9.7 cm

Slave boson and CPA studies of Mott – Hubbard metal – insulator transition

M. Michalik and K. I. Wysokiński
Institute of Physics, M. Curie – Skłodowska University
ul. Radziszewskiego 10, 20-031 Lublin, Poland

The change of the metal into insulator, induced by sufficiently strong short range repulsive electron–electron interaction U, is called Mott – Hubbard transition [1]. In this work we study the effect of disorder on the critical value the repulsion U_c. The Hubbard model with random site energies is used to describe the correlated and disordered system [2]. We use the Kotliar – Ruckenstein [3] slave boson technique [4] to treat correlations and coherent potential approximation (CPA) to deal with disorder. Even though our approach is of the mean field type we can study strong interaction and strong scattering limits. This is so because the slave boson technique is able to deal with strong interaction limit while CPA is correct both in the weak and strong scattering limits. The critical value of the interaction U for metal – insulator transition is decreasing function of the disorder strength.

[1] D. Belitz, T. R. Kirkpatrick, Rev. Mod. Phys. **66**, 261 (1994).

[2] K. I. Wysokiński, Phys. Rev. **B60**, 16376 (1999).

[3] G. Kotliar, A. E. Ruckenstein, Phys. Rev. Lett. **B2**, 4302 (1986).

[4] M. Lavagna, Phys. Rev. **B41**, 142 (1990).

13.4 cm

Subject category :

1. Correlated Electrons and High Temperature Superconductors

Presentation mode :
poster

Corresponding author :
M. Michalik

Address for correspondence :
M. Curie - Skłodowska University, ul. Radziszewskiego 10, 20-031 Lublin, Poland

Email address :
mariusz@kft.umcs.lublin.pl