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NEW APPROACHES TO STRONGLY CORRELATED ELECTRONS AND QUANTUM MAGNETISM

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Schwinger Boson representations[1] allow us to study ferromagnetic and antiferromagnetic Heisenberg models in a rotationally invariant formulation. This has proved particularly useful in one and two dimensions both for the ground state and at finite tempertaures, where quantum and thermal fluctuations can destroy the long range order.

The large-N SU(N) Heisenberg models can be approximated by the Schwinger Boson Mean Field Theory[1]. The SBMFT for N=2 is surprisingly successful in agreeing with numerical results, spin wave theory, and renormalization group analysis of the non linear sigma model, except for the case of antiferromagnetic half-odd integer spin chains. We discuss recent inderstanding of this issue related to effects of phase fluctuations around the mean field saddle point.

The Slave-Fermion/ Schwinger Boson representation of the Hubbard model, alows us to study the doped antiferromagnet (High Tc) problem, in the low doping limit. We present results for the ground state derived by two complimentary approaches: The extension of the SBMFT to the doped system, and an adiabatic approxiniation based on the coherent state path integral.

[1] D.P Arovas and A. Auerbach, Phys. Rev. B **38**, 316 (1988); A. Auerbach and D.P. Arovas, Phys. Rev. Lett. **61**, 617 (1988).