HALF-FILLED STRIPES IN THE t-t'-U HUBBARD MODEL

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Using a self-consistent Hartree-Fock (HF) approximation we investigate the relative stability of various stripe phases in the extended t-t'-U Hubbard model. They involve nonmagnetic filled stripes (one doped hole per site in a domain wall) stabilized by transverse charge fluctuations [1], and half-filled stripes (one doped hole per two atoms in a domain wall) involving an on-wall spin-density wave. In spite of better optimizing the potential energy the latter represent only locally stable solutions, both for the t-t'-U Hubbard model at half-filling, and $t' = 0$ off half-filling. However, previous HF studies of the filled stripes have shown that a negative ratio of next nearest-neighbor to nearest-neighbor hopping $t'/t < 0$, relevant to the doped CuO_2 planes of high-T_c superconductors, gives a positive kinetic energy contribution, expelling holes from antiferromagnetic domains and reinforcing the stripe order [2]. Guided by this observation we show here that half-filled stripes accommodate holes markedly easier than the filled ones. Consequently, the former take over in the regime of $t'/t \simeq -0.3$ appropriate for $YBa_2Cu_3O_{6+x}$.

[1] J. Zaanen and A. M. Oleś, Ann. Phys. (Leipzig) **5**, 224 (1996).
[2] M. Raczkowski, B. Normand, and A. M. Oleś, Phys. Stat. Sol. (b) **236**, 376 (2003).

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13.4 cm

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