Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Structural distortions in the spin-gap regime of the quantum antiferromagnet SrCu2(BO3)2 CARLO VECCHINI, IESL-FORTH,71110, Heraklion, Greece, LAURENT CHAPON, ISIS Facility, STFC-RAL, Didcot,OX110QX, UK , HIROSHI KAGEYAMA, Chemistry Department, Kyoto University, Kyoto,606-8502, Japan, OTHON ADAMOPOULOS, ALEXANDROS LAPPAS, IESL-FORTH,71110, Heraklion, Greece — Since the so-called pseudo spin-gap was suggested to be relevant for the appearance of high-Tc superconductivity, a number of studies have been made on low-dimensional quantum spin systems with a singlet ground state. SrCu2(BO3)2 is an example of a 2D frustrated magnet in which a rectangular network of spin-1/2 Cu dimers displays a spin-gap (T<20K). Spin anisotropies are needed to describe accurately the dynamics of this 2D orthogonal dimer model. Accurate knowledge of the lattice symmetry is necessary to rationalize the ground state properties. This is the first detailed crystallographic study within the gap region. Our powder neutron diffraction reveals distortions of the tetragonal structure that uncover an intimate spin-lattice coupling. The interdimer Cu-O-Cu angles increase abruptly by 0.4 deg, consistent with strengthening of the superexchange interaction. This is accompanied by a sharp reduction of the static buckling within the CuO2 planes and a contraction of the interlayer distances. We discuss the role of the structural deformations and the symmetry rules imposed for the development of the Dzyaloshinsky-Moriya exchange.

Carlo Vecchini
IESL-FORTH,71110, Heraklion, Greece

Date submitted: 19 Dec 2007 Electronic form version 1.4