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Flux and bias driven superconducting to normal transition in an SNS proximity dc SQUID[1] JIAN WEI, PAUL CADDEN-ZIMANSKY, VENKAT CHANDRASEKHAR, Northwestern University — We measure the magnetoresistance of a dc SNS SQUID in the form of a mesoscopic normal-metal loop in contact with two superconducting electrodes. Below the transition temperature of the superconducting leads, large $h/2e$ periodic magnetoresistance oscillations can be observed when the normal sections of the SNS junctions enter a proximity regime induced by the superconducting electrodes. As the temperature is lowered, the entire device becomes superconducting. In this regime, sharp switching from the zero-resistance state to a finite-resistance state is seen at half-integer flux quanta. With the application of a dc bias current at even lower temperatures, periodic switching from the superconducting state to the fully normal state can be produced with the external field. The observation of periodic flux-driven transitions in this device suggests that beyond the current SQUID theory for SIS junctions the development of SQUID theory for SNS junctions that incorporates the kinetic energy of the coherent electrons in the junctions is needed.

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