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Spin dynamics of the S=1/2 kagomé lattice antiferromagnet $\mathbf{ZnCu_3(OH)_6Cl_2}$ J.S. HELTON, K. MATAN, M.P. SHORES, E.A. NYTKO, B.M. BARTLETT, Massachusetts Institute of Technology, Y. YOSHIDA, Y. TAKANO, University of Florida, A. SUSLOV, National High Magnetic Field Laboratory, Y. QIU, J.-H. CHUNG, NIST Center for Neutron Research, D.G. NOCERA, Y.S. LEE, Massachusetts Institute of Technology — An important challenge in condensed matter physics is the search for quantum spin liquid states in two dimensional frustrated systems. We have performed thermodynamic and neutron scattering measurements on the $S = 1/2$ kagomé lattice antiferromagnet $ZnCu_3(OH)_6Cl_2$. The susceptibility indicates a Curie-Weiss temperature of $\theta_{CW} \simeq -300$ K; however, no magnetic order is observed down to 50 mK. Inelastic neutron scattering reveals a spectrum of low energy spin excitations with no observable gap down to 0.1 meV. The specific heat at low-T follows a power law with exponent $\alpha \leq 1$. These results suggest that an unusual spin-liquid state with essentially gapless excitations is realized in this kagomé lattice system.

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