Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Superconducting spin switch with infinite magnetoresistance[1] BIN LI, Francis Bitter Magnet Lab, MIT, NIKLAS ROSCHEWSKY, FBML, MIT and Georg-August-Universitaet, Goettingen, MARKUS MUNZENBERG, Georg-August-Universitaet, Goettingen, MARIUS EICH, FBML, MIT, MARGUERITE EPSTEIN-MARTIN, FBML, MIT and Spencer School, New York, JAGADEESH S. MOODERA, FBML and Physics Department, MIT — Nearly five decades ago de Gennes theoretically predicted that below the superconducting transition temperature T_C the resistance in a FI/S/FI (FI-ferromagnetic insulator; S-superconductor) trilayer structure depends on the magnetization direction of the two FI layers [de Gennes, *Phys. Lett.* **23**, 10 (1966)]. This prediction is experimentally demonstrated here. We present magneto-transport properties in a EuS/Al/EuS structure, showing an infinite magnetoresistance by tuning the internal exchange field at the FI/S interface. The superconducting order parameter was suppressed when the magnetic moment of the two EuS layers aligned in parallel whereas it was least affected when the two EuS layers have their magnetizations in antiparallel alignment: one could tune between the superconducting and normal states by the FI magnetization configuration. Importantly either of these two states could be maintained in zero applied fields, thus creating a nonvolatile two-level memory state. It was also shown that this is entirely an interface proximity effect and could be destroyed by introducing just a monolayer of Al_2O_3 barrier in between the interfaces. Furthermore the observed resistance switching field correlated with the surface anisotropy of the EuS layers.

[1]This work was supported by NSF DMR-1207469 and DOE DE-SC0001088.

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Date submitted: 08 Nov 2012 Electronic form version 1.4