Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Design and Fabrication of Piezoresistive Microcantilevers for Low Temperature Torque Magnetometry DAN J. HILLS, JACK K. LUO, CHRISTOPH BERGEMANN, University of Cambridge — Piezoresistive microcantilevers provide an experimentally simple and highly sensitive way of measuring the magnetization of small ($< (100\,\mu\mathrm{m})^3$) samples. These devices — micromachined from crystalline silicon — were originally designed as probes for atomic force microscopy, but were implemented by several researchers as torque sensors. Here we present newly designed and fabricated levers with properties optimized for torque measurements, including specifically those at low temperatures. In particular they may be used for de Haas- van Alphen measurements in high magnetic fields. Torque magnetometry detection of quantum oscillations is a potentially advantageous method for materials with anisotropic Fermi surfaces, existing in very small crystals or platelets. In addition, several other potential applications exist for torque measurements using levers of the same or similar design. Our designs couple high sensitivity with very small lever deflections in order to minimise torque interaction effects arising from field corrections introduced by the cantilever movement. Lever heat-sinking is also considered so as to maximise the sensing current that may be used, and hence the sensitivity, while maintaining the sample at low temperature.

Dan J. Hills

Date submitted: 20 Nov 2006 Electronic form version 1.4