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Competing magnetic ground states and their coupling to the crystal lattice in CuFe2Ge2[1] ANDREW MAY, Materials Science and Technology Division, Oak Ridge National Laboratory, STUART CALDER, Quantum Condensed Matter Division, Oak Ridge National Laboratory, DAVID PARKER, BRIAN SALES, MICHAEL MCGUIRE, Materials Science and Technology Division, Oak Ridge National Laboratory — $CuFe_2Ge_2$ has been identified as a system with competing magnetic ground states that are strongly coupled to the crystal lattice and easily manipulated by temperature or applied magnetic field. Powder neutron diffraction data reveal the emergence of antiferromagnetic (AFM) order near $T_N = 175$ K, as well as a transition into an incommensurate AFM spin structure below approximately 125 K. Together with refined moments of approximately 1 Bohr magneton per iron, the incommensurate structure supports an itinerant picture of magnetism in $CuFe_2Ge_2$, which is consistent with theoretical calculations. Bulk magnetization measurements suggest that the spin structures are easily manipulated with an applied field, which further demonstrates the near-degeneracy of different magnetic configurations. Interestingly, the thermal expansion is found to be very anisotropic, and the c lattice parameter has anomalous temperature dependence near T_N. These results show that the ground state of $CuFe_2Ge_2$ is easily manipulated by external forces, making it a potential parent compound for a rich phase diagram of emergent phenomena.

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