Erratum: Fluids in Extreme Confinement [Phys. Rev. Lett. 109, 240601 (2012)]

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In our recent work a term contributing to the transversal pressure [cf. Eq. (9)] has been overlooked, which arises from the L dependence of the 2D-reference hard-disk fluid via the diameter $\sigma_L = \sqrt{\sigma^2 - L^2}$.

By dimensional analysis the free energy $F_{\mathrm{ex}}^{\parallel}$ of the 2D-reference fluid is a function of the dimensionless area per particle $A/N\sigma_L^2$. Then, the derivative of the free energy of the reference fluid with respect to L is calculated to

$$-\partial F_{\mathrm{ex}}^{\parallel}/A\partial L = \pi n^2 k_B T L g(\sigma_L^+) = \pi n^2 k_B T L g(\sigma^+) + \mathcal{O}(L^3),$$

where the virial equation of the 2D-reference fluid $\Sigma_{\mathrm{ex}} = -\partial F_{\mathrm{ex}}^{\parallel}/\partial A = \pi n^2 \sigma_L^2 g(\sigma_L^+) k_B T/2$ has been employed. Inclusion of this term in Eq. (9) leads to the correct expression for the transversal pressure

$$p = \frac{n k_B T}{L}\left[1 + \frac{1}{6}\pi n L^2 g(\sigma^+) + \mathcal{O}(nL^2)^2\right].$$

Note, that the transversal pressure of the extremely confined fluid is larger than for a corresponding ideal gas.

