

PHYSICAL COLLOQUIUM

INVITATION

Monday, 05.07.2021, 4.15 p.m.,
video conference: <https://meeting.uol.de/b/anj-2vc-j6s-fwe>

speaks

Prof. Dr. Christian Schneider,
Institut für Physik, AG Quantenmaterialien, Universität Oldenburg

about

“Exploring real- and synthetic two-dimensional quantum matter via coherent light-matter interaction”

Controlling and engineering materials on the nanoscale is critical to access and manipulate their most fundamental optical - and electronic properties: Beyond conventional material engineering, coherent light-matter coupling has been identified as an interesting tool to enhance and explore some of the most fundamental properties in quantum materials. At the same time, it can be directly exploited to design and built a new generation innovative photonic devices.

Within this talk, I would like to provide a general overview of the activities and research strategy of the quantum materials group. I will then discuss two recent experiments, based on the strong light-matter coupling between a quantum material (such as an atomically thin crystal sheet) and a microcavity resonant mode.

First, I will explain how the Bose condensation of exciton-polaritons up to ambient conditions can be observed in such structures, with a clear transition from a dilute gas to a highly degenerate condensate [1,2].

Second, I will highlight a recent technological achievement, which will allow to load such condensates (or potentially single quanta of excitation) in highly tunable optical lattices to explore synthetic matter regarding their topological properties and correlations. [3]

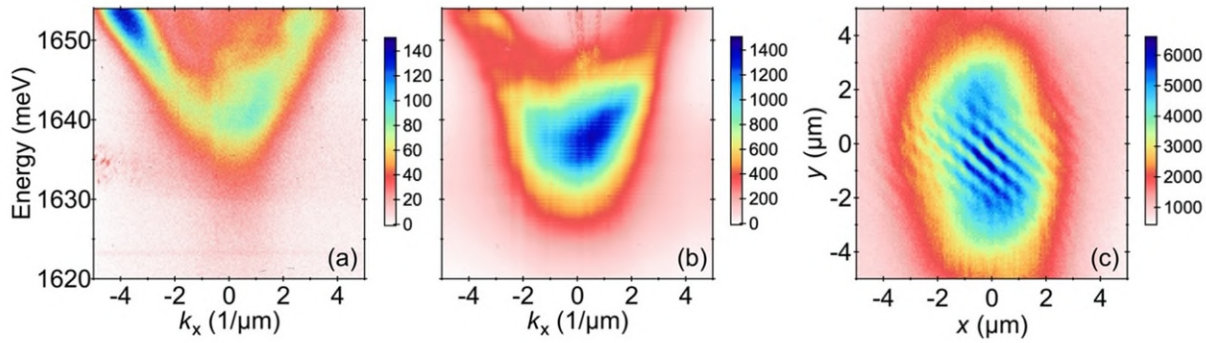


Figure 1. Polariton dispersion relation below (0.1 Pth, panel a, excitation laser at 1.671 eV) and above threshold (2Pth, panel b). (c) Real space interference pattern produced in a Michelson interferometer.

[1] C. Anton-Solanas, et al. *Nat. Materials* 1-7 (2021).

[2] H. Shan et al. *Arxiv 2103.10459* (2021)

[3] L. Lackner et al. *Arxiv 2102.09565* (2021).

All interested persons are cordially invited.

Sgd. Prof. Dr. Christian Schneider