Workshop (one day)

Dispersion forces and dissipation

November 1, 2017
at the Institute for Theoretical Physics, Universität Leipzig

Abstracts

R. Bennett (U Freiburg)
A sum rule for perfect electromagnetic conductor (PEMC) Casimir forces
Abstract:

M. Bordag (U Leipzig)
Casimir and Casimir-Polder forces with dissipation from first principles
Abstract:
We consider Casimir-Polder and Casimir forces with finite dissipation by coupling heat baths to the dipoles introducing, this way, dissipation from 'first principles'. We derive a representation of the free energy as an integral over real frequencies, which can be viewd as an generalization of the 'remarkable formula' introduced by Ford et. al. 1985. For instance, we obtain a nonperturbative representation for the atom-atom and atom-wall interactions. We investigate several limiting cases. From the limit $T \to 0$ we show that the third law of thermodynamics cannot be violated within the given approach, where the dissipation parameter cannot depend on temperature 'by construction'. We conclude, that the given approach is insufficient to resolve the thermodynamic puzzle connected with the Drude model when inserted into the Lifshitz formula. Further we consider the transition to Matsubara representation and discuss modifications of the contribution from the zeroth Matsubara frequency.

G. Ingold (U Uagsburg)
Aspects of the Casimir effect in the sphere-plane geometry
Abstract:
We will consider two aspects of the Casimir effect at finite temperatures in the sphere-plane geometry. First, we disentangle the dissipative and the geometric origin of a negative Casimir entropy by means of a scattering channel analysis. Then, we will show how the numerical evaluation of the Casimir force in the sphere-plane geometry can be pushed into the experimentally relevant parameter range. In particular, we will discuss the numerically obtained corrections to the proximity-force approximation for the plasma and the Drude description of the electromagnetic response.

C. Henkel (U Potsdam)
Entropy production and entanglement forces?
Abstract:

F. Intravaia (Max-Born-Institut and Humboldt-Universitt zu Berlin)
Thermodynamics of overdamped electromagnetic modes
Abstract:
We investigate the quantum-thermodynamic properties of overdamped electromagnetic modes (eddy currents) in the context of the Casimir-Polder interaction. We focus on the system's entropy and discuss it properties at low temperature.

G. Klimchitskaya (St.Petersburg)
The Casimir effect for thin films and the models of dissipation

Abstract:

A. Lopez (IQOQI Innsbruck)
Heat flux and Casimir forces in non-equilibrium scenarios
Abstract:
We develop a general canonical quantisation procedure within the open quantum systems framework with the aim of study non-equilibrium scenarios including dissipative material bodies. We show the different contributions that are present depending on the material configuration addressed. For the two finite width plate configuration, we study both, the non-equilibrium Casimir force and the heat flux between the plates. For the latter we show that the Landauer's formula is not valid for every scenario, while for the former how to correctly derive non-equilibrium Lifshitz's formula as a limiting case of the finite width expressions. Finally, we also show numerically how to tailor the heat flux between plates in different situations of potential nanotechnological application."

V. Mostepanenko (St.Petersburg)
Universal experimental test for the role of dissipation in the Casimir effect
Abstract:

I. Pirozhenko (JINR Dubna)

S. Scheel (U Rostock)