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Effects of spin-dependent interfaces on electronic transport in hetero-structure superconductor/ferromagnet junctions[1] KUEI SUN, NAYANA SHAH, University of Cincinnati, SMITHA VISHVESHWARA, University of Illinois at Urbana-Champaign — We study electronic transport in junctions consisting of a superconductor (S) electrode and two ferromagnet (F) leads having spin-dependent S-F interfaces associated with magnetization in the F leads. We model the system using an extended Blonder-Tinkham-Klapwijk treatment with a key modification that accounts for these spin-dependent interfacial barriers (SDIB). We compute current-voltage relations as a function of parameters characterizing the SDIB, magnetization in the F leads, geometry of the junction, and temperature. Our results reveal a rich range of significantly altered physics due to a combination of interfering spin-dependent scattering processes and population imbalance in the ferromagnets, such as a significant enhancement in crossed Andreev current and a sign change in the relative difference between resistance of two cases having a antiparallel or parallel alignment of the magnetization in the F leads, respectively. Our model well describes various experimental data of positive and negative relative resistance, both within sufficiently large parameter regions.

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Kuei Sun
University of Cincinnati

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