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Orbital selective pairing and gap structures of iron-based superconductors BRIAN M. ANDERSEN, Niels Bohr Institute, University of Copenhagen, ANDREAS KREISEL, Universitaet Leipzig, P. O. SPRAU, A. KOSTIN, J. C. SEAMUS DAVIS, Cornell University, P. J. HIRSCHFELD, University of Florida — Recent experiments in the superconducting phase of iron-based superconductors have mapped out the detailed momentum dependence of the superconducting gap structure. We discuss the influence on spin-fluctuation pairing theory of orbital selective strong correlation effects in Fe-based superconductors, particularly Fe chalcogenide systems. We propose that a key ingredient for an improved itinerant pairing theory is orbital selectivity, i.e. incorporating less coherent quasiparticles occupying specific orbital states into the pairing theory. This modifies the usual spin-fluctuation pairing via suppression of pair scattering processes involving those incoherent states and results in orbital selective Cooper pairing of electrons in the remaining states. We show that this paradigm yields remarkably good agreement with the experimentally observed anisotropic gap structures in both bulk and monolayer FeSe, as well as LiFeAs, indicating that orbital selective Cooper pairing plays a key role in the more strongly correlated iron-based superconductors.

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