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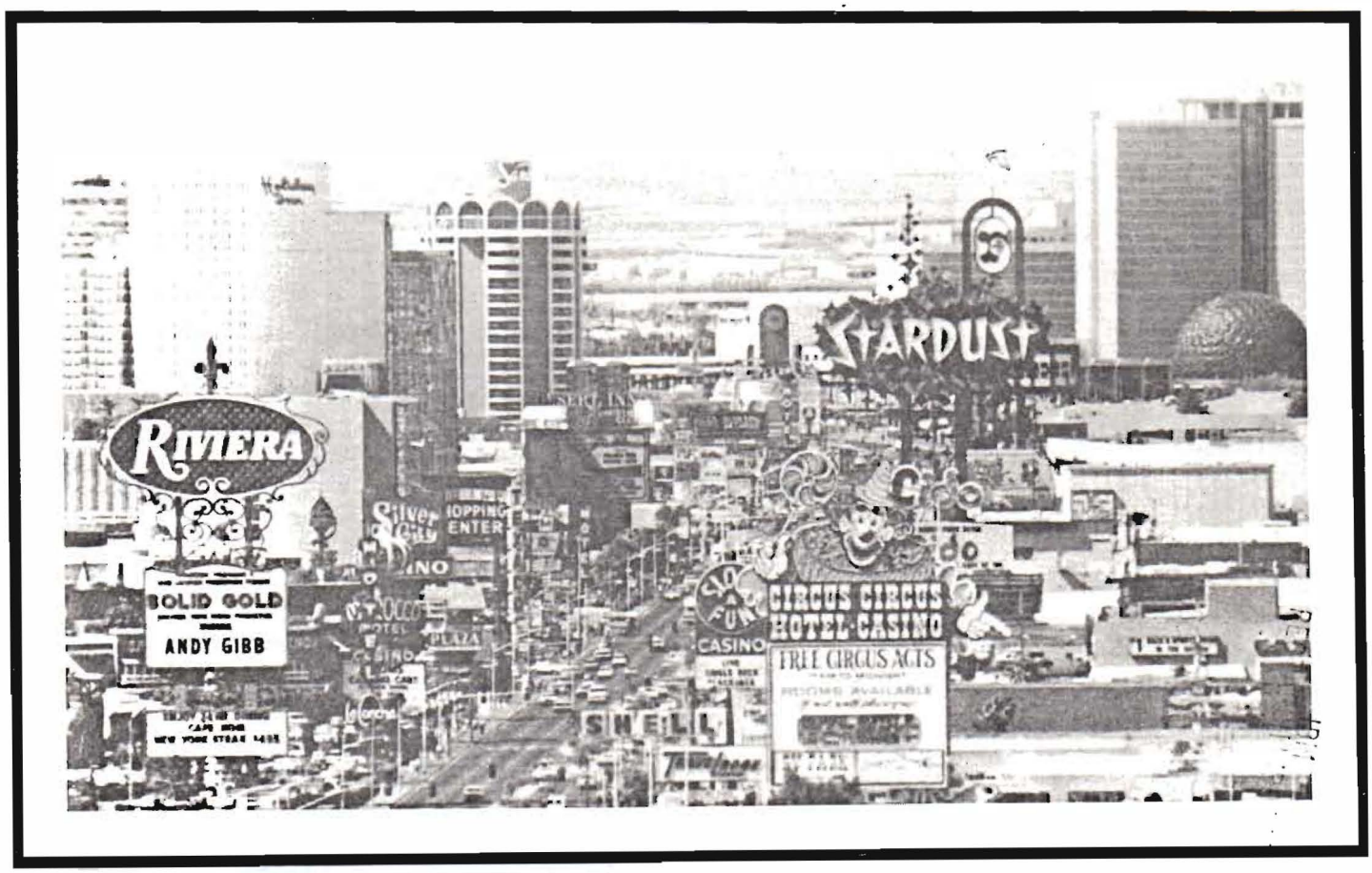

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but also analytic expressions for quenched average quantities such as the free energy or pinning length. The analytic results are confirmed by numerical studies. Experimental implications, and extensions to higher dimensions will be discussed.

*Supported by NSF Grant No. DMR 82-07431, and Harvard Society of Fellows.
1. D.A. Huse and C.L. Henley, Phys. Rev. Lett. 54, 2708 (1985).
2. M. Kardar and D.R. Nelson, Phys. Rev. Lett. 55, 1157 (1985).
3. M. Kardar, Phys. Rev. Lett. 55, 2235 (1985).

Contributed Papers

14:36

HL 2 Exact Results for Low-Temperature Spin Dynamics in Classical 1-D Easy Plane Ferromagnets. G. REITER, University of Houston.--The spin wave methods developed for the isotropic Heisenberg model have been extended to treat the easy plane ferromagnet. Spectral functions describing the behavior much below the crossover temperature have been obtained exactly. Unlike the isotropic model, there are no scaling violations in the in-plane correlation functions, which agree with the long wavelength theories of Nelson and Fisher, and of Villain. The short wavelength behaviour above the crossover wavevector $q = \sqrt{D/J}\,/a$ is in agreement with the isotropic model. The out of plane spectral function has a logarithmic singularity in the spin current decay rate at the spin wave frequency-a general feature of three spin wave processes in one dimension-and leads to a linewidth proportional to $T^2 \ln T$. Calculations by Cieplak and Sjolander[1], and simulations by Loveluck, Schneider, Stoll and Jauslin[2] are in disagreement with these results, and with each other. The methods used appear to be extendable to an arbitrary spin system at low-temperatures at or below its lower critical dimension.
1. J.Phys.C. 14, 4861 (1981)
2. J.Phys.C. 15, 1721 (1982)

14:48

HL 3 **Monte Carlo Study of the 1-Dimensional Fermion Chain***,** Mark Jarrell *UC Santa Barbara* — We report the results of a monte carlo study of a 1-dimensional spinless fermion chain. The model Hamiltonian contains hopping and near neighbor coulomb repulsion terms. The energy, and density-density correlation function are being studied. The correlation function results are compared to those obtained by other methods[1,2].
*Submitted by Douglas J. Scalapino
**Work supported by DOE grant DE-FG03-85ER45197
1. J. Borysowicz, T. A. Kaplan, and P. Horsch, Phys. Rev. B 31, 1590 (1985)
2. A. Luther, and I. Peschel, Phys. Rev. B 12, 3908 (1975)

15:00

HL 4 Josephson Junction Ladders and Quantum Fluctuations. M. KARDAR*, Harvard University. A ladder of Josephson Junctions provides a realization of the discrete Sine-Gordon chain. The spring constant and incommensurability can be varied by the supercurrent and the magnetic field. As the magnetic field is increased there is a transition to a vortex state. Due to charging effects (quantum fluctuations) the ladder becomes normal in the vicinity of this transition.
* Supported by NSF Grant No. DMR 82-07431, and the Harvard Society of Fellows.

15:12

HL 5 Random Exchange Effects in Antiferromagnetic Quantum Spin Chains: A Monte Carlo Study.* H.-B. SCHÜTTLER and D.J. SCALAPINO, UC Santa Barbara, and P.M. GRANT, IBM San Jose.--We report a Monte Carlo study of a random exchange antiferromagnetic spin-½ chain. For systems with XY-like (anisotropic) and with Heisenberg (isotropic) coupling, our results confirm the existence of a disorder induced low temperature (T) divergence in the long wavelength S^z-S^z susceptibility χ which was previously predicted by real space renormalization group (RSRG) treatments. Over the finite temperature range studied, these results are consistent with a $1/(T \log^2 T)$ behavior of χ, and hence in qualitative agreement with the RSRG results. As in the XY-Heisenberg regime, we also find a disorder-induced enhancement of the low-T susceptibility for a system with Ising-like exchange coupling. We also present results for the antiferromagnetic susceptibility and structure factor and for various susceptibilities towards the formation of a spin-Peierls state.

*Work supported by National Science Foundation Grant DMR83-20481, and IBM Research Laboratory.

15:24

HL 6 Classical Sine Gordon Thermodynamics from the Bethe Ansatz. I Anharmonic Phonons. M. FOWLER, N.N. CHEN, M.D. JOHNSON, Univ. of Virginia.*--For the low temperature classical sine-Gordon system, the leading contribution to the free energy comes from anharmonic phonons, and has been evaluated to high order in temperature using transfer matrices. We show that the Bethe ansatz equations for the low lying breathers in the quantum system can be transformed in the classical limit into a single equation for the anharmonic phonon density, soluble iteratively to give results in complete agreement with classical methods.

* Supported by NSF Grant No. DMR-84-04955

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HL 7 Classical Sine Gordon Thermodynamics from the Bethe Ansatz. II Soliton Free Energy. N.N. CHEN, M.D. JOHNSON and M. FOWLER, Univ. of Virginia.*--We find that in the classical limit the Bethe Ansatz equations for the quantum sine Gordon system can be reduced to two coupled integral equations for the soliton density and anharmonic phonon density. These can be solved iteratively. We find the single soliton contribution to the free energy to be

$$F_1 = -2mM \frac{2t}{\pi} e^{-1/t}\left(1 - \frac{7}{8}t - \frac{59}{128}t^2 - \frac{897}{1024}t^3 - \frac{75005}{32768}t^4 + \ldots\right)$$

in exact agreement with classical transfer matrix results.

* Supported by NSF grant No. DMR-84-04955

15:48

HL 8 Dynamics of the One-Dimensional Potts Model. P.O.WEIR and J.M.KOSTERLITZ. Brown University*.-- We consider the q-state Potts Model in one-dimension for the cases $q = 2^m$, $m = 1,2,3,\ldots$. The dynamical critical exponent is calculated with use of the real-space renormalization-group method. We find $z = 2$ in the 4- and 8- state models, which