Inelastic neutron scattering studies of the *trivial* dynamical magnetochirality in the quantum spin chains

J.E. Lorenzo, L.P. Regnault, C. Boullier

September 23, 2005

The observation of dynamical spin chirality has sparkled a flurry of studies in frustrated systems. These experiments, aiming at the observation of critical exponents related to a putative chirality universality class, have been conducted in the paramagnetic phase of antiferromagnets, although sufficiently close to T_N. However, the observation of *non-trivial* dynamical magnetochirality, as it is claimed, ought to be disentangled from the *trivial* one. Spin waves are odd-parity dynamical objects, characterized by both symmetric and antisymmetric spin-spin correlation functions. Although symmetric correlation functions ares currently measured in a regular inelastic neutron scattering experiment, little is known on the antisymmetric part, and thus on the *trivial* dynamical magnetochirality. In this paper we have carried out inelastic neutron scattering studies of the paramagnetic excitations in the chain sublattice of $Sr_{14}Cu_{24}O_{41}$ with polarization analysis where we evidence the presence of the *trivial* dynamical magnetochirality. The interest of this compound is that the excitations are very well defined at low temperatures, the ground state remains spin-singlet all the way down to the lowest temperature and no intrinsic chirality (space group is centrosymmetric) has been reported. Moreover correlation functions are just text book calculations. Finally, in view of the similitude of our experiments and results, as compared to those carried out in frustrated systems, we suggest that previous conclusions on dynamical spin chirality should be revisited.