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Magnetization-dependent resistance of double ferromagnet-superconductor junctions KUEI SUN, U. of Cincinnati & U. of Illinois at Urbana-Champaign, M. COLCI, U. of Illinois at Urbana-Champaign & Naval Research Laboratory, Washington DC, D.J. VAN HARLINGEN, U. of Illinois at Urbana-Champaign, NAYANA SHAH, U. of Cincinnati, SMITHA VISHVESHWARA, U. of Illinois at Urbana-Champaign — Studies of the crossed Andreev reflection (CAR) process in double ferromagnet-superconductor junctions have attracted a lot of attention as way of realizing solid-state entanglement. Here, we perform a theoretical analyses of such a system motivated by our surprising experimental findings that the resistance in the antiparallel alignment of the magnetization of ferromagnets is larger than that in the parallel state. We model the system using an extended Blonder-Tinkham-Klapwijk (BTK) treatment with spin-dependent interfacial barriers associated with the magnetization. We compute scattering amplitudes of CAR and other possible processes as well as the resistance as a function of interfacial parameters. Our results reveal significantly altered physics due to the magnetization-dependent scattering, such as a sign change in the relative resistance between the parallel and antiparallel cases. We can model the positive relative resistance corresponding to our experimental findings as well as the negative results observed in other experiments, both within sufficiently large parameter regions.

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