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Spin Texture and Spin Dynamics in Superconducting Cuprates Near the Phase Transition Revealed by the Electron Paramagnetic Resonance

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Abstract

© 2016 Springer Science+Business Media New YorkA short review of experimental results and theoretical models of the spin texture and spin dynamics in superconducting cuprates near the phase transition developed on the basis of the EPR measurements is given. Distortions of the long-range antiferromagnetic order in the YBa(Formula presented.)Cu(Formula presented.)O(Formula presented.) were investigated for (Formula presented.) using Yb(Formula presented.) ions as the EPR probe. In weakly doped samples with (Formula presented.), a strong anisotropy of the EPR linewidth is revealed which was related to the indirect spin–spin interaction between the ytterbium ions via antiferromagnetic spin-waves. In the case of the doping level (Formula presented.), the EPR signal consists of narrow and broad lines, which were attributed to formation of charged domain walls. A theoretical analysis is well consistent with experimental results for the case of coplanar elliptical domain walls. A discussion of possible reasons for the observed unusual planar oxygen isotope effect on a critical temperature T(Formula presented.) related to charge heterogeneity in underdoped cuprates is given.

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Keywords

Antiferromagnetism, Cuprates, EPR, Phase separation, Superconductivity