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Structural and Magnetic Properties of the Kagomé Antiferromagnet $YbBaCo_4O_7$ JOHN MITCHELL, Materials Science Division, Argonne National Laboratory, ASHFIA HUQ, IPNS, Argonne National Laboratory, LAURENT CHAPON, PAOLO RADAELLI, KEVIN KNIGHT, ISIS, Rutherford Laboratory, PETER STEPHENS, SUNY Stonybrook, HONG ZHENG, Materials Science Division, Argonne National Laboratory — The mixed-valent compound $YbBaCo_4O_7$ is built up of Kagomé sheets of CoO_4 tetrahedra, linked in the third dimension by a triangular layer of CoO_4 tetrahedra in an analogous fashion to that found in the known geometrically frustrated magnets such as pyrochlores and $SrCr_{9x}Ga_{12-9x}O_{19}$ (SCGO). We have undertaken a study of the structural and magnetic properties of this compound using combined high resolution powder neutron and synchrotron X-ray diffraction. $YbBaCo_4O_7$ undergoes a first order trigonal to orthorhombic phase transition at 175 K that breaks the trigonal symmetry of the structure. We show that this transition occurs as a response to a markedly underbonded Ba^{2+} site in the high-temperature phase and does not appear to involve charge-ordering of Co^{2+}/Co^{3+} ions in the tetrahedra. The symmetry-lowering relieves the geometric frustration of the structure, and a long-range ordered 3-D antiferromagnetic state develops below 80 K.

John Mitchell
Argonne National Laboratory

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