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Spin dynamics in the low-dimensional magnet TiOCl

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Abstract

We present detailed electron spin resonance investigations on single crystals of the low-dimensional quantum magnet TiOCl. The anisotropy of the g factor indicates a stable orbital configuration below room temperature and allows us to estimate the energy of the first excited state as 0.3 (1) eV, ruling out a possible degeneracy of the orbital ground state. Moreover, we discuss the possible spin relaxation mechanisms in TiOCl and analyze the angular and temperature dependence of the linewidth up to 250 K in terms of anisotropic exchange interactions. Towards higher temperatures an exponential increase of the linewidth is observed, indicating an additional relaxation mechanism. © 2006 The American Physical Society.

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