

Interplay between the pseudogap and superconducting gap in high-temperature cuprate superconductors

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High-temperature (T_c) superconductivity is one of the most interesting emergent phenomena in strongly correlated electron systems. Towards better understanding of high- T_c superconductivity, spectroscopic measurements sensitive to microscopic electronic structure are crucial. Among them, angle-resolved photoemission spectroscopy (ARPES) is a unique spectroscopic tool that can directly measure electronic structure in momentum space.

In my talk, I will focus particularly on the interplay between the pseudogap - a poorly understood anomalous energy gap above T_c - and superconducting gap in high- T_c cuprate superconductors. For comprehensive understanding of complex cuprate phase diagram, the pseudogap and superconducting gap have been extensively characterized by ARPES over the past two decades¹. With carefully matched experiments, spectroscopic fingerprints for distinct electronic symmetries associated with different energy gaps (i.e. the pseudogap and superconducting gap) have been revealed.^{2,3} More recently, the interplay between the pseudogap and d -wave superconductivity, has become even clearer,^{4,5} where the electron-boson might play an important role in an intertwined manner.⁶ These results provide us with microscopic insights into the rich cuprate phase diagram, an important step towards the understanding of high- T_c mechanism.

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- (1) M. Hashimoto *et al.*, *Nat Phys* **2014**, *10*, 483-495.
 - (2) M. Hashimoto*, R.-H. He* *et al.*, *Nat Phys* **2010**, *6*, 414-418.
 - (3) R.-H. He*, M. Hashimoto* *et al.*, *Science* **2011**, *331*, 1579-83.
 - (4) I. M. Vishik *et al.*, *PNAS* **2012**, *109*, 18332-18337.
 - (5) M. Hashimoto *et al.*, *Nat Mater* **2015**, *14*, 37-42.
 - (6) Y. He, M. Hashimoto *et al.*, in preparation.