Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Field-induced Bose-Einstein Condensation of triplons up to 8 K in Sr3Cr2O8[1] A.A. ACZEL, McMaster University, Y. KOHAMA, C. MARCENAT, Los Alamos National Laboratory, F. WEICKERT, Max Planck Institute for Chemical Physics of Solids, M. JAIME, O.E. AYALA-VALENZUELA, R.D. MCDONALD, Los Alamos National Laboratory, S.D. SELESNIC, H.A. DABKOWSKA, G.M. LUKE, McMaster University — Single crystals of the spin dimer system $Sr_3Cr_2O_8$ have been grown for the first time. Magnetization, heat capacity, and magnetocaloric effect data up to 65 T reveal magnetic order between applied fields of $H_{c1} \sim 30.4$ T and $H_{c2} \sim 62$ T. This field-induced order persists up to $T_c^{max} \sim 8$ K at H $\sim$ 44 T, the highest observed in any quantum magnet where H_{c2} is experimentally-accessible. We fit the temperature-field phase diagram boundary close to H_{c1} using the expression $T_c = A(H\text{-}H_{c1})^{\nu}$. The exponent $\nu = 0.65(2)$, obtained at temperatures much smaller than T_c^{max}, is that of the 3D Bose-Einstein condensate (BEC) universality class. This finding strongly suggests that $Sr_3Cr_2O_8$ is a new realization of a triplon BEC where the universal regimes corresponding to both H_{c1} and H_{c2} are accessible at ^{4}He temperatures.

[1]We acknowledge funding from NSERC, CIFAR, the National Science Foundation, the Department of Energy, and the State of Florida.

A.A. Aczel
McMaster University

Date submitted: 19 Nov 2009 Electronic form version 1.4