Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Unusual Magnetic Response of an S = 1 Antiferromagetic Linear-Chain Material.[1] J.S. XIA, M.W. MEISEL, Dept. of Physics and NHMFL, Univ. of Florida, A. OZAROWSKI, NHMFL, Florida State Univ., P.M. SPURGEON, A.G. GRAHAM, J.L. MANSON, Dept. of Chem. and Biochem., Eastern Washington Univ. — An $S = 1$ antiferromagnetic polymeric chain, $[Ni(HF_2)(3\text{-}Clpy)_4]BF_4$ (py = pyridine), has been identified to have nearest-neighbor antiferromagnetic interaction $J/k_B = 4.86$ K and single-ion anisotropy $D/k_B = 4.3$ K, while avoiding long-range order down to 25 mK.[2] With $D/J = 0.88$, this system is close to the $D/J \approx 1$ gapless quantum critical point between the topologically distinct Haldane and Large-D phases. The magnetization was studied over a range of temperatures, 50 mK $\leq T \leq 1$ K, and magnetic fields, $B \leq 10$ T. The results allow an upper bound of the critical field, B_c, which closes the Haldane gap, to be estimated. Specifically, $B_c \leq (35 \pm 10)$ mT, which is close to the predicted 46 mT,[3] when using the reported[2] values of J, D, and g. In low fields, the magnetic signal increases with decreasing T for 400 mK $< T <$ 800 mK but is independent of T for 50 mK $\leq T \leq$ 400 mK. This observation is consistent with a significant increase in the specific heat arising from the accumulation of entropy in the vicinity of the quantum critical point.

[1]Supported by NSF via DMR-1202033 (MWM), DMR-1306158 (JLM), and DMR-1157490 (NHMFL).
[2]J.L. Manson *et al.*, Inorg. Chem. **51** (2012) 7520.
[3]S. Hu *et al.*, Phys. Rev. B **84** (2011) 220402.

Mark Meisel
University of Florida

Date submitted: 07 Nov 2014 Electronic form version 1.4