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Magnetic excitations of the spin dimer system PHCC under pressure as seen by Raman scattering[1] SIMON BETTLER, GEDIMINAS SIMUTIS, GERARD PERREN, Neutron Scattering and Magnetism Group, DAN HUVONEN, National Institute of Chemical Physics and Biophysics, SEVERIAN GVASALIYA, ANDREY ZHELUDEV, Neutron Scattering and Magnetism Group
— The model spin-1/2 dimer system $(C_4H_{12}N_2)Cu_2Cl_6$ (aka PHCC) has recently been shown to undergo a phase transition to a magnetically ordered state upon applying hydrostatic pressure in both muon spin rotation(μ^+SR) and inelastic neutron scattering(INS) experiments. In the μ^+SR experiments a second phase transition from incommensurate to commensurate order was detected at 14 kbar. By contrast, the INS experiments found hardly any difference in the spin dynamics at 9 kbar and 18 kbar. To resolve this discrepancy, we performed Raman scattering experiments on single crystals to study the pressure-dependence of both magnetic and lattice excitations from ambient pressure up to 18 kbar. The three regimes found in μ^+SR could be reproduced. Each regime could be associated with a characteristic peak shape of the magnetic scattering. Increasing pressure leads to a shifting of the magnetic excitations to lower energies up to a pressure of 15 kbar, where the magnetic peak mode reaches a minimum. Increasing pressure further leads to the magnetic excitations' energy increasing again. Moreover, no indication of a structural phase transition could be found. We conclude that the evolution of spin dynamics in the ordered phase is far more intriguing than expected from INS.

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Simon Bettler
Neutron Scattering and Magnetism Group

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