

Abstract Submitted
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Effective Low-Energy Hamiltonian for the Frustrated $\text{Tb}_2\text{Ti}_2\text{O}_7$ Pyrochlore Antiferromagnet HAMID R. MOLAVIAN, MICHEL J.P. GINGRAS, Department of Physics, University of Waterloo — The antiferromagnetic pyrochlore $\text{Tb}_2\text{Ti}_2\text{O}_7$ presents a challenging puzzle to experimentalists and theorists studying frustrated magnets. Results from muon spin resonance and neutron scattering experiments for $\text{Tb}_2\text{Ti}_2\text{O}_7$ reveal a paramagnetic structure down to 50mK despite an antiferromagnetic Curie-Weiss temperature, $\theta_{\text{CW}} = -20\text{K}$. Crystal field calculations show that the Tb^{3+} ion in $\text{Tb}_2\text{Ti}_2\text{O}_7$ is a ground state doublet with local $\langle 111 \rangle$ anisotropy and is separated from the first excited doublet state by a gap of 20K. To understand the quantum nature of $\text{Tb}_2\text{Ti}_2\text{O}_7$, we apply the Rayleigh-Schrodinger method to map the four state problem with exchange and dipole-dipole interactions onto an effective Hamiltonian with two states per ion. We give some properties of this effective hamiltonian and compare the neutron scattering results with the experimental data.

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