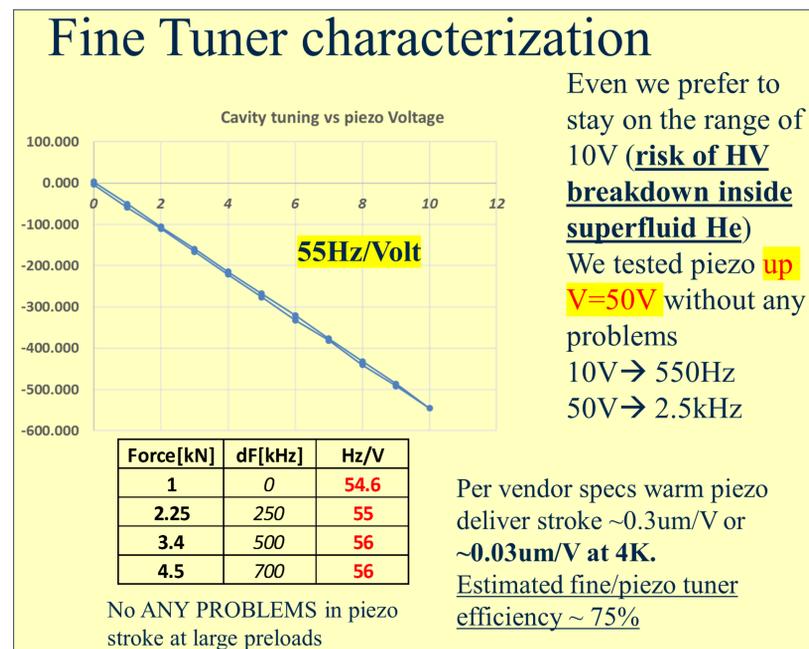
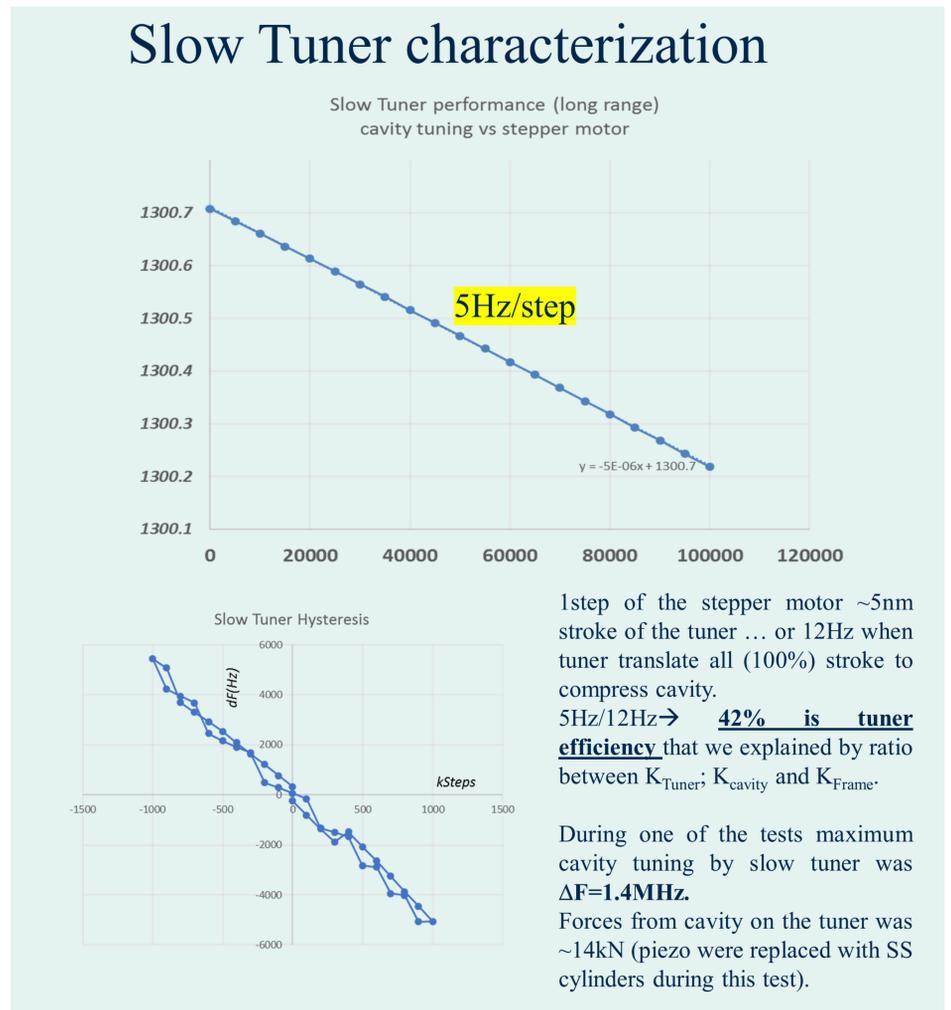
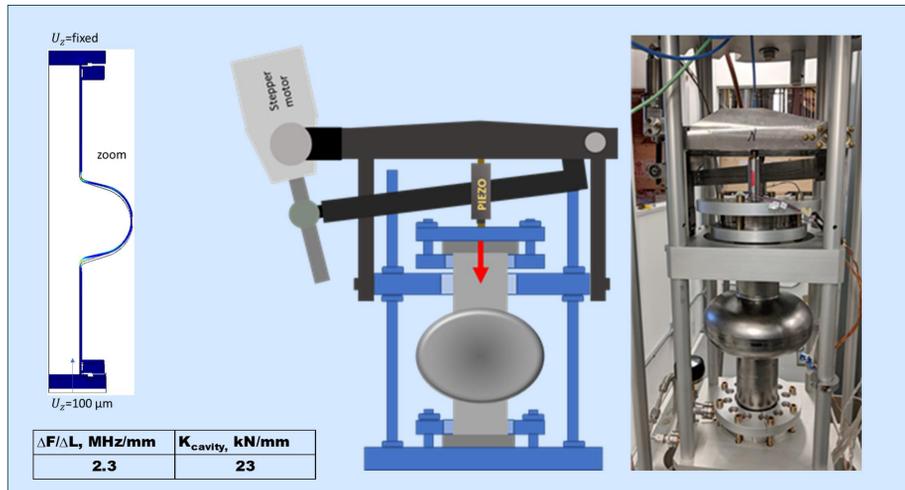
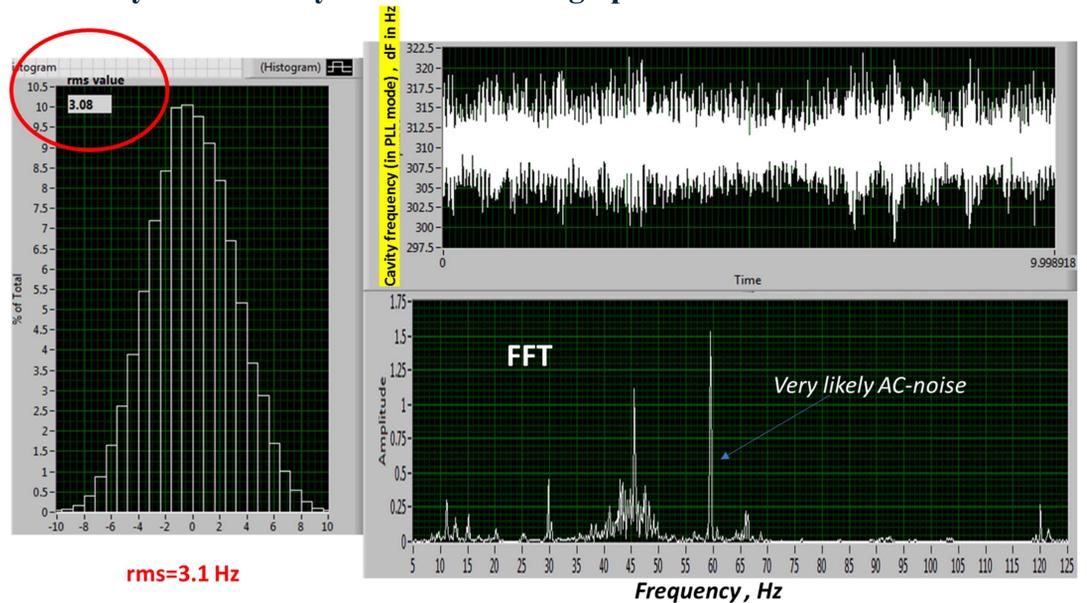


There are several projects is going at FNAL that required to tune bare (undressed) SRF cavities when they submerged into superfluid Helium. We have used LCLS II tuner [] mounted on the special mechanical structure to tune single cell 1.3 GHz cavity.

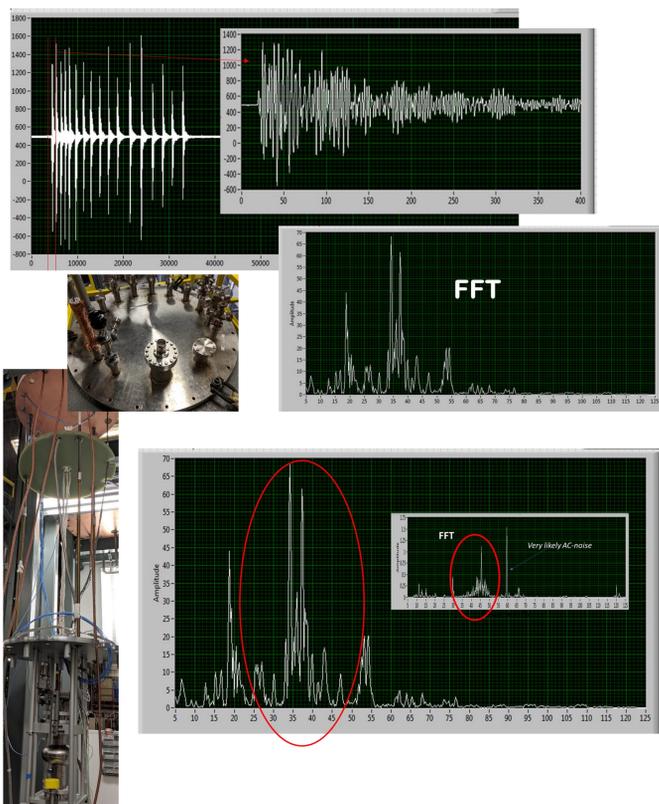
To precisely control the resonance of 1.3GHz SRF cavities during testing at the FNAL's Vertical Test Facility, we install for the first time a double lever tuner and operate it when submerged into the liquid He bath. Both active components of the tuner: electromechanical actuator (stepper motor) and piezo-actuators are operated inside superfluid helium. Accuracy in controlling the SRF cavity resonance frequency will be presented. Specifics of the tuner operation when submerged into liquid He will be discussed.



Stability of the cavity resonance during operation inside VTS at T=1.4K



Cavity excited by slightly hitting with wooden block on the Top Plate



Summary

- Tuner designed for operation inside cryo/insulated vacuum environment successfully operated inside superfluid He (T=1.4K).
- Both actuators (Phytron electromechanical and PI piezo) worked well. Piezo-actuator didn't experience any HV breakdown up to 50V. We didn't operated piezo above 50V.
- Tuner was able to retune cavity for DF=1.4MHz.
- When DC V=50V applied to piezo-actuator cavity was tuned on DF =2.5kHz that is satisfied our specifications.
- Cavity detuning caused by microphonics was on the level of the rms=3Hz ; with resonances near $\sim 30\text{-}40\text{Hz}$. Using piezo-tuner with active compensation could suppress microphonics below rms=1Hz.