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Spin-wave spectrum and magnetic phase diagram of hexagonal $HoMnO_3$ O.P. VAJK, National Institute of Standards and Technology, M. KENZELMANN, J.W. LYNN, S.B. KIM, S.-W. CHEONG — We present neutron scattering measurements of the magnetic order and spin-wave dynamics in single crystals of hexagonal $HoMnO_3$, an antiferromagnetic ferroelectric material. Ferroelectric ordering of Ho^{3+} ions along the c axis occurs around 875K, and the triangular lattice of S=2 moments on Mn^{3+} ions order in a 120° antiferromagnetic structure below 72K. Below 40K, these moments undergo a spin reorientation transition to another 120° structure, with significant coupling between the two order parameters observable at the transition. We have mapped out the spin-wave spectrum, and our results are well-described by a Heisenberg model on a triangular lattice with a nearest-neighbor exchange of 2.44 meV and a temperature-dependent anisotropy. Measurements of the spin structure in a magnetic field applied along the ferroelectric ordering direction reveal multiple spin-reorientation transitions along with significant hysteresis. Applied electric field results will also be discussed.

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