Max-Planck-Institut für
Struktur und Dynamik der Materie
Max Planck Institute for the Structure and Dynamics of Matter

IMPRS UFAST Call for PhD applications 2020/2021

Floquet twistronics in 2D materials
M. Sentef-2

Title of PhD Project	**Floquet twistronics in 2D materials**
Type	Theory - Areas of research: Condensed Matter Physics
Supervisor(s)	Dr. Michael Sentef
Affiliation(s):	Max Planck Institute for the Structure and Dynamics of Matter
Number of positions:	1
Abstract:	Twisted bilayers of 2D materials have recently received considerable attention [1] because of the opportunity to tune interesting correlated phases of matter, such as superconductivity and correlated insulating states as well as magnetism. On the other hand, Floquet-type light-induced states have been demonstrated in 2D materials as well, such as the light-induced anomalous Hall effect [2,3]. This project aims at building upon recent efforts to understand the combination of Floquet-enginering (photon-dressed band structures) and twisted 2D materials, as demonstrated in our proposal to induce topology in twisted bilayer graphene by appropriate laser driving [4]. In particular, a real-time as well as real-space code will be developed based on Non-Equilibrium Green Functions (NEGF) and Lindblad Master equations for driven-dissipative systems to model ultrafast transport in such twisted heterostructures. The goal of the project is to predict light-induced states that can be measured in ultrafast transport as well as pump-probe experiments, and to visualize light-induced topological edge states that can be measured by ultrafast imaging. [1] Y. Cao et al., Nature 556, 43 (2018) [2] J. McIver et al., arXiv:1811.03522 [3] S. Sato et al., Phys. Rev. B 99, 214302 (2019) [4] G. Topp et al., arXiv:1906.12135
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