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Angle resolved photoemission studies of colossal magnetoresistive bilayer manganites NORMAN MANNELLA, WANLI YANG, KIYOHISA TANAKA, XINGJIANG ZHOU, JENNIFER ZHENG, JOHN MITCHELL, JAN ZAANEN, TOM DEVEREAUX, NAOTO NAGAOSA, ZAHID HUSSAIN, ZHI-XUN SHEN, Lawrence Berkeley National Laboratory — In this talk, we will discuss the results of some recent angle-resolved photoemission spectroscopy (ARPES) investigations in the colossal magnetoresistive (CMR) bilayer compound $La_{1.2}Sr_{1.8}Mn_2O_7$ (LSMO, x = 0.4) [1]. The temperature dependent evolution of the quasiparticle excitations in LSMO has been found to track remarkably well the DC conductivity, thus accounting for the macroscopic transport properties and the metal to insulator transition. Our results indicate that the microscopic mechanism leading to the MIT and the CMR effect in manganites is intrinsically a quantum effect linked to a crossover via the nodal QP collapse from a coherent polaronic conductor in the FM state below T_C to a hopping regime with thermally activated single polarons in the paramagnetic state above T_C. The role of the exchange interaction is crucial in controlling the competition between coherence and localization effects. [1] N. Mannella et al., Nature 438, 474 (2005)

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