

Low Power RF Tests (1) in S1-G Cryomodule

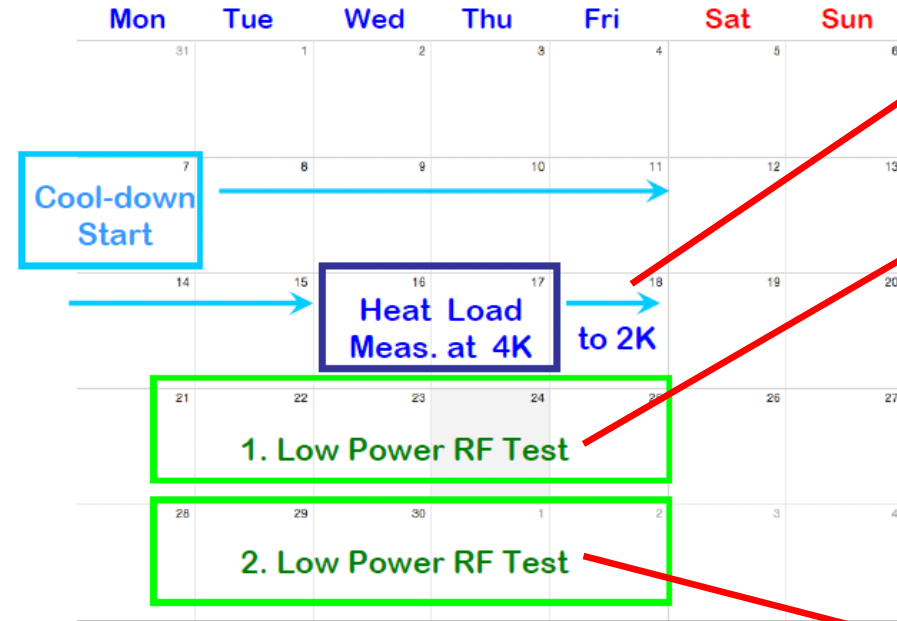




Low power rf tests in S1-G



June, 2010



- Frequency change during cool-down

- Stroke of motor tuner
- QL of variable coupler
- Adjustment of $f_0 = 1300.00 \text{ MHz}$
 $QL = 3.0 \times 10^6$
- Stroke and hysteresis of piezo tuner

- Calibration of Q_t , monitor coupler
- HOM filter property
- Multi-cycle hysteresis of piezo tuner
- Single pulse response of piezo tuner₂

E. KAKO (KEK)
2010' June 11

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Measurement time at 2 K ;
 Tue. – Fri. for 4 days
 13:00 ~ 19:00 for 6 h
 24 h per week

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2010' June 29

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Frequency change during cool-down

[MHz]

	Cavity	room temp.	Δfo	4.2 K	Δfo	2.0 K
1.	C1/AES-004	1297.989	1.959	1299.948	0.168	1299.780
2.	C2/ACC-011	1297.974	1.949	1299.922	0.157	1299.766
3.	C3/Z-108	1297.768	1.977	1299.745	0.044	1299.701
4.	C4/Z-109	1297.755	1.986	1299.741	0.045	1299.697
5.	A1/MHI-05	1297.793	1.990	1299.784	0.310	1299.473
6.	A2/MHI-06	1297.806	1.978	1299.784	0.300	1299.483
7.	A3/MHI-07	1297.664	1.977	1299.641	0.127	1299.514
8.	A4/MHI-09	1297.885	1.984	1299.869	0.184	1299.684

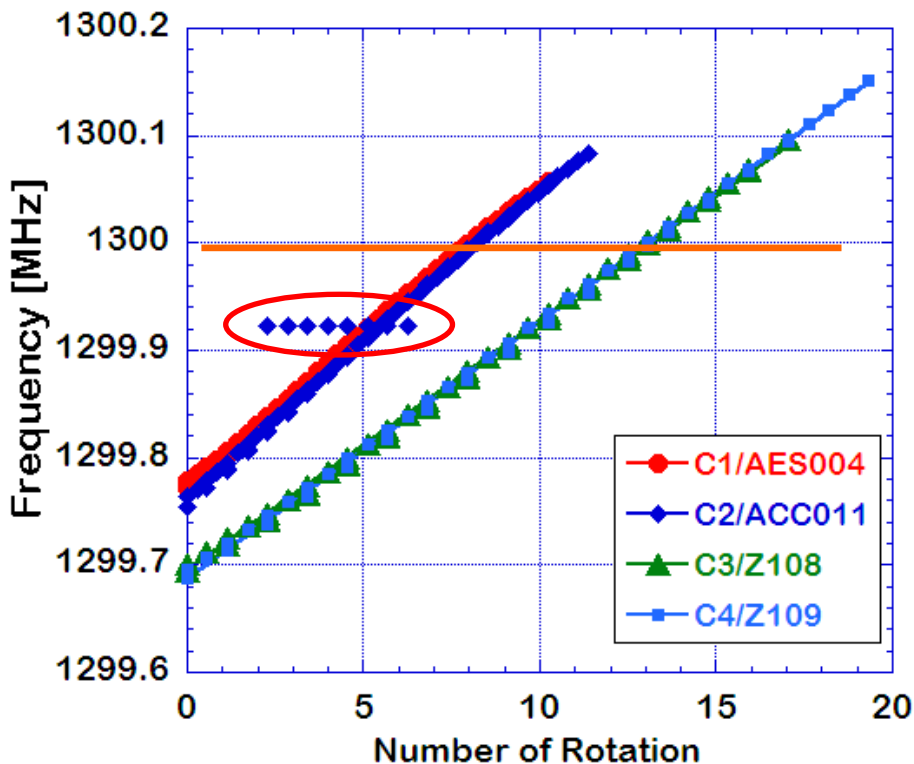
Δfo (300K - 4.2K) = 1.95 ~ 1.99 MHz

Δfo (4.2K - 2.0K) = -160 kHz (blade) , -45 kHz (Saclay)
-305 kHz (Slide-jack/center) , -155 kHz (Slide-jack/end)

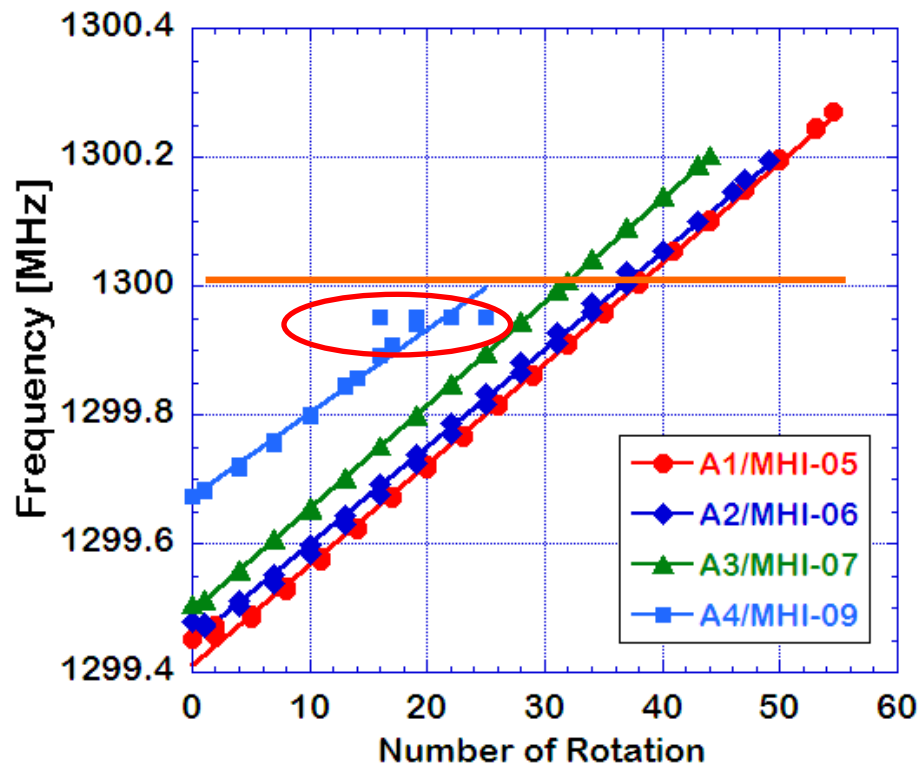


Stroke of Motor Tuner

Cryomodule - C



Cryomodule - A

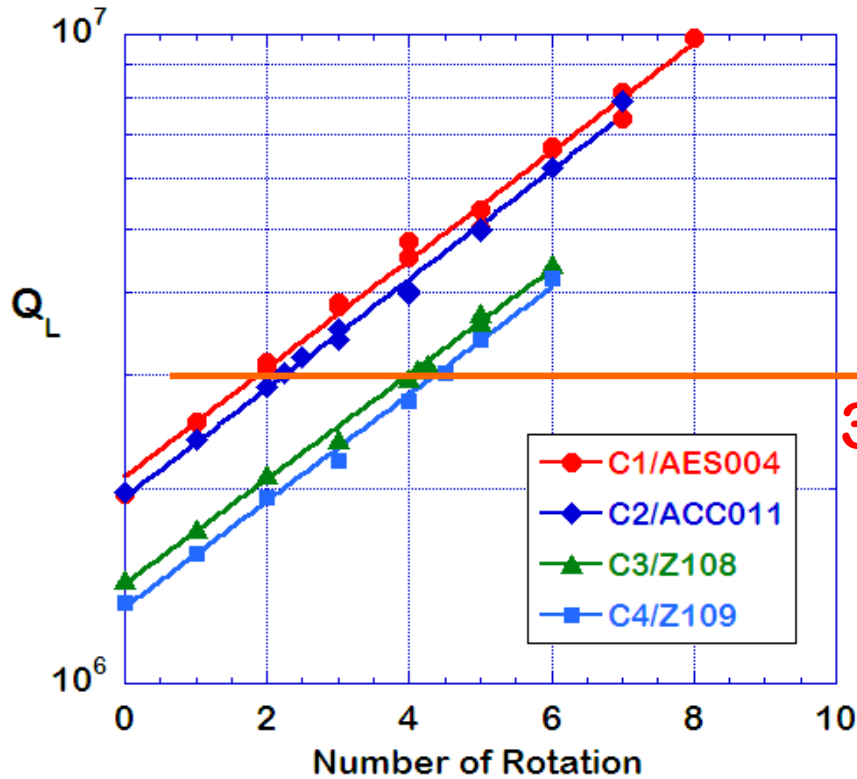


**Trouble of two motor tuners occurred in
C2/ACC011 (Blade) and A4/MHI-09 (Slide-Jack/end) !!**



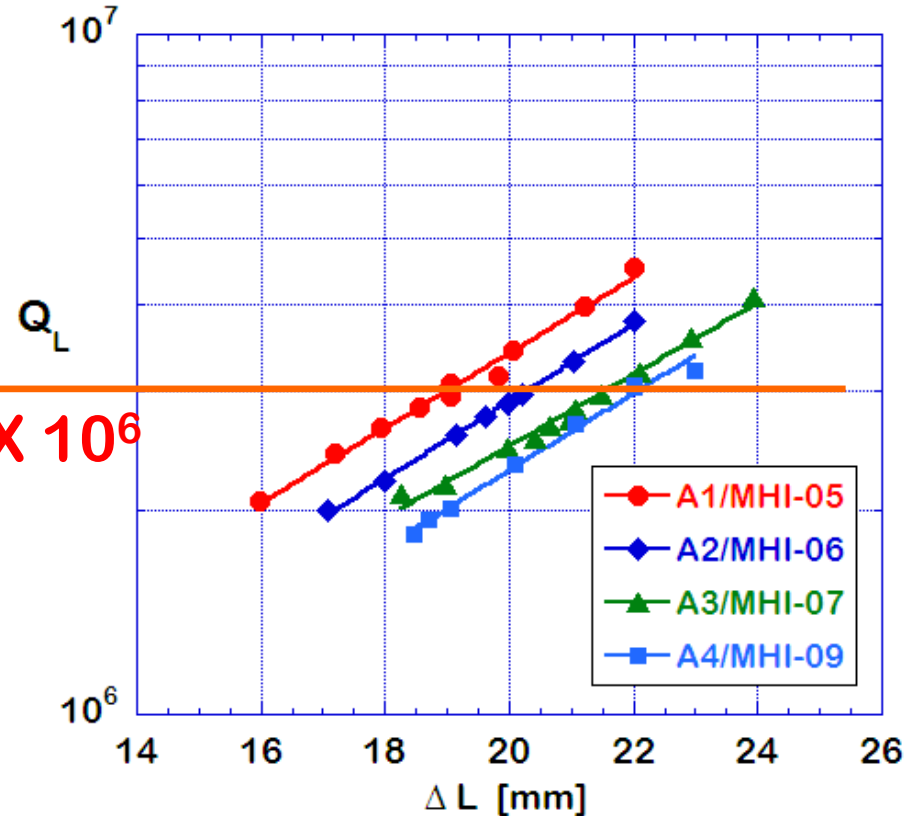
Q_L of Variable Input Coupler

Cryomodule - C



Q_L = 2.0 ~ 8. × 10⁶ (FNAL)
 Q_L = 1.3 ~ 4. × 10⁶ (DESY)

Cryomodule - A



Q_L = 2.0 ~ 4. × 10⁶ (KEK)



Adjustment of Frequency and Q_L

Cavity	Frequency	Loaded Q (Q_L)
1. C1/AES-004	1300.005 MHz	3.02×10^6
2. C2/ACC-011	1299.922 MHz	3.01×10^6
3. C3/Z-108	1300.012 MHz	3.04×10^6
4. C4/Z-109	1300.012 MHz	3.01×10^6
5. A1/MHI-05	1300.004 MHz	2.93×10^6
6. A2/MHI-06	1300.022 MHz	2.95×10^6
7. A3/MHI-07	1300.008 MHz	2.96×10^6
8. A4/MHI-09	1299.953 MHz	3.05×10^6



Calibration of Q_t , Q_{HOM1} , Q_{HOM2}

Cavity	Q_t	Q_t (VT)	error	Q_{HOM1}	Q_{HOM2}
1. C1/AES-004	6.01×10^{11}	5.9×10^{11}	+ 2%	6.08×10^{11}	2.25×10^{13}
2. C2/ACC-011	2.48×10^{12}	2.8×10^{12}	-13%	9.45×10^{12}	4.36×10^{12}
3. C3/Z-108	2.43×10^{11}	1.9×10^{11}	+22%	9.23×10^{11}	2.06×10^{13}
4. C4/Z-109	3.53×10^{11}	4.0×10^{11}	-13%	4.93×10^{12}	7.22×10^{15}
5. A1/MHI-05	2.39×10^{11}	2.2×10^{11}	+ 8%	1.90×10^{13}	3.99×10^{13}
6. A2/MHI-06	2.83×10^{11}	3.4×10^{11}	-20%	1.53×10^{13}	6.42×10^{13}
7. A3/MHI-07	2.31×10^{11}	2.6×10^{11}	-13%	9.27×10^{12}	6.09×10^{12}
8. A4/MHI-09	2.50×10^{11}	1.8×10^{11}	+28%	9.96×10^{12}	8.04×10^{13}

error of $Q_t = -20 / +28 \%$

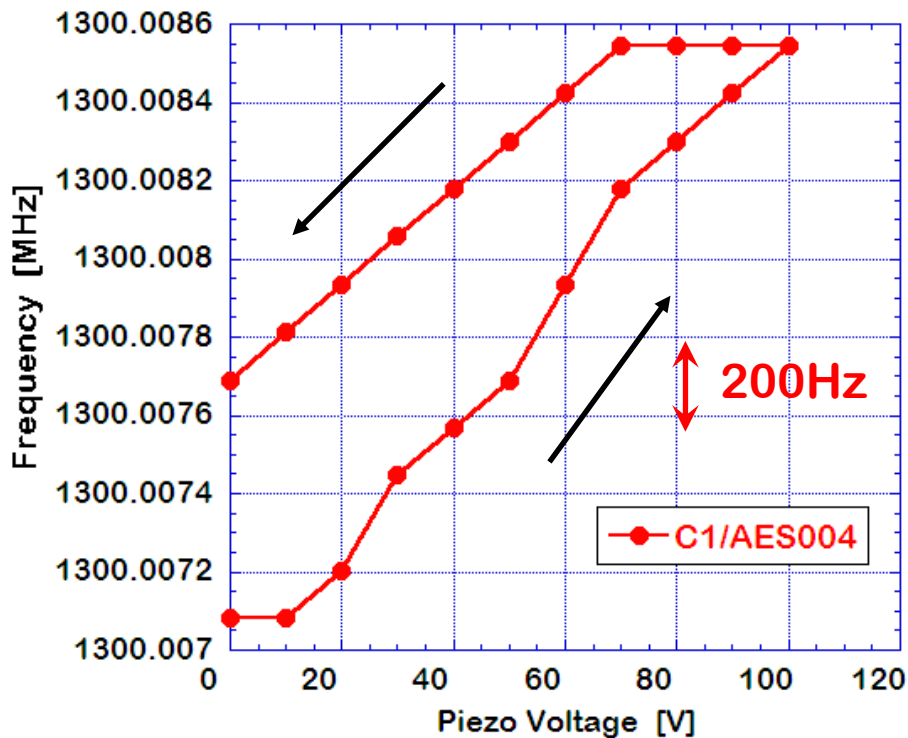
$Q_{\text{HOM1}}, Q_{\text{HOM2}} > 1 \times 10^{12}$, OK



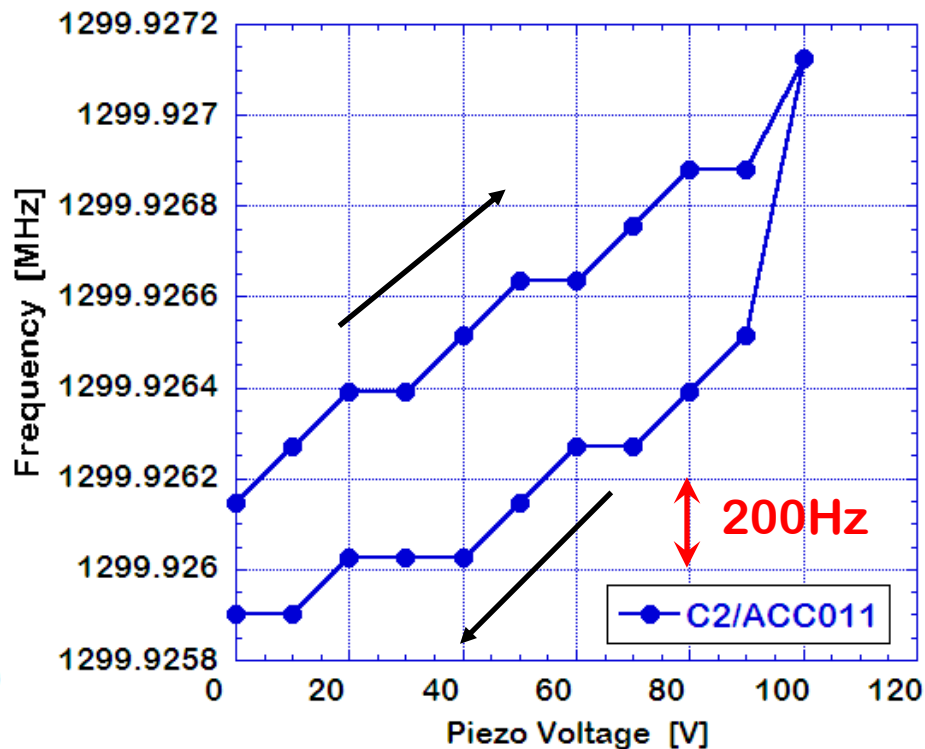
Stroke & Hysteresis of Piezo Tuner

Cryomodule-C / Blade Tuner (FNAL cavity)

First one cycle (0 – 100 V)



C1/AES004



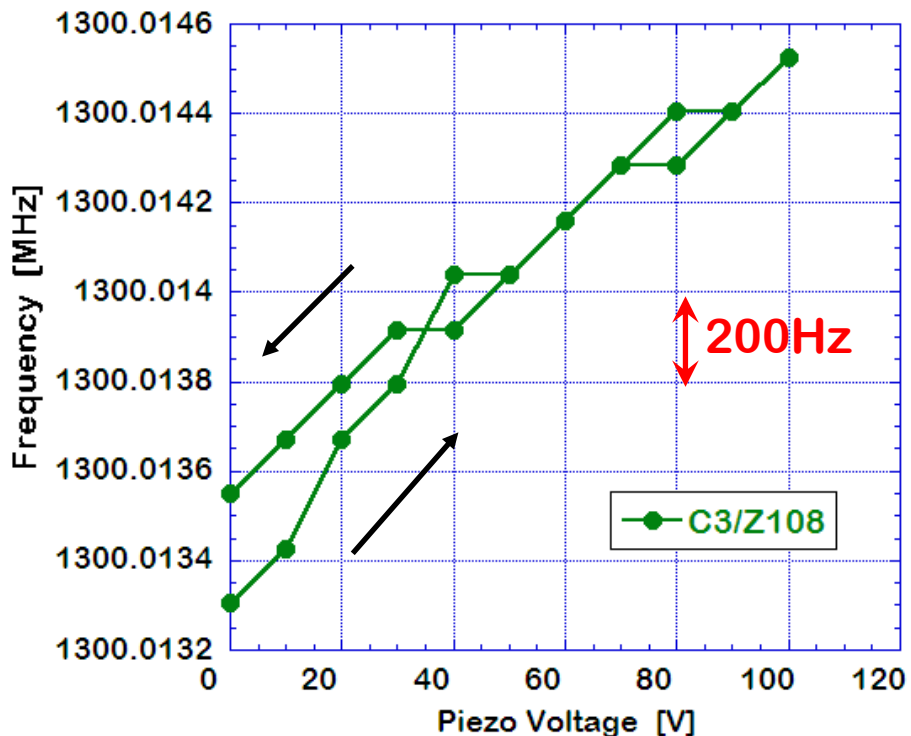
C2/ACC011



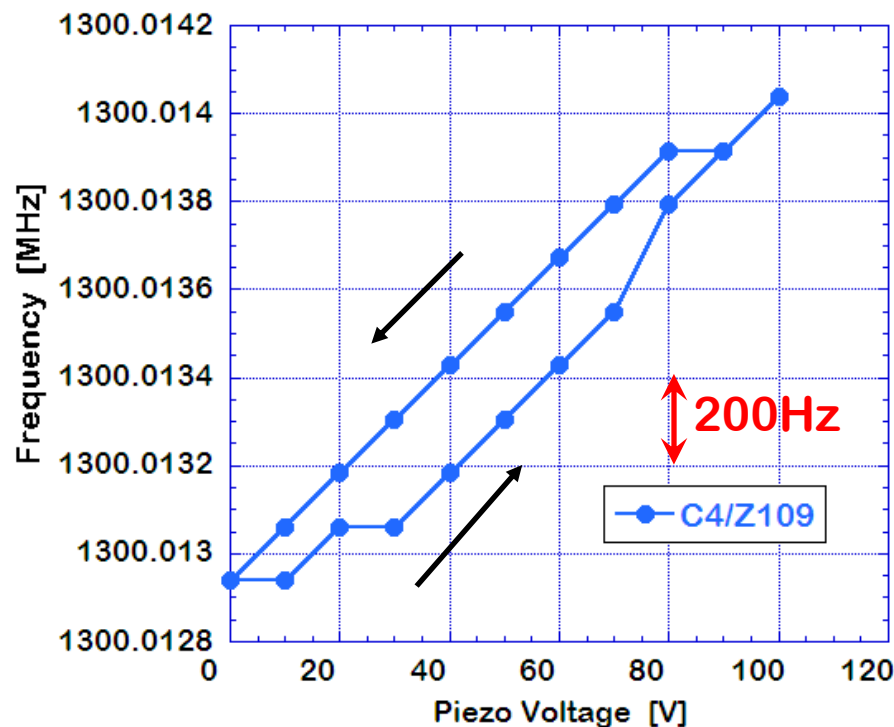
Stroke & Hysteresis of Piezo Tuner

Cryomodule-C / Saclay Tuner (DESY cavity)

First one cycle (0 – 100 V)



C3/Z108



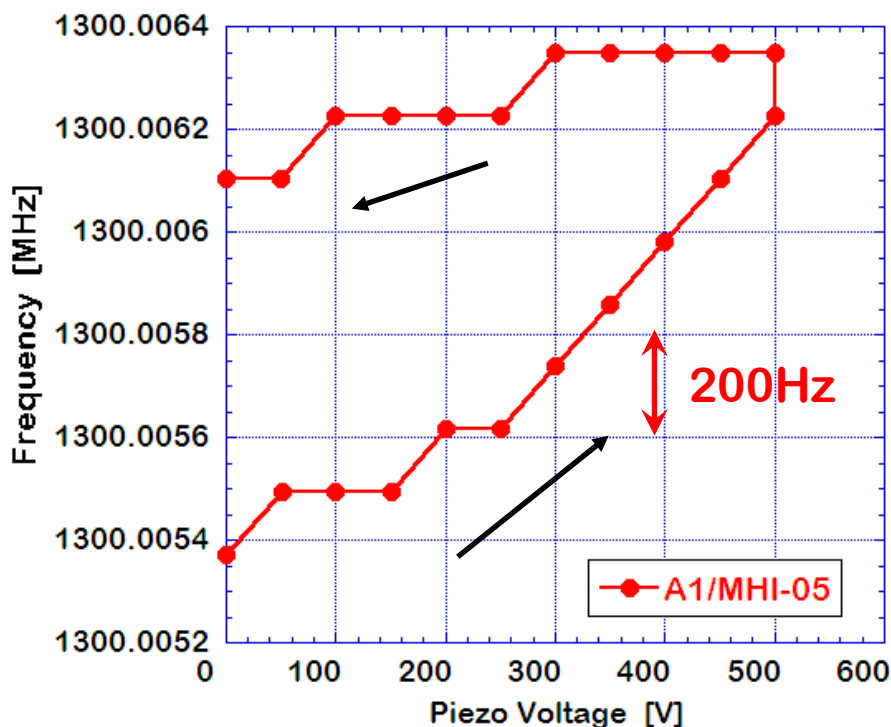
C3/Z109



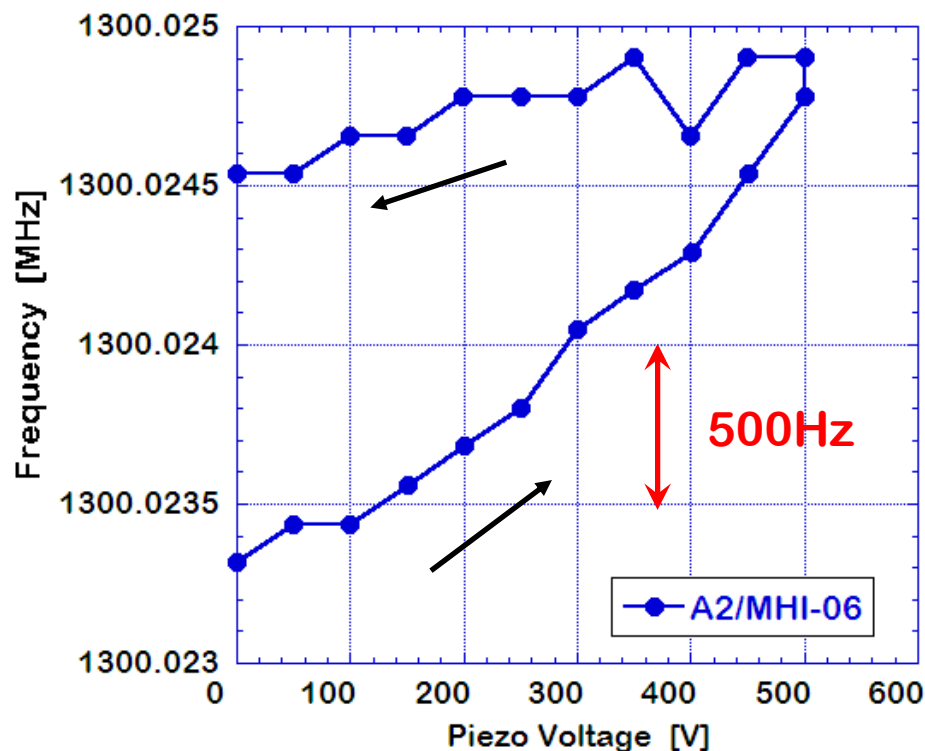
Stroke & Hysteresis of Piezo Tuner

Cryomodule-A / Slide-Jack Tuner (KEK cavity)

First one cycle (0 – 500 V)



A1/MHI-05



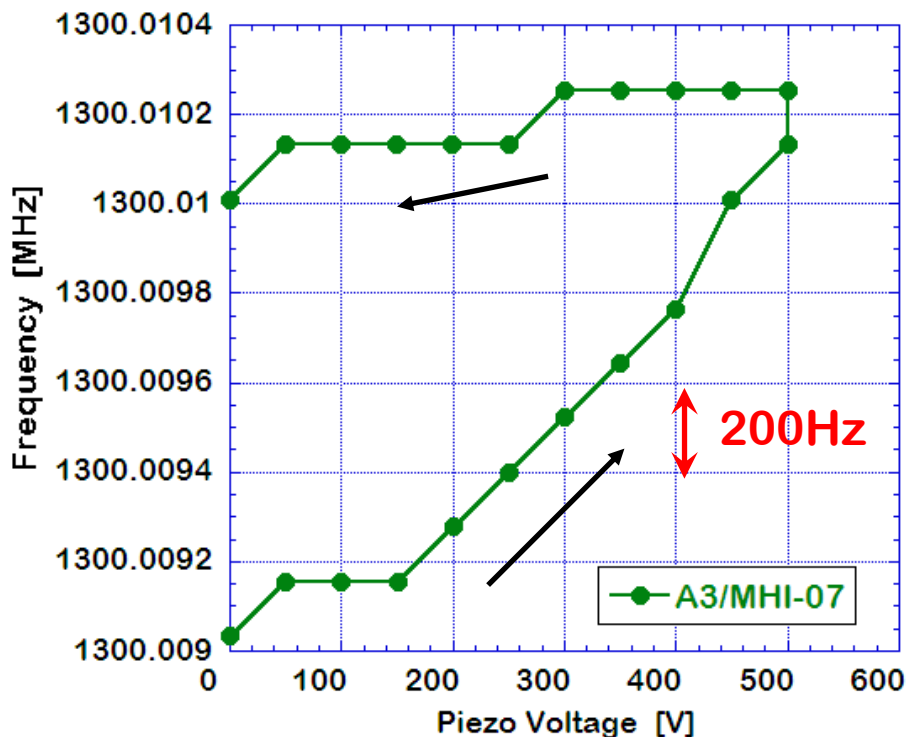
A2/MHI-06



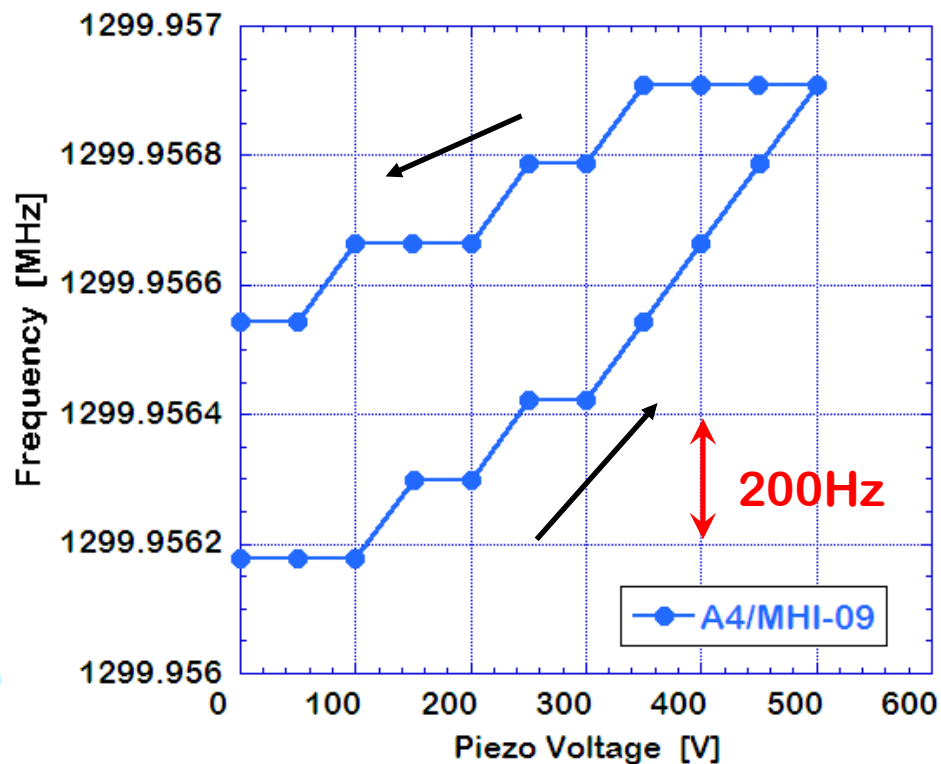
Stroke & Hysteresis of Piezo Tuner

Cryomodule-A / Slide-Jack Tuner (KEK cavity)

First one cycle (0 – 500 V)



A3/MHI-07



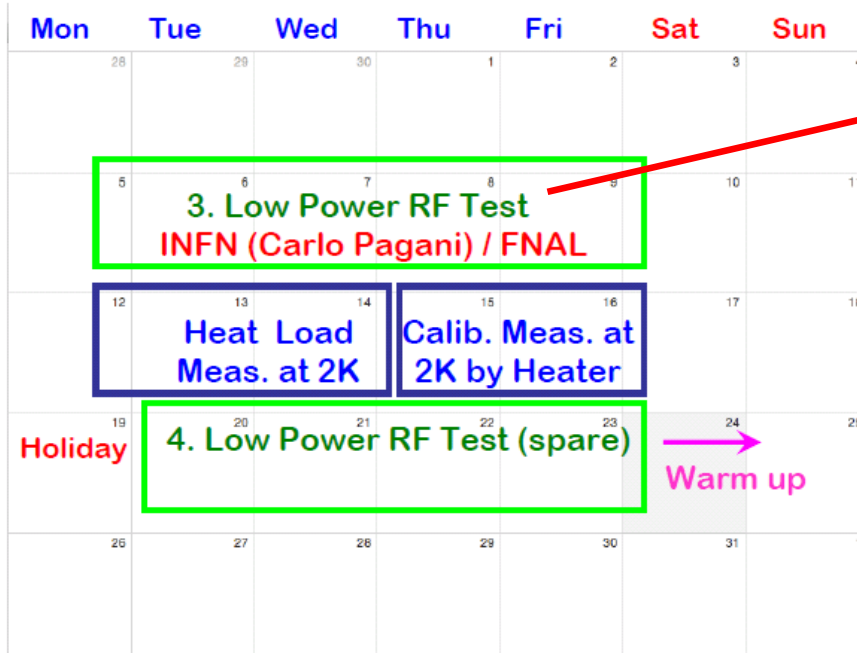
A4/MHI-09



Low power rf tests in S1-G



July, 2010



Mon. 15:00 ~

Talk by Yuriy, at 3Buid.5F
“Piezo tuner experiments
at FNAL” for 20 min.

Tue. 10:00 ~ 12:00

Discussion with INFN/FNAL/KEK
“Tuner experiments in S1-G”
at STF control room

Fri. 17:00 ~ 17:30

Summary of the results on
“Tuner experiments in S1-G”
at STF control room

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