9.7 cm

VERTICAL AND DIAGONAL STATIC STRIPES IN THE HUBBARD MODEL

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Qualitative picture of stable static stripe phases which occur in doped superconducting cuprates can be given within the Hubbard model using Hartree-Fock approximation [1]. Here we extend earlier Hartree-Fock studies of the stripe stability [2], and determine the phase diagram of the Hubbard model with nearest-neighbor $\propto t$, by varying the on-site Coulomb repulsion U and next-neighbor $\propto t'$ hopping, by investigating the locally stable structures for a few representative doping levels. Qualitatively vertical (01) [diagonal (11)] stripes are stable for $U < 4t$ [$U > 4t$], if $t' = 0$. Negative t' ($t'/t < 0$), as obtained for the realistic parameters of high temperature superconductors, stabilizes vertical (01) stripes. In the anisotropic Hubbard model ($t_x = 1.1t$, $t_y = 0.9t$) vertical (01) stripes are more stable than diagonal stripes even at $t' = 0$. Furthermore, we report the changes in the stability of (11) and (01) stripes due to repulsive ($V > 0$) and attractive ($V < 0$) nearest-neighbor interaction. If $V > 0$ the diagonal stripes are stable, while vertical (01) stripes are stabilized by the weak attractive interaction $V \simeq -0.5t$.

[1] A.M. Oleś, Acta Phys. Polon. B **31**, 2963 (2000).
[2] B. Normand and A.P. Kampf, Phys. Rev. B **64**, 024521 (2001).

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