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Hidden zero-temperature bicritical point in the 2D anisotropic Heisenberg model: Monte Carlo simulations and novel finite-size scaling[1]
CHENGGANG ZHOU, Center for Nanophase Materials Science, Oak Ridge National Laboratory, DAVID LANDAU, Center for Simulational Physics, University of Georgia, THOMAS SCHULTHESS, Center for Nanophase Materials Science, Oak Ridge National Laboratory — The bicritical point in the phase diagram of the 2D anisotropic Heisenberg antiferromagnet in a field has not been fully resolved by Monte Carlo simulations. A recent study [Phys. Rev. B **72**, 064443 (2005)] showed an upper bound for the bicritical temperature. By performing quite detailed Monte Carlo simulations near the apparent spin-flop line, we found this system was governed by a single-spin Hamiltonian, which terminates the renormalization group flow of a finite-size 2D nonlinear σ model. Using a novel finite-size scaling analysis, we confirm that the bicritical point in two dimensions is Heisenberg-like and occurs at T=0. Thus, the uncertainty in the phase diagram is completely removed [Phys. Rev. B **74**, 064407 (2006)].

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