

## Announcement

### Ultracold Quantum Gases

Prof. Dr. Johannes Hecker Denschlag

#### Description

The young field of ultracold quantum gases is an exciting, fast-growing field of research. In recent years, technologies have been developed to cool atoms and molecules to the lowest temperatures and to manipulate them in its degrees of freedom to the quantum level and to control them. These ultracold quantum gases now represent fairly universal instruments to examine current issues and interesting physical phenomena. This can come from many different areas of physics, such as quantum physics, quantum information, solid-state physics, many-body physics and molecular physics.

In this course we will discuss both the fundamentals as well as exciting, current research examples.

#### Content

- laser cooling
- atom and molecule traps
- ultracold collisions
- Bose-Einstein condensation
- degenerate Fermi gases
- matter waves interferometry
- superfluidity
- artificial solid with optical lattices
- nonlinear dynamics with cold atoms
- quantum mechanical entanglement of atoms, the quantum computer

#### Prerequisites

A basic knowledge of quantum mechanics is assumed.

#### Details

- Lecture (3 SWS), exercises (2 SWS)
- 6 ECTS credits

#### Lecturer

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