Nonequilibrium critical dynamics of low-dimensional frustrated magnets and multilayer structures

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A significant interest has been recently focused on non-equilibrium processes in magnetic low-dimensional materials. The reduction of the dimension of magnets is accompanied by an increase in fluctuations of the spin density and the manifestation of the effects of critical slowing down and "aging" in the non-equilibrium behavior of low dimensional magnetic systems [1]. Thin films and low-dimensional demonstrates the slow critical evolution from a nonequilibrium initial state. Aging, coarsening and memory effects are nontrivial features in the non-equilibrium behavior of such systems with slow dynamics [2].

The magnetic properties of multilayer magnetic systems have been widely investigated over the past years, since they widely used in magnetic storage devices [3]. The antiferromagnetic coupling was crucial for the discovery of the giant magnetoresistance (GMR). It kickstarted the field of nanomagnetism and spintronics [4]. The using synthetic antiferromagnets in magnetic random access memory (MRAM) [5] can reduce the critical current [6] and the time for switching [7].

Magnetic order in the multilayers is complex due to a strong influence of the shape and the magnetocrystalline anisotropies of the sample. Anisotropy effects leads to dimensionality crossover in Heisenberg films [8]. This study includes the Monte-Carlo simulation of the non-equilibrium critical evolution from different initial states of low-dimensional magnetics [9] and multilayers based on anysotropic Heisenberg films [10, 11, 12].

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