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PLENARY: Kinetic-energy driven superconductivity in cuprate superconductors

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Abstract content
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Superconductivity in cuprate superconductors occurs upon charge-carrier doping Mott insulators [1], where a central question [2] is what mechanism causes the loss of electrical resistance below the superconducting transition temperature? In this talk, we attempt to summarize the basic idea of the kinetic-energy driven superconducting mechanism in the description of superconductivity in cuprate superconductors [3,4,5]. The mechanism of the kinetic-energy driven superconductivity is purely electronic without phonons, where the interaction between charge carriers and spins directly from the kinetic energy by the exchange of spin excitations induces the superconducting-state in the particle-particle channel and pseudogap state in the particle-hole channel, therefore there is a coexistence of the superconducting gap and pseudogap. This kinetic-energy driven d-wave superconducting-state is controlled by both the superconducting gap and quasiparticle coherence, which leads to that the maximal superconducting transition temperature occurs around the optimal doping, and then decreases in both the underdoped and overdoped regimes. The kinetic-energy driven superconducting mechanism also indicates that the strong electron correlation favors superconductivity, since the main ingredient is identified into a charge-carrier pairing mechanism not from the external degree of freedom such as the phonon but rather solely from the internal spin degree of freedom of the electron.

[1] J. G. Bednorz and K. A. Muller, Z. Phys. B 64, 189 (1986).

[2] P. W. Anderson, Science 235, 1196 (1987); Science 317, 1705 (2007).

[3] See, the review, S. Feng et al., Int. J. Mod. Phys. B 29,1530009 (2015).

[4] S. Feng, Phys. Rev. B 68, 184501 (2003); S. Feng et al., Physica C 436, 14 (2006); S. Feng et al., Phys. Rev. B. 85, 054509 (2012).

[5] S. Feng et al., Physica C 517, 5 (2015); Phil. Mag., in press (2016). arXiv:1510.05384.

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