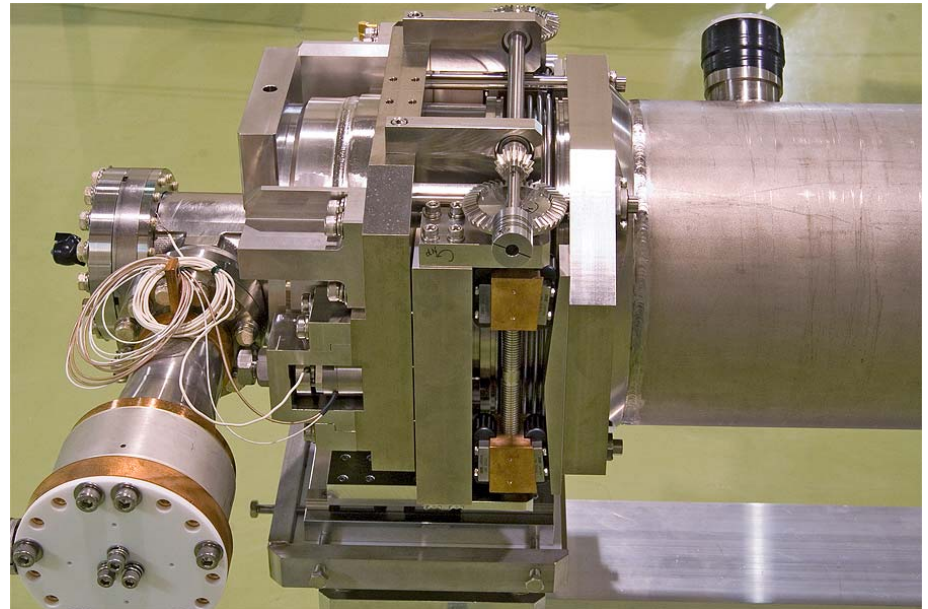
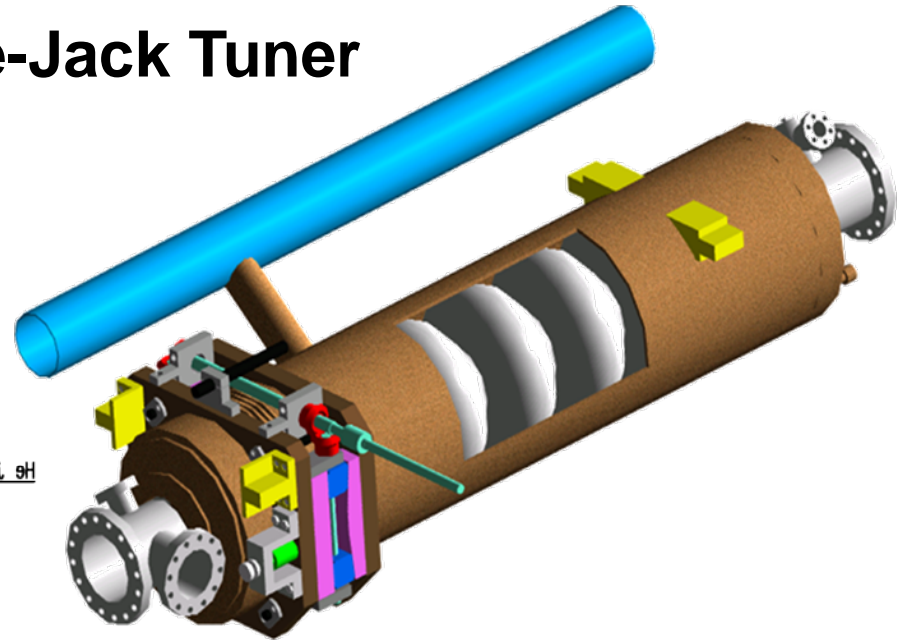
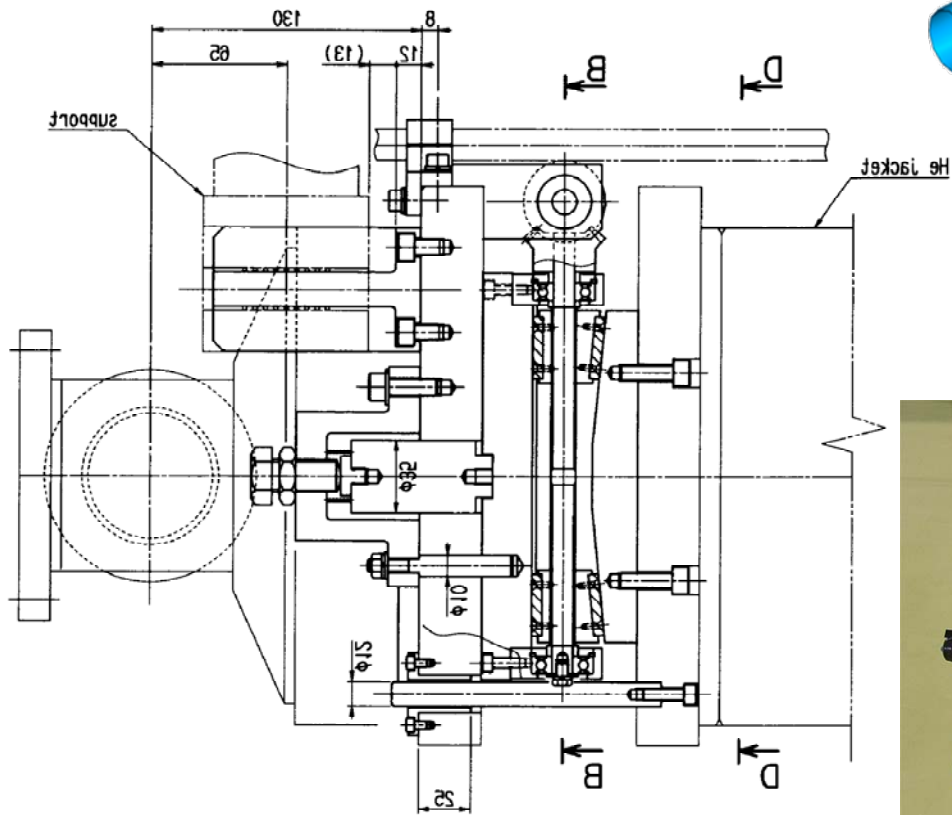


Piezo Tuner Response at Room Temperature, KEK slide jack tuner

2009.04.18

H. Hayano, KEK

KEK Slide-Jack Tuner

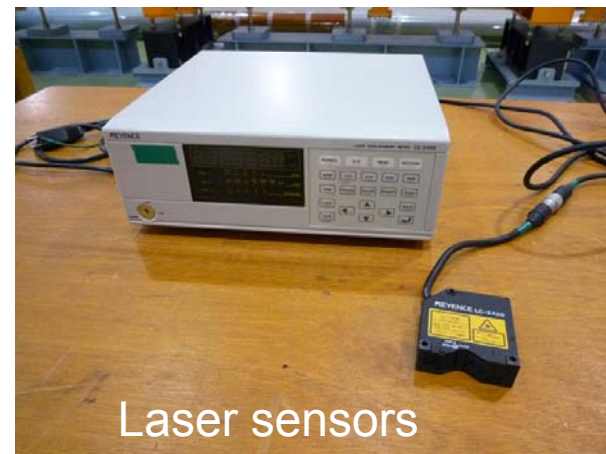
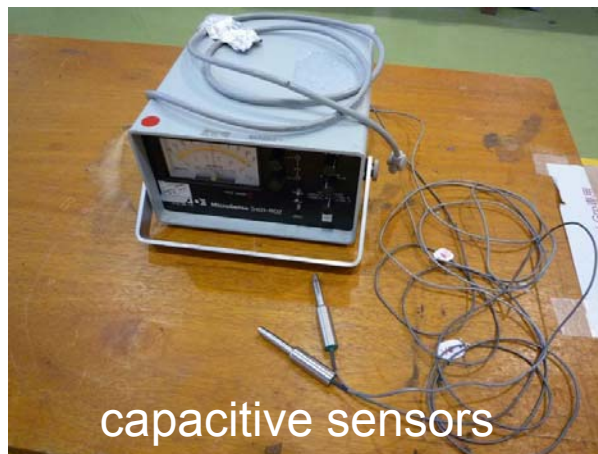


Motivation of response measurement

To understand no repeatability in cryomodule test at 2K.

To evaluate movement of each part of the tuner, (friction?)

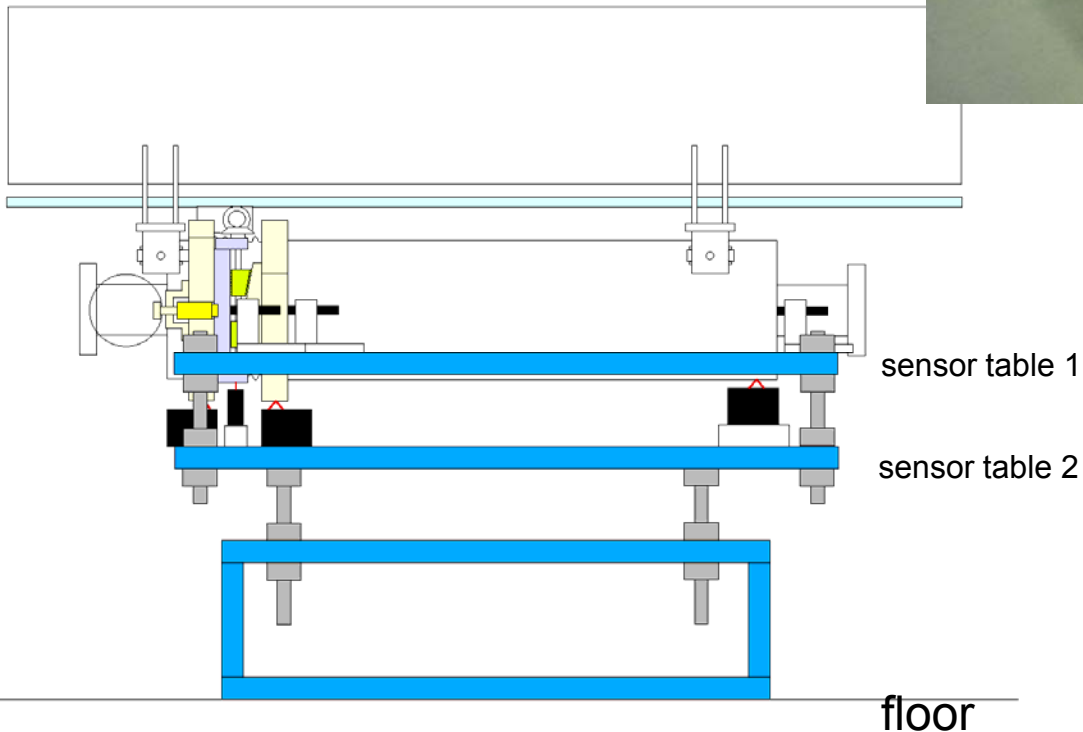
Sensors: ch1 – ch6 = capacitive displacement sensors
(range $\pm 25\mu\text{m}$, resolution $0.1\mu\text{m}$)
+ direction = object move to sensor
ch7, ch8, ch9 = Laser displacement sensors
(range $\pm 50\mu\text{m}$, resolution $< 0.1\mu\text{m}$)
+ direction = object move away from sensor

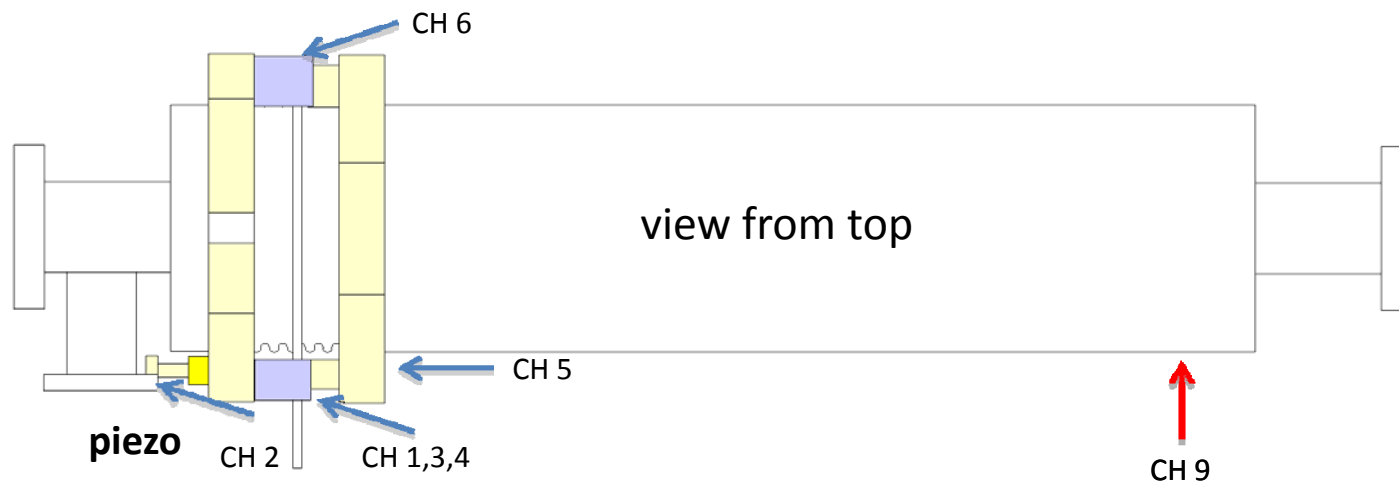


position sensor setup

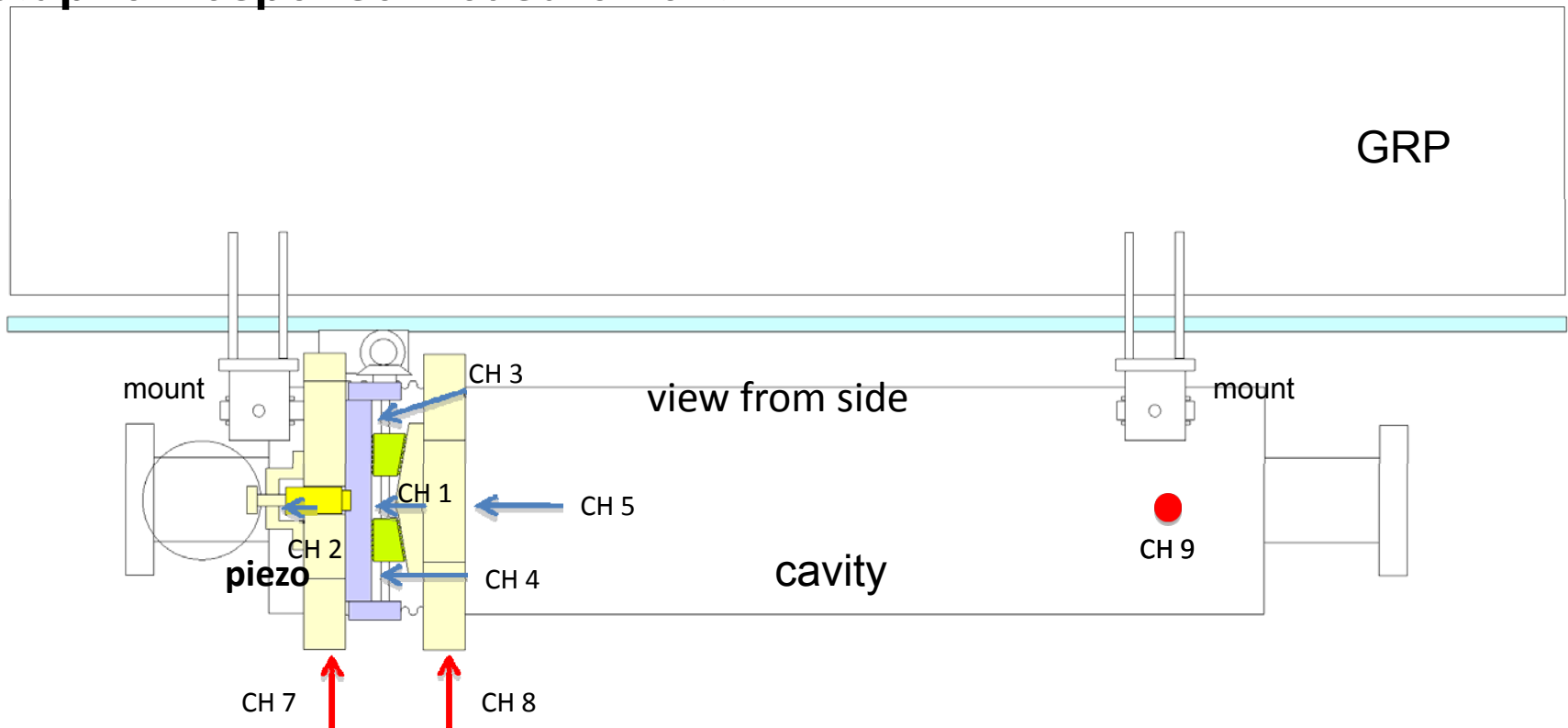
Cavities are hang on GRP, with invar rod fixed.

Sensors are fixed on the sensor table,
which is fixed to floor.



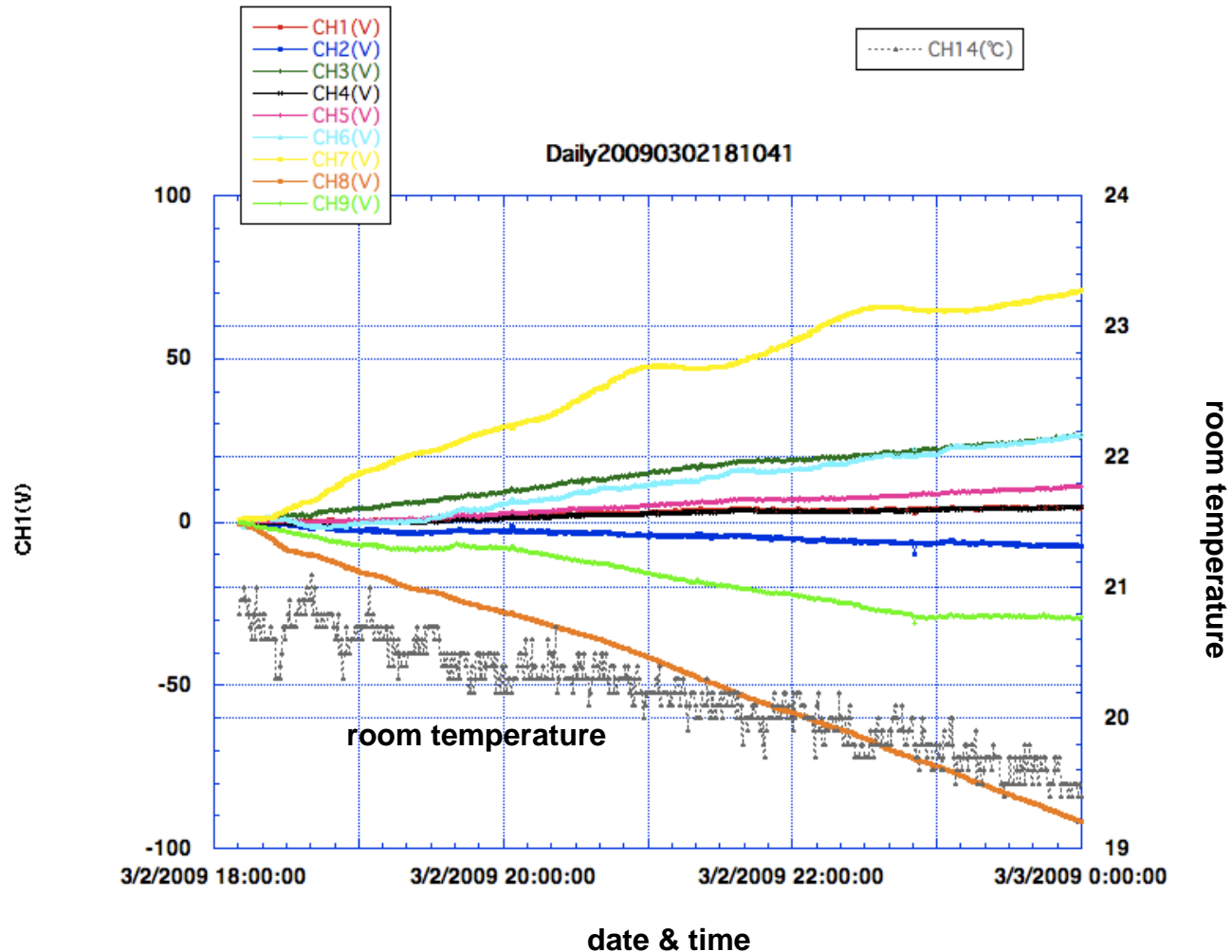


setup for response measurement



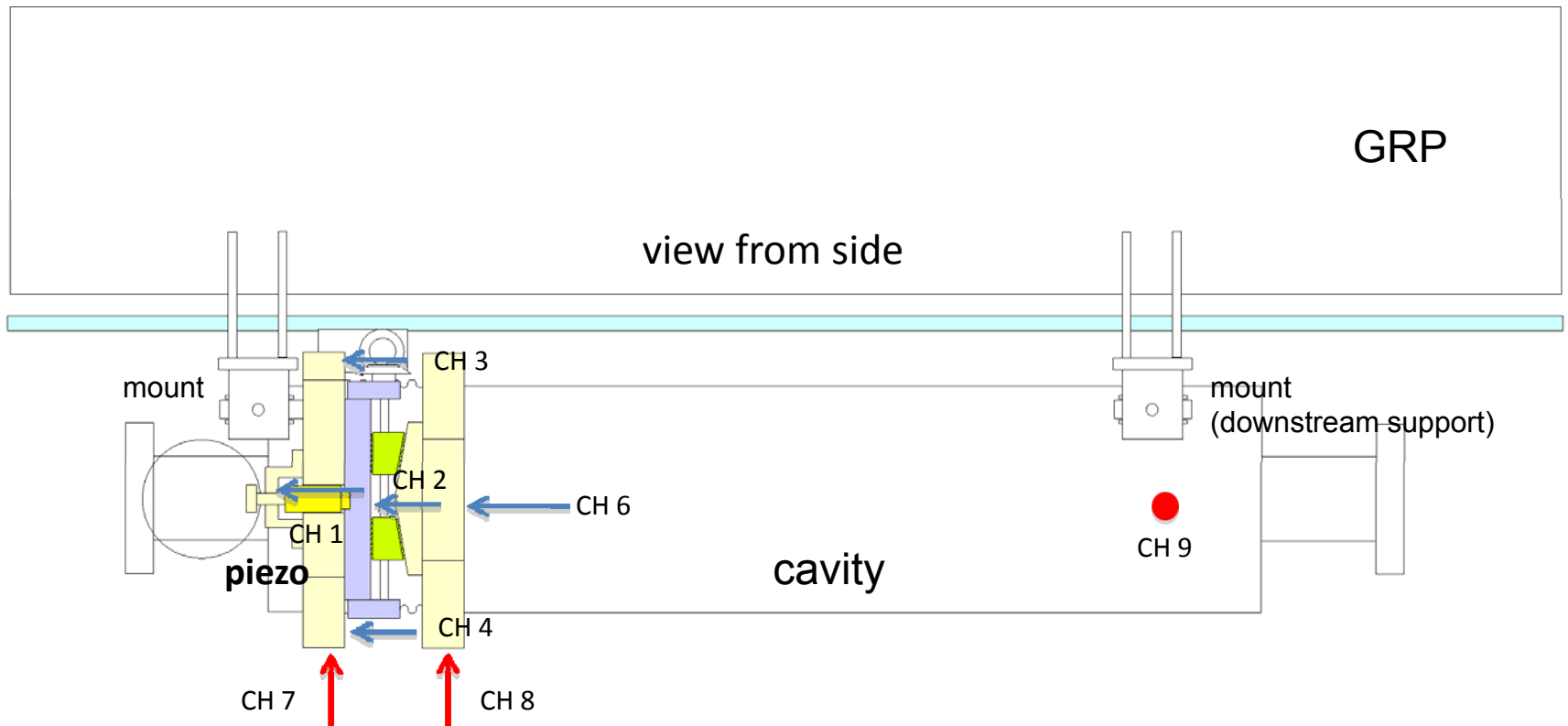
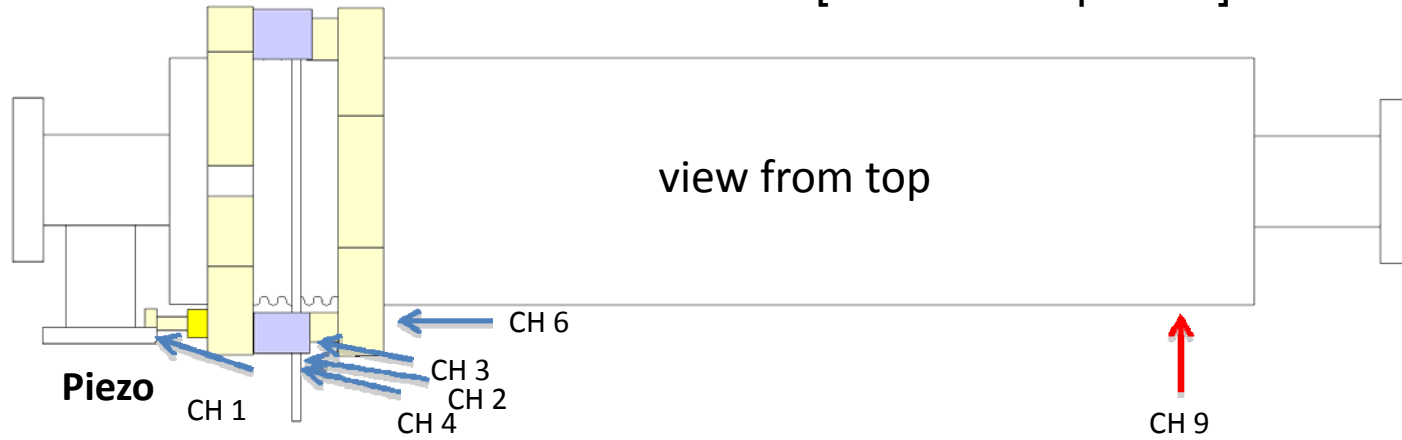
Response measurement was affected by temperature change.

6 hours trend plot of cavity position movement
(no piezo actuation)



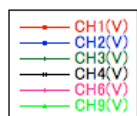
[sensor setup No.9]

CH 5 was dead.

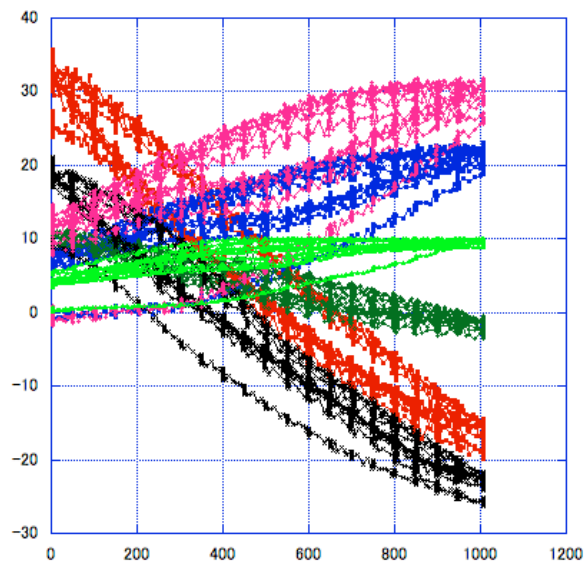


Piezo 0-1000V up/down by 50V step, 5 excursions

SLOT-C cavity tuner position = 250

downstream support
both fixed

Excursion_plot_0903251413_cap



PIEZO(V)

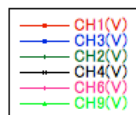
ch3 -10μm

ch2 15μm

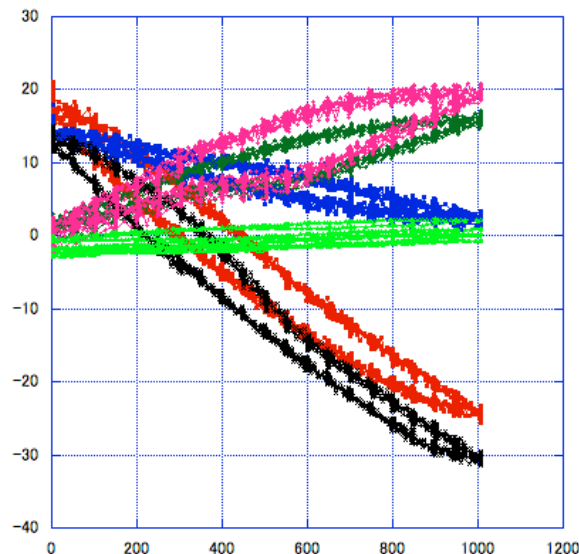
 δX ch1 -50μm

ch6 20μm

ch4 -40μm

downstream support
piezo-side fixed

Excursion_plot_0903251454_cap



PIEZO(V)

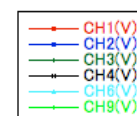
-12μm

15μm

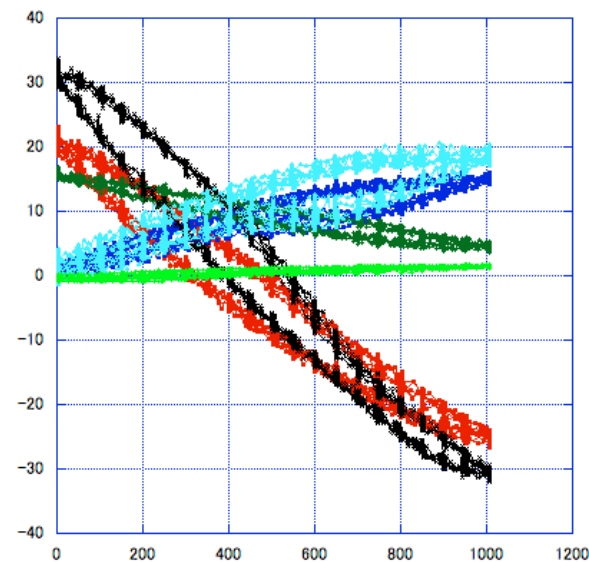
-42μm

20μm

-42μm

downstream support
both free

Excursion_plot_0903251733_cap



PIEZO(V)

-10μm

15μm

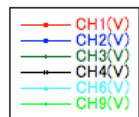
-45μm

20μm

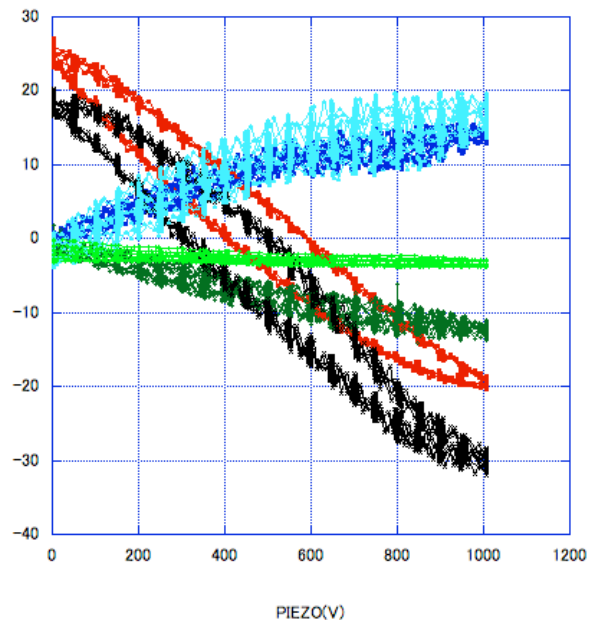
-60μm

Piezo 0-1000V up/down by 50V step, 5 excursions

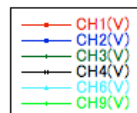
SLOT-C cavity tuner position = 200

downstream support
both fixed

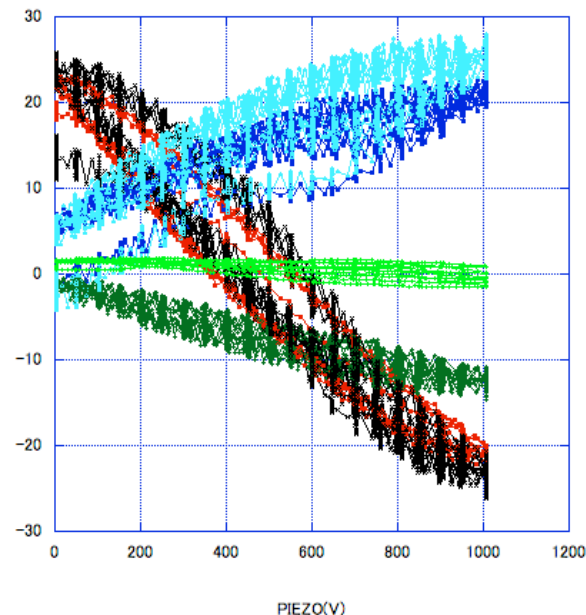
Excursion_plot_0903261106_cap

ch3 -12 μ m
 δX

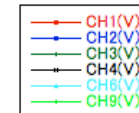
ch2	14 μ m
ch1	-45 μ m
ch6	18 μ m

ch4 -48 μ mdownstream support
piezo-side fixed

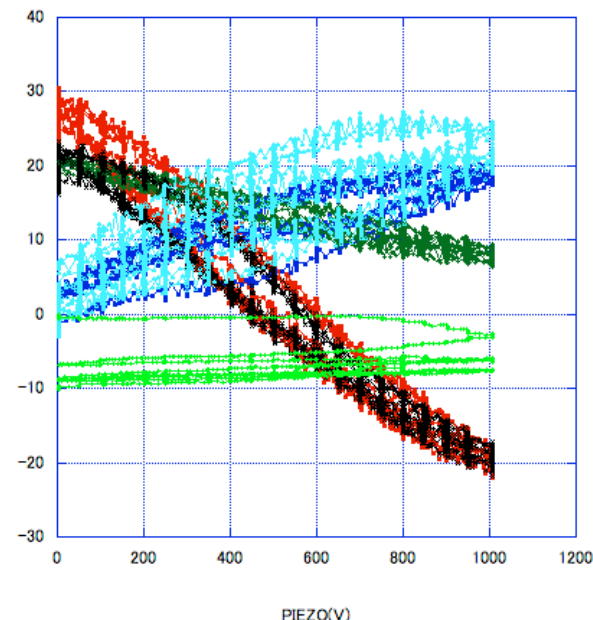
Excursion_plot_0903261035_cap

-10 μ m

16 μ m
-40 μ m
20 μ m

-44 μ mdownstream support
both free

Excursion_plot_0903260947_cap

-13 μ m

16 μ m
-45 μ m
20 μ m

-40 μ m

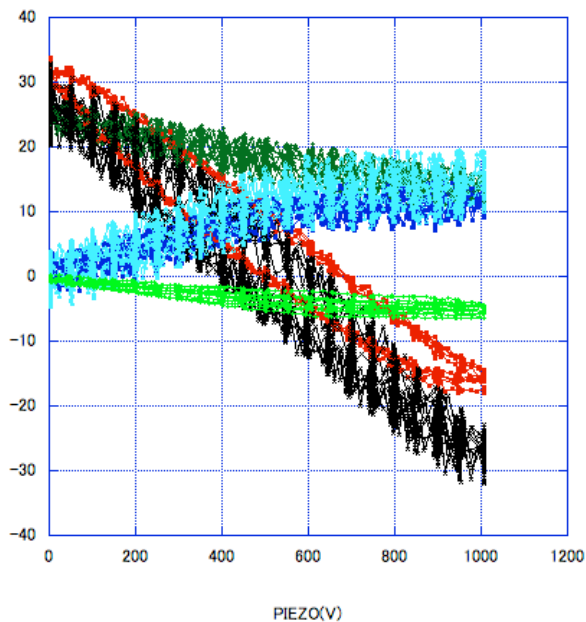
Piezo 0-1000V up/down by 50V step, 5 excursions

SLOT-C cavity tuner position = 150

downstream support
both fixed

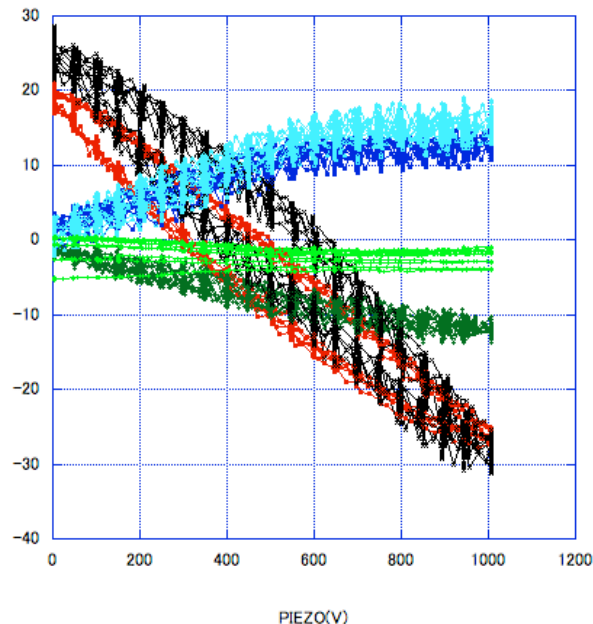
CH1(V)
CH2(V)
CH3(V)
CH4(V)
CH6(V)
CH9(V)

Excursion_plot_0903261333_cap

downstream support
piezo-side fixed

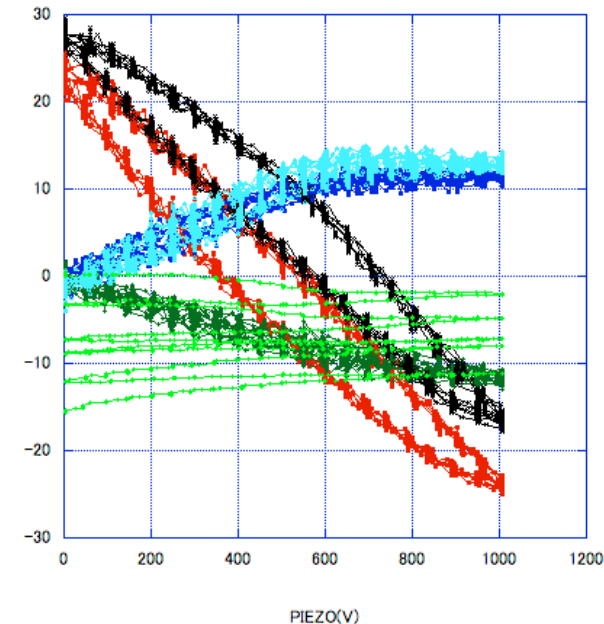
CH1(V)
CH2(V)
CH3(V)
CH4(V)
CH6(V)
CH9(V)

Excursion_plot_0903261408_cap

downstream support
both free

CH1(V)
CH2(V)
CH3(V)
CH4(V)
CH6(V)
CH9(V)

Excursion_plot_0903261454_cap

ch3 -10 μ m-10 μ m-10 μ m

δX ch2 10 μ m
ch1 -45 μ m
ch6 16 μ m

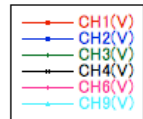
12 μ m
-46 μ m
15 μ m

12 μ m
-45 μ m
13 μ m

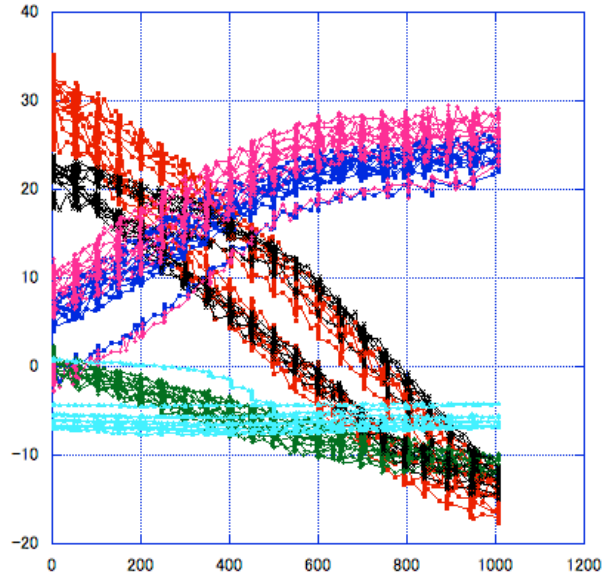
ch4 -50 μ m-50 μ m-40 μ m

Piezo 0-1000V up/down by 50V step, 5 excursions

SLOT-C cavity tuner position = 100

downstream support
both fixed

Excursion_plot_0903261801_cap



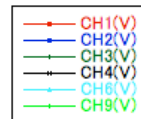
PIEZO(V)

ch3 -10μm

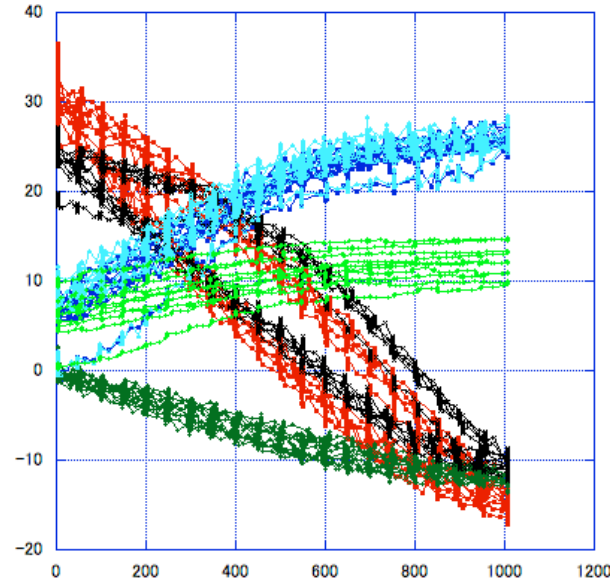
δX

ch2	20μm
ch1	-43μm
ch6	18μm

ch4 -30μm

downstream support
piezo-side fixed

Excursion_plot_0903261652_cap

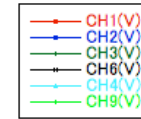


PIEZO(V)

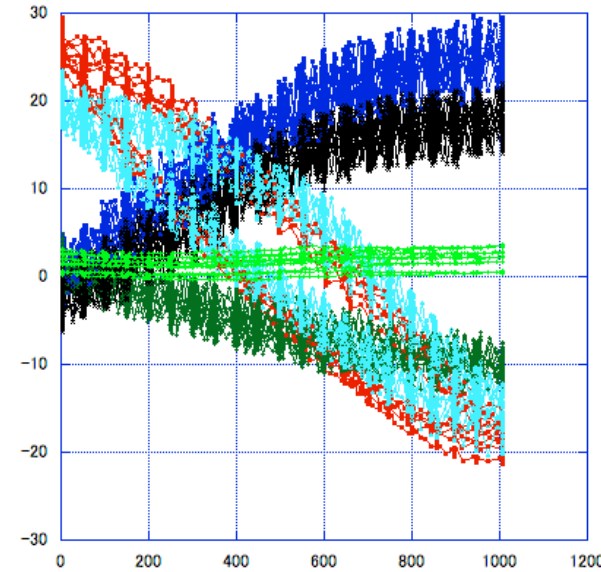
-11μm

20μm
-42μm
20μm

-35μm

downstream support
both free

Excursion_plot_0903261613_cap



PIEZO(V)

-10μm

26μm
-42μm
20μm

-35μm

Summary

(1) Measurements were affected by room temperature change, and much interference by the cryomodule work and EP construction work. Need quiet and stable place.
(It was not good condition for repeatability test.)

(2) Response measurement by changing mechanical tuner position and downstream support condition were performed.
5 times excursion for full piezo stroke (0-1000V) with 50V step were done.

Only one example of measurement was shown here,

- (a) Even piezo mount flange was fixed to invar rod, they were moved.
piezo back fixture was stretched 40-50 μ m,
bellows other flange was stretched \sim 20 μ m. (total piezo stretch was \sim 60-70 μ m)
- (b) bellows downward gap was stretched 3 – 5 times more than bellows upward gap.
- (c) support condition was no clear effect on the response measurement.

More precise measurement in stable condition is planned in the next few month.