TT 23: Superconductivity: Fe-based Superconductors - 1111

Time: Monday 16:45–17:45 Location: H21

TT 23.1 Mon 16:45 H21

Anisotropy of normal state and superconducting properties of oxypnictides — •Silvia Haindl[1], Martin Kidszun[1], Alexander Kauffmann[1], Nadja Kozlova[1], Kazumasa Iida[1], Thomas Thersleff[1,2], Takahiko Kawaguchi[3], Hiroshi Ikuta[3], Erik Kampert[4], Jochen Wosnitza[4], Oleksii Vakaliuk[1], Nadezda Panarina[1], Christian Hess[1], and Bernd Büchner[1] — [1]IFW Dresden, P.O.Box 270116, 01171 Dresden, Germany — [2]The Ångström Laboratory, Department of Engineering Sciences, Division of Applied Materials Science, Uppsala University, 752 37 Uppsala, Sweden — [3]Department of Crystalline Materials Science, Nagoya University, Nagoya 464-8603, Japan — [4]Hochfeld-Magnetlabor Dresden (HLD), Helmholtz-Zentrum Dresden-Rossendorf, D-01314 Dresden, Germany

The very large upper critical fields of the oxypnictides complicate the experimental determination of their anisotropy, γ_{Hc2}, especially at low temperatures. In Kidszun et al., PRL 106, 137001 (2011), we have applied the anisotropic Ginzburg-Landau scaling on angular-dependent critical-current densities measured for an epitaxially grown $La(O_{1-x}F_x)FeAs$ thin film (see review by Haindl et al., Int. J. Mod. Phys. B). The obtained scaling parameter matches γ_{Hc2} as can be demonstrated by recent magnetotransport measurements in pulsed magnetic fields up to 70 T and down to 2 K. Using the method of critical current scaling H_{c2}^{ab} for $Nd(O_{1-x}F_x)FeAs$ is extrapolated. In addition we discuss normal state electrical transport properties of $La(O_{1-x}F_x)FeAs$ and $Nd(O_{1-x}F_x)FeAs$ thin films.

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TT 23.2 Mon 17:00 H21

Phase diagram of F- and Co-doped CeFeAsO — •Oleksii Vakaliuk, Sabine Wurmehl, Christine Malbrich, Eva Brüning, Hans-Joachim Grafe, Christian Hess, and Bernd Büchner — Leibniz Institute for Solid State and Materials Research Dresden, Helmholtzstr. 20, 01069 Dresden Germany

We carried out an experimental systematic electronic resistivity investigation of CeFeAsO system in a wide Co-doping range (0 - 0.12) and compare it to F-doped (0 - 0.10) CeFeAsO. The resistivity of the pristine compound: i) exhibits a pronounced peak at approximately 150 K, followed by a steep decrease and ii) an inflection point which are clear signatures of the tetragonal to orthorhombic structural transition, and the antiferromagnetic spin density wave transition, respectively. iii) At low temperature the resistivity shows a kink-like anomaly due to ordering of Ce magnetic moments. Upon doping these anomalies shifts to lower temperature, and become suppressed and broadened. From these observations we construct the magnetic/superconducting phase diagrams for both compounds. Furthermore, NMR/NQR studies reveal a new type of microscopic order in the underdoped normal state regime.

TT 23.3 Mon 17:15 H21

Spin Fluctuations in Iron Based Superconducters Probed by NMR Relaxation Rate — •Uwe Gräfe[1], Franziska Hammerath[1,2], Tim Kühne[1], Sabine Wurmehl[1], Guillaume Lang[3], Bernd Büchner[1], and Hans-Joachim Grafe[1] — [1]IFW Dresden, Institute for Solid State Research, PF 270116, 01171 Dresden, Germany — [2]Department of Physics "A. Volta", University of Pavia-CNISM, I-27100 Pavia, Italy — [3]3LPEM-UPR5, CNRS, ESPCI Paris Tech, 10 Rue Vauquelin, 75005 Paris, France

We present ^{75}As nuclear magnetic resonance (NMR) results in F doped LaOFeAs iron pnictides. In the underdoped superconducting samples, pronounced spin fluctuations lead to a peak in the NMR spin lattice relaxation rate, $(T_1T)^{-1}$. The peak shows a typical field dependence that indicates a critical slowing of spin fluctuations: it is reduced in height and shifted to higher temperatures. In contrast, a similar peak in the underdoped magnetic samples at the ordering temperature of the spin density wave does not show such a field dependence. Furthermore, the peak is absent in optimally and overdoped samples, suggesting the absence of strong spin fluctuations. Our results indicate a glassy magnetic ordering in the underdoped samples that is in contrast to the often reported Curie Weiss like increase of spin fluctuations towards T_c. Additional measurements of the linewidth and the spin spin relaxation rate are in agreement with such a glassy magnetic ordering that is most likely competing with superconductivity. Our results will be compared to Co doped $BaFe_2As_2$, where a similar peak in $(T_1T)^{-1}$ has been observed [Ning, JPSJ 2009].

TT 23.4 Mon 17:30 H21

Carrier doping by current injection into LaOFFeAs — •Irina Lazareva[1], Yury Koval[1], Christian Steiner[1], Sabine Wurmehl[2], Bernd Büchner[2], Tobias Stürzer[3], Dirk Johrendt[3], and Paul Müller[1] — [1]Department of Physics, Universität Erlangen, Detschland — [2]IFW Dresden, Deutschland — [3]Department Chemie, LMU München, Detschland

Recently, we were able to change the carrier concentration of hole-doped high-T_c superconductors by injection of large currents along the c-axis. We extend this type of experiments to electron-doped pnictides. From our earlier interpretation we should expect that trapping of electrons caused by current injection would decrease the available carrier concentration. Indeed, by various experiments with superconductors from the $LaO_{1-x}F_xFeAs$ family we are able to show that trapped electrons caused by current injection perpendicular to the FeAs planes decrease the carrier concentration. We present a spectacular confirmation of this interpretation by the T_c increase by more than 15 K in heavily overdoped $La_{O.74}F_{0.26}FeAs$. We performed similar experiments with the recently discovered 1048 layered pnictides of the composition $Ca_{10}(FeAs)_{10}(Pt_4As_8)$ [1]. The general tendency of carrier doping by trapped electrons was confirmed. A rather interesting discovery was the evolution of hysteretic c-axis IV-characteristics. This is a strong indication of intrinsic Josephson effects. We discuss these results in terms of a change of anisotropy by carrier doping.

[1] T. Stürzer, G. Derondeau, D. Johrendt, Phys. Rev. B 86, 060516(R) (2012).