TRR 80 Seminar

Am Dienstag, den 18. November um 16:00 Uhr

spricht

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über das Thema

Multiferroic Properties of Cobalt Based Oxides with Layered Crystal Structure

Magnetoelectric multiferroic materials have attracted both experimental and theoretical interest from the point of view of fundamental science as well as for the possible applications of their giant magnetoelectric effects. In these materials, strong coupling or cross correlation between magnetism and dielectricity is often realized through a magnetically induced electric polarization, which is well explained by several microscopic mechanisms. The generally accepted model is the spin current mechanism. In materials with a cycloidal spin structure, electric polarization is induced by this spin current mechanism. Another origin of magnetically induced ferroelectricity is the exchange striction mechanism. In materials with multiple inequivalent magnetic sites, even a collinear spin structure may induce ferroelectricity via magnetostriction caused by the symmetric exchange interaction. Recently, a third mechanism of magnetically induced electric polarization has been proposed, namely, transition metal-ligand (*p-d*) hybridization, dependent upon the spin direction. The magnetoelectric properties of the present compound $Sr_2CoSi_2O_7$ shown in Figure is thought to be caused by this *p-d* hybridization mechanism.

In my talk, I will present the magnetic and dielectric properties of åkermanite $Sr_2CoSi_2O_7$, $Ca_2CoSi_2O_7$ and related $CaBaCo_4O_7$ single crystals in high magnetic fields. We have found that azimuthal angle φ dependence of the electric polarization along the *c* axis of $Sr_2CoSi_2O_7$ in a fixed field of 25T is proportional to $\sin 2\varphi$, which is well explained by the *p-d* hybridization mechanism. Furthermore, magnetic-field-induced electric polarization was observed even in a paramagnetic state without magnetic order, which can be regarded as the magnetoelectric effect of the second order form the symmetry point of view. In addition, a low magnetic field-driven electric polarization flip induced by a rotating field, even at room temperature, has been demonstrated.

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Gäste sind herzlich willkommen!
Der Vortrag findet im Seminarraum S-288/Physik-Süd, Universität Augsburg statt.
Gastgeber: Prof. Dr. Alois Loidl