KIDS TALK

“Probing Bloch band geometry with Wilson lines in a honeycomb lattice”

Speaker: Tracy Li, LMU München (AG Bloch)

Abstract: The physical properties of a solid are determined not only by the scalar dispersion of the bands, but also by the geometry of the band eigenstates. While the geometry of single bands is encoded in the Berry connection and the corresponding Berry phase, the geometry of multi-band systems is governed by a matrix-valued Wilczek-Zee connection and the corresponding Wilson lines. Although Berry phases have been directly observed in Bloch bands, the experimental access of Wilson lines has remained an outstanding challenge. Here, we realize the Wilson line formalism using ultracold atoms in a honeycomb lattice and demonstrate how, in addition to being of fundamental interest, Wilson lines can be used as versatile probes of band structure geometry. We present a straightforward and robust method to fully map out the geometric structure of energy bands. Furthermore, our measurements enable us to extract the eigenvalues of Wilson lines. These eigenvalues can be used to formulate topological invariants, such as the Z2 invariant, which can not be obtained by standard Berry phase measurements.

When: Friday, July 10th 2015, **10:00 am**

Where: Room 46-387/388

All undergraduate and graduate students as well as postdocs are welcome and encouraged to join our discussion!

********** COFFEE, TEA AND COOKIES WILL BE SERVED **********

For questions, comments or suggestions: vollmar@rhrk.uni-kl.de

MATERIALS IN MAINZ SCIENCE

OPTIMAS TU Kaiserslautern

TECHNISCHE UNIVERSITÄT KAISERSLAUTERN