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Quantum phase diagram of the half filled Hubbard model with bond-charge interaction ARIEL DOBRY, Instituto de Física Rosario (Argentine), ARMANDO ALIGIA, Centro Atómico Bariloche and Instituto Balseiro (Argentine) — Using field theoretical bosonization, we determine the quantum phase diagram of the one-dimensional Hubbard model with bond-charge interaction X in addition to the usual Coulomb repulsion U at half-filling, for small values of the interactions. We show that it is essential to take into account formally irrelevant terms of order X. They generate relevant terms proportional to X^2 in the flow of the renormalization group (RG). The model shows three phases separated by a charge transition at $U = U_c$ and a spin transition at $U = U_s > U_c$. For $U < U_c$ singlet superconducting correlations dominate, while for $U > U_s$, the system is in the spin-density wave phase as in the usual Hubbard model. For intermediate values $U_c < U < U_s$, the system is in a spontaneously dimerized bond-ordered wave phase, which is absent in the ordinary Hubbard model with $X = 0$. We provide an analytical expression for $U_s(X)$. The results, with only one adjustable parameter, are in excellent agreement with numerical ones for $X < t/2$ where t is the hopping.

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