Hysteretic magneto-transport of a High-T$_c$ superconducting/ferromagnetic multilayer with tunable magnetic domain structure

JAVIER E. VILLEGAS, CRISTINA VISANI, PETER J. METAXAS, AURELIE COLLAUDIN, BAPTISTE CALVET, ROZENN BERNARD, JAVIER BRIATICO, CYRILE DERANLOT, KARIM BOUZEHOUANE, Unite Mixte de Physique CNRS/Thales, 1 avenue A. Fresnel, 91767 Palaiseau, and Universite Paris Sud 11, 91405 Orsay, France — The magneto-transport of a hybrid heterostructure combining a YBaCuO$_{7-\delta}$ thin film and a Co/Pt superlattice shows an unusual hysteretic behavior. Depending on the angle between the external applied field and the film plane, and on the magnetic history, either an increase or a decrease of the mixed-state resistance is observed. The combination of magneto-transport, magnetic force microscopy and anomalous Hall effect measurements allows us to correlate these effects to the magnetic domain structures in the Co/Pt superlattice. We unequivocally prove that the hysteretic magneto-transport is induced by the stray magnetic fields from tunable magnetic domain structures, which may induce vortices or produce vortex pinning, leading to the increase/decrease of the mixed-state resistance.

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