Erratum: Universal scaling functions of critical Casimir forces obtained by Monte Carlo simulations [Phys. Rev. E 79, 041142 (2009)]

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In the inset of Fig. 13 instead of the scaling function $\vartheta(x)$ of the critical Casimir force f_C obtained from the ϵ-expansion we inadvertently reported the corresponding prediction for twice the scaling function $\Theta(x)$ of the excess free energy f^{ex}:

$$f^{\mathrm{ex}}(\beta,L) = \beta L[f - f^{\mathrm{bulk}}(\beta)] \equiv L^{-(d-1)}\Theta(\tau(L/\xi_0^+)^{1/\nu}).$$

Here $x=\tau(L/\xi_0^+)^{1/\nu}$ is the scaling variable, $\tau=(T-T_c)/T_c$ is the reduced temperature, and $d=3$ is the spatial dimensionality.

The relationship between these two scaling functions follows from $f_C=-\partial f^{\mathrm{ex}}/\partial L$:

$$\vartheta(x) = (d-1)\Theta(x) - \frac{x}{\nu}\Theta'(x).$$

Accordingly, the solid line in the inset of Fig. 13 misses, for ϑ, the second term on the right-hand side, which, however, vanishes at bulk criticality $x=0$. The corrected version of the figure is provided below together with the corresponding caption. The agreement between the correct ϵ-expansion result and the Monte Carlo data improves.

We are thankful to Boris Kastening and Volker Dohm [1] for alerting us to this issue.

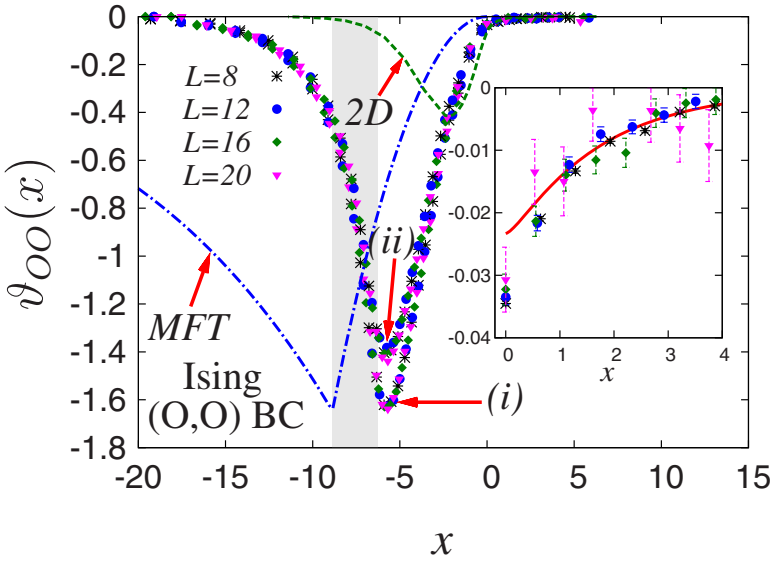

FIG. 13. (Color online) Scaling function ϑ_{OO} of the Casimir force for the three-dimensional Ising model with (O,O) BC and zero bulk field. The MC data refer to lattices with $L=8$, 12, 16, 20 and with a fixed inverse aspect ratio $1/\rho=6$. Corrections to scaling have been accounted for according to two different ansätze, provided by Eqs. (20) and (21), and the corresponding numerical results are denoted by (i) and (ii), respectively. With corrections of the form (ii), the *shape* of the resulting scaling function is almost indistinguishable from the one obtained with corrections of the form (i), but its overall amplitude is reduced by a factor $R\simeq 0.866$. For comparison we show the exact result for the 2D Ising model [23] (dashed line) and the mean-field prediction [30] (dash-dotted line) normalized such that it yields the same depth of the minimum as the one of the MC data (i). In the inset we compare the MC data corresponding to the case (i) with the scaling function obtained from the ϵ-expansion [7]. The gray bar indicates the value $x_{OO}^*=-7.6(1.3)$ (and its uncertainty) of the scaling variable x corresponding to the occurrence of the shifted critical point, inferred from extrapolating the data in Table II of Ref. [50] to $L\to\infty$.

[1] Boris Kastening and Volker Dohm, e-print arXiv:0907.1613.

