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Spin Dynamics and Ground State of the Frustrated Diamond Lattice Magnet CoAl2O4 as seen by ^{27}Al NMR

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Abstract

Â© 2016, Springer-Verlag Wien.We report an experimental study of the low-temperature dynamics of electron spin fluctuations in the magnetically frustrated spinel CoAl2O4 as revealed by 27Al nuclear magnetic relaxation measurements in a magnetic field of 7.7Â T in the temperature range 4Â <Â TÂ <Â 240Â K. With this local probe technique, we show that the dynamics of the correlated Co spins strongly depends on the frustration of spin interactions and on Co/Al site disorder. The anisotropy of the temperature dependences of the spin–lattice (T1−1) and spin–spin (T2−1) 27Al nuclear relaxation rates reveals a coexistence of the short-range NÃ©el order below a characteristic temperature T*Â =Â 8Â K and slow non-commensurate magnetic correlations below and above T*, in agreement with the results of neutron diffraction experiments and our previous NMR spectroscopy data.

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