Erratum: Bending Rigidity of 2D Silica [Phys. Rev. Lett. 120, 226101 (2018)]

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Although the results presented in this Letter reporting the measurement of the bending rigidity constant κ of a two-dimensional (2D) bilayer of SiO_2 (silica) remain completely unaffected, it has been brought to our attention that in Eq. (2) we repeated an incorrect expression for the dispersion of the shear vertical (ZA) mode of a freestanding thin membrane with fixed edge (d'Alembert) boundary conditions [1]. The correct expression is

$$\omega_{\mathrm{ZA}}^2(\Delta\mathbf{K}) = v_{\mathrm{ZA}}^2\Delta\mathbf{K}^2 + \frac{\kappa}{\rho_{\mathrm{2D}}}\Delta\mathbf{K}^4, \tag{1}$$

where $\Delta\mathbf{K}$ is the parallel wave vector transfer, ρ_{2D} is the 2D mass density of the membrane, $v_{\mathrm{ZA}} = \sqrt{c_{44}/\rho_{\mathrm{2D}}}$, and c_{44} is the shear force constant [2–4]. In Eq. (2) the acoustic term $v_{\mathrm{ZA}}^2\Delta\mathbf{K}^2$ was missing, which makes it to be the correct dispersion equation for a large thin freestanding membrane with free edge (Lagrange) boundary conditions. Typically, the leading term in Eq. (1) is small and the dispersion is dominated by the term in $\Delta\mathbf{K}^4$ except at very large wavelengths compared to the lattice spacing.

When a thin membrane is supported on a flat and ordered substrate, the ZA mode dispersion has been reported to be [5]

$$\omega_{\mathrm{ZA}}^2(\Delta\mathbf{K}) = \omega_0^2 + \frac{\kappa}{\rho_{\mathrm{2D}}}\Delta\mathbf{K}^4, \tag{2}$$

where ω_0 is the gap frequency due to the coupling between the film and substrate. This is the expression used to extract, from measured He atom scattering spectra, the value of the flexural constant κ for bilayer SiO_2, and which has also been used similarly with monolayer graphene on several close packed metal substrates [6].

In principle, since a supported thin membrane corresponds to d'Alembert boundary conditions, a quadratic (acoustic) term similar to that of Eq. (1) should also appear in Eq. (2), but such a term is of negligible importance because it is completely dominated at small $\Delta\mathbf{K}$ by the constant term. Thus the values κ for the bending rigidity of bilayer SiO_2 as determined from our He atom scattering experiments, and all other conclusions in our Letter, remain completely unaffected. For a detailed explanation of the d'Alembert and Lagrange solutions, together with references, see Ref. [1].

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