Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Noise Temperature and Thermodynamic Temperature of a Sample-on-Cantilever System Below 1K ANIA BLESZYNSKI, WILL SHANKS, JACK HARRIS, Department of Physics, Yale University — Micromechanical systems such as cantilevers are frequently used to detect ultra-small forces and displacements. In a sample-on-cantilever geometry, operation at low temperature requires cooling the thermodynamic temperature of the sample T_S and the noise temperature of the cantilever T_N. This can be challenging because for high-Q cantilevers, these temperatures are only weakly coupled. In addition, for insulating cantilevers monitored by a reflected laser beam, these temperatures may also be weakly coupled to the refrigerator temperature. We have made quantitative measurements of T_N and T_S for a sample-on-cantilever set-up as a function of incident laser power and refrigerator temperature below 1 Kelvin. We infer T_S from measurements of the critical magnetic field of a superconducting sample mounted on the cantilever. T_N is inferred from the cantilever's Brownian motion. We find that for this system both T_S and T_N remain quite close to the refrigerator temperature.

Ania Bleszynski
Department of Physics, Yale University

Date submitted: 21 Nov 2006 Electronic form version 1.4