Spin polarization versus lifetime effects at point contacts between superconducting niobium and normal metals

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During the last decade point contact Andreev reflection spectroscopy has emerged as a versatile technique to measure the spin polarization of metals. However, the analysis of point-contact spectra with ferromagnets has encountered a number of serious challenges[1]. And only few of the many relevant publications mention explicitly how difficult it is to distinguish between the effect of polarization and that of a finite quasi-particle lifetime[2] although one would expect an enhanced pair breaking at the interface of a superconductor with a ferromagnet. We have recently confirmed the polarization-lifetime ambiguity for Nb-Co and Nb-Cu contacts and suggested to use Fermi surface mismatch, the normal reflection due to the difference of Fermi wave vectors of the two electrodes, to solve this dilemma[3]. Here we present further experiments on contacts between superconducting Nb and the ferromagnets Fe and Ni as well as the noble metals Ag and Pt that support our previous results and their interpretation. Our data indicate that the Nb - normal metal interfaces have a transparency of up to about 80% and a small, if not negligible, spin polarization.

[1]Baltz *et al.*, J. Phys.: Condens. Matter **21**, 095701 (2009).
[2]Chalsani *et al.*, Phys. Rev. B **75**, 094417 (2007).
[3]E. Tuuli and K. Gloos, Low Temp. Phys. (2011), accepted for publ.