TRR 80 Sonderseminar

Am Donnerstag, den 11. Dezember um 13:30 Uhr

spricht

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über das Thema

Neutron Scattering Investigation of Quantum Magnetism and Quantum Phase Transitions in the Quasi-1D Antiferromagnets $SrM_2V_2O_8$

Quantum magnets, a special class of magnetic materials in which the properties are dominated by quantum mechanical effects, exhibit novel, highly nontrivial phases of matter. They are also of immense significance for the advance of technology and are expected to play a major role in the future information technology such as, quantum communication, quantum computing *etc*. Among them, the quasi-1D antiferromagnets are of special interest for both theoretical and experimental understandings. Contrary to conventional magnets (3D magnets), the possibility of magnetic long-range order in 1D magnets is significantly restricted because of strong fluctuations in the order parameter, resulting into novel magnetic states. Furthermore, the magnetic properties are strongly dependent on their spin values [1]. They are also very susceptible to internal (interchain couplings and anisotropy) and external perturbations (temperature, magnetic field and pressure), which often lead to quantum phase transitions [2,3]. In these quests, neutron scattering has proven to be an indispensable tool, as it provides direct access to spatial and temporal correlation functions.

In my talk I shall present the most recent results of neutron scattering as well as magnetothermodynamic studies of two isostructural quasi-1D antiferromagnetic (AFM) model compounds Sr*M*2V2O8 (*M* = Ni, Co) with spin =1 (Ni2+) and spin = ½ (Co2+) [4-7]. The spin-1 compound SrNi2V2O8 shows an emergent '*spin-liquid*' ground state where zeropoint quantum spin fluctuations destroy long-range order. Application of external perturbation such as magnetic field results quantum phase transition to magnetic ordered states. In contrast, the Ising spin-1/2 chain compound SrCo2V2O8 has a long-range AFM ordered ground state below 5 K which is suppressed under magnetic field and emerges into quantum '*Luttinger spin-liquid*' state. Moreover, at very low temperatures (below ~ 1 K), novel ordered magnetic states are stabilized in the '*Luttinger spin-liquid*' regime by finite interchain interactions resulting in to a series of QPTs under longitudinal magnetic field (*H*//*c*); first from the zero-field commensurate AFM state to a novel incommensurate '*longitudinal spin density wave*' state at ~ 3.7 T, and then to a second quantum-magnetic state at ~ 7 T. Both compounds reveal rich phase diagrams in the *H*-*T* plane with their own characteristics. The presence of the sizable interchain interactions and anisotropies in these compounds lead to complex behaviors and rich phase diagrams.

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[5] A. K. Bera, B. Lake, A. T. M. N. Islam, B. Klemke, E. Faulhaber, and J. M. Law, Phys. Rev. B 87, 224423 (2013).
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Gäste sind herzlich willkommen.
Der Vortrag findet im Seminarraum S-403 / Institut für Physik, Universität Augsburg statt.

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