

Theoretical Investigation of the EPR g -factors for Yb^{3+} in $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$

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The EPR g factors g_{\parallel} , g_{\perp} for Yb^{3+} in $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$ are studied with perturbation formulas based on the cluster approach of the spin-Hamiltonian parameters for a $4f^{13}$ ion in tetragonal symmetry. In these formulas, the contributions to the EPR parameters of the covalency effects, the admixture between the $J = 7/2$ and $J = 5/2$ states and the second-order perturbation terms are all included. The used crystal-field parameters are calculated with the superposition model and the local structural data of Yb^{3+} in $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$. The resulting EPR g factors for Yb^{3+} ions in the superconductor $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$ agree reasonably with the experimental values. The results are discussed.

Key words: Electron Paramagnetic Resonance; High-Tc Superconductor; Yb^{3+} ; $\text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$.