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Phase Control of Magnetic Order in (Y,Lu)BaCo₄O₇ JOHN MITCHELL, HONG ZHENG, SEVDA AVCI, Argonne National Laboratory, LAURENT CHAPON, DMITRY KHALYAVIN, ISIS Facility, OMAR CHMAISSEM, Northern Illinois University, ASHFIA HUQ, Oak Ridge National Laboratory — The RBaCo₄O₇ (R=Ca, Y, Tb-Lu) provides a novel topology for studying geometric frustration, in which face-sharing tetrahedra of magnetic ions link to form trigonal bipyramids on a Kagomé lattice. Here we describe the structural and magnetic behavior of the Lu member and the solid solution joining Lu to Y as a chemical means to tune between magnetically ordered and disordered ground states. Mean-field models of the generic magnetic phase diagram of RBaCo₄O₇ determined recently by our group (D. D. Khalyavin et al. Physical Review B 82, 094401 (2010)) show a variety of magnetic states as a function of two exchange parameters: J_{ab} and J_c , where J_{ab} links Co ions in the Kagomé planes and J_c links Co ions from the Kagome plane to the interleaving triangular layer. Experimentally, we find that YBaCo₄O₇ has a long-range ordered antiferromagnetic ground state, while LuBaCo₄O₇ appears to be disordered above 2 K. We use the solid solution to interpolate between these endpoints and discuss these results with respect to the mean-field phase diagram.

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