Effects of the Quenched Disorder on the Relaxation and Steady State Dynamics of the Blume Capel Model

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The relaxation dynamics of the Blume-Capel model with a quenched diluted crystal field is formulated by a method combining the statistical equilibrium theory and the thermodynamics of irreversible processes [1]. We have found that the relaxation time of the order parameter diverges near the critical and multicritical points, which corresponds to the familiar critical slowing down. On the other hand, it displays has a jump discontinuity at the first order phase transition temperatures.

The steady state of the Blume Capel model with quenched random crystal field which is under the effect of a oscillating magnetic field is studied by two distinct methods: Firstly, we have extended our analysis devoloped for relaxation dynamics by utilizing the steady state solution of the kinetic equation in existence of sinusoidal magnetic field and temperature, frequency dependencies of the magnetic dispersion and absorption factors are investigated [2]. Secondly, the kinetics is modeled with a formalism of a master equation. The dynamical phase diagrams of the kinetic Blume Capel model with random diluted single-ion anisotropy under the presence of a time-varying external magnetic field calculated by mean field and effective-field theories [3,4]. It is observed that the inclusion of spin-spin correlations supress the first-order transiton lines and dynamical tricritical points for all values of the crystal field concentration.

References:

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