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Probing superconducting samples using a two-superconducting-nanowire device DAVID PEKKER, University of Illinois at Urbana-Chanmpaign, ALEXEY BEZRYADIN, DAVID S. HOPKINS, PAUL M. GOLDBART — An NQUID (nanowire SQUID) is a device featuring two thin-film superconducting leads connected by a pair of parallel narrow superconducting wires [1,2]. Thermal fluctuations of the order parameter in the superconducting wires endow the device with a nonzero lead-to-lead resistance (R). For short wires, R also depends on the phase profile of the order parameter in the leads. Here, we consider the situation in which one of the leads carries a supercurrent perpendicular to the wires (a cross-current). We show that R is a periodic function of this cross-current. Minima of R occur whenever the phase-gain between the wire attachment-points along the lead carrying the cross-current is an integer multiple of 2π. NQUID devices such as these may be useful for probing superconducting order in the leads or determining current-phase relations in various settings. The results of experiments on devices carrying cross-currents will be presented in a companion talk by Hopkins et al.
[1] Hopkins et al., Science 308, 1762 (2005).
[2] Pekker et al., Phys. Rev. B 72, 104517 (2005).

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