Recent results on the electronic structure of high-T_c superconductors from angle-resolved photoemission

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Using angular-resolved photoemission (ARPES) in the traditional way as a band mapping method the Fermi surface and the bilayer splitting could be determined in the high-T_c superconductor $Bi_2Sr_2CaCu_2O_{8+\delta}$ as function of the hole concentration. Thus the parameters like the intra- and interplane hopping parameters, which determine the independent particle bandstructure, could be derived. On the other hand, modern high-resolution ARPES is able to provide further important information on the electronic structure of high-T_c superconductors, such as the renormalized effective mass and the scattering rates of the charge carriers. Both quantities which determine the self-energy function and thus the deviation from an independent particle model have been found to be strongly dependent on the hole concentration, the temperature, and the location of the Fermi surface. In underoped samples for $T < T_c$ near $(\pi, 0)$ a huge renormalization of the mass of the charge carriers has been detected while above T_c both along (π, π) and particularly near $(\pi, 0)$ in over- and underdoped samples the renormalization is considerably weaker. The results are discussed in terms of an interaction of the charge carriers with bosonic excitations (phonons or spin fluctuations) or electronic degrees of freedom. Finally we present unsuccessful attempts to detect a hidden order with time-reversal symmetry breaking in the pseudogap region using ARPES with circularly polarized photons.