AKjDPG 2: Quantum Control

Time: Sunday 16:00–17:40 Location: HS 3+4

Tutorial AKjDPG 2.1 Sun 16:00 HS 3+4

Floquet engineering for quantum simulation — •Marín Bukov — Max Planck Institute for the Physics of Complex Systems

This lecture introduces periodically driven systems, with particular emphasis on applications in AMO-based quantum simulators. After introducing Floquet's theorem, we will focus on the physical intuition behind it and discuss how to design effective Hamiltonians with prescribed properties. In particular, we will discuss how to use strong high-frequency periodic drives to stabilize unstable equilibria, localize quantum matter, and engineer artificial magnetic fields. Time permitting, we will mention the primary role of periodic drives for the investigation of energy absorption and thermalization in closed interacting quantum systems, and introduce Floquet time crystals – a nonequilibrium phase of matter with no equilibrium counterpart.

Tutorial AKjDPG 2.2 Sun 16:50 HS 3+4

Quantum Optimal Control in a Nutshell — •Daniel Reich — Dahlem Center for Complex Quantum Systems and Fachbereich Physik, Freie Universität Berlin, Berlin, Germany

Since the start of the 21st century, research and development of technologies actively exploiting quantum properties of light and matter has experienced a surge in popularity. To this end, quantum optimal control is one of the main tools for devising concrete protocols to manipulate quantum systems in order to achieve specific tasks in the best way possible. In this tutorial I tell you about the main principles of quantum optimal control and provide a brief summary of the key techniques used in the field. Furthermore, I demonstrate the power of the quantum optimal control toolbox via practical use cases and introduce some of the available software packages such that you can start controlling quantum systems, too.