Orientational dependent van der Waals forces and their application to spectroscopy

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Van der Waals forces are intermolecular forces acting on large separations. They are due to ground-state fluctuations of the electromagnetic field which couple to the particles' polarisabilities, inducing dipole moments [1]. The orientation of the induced dipoles, leads to an orientational dependence of the resulting potential. We develop a method for describing this effect efficiently by introducing eccentricities of the tensor-valued polarisability. Further, we present an effective modelling of the interaction between particles which are simultaneously anisotropic and finite-sized [2].

An alternative interpretation of the van der Waals potential is an influx of energy caused by the presence of the second object which can be measured via spectral shifts. This is also valid for the orientational dependence of the van der Waals forces, providing a means for monitoring the orientation of two particles spectoscopically [3].

References

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