Abstract Submitted
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Local superfluid densities probed via current-induced superconducting phase gradients[1] ALEXEY BEZRYADIN, University of Illinois at Urbana-Champaign, DAVID HOPKINS, LAM research, DAVID PEKKER, Harvard University, TZU-CHIEH WEI, University of Waterloo, PAUL GOLDBART, University of Illinois at Urbana-Champaign — We have developed a superconducting phase gradiometer consisting of two parallel DNA-templated nanowires connecting two thin-film leads [1,2,3]. We have ramped the cross current flowing perpendicular to the nanowires, and observed oscillations in the lead-to-lead resistance due to cross-current-induced phase differences. By using this gradiometer we have measured the temperature- and magnetic-field dependence of the superfluid density, and observed an amplification of phase gradients caused by elastic vortex displacements. We examine our data in light of Miller-Bardeen theory of dirty superconductors and a microscale version of Campbell's model of field penetration.
[1] Hopkins et al., Science **308**, 1762 (2005). [2] Pekker et al., Phys. Rev. B **72**, 104517 (2005). [3] Hopkins et al., Phys. Rev. B Rapid Comm. (2007, in press), accepted for publication.

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Alexey Bezryadin
University of Illinois at Urbana-Champaign

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