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Barkhausen noise in the Random Field Ising Magnet NdFeB JIAN XU, DANIEL SILEVITCH, University of Chicago, THOMAS ROSENBAUM, California Institute of Technology — With the application of a magnetic field transverse to the magnetic easy axis, sintered blocks of the rare-earth ferromagnet Nd₂Fe₁₄B form a realization of the Random-Field Ising Model at room temperature. We study domain reversal and avalanche dynamics through an analysis of the Barkhausen noise. Power-law behavior with a cutoff is observed in the avalanche energy spectrum, consistent with theoretical predictions for disordered materials. Two regimes of behavior are found, one at low temperature and high transverse field where the system shows behavior consistent with randomness-dominated dynamics, and a high-temperature, low-transverse-field regime in which thermal fluctuations dominate the dynamics. In the randomness-dominated regime, the critical exponents are consistent with mean-field predictions for heavily disordered system, whereas in the thermal-fluctuation regime, the critical exponents differ substantially from the mean-field predictions.

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