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Spin nematics in pyrochlore antiferromagnet with ferromagnetic next-nearest-neighbor interaction[1] GIA-WEI CHERN, OLEG TCHERNYSHYOV, Johns Hopkins University — The classical Heisenberg antiferromagnet on the pyrochlore lattice remains disordered down to zero temperature. A weak ferromagnetic interaction between second neighbors J_2 leads to a discontinuous ordering at a temperature $T_c \sim |J_2|$. Below the transition, a spin order with an extended unit cell containing as many as 1024 spins was found in Monte-Carlo simulations for $J_2 = -0.1J_1$ [1]. Here we present the characterization of ordered states at a smaller $J_2 = -0.01J_1$. This time the magnet shows a layered structure in the ordered phase: tetrahedra of the same layer develop a collinear Néel order with an in-plane wavevector $\mathbf{q} = 2\pi(1, 1)$. At the mean-field level, each different layer has its own preferred spin direction. Thermal fluctuations, however, favor a collinear alignment of spins in different layers. There still remains a Z_2 symmetry for each layer: the Néel vector of a plane can be parallel or antiparallel to the common preferred direction, rendering the magnet a *spin nematic,* possibly with an additional bond order. [1] D. Tsuneishi, M. Ioki, and H. Kawamura, J. Phys. Condens. Matter, to be published; cond-mat/0609655.

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