

TRANSPORT IN HYBRID DOUBLE KONDO DOTS

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We investigate electronic transport through a serially-coupled double quantum dot in the Kondo regime coupled to normal-metals and superconducting leads. For the first case we calculate the linear conductance and for the superconducting one we compute the Josephson current. We employ different techniques, slave boson expansions and NRG calculations and we discuss the range of validity of these approaches. Surprisingly for the normal case we find that the dependence of the linear conductance on the interdot coupling varies with the strength of the lead-dot tunneling amplitude [see Fig. 1] when the exchange interaction is negligible. However when magnetic correlations play an important role the linear conductance presents a scaling behaviour independently on the magnitude of the interdot tunneling rate [see Fig.2]. For the Josephson current we obtain a non monotonous behaviour with the interdot tunneling [see Fig.3] that can be explained in terms of the formation of coherent Kondo states similar to the behaviour found in carbon nanotubes attached to superconducting contacts.

References:

[1] R. Lopez, M-S Choi, R. Aguado Phys. Rev. B 75, 045132 (2007).

[2] P. Jarillo-Herrero et al., Nature 439, 953-956 (23 February 2006).

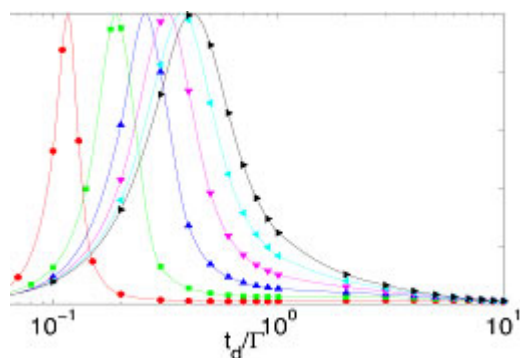


Fig.1 Linear conductance for different values of the lead-dot tunneling coupling

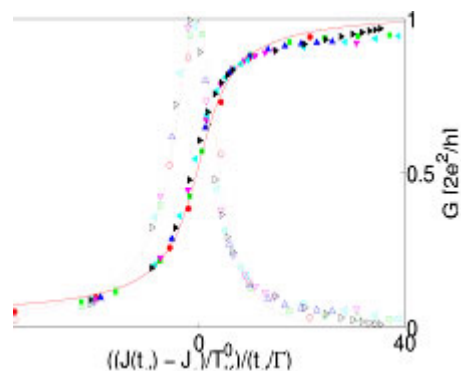


Fig.2 Linear conductance behavior for different lead-dot couplings

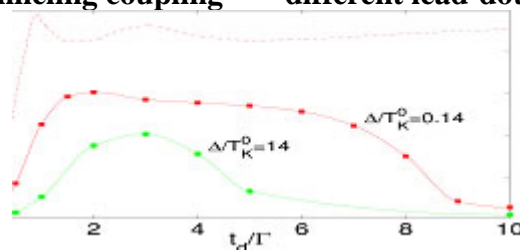


Fig3. Non monotonous behavior of the Josephson current as a function of the interdot tunneling amplitude