

Abstract Submitted
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DMRG study of the Phase Diagram of the Infinite U Hubbard

Model LI LIU, Stanford University, HONG YAO, UC Berkeley, EREZ BERG, Harvard University, STEVE WHITE, UC Irvine, STEVE KIVELSON, Stanford University, BRIAN MOLTZ COLLABORATION — Despite decades of discussion, the phase diagram of the paradigmatic Hubbard model in the strong coupling limit remains uncertain. Here, we study Hubbard ladders with infinite on site repulsion and electron density ranging from $n=0$ to $n=1$ per site. DMRG calculations shows that the phase diagrams of two, three and four-leg ladders share the following similarities: as a function of decreasing n a fully polarized (half metallic ferromagnetic) phase is followed by a partially polarized ferromagnetic metallic state, and finally by a paramagnetic (unpolarized) phase for n less than a critical value of roughly $n \sim 0.5$, but which differs somewhat depending on the number of legs. Unexpectedly, the ferromagnetic metal phase is reentrant in the sense that it is interrupted at a special commensurate density ($n=0.75$ for the two-leg and 4-leg ladders and $n=0.8$ for the three leg) by an incompressible commensurate density wave phase with zero net ferromagnetic moment. All results appear to extrapolate smoothly to the limit of infinite ladder length. We conclude with some speculations about the phase diagram of the 2D infinite U Hubbard model.

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