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**Inhomogeneous states with checkerboard order in the  $t$ - $J$  Model**

CHUNHUA LI, Boston College, SEN ZHOU, ZIQIANG WANG — We study inhomogeneous states in the  $t$ - $J$  model using an unrestricted Gutzwiller approximation. We find that  $pa \times pa$  checkerboard order, where  $p$  is a doping dependent number, emerges from Fermi surface instabilities of both the staggered flux phase and the Fermi liquid state with realistic band parameters. In both cases, the checkerboard order develops at wave vectors  $(\pm 2\pi/pa, 0)$ ,  $(0, \pm 2\pi/pa)$  that are tied to the peaks of the wave-vector dependent susceptibility, and is of the Lomer-Rice-Scott type. The properties of such periodic, inhomogeneous states are discussed in connection to the checkerboard patterns in the local tunneling density of states discovered in underdoped cuprates.

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