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High sensitivity cantilevers for measuring persistent currents in normal metal rings ANIA BLESZYNSKI JAYICH, WILL SHANKS, Yale University, ROB ILIC, Cornell University, JACK HARRIS, Yale University — We propose a new approach to measuring persistent currents in normal metal rings. By integrating micron-scale metal rings into sensitive micromechanical cantilevers and using the cantilevers as torque magnetometers, it should be possible to measure the rings' persistent currents with greater sensitivity than the SQUID-based and microwave resonator-based detectors used in the past. In addition, cantilever-based detectors may allow for measurements in a cleaner electromagnetic environment. We have fabricated ultra sensitive cantilevers with integrated rings and measured their mechanical properties. We present an estimate of the persistent current sensitivity of these cantilever-based detectors, focusing on the limits set by the cantilever's Brownian motion and the shot noise in the laser interferometer that monitors the cantilever.

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