



Physikalisches Institut  Institut für Festkörperteorie

Integriertes Seminar

Aktuelle Probleme dimensionsreduzierter Festkörper

Sondertermin

Ort: Seminarraum 718 (Wilhelm-Klemm-Straße 10)

Zeit: **Freitag, 21.09.2018, 11:00 Uhr (s.t.)**

Lasing and Origin of Optical Gain in 2D Transition Metal Dichalcogenides

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2D transition metal dichalcogenides (TMDCs) provide many unique opportunities for both fundamental studies as well as for technological applications. On the fundamental side, the co-existence and mutual conversion dynamics of exciton and associated complexes such as trions and bi-excitons are related to important issues such as the Mott transition and are at the core of condensed matter physics. Such issues can now be studied in 2D materials in much larger range of energies, at much higher temperatures, or in larger range of control parameters than possible in conventional semiconductors. From the application point of view, 2D materials could potentially provide the thinnest optical materials with strong optical transitions for low energy photonic applications, such as nanolasers for future on-chip interconnects.

This talk will focus on recent efforts in demonstrating lasing operation using 2D TMDCs, after a brief review of semiconductor nanolasers. We will discuss recent results in demonstrating the room temperature lasing operation using a monolayer of molybdenum ditelluride integrated with a 1D silicon photonic crystal nanobeam cavity. One of the unresolved issues of optical study of 2D TMDCs is the origin of optical gain in low density regime. We will present some of our recent spectroscopic studies of exciton complexes and the possible correlation with existence and origin of optical gain in such 2D materials.

Einladender: Tilmann Kuhn