Abstract Submitted
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Non-adiabatic spin transition in the presence of phonon bottleneck effect[1] LEI CHEN, IRINEL CHIORESCU, Department of Physics and the National High Magnetic Field Laboratory, Florida State University — We present a study on deviations of the magnetization cycle of a two-level spin system from a reversible function into an opened hysteresis cycle due phonon bottleneck effect combined with Landau-Zener transitions. In the case of large zero-field level repulsion the magnetization curves can be described by a simple phonon-bottleneck model, in agreement with recent experiments on molecular magnets (V15 and Ru2 [1]). In the case of small tunneling gaps, as for large spin systems (Mn12 or Fe8), the spin will tunnel with a probability given by the Landau-Zener mechanism. The phonon-bottleneck model is here generalized into a model able to blend the non-adiabatic dynamics of spins with the presence of a non-equilibrium phonon bath [2]. Bloch equations are written in the eigenbasis of the effective spin Hamiltonian, assumed to be a two-level system at low temperatures, with a relaxation term driven by the phonon-bottleneck mechanism.
[1] L. Chen et al, Applied Phys. Lett. 89, 252502 (2006)
[2] L. Chen, I. Chiorescu, cond-mat/0810.2502

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