

## Quantum Physics

# Local-field corrected van der Waals potentials in magnetodielectric multilayer systems

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Within the framework of macroscopic quantum electrodynamics in linear, causal media, we study the van der Waals potentials of ground-state atoms in planar magnetodielectric host media. Our investigation extends earlier ones in two aspects: It allows for the atom to be embedded in a medium, thus covers many more realistic systems; and it takes account of the local-field correction. Two- and three-layer configurations are treated in detail both analytically and numerically. It is shown that an interplay of electric and magnetic properties in neighbouring media may give rise to potential wells or walls. Local-field corrections as high as 80% are found. By calculating the full potential including the translationally invariant and variant parts, we propose a way to estimate the (finite) value of the dispersion potential at the surface between two media. Connection with earlier work intended for biological applications is established.

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