

Nernst heat theorem for the Casimir-Polder interaction between a magnetizable atom and ferromagnetic dielectric plate

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Abstract

© 2020 World Scientific Publishing Company. We find the low-Temperature behavior of the Casimir-Polder free energy for a polarizable and magnetizable atom interacting with a plate made of ferromagnetic dielectric material. It is shown that the corresponding Casimir-Polder entropy goes to zero with vanishing temperature, i.e., the Nernst heat theorem is satisfied, if the dc conductivity of the plate material is disregarded in calculations. If the dc conductivity is taken into account, the Nernst theorem is violated. These results are discussed in light of recent experiments.

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Keywords

Casimir-Polder free energy, ferromagnetic dielectrics, Nernst heat theorem

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