## Seminar Ultracold Quantum Gases

**Code** 8812875024  
**ECTS credits** 3  
**Attendance time** 2  
**Language of instruction** English  
**Duration** 1 Semester  
**Cycle** each Winter Semester  
**Coordinator** Dean of Physics Studies  
**Instructor(s)** Prof. Dr. Johannes Hecker Denschlag  

### Allocation of study programmes
- Physics M.Sc., elective
- Physics and Management M.Sc., elective

### Recommended prerequisites
Profound knowledge in atomic physics and quantum mechanics.

### Learning objectives
The seminar addresses both fundamental and advanced topics in the fascinating field of ultracold quantum gases. The talks are based on a small number of selected publications and are intended to provide a good understanding of the underlying physics. Enough time is arranged for relaxed and stimulating discussions in order to deepen the acquired knowledge.

### Syllabus
1. Matter-wave interferometry and gravitational measurements  
2. Nonlinear atom optics, 4-wave mixing, and solitons  
3. Scattering length and Feshbach resonance  
4. Optical lattices and Hubbard model  
5. Ultracold molecules  
6. Repulsively bound atom pairs
<table>
<thead>
<tr>
<th>Literature</th>
<th>-</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Teaching and learning methods</strong></td>
<td>Seminar (2 hours per week)</td>
</tr>
<tr>
<td>Workload</td>
<td>90 hours</td>
</tr>
<tr>
<td><strong>Assessment</strong></td>
<td>The credit points will be awarded once the colloquium (presentation and discussion) has been passed. No prerequisites are necessary for exam registration.</td>
</tr>
<tr>
<td><strong>Grading procedure</strong></td>
<td>The grade of the module will be the grade of the exam.</td>
</tr>
<tr>
<td><strong>Basis for</strong></td>
<td>Research in quantum technology.</td>
</tr>
</tbody>
</table>