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 2022/2023

AR2- Creating synthetic dimensions with light

Title of PhD Project	**Creating synthetic dimensions with light**
Type	Theory
Supervisor(s)	Prof. Dante Kennes, Prof. Peizhe Tang and Prof. Angel Rubio
Affiliation(s):	Max Planck Institute for the Structure and Dynamics of Matter RWTH Aachen University Beihang University
Number of positions:	1
Abstract:	Driving a quantum many-body system allows to realize novel and exotic phenomena. One of these routes of control is Floquet engineering, which exploits that the basic idea that a periodically driven system can be viewed as a quasi-static one in composite real and time space. Using this viewpoint allows to engineer new, synthetic dimensions mixing the space and time paradigm. In this project we aim to explore this avenue of control to study one-dimensional materials and explore how their topological and correlated properties can be altered. One dimensional systems are particularly intriguing in this regard as they exhibit fascinating many-body and topological phenomena on the one hand; and on the other hand are particularly amendable to a theoretical description. The successful candidate will use and develop DFT, tight-binding and tensor network methods to address the above outlined questions with a focus on how synthetic time-space dimensions can be utilized in experiments.
Contact person for scientific questions about the project:	dante.kennes@rwth-aachen.de angel.rubio@mpsd.mpg.de peizhe.tang@mpsd.mpg.de