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d-wave Metal phase of itinerant electrons with ring exchange on a 2-leg ladder M.S. BLOCK, Dept. of Physics, UCSB, H.-C. JIANG, Microsoft Research, Station Q, UCSB, R.V. MISHMASH, Dept. of Physics, UCSB, D.N. SHENG, Dept. of Physics and Astronomy, CSU, Northridge, O.I. MOTRUNICH, Dept. of Physics, Caltech, M.P.A. FISHER, Dept. of Physics, UCSB — I will present recent results in the search for theoretical insights into non-Fermi liquid phases in two dimensions. In particular, we propose a novel conducting phase for itinerant electrons on the square lattice with strong d-wave correlations (i.e. a "d-wave metal"; see [1] for the bosonic analog of this phase) and a candidate Hamiltonian (hopping plus four-site electron ring exchange), which we examined in search of this phase (at $T = 0$) over some portion of the phase diagram. For numerical tractability, we specialize to the 2-leg ladder and study this model using variational Monte Carlo (VMC) and the density matrix renormalization group (DMRG). For the VMC, we construct trial wavefunctions corresponding to a particular slave particle decomposition of the electrons and consistent with the properties of the proposed d-wave metal as well as for the "normal" Fermi liquid phase to map out a VMC phase diagram for the candidate Hamiltonian. Meanwhile, DMRG is employed as a quasi-exact probe of this Hamiltonian and the successes and failures of the trial wavefunctions, relative to the unbiased DMRG results, will be presented. [1] O. I. Motrunich and M. P. A. Fisher, Phys. Rev. B, **75**, 235116 (2007).

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