The Strong Coupling Limit of the Hubbard Model

LI LIU, Stanford University, HONG YAO, Berkeley, STEVE KIVELSON\textsuperscript{1}, Stanford University, DOE COLLABORATION — We carry out a coordinated study of the two dimensional Hubbard model in the extreme strong-coupling limit, $U/t \to \infty$. The resulting problem has no parameters other than the mean electron concentration per site, $n$. As is well known, for $n=1$, the infinite $U$ limit is singular, in that interactions of order $t^2/U$ must be included to resolve the $2^N$ fold degeneracy of the ground state found for infinite $U$. For any other value of $n$, however, the infinite $U$ limit is well behaved, but incompletely understood. We have applied a combination of exact diagonalization and variational methods to explore the phase diagram of this paradigmatic model of strongly interacting electrons.

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