MAR09-2008-006772

Abstract for an Invited Paper
for the MAR09 Meeting of
the American Physical Society

Theory of novel and superconducting properties of Fe-based superconductors

ANDREY CHUBUKOV, University of Wisconsin

I will discuss antiferromagnetism and superconductivity in novel $Fe-$based superconductors within the itinerant model of small electron and hole pockets near $(0,0)$ and (π,π). I will argue that the effective interactions in both channels logarithmically flow towards the same values at low energies, *i.e.*, antiferromagnetism and superconductivity must be treated on equal footings. The magnetic instability comes first for equal sizes of the two pockets, but looses to superconductivity upon doping. The superconducting gap has no nodes, but changes sign between the two Fermi surfaces (extended s-wave symmetry). I will argue that the T dependencies of the spin susceptibility, NMR relaxation rate, and the penetration depth for such state are exponential only at very low T, and can be well fitted by power-laws over a wide T range below T_c. I will also discuss the type of a transition between spin-density-wave and superconducting states at $T = 0$ and at finite T, and the linear T dependence of the spin susceptibility in the normal state.
Based on the works done with I. Eremin, D. Efremov, M. Korshunov, D. Maslov, M. Vavilov, and A. Vorontsov.