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Measurement of the typical persistent current in gold rings at high magnetic fields[1] DUSTIN NGO, IVANA PETKOVIC, ANTHONY LOLLO, JACK HARRIS, Yale University Department of Physics — Theory has long predicted the existence a dissipationless persistent current (PC) in rings made of a normal (i.e., non-superconducting) conductor. The PC is usually detected via its magnetic moment (i.e., without connection to leads or deliberate excitation) and therefore provides an important testbed for understanding the equilibrium properties of conductors. At low magnetic fields, the PC is predicted to be a sensitive probe of electron-electron interactions, non-equilibrium effects, and variety of other interesting phenomena. In contrast, at high magnetic fields the PC is expected to be accurately described by a simple single-electron theory. Previously, our group used a torque magnetometry technique to measure PC in aluminum rings in the presence of a strong magnetic field, and found good agreement with the single-electron theory of PC. In this talk we describe new measurements of very large arrays of gold rings. We will present measurements of these rings in high magnetic fields, where we find good agreement with the single-electron theory (including Zeeman and spin-orbit coupling effects). We will also describe the prospect for measuring these arrays at low magnetic field, where many-body and non-equilibrium effects may dramatically alter the PC.

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