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Vortex Confinement in Superconducting/Ferromagnet Hybrid Structures M. IAVARONE[1], Physics Department, Temple University, Philadelphia, PA 19122, USA, A. SCARFATO, F. BOBBA, M. LONGOBARDI, Physics Department, University of Salerno, Fisciano 84084, Italy, F. GIUBILEO, CNR-SPIN Laboratory, Salerno, Italy, G. KARAPETROV, V. NOVOSAD, V.G. YEFREMENKO, Materials Science Division, Argonne National Laboratory, Argonne, IL 60439, USA, A. CUCOLO, Physics Department, University of Salerno, Fisciano 84084, Italy — Magnetically coupled superconductor-ferromagnet hybrids offer advanced routes for nanoscale control of superconductivity. Scanning tunneling microscopy (STM) and scanning magnetic force microscopy (MFM) coupled to magneto-transport measurements reveal rich vortex phase diagram. The magnetic stripe domain of the ferromagnet induces periodic local magnetic induction in the superconductor, creating a series of pinning and anti-pinning channels for vortices observed with low temperature STM and MFM. Such laterally confined Abrikosov vortices form chains. We also found general equilibrium condition for which vortex-antivortex pairs are spontaneously formed during zero-field cooling. In the non-equilibrium state the strong magnetic pinning of the vortex lattice results in avalanches of antivortices when changing the polarity of the applied magnetic field.

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