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The concept of effective temperature in current carrying quantum critical states STEFAN KIRCHNER, Max Planck Society, QIMIAO SI, Rice University — At a quantum critical point, a scale-invariant fluctuation spectrum implies the absence of intrinsic energy scales. The system is therefore readily driven out of equilibrium. The resulting non-linear response regime violates the fluctuation-dissipation theorem. We study the out-of equilibrium phenomena in a single electron transistor with ferromagnetic leads, which can be tuned through a quantum phase transition[1]. We consider the breakdown of the fluctuation-dissipation theorem and study the universal behavior of the fluctuation dissipation relation of various correlators in the quantum critical regime[2]. In particular, we explore the concept of effective temperature as a means to extend the fluctuation-dissipation theorem into the non-linear regime[3]. Such effective temperatures were introduced in the context of steady states in chaotic systems, and successfully used for non-stationary states in glassy systems. References: [1] S. Kirchner et al.,PNAS 102, 18824 (2005). [2] S. Kirchner and Q. Si, PRL 103, 206401 (2009). [3] S. Kirchner and Q. Si, arXiv:0909.3925 (2009).

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