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Field induced first order phase transition in the antiferromagnet Yb_3Pt_4[1] L.S. WU, Stony Brook University, Y. JANSSEN, M.S. KIM, Brookhaven National Lab, C. MARQUES, Stony Brook University & Brookhaven National Lab, K.S. PARK, M. BENNETT, Brookhaven National Lab, M.C. ARONSON, Stony Brook University & Brookhaven National Lab, S.X. CHI, J.W. LYNN, NIST Center for Neutron Research — Yb_3Pt_4 is an antiferromagnet that orders at T_N=2.4K. Magnetic fields B suppress T_N, and the B-T phase line T_N(B) terminates almost vertically at T=0, B_C=2.0 T. Specific heat measurements find a mean-field transition at T_N(B), and the magnetocaloric effect shows that the antiferromagnetic transition is continuous at all fields, with no associated latent heat. However, neutron diffraction measurements performed for B$\sim B_C$ find that a distinct step in the magnetization ΔM occurs near the transition, with a magnitude that increases for T<1 K. The field dependent magnetization M(B) similarly has a metamagnetic-like step at T_N(B) below 1 K, accompanied by a sharp peak in the susceptibility whose magnitude increases but does not diverge as T$\rightarrow$0. We argue that a nonzero magnetization step ΔM is required to give ΔS=0 for T=0, since the vertical phase line at T=0 implies $dT_N/dB=-\Delta M/\Delta S \rightarrow -\infty$. We argue that T_N (B) terminates at B_C in a T=0 first order transition.

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