

13. Mai 2022

Einladung zum Physikalischen Kolloquium

20.05.2022 **Falk Eilenberger, Friedrich-Schiller-Universität Jena**

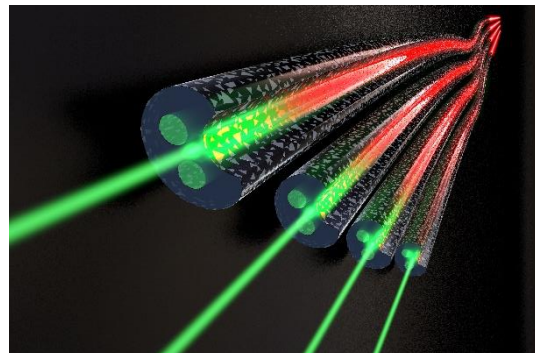
**»Integration of two-dimensional materials in optical systems:
towards nonlinear waveguides, integrated quantum light sources,
and polariton physics«**

Einführung: C. Rockstuhl

Abstract: Monolayer materials are a natural addition to the set of optical materials and can be used to functionalize classic micro- and nanooptical systems. Moreover, they grow in a crystalline manner on many substrates and structures, irrespective of epitaxial compatibility, which allows for scalable integration with many optical systems. I will discuss some strategies which can be used to integrate 2D-materials with coatings, resonators, and waveguides, without massively degrading their properties.

From an optics point-of-view transition-metal dichalcogenides (TMCs) and hexagonal Boron-Nitride (hBN) are particularly appealing material classes. TMCs are direct semiconductors with bandgaps in the visible. They exhibit unusually high refractive indices, strong and highly sensitive fluorescence, and large nonlinear coefficients. hBN, on the other hand, is a large bandgap dielectric, with stable, room-temperature single-photon emitters.

Based on the established materials platform and integration techniques I shall discuss nanoscale light sources, based on polaritonic lasing and one-dimensional p-n-junctions. Another topic is the integration of 2D-materials with optical fibers and nanophotonic waveguides. These waveguides enhance light-matter interaction and enable sensing applications and new pathways to fiber-based nonlinear optics. Moreover, I will discuss single photon emitters in hBN and argue that they are not only suitable for miniature and space-compatible QKD-devices but that they enable new applications in optical sensing, such as a highly sensitive test of Born's rule.



Der Vortrag findet um **15:45 Uhr im Otto-Lehmann-Hörsaal**, Physik-Flachbau (Geb. 30.22), statt. Zusätzlich wird der Vortrag im Livestream angeboten:

<https://kit-lecture.zoom.us/j/65883974833>

Meeting ID: 658 8397 4833

Passcode: 303465