

MP 6: Quantum Statistical Mechanics

Time: Tuesday 16:30–16:55

Location: H7

MP 6.1 Tue 16:30 H7

Quantum vacuum physics in dielectric media with dispersion and dissipation — ●SASCHA LANG^{1,2}, RALF SCHÜTZHOLD^{1,3,2}, and WILLIAM G. UNRUH⁴ — ¹Helmholtz-Zentrum Dresden-Rossendorf, 01328 Dresden, Germany — ²Fakultät für Physik, Universität Duisburg-Essen, 47057 Duisburg, Germany — ³Institut für Theoretische Physik, Technische Universität Dresden, 01062 Dresden, Germany — ⁴Department of Physics and Astronomy, University of British Columbia, Vancouver V6T 1Z1, Canada

Experiments on quantum radiation (particle creation from vacuum)

often pose major challenges when probing relativistic quantum field theories. Sometimes, effective field theories in suitable condensed matter systems may be accessible more easily. However, such systems are generally affected by material properties such as dispersion and dissipation.

We study quantum vacuum physics in a dielectric medium featuring both dispersion and dissipation. To this end, we explicitly add an environment field to the standard ‘Hopfield model’ for dispersive but non-dissipative dielectric media. The refined model allows for an ‘ab initio’ treatment of dissipation and we consider an application in which the interplay of dispersion and dissipation plays a role.