



Duke Kunshan University Mathematical Research Seminar Series

Non-equilibrium almost-stationary states and linear response for gapped quantum systems

Prof. Dr. Stefan Teufel, The University of Tübingen

Venue: DKU Academic Building 3107

Date: 1:30-2:30pm, Thursday, 11 October 2018

About the speaker:

Prof. Dr. Stefan Teufel studied physics at the Ludwig-Maximilians-Universität in Munich, where he also received his doctorate in mathematics. After postdocs at Rutgers University and the Technical University of Munich, he was appointed lecturer at the University of Warwick, England. Since 2005 he has been Full Professor of Mathematics at the University of Tübingen.

<https://www.math.uni-tuebingen.de/arbeitsbereiche/maphy/personen/StefanTeufel>

Abstract: I will present a new result on the validity of linear response theory at zero temperature for perturbations of gapped Hamiltonians describing interacting fermions on a lattice. As an essential innovation, the result requires the spectral gap assumption only for the unperturbed Hamiltonian and applies to a large class of perturbations that close the spectral gap.

This justification of linear response theory is based on a novel extension of the adiabatic theorem to situations where a time-dependent perturbation closes the gap. According to the standard version of the adiabatic theorem, when the perturbation is switched on adiabatically and as long as the gap does not close, the initial ground state evolves into the ground state of the perturbed operator. The new adiabatic theorem states that for perturbations that are either slowly varying potentials or small quasi-local operators, once the perturbation closes the gap, the adiabatic evolution follows non-equilibrium almost-stationary states (NEASS) that we construct explicitly.

