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Quantum criticality out of equilibrium: Thermopower and shot noise in a ferromagnetic single electron transistor JEDEDIAH PIXLEY, STEFAN KIRCHNER, QIMIAO SI, Rice University — The low-energy properties of a single electron transistor attached to ferromagnetic leads are described by the Bose-Fermi Anderson model. This model can undergo a continuous T=0 dissipative phase transition and it was shown in [1] that the transistor can be tuned through this quantum phase transition. The out-of-equilibrium scaling properties near the quantum critical point and in the adjacent phases of the spin and charge response and their fluctuation-dissipation ratios were recently studied in [2]. In this contribution, we study the thermopower and shot noise, which probe the quantum criticality in a way that goes beyond the current-voltage characteristics. The thermoelectric properties of a quantum dot in the Kondo regime can be directly measured [3]. Bulk thermopower measurements of heavy fermion compounds near their quantum critical point provide valuable information about the Fermi surface [4] and are related to our work through the Extended Dynamical Mean Field Theory that maps the Kondo lattice onto a Bose-Fermi Kondo model augmented by a self-consistency condition. [1] S. Kirchner et al., PNAS 102, 18824 (2005). [2] S. Kirchner and Q. Si, arXiv:0805.3717 (2008). [3] R. Scheibner et al, PRL 95, 176602 (2005). [4] S. Hartmann et al, to be published (2008).

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