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Solid-State Physics

Stefan Yoshi Buhmann

Dispersion Forces II

Many-Body Effects, Excited Atoms, Finite Temperature and Quantum Friction

In this book, a modern unified theory of dispersion forces on atoms and bodies is presented which covers a broad range of advanced aspects and scenarios. Macroscopic quantum electrodynamics is shown to provide a powerful framework for dispersion forces which allows for discussing general properties like their non-additivity and the relation between microscopic and macroscopic interactions. It is demonstrated how the general results can be used to obtain dispersion forces on atoms in the presence of bodies of various shapes and materials. Starting with a brief recapitulation of volume I, this volume II deals especially with bodies of irregular shapes, universal scaling laws, dynamical forces on excited atoms, enhanced forces in cavity quantum electrodynamics, non-equilibrium forces in thermal environments and quantum friction. The book gives both the specialist and those new to the field a thorough overview over recent results in the field. It provides a toolbox for studying dispersion forces in various contexts.

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