

KIDS TALK

“Realization of the Hofstadter Hamiltonian with ultracold atoms in optical lattices”

Speaker: Monika Aidelsburger, LMU München

Abstract: We developed a new experimental technique to simulate strong uniform artificial magnetic fields on the order of one flux quantum per plaquette with ultracold atoms in optical lattices. The underlying method does not rely on the internal structure of the atoms and, therefore, constitutes a general approach to realize artificial gauge fields without the drawbacks of near-resonant optical potentials. Using laser-assisted tunneling in a tilted optical lattice we engineer complex tunneling amplitudes - so called Peierls phases - whose value depends on the position in the lattice. Thereby, atoms hopping in the lattice accumulate a phase shift equivalent to the Aharonov-Bohm phase of charged particles in a magnetic field. We determine the local distribution of fluxes through the observation of cyclotron orbits of the atoms on isolated four-site square plaquettes. Furthermore, we show that for two atomic spin states with opposite magnetic moments, our system naturally realizes the time-reversal-symmetric Hamiltonian underlying the quantum spin Hall effect; i.e., two different spin components experience opposite directions of the magnetic field [Phys. Rev. Lett. 111, 185301 (2013)].

When: Friday, Nov. 29th 2013, **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! **Professors are welcome to join!**

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

For subscription to kids mailinglist, questions, comments or suggestions: grusdt@physik.uni-kl.de

