Hans-Ulrich Everts: Short Visit Ref. No. 1298

Purpose of the visit

The purpose of the meeting of Daniel Cabra, Andreas Honecker, Pierre Pujol, Franck Stauffer and myself was to finalize our common project on the ground state and thermodynamics of a highly frustrated spin model that appears in various physical contexts (trimerised kagomé antiferromagnet in a magnetic field, fermionic atoms in a trimerised kagomé lattice at 2/3 filling).

Description of the work carried out during the visit

We discussed the contributions of the individual members of the collaboration. We decided how much additional work needs to be done by the contributors, and a draft of the paper we plan to publish was devised. Additional Monte Carlo (MC) simulations were performed. In the simulations order-disorder phase transitions are found for both signs of the exchange constant J of the effective spin Hamiltonian that desribes our model. While for negative J the transition temperature is of the order of J, it is estimated to be of the order of $10^{-2}J$ for positive J.

Description of the main results obtained

The spin-wave analysis of our model Hamiltonian was completed. Exact results for the zero temperature limit of the specific heat are easily obtained for both cases, $J < 0$ and $J > 0$. The MC data agree nicely with the analytical prediction for $J < 0$, but deviate slightly from the predicted low-temperature limit for $J > 0$.

We have discussed the nature of the order-disorder transition for the case $J < 0$ and concluded that the MC data points towards a weakly first order transition in this case.

Projected publications/articles to result from your grant

A. Honecker has been invited to present our results on the conference ,,Highly Frustrated Magnetism 2006" (HFM2006) which takes place during August in Osaka, Japan. An article for the Proceedings of this conference will be submitted shortly. A longer article, which contains the main results of our collaboration, is in preparation and planned to be submitted to Phys. Rev. B.