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Crystal Field Fluctuations in a Frustrated Pyrochlore Antiferromagnet $Tb_2Ti_2O_7$. HAMID R. MOLAVIAN, MICHEL J. P. GINGRAS, Department of physics, University of Waterloo — The antiferromagnetic pyrochlore $Tb_2Ti_2O_7$ presents a challenging puzzle to experimentalists and theorists studying frustrated magnets. Results from muon spin resonance and neutron scattering experiments for $Tb_2Ti_2O_7$ reveal a paramagnetic structure down to 50mK despite an antiferromagnetic Curie-Weiss temperature, $\theta_{CW} = -20$K. Crystal field calculations show that the Tb^{3+} ion in $Tb_2Ti_2O_7$ 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. We apply the Rayleigh-Schrodinger method to map the four states 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 discuss the possible classical and quantum phases of $Tb_2Ti_2O_7$.

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