

# Cold Tuner test overview

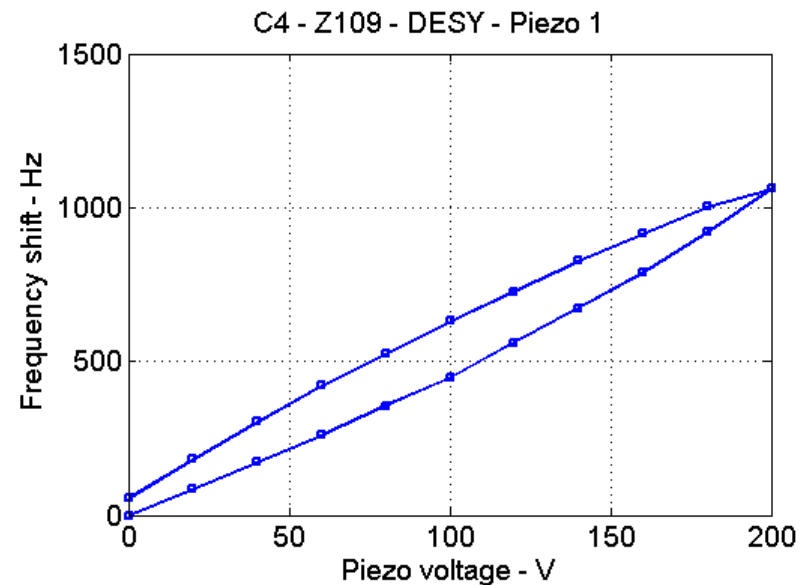
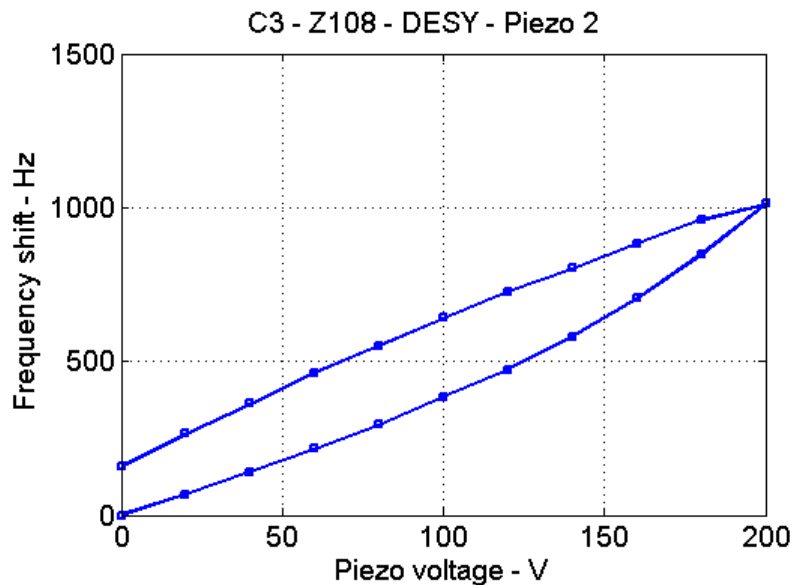
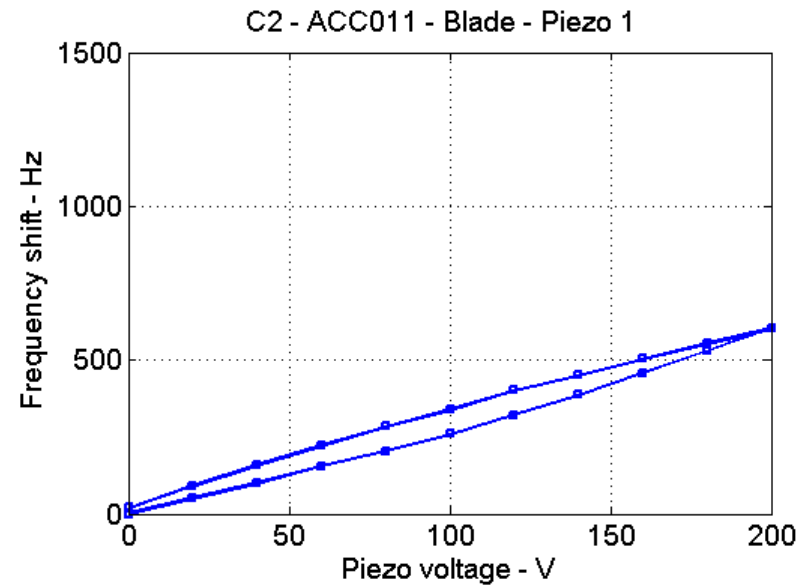
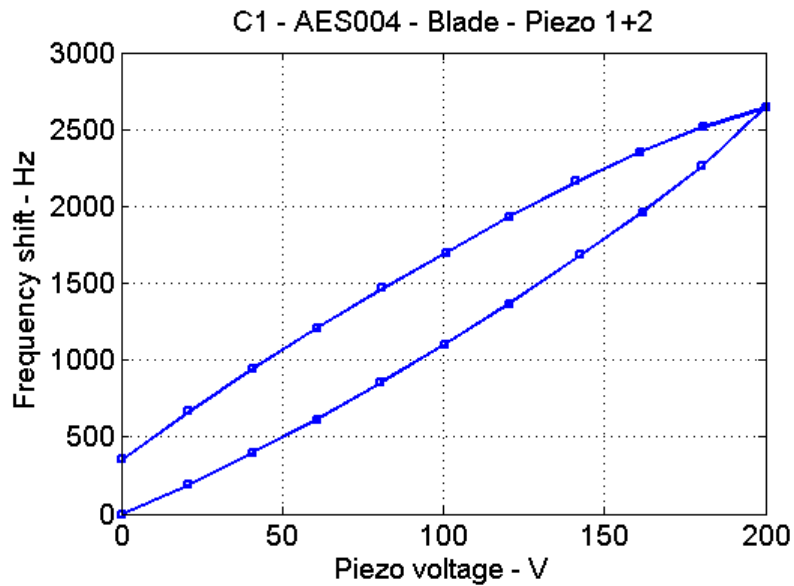
S1-Global at KEK

5-9 July 2010

# Introduction

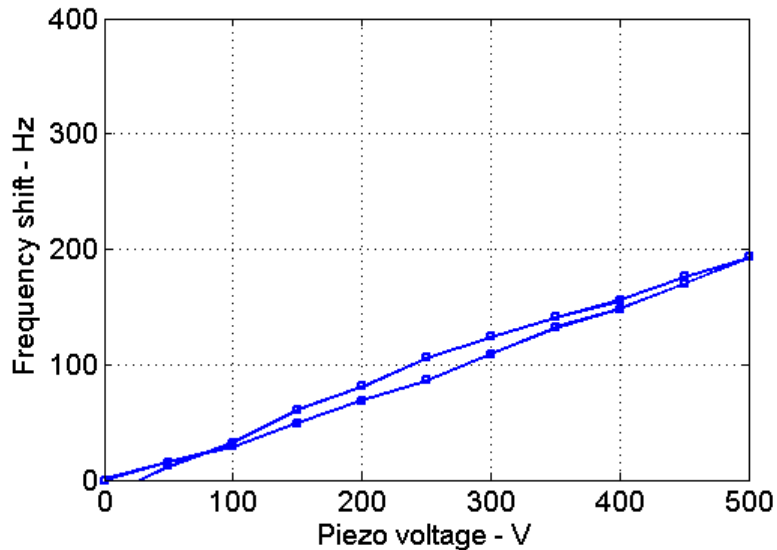
- Issues with slow tuning mechanics on cavities C2 and A4 were initially faced but corrective actions were not possible.
- The test time has been almost entirely focused on piezo study.
- Three sets of piezo measurements:
  - DC performances: DC voltage applied and cavity frequency shift recorded.
  - Pulsed performances: in view of LFD compensation a simple 2.5 ms half-sin pulse is applied and cavity dynamic response acquired.
  - Spectral analyses: cavity oscillations recorded both with no piezo action (microphonics) and with a large bandwidth input pulse (square wave)
- Almost all measurements have been performed with cavity locked in a Phase Locked Loop with 1 kHz/V FM modulation factor.
  - The modulation input signal is acquired, higher resolution and reproducibility is achieved if compared to direct NA measurements.
- Just raw data and simple analyses are presented. More detailed analyses are possible and further results could be presented in next webex meetings.

# DC response – module C

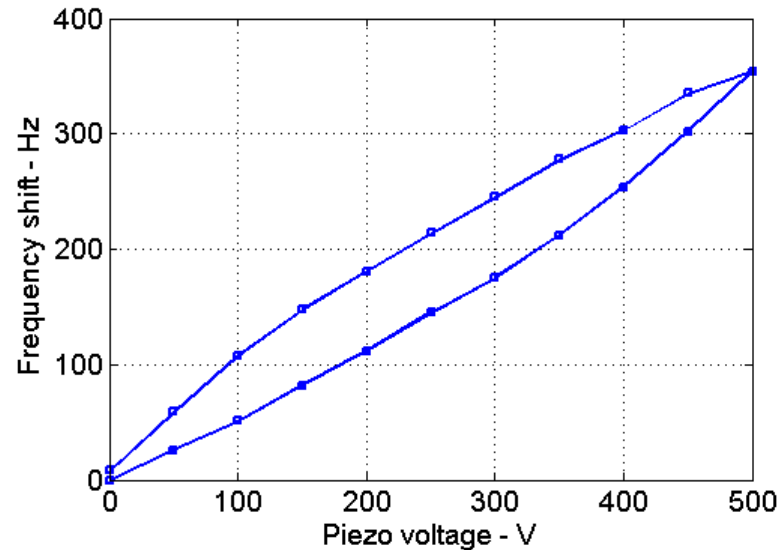


# DC response – module A

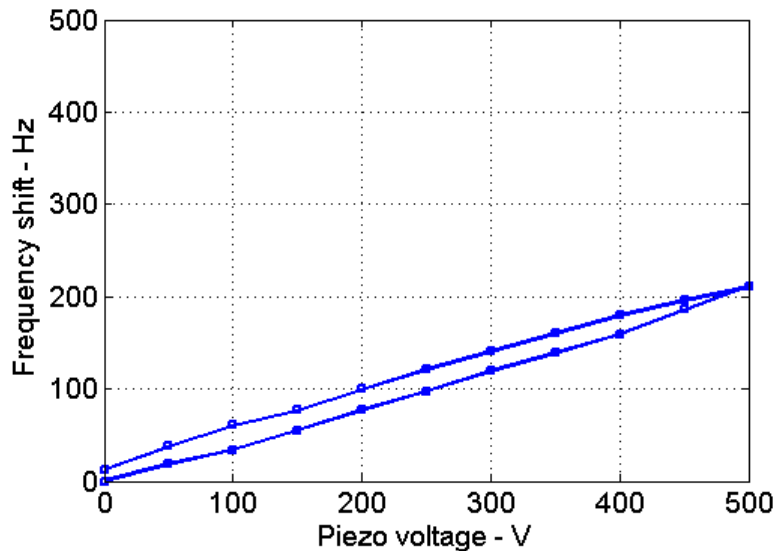
A1 - Slide Jack central



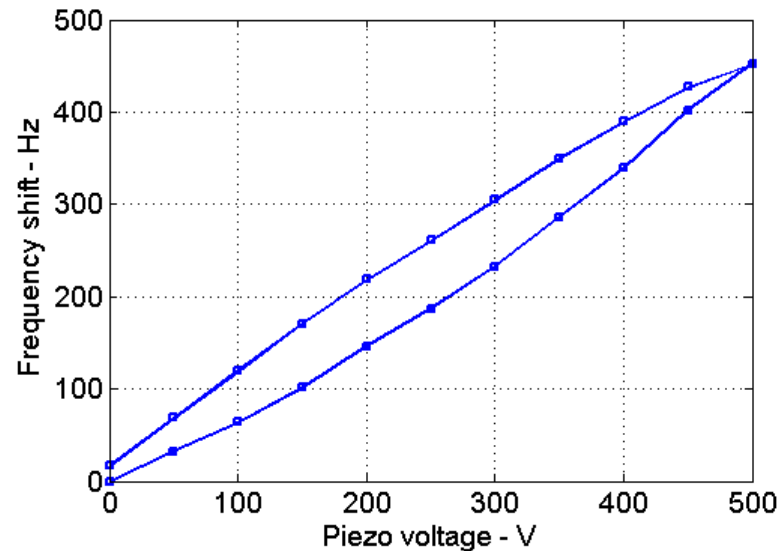
A2 - Slide Jack central



A3 - Slide Jack lateral



A4 - Slide Jack lateral

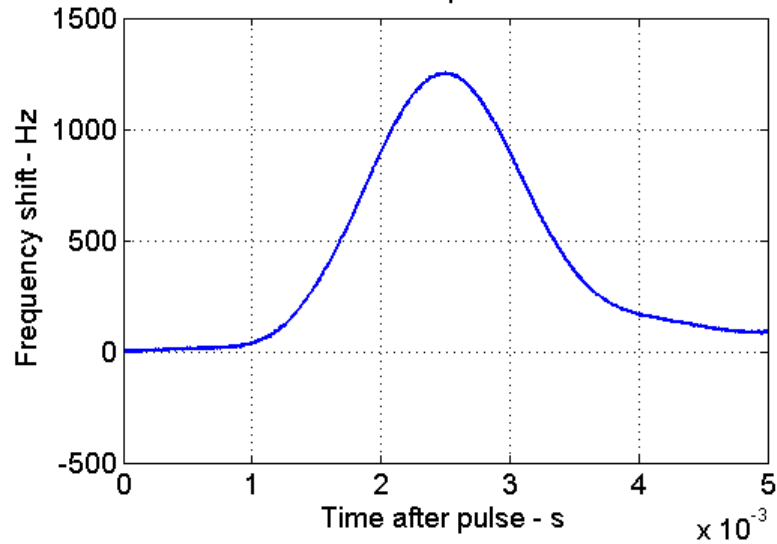


# DC response analyses results

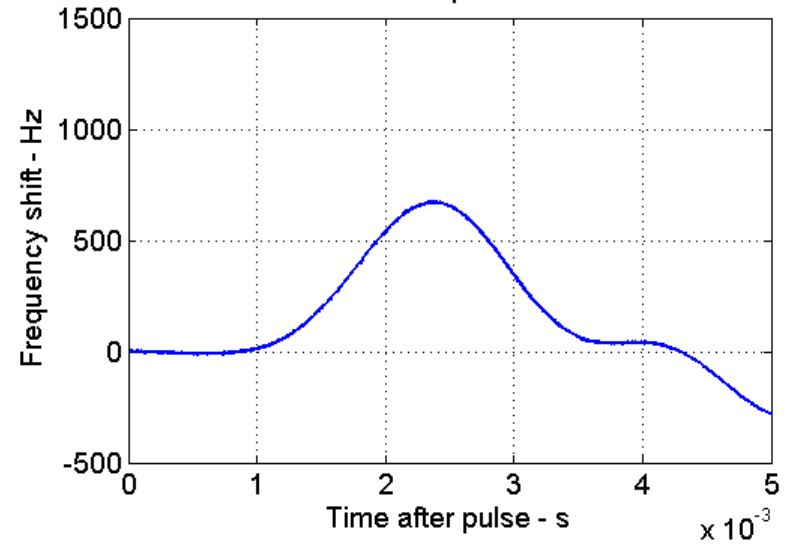
Cavity	Tuner	Maximum nominal piezo voltage [V]	Piezo configuration	Max applied voltage [V]	Frequency shift [Hz]
C1 – FNAL	Blade	200	1+2	200	2650
C2 – FNAL	Blade	200	1	200	610
C3 – DESY	DESY/Saclay	200	2	200	1010
C4 – DESY	DESY/Saclay	200	1	200	1060
A1 – KEK	Slide Jack cent.	500	-	500	190
A2 – KEK	Slide Jack cent.	500	-	500	350
A3 – KEK	Slide Jack lat.	500	-	500	210
A4 – KEK	Slide Jack lat.	500	-	500	450

# SIN pulse response – module C

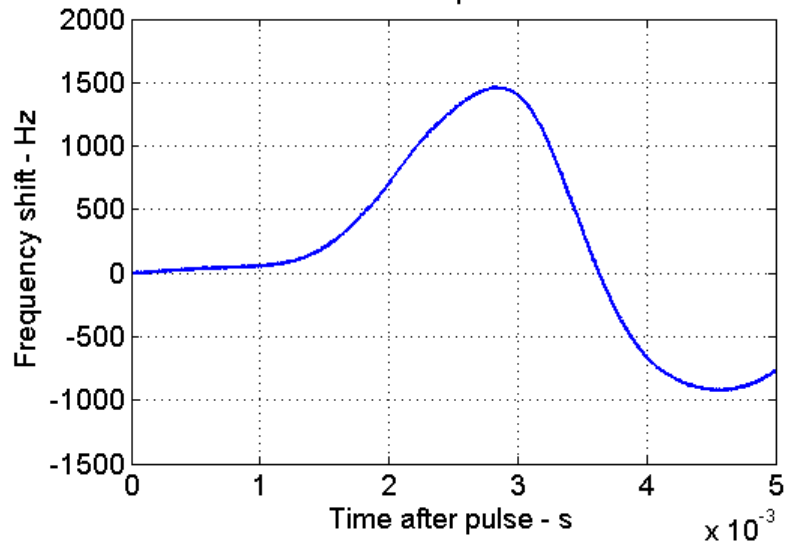
C1 - AES004 - Blade - Piezo 1+2  
135V pulse



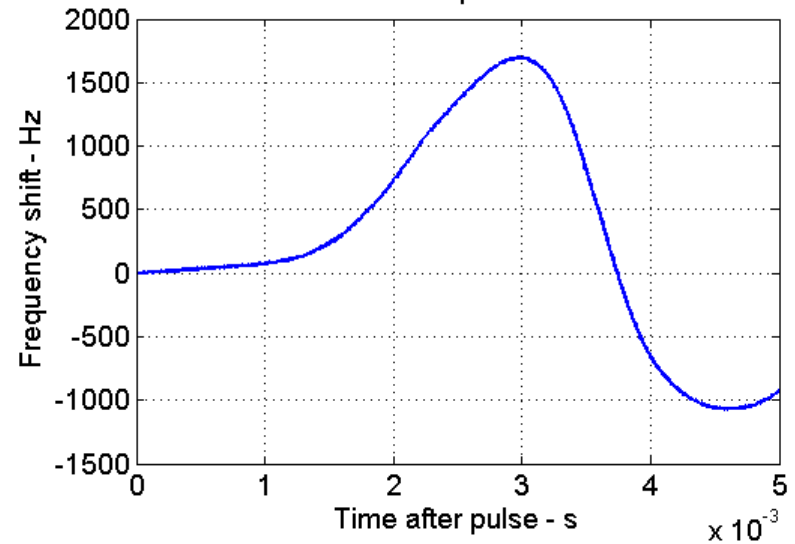
C2 - ACC011 - Blade - Piezo 1+2  
100V pulse



C3 - Z108 - DESY - Piezo 2  
180V pulse

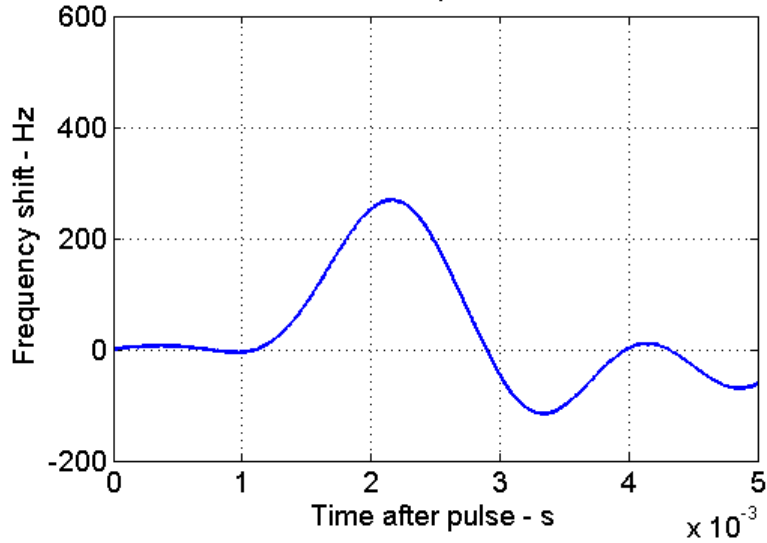


C4 - Z109 - DESY - Piezo 1  
170V pulse

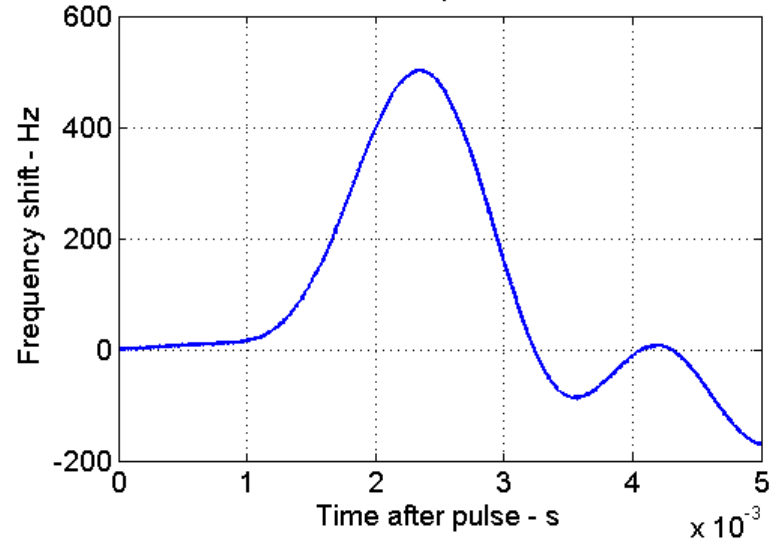


# SIN pulse response – module A

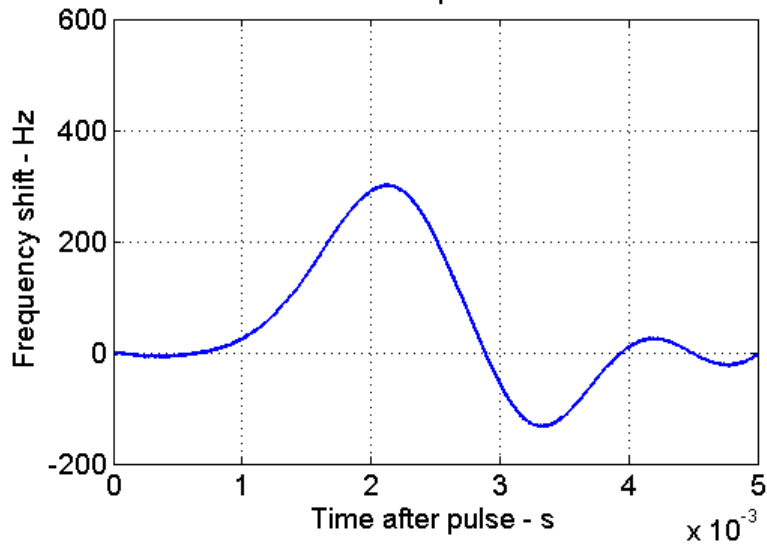
A1 - Slide Jack central  
470V pulse



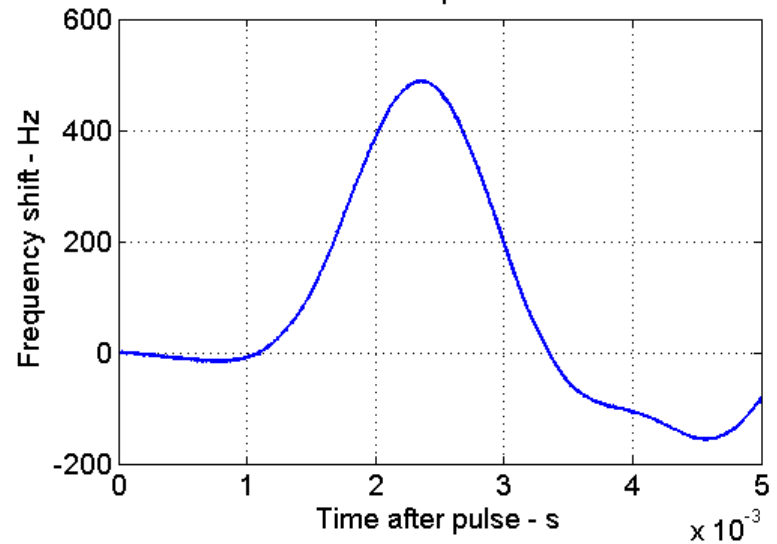
A2 - Slide Jack central  
470V pulse



A3 - Slide Jack lateral  
470V pulse



A4 - Slide Jack lateral  
470V pulse







# SIN pulse analyses results

Cavity	Tuner	Maximum nominal piezo voltage [V]	Load capacitance at 2 K [ $\mu$ F]	Piezo conf.	SIN pulse amplitude [V]	Maximum frequency shift in 1 ms [Hz]	Best lead time from RF pulse start* [ms]	Dynamic to static detuning ratio**
C1-FNAL	Blade	200	4.1	1+2	135	1040	0.81	0.6
C2-FNAL	Blade	200	3.9	1+2	100	590	0.74	1
C3-DESY	DESY/Saclay	200	2.0	2	180	1100	1.08	1.2
C4-DESY	DESY/Saclay	200	1.9	1	170	1170	1.14	1.3
A1-KEK	Slide Jack cent.	500	0.19	-	470	270	0.6	1.5
A2-KEK	Slide Jack cent.	500	0.21	-	470	450	0.76	1.4
A3-KEK	Slide Jack lat.	500	0.20	-	470	270	0.53	1.3
A4-KEK	Slide Jack lat.	500	0.21	-	470	450	0.72	1.1

\* 0.5 ms fill-time has been considered

\*\*Simple estimation obtained linearly scaling results for different piezo voltages

And last but not least: thanks to all our KEK colleagues, we had a good time working together!

