MAR14-2013-000865

Abstract for an Invited Paper
for the MAR14 Meeting of
the American Physical Society

Electronic nematicity and its relation to magnetism in $EuFe_2As_2$ based superconductors

PHILIPP GEGENWART, I. Physikalisches Institut, Georg-August-University of Goettingen

The interplay of electronic, magnetic and structural degrees of freedom leads to the competition of various phases in iron pnictude superconductors. We have recently established the thermoelectric power under uniaxial pressure as sensitive novel probe of electronic nematicity in these materials, which is able to distinguish the influence of anisotropic magnetic fluctuations and orbital polarization [1]. We focus our attention on $EuFe_2As_2$ based systems, where the presence of local 4f moments leads to intriguing behavior: their magnetic ordering below 20 K, mediated by RKKY interaction, sensitively depends on the electronic structure, which can be tuned by chemical or hydrostatic pressure [2,3]. Such tuning results in different magnetic phases which coexist or compete with superconductivity [4]. Application of magnetic field below 20 K, acts differently along the orthorhombic a and b axis before the polarization of 4f moments is reached at 1.5 T. A giant magnetostriction of order 10^{-3} is found, related to field induced de-twinning, which (partially) remains up to 200 K. Application of this effect to the study of the in-plane anisotropy in various properties is demonstrated. Work in collaboration with H.S. Jeevan, Y. Tokiwa, J. Maiwald, N. Bach, C. Stingl, S. Jiang, S. Zapf and M. Dressel.

[1] S. Jiang, H.S. Jeevan, J. Dong, P. Gegenwart, Phys. Rev. Lett. 110, 067001 (2013).
[2] H.S. Jeevan, D. Kasinathan, H. Rosner, P. Gegenwart. Phys. Rev. B 83, 054511 (2011).
[3] Y. Tokiwa, H.-S. Hübner, O. Beck, H.S. Jeevan, P. Gegenwart, Phys. Rev. B 86, 220505(R) (2012).
[4] S. Zapf, H.S. Jeevan, T. Ivek, F. Pfister, F. Klingert, S. Jiang, D. Wu, P. Gegenwart, R.K. Kremer, M. Dressel, Phys. Rev. Lett. 110, 237002 (2013).