

Pseudogap Suppression by Competition with Superconductivity in La-Based Cuprates

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We have carried out a comprehensive high resolution angle-resolved photoemission spectroscopy (ARPES) study of the pseudogap interplay with superconductivity in La-based cuprates. The three systems $\text{La}_{2-x}\text{Sr}_x\text{CuO}_4$, $\text{La}_{1.6-x}\text{Nd}_{0.4}\text{Sr}_x\text{CuO}_4$ and $\text{La}_{1.8-x}\text{Eu}_{0.2}\text{Sr}_x\text{CuO}_4$ display slightly different pseudogap critical points in the temperature versus doping phase diagram. We have studied the pseudogap evolution into the superconducting state for doping concentrations just below the critical point. In this setting, near optimal doping for superconductivity and in presence of the weakest possible pseudogap, we uncover how the pseudogap is partially suppressed inside the superconducting state. This conclusion is based on the direct observation of a reduced pseudogap energy scale and re-emergence of spectral weight suppressed by the pseudogap. All together these observations suggest that the pseudogap phenomenon is in competition with superconductivity for anti-nodal spectral weight.