Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Stochastic Resonance in Bistable Nanomechanical Oscillators
ROBERT BADZEY, PRITIRAJ MOHANTY, Department of Physics, Boston University, Boston, MA 02215 — The bistable doubly-clamped nanomechanical beam resonator has recently been shown [1] to be a promising step in the development of mechanical memory cells. One of the major obstacles to the full implementation of this scheme lies in the ability to effectively control the two states [2] in a noisy or high-temperature environment. Here, we present the observation of stochastic resonance in these nanomechanical systems. This is a counter-intuitive effect in which the addition of noise to a noisy system results in coherent response. Over the past two decades, it has been seen in a wealth of physical systems. Aside from adding to knowledge in this area, the observation of stochastic resonance here lays the foundation for its effective use in the areas of signal processing, quantum information, and quantum control. This work is supported by NSF Nanoscale Exploratory Research (NER) Program and NSF (DMR, CCF, ECS), DOD (ARL), ACS (PRF), and the Sloan Foundation. [1] R. Badzey et al., Appl. Phys. Lett. 85, 3587 (2004). [2] R. Badzey et al., (To be Published, Appl. Phys. Lett. 1/20/05).

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Date submitted: 06 Dec 2004 Electronic form version 1.4