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A quartz tuning fork as a force sensor for atomic force microscopy[1] ARTHUR IANUZZI, JULIA NEFF, JOHN TIMMERWILKE, AMLAN BISWAS, Department of Physics, University of Florida, Gainesville, FL 32611 — We are designing and building an atomic force microscope (AFM) to characterize the surface properties of perovskite oxides in low temperature (∼10K) and high magnetic field (9T) environments. We are using a quartz tuning fork as the force sensor. The z-axis displacement of a conducting AFM tip due to surface features will be detected by observing the shift in resonance frequency of the tuning fork which is attached to the tip. The conducting tip will also allow us to perform conductive atomic force microscopy. The resonance characteristics of the tuning fork element were determined in various degrees of vacuum, with and without the tip installed, and as a function of the tip's proximity to the sample surface. We show that the high resonance frequency (∼32kHz) and quality factor (∼30,000) of the tuning fork makes it an extremely sensitive force detector. The apparatus has also been designed with the capability of performing magnetic force microscopy on perovskite oxides.

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