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Electrical resistivity, hall coefficient, and thermopower of optimally doped high-T c superconductors

Larionov I., Barabanov A.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2014, Pleiades Publishing, Inc. For a two-dimensional optimally doped antiferromagnet with spin S =1/2, we study the temperature dependence of the electrical resistivity ρ(T), Hall coefficient RH(T), and thermopower Q(T). The temperature dependence corresponding to optimally doped layered high-Tc superconducting cuprates has been obtained simultaneously for all three transport coefficients within the unified spin-polaron approach for the Kondo lattice. The key features of our study are the usage of the multimoment method for solving the kinetic equations (seven moments for the nonequilibrium distribution function ensure a good convergence) and the form of ac spin susceptibility χ(q, ω) for localized spins. For χ(q, ω), we choose a self-consistent expression which takes into account the “crossover” between the spin susceptibility determined by the self-consistent spherically symmetric Green’s function method and the semiphenomenological spin susceptibility corresponding to the critical decay of magnons.

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