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Numerical renormalization group study of a dissipative quantum dot[1] M.T. GLOSSOP, K. INGERSENT, U. Florida — We study the quantum phase transition (QPT) induced by dissipation in a quantum dot device at the degeneracy point. We employ a Bose-Fermi numerical renormalization group approach [1] to study the simplest case of a spinless resonant-level model that couples the charge density on the dot to a dissipative bosonic bath with density of states $B(\omega) \propto \omega^s$. In anticipation of future experiments [2] and to assess further the validity of theoretical techniques in this rapidly developing area, we take the conduction-electron leads to have a pseudogap density of states: $\rho(\omega) \propto |\omega|^r$, as considered in a very recent perturbative renormalization group study [3]. We establish the conditions on r and s such that a QPT arises with increasing dissipation strength — from a delocalized phase, where resonant tunneling leads to large charge fluctuations on the dot, to a localized phase where such fluctuations are frozen. We present results for the single-particle spectrum and the response of the system to a local electric field, extracting critical exponents that depend in general on r and s and obey hyperscaling relations. We make full comparison with results of [3] where appropriate. Supported by NSF Grant DMR-0312939. [1] M. T. Glossop and K. Ingersent, PRL **95**, 067202 (2005); PRB (2006). [2] L. G. G. V. Dias da Silva, N. P. Sandler, K. Ingersent, and S. E. Ulloa, PRL **97**, 096603 (2006). [3] C.-H. Chung, M. Kirćan, L. Fritz, and M. Vojta (2006).

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