Q 44 Gruppenberichte Quanteneffekte

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Gruppenbericht

Q 44.1 Di 14:00 HU 1072

Casimir-Polder forces in multilayer magnetodielectrics — •Stefan Yoshi Buhmann[1], Thomas Kampf[2], and Dirk-Gunnar Welsch[1] — [1]Theoretisch-Physikalisches Institut, Friedrich-Schiller-Universität Jena, Max-Wien-Platz 1, 07743 Jena, Germany — [2]Fachbereich Physik, Universität Rostock,Universitätsplatz 3, 18051 Rostock, Germany

It has long been known that the vacuum fluctuations of the electromagnetic field can give rise to a force between electrically polarizable objects - the most prominent examples for this effect being the Casimir interaction between two metallic or dielectric plates, the Casimir-Polder interaction between single atoms and macroscopic objects, and the van-der-Waals interaction between two atoms. From the duality between electric and magnetic fields one can infer that simlar interactions should arise if one or both of the interacting objects is magnetically polarizable.

Motivated by this observation, we study the Casimir-Polder force between an atom and a magnetodielectric multilayer system, where attention is focussed on systems possessing non-trivial magnetic properties. We approach the problem using a recently developed theory of Casimir-Polder forces which is based on macroscopic QED in dispersive and absorbing media. In close analogy to the repulsive Casimir interaction between a magnetic and a metallic plate it is found that the ground-state Casimir-Polder potential of an atom near a magnetic multilayer system is repulsive. In addition, effects due to absorption, finite layer thickness as well as multiple reflections are analysed.