Out-of-equilibrium dynamics of the Heisenberg model with quenched random anisotropy disorder

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We have studied the out-of-equilibrium behavior of the Random Anisotropy Model (RAM), with Hamiltonian [1]

$$\mathcal{H} = -\sum_{\langle \mathbf{r},\mathbf{r}'\rangle} \mathbf{S_r}\cdot\mathbf{S_{r'}} - D\sum_{\mathbf{r}}(\hat{\mathbf{x}}_\mathbf{r}\cdot\mathbf{S_r})^\mathbf{2}\,, \qquad (1)$$

$\mathbf{S_r}$ being classical Heisenberg spins living in a three-dimensional lattice, D is the strength of the anisotropy and $\hat{\mathbf{x}}_\mathbf{r}$ are unit vectors pointing to the direction of the random (quenched) local anisotropy axis. In this work we will consider two probability distributions for the random anisotropy: 1) isotropic distribution and 2) uniformly distributed only on the six axes of the underlying cubic lattice.

Using the techniques of Refs. [2, 3] we have computed the critical exponents (η, z and ν) of this model for the two choices of the random anisotropy. To do that we have extensively run on GPUs. Finally, we compare our results [4] with those obtained in equilibrium numerical simulations [5].

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