MAGNETIC AND SUPERCONDUCTING INSTABILITIES AND LOCAL MOMENT FORMATION IN THE ANDERSON LATTICE

M. A. N. Araújo and N. M. R. Peres

Departamento de Física, Universidade de Évora, Rua Romão Ramalho, 59, P-7000-671 Évora, Portugal

Centro de Física da Universidade do Minho, Campus Gualtar, P-4700-320 Braga, Portugal

9.7 cm

We study the magnetic and superconducting instabilities of the periodic Anderson model at $U = \infty$ in RPA. Both the Néel and the superconducting temperatures are obtained as functions of electronic density and hybridization V (*pressure*). Close to the region where the system exhibits magnetic order the critical temperature T_c is much smaller than the Néel temperature, in agreement with T_N/T_c ratios found for some heavy-fermion materials. In this model, all the magnetic and superconducting behaviour has its origin in the slave-boson fluctuations above the condensate.

We also study local moment formation in the presence of superconducting correlations among the $f-$electrons. Local moments form if the Coulomb repulsion $U > U_{cr}$. U_{cr} is considerably stronger in the superconducting phase than in the normal phase. In the presence of $d-$wave superconductivity the local moment formation presents a quantum phase transition as function of pressure, which separates a region where local moments and $d-$wave superconductivity coexist from another region with superconductivity alone. We discuss the relevance of these results to experimental studies of the competition between magnetic order and superconductivity in $CeCu_2Si_2$.

13.4 cm

Subject category :

1. Correlated Electrons and High Temperature Superconductors

Presentation mode :
poster

Corresponding author :
M. A. N. Araújo

Address for correspondence :
Departamento de Física, Universidade de Évora, Rua Romão Ramalho, 59, P-7000-671 Évora, Portugal

Email address :
mana@uevora.pt