Carl von Ossietzky
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Institut für Physik

Physical Colloquium

„(Quantum) Light Control of Materials“

Prof. Dr. Dante Kennes
Institut für Theorie der statistischen Physik,
RWTH Aachen

Colloquium on

Monday, 20.10.2025, 2.15 p.m.
Room No. W02 1-148

Light offers a versatile handle for tailoring quantum materials. I will outline two complementary examples focusing on their theoretical and computational nonequilibrium quantum many-body descriptions: (i) Ultrafast optical drives can transiently reshape a solid’s symmetry and electronic structure, where for the latter Floquet engineering provides the framework for accessing and stabilising novel non-equilibrium phases [1]. (ii) Embedding a material in an optical cavity couples it to quantised photon modes, unlocking new many-body phenomena in the realm of cavity quantum electrodynamics [2]. I will close with an outlook on merging these strategies with the flexibility of two-dimensional heterostructures to enable on-demand design of quantum functionalities [3].

[1] Rev. Mod. Phys. 93, 041002 (2021)
[2] Appl. Phys. Rev. 9, 011312 (2022)
[3] Nat. Phys. 17, 155 (2021)

Host: Prof. Dr. Christian Schneider