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Spin chirality and high-field phase diagram of the kagomé lattice antiferromagnet $A\mathbf{Fe_3(OH)_6(SO_4)_2}$ K. MATAN, J. S. HELTON, Massachusetts Institute of Technology, D. GROHOL, University of Wyoming, B. M. BARTLETT, Massachusetts Institute of Technology, V. SIKOLENKO, Hahn-Meitner-Institut, D. G. NOCERA, Y. S. LEE, Massachusetts Institute of Technology — We have used neutron scattering to study spin chirality and high-field spin re-orientation in single crystal and powder samples of the antiferromagnetic kagomé lattice compounds, $A\mathrm{Fe_3(OH)_6(SO_4)_2}$ (A = K and Ag). The $\frac{5}{2}$ $\mathrm{Fe^{3+}}$ spins on the kagomé lattice order three dimensionally for temperatures below the Néel temperature, $\mathrm{T}_N = 65$ K. Above the Néel temperature, we observed the spin chiral order. Neutron measurements reveal critical spin fluctuations above T_N, which indicate that the spin-rotational symmetry and the vector chiral symmetry are not broken simultaneously at T_N. Below the Néel temperature, neutron scattering measurements in high fields show a spin re-orientation transition, which appear to be first-order in nature. Details of the high field phase diagram will be discussed.

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