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Measurement of superconducting phase gradients using a DNA-templated nanowire interference device DAVID S. HOPKINS, DAVID PEKKER, PAUL M. GOLDBART, ALEXEY BEZRYADIN, University of Illinois at Urbana-Champaign — We have fabricated an NQUID (i.e., a Nanowire SQUID) [1,2] in which two thin ($\sim$15 nm) superconducting nanowires templated by DNA molecules are used to directly measure phase gradients of the Ginzburg-Landau order parameter along a superconducting strip of width $\sim$1 μm. A supercurrent flowing along the strip creates a phase difference between the contact-points of the nanowires. This causes the resistance of the two-wire device to oscillate as a function of the current flowing along the strip with a period equal to the amount of current required to create a 2π phase difference between the contact-points of the wires. We find that the period increases with decreasing temperature, due to the increase in superfluid density in the film. Using this device we are able to study the process of superconductivity suppression in the thin film strip caused by a high bias-current and/or a magnetic field. A theory of the operation of such NQUIDs will be presented in a companion talk by Pekker et al. [1] Hopkins et al., Science 308, 1762 (2005). [2] Pekker et al., Phys. Rev. B 72, 104517 (2005).

David S. Hopkins
University of Illinois at Urbana-Champaign

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