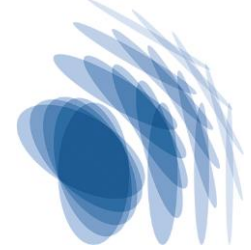


Max-Planck-Institut für Struktur und Dynamik der Materie

Max Planck Institute for the Structure and Dynamics of Matter



IMPRS UFAST Call for PhD applications 2020/2021



Topology with Light

A. Rubio-4

Title of PhD Project	Topology with Light
Type	Theory
Supervisor(s)	Prof. Dante Kennes Prof. Angel Rubio and Prof. Peizhe Tang
Affiliation(s):	Max Planck Institute for the Structure and Dynamics of Matter RWTH Aachen University Beihang University
Number of positions:	2
Abstract:	In this project we aim to bring together two exciting ideas of frontier condensed matter research and material science: the study of low-dimensional topological systems and the novel control opportunities offered by strong lasers. Both of these separate directions have made major experimental and theoretical leaps in the last decade and harbor great technological implications even separately. However, when fused together their true potential is unlocked. Using laser fields should allow us to control, modify, and steer topological properties on ultra-fast (femto to picosecond) time scales in a reversible and flexible manner. However, in this rich field theoretical approaches to describe the light matter interaction in topological systems are still urgently needed. Within this project we will address this theoretical challenge from a two-fold vantage point. We will consider ab initio approaches as well as model Hamiltonian calculations to obtain material specificity as well as accuracy. Methods to be learned and applied include Keldysh Green's function techniques, tensor network approaches as well as density functional theory with a direct connection to experiments. An international and highly collaborative environment was established to accommodate this project resting on the input of three nodes Aachen, Beijing and Hamburg.
Contact person for scientific questions about the project:	Dante Kennes: dante.kennes@rwth-aachen.de Angel Rubio: angel.rubio@mpsd.mpg.de Peizhe Tang: peizhe.tang@mpsd.mpg.de

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