

Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Two Dimensional Correlations and Field Induced Order in the Pyrochlore Ferromagnet $\text{Yb}_2\text{Ti}_2\text{O}_7$ ¹ KATE ROSS, J.P.C. RUFF, B.D. GAULIN, McMaster University, C.P. ADAMS, St Francis Xavier University, J.S. GARDNER, NCNR, H.A. DABKOWSKA, McMaster University, Y. QIU, UMD / NCNR, J.R.D. COPLEY, NCNR — The rare earth pyrochlore magnets are of intense current interest due to their often unconventional magnetic behaviour. The pyrochlore lattice, which is occupied by the magnetic ions in such materials, is the 3D archetype for geometric frustration. We have studied the frustrated pyrochlore magnet, $\text{Yb}_2\text{Ti}_2\text{O}_7$, in single crystal form using time-of-flight neutron scattering. Our study confirms the presence of diffuse rods of scattering, which indicate unexpected 2D magnetic correlations in this cubic system. The diffuse scattering is measured both above and below a previously reported first order transition at $T_c = 240\text{mK}$. Although rod-like scattering persists below T_c , three dimensional correlations develop, indicating a build-up of interplane correlations. Yet $\text{Yb}_2\text{Ti}_2\text{O}_7$ continues to resist long range order down to $\sim 50\text{mK}$. We have discovered, however, that the application of a small magnetic field along the [110] direction readily induces a long range ordered magnetic state, as evidenced by well defined spin wave excitations. We will present a magnetic phase diagram for $\text{Yb}_2\text{Ti}_2\text{O}_7$ based on the results of this study.

¹Work supported by NSERC

Kate Ross
McMaster University

Date submitted: 15 Dec 2008

Electronic form version 1.4