Universität Basel

Research Project

Quantum coherence, quantum statistics, and superconductivity in mesoscopic systems

Third-party funded project

Project title Quantum coherence, quantum statistics, and superconductivity in mesoscopic systems
Principal Investigator(s) Bruder, Christoph ;
Organisation / Research unit
Departement Physik / Theoretische Physik (Bruder)
Department
Project start 01.10.2017
Probable end 30.09.2020
Status Completed
A. Quantum coherence and statistics of mesoscopic system

We will explore novel nano- and optomechanical setups
and their applications (phononic structures, combined photonic and
phononic crystals, quantum dots embedded in nanowires, and trapped ions).
We will propose and analyze new transport experiments with ultracold
atoms, e.g. addressing the question of the phase dependence
of heat transport.
We will analyze models that illustrate how
system-mediated detector-detector interactions will determine the
measured operator order in a quantum correlation measurement.

B. Mesoscopic superconductivity

We will investigate a quantum realization of the Kuramoto model in a
one-dimensional Josephson array.
Using a tight-binding approach we will explore the influence of magnetic
disorder on the disorder-induced 2D topological insulator
state, the so-called topological Anderson insulator.
Lastly, we will investigate the possibility to use superconducting
transmon qubits as an implementation of driven anharmonic
self-oscillators. This would lead to applications in the study of
dissipative quantum phase transitions.

Financed by
Swiss National Science Foundation (SNSF)

Add publication

Add documents

Specify cooperation partners