Quantum mechanics in macroscopic systems?

Classical harmonic oscillator

Quantum harmonic oscillator

Interaction with the external world sets the reality!

Haroche and Wineland
(Nobel Prize 2012 for “measuring and manipulation of individual quantum systems”)

Application: quantum sensors, quantum memories, quantum computers
Selected quantum systems

Superconducting Qubits

Nanoelectromechanics

Theory of open quantum systems

Circuit Quantum Electro Dynamics (CQED)

Optomechanical systems

Hybrid quantum devices
Selected seminar topics

**Coherent systems:**
- Superconducting qubits
- Circuit quantum electrodynamics
- Nanoelectromechanical systems
- Optomechanical systems
- Hybrid quantum devices

**Theoretical topics:**
- Spin-boson and Jaynes-Cummings model
- Lindblad dynamics
- Quantum non-demolition measurement
- Entanglement as quantum resource
- Engineering dissipation

http://qt.uni.kn
Seminar in Theoretical Physics
Quantum coherence and dissipation in hybrid quantum systems

Quantum Transport Theory Group
qt.uni.kn

- Aimed at students, who plan to obtain a master degree in quantum solid state physics
- Prerequisites:
  - Solid State Physics
  - Advanced Quantum Mechanics
  - Statistical Physics
- Consists of introductory lectures and seminars talks
- Active participation of students is an integrated part of the course

First meeting: Thursday, 27.4., 11:45, P602  (Interest → email)