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Noise Spectrum Signature of Large Jumps in the Magnetization of a Finite System Near a Phase Transition[1] ZHI CHEN, CLARE YU, University of California, Irvine — It is well known that a finite-size spin system can undergo thermally driven flips of the magnetization of the system as a whole. But what is an experimentally measurable signal of this? We show that the low frequency noise spectrum of the magnetization has a distinct signature of these total magnetization flips which as particularly evident just below the phase transition temperature. To see this, we studied the magnetization and energy spectra of the 2D Ising model by using Monte Carlo simulations. We find that at T_C the noise power is a power law in the frequency where the power is given by the critical exponents. As the frequency decreases for a finite system just below T_C, the magnetization noise spectrum crosses over to f^{-2}. We show that this is due to large jumps in the entire magnetization. Finally at the lowest frequencies, the noise spectrum saturates at a frequency that depends on the system size. The method we used can be applied without much modification to quantify the contribution of jumps to the dynamics of other systems.

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