### Module title
Topological Order

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<th>Abbreviation</th>
<th>11-TOPO-132-m01</th>
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### Module coordinator
Managing Director of the Institute of Applied Physics

### Module offered by
Faculty of Physics and Astronomy

### ECTS
6

### Method of grading
Numerical grade
Only after succ. compl. of module(s)

### Duration
1 semester

### Module level
Graduate

### Other prerequisites
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### Contents
In modern Solid-State Physics, the concept of topologically ordered phases plays an increasingly important role. These phases possess no order in the conventional sense of a broken symmetry, but are characterised by topological quantum numbers. Examples of topological quantum numbers or phases include:

1. The fractional charge and statistics of quasiparticle excitation in quantum Hall fluids.
2. The fractional quantisation of spins in spin liquids and the accompanying split-up of spin and charge in antiferromagnets.
3. The topological anomalies of fractionally quantised systems on the torus (or generally on surfaces with genus \( g > 0 \)).
4. Majorana fermion states at the interfaces between topological superconductors and topologically trivial regions. The lecture explains the fundamental concepts with the help of basic examples.

### Intended learning outcomes
The students acquire in-depth knowledge of topological order in quantum condensates.

### Courses
V + R (no information on SWS (weekly contact hours) and course language available)

### Method of assessment
a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes)

Assessment offered: When and how often assessment will be offered depends on the method of assessment and will be announced in due form under observance of Section 32 Subsection 3 ASPO (general academic and examination regulations) 2009.

Language of assessment: German, English

### Allocation of places
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### Additional information
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### Referred to in LPO I
(examination regulations for teaching-degree programmes)

### Module appears in
- Master's degree (1 major) Physics (2010)
- Master's degree (1 major) Physics (2011)
- Master's degree (1 major) FOKUS Physics (2010)
- Master's degree (1 major) FOKUS Physics (2011)