



CRC Seminar Series

DATE: 18 February 2021
TIME: 3:00 PM – 5:00 PM
LOC: Online Zoom Meeting



GUEST SPEAKER:

Dr Alexey Chernikov

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TITLE:

"Mobile excitations in 2D inorganic and hybrid materials"

ABSTRACT:

Transport of optical excitations in semiconducting solids plays a central role from both fundamental and technological perspectives. In systems with strong Coulomb interaction the propagation of optically injected carriers is dominated by excitons instead of free electrons or holes. This can affect both the overall energy landscape and the interactions with vibrational modes, with a strong impact on the mobility of the excitations.

Here, I will present recent studies of exciton propagation in semiconducting van der Waals monolayers and hybrid two-dimensional materials, directly monitored via time-resolved optical microscopy. I will discuss linear and non-linear phenomena arising from efficient interactions as well as illustrate intriguing temperature-dependent dynamics revealing distinct regimes of exciton propagation. Particular focus will be placed on the impact of efficient coupling to vibrational modes and the influence of disorder from local fluctuations of the dielectric environment. Finally, I will discuss the interplay between free carriers and excitons at room temperature conditions and the limits of semi-classical description for exciton transport, with an outlook towards future directions.

PROFILE OF DR ALEXEY CHERNIKOV:

Alexey Chernikov received his Ph.D. from the University of Marburg (Germany) for the work on the optical properties of semiconducting materials and external cavity semiconducting lasers. With a Feodor-Lynen Fellowship from the Alexander von Humboldt Foundation, he joined the group of Tony F. Heinz at the Columbia University (New York, USA) in 2013 to study Coulomb phenomena in atomically-thin 2D systems. Currently, he leads a research group at the University of Regensburg (Germany) funded by the Emmy-Noether Initiative of the German Research Foundation. He is the recipient of the Heinz-Maier Leibnitz award of the DFG in 2018 and ERC Consolidator Grant in 2020. His research is focused on fundamental interactions of electronic and excitonic many-body states in nanostructured matter.