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Imprinting properties of magnetic vortices into superconducting films.[1] JAVIER E. VILLEGAS, C.-P. LI, IVAN K. SCHULLER, Physics Department, University of California-San Diego, La Jolla CA — We investigated experimentally the magnetotransport properties of superconducting Al thin films on top of sub-100 nm Fe nanodot arrays. Samples with arrays of single-domain magnetic dots behave similar to plain Al films. A dramatically different behavior is observed for arrays of dots in the so-called magnetic vortex-state. For these, the details of the magnetic reversal are "imprinted" into the superconductor and show up in the magnetotransport properties below the superconducting T_C. The resulting hybrid system shows a giant (up to 10^5 %) hysteretic magnetoresistance with different reversible/irreversible regimes related to the array's magnetic state. Such controllable effects originate from the stray fields produced by the magnetic vortex cores in the nanodots, which induce a normal/superconducting transition depending on the distribution of the vortex cores polarities.

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Javier E. Villegas
University of California-San Diego

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