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Conditions for Triggering Avalanches in Mn_{12}-acetate. YOKO SUZUKI, S. MCHUGH, R. JAAFAR, M.P. SARACHIK, City College of New York/CUNY, Y. MYASOEDOV, H. SHTRIKMAN, E. ZELDOV, The Weizmann institute of Science, R. BAGAI, N.E. CHAKOV, G. CHRISTOU, University of Florida at Gainesville. — Recent measurements in Mn_{12}-acetate have shown that magnetic avalanches (corresponding to fast magnetization reversal) propagate as a narrow front with a velocity that is roughly two orders of magnitude smaller than the speed of sound. This phenomenon is closely analogous to the propagation of a flame front through a flammable chemical substance (deflagration) [1]. The conditions for nucleation of avalanches triggered in response to a time-varying (swept) magnetic field were studied for different fields and temperatures. In these crystals, avalanches happened only at low temperatures and were found to occur stochastically at fields ranging from 1.0 T to 4.5 T. There is no apparent structure in the distribution of avalanches for fields below $\approx$ 3.5 T; at higher fields we find evidence that the probability is lower at "nonresonant" magnetic fields where tunneling across the anisotropy barrier is suppressed. This provides evidence that lowering the barrier by quantum mechanical tunneling facilitates the ignition of avalanches. Based on these and other measurements, we suggest that avalanches are triggered below 3.5 T by defects with lower energy barriers. [1] Y. Suzuki, et al., Phys. Rev. Lett. 95, 147201 (2005).

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