## Abstract Submitted for the MAR13 Meeting of The American Physical Society

Graphene on silicon nitride resonators for optomechanics ROBERTO DE ALBA, Department of Physics, Cornell University, VIVEK ADIGA, School of Applied & Engineering Physics, Cornell University, ISAAC STORCH, Department of Physics, Cornell University, PATRICK YU, Department of Engineering, University of North Texas, ROB ILIC, Cornell Nanoscale Science and Technology Facility, ROBERT BARTON, Department of Physics, Cornell University, SUNWOO LEE, JAMES HONE, Department of Mechanical Engineering, Columbia University, PAUL MCEUEN, Department of Physics, Cornell University, HAROLD CRAIGHEAD, School of Applied & Engineering Physics, Cornell University, JEE-VAK PARPIA, Department of Physics, Cornell University — Recently, much work on nanoelectromechanical resonators has focused on high Q systems and on coherent back action used to suppress or enhance device motion. Here we attempt to merge these concepts by studying graphene on silicon nitride bilayer membranes. The high Q's of these hetero-structures, along with the conductivity of graphene, result in both electrostatic and optical tunability of mechanical resonance. By coupling these devices with a movable, highly reflective mirror to form a Fabry-Perot cavity, we are able to modulate resonator frequency and damping through cavity detuning. We thus present evidence of photothermal back action in these devices due to energy absorption from an impinging laser beam. We utilize both optical and electrical read-out schemes to detect device motion, enabling us to compare electrical and optical nonlinearities as a function of cavity detuning and capacitive drive.

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