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Unification of electromagnetic noise and Luttinger liquid via quantum-dot resonant level KARYN LE HUR, MEI-RONG LI, Département de Physique, Université de Sherbrooke, Sherbrooke, Québec, Canada J1K 2R1 — We investigate the effect of dissipation on a small quantum dot (resonant level) tunnel-coupled to a chiral Luttinger liquid (LL) with the LL parameter K. The dissipation stems from the coupling of the dot to an electric environment, being characterized by the resistance R, via Coulomb interactions. We show that this problem can be mapped onto a Caldeira-Leggett model where the (ohmic) bath of harmonic oscillators is characterized by the effective dissipation strength $\alpha = (2\tilde{K})^{-1}$ with $\tilde{K}^{-1} = K^{-1} + 2R/R_K$ and $R_K = h/e^2$ the quantum of resistance. A quantum phase transition emerges at $\tilde{K} = 1/2$ and its consequences on the occupation of the level are addressed. The special limit $K = 1/2^+$ is thoroughly studied at small R/R_K via a link to the spin-boson-fermion model. Our result can be detected by measuring the occupation of the quantum dot or by carrying out resonant tunneling transport measurement.

Mei-Rong Li
Département de Physique, Université de Sherbrooke, Sherbrooke, Québec, Canada J1K 2R1

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