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Effect of fluctuations on effective Hamiltonians of anisotropic frustrated pyrochlore antiferromagnets. PAUL MCCLARTY, MICHEL GINGRAS, University of Waterloo — The rare earth pyrochlore magnets $R_2Ti_2O_7$ exhibit a wide range of puzzling features. $Tb_2Ti_2O_7$, a weakly Ising-like antiferromagnet, is a cooperative paramagnet down to, at least, 50 mK despite having a -20 K Curie-Weiss temperature. $Er_2Ti_2O_7$, which has magnetic ions with a strong easy plane anisotropy, has a transition to an ordered phase but the origin of a long-range ordered state with discrete broken symmetry is not understood. Recent experimental work has also uncovered interesting field-induced phases in both of these materials. We construct effective Hamiltonians, derived from microscopic models, for these two frustrated antiferromagnets by considering the effects of quantum fluctuations out of the classical ground states of these models to assess the stability of these states, the nature of the excitations and possible mechanisms of degeneracy breaking.

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