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Title:

## **Ground state of frustrated spin-1/2 J1-J2 Heisenberg ferromagnets**

Motivated by recent experiments on quasi two-dimensional (2D) and quasi-one dimensional (1D) frustrated quantum magnets with ferromagnetic nearest-neighbor exchange coupling  $J_1$  and antiferromagnetic next-nearest-neighbor exchange coupling  $J_2$  we investigate the ground-state magnetic ordering of the corresponding J1-J2 spin-1/2 Heisenberg magnets. These systems exhibit a zero-temperature phase transition from the ferromagnetic ground state to a ground state with zero magnetization at a critical value of frustration  $J_{2_c}$ .

For the 2D model we use exact diagonalization (ED) and the coupled cluster method (CCM) [1] to investigate the magnetic order for  $J_2 > J_{2_c} \sim 0.4|J_1|$ . By contrast to previous results, see e.g. [2], we do not find indications for a magnetically disordered ground state for  $J_2 < J_{2_c} < 0.6|J_1|$ , rather our results are in favor of a stable collinear stripe ground-state magnetic long-range order for  $J_2 > 0.4|J_1|$  [1].

For the quasi-1D model, i.e. a system of coupled J1-J2 chains, we study the influence of an inter-chain exchange coupling on the ground state of the model.

The spiral correlations at zero field are studied by means of the CCM [3]. The DMRG and ED are used to discuss the fate of multi-magnon bound states in high magnetic fields if inter-chain coupling is taken into account [4].

We find that already a small antiferromagnetic inter-chain coupling may have a significant effect on the ground state in high magnetic fields.

[1] J. Richter, R. Darradi, J. Schulenburg, D. Farnell, and H. Rosner, arXiv:1002.2299 (Phys. Rev. B, in press).

[2] N. Shannon, T. Momoi, and P. Sindzingre, Phys. Rev. Lett. 96, 027213 (2006).

[3] R. Zinke, S.-L. Drechsler and J. Richter, Phys. Rev. B **79**, 094425 (2009).

[4] S. Nishimoto, S.-L. Drechsler, R.O.Kuzian, W.E.A.Lorenz, R. Klingeler, B. Büchner, and J. Richter, arXiv:1004.3300.