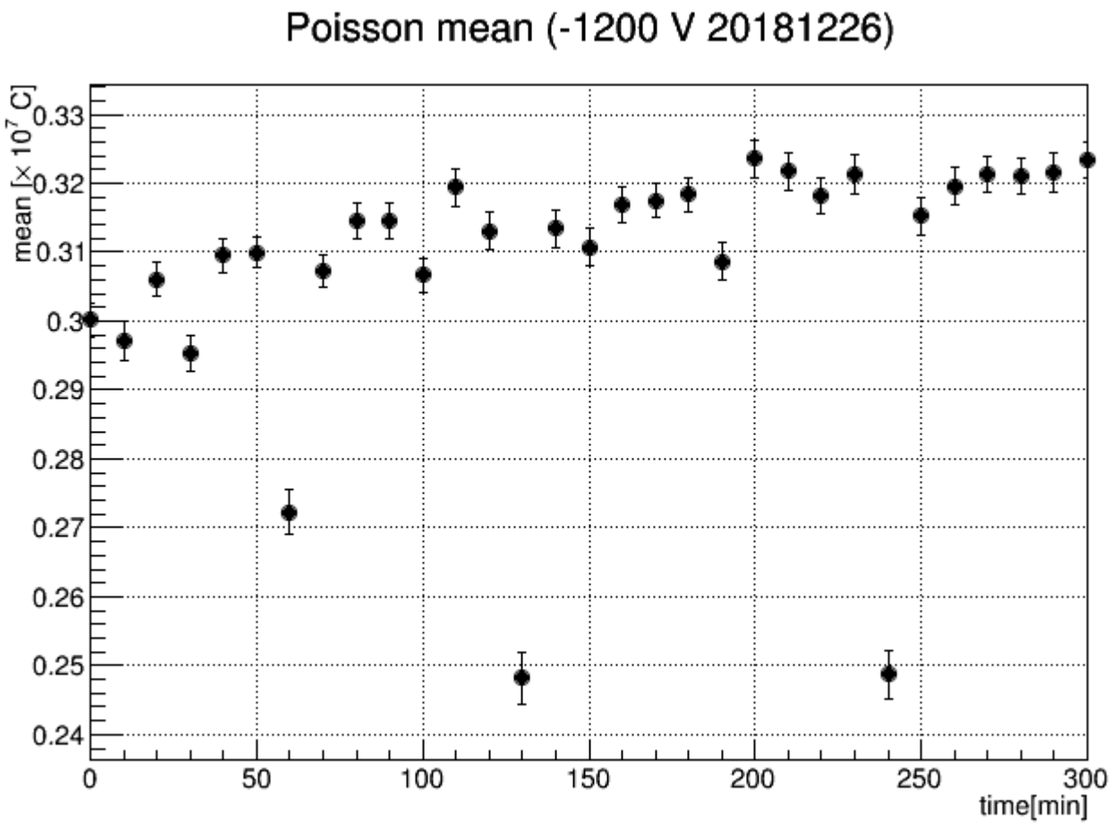


- 10:00 Monitor PMT HV on
  - CAEN and trigger on
  - Oscilloscope off
- 13:10 LED and 3” PMT on
- Room Temp. 20~21C

Stability: Poisson mean

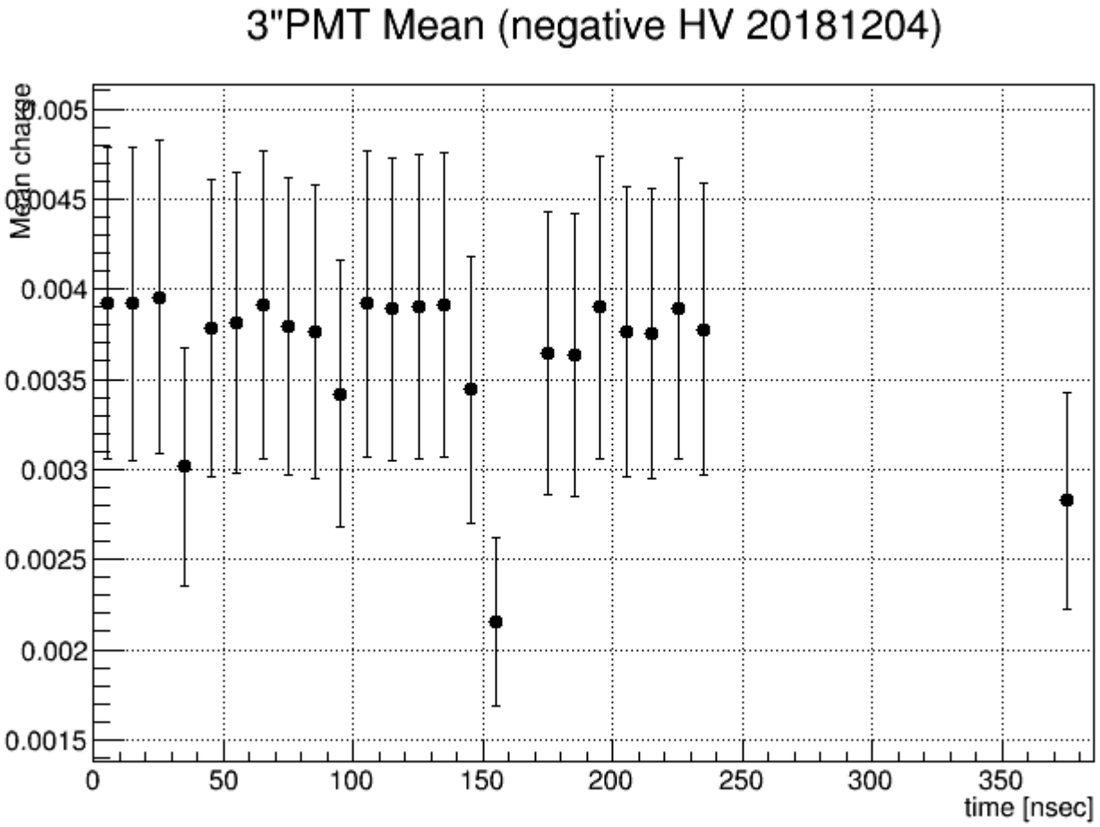


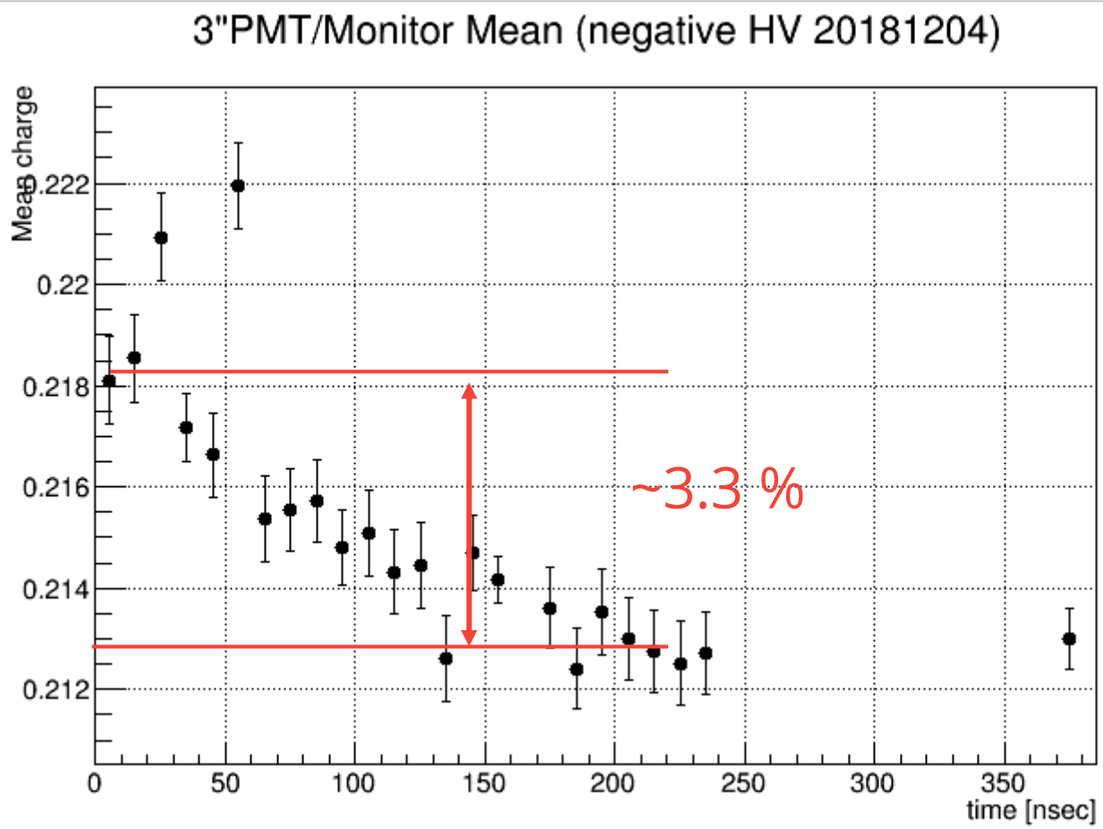


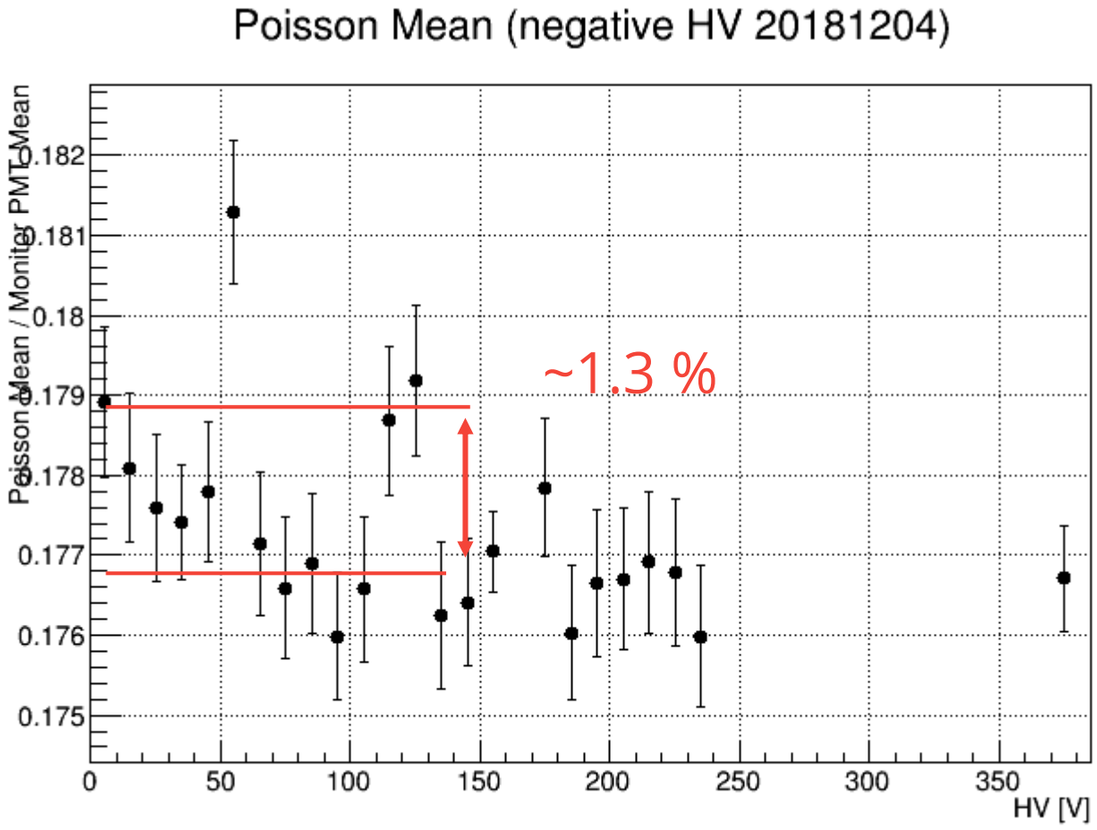


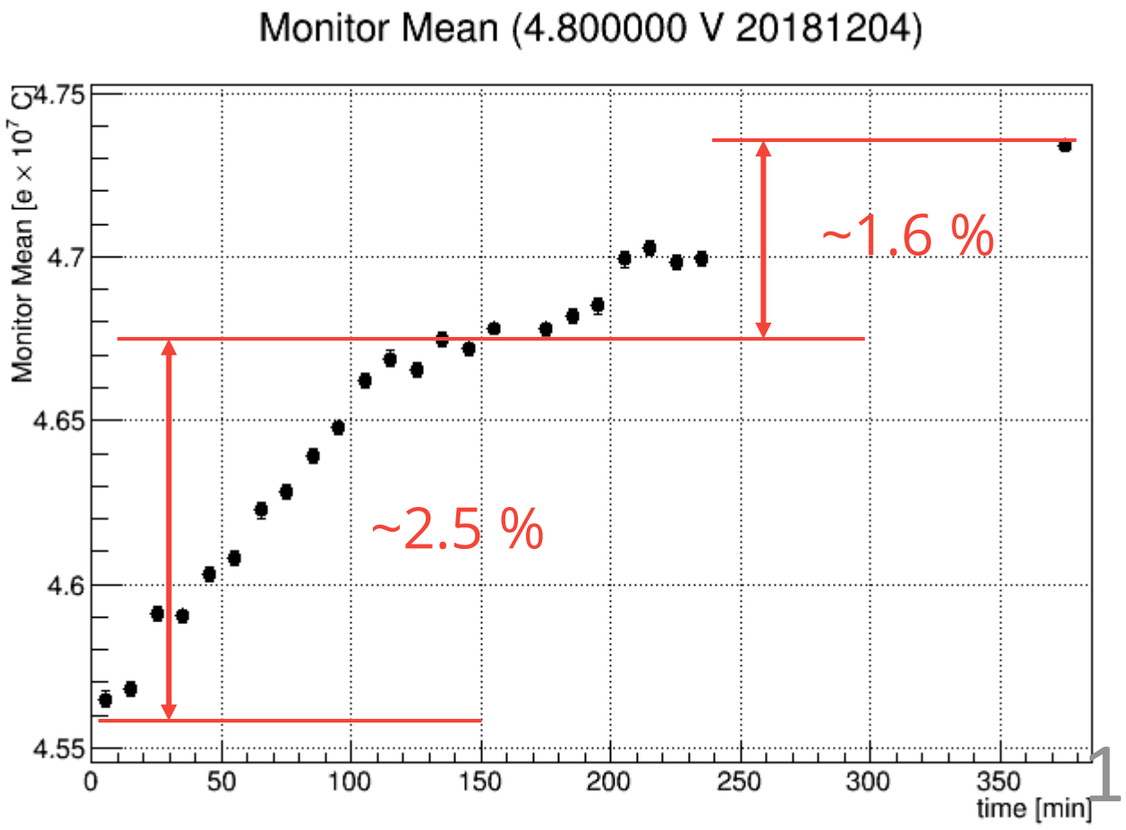
- Outliers appeared irrespective of kinds of PMT.
- -> it is not problem of PMT.
- Mean might oscillate ~4 %?
- This fluctuation is cased by LED or Set up?

Stability: 3”PMT (2.5 hours leaving LED and Monitor on)

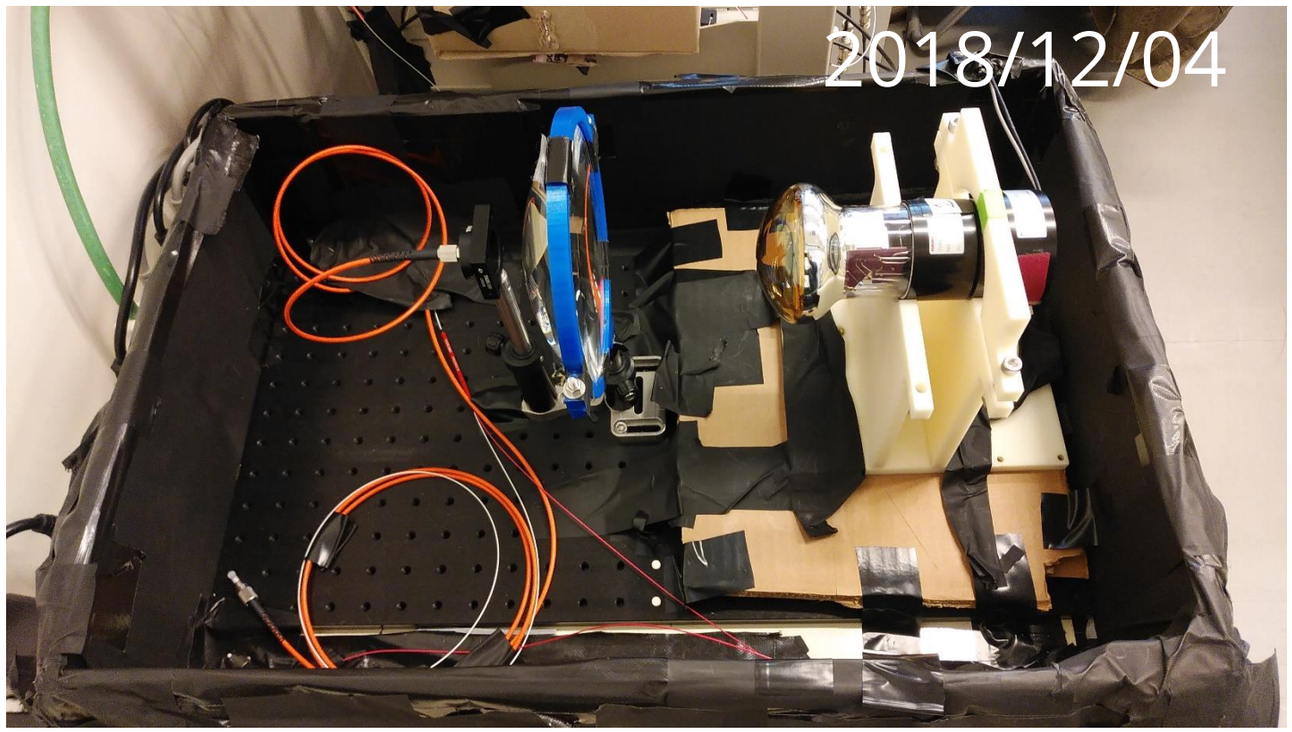


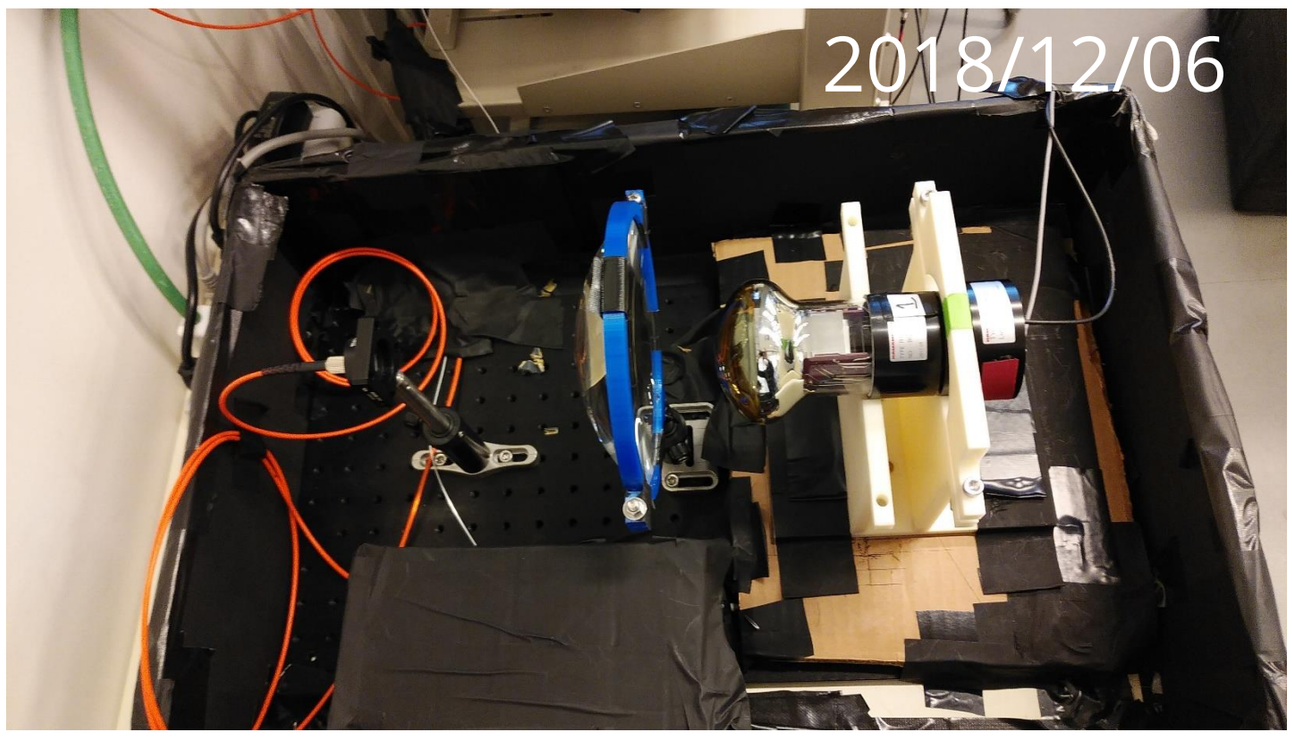






Stability





- The distances btw the lens, LED and PMT had changed.
  - LED to Lens: farther
  - Lens to PMT: closer
- Monitor PMT was moved into 3”PMT setup.
  - to avoid heat from the oscilloscope.

Summary

- CalculatePedestal() had changed
  - processing become faster
- Gain/Peak-to-Valley/TTS
  - need to measure again for BC0038 Negative HV
- TTS vs #pe plots @+/-1200/1250V
  - need to process again with more larger domain of qFunction
- Stability
  - measure again at the same distance as 2018/12/04?
- Uniformity->Reflector?
  - need your help