Errata

Erratum: Spontaneous dimerization in the $S=\frac{1}{2}$ Heisenberg antiferromagnetic chain with competing interactions [Phys. Rev. B 25, 4925 (1982)]

F. D. M. Haldane

It has come to light that an error was made in obtaining the coefficients of the effective Hamiltonian (3) by linearization of the lattice fermion model (2) (the sign of the "Hartree-Fock" renormalization of the Fermi velocity due to the new term J_2 was inadvertently reversed). The corrected effective Hamiltonian now gives the impressively accurate value $\eta=0.9937$ for the correlation exponent of the isotropic model $|\Delta|=1$ satisfying the condition $\gamma_2=0$ for the umklapp process to be absent (the exact value is $\eta=1$).

Equation (3) for the effective Hamiltonian should read

$$\mathcal{H}^{\text{eff}}=J_1\int dx\left\{i\sum_p p\psi_p^\dagger\nabla\psi_p\right\}+\gamma_1\left\{\sum_{pp'}\rho_p\rho_{p'}\right\}+\gamma_1'\left\{\sum_{pp'}pp'\rho_p\rho_{p'}\right\}+\gamma_2\left\{\sum_p e^{i4pk_F x}(\psi_p^\dagger\nabla\psi_p^\dagger)(\psi_{-p}\nabla\psi_{-p})\right\}\ . \tag{3}$$

The couplings γ_1 and γ_1' are given by $\gamma_1=2|\Delta|$, $\gamma_1'=-4J_2/J_1$ (instead of $\gamma_1=2|\Delta|+4J_2/J_1$, $\gamma_1'=0$, as in the original version). The coupling γ_2 remains unchanged with value $\gamma_2=(|\Delta|-6J_2/J_1)$.

The formula for the correlation exponent η in the harmonic approximation that ignores the umklapp coupling γ_2 (p. 4926, line 6) should now read

$$\eta=(\tfrac{1}{4}+\gamma_1/2\pi)^{1/2}/(1+2\gamma_1'/\pi)^{1/2}\ .$$

The above-mentioned value $\eta=0.9937$ results from combining the nonumklapp condition $\gamma_2=0$ (i.e., $J_2/J_1=|\Delta|/6$) with the spin-isotropy condition $|\Delta|=1$.

The error was spotted as a result of numerical calculations under way to test the theory of the dimerization transition that was presented. These results are planned to be reported elsewhere.[1]

[1]R. Jullien and F. D. M. Haldane (unpublished).

Erratum: Dislocations in the commensurate-incommensurate transition [Phys. Rev. B 25, 6981 (1982)]

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Below formula (1) it is stated that the model (1) does not explicitly include the logarithmic elastic interaction between dislocations. This is wrong, or at best misleading.

In the "noninteracting" system determined by the first term in (1) it is not present, but including the second term the domain walls will distort around dislocations giving the logarithmic interaction, as in a usual elastic medium, so long as we are in the incommensurate phase where walls are present. In the commensurate phase these forces are not present and should not be. Using the full Hamiltonian (1) the dislocations indeed screen each other as correctly stated so the logarithmic forces disappear.

Hence the discrete model (1) is quite equivalent to the continuum sine-Gordon model considered by T. Bohr, V. L. Pokrovskii, and A. L. Talapov {Pis'ma Zh. Eksp. Teor. Fiz. 35, 165 (1982) [JETP Lett. 35, 203 (1982)]}, except that the latter includes "antiwalls" as well, and the results are very similar.