

Vibration Measurement

Tom Krokotsch

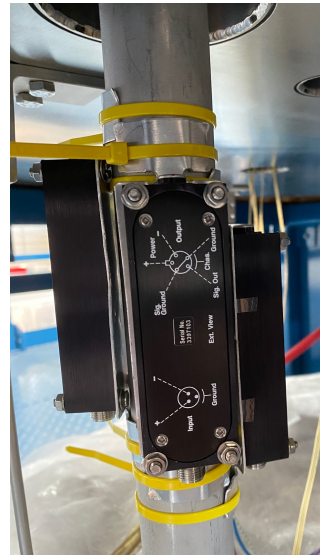
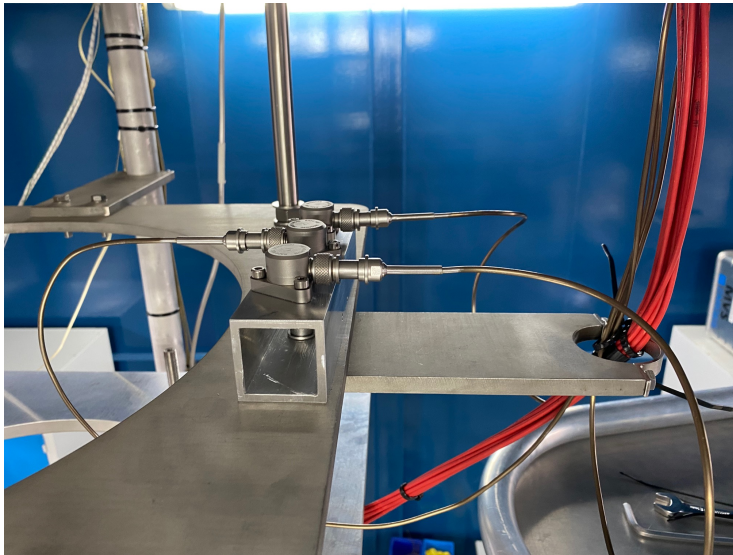
Setup

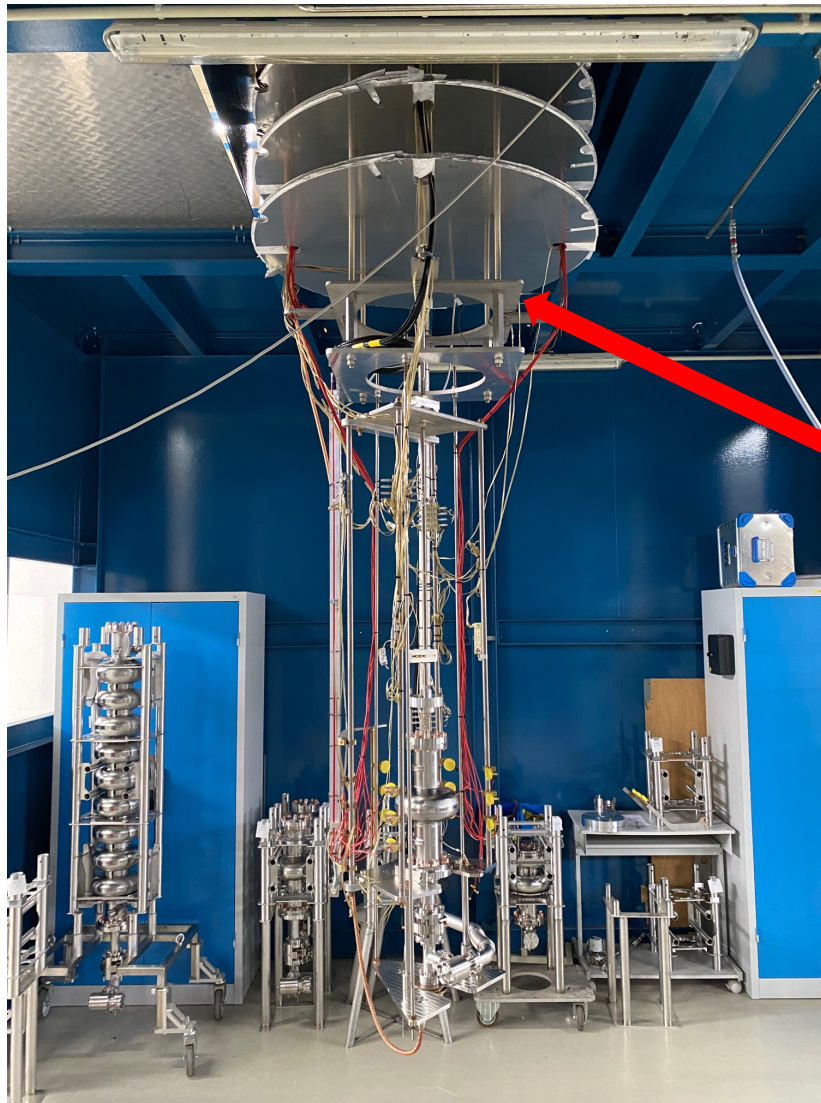
3 x (Accelerometers +

Amplifier)



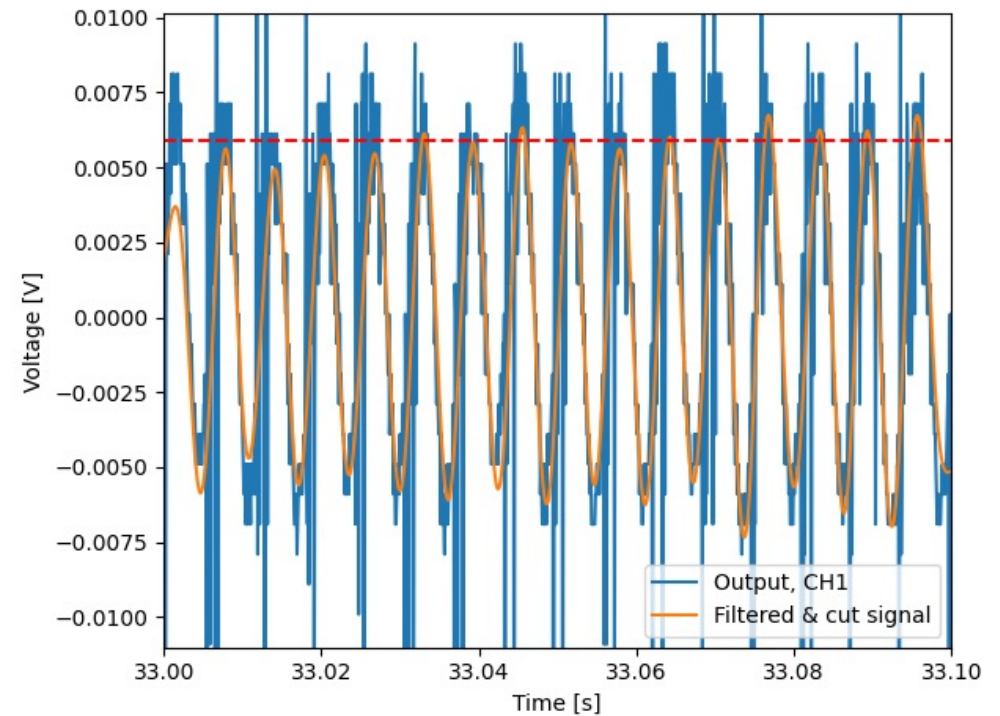
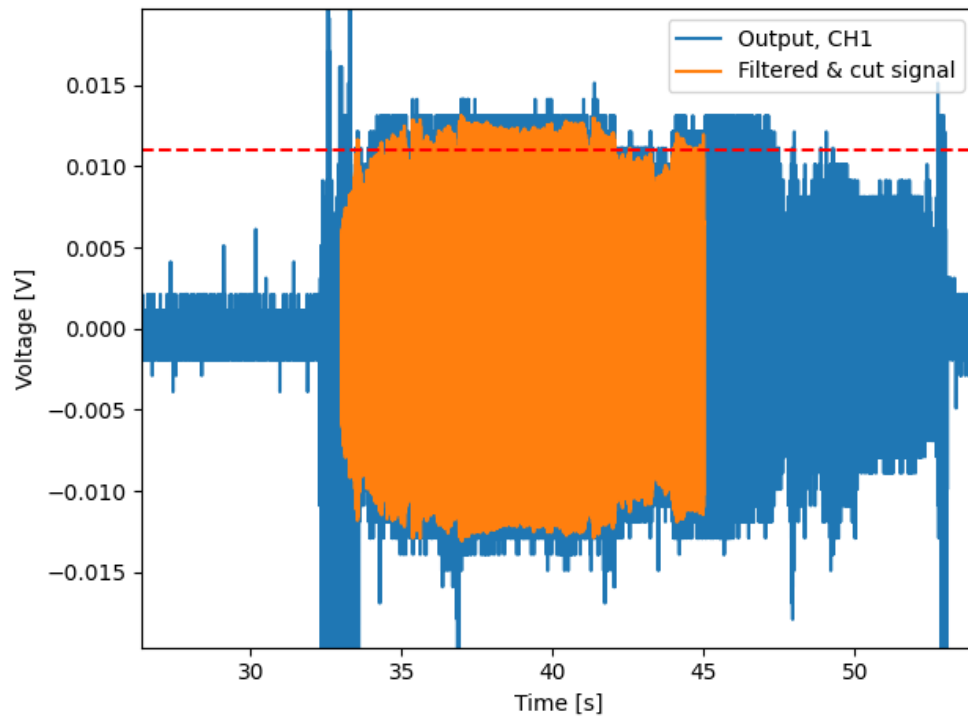
Readout





Sensors at 26 K for cavity at 2K
(Producer specifies > 77 K)

Calibration



shaker acc. amp.

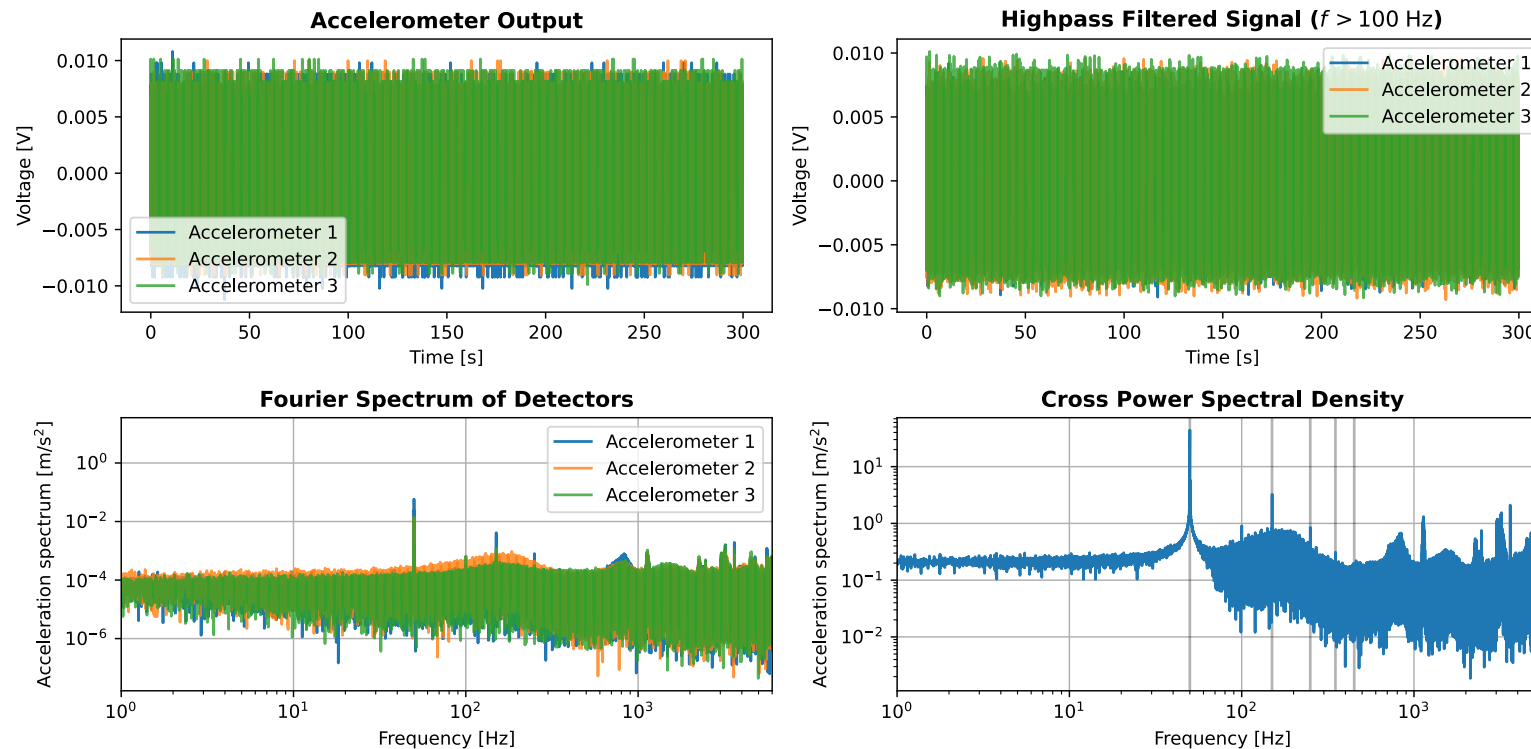
$$\text{Expect: } U_{out} = 10 \frac{m}{s^2} \cdot \frac{1pC}{m/s^2} \cdot \frac{10 mV}{pC} = 0.1 V$$

$$\text{Find: } U_{out} \approx 0.01 V$$

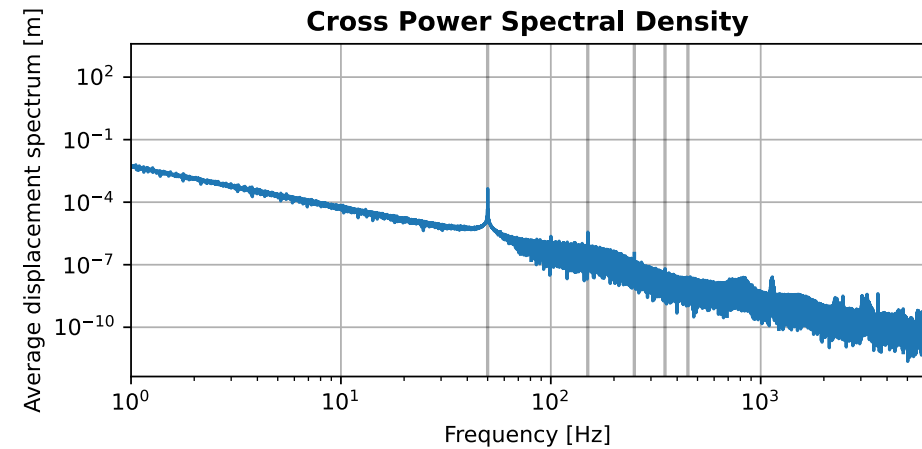
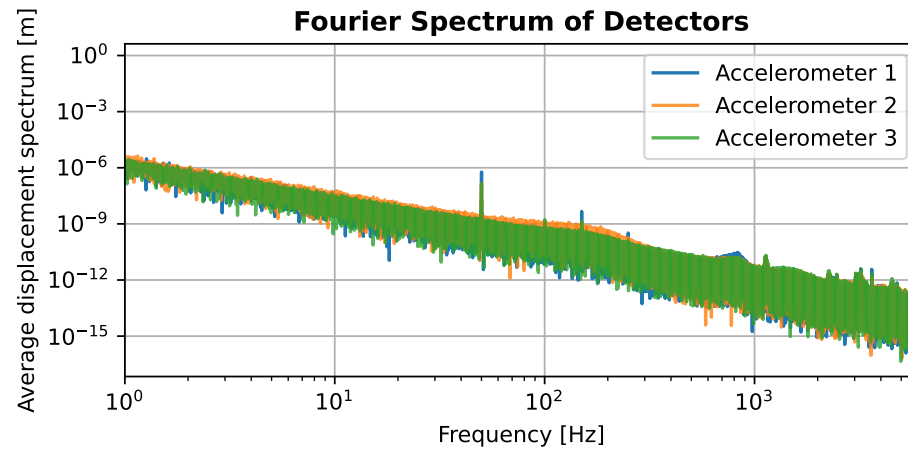
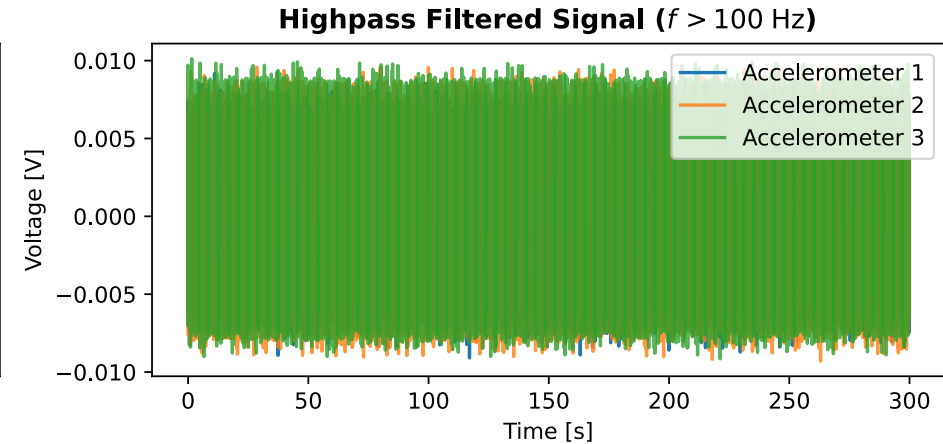
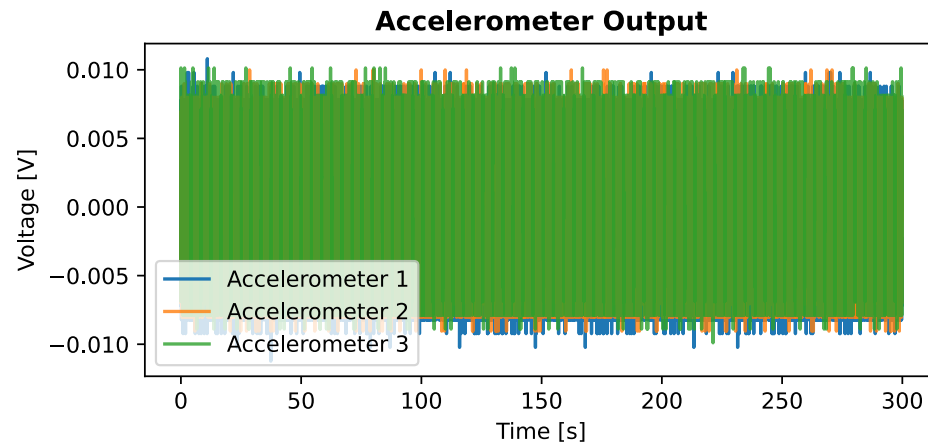
$$\text{i.e. } a = 100 \frac{m}{s^2} \cdot \frac{U_{out}}{V} \Rightarrow q_{rms} = \frac{1}{(2\pi f)^2} \cdot 100 \frac{m}{s^2} \cdot \frac{U_{out}}{V}$$

$$\text{i.e. } a = 1000 \frac{m}{s^2} \cdot \frac{U_{out}}{V}$$

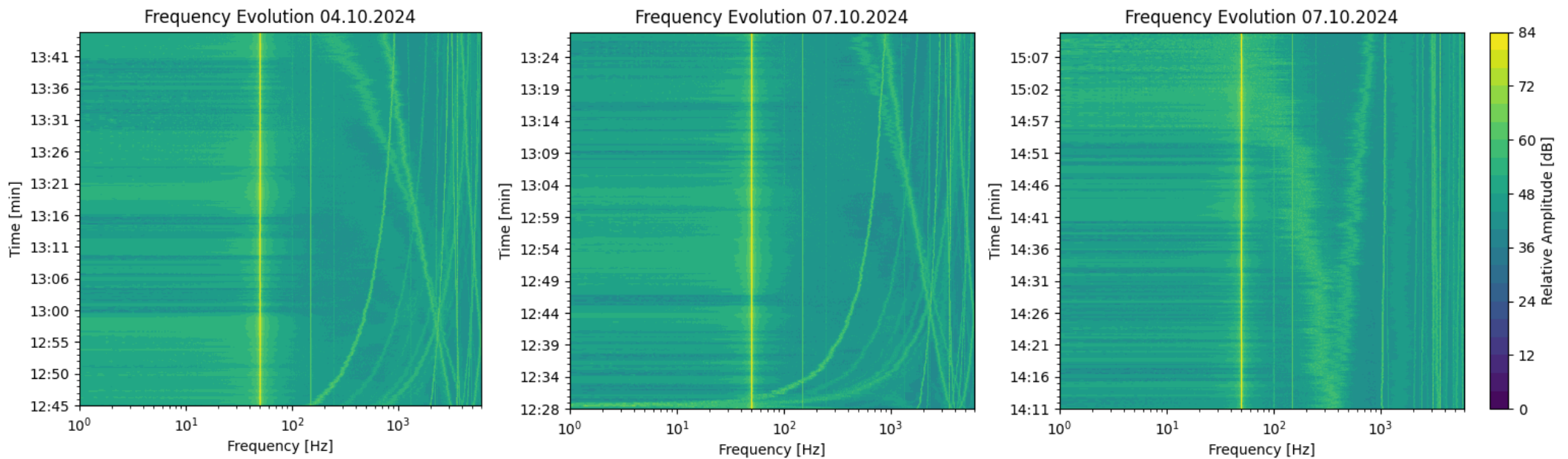
Spectrum at 2K (Sensors still work)



Inferred average displacement (preliminary)

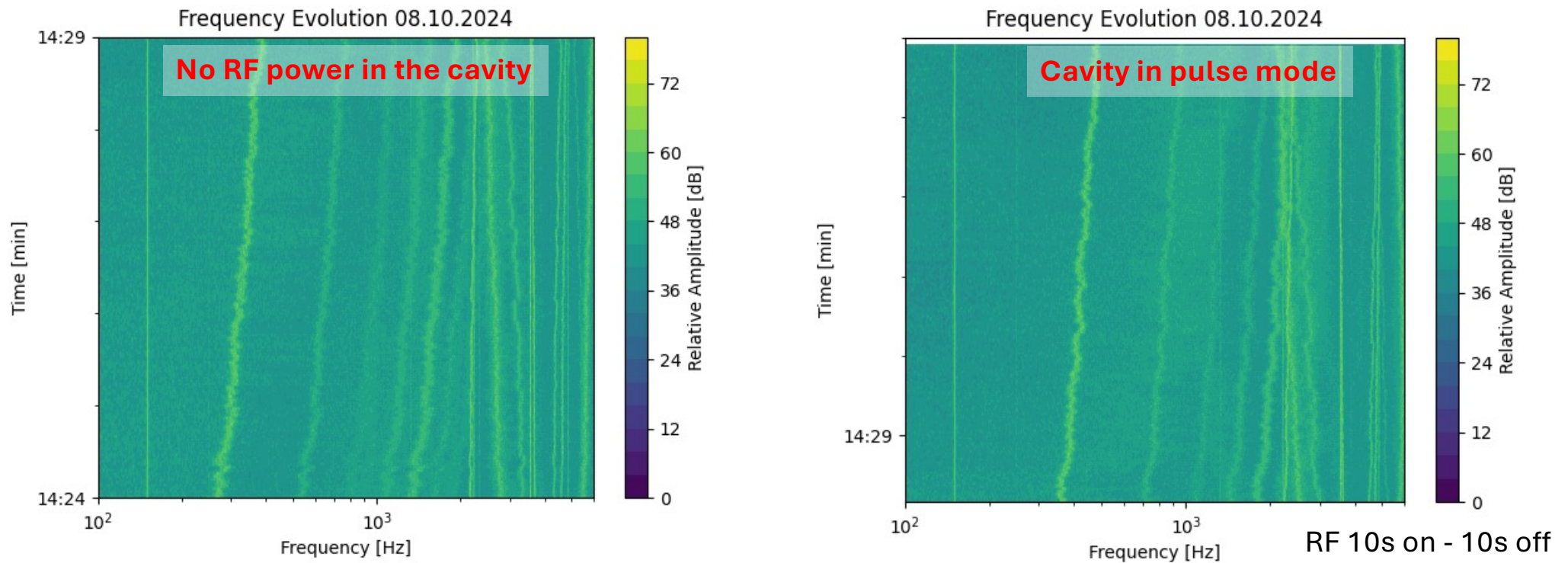


Measurement at 4K (cavity resting)



Noise sources seem to chirp

Measurement at 2K during testing



RF power does not affect vibrations **at** the measurement point