Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Field driven phases in the geometrically frustrated dipolar Heisenberg pyrochlore antiferromagnet $Gd_2Ti_2O_7$ MATTHEW ENJALRAN, Department of Physics, Southern CT State University, New Haven, CT, ADRIAN DEL MAESTRO, Department of Physics, Harvard University, Cambridge, MA , MICHEL J.P. GINGRAS, Department of Physics and Astronomy, University of Waterloo, Waterloo, ON, Canada; Canadian Institute for Advanced Research, Toronto, ON, Canada — The rare-earth pyrochlore gadolinium titanate, $Gd_2Ti_2O_7$, represents an excellent experimental realization of a Heisenberg antiferromagnet (AFM) in a frustrated geometry with weak long-range dipole-dipole interactions (approximately 20% of nearest neighbor AFM exchange). Experiments on $Gd_2Ti_2O_7$ in a magnetic field reveal a complex phase diagram associated with the breaking of spatial symmetries of the pyrochlore lattice as the field is applied along select symmetry directions. We study a model of classical Heisenberg spins (O(3) symmetry) on a pyrochlore lattice with exchange and dipolar interactions within mean-field theory. Using parameters relevant to the material system, we develop phase diagrams in finite magnetic fields. Our results our compared to experiments on $Gd_2Ti_2O_7$ (and $Gd_2Sn_2O_7$).

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Date submitted: 01 Dec 2007 Electronic form version 1.4