



Contribution ID: 79

Type: Poster

## THE STUDY OF LATTICE DYNAMICS IN LOW-DIMENSIONAL QUANTUM MAGNETS WITH CHAIN-LIKE CRYSTAL STRUCTURE

*Wednesday 9 September 2020 16:20 (30 minutes)*

Current work is focused on the lattice subsystem of  $\text{Cu(en)Cl}_2$ ,  $\text{Cu(tn)Cl}_2$  and  $\text{Cu(en)(H}_2\text{O)}_2\text{SO}_4$  ( $\text{en} = \text{C}_2\text{H}_8\text{N}_2$ ,  $\text{tn} = \text{C}_3\text{H}_{10}\text{N}_2$ ), quasi-two-dimensional quantum magnets with one-dimensional polymeric structure. Magnetic layers were described within spin = 1/2 Heisenberg models on the rectangular and zig-zag-square lattice with nearest-neighbor couplings  $J_1 > J_2$ . The largest spatial anisotropy  $R = 1 - J_2 / J_1$  and the strongest effect of interlayer coupling  $J'$  was observed in  $\text{Cu(en)Cl}_2$ , while somewhat lower  $R$  and much weaker  $J'$  in  $\text{Cu(tn)Cl}_2$  and  $\text{Cu(en)(H}_2\text{O)}_2\text{SO}_4$ .

Specific heat in zero magnetic field was measured from 2 to 300 K and Raman spectra at 300 K. In  $\text{Cu(en)Cl}_2$  and  $\text{Cu(tn)Cl}_2$ , specific heat anomalies observed at 138 K and 160 K, respectively, are associated with a structural phase transition. No structural phase transition was observed in  $\text{Cu(en)(H}_2\text{O)}_2\text{SO}_4$ . The contribution of acoustic modes is described within Debye approximation with Debye temperatures  $\Theta_D = 147$  K, 109 K and 93 K for  $\text{Cu(en)(H}_2\text{O)}_2\text{SO}_4$ ,  $\text{Cu(en)Cl}_2$  and  $\text{Cu(tn)Cl}_2$ , respectively. The larger  $\Theta_D$  value of  $\text{Cu(en)Cl}_2$  and the Raman shift towards higher energies correspond well with the  $\text{Cu(en)Cl}_2$  specific heat values which are lower than those of  $\text{Cu(tn)Cl}_2$  in the whole temperature region. The influence of acoustic modes on the magnetic correlations is discussed.

**Presenter:** VINNIK O. (Institute of Physics, P. J. Šafárik University, Košice)

**Session Classification:** Poster session