

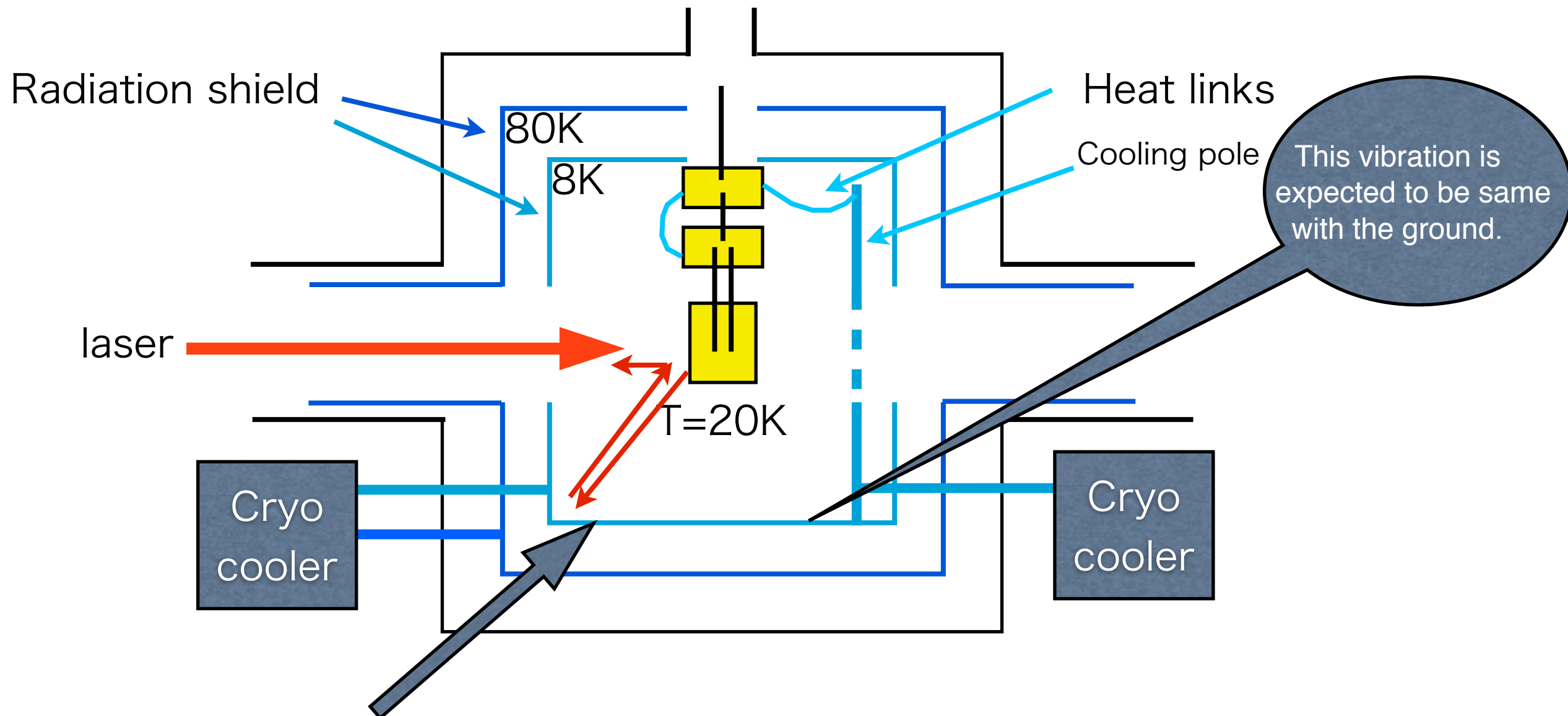
Measurement of vibration of radiation shield

Dan Chen

Cryogenic meeting 6th Nov. 2012

Purpose

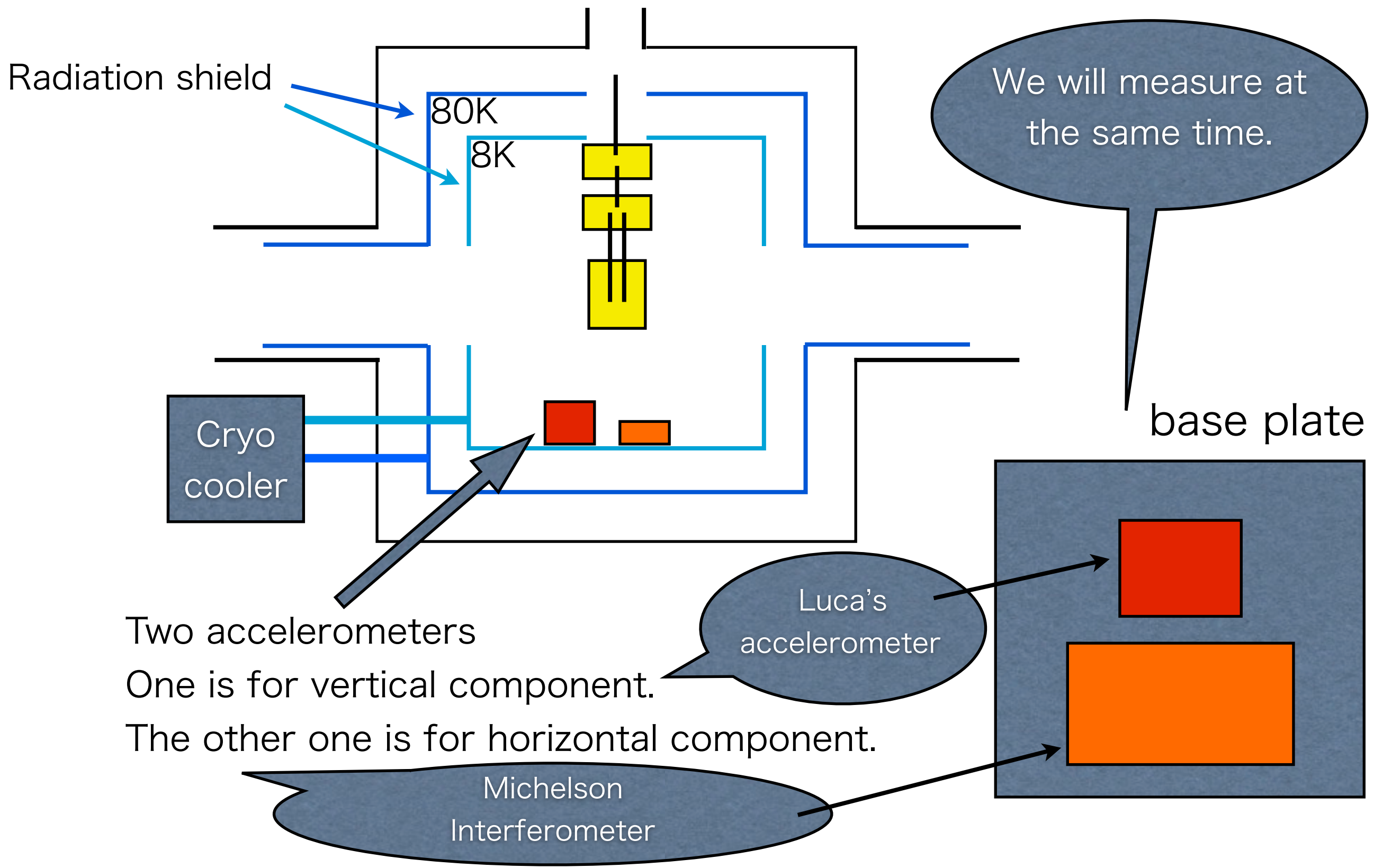
Measurement of the vibration on the radiation shield.



The vibration of the radiation shield may swing the test mass through the heat links. The scattering laser may be reflected by the shield and recombine into main laser.

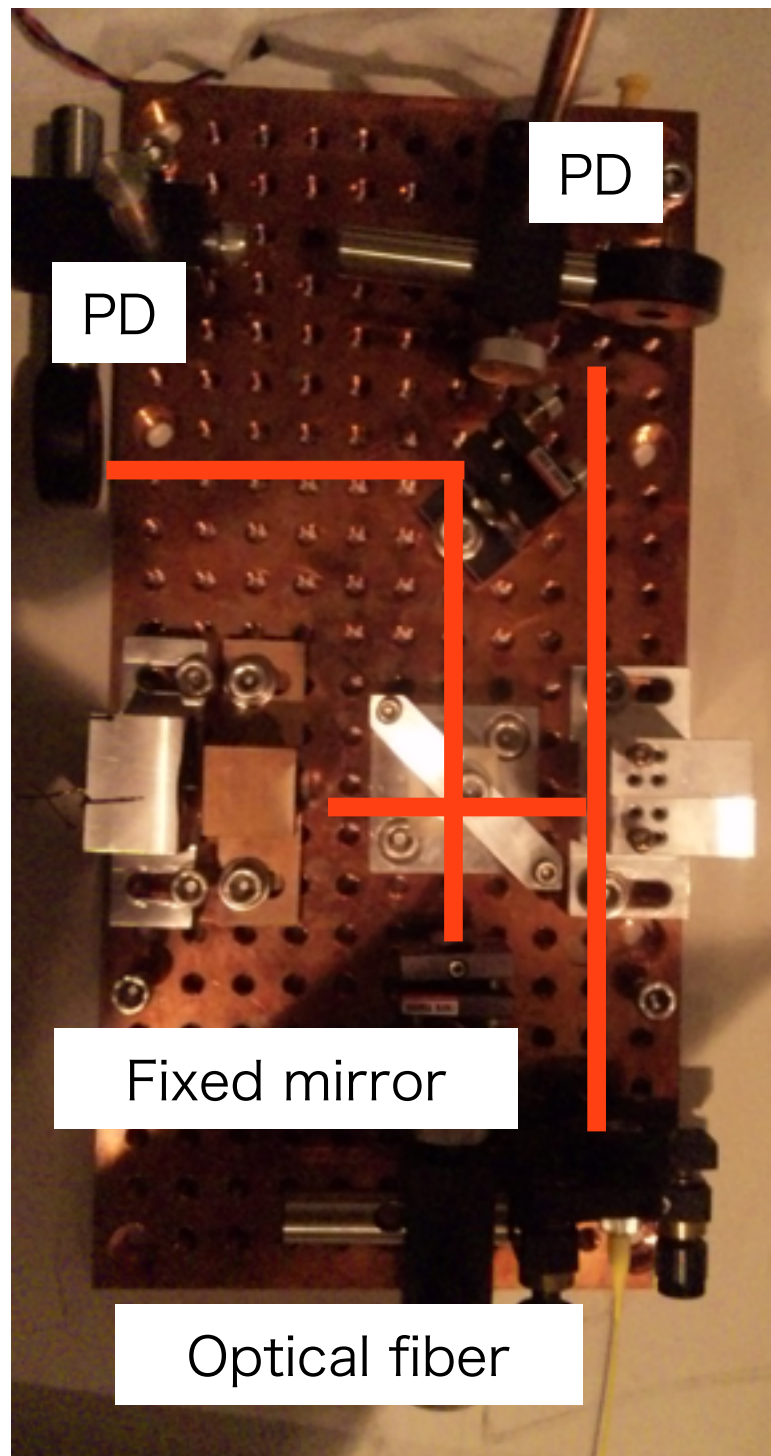
➔ We will measure the vibration on this radiation shield with cryocooler ON. The real measurement will be run in Toshiba(Yokohama-city) in December.

The measurement in Toshiba



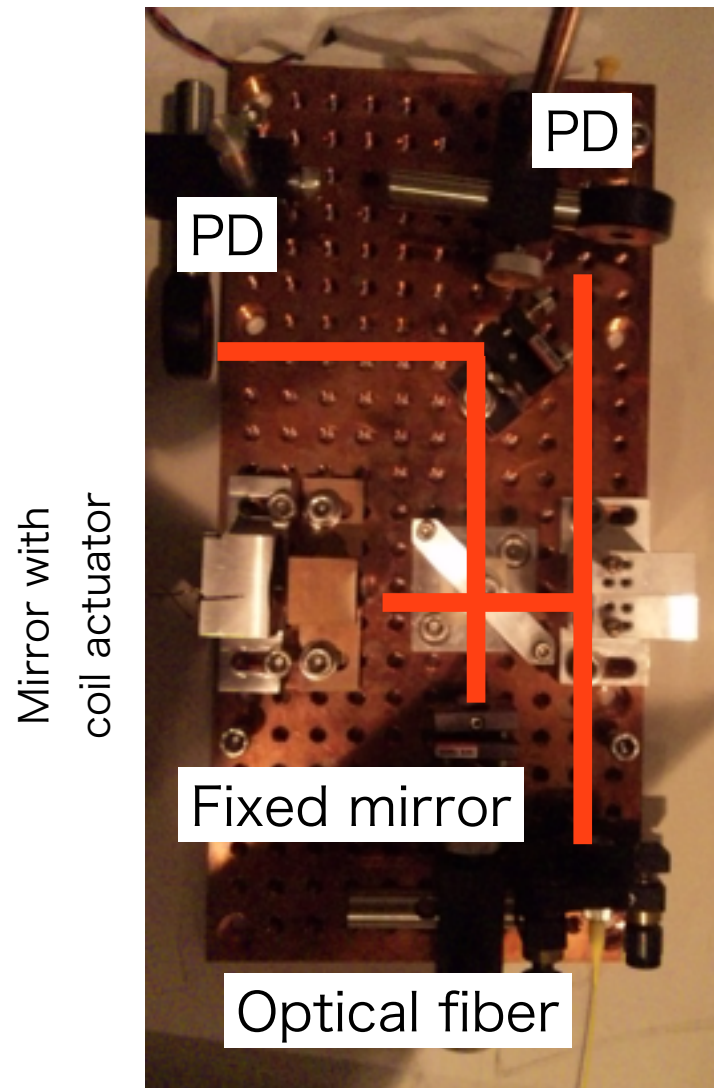
Method

Mirror with
coil actuator



We will use a MI to measure the vibration.(horizontal component)

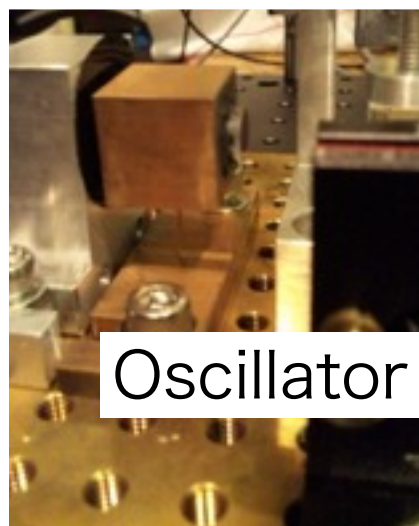
Method



Mirror with coil actuator

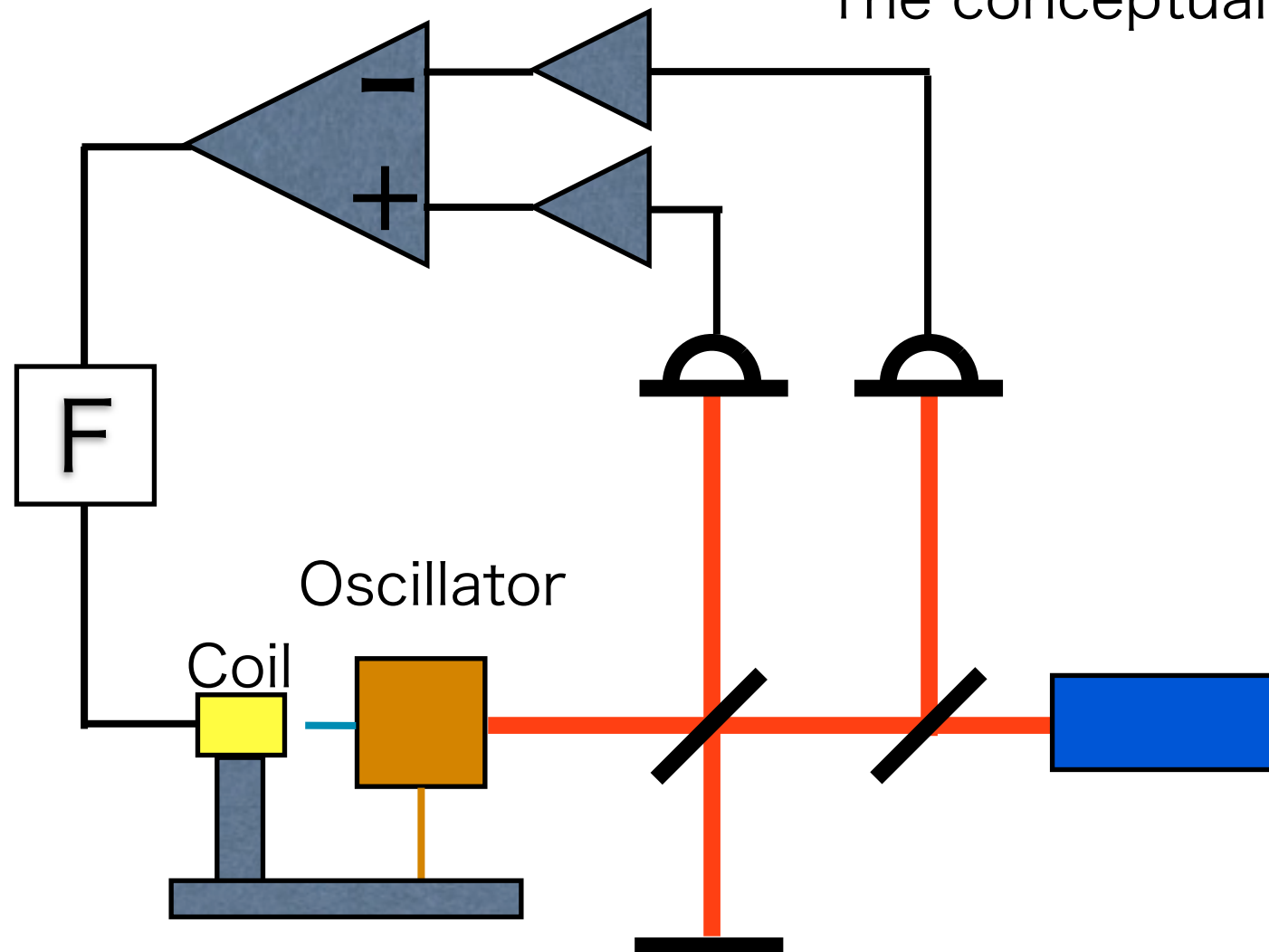
Fixed mirror

Optical fiber



Oscillator

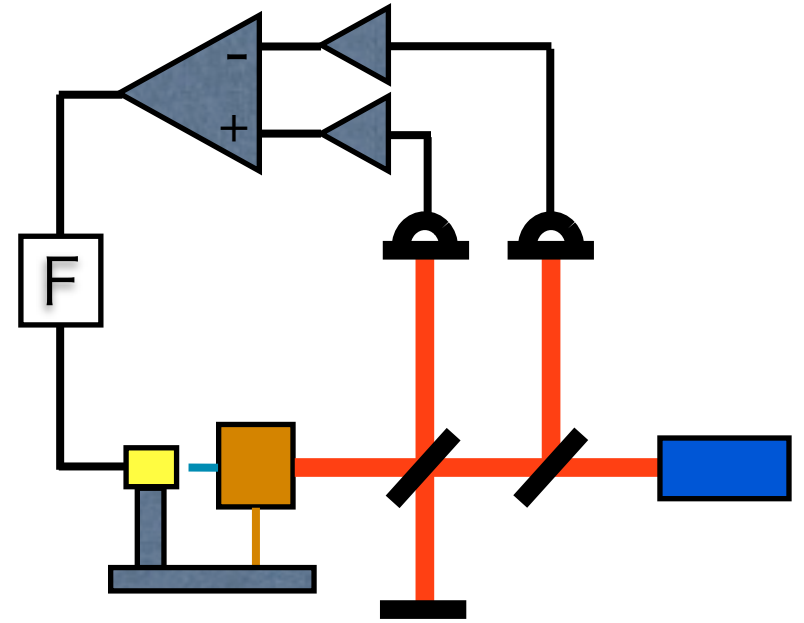
The conceptual figure



One of the arms is a oscillator.

We can control the oscillator with the output of the MI to know the vibration.

present status

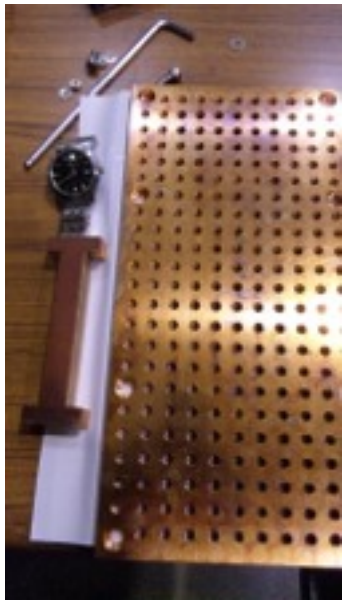


We will have a cooling test before the real measurement in Toshiba.

We need...

0. Cryocooler
1. Chamber
2. Optical fiber
3. Laser
4. Interferometer control test
5. Other

Cooling test -chamber- pulse tube cooler head

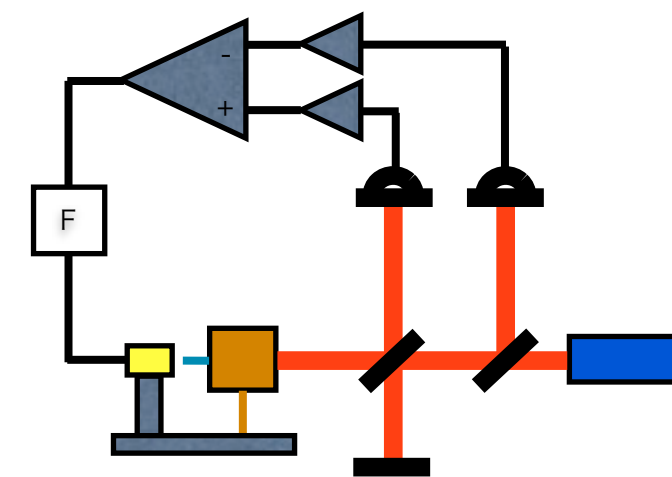
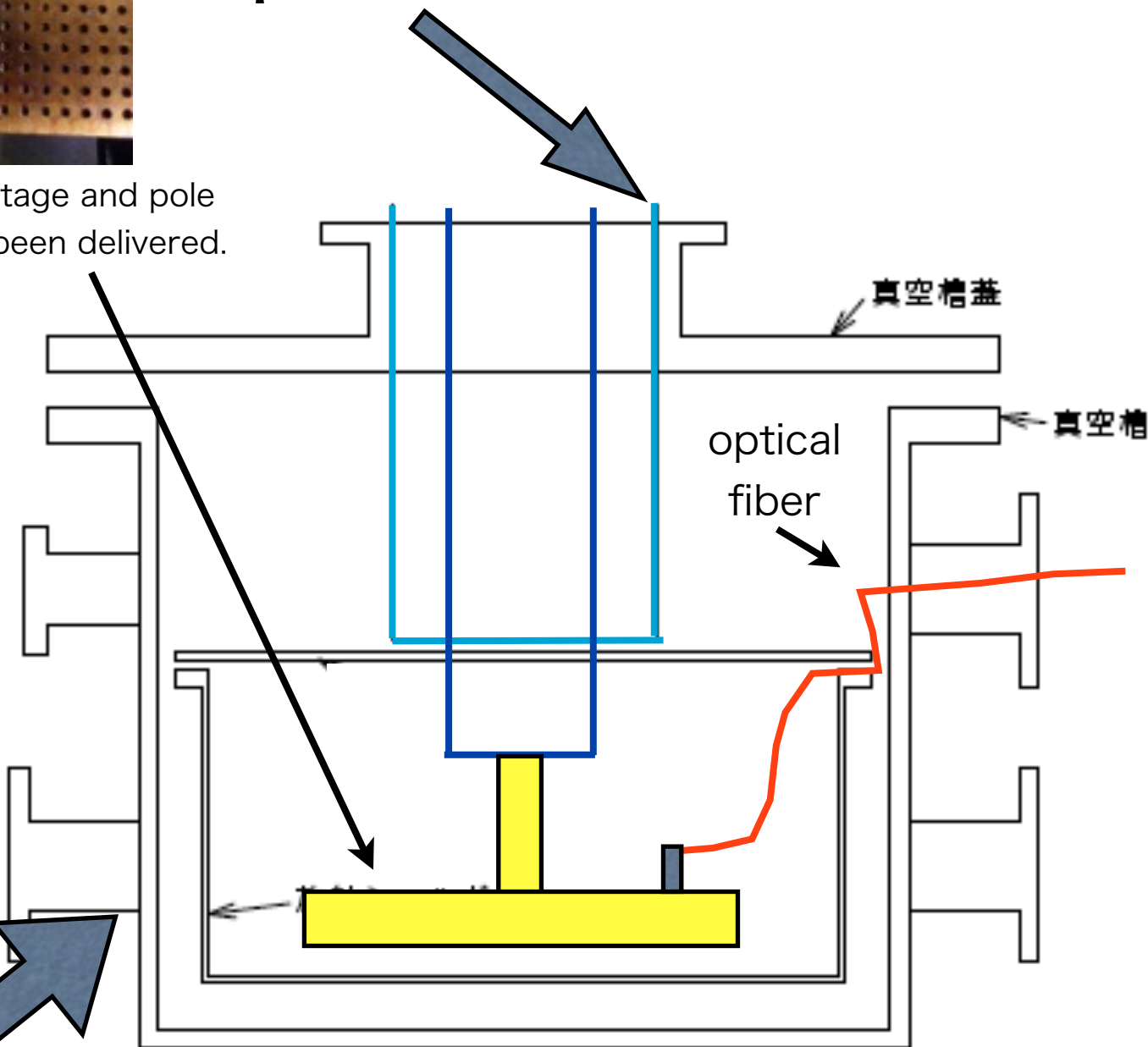


This optical stage and pole have already been delivered.



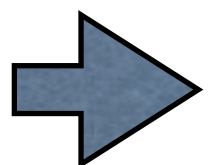
UV208P56LSW

This cryocooler had a trouble.
-> We will use another one.



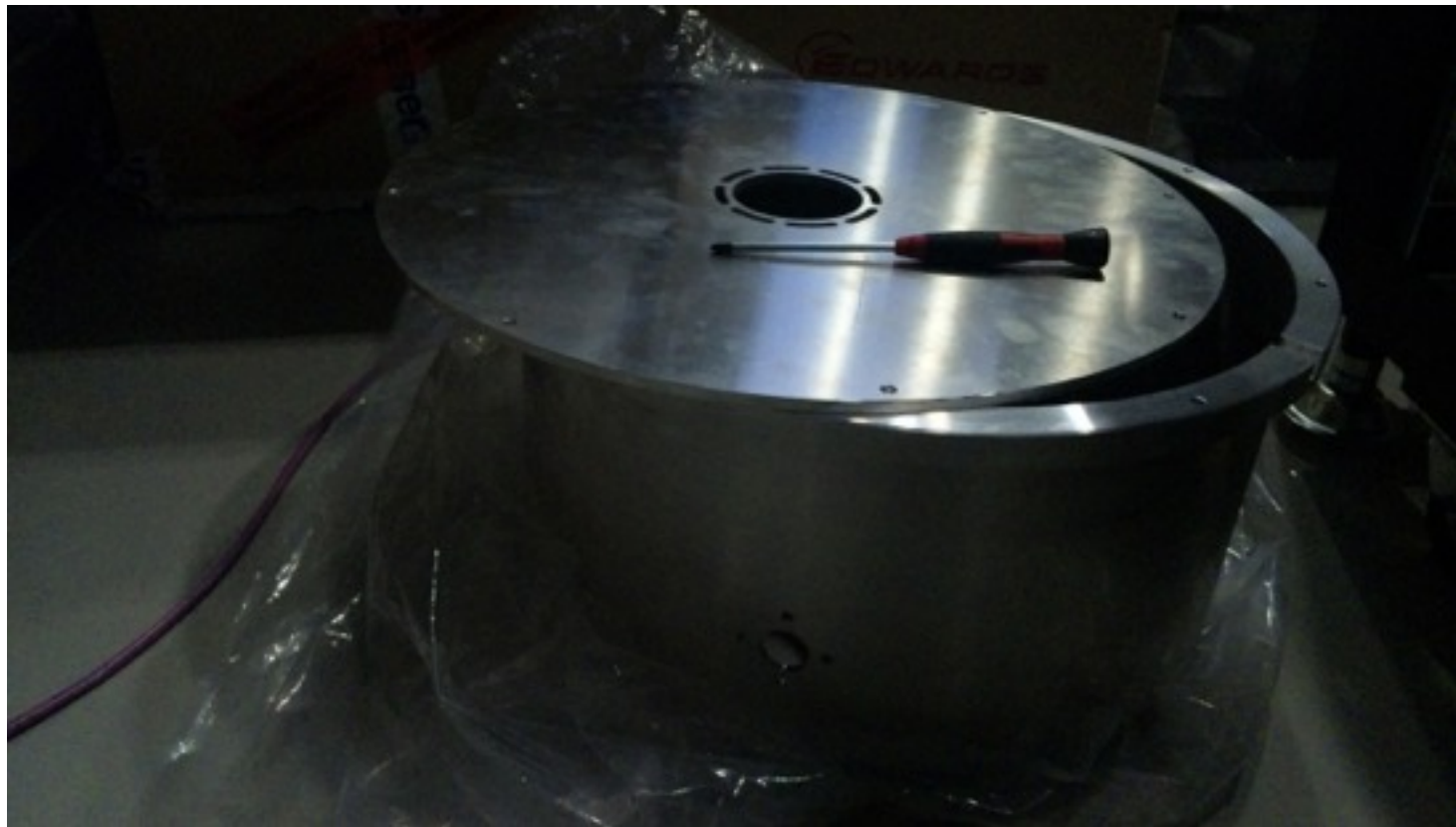
We will use this chamber to test PD, MI control and so on.

We ordered this chamber and radiation shield.

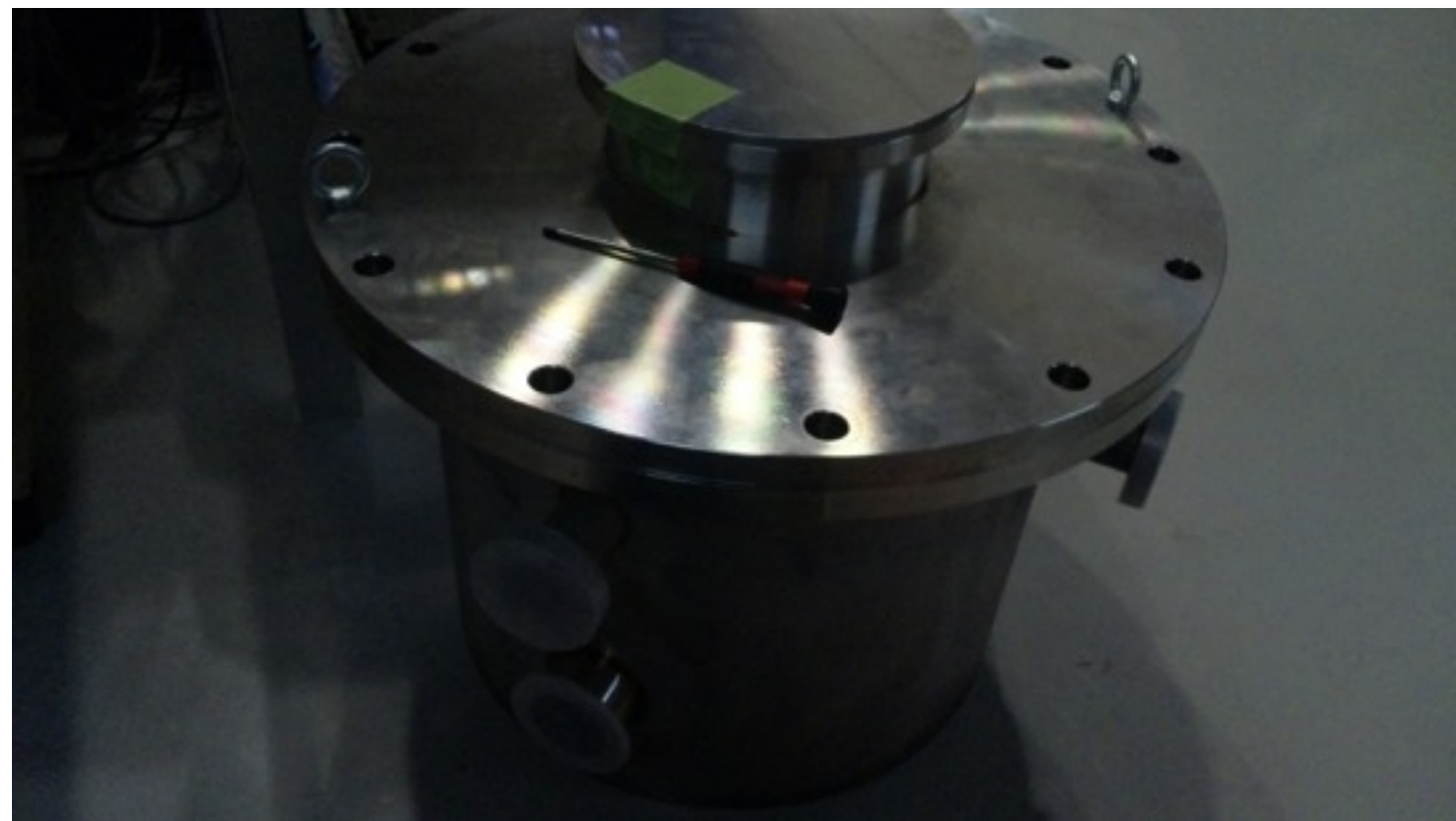


We have already received.

Cooling test -chamber-



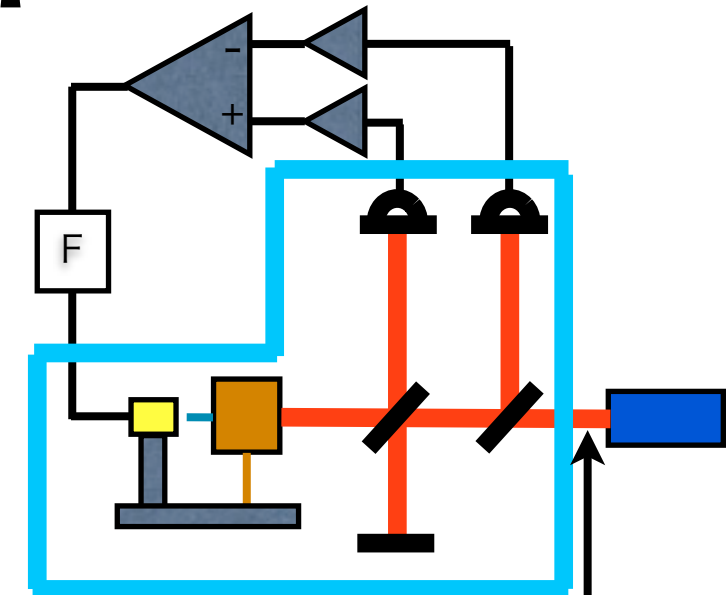
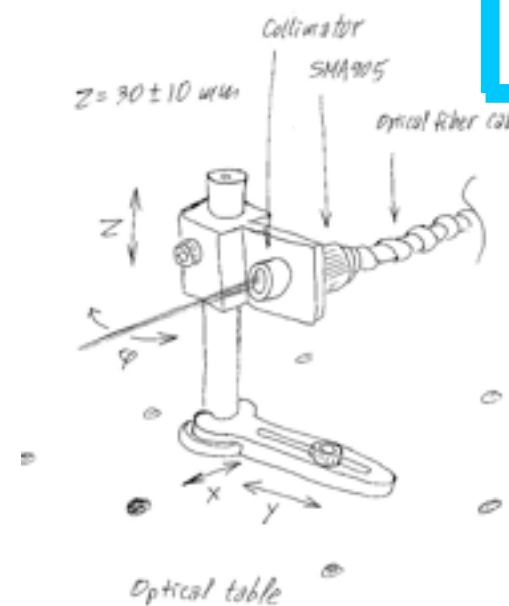
radiation
shield



chamber

Optical fiber

UHV & Cryogenic

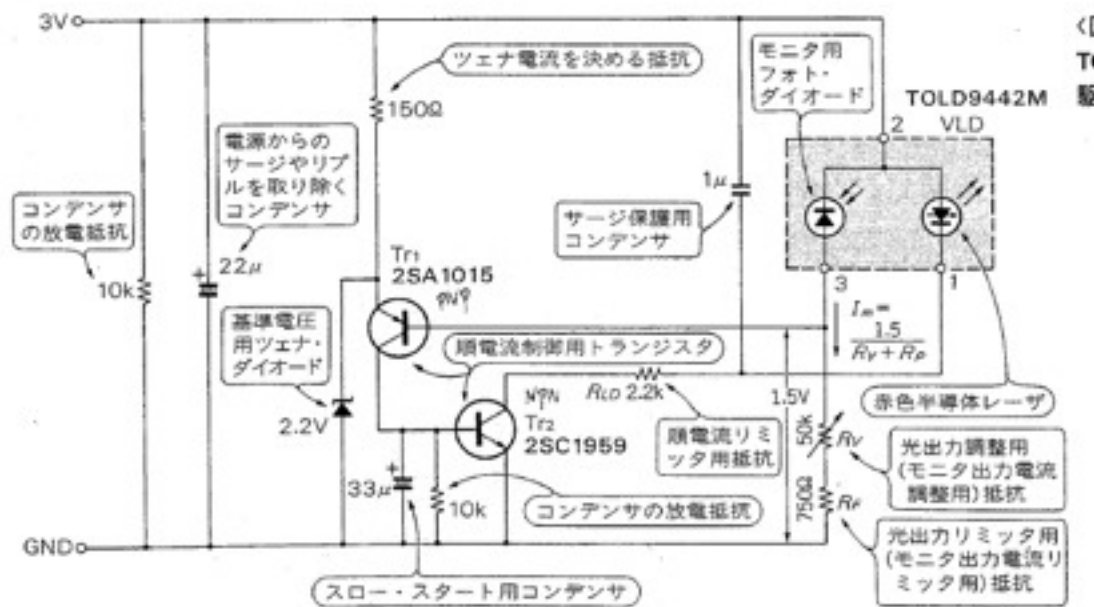


Optical fiber

We have already received partly.

The mount system of this fiber will be delivered in the next week.

Laser(1550nm)

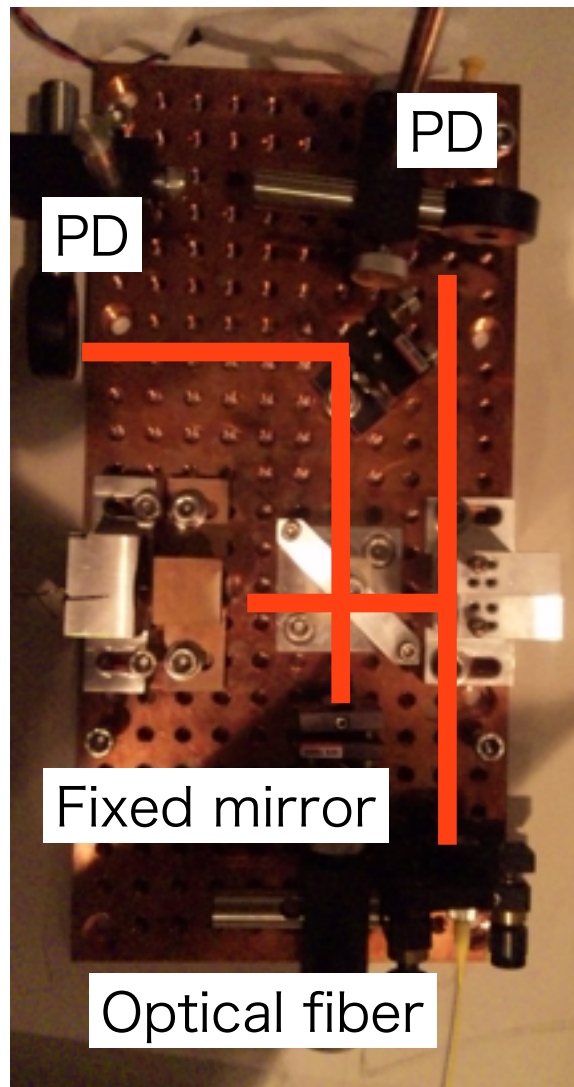


Fiber-Pigtailed Laser Diode

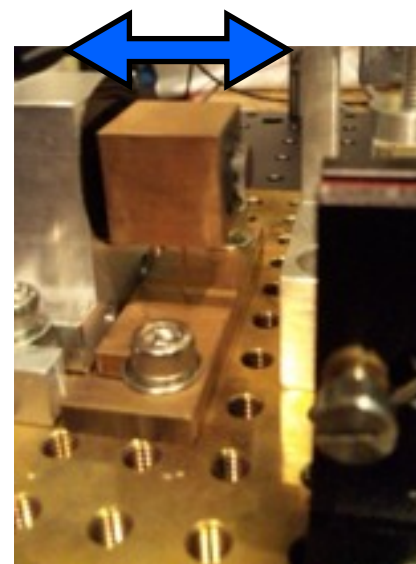
I made a APC(Auto Power Control) circuit to drive and stabilize the LD

Interferometer control test

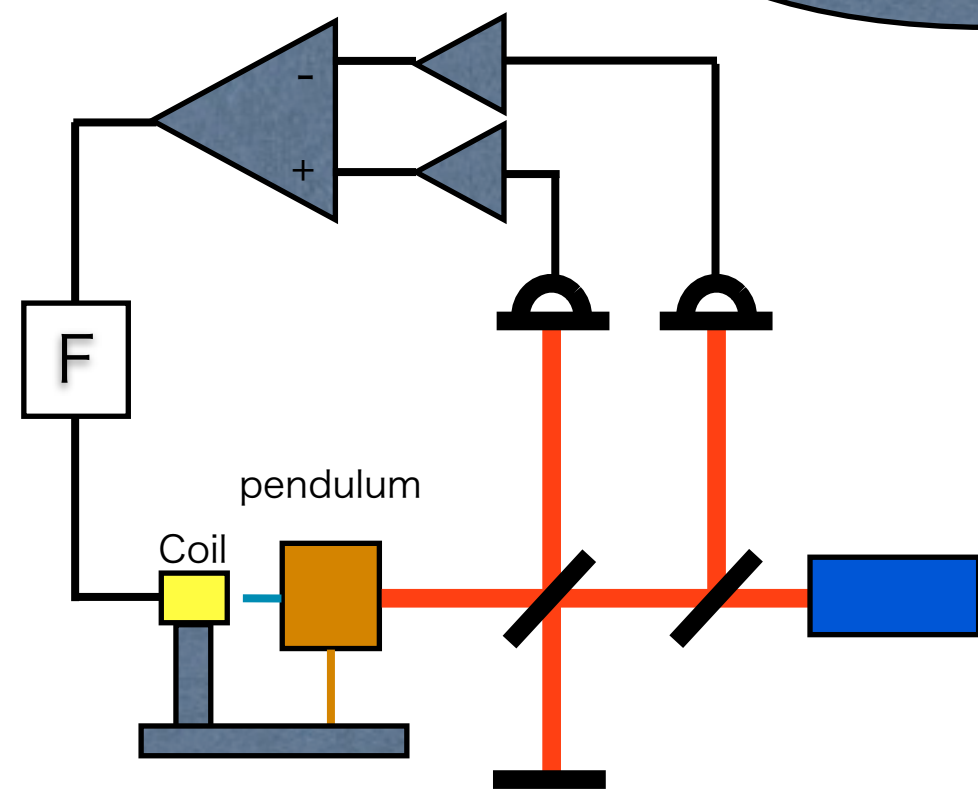
We used a **1550nm laser** to setup the MI and measured the seismic vibration under air and room temperature.



MI



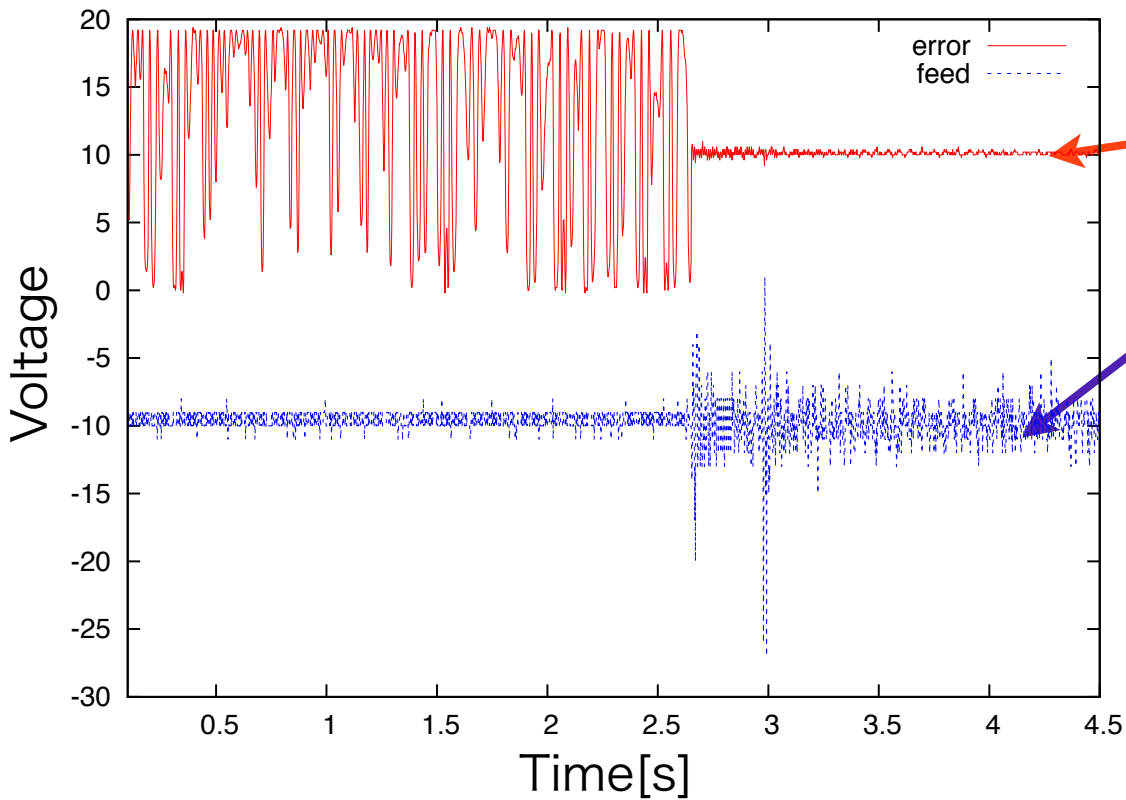
Oscillator



The conceptual figure

Consistent with RION accelerometer.

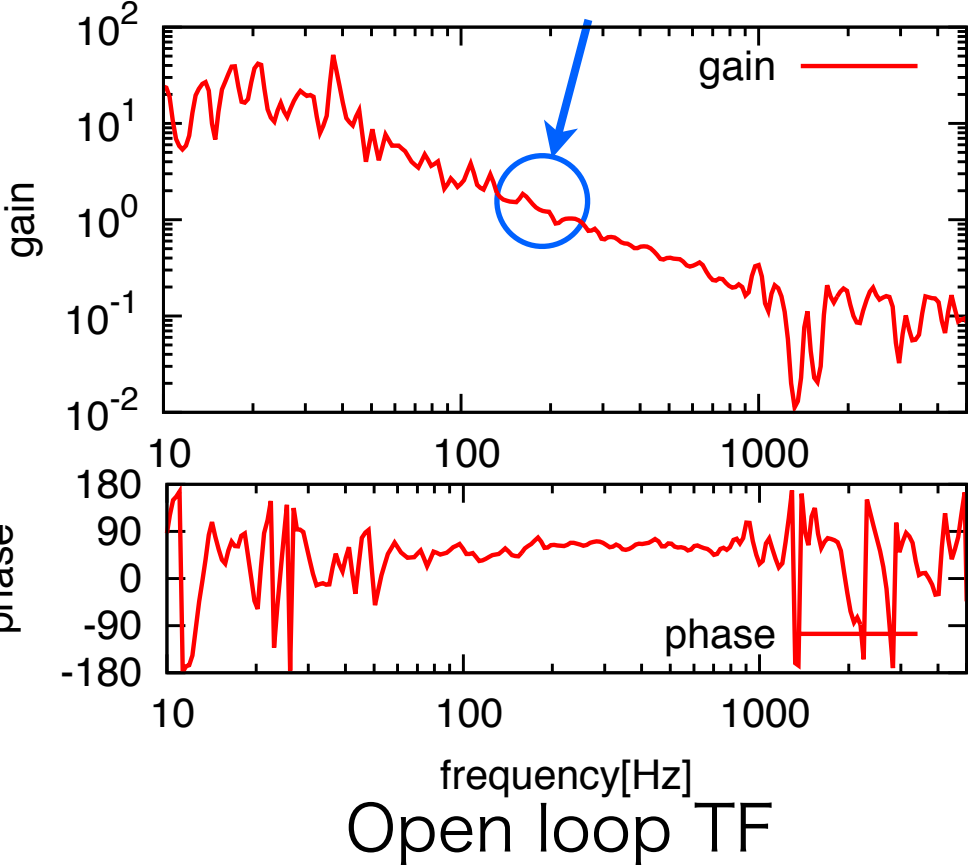
Interferometer control test



Error signal

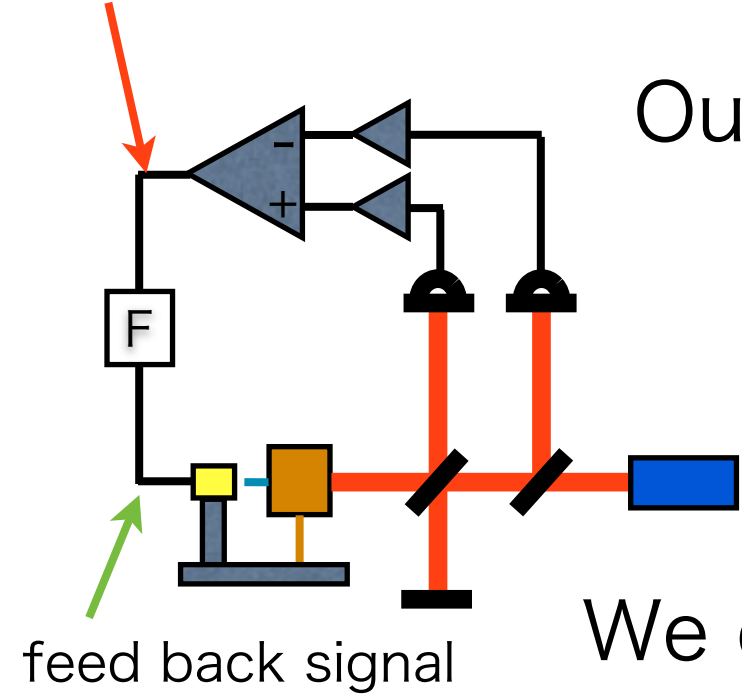
Feed back signal

UGF ~ 200Hz



error signal

Output of the MI and control signal

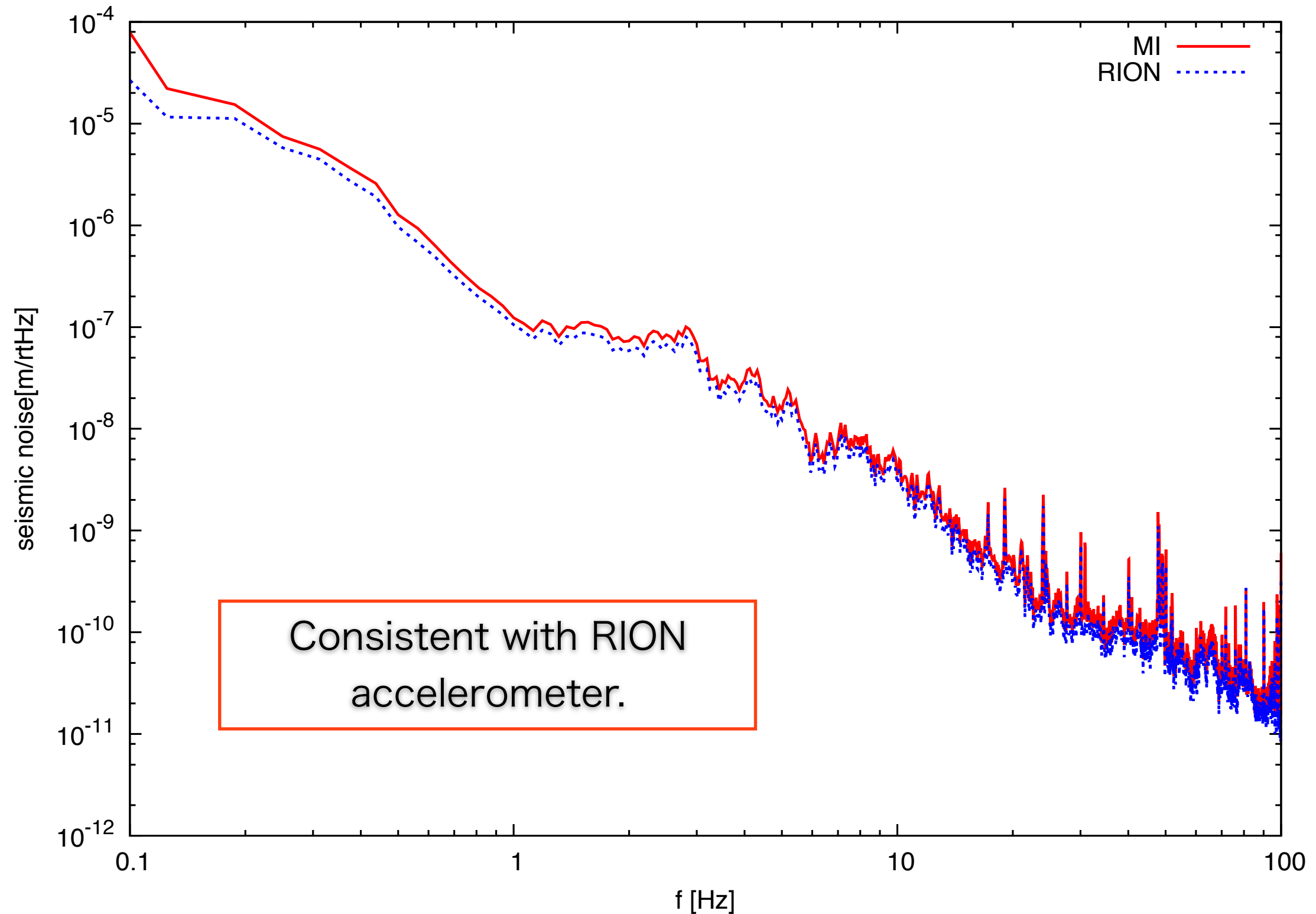


We can measure the vibration under 100Hz

Open loop TF

Interferometer control test

Seismic measurement@Kashiwa



Action Items (last meeting)

- Laser source

➔ It worked

- Order O-ring for the chamber

➔ These will be delivered in the next week

- Order optical components (UHV)

➔ These will be delivered in this month

- Clean room to clean the accelerometers.

➔ We can use the clean room Hirose-san maintains

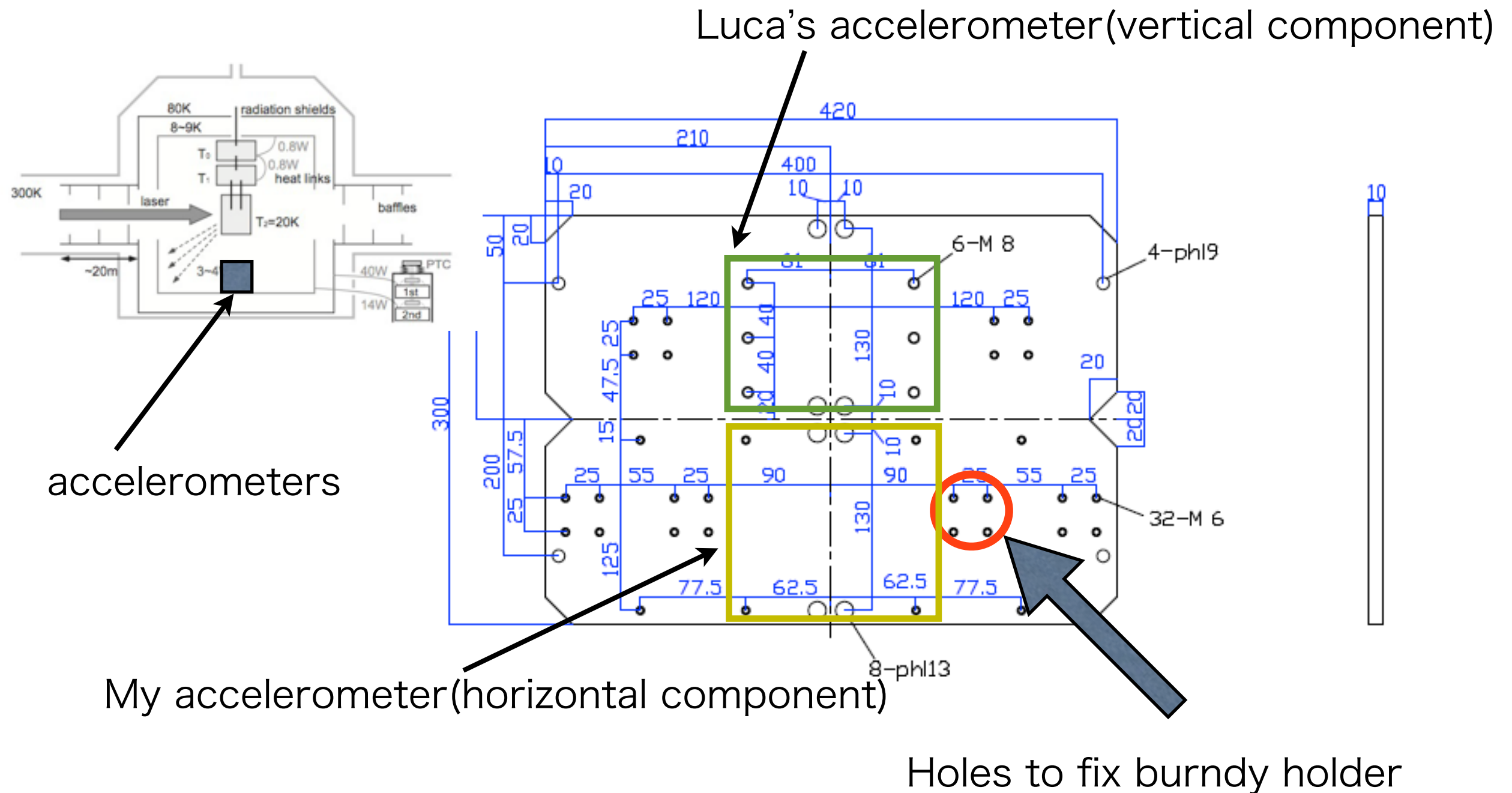
Action Items

- Making the adapter to connect new cryocooler and chamber we made.

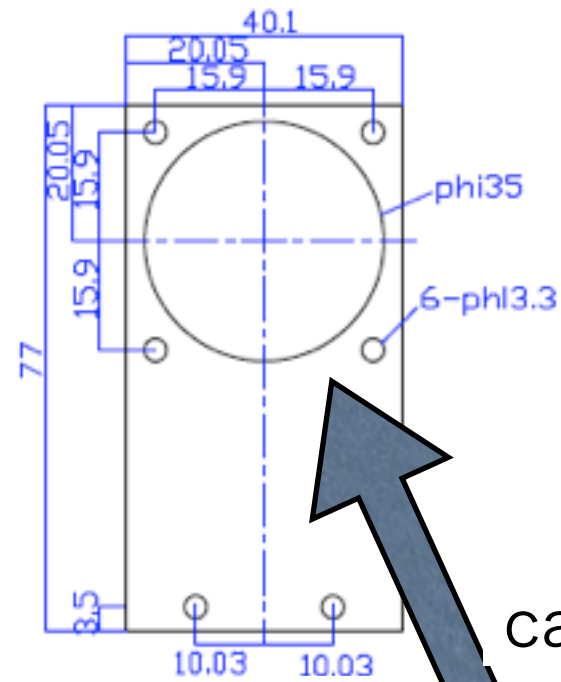
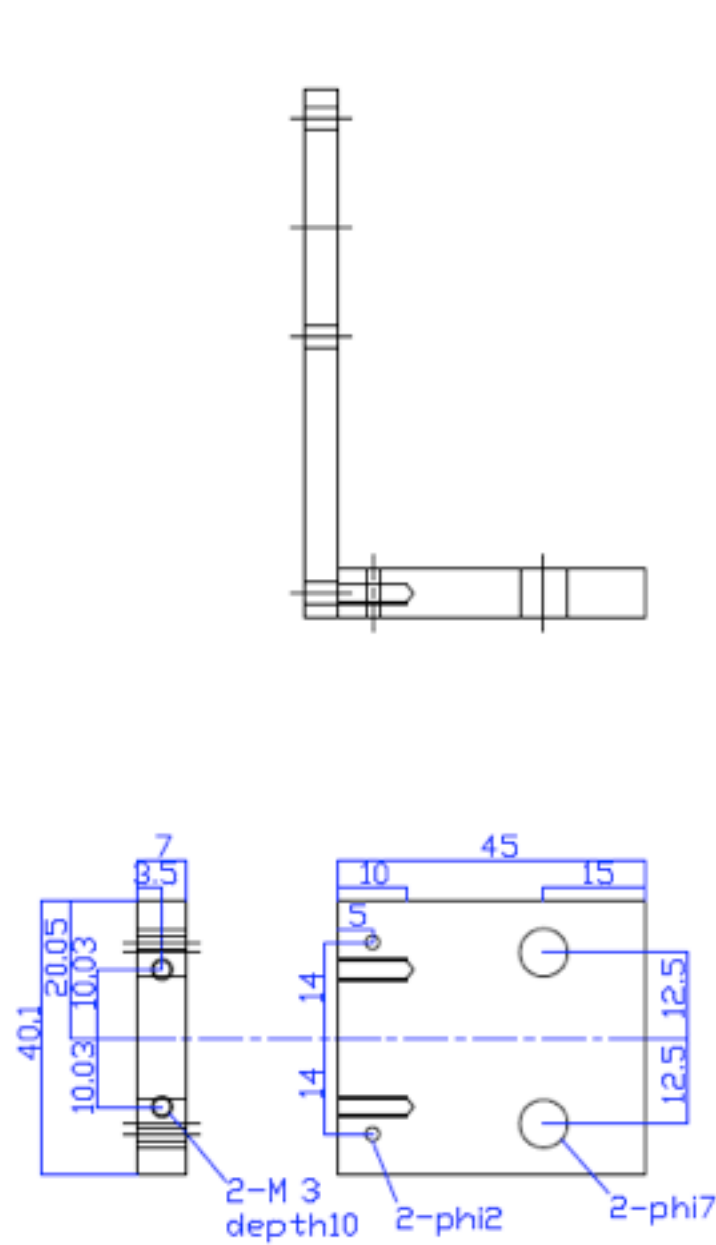
end

Fix with radiation shield

(The design of the baseplate.)



fix with radiation shield

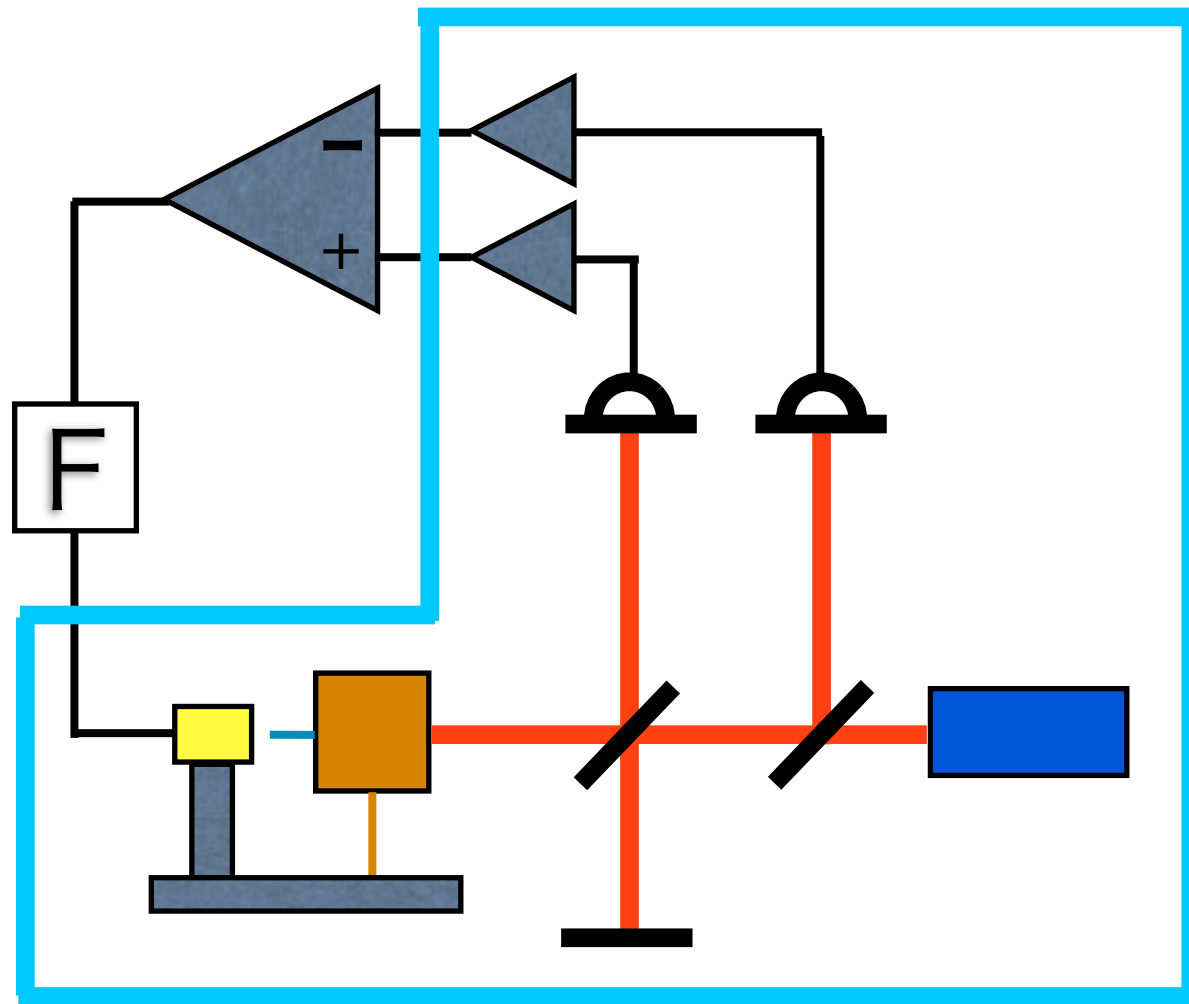


The connector of the cable will be inserted here.



Burndy holder v.2	2012/7/25
Scale = 1/1	Dan Chen

Method

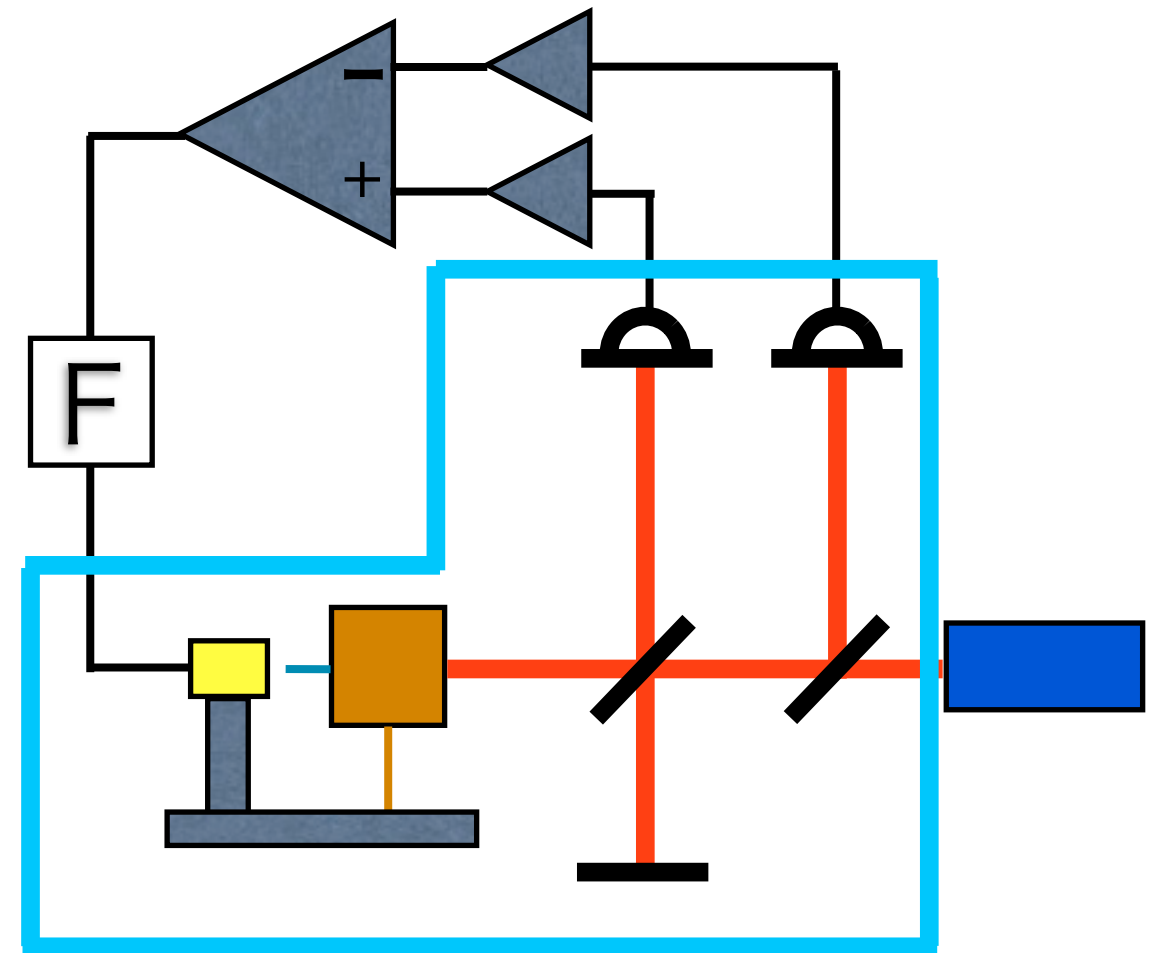


Cryogenic

Challenging

We will prepare both of the configurations.

(The priority of right one is higher)



Cryogenic

The easiest