

Casimir Effect: Theory and Applications

Workshop talk

Nonlocal Electrostatics in Electrolytes: Consequences for Screened Electrostatic Interactions

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Screened electrostatic surface forces, also called double layer forces, between surfaces in ionic liquids and concentrated electrolyte solutions can, depending on the circumstances, decay in an exponentially damped, oscillatory manner or in a plain exponential way with a long decay length (the latter as in dilute electrolyte solutions where ion–ion correlations are very weak). A vital ingredient in an understanding of these decay behaviours is the fact that electrostatics in dense electrolytes have a non-local nature caused by strong ion-ion correlations. This can be elucidated by a remarkably simple, general expression for the decay length, that is very similar to the classical expression for the Debye length and is valid for both plain exponential and oscillatory cases. The formally exact theoretical treatment highlights the role of dielectric response of the fluid in terms of renormalised (effective) dielectric permittivity and renormalised charges.

References: R. Kjellander, *J. Chem. Phys.* **148** (2018) 193701; *Phys. Chem. Chem. Phys.* **18** (2016) 18985; *J. Chem. Phys.* **145** (2016) 124503.