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Nanoscale properties of superconducting cuprates probed by the electron paramagnetic resonance

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Abstract

The basic principles of EPR in the high- T_c materials are presented with the accent on the novel features of these compounds in comparison with the conventional metallic systems. An overview is given on the various results obtained in the past years with the emphasis on the analysis of the local properties. Among the issues discussed in the details are the unusual normal state properties, the magnetic fluctuations, the phonon effects, stripe phase and the nanoscale phase separation resulting from the interplay of the lattice distortions with the strong electron correlations. The special attention is focused on their relevance to the origin of the high-temperature superconductivity. The main conclusions followed from EPR experiments in the cuprates are discussed. Some recent developments are addressed and compared to theoretical models. © Springer-Verlag Berlin Heidelberg 2005.

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Keywords

Cuprates, Localized states, Magnetic resonance, Phase separation, Superconductivity