ESI Erwin Schrödinger International Institute for Mathematical Physics

universität wien

DVR 0065528

Seminar

Prof. Alessandro Giuliani

Università di Roma, La Sapienza

Quantum Hall effect in the Haldane model

Thursday, July 2, 2015

at 16:00 h

ESI, Boltzmann Lecture Hall

Abstract: We consider a model of interacting electrons hopping on the honeycomb lattice with complex hopping amplitudes. The complex hoppings correspond to a non-trivial magnetic field orthogonal to the plane and zero flux across any unit cell, such as the one generated by magnetic dipoles ordered ferromagnetically normal to the plane and placed at the centers of the hexagonal cells. In the absence of interactions, Haldane showed in 1988 that the model exhibits non trivial quantum Hall phases as the complex hoppings are varied. We pick values of the phases well inside the region that, in the absence of interactions, exhibits quantum Hall conductivity equal to e^2/h. For those values, we compute the Hall conductivity in the presence of weak interactions and prove its exact independence from the interaction strength. The proof is based on lattice Ward Identities combined with constructive (determinant) estimates on the convergence of fermionic perturbation theory. Joint work with V. Mastropietro and M. Porta.

L. Erdoes, R. Seiringer, S. Warzel

June 29, 2015