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Cooperative Paramagnetic Behavior in the Stuffed Pyrochlore $\mathbf{Tb_{2+x}Ti_{2-2x}Nb_xO_7}$ B.G. UELAND, J.S. GARDNER, NIST Center for Neutron Research, National Institute of Standards and Technology, M.L. DAHLBERG, P. SCHIFFER, Department of Physics and Materials Research Institute, Pennsylvania State University, A.J. WILLIAMS, J.G. KIM, R.J. CAVA, Department of Chemistry and Princeton Materials Institute, Princeton University — The pyrochlore $Tb_2Ti_2O_7$ is a cooperative paramagnet that has generated much interest in the frustrated magnetism community due to the presence of persistent short range spin-spin correlations and its apparent lack of long range magnetic order down to temperatures below $T = 0.05$ K, despite an effective spin-spin interaction strength given by $\theta_W \sim 10$ K. Motivated by recent work on the stuffed spin ices, we have begun investigations into stuffed variants of $Tb_2Ti_2O_7$, in which we replace some of the nonmagnetic Ti^{4+} with magnetic Tb^{3+}, thus gradually changing the geometry of the magnetic sublattice from a lattice of corner sharing tetrahedra to a disordered lattice of side sharing tetrahedra. Here, we present results from magnetization and neutron scattering studies on powder samples of $Tb_{2+x}Ti_{2-2x}Nb_xO_7$, where $x = 0.2$, 0.4, 0.6, or 1, where diffraction data indicate that the $x = 1$ material has a disordered fluorite lattice. Preliminary results indicate that short range magnetic correlations similar to those present in $Tb_2Ti_2O_7$ exist in all of the materials studied, and that long range antiferromagnetic order may exist in the $x = 1$ material.

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