

Seminar: Configurational Temperature for Interacting Anisotropic Magnetic Particles

Monday, 14 July 2008

Last Updated Monday, 14 July 2008

Dear All

Our next speaker is Doctor David Laroze. Please see below a summary of his research work. The seminar will be as usual in the laboratory of Matter out of Equilibrium (FCFM downstairs) at 16:00 hrs next Tuesday.

Best regards, Enrique Cerda

Summary: We study both the dynamic and the thermodynamics equilibrium properties of the interacting anisotropic magnetic particles on a chain in the presence of an applied magnetic field, by means the Landau-Lifshitz equation. The interaction between magnetic particles is produced by exchange coupling in the first neighbors with periodic boundary conditions. We find that the total magnetization modulus can be a fluctuating function of time, since the system analyzed contains anisotropic terms. We calculate the analytical expression of the configurational temperature and approximation of it for large number of particles is obtained. The temperature presents an oscillatory behavior as a function of time, when the direction of the external field is different to the easy axes. Finally, using the temperature time average we calculate the energy and the magnetization along the external field as a function of temperature, so recovering the equilibrium thermodynamics results.

Figure Caption

Fig. 1: a) Spatio-temporal diagram of the z-component of the magnetization for an anisotropic Heisenberg chain. b) Time average of the total magnetization along the field as a function of the temperature time average for a anisotropic Heisenberg chain with constant and Gaussian anisotropy fields.

