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**Noise and Phase Transitions** ZHI CHEN, CLARE C. YU, University of California, Irvine — Noise is present in many physical systems and is often viewed as a nuisance. Yet it can also be a probe of microscopic fluctuations. There have been indications recently that the noise in the resistivity increases in the vicinity of the metal-insulator transition. But what are the characteristics of the noise associated with well-understood first and second order phase transitions? It is well known that critical fluctuations are associated with second order phase transitions, but do these fluctuations lead to enhanced noise? We have addressed these questions using Monte Carlo simulations to study the noise in the 2D Ising model which undergoes a second order phase transition, and in the 5-state Potts model which undergoes a first order phase transition. We monitor these systems as the temperature drops below the critical temperature. At each temperature, after equilibration is established, we obtain the time series of quantities characterizing the properties of the system, i.e., the energy and magnetization per site. We apply different methods, such as the noise power spectrum, the Detrended Fluctuation Analysis (DFA) and the second spectrum of the noise, to analyze the fluctuations in these quantities.

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