

Abstract Submitted
for the DAMOP10 Meeting of
The American Physical Society

Atomic probe Wigner tomography of a nanomechanical system¹

SWATI SINGH, PIERRE MEYSTRE, University of Arizona — We propose a scheme to measure the quantum state of a nanomechanical oscillator cooled near its ground state of vibrational motion. This is an extension of the nonlinear atomic homodyning technique scheme first developed to measure the intracavity field in a micromaser. It involves the use of a detector-atom that is simultaneously coupled to the cantilever via a magnetic interaction and to (classical) optical fields via a Raman transition. We show that the probability for the atom to be found in the excited state is a direct measure of the Wigner characteristic function of the nanomechanical oscillator. We also investigate the back-action effect of this destructive measurement on the state of the cantilever.

¹Research supported by NSF, ARO and ONR

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Date submitted: 08 Jan 2010

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