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Dominant second harmonic in the Josephson current–phase relation: Manifestation of the long-range spin-triplet proximity effect in SFF'S junctions ZORAN RADOVIC, University of Belgrade, Serbia, LUKA TRIFUNOVIC, University of Basel, Switzerland, MILOS KNEZEVIC, University of Cambridge, UK — We present theoretical study of the Josephson effect and pairing correlations in planar SFF'S junctions that consist of conventional superconductors connected through two metallic monodomain ferromagnets. Both singlet and triplet pair amplitudes, the Josephson current-phase relations, and density of states for arbitrary orientation of magnetizations are calculated from the self-consistent solutions of Eilenberger equations in the clean limit and for moderate disorder in ferromagnets. We find that in highly asymmetric SFF'S junctions the long-range spin-triplet proximity effect manifests itself as a dominant second harmonic in the Josephson current-phase relation [1] and gives distinctive tunneling conductance spectra [2]. Unambiguous detection of the long-range spin-triplet proximity effect by tunneling spectroscopy and experimental realization of the Josephson junctions ground state degeneracy (like at 0-pi transtions) is accessible for small interface roughness and moderate disorder in ferromagnets at low temperatures.

[1] L. Trifunovic, Z. Popovic and Z. Radovic, Phys. Rev. B 84, 064511 (2011).
[2] M. Knezevic, L. Trifunovic, and Z. Radovic (to be published).

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