Electronic transport through superconductor/ferromagnet nanostructures

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We review recent work on superconductor/ferromagnet (S/F) nanostructures. Superconductors can be employed to probe the ferromagnetism of metals by virtue of Andreev reflection. Using nanocontacts defined by e-beam lithography, the spin-polarization of the current across the S/F interface can be determined reliably [1]. Particularly intriguing is the non-local Andreev reflection, i.e., an incident electron from a ferromagnetic nanocontact is retroreflected as a hole in an adjacent contact, forming a spatially separated but entangled Einstein-Podolski-Rosen pair [2]. The proximity-induced superconductivity can be probed by magnetization measurements. We report on the fate of normal metal (Ag) squeezed between a superconductor and a ferromagnet [3]. Finally, we report on the superconducting spin-switch effect where T_c of a superconducting film between ferromagnets depends on the latter's relative magnetization orientation [4].

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