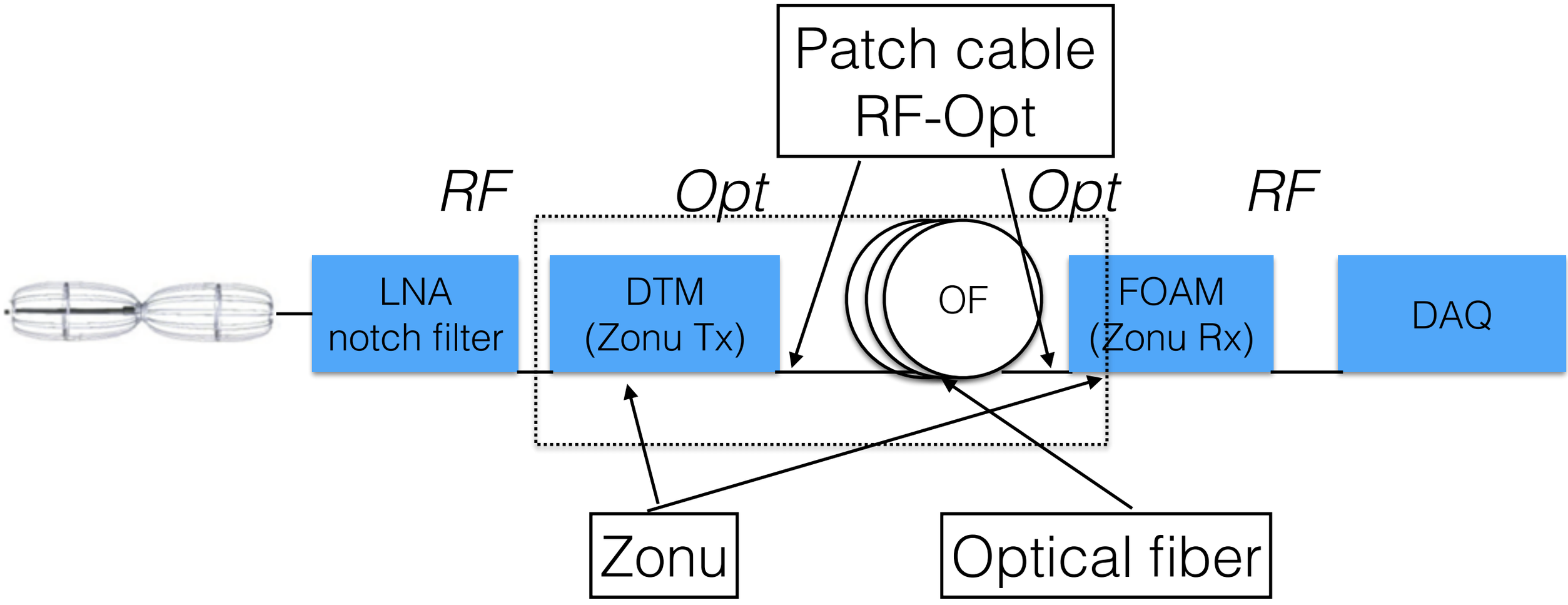
RFoF calibration status
(Radio Freq. Over Fiber)

Hikaru Isoba
Chiba University

What was done



Calibration

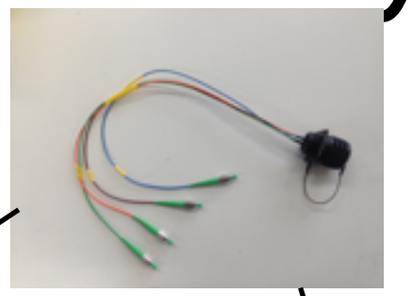
1. Optical cable system
   (patch cable/ optical fiber)
2. Zonu Tx/Rx
3. DTM - OF - FOAM

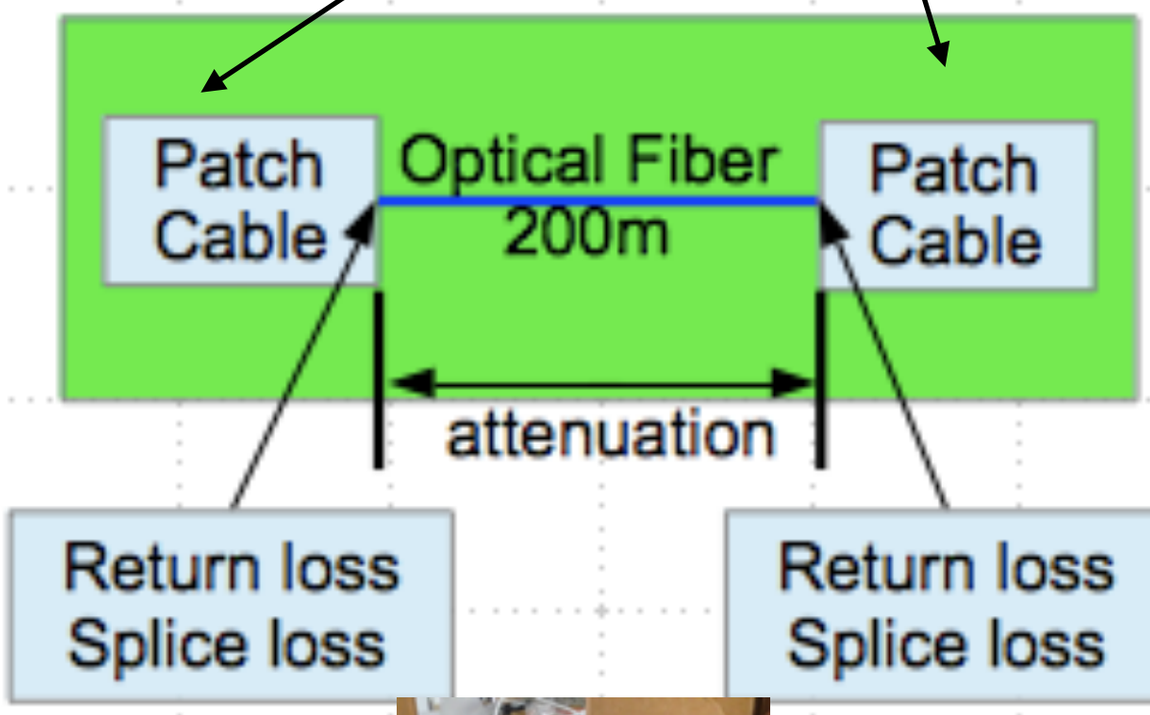
Integration/assembly

- Patch cable->Opt fiber
- Zonu combination
- DTM construction (4#)

Optical system

Optical system

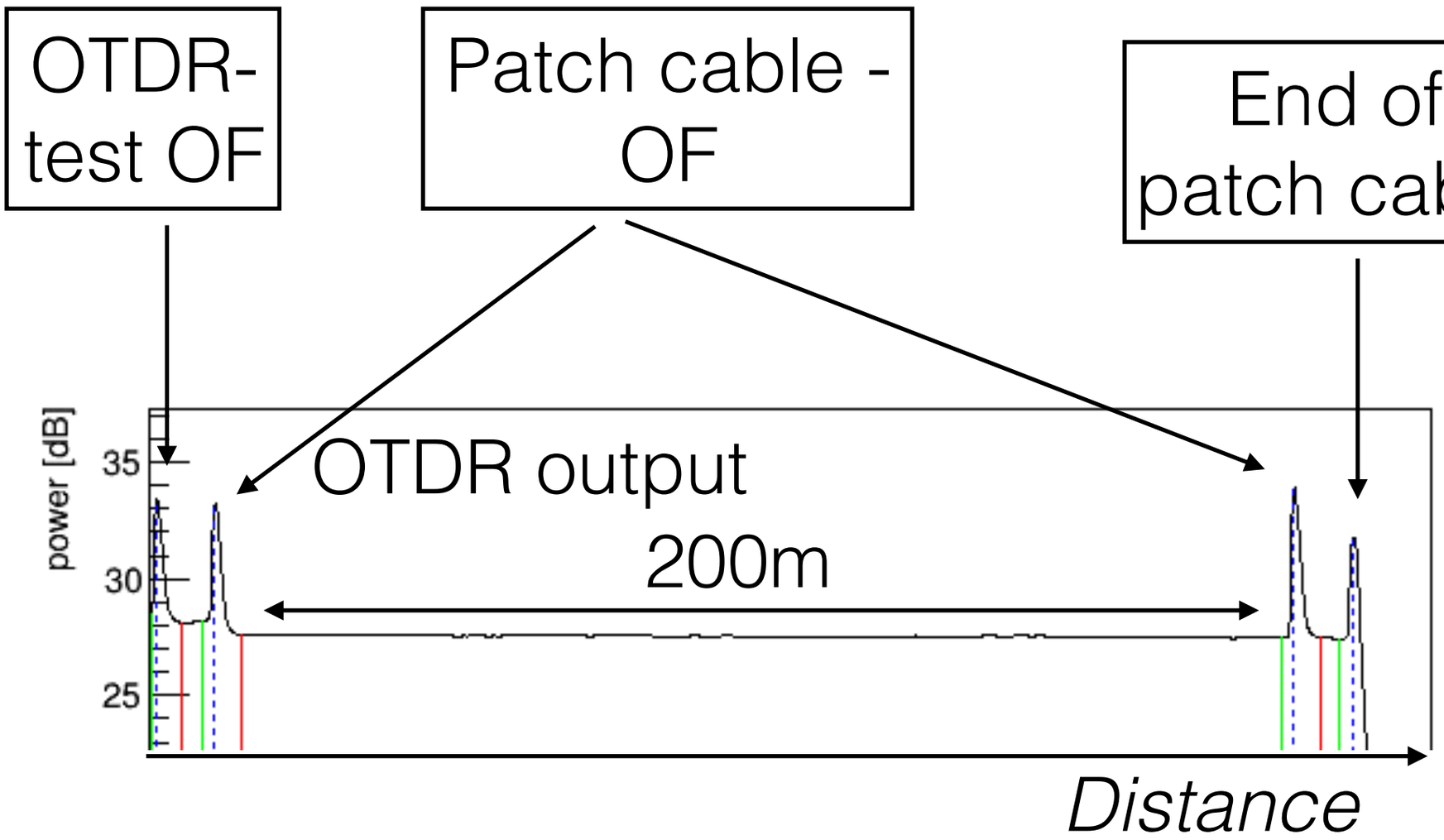


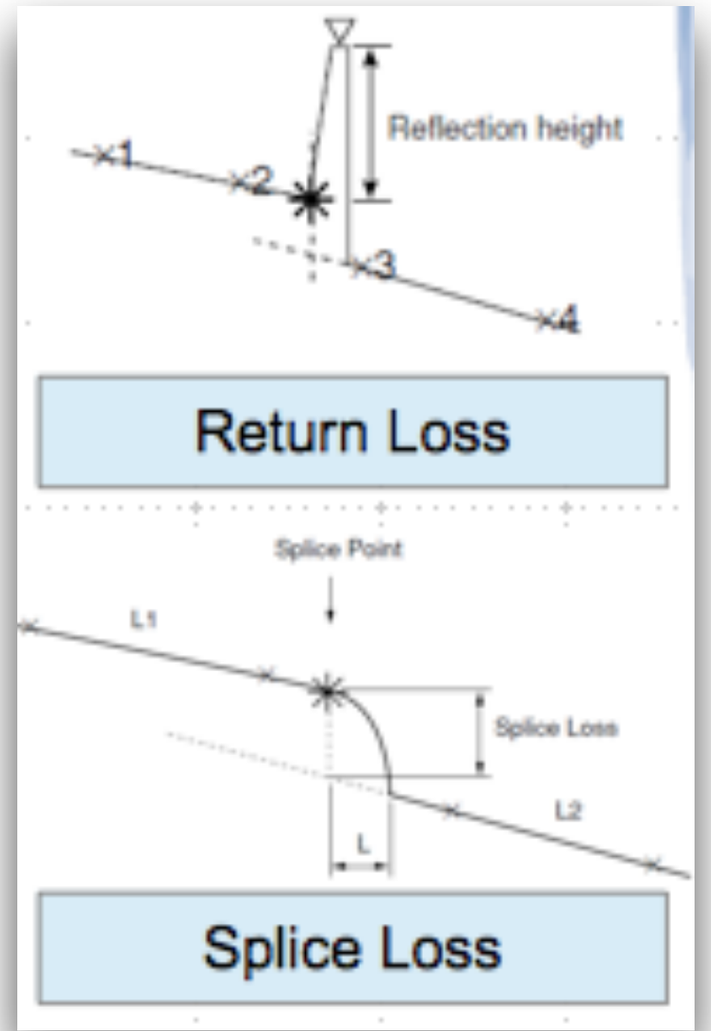


Measured parameters

- Return Loss
- Splice Loss
- Attenuation

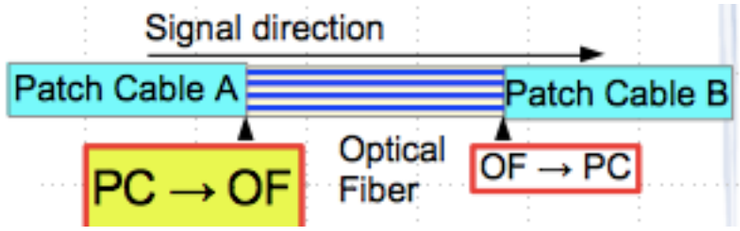
Optical system

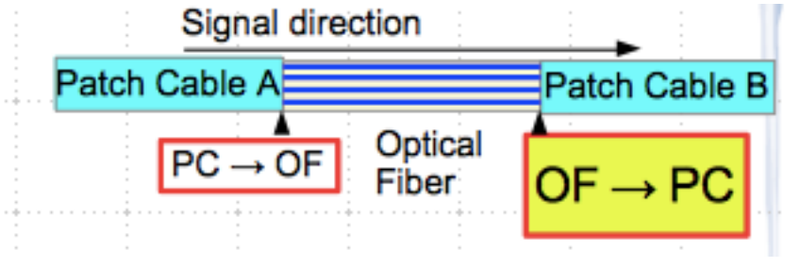


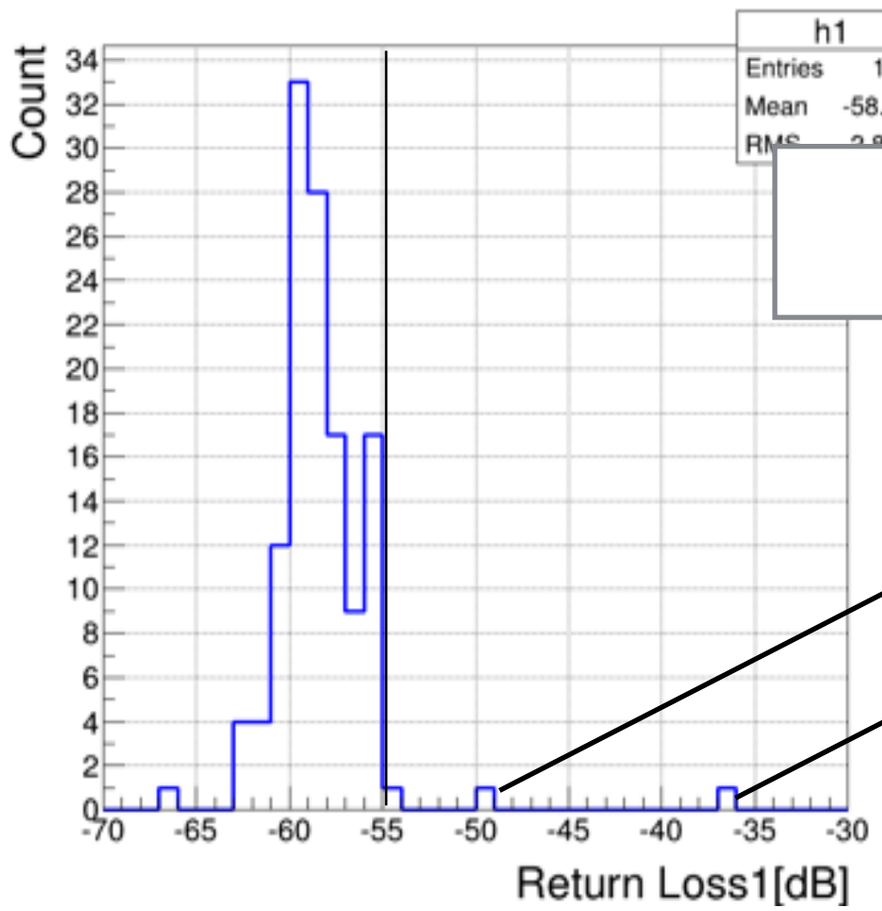


- OTDR measures the back light power as a function of distance
- Peak show optical connections

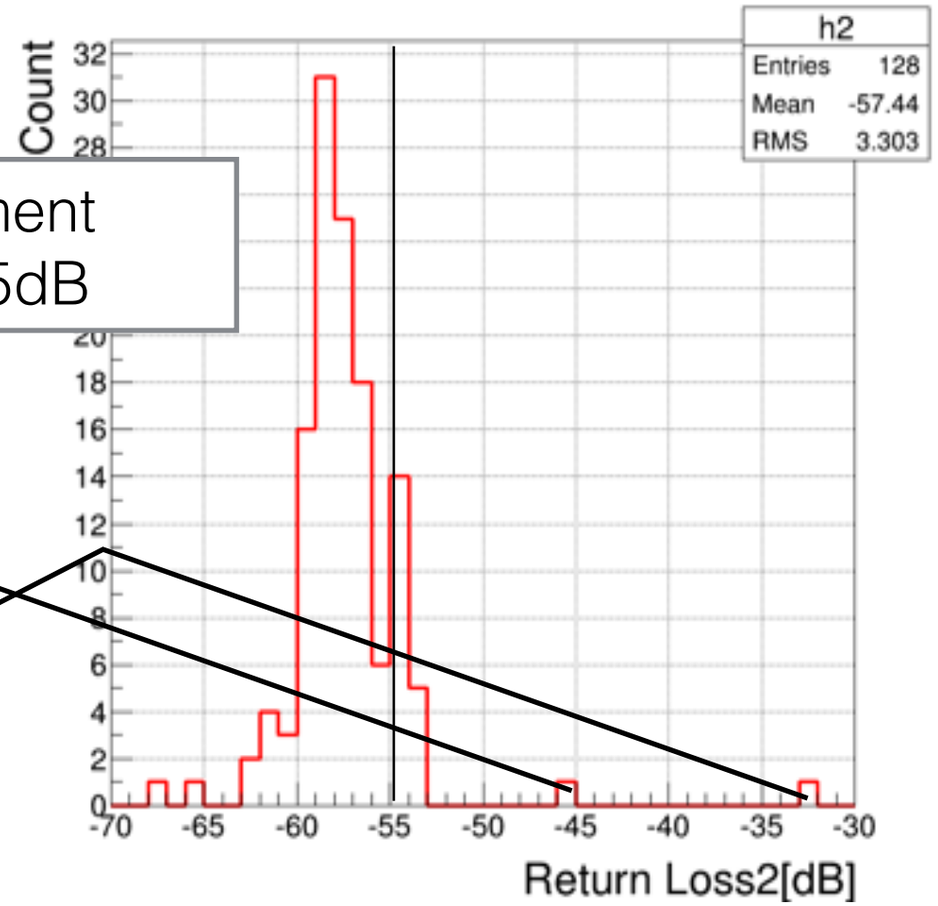
Patch Cable/OF







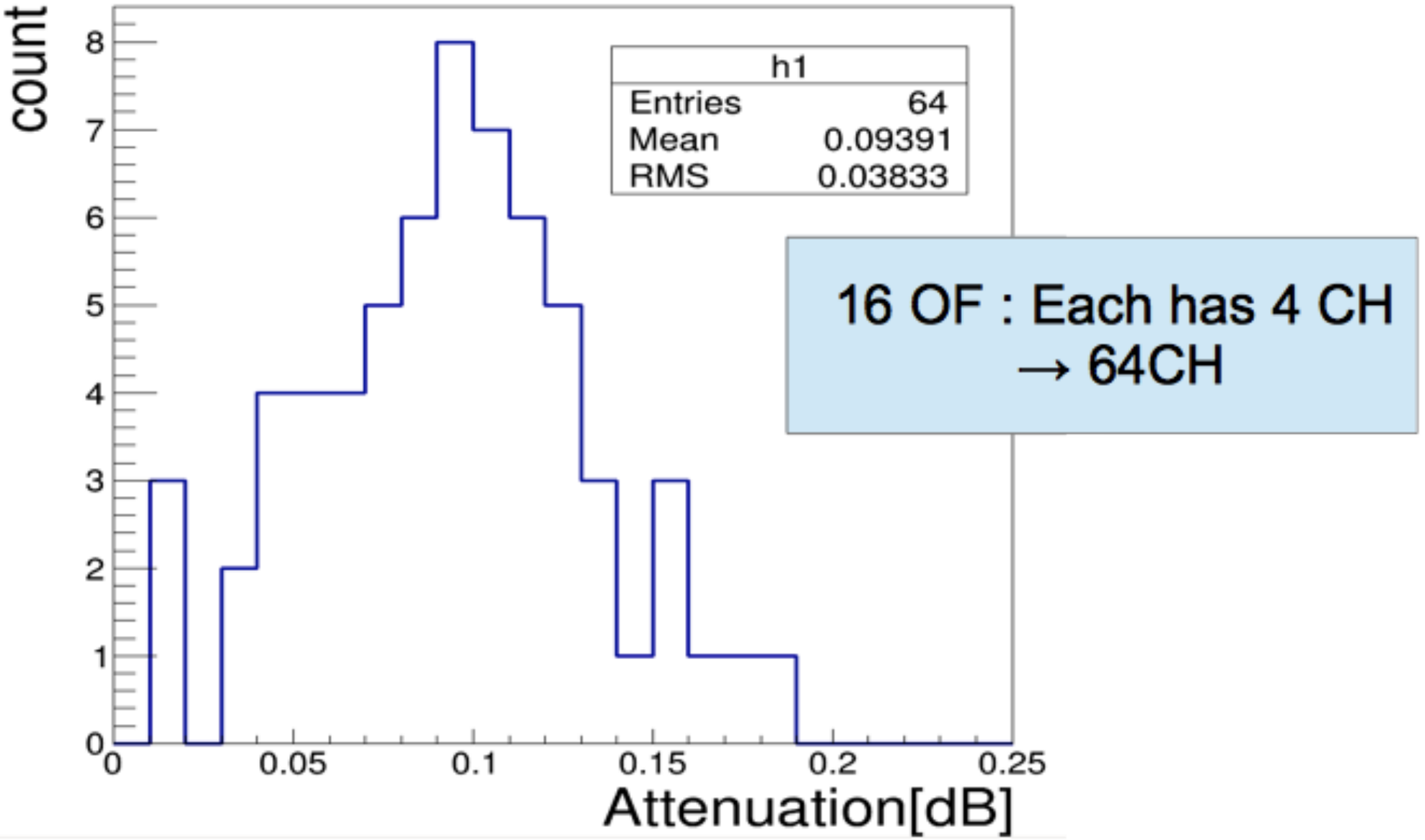
requirement
RL < -55dB



Loss	Number
< -55[dB]	125
-55 ~ -54[dB]	1
-54 ~ -53[dB]	0
-53 ~ -50[dB]	0
> -50[dB]	2

Loss	Number
< -55[dB]	107
-55 ~ -54[dB]	14
-54 ~ -53[dB]	5
-53 ~ -50[dB]	0
> -50[dB]	2

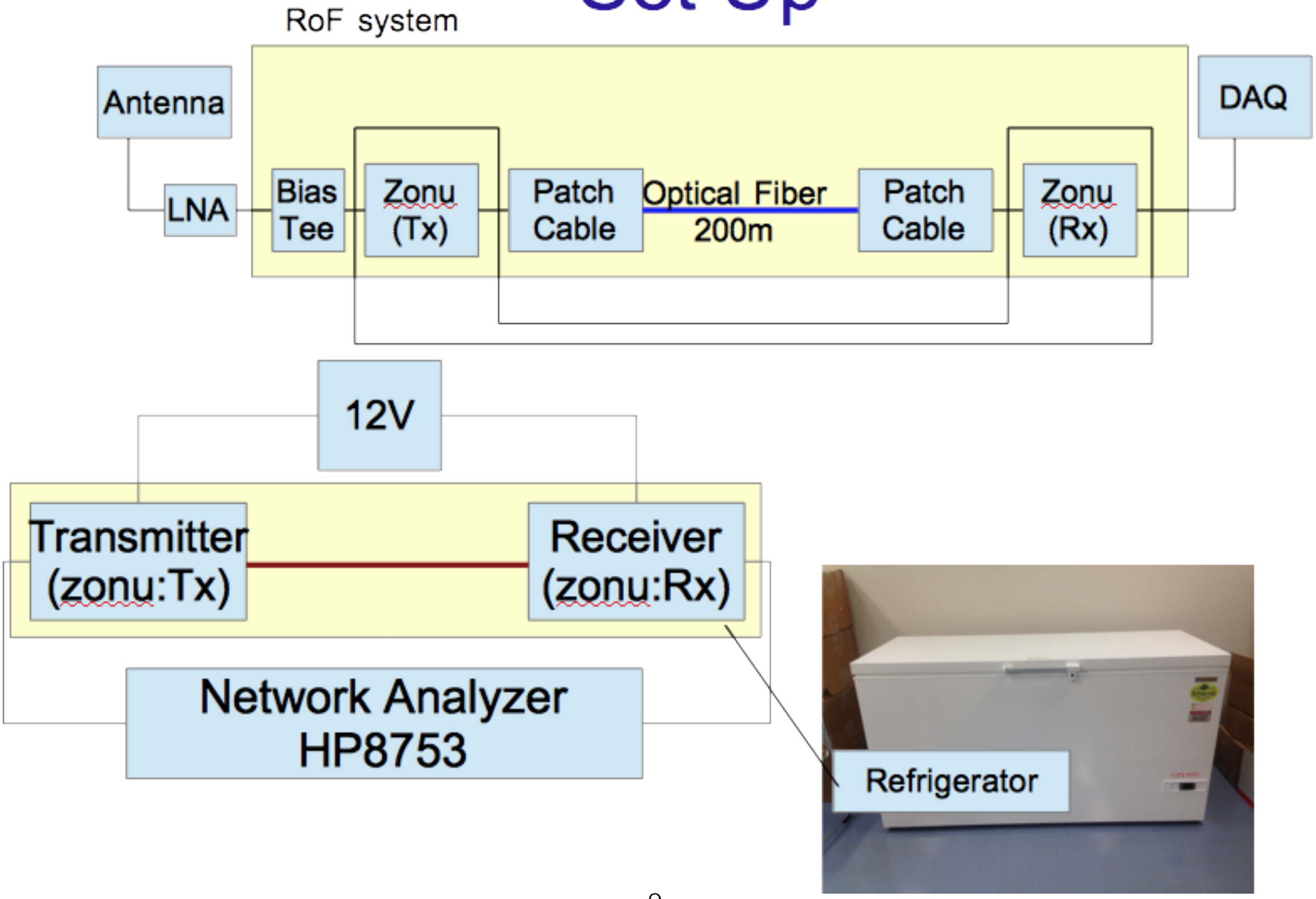
Optical Fiber Attenuation



- Attenuation while the light transmit through the fiber 200m are small.

Zonu

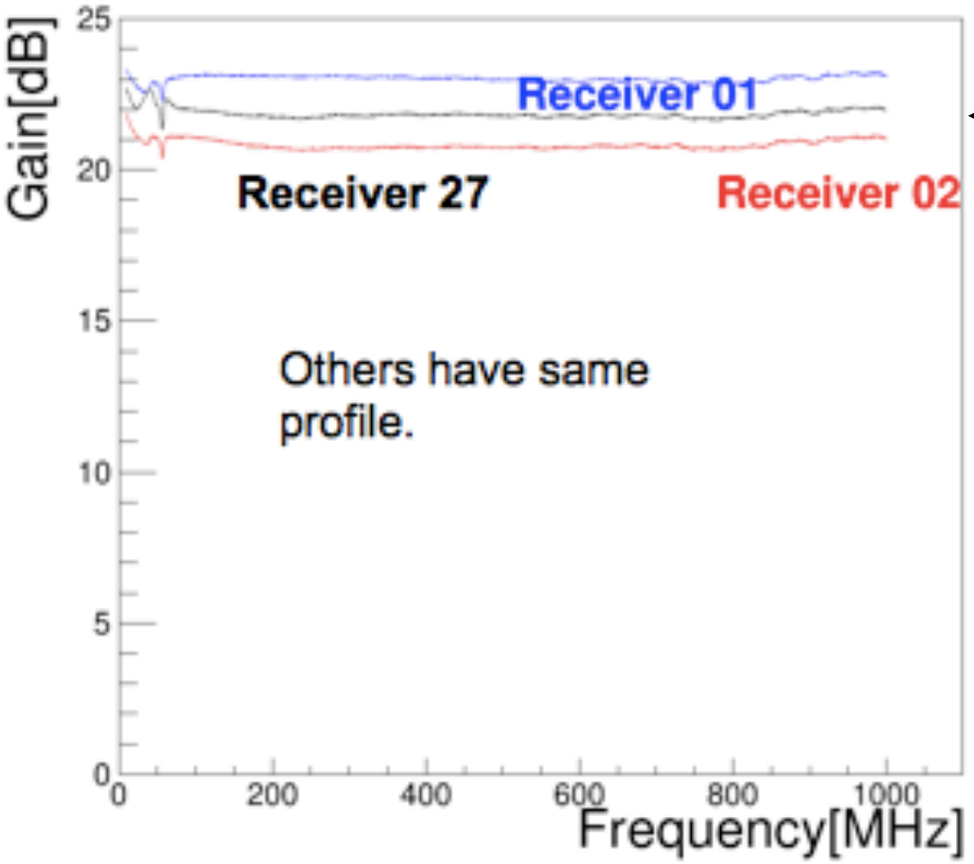
Zonu Measurement Set Up



ZONU

Rx

Tx/Rx link with fixed Tx



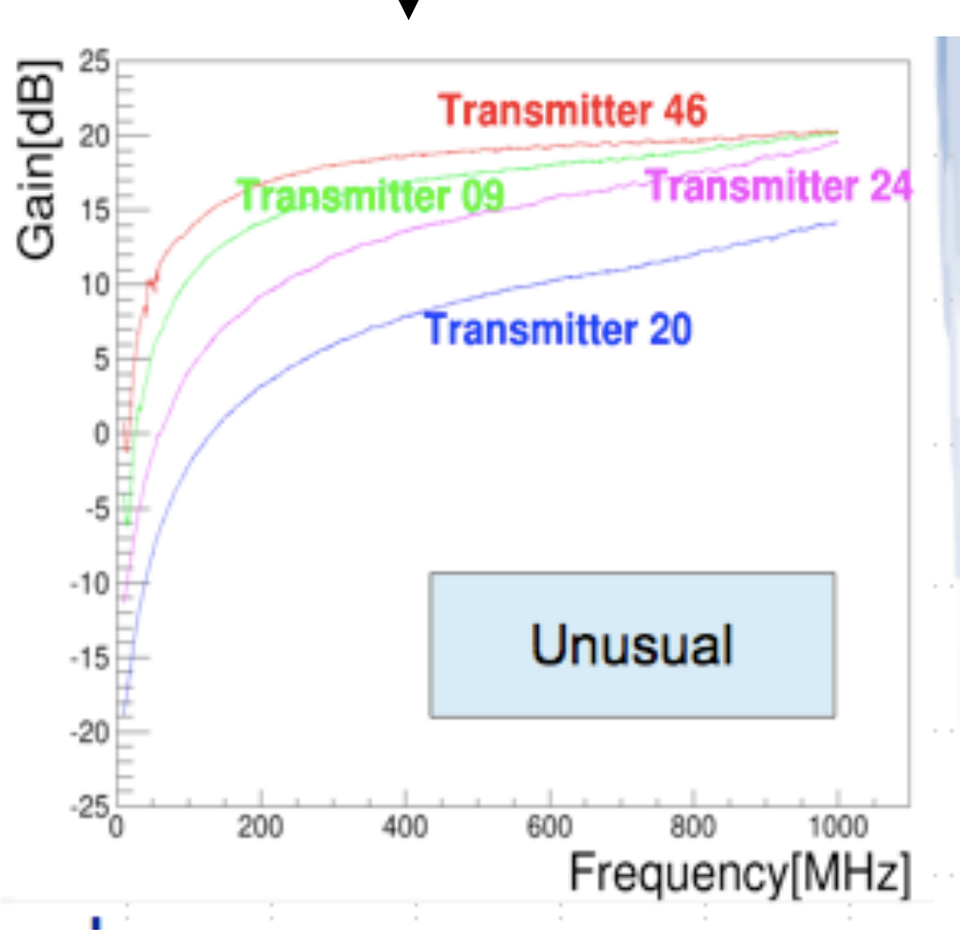
- All worked as expected

Tx

Tx/Rx link with fixed Rx

Most of them have the expected profile

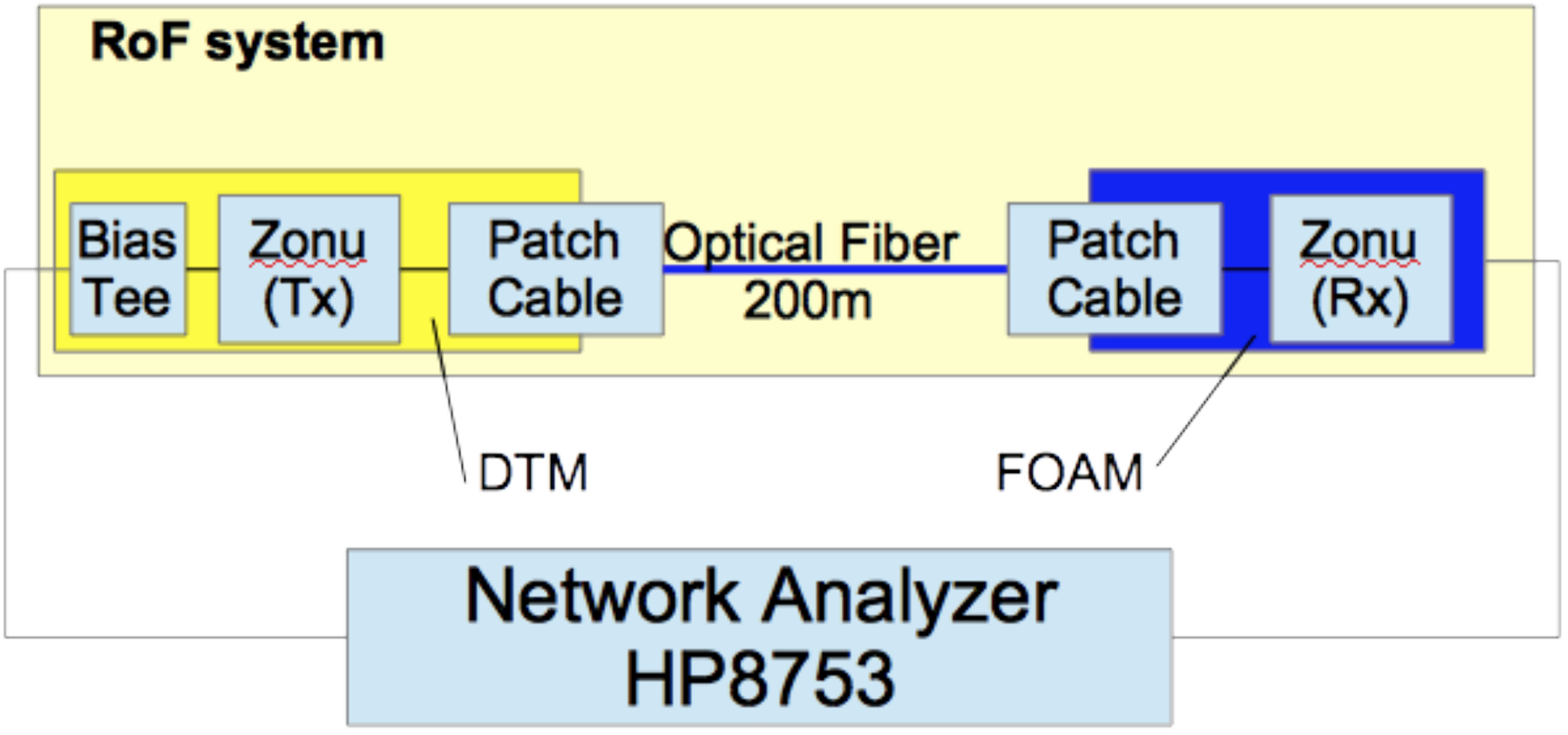
4 have this gain profile



DTM assembly and calibration

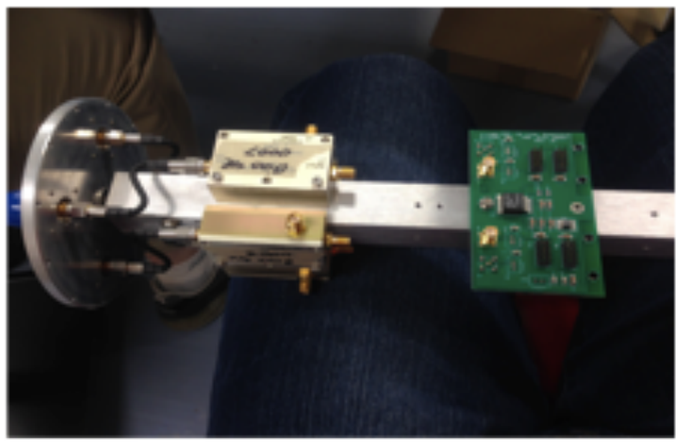
Full RoF system Measurement

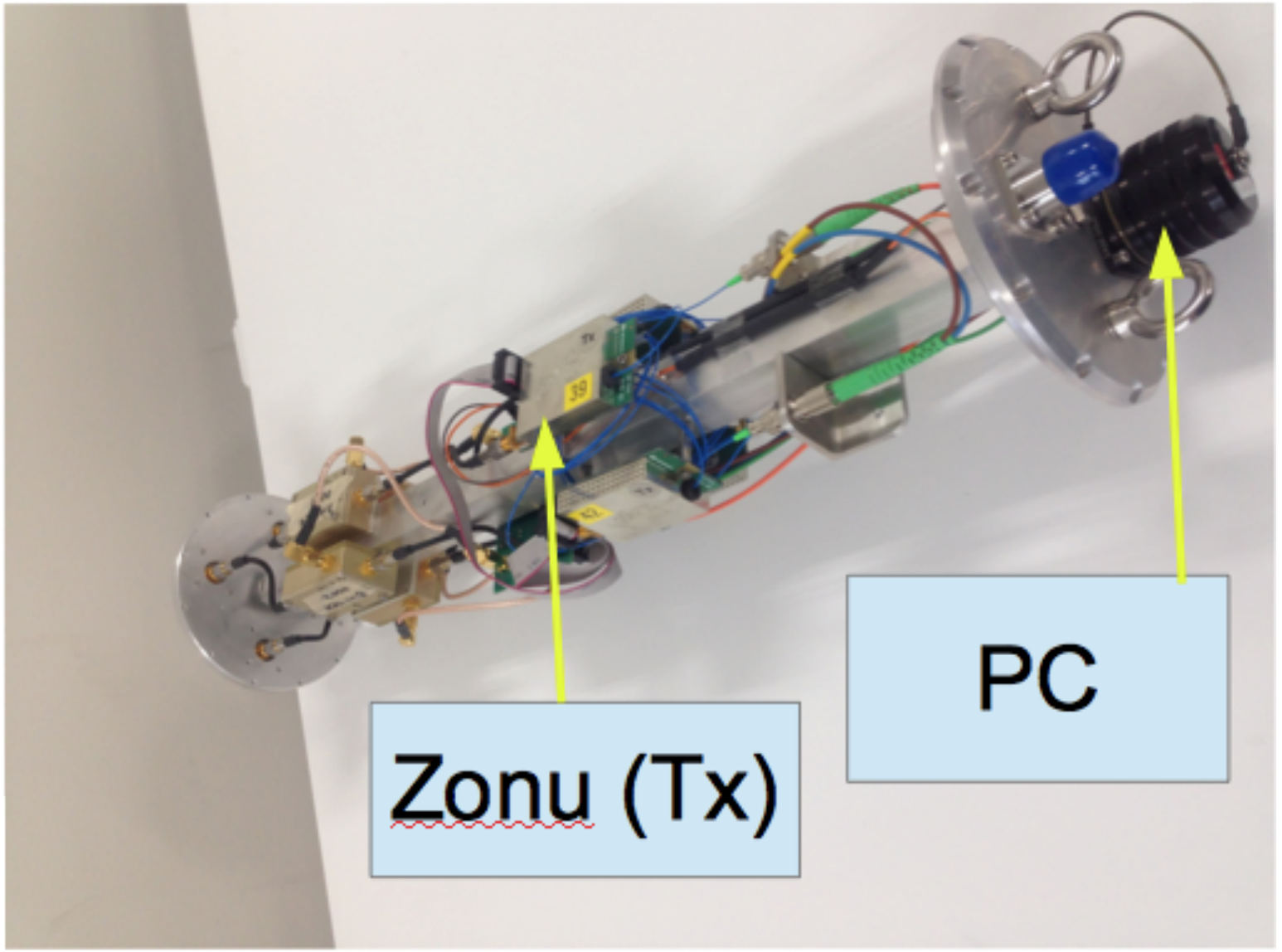
~~Antenna + LNA~~ + **DTM+Optical Fiber+FOAM**



- DTM : Using new one
- FOAM : Using old power board, new PC and Rx

Status of DTM assembly

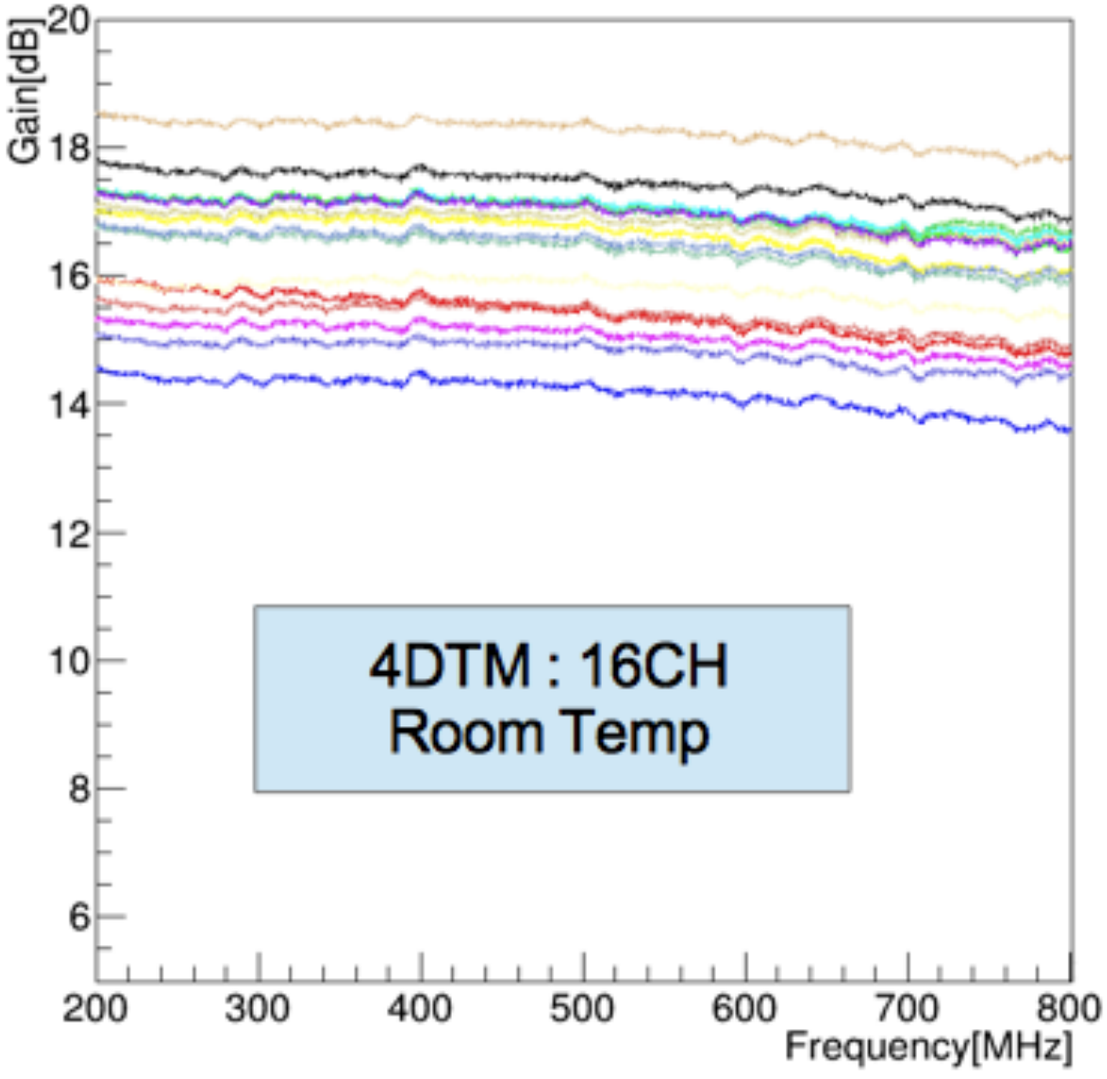


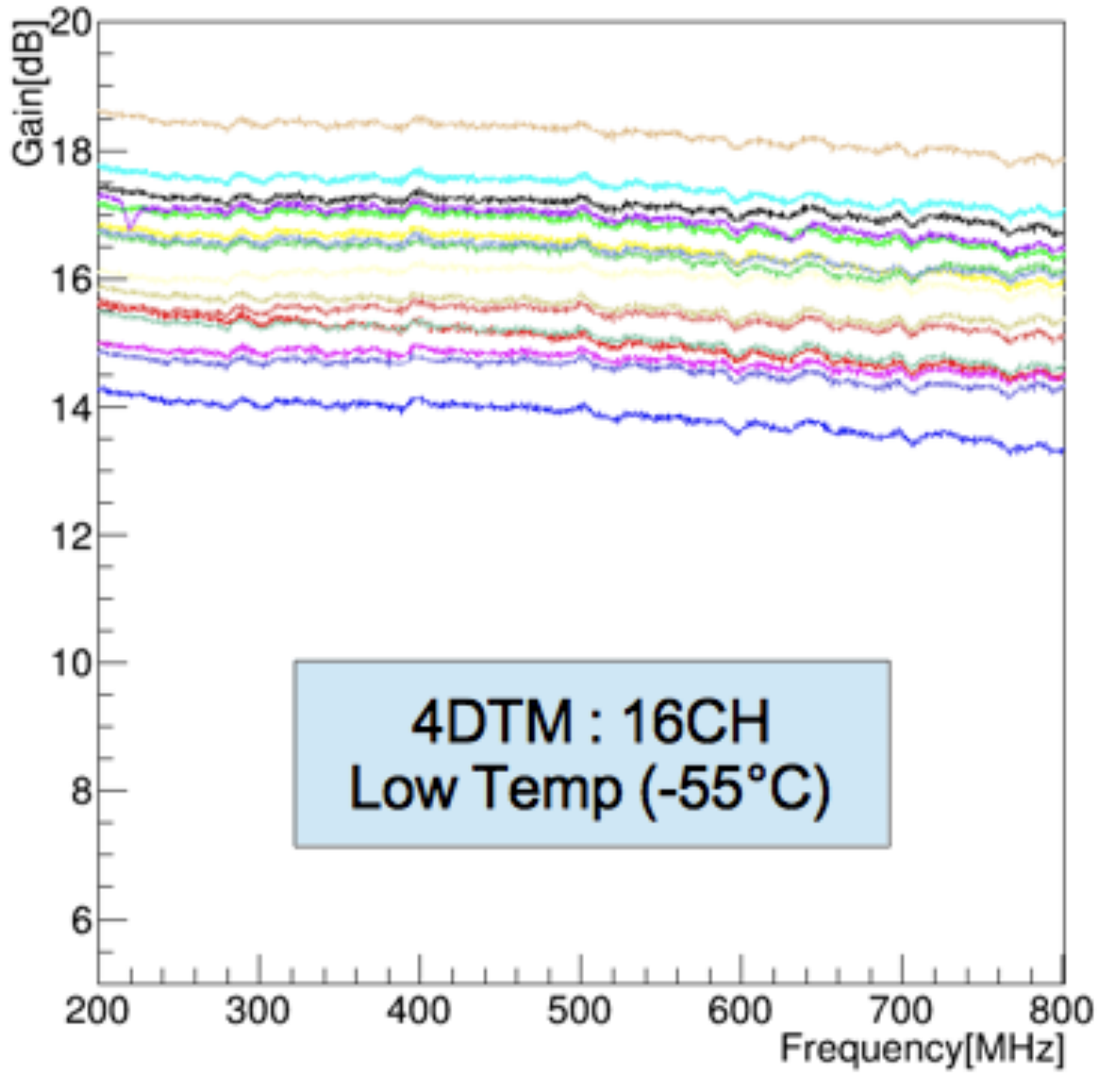


- No problem with the assembly
- 4 DTM are already build
- Have the component for 2 more stations

Gain of “DTM - Fiber - FOAM”

~~Antenna + LNA~~ + **DTM + Optical Fiber+FOAM**

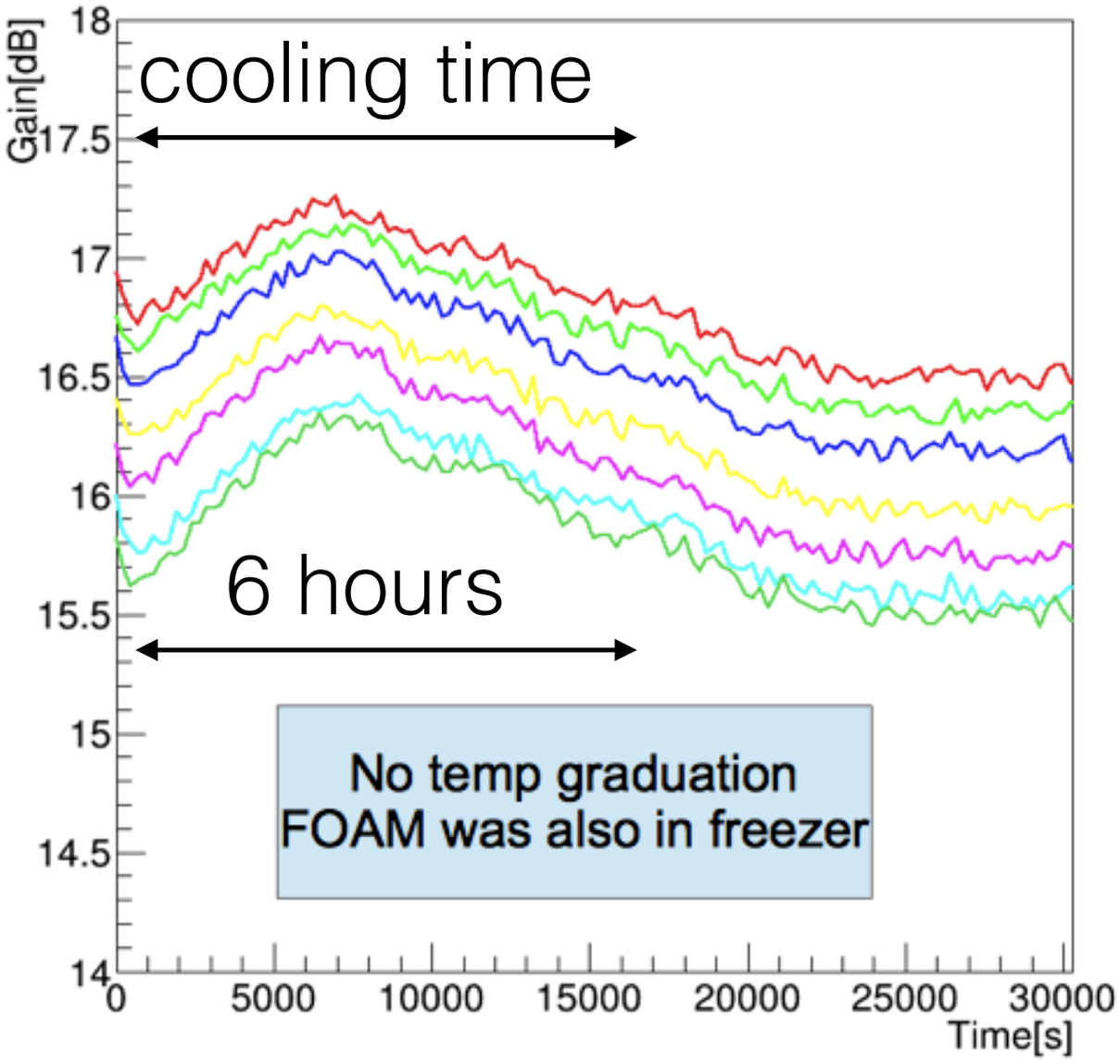




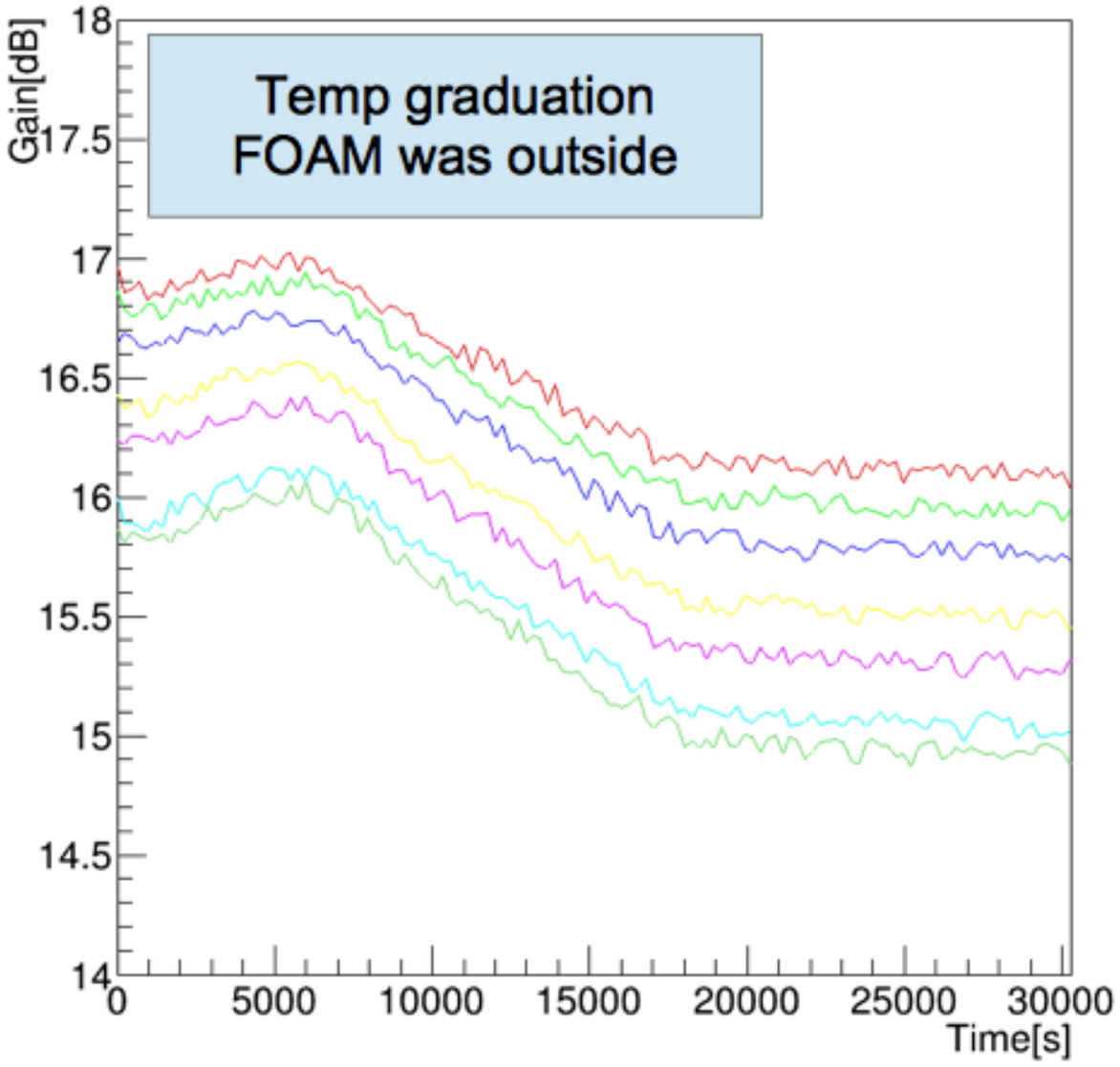
- All CH gain between 14[dB]~19[dB] .

Temperature dependence

DTM - FIBER -FOAM
in freezer



DTM - FIBER
in freezer
FOAM at room temp



Conclusion/status/questions

- **Conclusion**
  - The component for DTM/Optical fiber construction were tested (4 bonus broken)
  - 4 DTM were constructed, calibrated, temp. dependence quickly checked
  - We can assemble 3 stations in total
- **Questions**
  - Noise measurement: Is there any other solution than buying at noise meter ?
  - Any idea for the EM isolation measurement
  - What is the calibration process Chiba-Madison-South Pole ?

Back up

Effect of Fiber connection cleaning

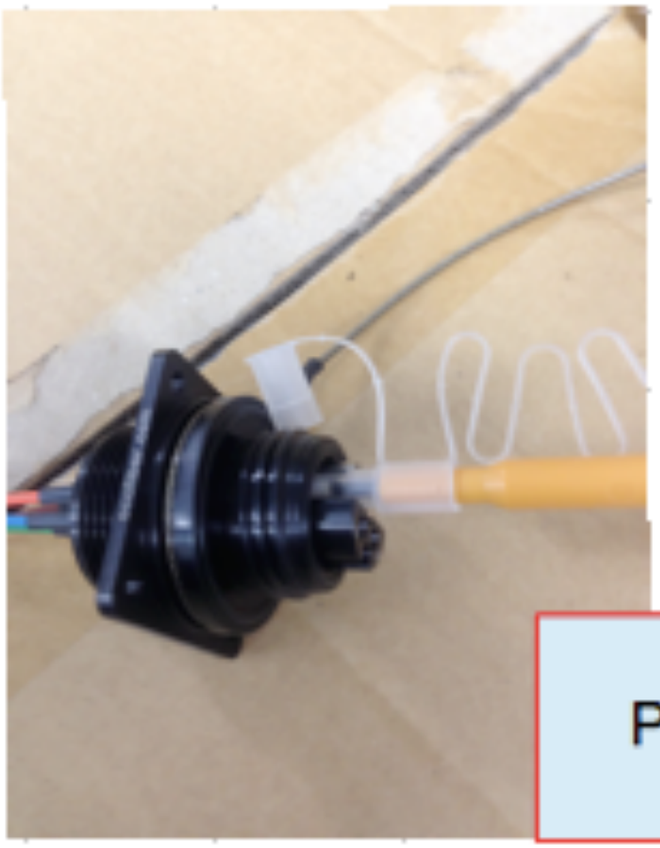
For **female** connector

For **male** connector

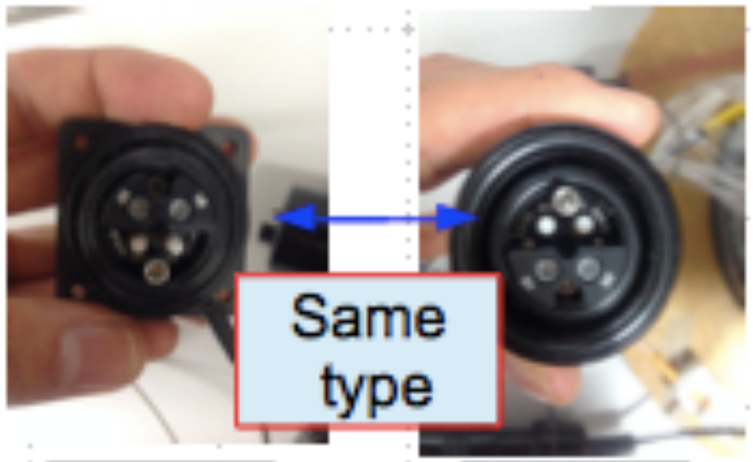
Cleaning : Procedure

Rotate cleaner
same direction
3 times

1 connector, 1 cleaner



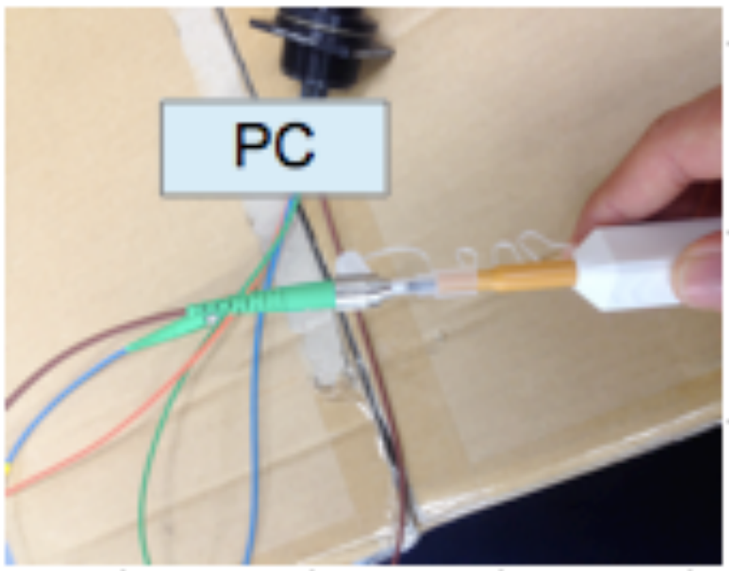
Push once



Same type

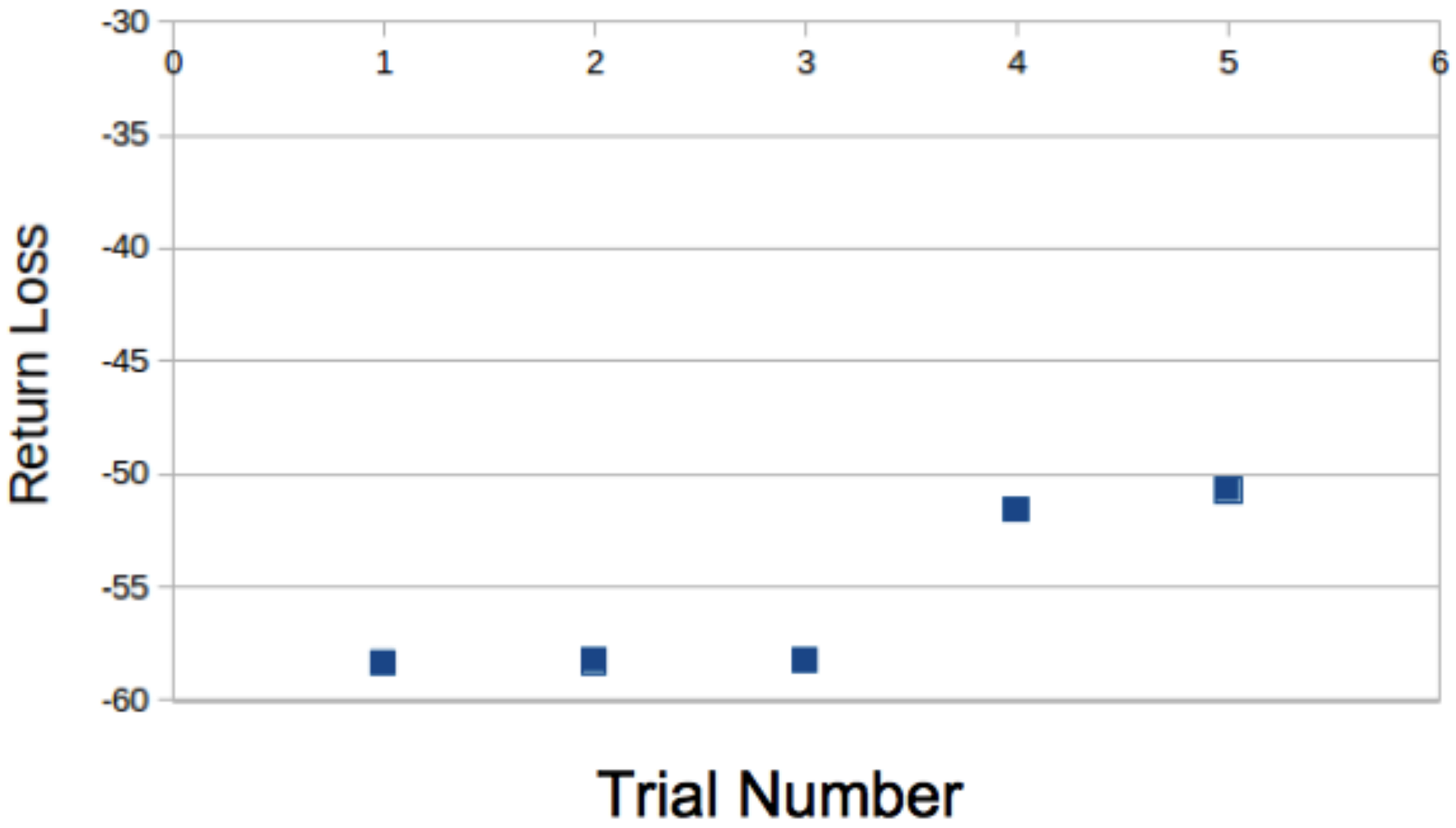
PC

OF



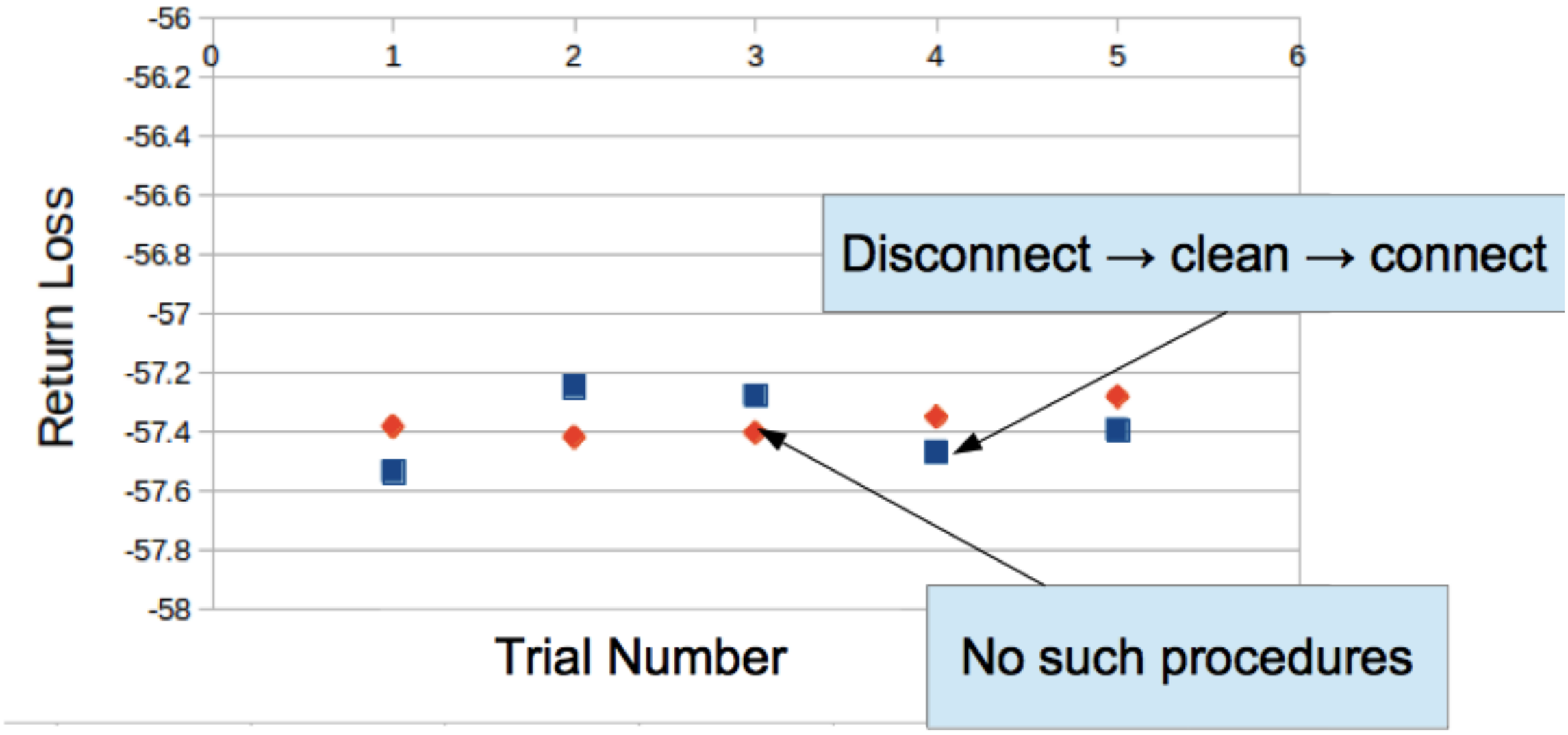
PC

Cleaning : Notes



- If there are some dirt on fiber surface, Return Loss will be *like* Event 4 or 5.
- Even with the cleaner, sometimes you cannot remove dirt.→ look surface carefully with eyes.

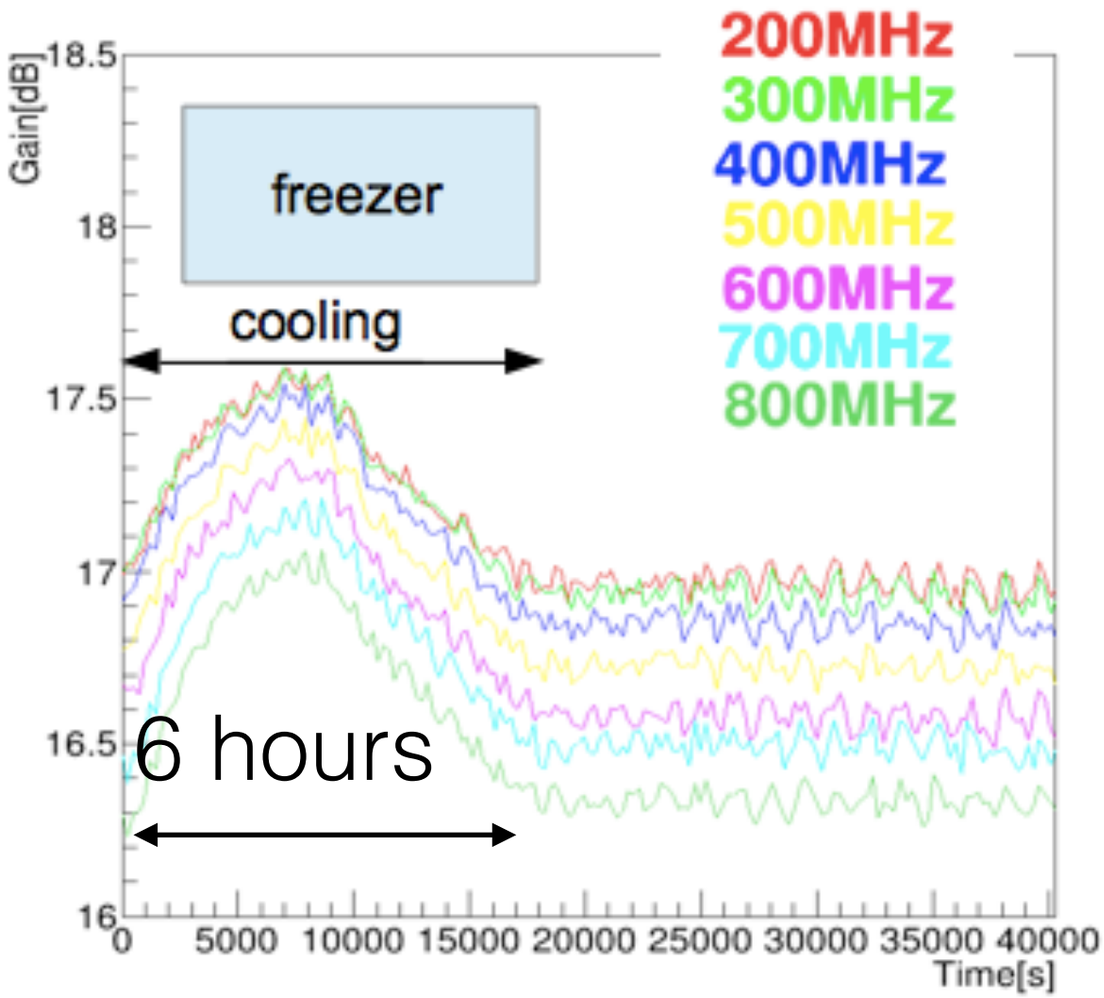
The variation due to cleaning.



- Variation is slightly increase.
- Important thing is to clean at the beginning.

Temperature dependence

DTM - FIBER -FOAM
in freezer



DTM - FIBER
in freezer
FOAM at room temp