

SFB 608

Einladung zum Kolloquium

- Ort:** Universität zu Köln
II. Physikalisches Institut, Seminarraum 201
- Zeit:** Mittwoch, den 26. November 2002, 15 Uhr c.t.
- Sprecher:** Dr. B. Normand
Université de Fribourg, Suisse
- Thema:** Field- and pressure-induced magnetic quantum phase transitions in TlCuCl_3

Thallium copper chloride is a quantum spin liquid of $S = 1/2$ Cu^{2+} dimers. Interdimer super exchange interactions give a three-dimensional magnon dispersion and a spin gap significantly smaller than the dimer coupling. This gap is closed by an applied hydrostatic pressure of approximately 2.5kbar or by a magnetic field of 5.6T, offering a unique opportunity to explore the both types of quantum phase transition and their associated critical phenomena. We use a bond-operator formulation to obtain a continuous description of all disordered and ordered phases, and thus of the transitions separating these. Both pressure- and field-induced transitions may be considered as the Bose-Einstein condensation of triplet magnon excitations, and the respective phases of staggered magnetic order as linear combinations of dimer singlet and triplet modes. We focus on the evolution with applied pressure and field of the magnetic excitations in each phase, and in particular on the gapless (Goldstone) modes in the ordered regimes which correspond to phase fluctuations of the ordered moment. The bond-operator description yields a good account of the magnetization curves and of magnon dispersion relations observed by inelastic neutron scattering under applied fields, and a variety of experimental predictions for pressure-dependent measurements.

Gez. Priv. Doz. G. Uhrig