Frustrated Antiferromagnetic Quantum Chain Systems

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Antiferromagnetic (afm) S=1/2 Heisenberg chain systems with uniform nearest-neighbour exchange coupling are best understood. The ground state and the excitation spectrum are well known and the experimental observations are in good agreement with theory. Additional next-nearest neighbour exchange along the chains which can be described by the Majumdar-Ghosh Hamiltonian $H = J_{nn} \sum_i (S_i S_{i+1} + \alpha S_i S_{i+2})$ with α=J_{nnn}/J_{nn} gives rise to a more complex behaviour, since next-nearest neighbour interaction may lead to magnetic frustration. I review the magnetic properties of the afm S=1/2 Cu^{2+} chain systems $LiCuVO_4$ and CuX_2 (X=Cl, Br) for which afm *incommensurate* long-range ordering has been observed by neutron diffraction at low temperatures. The appearance of incommensurate ordering is ascribed to competing *nn* and *nnn* exchange interaction which is also evidenced in the bulk magnetic properties.