Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Magnon decay in gapped quantum spin systems ALEXEI KOLEZHUK[1], SUBIR SACHDEV, Harvard University, Department of Physics — In the O(3) σ-model description of gapped spin systems, $S = 1$ magnons can only decay into *three* lower energy magnons. We argue that the symmetry of the quantum spin Hamiltonian often allows decay into *two* magnons, and compute this decay rate in model systems. For a realistic model describing two-dimensional spin dimer material $(C_4H_{12}N_2)Cu_2Cl_6$ (known as PHCC), we compare our results for the momentum-dependent magnon linewidth with recent measurements by Stone *et al.* (e-print cond-mat/0511266) and extract new information on the exchange coupling pattern in this material. For $S = 1$ Haldane chains, we show that two-magnon decay is allowed in the full lattice description, even though it cannot be induced by any allowed term written in powers and gradients of the σ-model field. We present estimates for the behavior of the magnon linewidth in Haldane gap chains and discuss relation to the recent experimental work.

[1]Supported by the Heisenberg Fellowship of DFG; on leave from Institute of Magnetism, National Academy of Sciences of Ukraine.

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Date submitted: 28 Nov 2005 Electronic form version 1.4