Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Extended universality and information theory CINTIA LAPILLI, PETER PFEIFER, CARLOS WEXLER, University of Missouri — Recently, we have discovered the *extended universality*, where entire families of systems behave identically both near and away from a critical point [1] if the temperature and a parameter describing the interaction between neighboring units of the system exceed a certain value. In the regime where the extended universality is present $T > T_{\rm eu}$, the thermodynamics of the system is *degenerate* in the sense that all thermodynamic observables of each system are independent of the interaction parameter, and a system with discrete degrees of freedom (i.e. the p-state clock model) behaves (from the point of view of all thermodynamic observables) exactly as if these degrees of freedom were continuous (i.e. the planar rotor or XY model). To the best of our knowledge there is only one comparable case where a similar sharp switchover between a discrete and a continuum description of a system is observed: this is in the areas of telecommunications, digital signal processing, and information theory: the Nyquist-Shannon sampling theorem [2]. In this talk we will give an interpretation of the extended universality in terms of the NyquistShannon sampling theorem. [1] Universality away from critical points in two-dimensional phase transitions, C.M. Lapilli, P. Pfeifer, and C. Wexler, Phys. Rev. Lett. **96**, 140603 (2006). [2] H. Nyquist, Trans. AIEE **47**, 617 (1928); [3] C.E. Shannon, Proc. Institute of Radio Engineers **37**, 10 (1949).

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Date submitted: 04 Dec 2006 Electronic form version 1.4