



TRR 80 Sonderseminar

Am Dienstag, den 11. März um 10:30 Uhr

spricht

Prof. Dr. Neven Barišić

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über das Thema

High temperature superconductivity: correlation effects and itinerant particles

Understanding the nature of quasiparticles in the presence of strong correlations is one of the most challenging topics in physics. In the case of high-temperature superconductors it is considered that the description of their physical properties is related to the interaction of itinerant quasiparticles with localized degrees of freedom (charge and magnetic). Contrary to conventional wisdom, we find that the in-plane resistivity in the pseudogap phase(1) of the model cuprate $\text{HgBa}_2\text{CuO}_{4+\delta}$ (2,3) exhibits a quadratic temperature dependence of the resistivity ($\rho \propto T^2$), the same behavior that is seen in conventional Fermi liquids (4). Furthermore, for a large variety of cuprate superconductors, a universal sheet resistance was found throughout the temperature-doping phase diagram (4). The quadratic frequency dependence and the temperature-frequency scaling of the optical conductivity confirm the correlated Fermi liquid nature of the itinerant carriers (5). We arrive at the unexpected conclusion that, even close to the Mott-insulating state at zero doping, the high temperature cuprate superconductors behave like Fermi liquids. Similar conclusions will be drawn for optimally-doped 122-iron pnictide superconductors. Current theoretical models can now be benchmarked against these universal results.

1. Y. Li, V. Baledént, N. Barišić, Y. Cho, B. Fauque, Y. Sidis, G. Yu, X. Zhao, P. Bourges, M. Greven. Nature 455, 372 (2008).
2. N. Barišić, Y. Li, X. Zhao, Y. Cho, G. Chabot-Couture, G. Yu, M. Greven. Phys. Rev. B 78, 054518 (2008).
3. N. Barišić, S. Badoux, M. K. Chan, C. Dorow, W. Tabis, B. Vignolle, G. Yu, J. Béard, X. Zhao, C. Proust, and Martin Greven. Nature Physics 9, 761 (2013).
4. N. Barišić, Y. Li, G. Yu, X. Zhao, M. Dressel, A. Smontara, M. Greven. Proc. Natl. Acad. Sci. 110, 12235 (2013).
5. S. I. Mirzaei, D. Stricker, J. N. Hancock, C. Berthod, A. Georges, E. van Heumen, M. K. Chan, X. Zhao, Y. Li, M. Greven, N. Barišić, D. van der Marel. Proc. Natl. Acad. Sci. 110, 5774 (2013).

Gäste sind herzlich willkommen.

Der Vortrag findet im Seminarraum S-288 / Institut für Physik, Universität Augsburg statt.

Gastgeber: Dr. Joachim Deisenhofer
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