Abstract Submitted
for the SES05 Meeting of
The American Physical Society

Spectral density of fluctuations for a driven, nonlinear micromechanical oscillator at kinetic phase transition COREY STAMBAUGH, HO BUN CHAN, University of Florida — We measure the spectral densities of fluctuations of an underdamped nonlinear micromechanical oscillator. By applying a sufficiently large periodic driving force, two stable dynamical states occur within a particular range of drive frequency. White noise is injected into the driving force allowing the system to overcome the activation barrier and to switch between the two states. While the system predominately resides in one of the two states for most excitation frequencies, a narrow range of frequencies exist where the population levels are approximately equal and the system is at a 'kinetic phase transition' that is analogous to the phase transition of thermal equilibrium systems. By examining the power spectral densities of the measured oscillation amplitude, the fluctuation characteristics of the system can be studied. At the 'kinetic phase transition' a supernarrow peak, centered at the excitation frequency, arises as a result of noise-induced transitions between the two dynamic states. A smaller, secondary peak associated with fluctuations about the two attractors is also examined. Its dependence on noise and excitation frequency is shown to be different from that of the supernarrow peak.

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Date submitted: 09 Aug 2005

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