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Equal-spin Andreev reflection from quasiparticle interference effects in high-T_C/half metallic ferromagnet junctions[1] C. VISANI, R. BERNARD, J. BRIATICO, M. BIBES, A. BARTHÉLÉMY, J.E. VILLEGAS, Unité Mixte de Physique CNRS/Thales, J. TORNOS, Z. SEFRIOUI, J. SANTAMARIA, GFMC, Universidad Complutense de Madrid — We report evidence for long-range superconducting correlations in the half-metallic ferromagnet (F) $La_{0.7}Ca_{0.3}MnO_3$, obtained from conductance measurements along the c-axis in SFS and SF junctions (with S the high-T_C superconductor $YBa_2Cu_3O_7$). Well below the superconducting T_C, we observed oscillations in the differential conductance as a function of the voltage bias, in which we identified two sets of resonances: i) quasiparticle interferences in the S (top) layer (Tomasch resonances) and ii) in the half-metallic F layer (McMillan-Rowell resonances). Both of them imply Andreev-like reflections at the SF interface and the coherent propagation of the resulting phase-conjugated quasiparticles through the entire S and F layers thickness (up to 30 nm for the F layer). Because conventional Andreev reflection and the coherent long-range propagation of the outcoming opposite-spin electron/hole pairs are heavily suppressed in strongly polarized ferromagnets, the observation of the above effect implies the occurrence of equal-spin Andreev reflection at the studied SF interfaces.

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C. Visani
Unité Mixte de Physique CNRS/Thales

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