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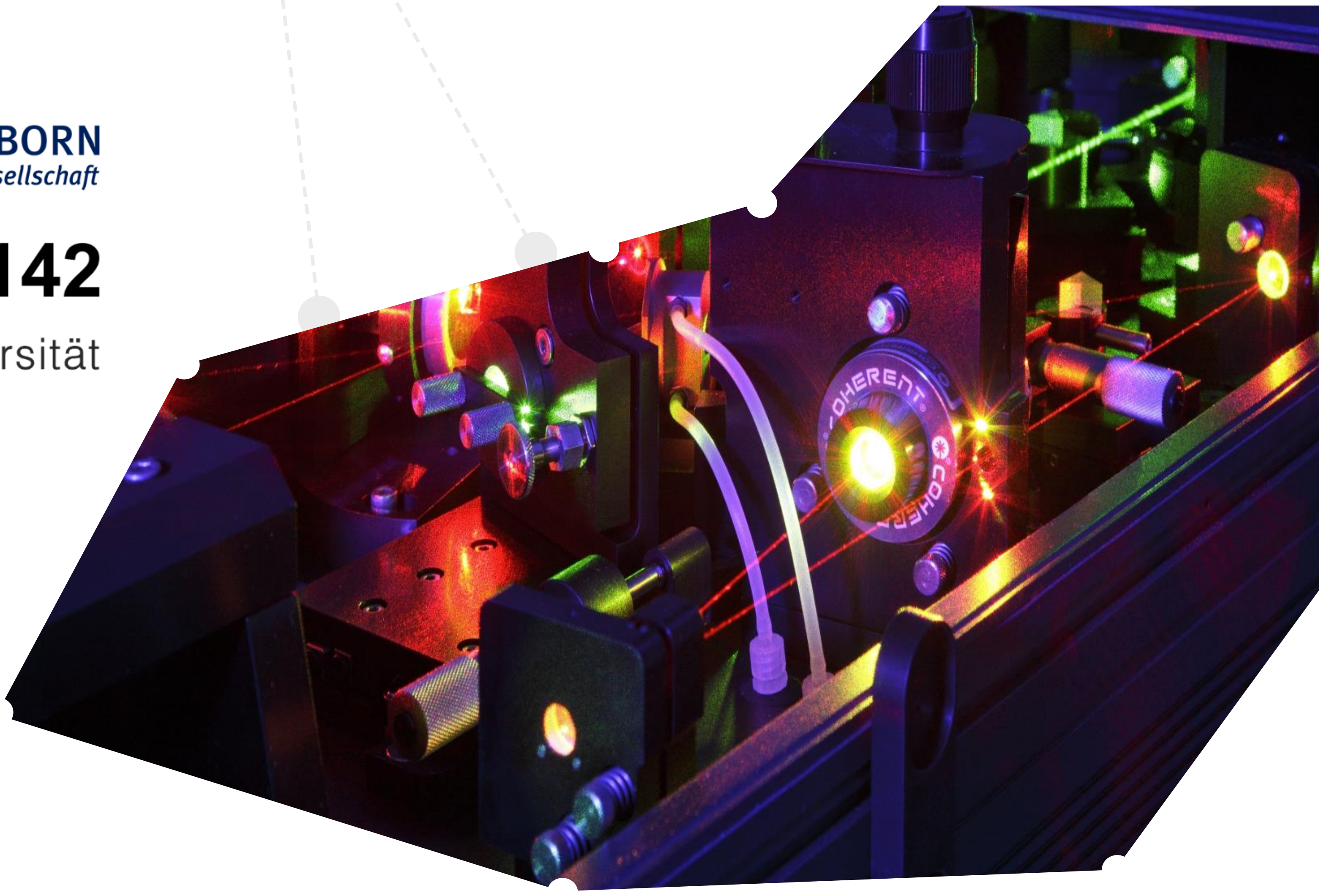

PADERBORN PHOTONIC LECTURE

THURSDAY, 15TH SEPTEMBER 2022

PROF. DR. ERMIN MALIC

UPB | LECTURE HALL A.1 | 14:00 H

Ultrafast exciton dynamics in atomically thin semiconductors

Monolayer transition metal dichalcogenides (TMDs) and related van der Waals heterostructures exhibit a rich exciton physics including bright and a variety of dark states as well as spatially separated interlayer excitons. Solving 2D material Bloch equations for excitons, phonons and photons, we obtain a microscopic access to the interplay of optics, ultrafast dynamics and diffusion of excitons in these technologically promising materials. In joint theory-experiment studies we shed light on the importance of momentum-dark excitons in low-temperature photoluminescence spectra [1], temperature-resolved exciton-exciton annihilation [2], and exciton (anti-)funnelling [3] in strained TMD monolayers. Furthermore, we investigate twist-angle dependent trapping of excitons in moiré potentials [4] as well the ultrafast charge transfer dynamics in TMD heterostructures [5].

The gained microscopic insights into the spatiotemporal exciton dynamics are crucial for understanding and controlling many-particle phenomena governing exciton optics, dynamics and transport in technologically promising 2D materials and related heterostructures.

Prof. Dr. Ermin Malic
Philipps Universität Marburg
(Photo: Jan Hosan)