Competition between the Kondo effect and electron pairing in nanoscopic systems

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We investigate the low energy spectrum of a correlated quantum impurity embedded in a superconducting reservoir, where the proximity effect induces electron pairing manifested by the in-gap Andreev states. Recently the experiments using two-terminal and three-terminal nanoscopic heterojunctions have enabled controllabe evolution from the BCS-type to the singly occupied configurations. We study mutual dependence between the induced pairing and electron correlations using two complementary methods. In particular, we find that the spin exchange mechanism (promoting the many-body Kondo state) leads to substantial changes of the subgap Andreev conductance. We confront this result with the available experimental data.