

Erratum: Fermion-mediated long-range interactions of bosons in the one-dimensional Bose-Fermi-Hubbard model [Phys. Rev. A **81, 011603 (2010)]**

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In our paper we discussed the ground-state phase diagram of a mixture of bosons and spin-polarized fermions in the limit of ultralight fermions. Unfortunately, we overlooked a factor of $\sqrt{2\pi}$ in the solution of the free fermion problem in the presence of the boson-induced alternating potential. This factor leads to slight modifications of some of the equations resulting in a much better agreement of the numerical data to the analytic predictions.

The main difference occurs in the definition of the amplitude factor a before Eq. (3). It should read

$$a = \frac{V\eta}{4J_F}, \quad (1)$$

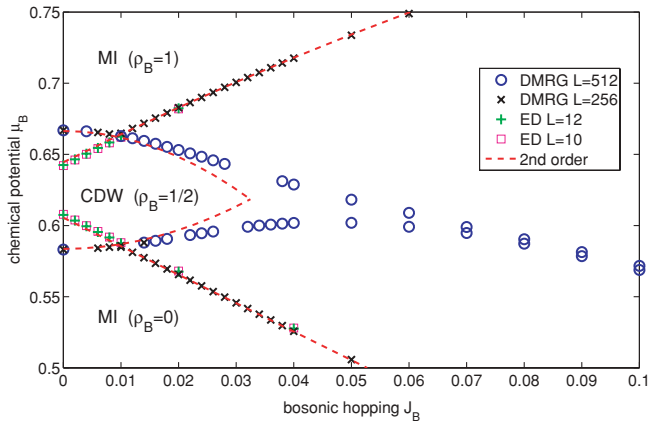


FIG. 1. (Color online) Boundaries of the incompressible Mott insulator (MI) phases and the CDW phase for half fermion filling $\rho_F = 1/2$, $J_F = 10$, and $V = 1.25$ obtained by the density-matrix renormalization group (DMRG) and for small values of J_B by exact diagonalization (ED). One recognizes the partial overlap between the MI and CDW phases for small values of J_B indicating regions of spatial phase separation (PS) between MI and CDW. The dashed lines are results from the second-order perturbation theory based on the effective bosonic model with the corrected amplitude, Eq. (1).

which alters the amplitude of the induced fermionic charge-density wave (CDW) η_F defined after Eq. (4) according to

$$\eta_F = \frac{2a}{\pi\sqrt{1+a^2}} K \left[\frac{1}{1+a^2} \right]. \quad (2)$$

These corrected equations now exactly reproduce the numeric results for the fermionic problems. Furthermore, the critical point of the CDW phase determined from the strong coupling theory (last page) is now calculated to be $J_B^{\text{CDW}} = 0.0325$. The overall agreement of the analytic predictions to the numerical results becomes much better as can be seen in the corrected Figs. 1 and 2 given below. All conclusions of our work remain unchanged.

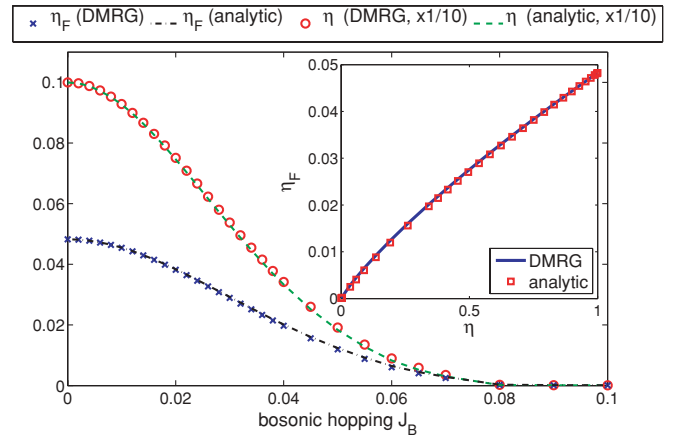


FIG. 2. (Color online) CDW amplitudes of bosons (red open circles) and fermions (blue crosses) for double half filling as a function of normalized boson hopping. Dash-dotted line: calculated factor a from the fermionic data. Dashed line: analytic estimate of the bosonic amplitude from the fermionic input a . With the corrected value of a , Eq. (1), one now finds perfect agreement between the numerical and analytical data.

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