



LUDWIG-
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MÜNCHEN

ARNOLD SOMMERFELD
CENTER FOR THEORETICAL PHYSICS



Arnold Sommerfeld Lecture Series

Professor Eugene Demler

ETH Zürich

Research Seminar:

Photons for many body physics:
a platform and probe

In this talk, I will discuss the applications of cavity electrodynamics for controlling many-body electron systems. The focus will be on achieving strong coupling between cavities and collective excitations of interacting electrons at Terahertz and IR frequencies. As a specific example I will consider a cavity platform based on a two dimensional electronic material encapsulated by a planar cavity consisting of ultrathin polar van der Waals crystals. I will also discuss how metallic mirrors sandwiching a paraelectric material can modify the transition into the ferroelectric state. Finally, I will review a general question of theoretically describing ultrastrong coupling waveguide QED. I will present a novel approach to this problem based on a non-perturbative unitary transformation that entangles photons and matter excitations. In this new frame of reference, the factorization between light and matter becomes exact for infinite interaction strength and an accurate effective model can be derived for all interaction strengths.

Thursday, April 18, 2024, 14:15 h, Room A348, Theresienstr. 37, LMU