Heavy Quasiparticles and Fermi Surface Nesting in $CeCu_2Si_2$ and $CeRh_2As_2$ Revealed by ARPES

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Heavy fermion superconductors, where the Cooper pairs are derived from the heavy quasiparticles as a result of lattice Kondo effect, are a classical example of unconventional superconductivity. In these superconductors, the antiferromagnetic (AFM) spin fluctuation is often thought to be the driving force of superconductivity and is intimately connected to the underlying Fermi surface. In this talk, we will report our recent ARPES studies of two Ce-based heavy fermion superconductors, i.e., $CeCu_2Si_2$ and $CeRh_2As_2$, in comparison with theoretical calculations. Our results reveal the momentum-dependent quasiparticle bands with large effective mass, which are clear manifestation of strong electron correlations. We further demonstrate the nesting of Fermi surface, which can explain the AFM spin fluctuations observed by inelastic neutron scattering. These insights pave the way to understand the unconventional superconductivity in these compounds. The importance of the locally non-centrosymmetric crystal structure and dominant intralayer hopping in $CeRh_2As_2$ will be discussed.

Reference

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