

# Virtual Frühjahrstagung

## DPG Spring Meeting of the Surface Science Division

1<sup>st</sup> - 4<sup>th</sup> March 2021

### Coherent band structure engineering with light

Modern technology is based on condensed matter materials with sophisticated electrical, optical, structural, and topological properties. The design of these properties through different strategies, such as heteroepitaxial growth or impurity doping, has facilitated applications ranging from medicine to smart devices. Taking a step beyond these static approaches, band structure engineering by light, as recently termed Floquet-engineering [1-3], is a new strategy that treats coherent light-matter interaction under extreme conditions: intense time-periodic electromagnetic light-fields impinging onto a solid-state material require the renormalization of the system's eigenstates; dynamical band gap openings or even topological phase transitions can be induced. Therefore, all chemical and physical properties that depend on the electronic band structure become tailorable by the characteristic parameters of the external light field. Research on such out-of-equilibrium phases is largely theory driven [2-5], with selected input from experimental side using optical spectroscopies [6,7], variants of time- and angle-resolved photoelectron spectroscopy [8-10], and transport measurements [11].

In this Mini-Symposia, we aim to provide a platform to engage exchange between theorists and experimentalists working on this field. We would like to tackle open question like:

- What are the major challenges to theoretically describe those out-of-equilibrium phases?
- Which experimental approaches can provide quantitative access to light-engineered band structures? What are the drawbacks, and the advantages of the approaches?
- For which material systems (dissipation channels, and decoherence phenomena), and for which light-field parameters (pulse duration, electric field strength) is light-induced band structure engineering feasible (theoretically & experimentally)?
- More speculative: Can Floquet engineering be used to tailor structural material properties?

We are looking forward to invited talks presented by the following experts:



Prof. Dr. Isabella Gierz-Pehla  
Unü Regensburg



Dr. James McIver  
MPI, Hamburg



Prof. Dr. Netanel Lindner  
Technion, Haifa



Dr. Michael Sentef  
MPI, Hamburg

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