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Frustration of dissipation in a spin-boson model KEVIN INGERSENT, ALPER DURU, U. of Florida — The spin-boson model (SBM), in which a quantum two-level system couples via one component of its effective spin to a dissipative bosonic bath, has many realizations. There has been much recent interest in the SBM with a sub-Ohmic bath characterized by a power-law spectral exponent $0 < s < 1$, where at zero temperature a quantum critical point separates delocalized and localized phases. Numerical renormalization group calculations have called into question [1] the validity of the long-assumed mapping between the SBM and the classical Ising chain with interactions decaying with distance $|i - j|$ as $1/|i - j|^{1+s}$. Attention has also fallen on a variant of the SBM in which two components of the impurity spin couple to different bosonic baths. For Ohmic case ($s = 1$), competition between the baths has been shown to frustrate the dissipation and reduce the coupling of the impurity to the environment [2]. The present study addresses the SBM with two sub-Ohmic baths, where dissipative effects are intrinsically stronger than for $s = 1$. Numerical renormalization group methods are used to identify a continuous quantum phase transition in this model and to evaluate critical exponents characterizing the quantum-critical behavior in the vicinity of the transition. [1] M. Vojta et al., Phys. Rev. Lett. 94, 070604 (2005). [2] E. Novais et al., Phys. Rev. B 72, 014417 (2005). Supported by NSF Grant DMR-0710540.

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