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Moving toward two dimensions in a t - J - K model with frustrating ring exchange: the quest to stabilize a non-Fermi liquid d -wave metal phase JAMES R. GARRISON, UCSB, HONG-CHEN JIANG, KITP, RYAN V. MISHMASH, UCSB, BRYAN K. CLARK, Station Q, OLEXEI I. MOTRUNICH, Caltech, MATTHEW P. A. FISHER, UCSB — Recent work (arXiv:1207.6608) has established compelling evidence, on the two-leg ladder, for the existence of a non-Fermi liquid strange metal phase as the ground state of a realistic model Hamiltonian—the t - J model supplemented with a frustrating ring-exchange term. Here we present our findings, guided by VMC and DMRG calculations, as we move toward two dimensions in an attempt to fully characterize the phase diagram and to stabilize this “ d -wave metal” phase beyond the two-leg ladder. Ultimately, we are motivated by a desire to understand the strange metal phase in the cuprates, and to determine whether the superconductor and pseudo-gap regimes can potentially be understood as instabilities of the d -wave metal phase resulting from this (or a similar) model Hamiltonian.

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