Spin Dynamics in the Organic Quantum Magnet $(C_5H_{12}N)_2CuBr_4$

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The spin dynamics in the magnetic field versus temperature phase diagram of gapped quantum magnets, like Haldane-, ladder- and dimer-spin systems, has recently attracted considerable interest due to the presence of several novel quantum phases. Our search for a new model compound, where the complete phase diagram is accessible by neutron scattering experiments, has been successful. The potential organic ladder material $(C_5H_{12}N)_2CuBr_4$ has recently been grown in single crystalline form with sample masses (deuterated) suitable for such investigations. Its intrinsic energy scale with $H_{c1} = 6.6$ T and $H_{c2} = 13.5$ T, as determined from our inelastic neutron scattering experiments and magnetisation measurements, allows addressing for the first time the generic phase diagram of such a model spin system up to saturation. The system has therefore the highest potential for parametric studies. The spin dynamics in zero-field, including the determination of the spin Hamiltonian, its field-dependence, and the phase diagram for the region between H_{c1} and H_{c2} will be presented and compared to recent predictions from theory.