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Superconductivity in Heavy Fermion Materials JOHN VAN DYKE, JEREMY FIGGINS, DIRK MORR, University of Illinois at Chicago — Superconductivity in heavy fermion materials is a complex phenomenon since it often emerges from a strongly entangled state, the Kondo screened heavy Fermi liquid. In this talk, we discuss possible pairing interactions that arises in the heavy Fermi liquid, and the resulting symmetries and momentum dependencies of the superconducting order parameter. In particular, we show that the interplay between the large Fermi surface of the Fermi liquid state and the momentum dependence of the pairing interaction naturally leads to an unconventional symmetry of the superconducting order parameter in general, and a $d_{x^2-y^2}$ -symmetry in particular. Moreover, we identify the signatures of unconventional pairing in the differential conductance, dI/dV , measured in scanning tunneling spectroscopy as well as in the quasi-particle interference pattern. Finally, we discuss the effects of impurities on the spatial dependence of both the superconducting order parameter and the hybridization.

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