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Vertical Transport in Ferroelectric/Superconductor Heterostructures[1] LAURA BEGON-LOURS, JUAN TRASTOY, ROZENN BERNARD, ERIC JACQUET, CECILE CARRETERO, KARIM BOUZEHOUANE, STEPHANE FUSIL, VINCENT GARCIA, STEPHANE XAVIER, STEPHANIE GIROD, CYRILE DERANLOT, MANUEL BIBES, AGNES BARTHELEMY, JAVIER E. VILLEGAS, Unite Mixte de Physique CNRS/Thales, France — We study electric field-effects in superconducting films by measuring vertical transport in ferroelectric/superconductor heterostructures. These are based on ultrathin (4 to 8 nm thick) BiFeO3-Mn grown on YBa2Cu3O7 by pulsed laser deposition. Nanoscale contacts are defined on the BiFeO3 via a series of nanofabrication steps which include e-beam lithography, metal deposition (Nb or Co capped with Pt) and lift-off. Conductive-tip atomic force microscopy and piezoresponse force microscopy are used to characterize the transport across the ferroelectric barrier as a function of its polarization (up/down). The observed electro-resistance, measured at various temperatures, allows studying the different electric-field screening in the normal and superconducting states.

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