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Quantum frustration and dissipation in the XY-anisotropic spin-boson model[1] MENGXING CHENG, Univeristy of Florida, KEVIN INGERSENT, University of Florida — Using a generalization of Wilson's numerical renormalization-group method, we study quantum frustration and dissipation in the XY-anisotropic spin-boson model in which a spin-1/2 magnetic impurity can tunnel between its two spin-z eigenstates and is also coupled via its x and y spin components to two bosonic baths. For the Ohmic case of baths described by a spectral exponent $s = 1$, we confirm the result, found previously [1] by mapping onto a pure-fermionic problem, that even very strong bath coupling is insufficient to localize the impurity. By contrast, in sub-Ohmic cases $0 < s < 1$, we find that the system exhibits a continuous quantum phase transition between a delocalized phase in which the impurity dynamics are dominated by the tunneling and a localized phase in which the dynamics are controlled by the coupling to the dissipative baths. Critical properties in the vicinity of the quantum phase transition will be presented.

[1] A. H. Castro-Neto et al., Phys. Rev. Lett. 91, 096401 (2003).

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