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Equilibrium charge fluctuations of a charge detector and its effect on a nearby quantum dot[1] DAVID RUIZ-TIJERINA, Ohio University, EDSON VERNEK, Universidade Federal de Uberlandia, SERGIO ULLOA, Ohio University — We study the Kondo state of a spin-1/2 quantum dot (QD), in close proximity to a quantum point contact (QPC) charge detector near the conductance regime of the 0.7 anomaly. The electrostatic coupling between the QD and QPC introduces a remote gate on the QD level, which varies with the QPC gate voltage. Furthermore, models for the 0.7 anomaly [Y. Meir et al., PRL 89,196802(2002)] suggest that the QPC lodges a Kondo-screened level with charge-correlated hybridization, which may be also affected by capacitive coupling to the QD, giving rise to a competition between the two Kondo ground states. We model the QD-QPC system as two capacitively-coupled Kondo impurities, and explore the zero-bias transport of both the QD and the QPC for different local gate voltages and coupling strengths, using the numerical renormalization group and variational methods. We find that the capacitive coupling produces a remote gating effect, non-monotonic in the gate voltages, which reduces the gate voltage window for Kondo screening in either impurity, and which can also drive a quantum phase transition out of the Kondo regime. Our study is carried out for intermediate coupling strengths, and as such is highly relevant to experiments; particularly, to recent studies of decoherence effects on QDs.

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