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Magnetic excitations in the Ising-chain material RbCoCl3

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One of the simplest realizations of a quantum phase transition is the Ising model in a transverse magnetic field. The Co2+ ion is a good resource for anisotropic spins with Ising or XY interactions. Several families of cobalt halides and oxides have been classified as approximate realizations of the Ising chain model. The hexagonal perovskite family ACoX3 with A = Rb, Cs, Tl and X = Br, Cl is one class of potential Ising materials [1, 2, 3].
The material RbCoCl3 has been studied to a lesser extent. In RbCoCl3 the Co2+ ions have effective spin-½. Neutron powder diffraction data show that the ordered magnetic moments are aligned antiferromagnetically up-down the crystallographic c-axis with an amplitude modulation in the ab-plane. Two antiferromagnetic phase transitions at TN1 = 28 K and TN2 = 13 K were observed [4].
On the new thermal TAS EIGER at SINQ, the spectrometer IN22 at ILL and the LET ToFspectrometer at ISIS Ising-domain wall excitations were measured. These excitations show a cosinusoidal dispersion and sharpening and splitting at the successive magnetic transitions at TN1 and TN2. In the experiment on we observed how the excitations change with temperature. We were also able to observe the splitting of the modes in a very successful commissioning experiment on EIGER at PSI. We will present results and preliminary analysis of the LET, IN22 and EIGER data.

References

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