

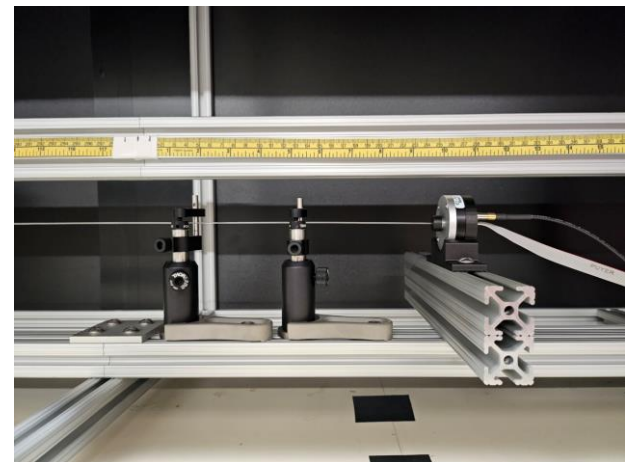
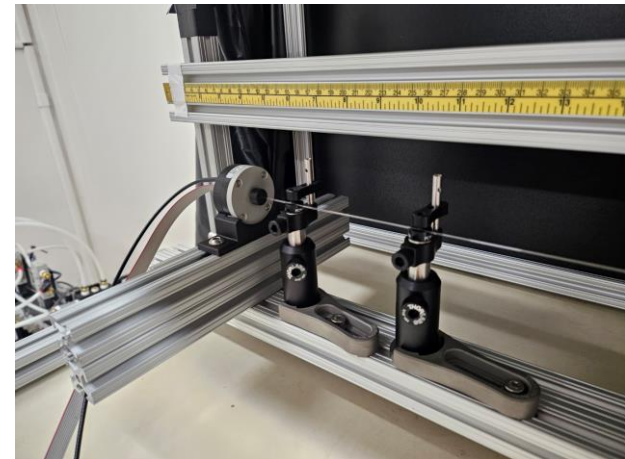
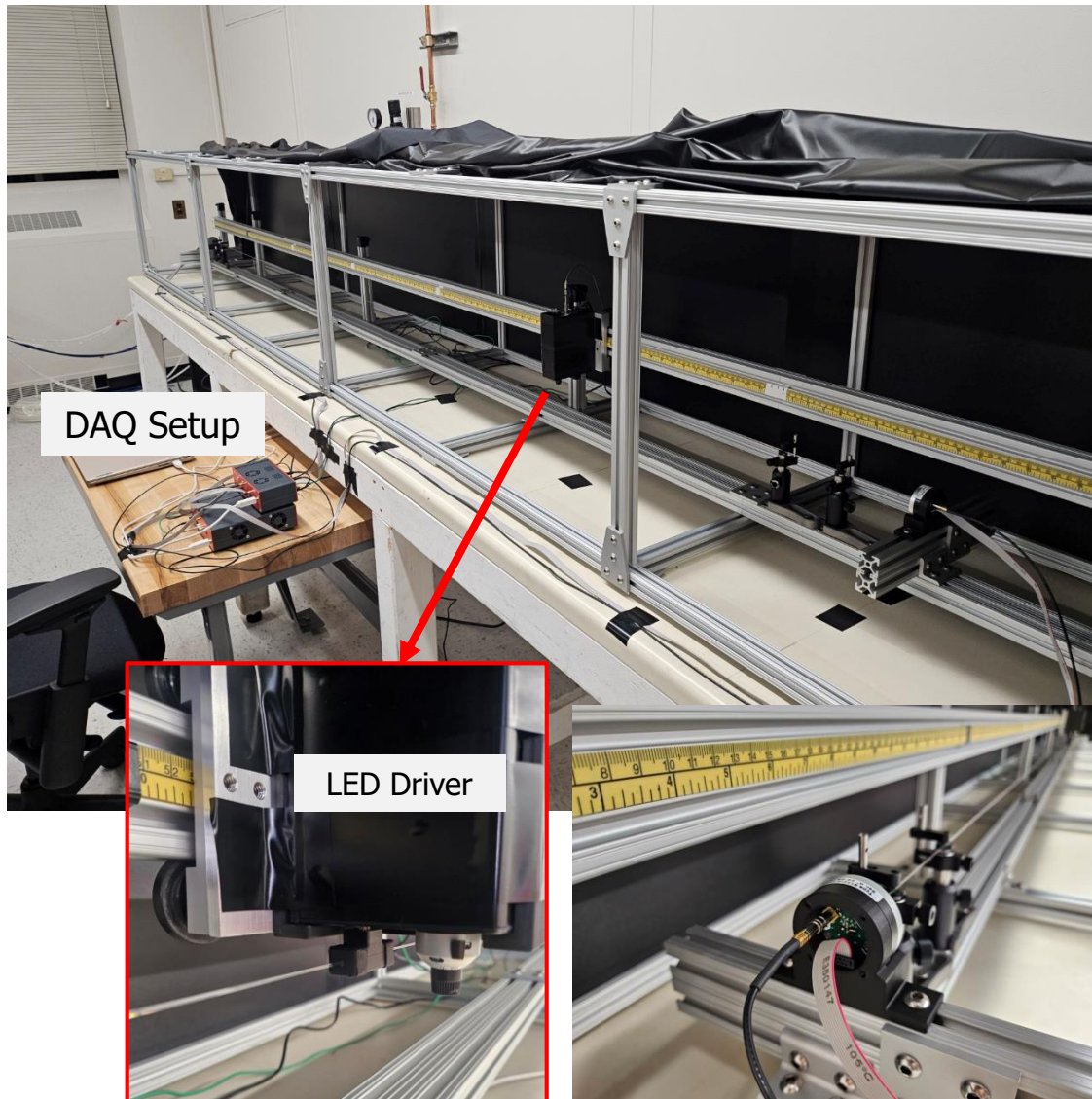
BIC System Testing Meeting

02. 25. 2025

Seoyun Jang

SciFi Measurement

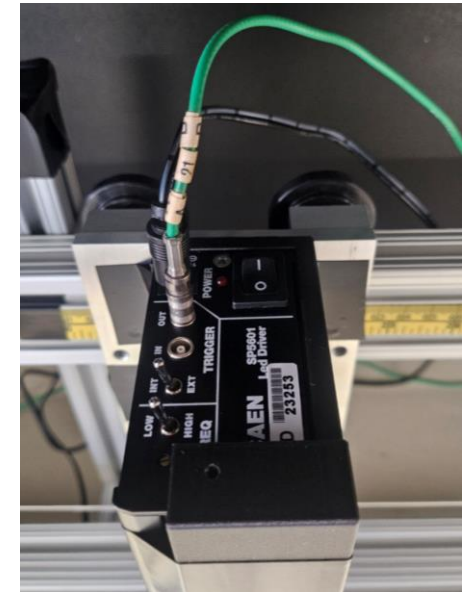
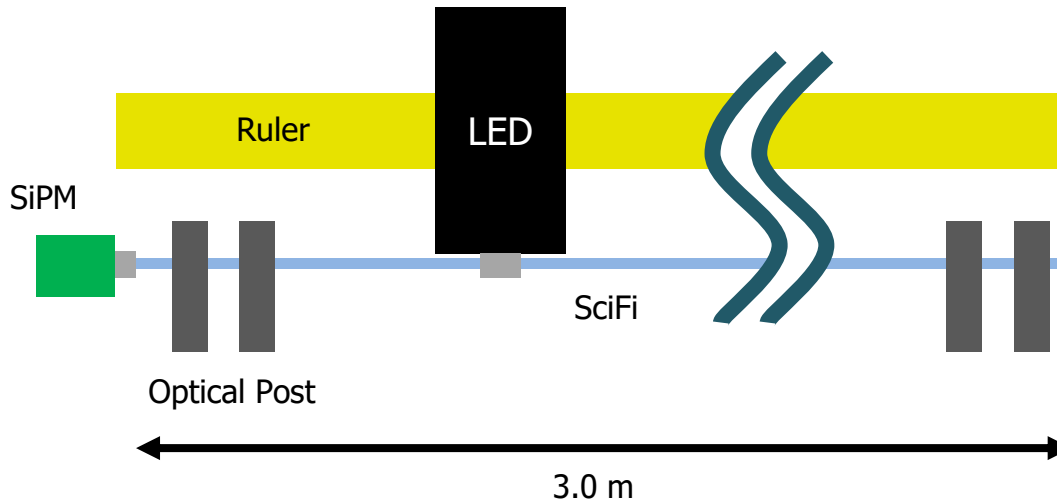
Updated Setup



SiPM on both end
[S13360-1350CS](#)

SciFi Measurement

Attenuation Length Measurement Setup



Event is triggered by LED trigger
-> makes less affected by noise

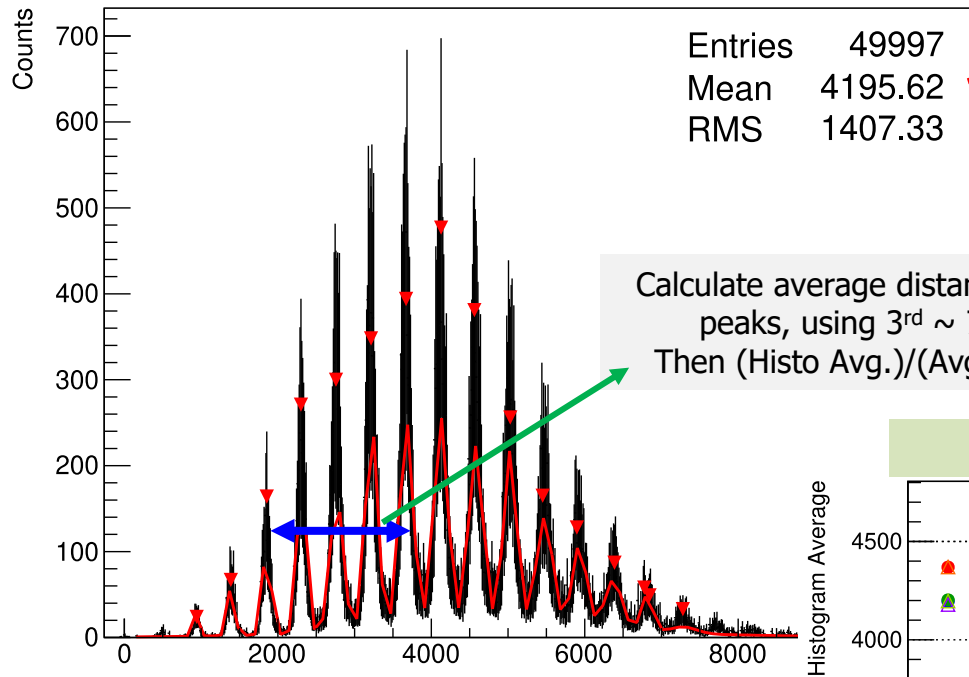
- **Measured only one side** of SiPM for attenuation measurement.
- Similar setup done in Korea, using CAEN [SP5600E](#) (SiPM : [S13360-1350CS](#))
- Used 3.0 m Kuraray SciFi – **SCSF-78** (Single / Double Clad.) (10cm interval, 20~280 cm)
- Now **reproducing results** & confirming setup.
- It takes ~25 min for one full measurement cycle (10cm step, 50k evt/point)

SciFi Measurement

Result Reproduction

KSC – Kuraray Single Cladding

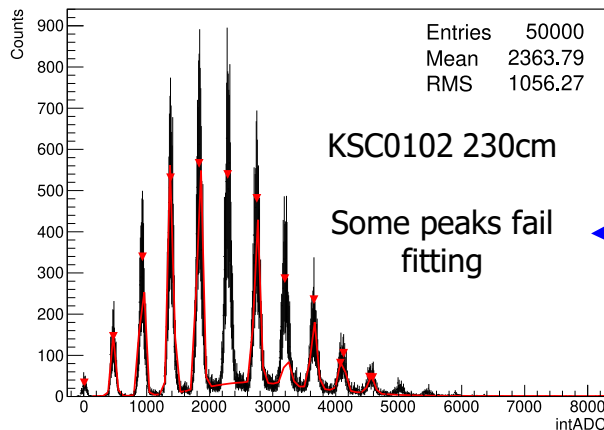
One example point, KSC01-01 20cm point



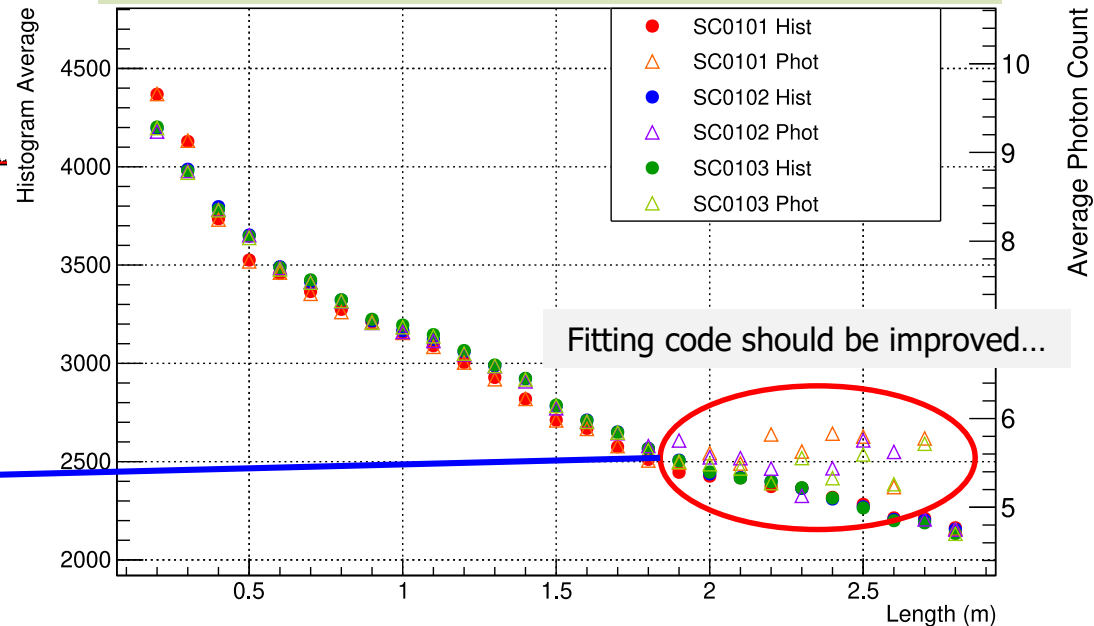
1. **Average of histogram**

-> Used in Korea setup result

2. **# of p.e.** (convert to # of photon)



KSC01 20cm ~ 280cm Measurements



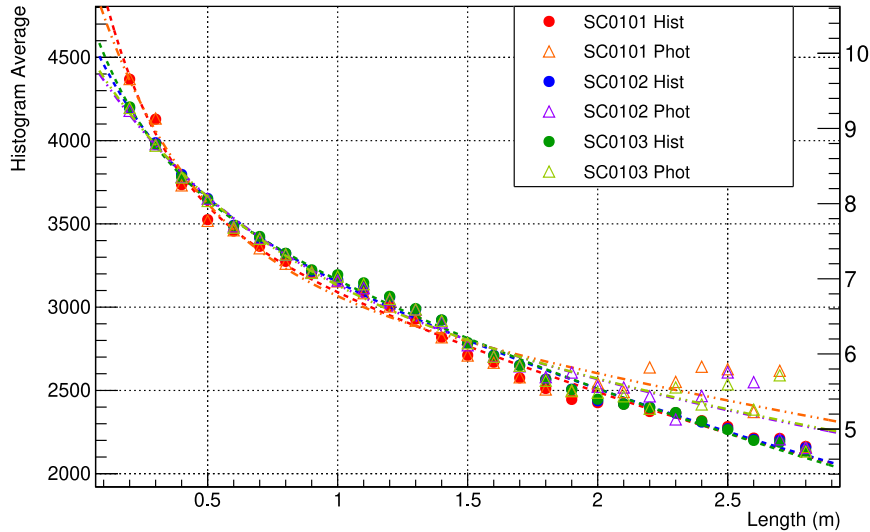
SciFi Measurement

Result Reproduction – Single Clad.

*Only result of **histogram avg.**

Measured 3 times for same fiber

Double exp Fitting – KSC01 20cm ~ 280cm



Double exp Fit func. :

$$I(x) = I_0 (\alpha \exp(x/\lambda_{short}) + (1 - \alpha) \exp(x/\lambda_{long}))$$

Trial 1 : $\lambda_{short} = 0.22 \pm 0.06 \text{ m}$, $\lambda_{long} = 4.79 \pm 0.27 \text{ m}$

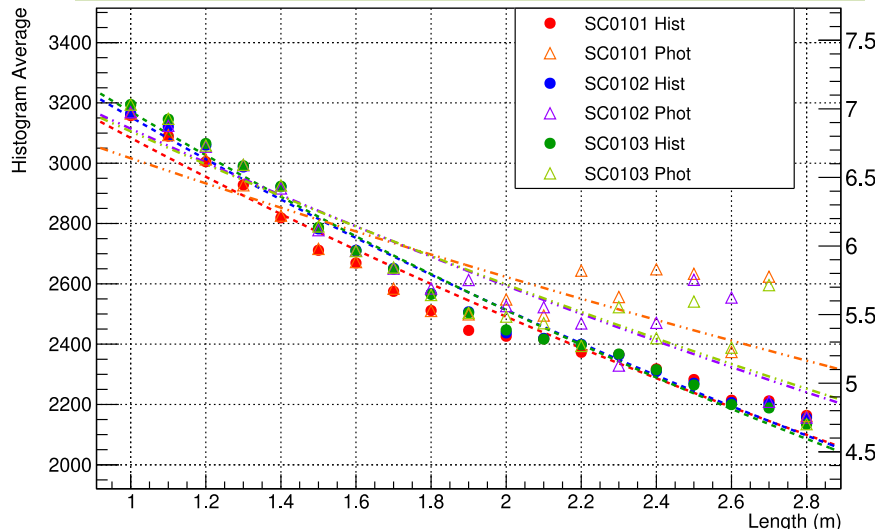
Trial 2 : $\lambda_{short} = 0.32 \pm 0.10 \text{ m}$, $\lambda_{long} = 4.64 \pm 0.25 \text{ m}$

Trial 3 : $\lambda_{short} = 0.23 \pm 0.07 \text{ m}$, $\lambda_{long} = 4.42 \pm 0.16 \text{ m}$

Single exp Fit func. :

$$I(x) = I_0 \exp(x/\lambda_{long})$$

Single exp Fitting – KSC01 100cm ~ 280cm



Trial 1 : $\lambda_{long} = 4.68 \pm 0.22 \text{ m}$

Trial 2 : $\lambda_{long} = 4.41 \pm 0.14 \text{ m}$

Trial 3 : $\lambda_{long} = 4.30 \pm 0.14 \text{ m}$

NKS	06	411 ± 15	14.61 / 17
	07	486 ± 7	15.69 / 17
	10	459 ± 12	16.53 / 17
	02	512 ± 10	15.11 / 17

Partial results from Regina (cm unit)

Results done in Korea : KSC atten. length : $5.21 \pm 0.39 \text{ m}$

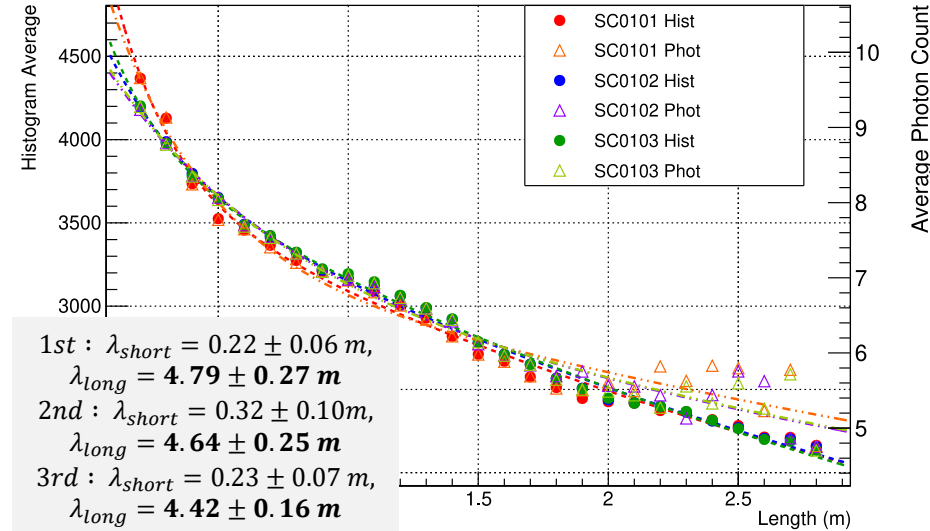
Reasonable Result?...

SciFi Measurement

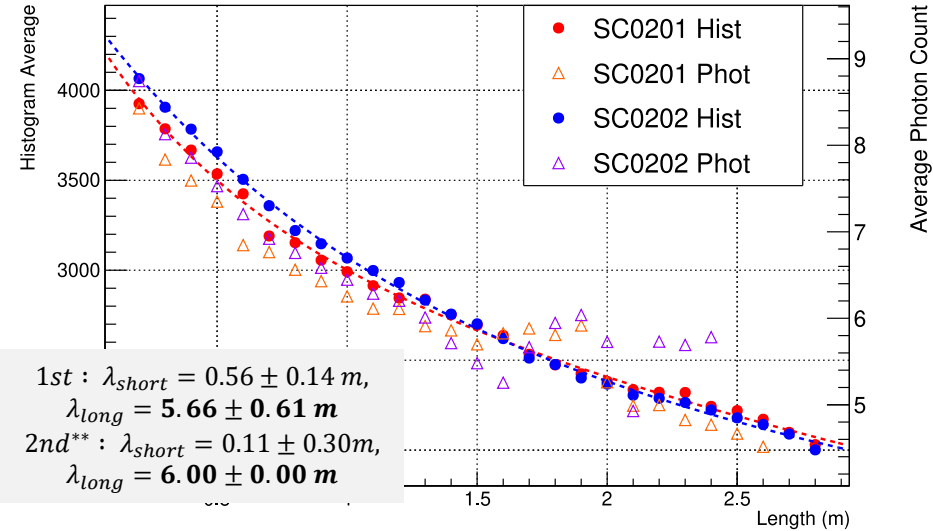
Result Reproduction – Single Clad.

*Only result of **histogram avg.**
 **Not proper fitting

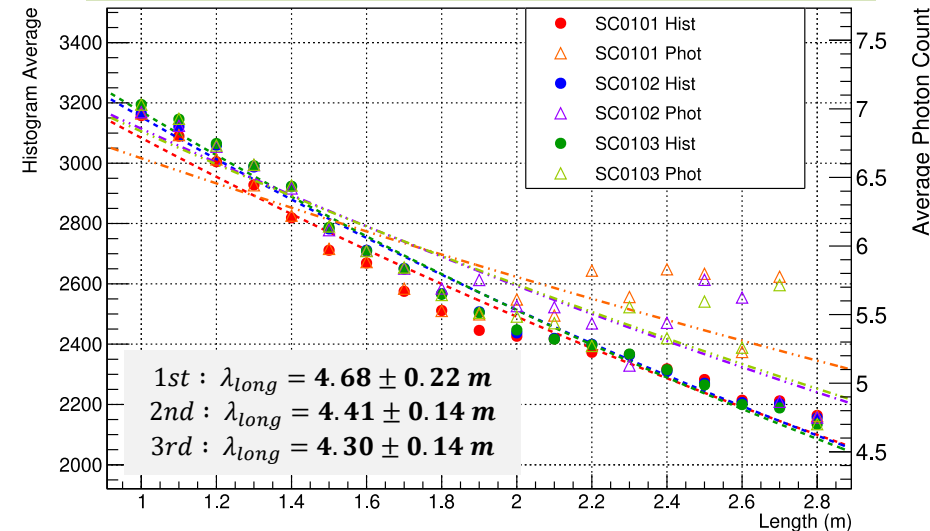
Double exp Fitting – KSC01 20cm ~ 280cm



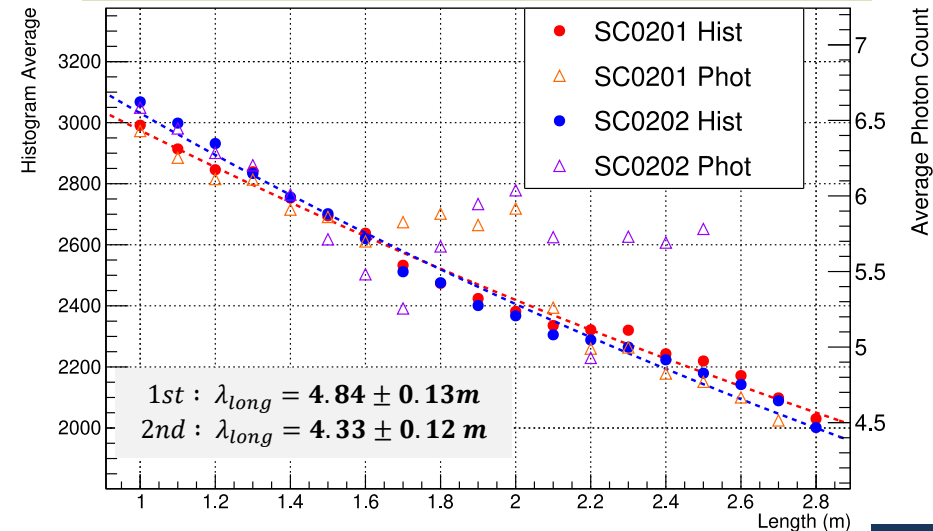
Double exp Fitting – KSC02 20cm ~ 280cm



Single exp Fitting – KSC01 100cm ~ 280cm



Single exp Fitting – KSC02 100cm ~ 280cm

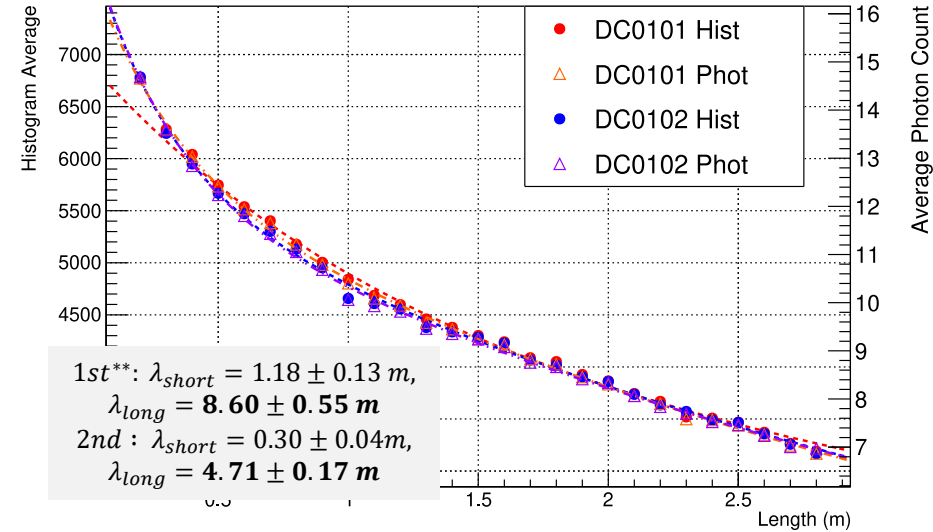


SciFi Measurement

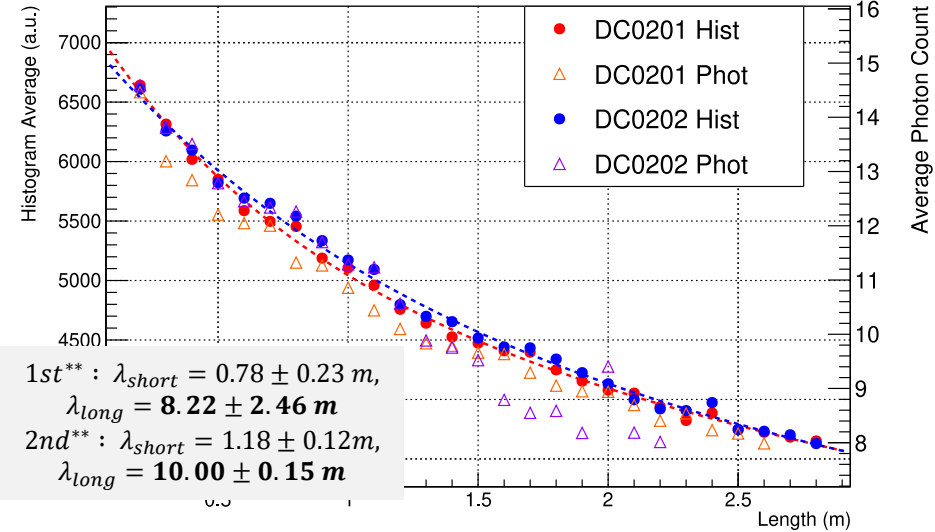
Result Reproduction – Double Clad.

*Only result of **histogram avg.**
 **Not proper fitting

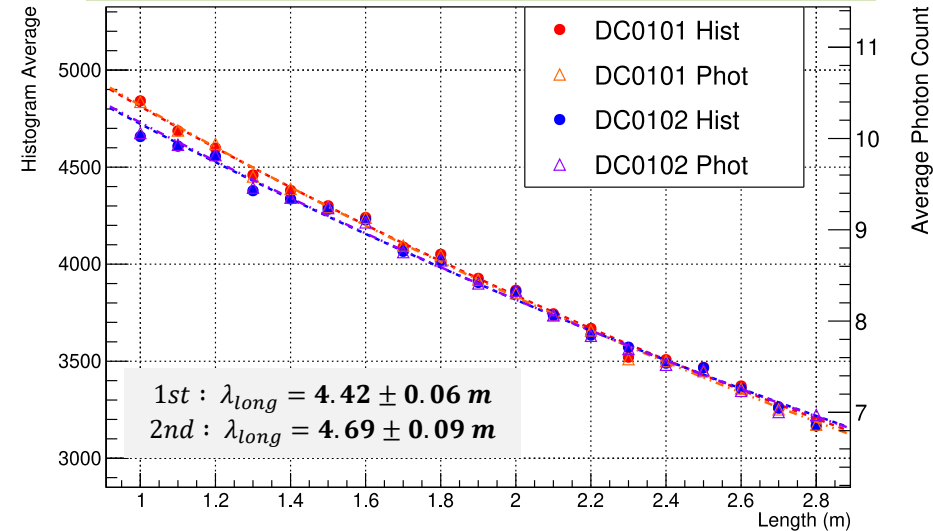
Double exp Fitting – KDC01 20cm ~ 280cm



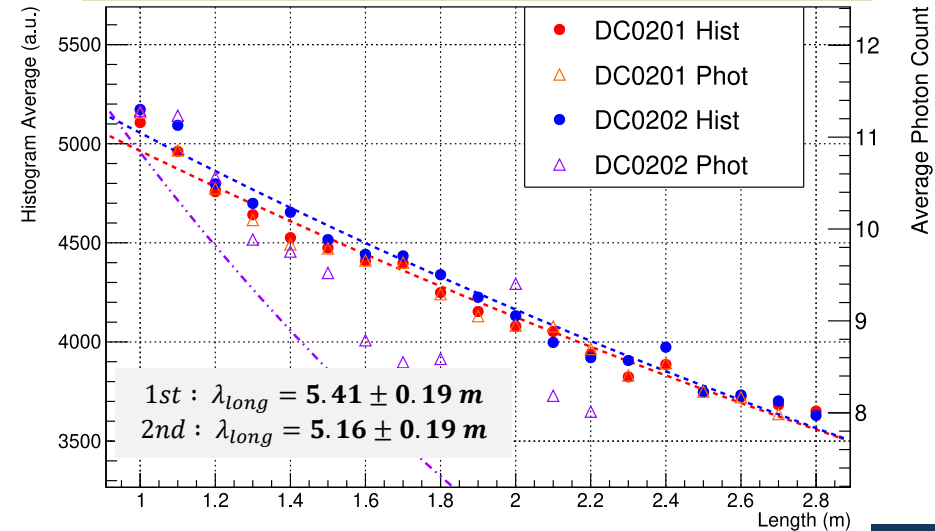
Double exp Fitting – KDC02 20cm ~ 280cm



Single exp Fitting – KDC01 100cm ~ 280cm



Single exp Fitting – KDC02 100cm ~ 280cm



SciFi Measurement

Summary & To do

*Only result of **histogram avg.**

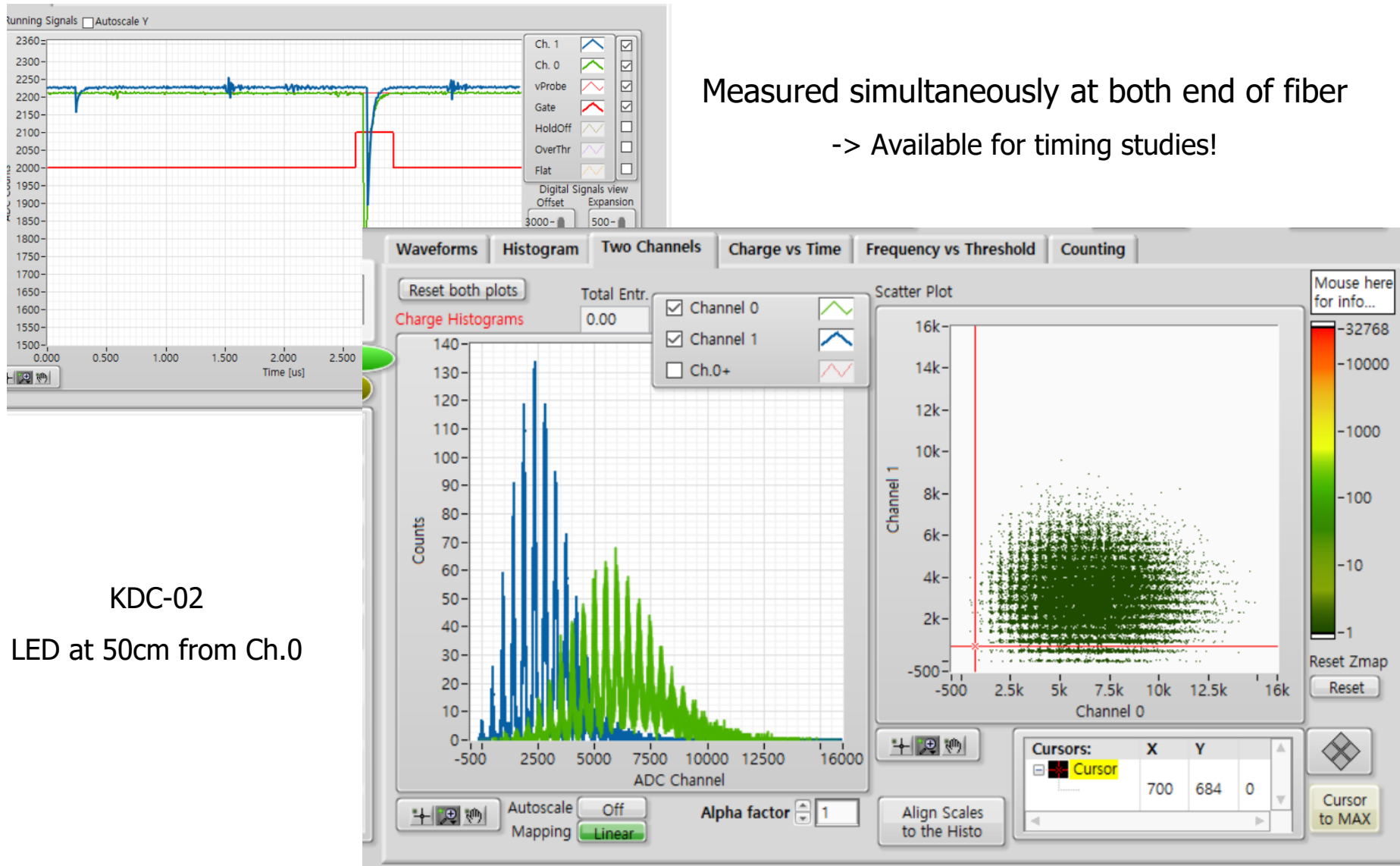
Fiber	λ_{short}	λ_{long}	$\lambda_{long} (>1.0m)$	Fiber	λ_{short}	λ_{long}	$\lambda_{long} (>1.0m)$
KSC01-01	0.22 ± 0.06	4.79 ± 0.27	4.68 ± 0.22	KDC01-01	1.18 ± 0.13	8.60 ± 0.55	4.42 ± 0.06
KSC01-02	0.32 ± 0.10	4.64 ± 0.25	4.41 ± 0.14	KDC01-02	0.30 ± 0.04	4.71 ± 0.17	4.69 ± 0.09
KSC01-03	0.23 ± 0.07	4.42 ± 0.16	4.30 ± 0.14	KDC02-01	0.78 ± 0.23	8.22 ± 2.46	5.41 ± 0.19
KSC02-01	0.56 ± 0.14	5.66 ± 0.61	4.84 ± 0.13	KDC01-02	1.18 ± 0.12	10.00 ± 0.15	5.16 ± 0.19
KSC02-02	0.11 ± 0.30	6.00 ± 0.00	4.33 ± 0.12				

- Measured **2 SC, 2 DC samples** – short & long attenuation length
 - Long attenuation length (fit over 1.0m) show consistent, **under 10% fluctuation.**
Reasonable value compared to result measured in Korea & Regina
 - **Fitting should be improved**
Both ADC distribution & exponential fitting (especially double exponential)
 - **Need to measure more samples!**
- Need minor updates on setup – magnets, additional dark curtain, cables (and [instruction](#))

SciFi Measurement

Measuring both end

Measured simultaneously at both end of fiber
-> Available for timing studies!



KDC-02
LED at 50cm from Ch.0

Backup

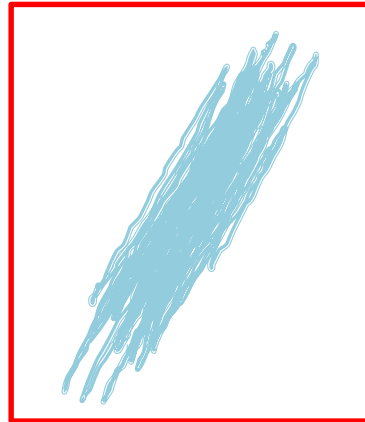
Fiber Polishing

Instruction

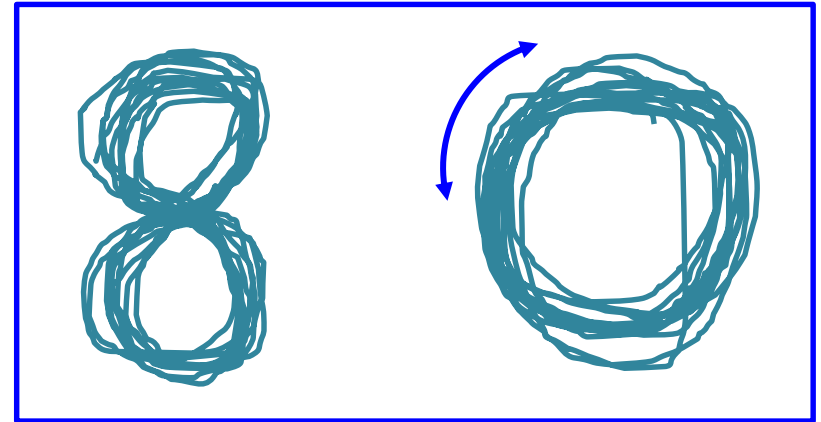
Please **wear GLOVES** on all process. (Latex, Silicon, ...)

0. Align & grip 3~4 fibers near 1cm point from the edge.

1. Grind fibers on 400 grit sandpaper, **until they become flat**. (~1 min.)



X



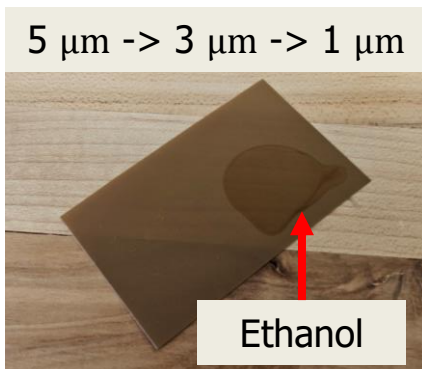
O

Grind fibers drawing 8 or O shape, to make edge of fibers perpendicular

2. Grind fibers on polishing films, **5 μm -> 3 μm -> 1 μm** . (each ~2 min.)

Spray ethanol on polishing films before grinding, and clean up fiber with ethanol swab after each process.

This helps eliminating grinded particles of fibers on them.

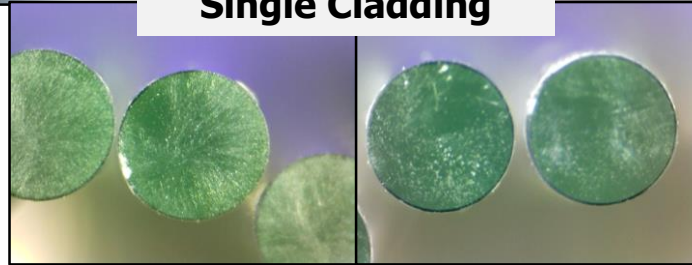


Fiber Polishing

SC & DC



Single Cladding



Double Cladding

