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Ferromagnetic transition coupled to magnetoelastic interactions¹

J.L. MUSFELDT, L.I. VERGARA, T.V. BRINZARI, University of Tennessee, L.C. TUNG, Y.J. WANG, NHMFL, J.A. SCHLUETER, Argonne, J.L. MANSON, Eastern Washington, UNIVERSITY OF TENNESSEE TEAM, NHMFL TEAM, ARGONNE TEAM, EASTERN WASHINGTON TEAM — We investigate the magneto-infrared response of $\text{CuHF}_2(\text{pyz})_2\text{BF}_4$, a quasi-two-dimensional Heisenberg antiferromagnet, in order to probe the microscopic aspects of magnetoelastic coupling through the field-driven antiferromagnetic to ferromagnetic transition. The ferromagnetic transition is accompanied by substantial changes in the out-of-plane pyrazine ring distortion and bending modes giving rise to an overall softer lattice. The size of these field-induced distortions tracks the bulk magnetization demonstrating that the ferromagnetic transition is coupled to magnetoelastic interactions in this material. We discuss these results in terms of local structural distortions and the effect on in-plane superexchange interactions.

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