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Non-local transport through a quantum dot coupled to two normal and one superconducting leads YASUHIRO YAMADA, Department of Physics, Kyoto University, YOICHI TANAKA, Condensed Matter Theory Laboratory, RIKEN, NORIO KAWAKAMI, Department of Physics, Kyoto University —
Using the modified second-order perturbation theory, we study the non-local transport through a quantum dot coupled to two normal and one superconducting leads. The non-local transport between the two normal leads is governed by two competing electron transport processes, the crossed Andreev reflection and the elastic cotunneling. In equilibrium case, the non-local conductance shows the zero-bias anomaly with increasing Coulomb interaction at the quantum dot because the elastic cotunneling is enhanced by the Kondo effect. Even in the strong interaction regime, however, we also observe that the non-local differential conductance drastically decreases with increasing bias voltage between the normal leads, and shows the sign change in some specific nonequilibrium condition. We elucidate that the sign change comes from the alternation of the dominant transport process, which is caused by the enhancement of the crossed Andreev reflection due to the cooperation between the Kondo/proximity effects and the suppression of the elastic cotunneling at finite bias.

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