Spin dynamics of YBa$_2$Cu$_3$O$_{6+x}$
BERNHARD KEIMER, Max-Planck-Institute for Solid State Research

We have used inelastic neutron scattering to determine the spin dynamics in untwinned single crystals of YBa$_2$Cu$_3$O$_{6+x}$ over a wide range of doping levels [1], with particular attention on its in-plane anisotropy [2]. Among other observations, we have found that the spin dynamics in the superconducting and pseudogap states are qualitatively different. The results allow incisive tests of current theories; including in particular theories based on static and fluctuating spin-charge stripes. We will also present initial results of an effort to provide a quantitative description of both the spin dynamics and the charge dynamics (determined by infrared and angle-resolved photoemission spectroscopies [3]) in the same YBa$_2$Cu$_3$O$_{6+x}$ single crystals. [1] S. Pailhes et al., Phys. Rev. Lett. 93, 167001 (2004); Phys. Rev. Lett. 96, 257001 (2006).