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Large oscillations of the magnetoresistance in nano-patterned high-temperature superconducting films ILYA SOCHNIKOV, AVNER SHAULOV, YOSEF YESHURUN, Bar-Ilan University, GENNADY LOGVENOV, IVAN BOZOVIC, Brookhaven National Laboratory — Measurements on nano-scale structures made of high-temperature superconductors are expected to shed light on the origin of superconductivity in these materials. The size of loops made of these compounds was so far limited to the submicron scale. We report the results of measurements on loops of $La_{1.84}Sr_{0.16}CuO_4$, with dimensions down to tens of nanometers. We observe oscillations in the loops resistance as a function of the magnetic flux through the loops. The oscillations have a period of $h/2e$ and their amplitude is much larger than the amplitude of resistance oscillations expected from the Little-Parks effect [1-2]. Unlike the Little-Parks oscillations, caused by periodic changes in the superconducting transition temperature, the oscillations we observe are caused by periodic changes in the interaction between thermally-excited moving vortices and the oscillating persistent current induced in the loops. Despite the enhanced amplitude of these oscillations, we have not detected oscillations with a period of h/e, as recently predicted for nanoscale loops of superconductors with d-wave symmetry, or with a period of $h/4e$, as predicted for superconductors that exhibit stripes. [1] I. Sochnikov *et al.*, Nature Nano. **5**, 516 (2010). [2] I. Sochnikov *et al.*, PRB **82,** 094513 (2010).

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