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Séminaire SPEC

X.X. ZHANG

Hong Kong University of Science and Technology

Memory effect in magnetic nano-cluster systems

Attention : jour et heure inhabituels

We have studied the nano-cluster systems, such as Co-SiO₂ and FeAg with the low temperature magnetic measurements to observe the memory effect. It has been reported that in the nanoparticles systems (also in the non-continue multilayers) when the concentration of the particles is high, the dipole-dipole interactions become strong enough to lead to a low-temperature spin-glass phase, which was evidenced by observation of aging effect and memory effect, the characteristic properties of the spin-glasses. The nano-particles are oxide and nitride in the most of studies. Magnetic studies on the nano-particles indicated that some of the spin-glass-like phenomena observed could be due to the existence of spin-glass-like shells surrounding the ferrimagnetic cores. The core-shell structures of the nanoparticles have been demonstrated by the TEM observations. Therefore, a question remains to be answered is that the spin-glass phenomena observed in nanoparticles really originated from the dipole-dipole interactions. We want to use the magnetic nano-cluster systems to clarify this question.

Recently, a new experimental approach has been employed by Sun et al [1] observe the memory effect in the interacting nanoparticles. The steplike M(T) curves has been called as striking memory effect and associated to the hierarchical picture of the energy barriers by Sun et al. We have obtained same results in a non-interacting particle system using their approach. Here, we will present the detailed experimental, numerical results and the complete physical pictures to show the physical origins of the so-called striking memory effect.

References:

[1] Y. Sun, M.B. Salamon, K. Garnier, R.S. Averback, Phys. Rev. Lett. 2003, 91, 167206.

Orme des Merisiers
Salle Claude Itzykson, Bât. 774
Jeudi 15 juin 2006
14h30