Session 22bC

Fluctuation-Dissipation relation in a spin glass in the non-stationary regime. 22bC1

Didier Hérisson, Miguel Ocio

DSM, Service de Physique de l'Etat Condensé, CEA Saclay, 91191 Gif sur Yvette Cedex, France.

The non-stationary time autocorrelation function $C(t',t)$ and relaxation function $\sigma(t',t)$ of magnetization have ben measured in the insulating spin glass $CdCr_{1.7}In_{0.3}S_4$ at temperatures from $0.25T_g$ to $0.9T_g$. A special experimental setup equivalent to an absolute thermometer was used, allowing a *quantitative* comparison between both quantities. The plots of $\sigma(t',t)$ *vs* $C(t',t)$ show for short times a linear part with $1/T$ slope, as predicted for equilibrium by the fluctuation dissipation theorem, and a strong departure from this slope in the aging regime. These results are compared with the recent theoretical ones on weak ergodicity breaking systems, predicting a waiting-time independent $\sigma(C)$ function in the asymptotic limit of long waiting times. We can approach this condition by using the time scaling properties of σ and C. Universality of the $\sigma(C)$ curve still remains an open question.

Rational design of bulk magnets exhibiting two compensation temperatures and an inverted hysteresis loop 22bC2

Shin-ichi Ohkoshi, Toshiya Hozumi, Yukinori Abe, Kazuhito Hashimoto

Research Center for Advanced Science and Technology, The University of Tokyo, 4-6-1 Komaba, Meguro-ku, Tokyo 153-8904, Japan

We have prepared a magnet exhibiting two compensation temperatures with $(Ni^{II}_{0.22}Mn^{II}_{0.60}Fe^{II}_{0.18})_{1.5}$ $[Cr^{III}(CN)_6]\cdot 7.6H_2O$. The key to obtaining this unusual behavior is the simultaneous incorporation of one antiferromagnetic and two different ferromagnetic interactions through the use of four different spin sources. In addition, we have synthesized a bulk magnet exhibiting an inverted magnetic hysteresis loop, i.e., the magnetization becomes negative in the decreasing part even when the applied field is still positive while the magnetization becomes positive in the increasing part when the applied field is still negative, with the system of $Sm^{III}_{0.52}Gd^{III}_{0.48}[Cr^{III}(CN)_6]\cdot 4H_2O$.

22bC3 First order transition from antiferromagnetic SDW to superconductivity in Cr-Ru

Yauo Endoh[a], Ken'ichi Chatani[b]

[a]*Institute for Materials Research, Tohoku University, Katahira, Aoba-ku, Sendai 980-8577, Japan, CREST*
[b]*Department of Physics, Tohoku University, Aramaki Aza Aoba, Aoba-ku, Sendai 980-8578, Japan, CREST*

We present a clean evidence for the first time that the antiferromagnetic Spin Density Wave (SDW) is well separated from the superconducting phase from the systematic experiments from very homogeneous Cr-Ru alloys. We found that the phase boundary is of the first order upon varying the aloy concentration, x of $Cr_{1-x}Ru_x$ near the critical value of x = 0.17. The power law of the phase transition temperature of each order paramater was determined as the function of x indicates not to be the bicritical point.

22bC4 Non-Fermi liquid form of the low temperature resistivity in the ferromagnets YNi_3 and Ni_3Al

Markus J. Steiner, Fabien Beckers, Gilbert G. Lonzarich

LTP, Cavendish Laboratory, Madingley Road, Cambridge CB3 0HE, United Kingdom

We present high resolution measurements at ambient pressure on high purity crystals of YNi_3 and Ni_3Al in the temperature range from 50 mK to 7 K. Although both systems are well in their low moment ferromagnetic state there is no evidence for a T^2-temperature dependence of the resisitvity as would be expected from Fermi liquid theory. Instead we observe and anomalous temperature exponent of 1.5-1.6 all the way down into the millikelvin regime.
Because of the comparitively simple structure in particular of Ni_3Al and a nearly continuous magnetic ordering transition in both YNi_3 and Ni_3Al, the present measurements together with studies in an applied magnetic field will allow a quantitative comparison with the predictions of spin fluctuation theory.

22bC5 Dynamic Spin and Charge Responses near Neutral-Ionic Phase Transitions

Kenji Yonemitsu

Institute for Molecular Science and Graduate University for Advanced Studies, Okazaki 444-8585, Japan

Neutral-ionic phase transitions in mixed-stack organic charge-transfer complexes are basically transitions from a band insulator to a Mott insulator. Because of the spin-Peierls instability in the ionic phase, dimerization is induced by the site-off-diagonal electron-lattice coupling. Charge fluctuations are then enhanced near the phase boundary. We show the evolution of spin and charge dynamic response functions near the neutral-ionic transition in the one-dimensional extended Hubbard model with alternating potentials and transfer integrals. The finite-temperature density-matrix renormalization-group method is used. For a large transfer integral, dimerization appears even in the neutral phase. It increases the ionicity and lowers the spin excitation energies.