Sonderseminar TRR 80

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um 14:15 Uhr

spricht

Dr. Matthias Frontzek

Paul Scherrer Institut
Laboratory for Neutron Scattering

im Seminarraum 2224 im Physik-Department

über das Thema

" The multiferroic, geometric frustrated CuCrO2 compound: interlayer exchange and domain formation"

Multiferroic materials have become of interest for their unusual low-temperature properties in general and in particular for the observation that their magnetic structure can be modified through an electric field and their electric polarization can be adjusted through a magnetic field. The most promising candidates for a controllable multiferroic have been found among the materials with inherent geometric magnetic frustration.

Among these, the delafossite $CuCrO_2$, which crystallizes in the rhombohedral *R*-3*m* space group, is a multiferroic compound with an apparent strong coupling of spin and charge. In contrast to other multiferroic compounds $CuCrO_2$ shows a spontaneous electric polarization upon antiferromagnetic ordering without an accompanying structural phase transition. The spin-charge coupling in the delafossites has been discussed within the frame of the *p-d* hybridization model, first introduced by Taka-hisa Arima. However, so far only the multiferroic delafossites are known examples for this spin-charge coupling mechanism and its properties are therefore still to be fully characterized.

In my contribution, I'll present a detailed study on $CuCrO_2$ single crystals using neutron diffraction and spectroscopy as well as electric polarization measurements up to 60 T in pulsed magnetic fields. Based on our studies, I will show a revised magnetic structure model and present a model Hamiltonian including in-plane next-next nearest neighbor and inter-layer exchange interaction. I will stress the importance of the latter for the multiferroic properties and briefly discuss it alone breaks inversion symmetry. Furthermore, neutron diffraction in applied electric fields helped us to clarify the domain distribution in the field cooled state which necessitates a re-interpretation of macroscopic measurements.