

Reentrant superconductivity in Nb/Cu_{1-x}Ni_x bilayers

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Abstract

We report on the first observation of a pronounced reentrant superconductivity phenomenon in a superconductor/ferromagnet layered system. The results were obtained using a superconductor/ferromagnetic-alloy bilayer of Nb/Cu_{1-x}Ni_x. The superconducting transition temperature T_c drops sharply with increasing thickness d_{CuNi} of the ferromagnetic layer, until complete suppression of superconductivity is observed at $d_{\text{CuNi}} \approx 4 \text{ nm}$. Increasing the Cu_{1-x}Ni_x layer thickness further, superconductivity reappears at $d_{\text{CuNi}} \geq 13 \text{ nm}$. Our experiments give evidence for the pairing function oscillations associated with a realization of the quasi-one-dimensional Fulde-Ferrell-Larkin-Ovchinnikov-like state in the ferromagnetic layer. © 2006 The American Physical Society.

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