

**Modulbezeichnung:** Physikalisches Seminar: Experimental techniques in quantum optics (PS) 5 ECTS

(Seminar on Physics: Experimental techniques in quantum optics)

Modulverantwortliche/r: Christoph Marquardt, Maria Chekhova, Markus Sondermann

Lehrende: Christoph Marquardt, Maria Chekhova, Markus Sondermann

Startsemester: SS 2015

Dauer: 1 Semester

Turnus: unregelmäßig

Präsenzzeit: 30 Std.

Eigenstudium: 120 Std.

Sprache: Deutsch oder Englisch

**Lehrveranstaltungen:**

Quantum and classical experiments with structured light (SS 2015, Hauptseminar, 2 SWS, Peter Banzer et al.)

**Inhalt:**

**Contents**

This seminar treats various experimental techniques which are of importance in many state-of-the-art experiments in quantum optics and related research areas. For each of the seminar's topics the presentations will cover the corresponding basics and connect to current research.

**Topics**

- Optical tweezers
- Single-photon imaging
- Spatial light modulators
- Homodyne detection
- Laser cooling of atoms
- Generation of optical harmonics
- Ion traps
- High-resolution microscopy
- Hanbury Brown - Twiss interferometry
- Whispering-gallery resonators
- Quantum state reconstruction
- Single-photon detectors

**Lernziele und Kompetenzen:**

**Learning goals and competences**

Students

- comprehend an interesting physical topic in a short time frame
- identify and interpret the appropriate literature
- select and organize the relevant information for the presentation
- compose a presentation on the topic at the appropriate level for the audience
- use the appropriate presentation techniques and tools
- criticize and defend the topic in a scientific discussion

**Literatur:**

**Literature**

Primary literature will be provided by the supervisors of the individual topics.

**Verwendbarkeit des Moduls / Einpassung in den Musterstudienplan:**

Das Modul ist im Kontext der folgenden Studienfächer/Vertiefungsrichtungen verwendbar:

[1] **Physics (Master of Science)**

(Po-Vers. 2015s | Master examination | Master examination | Physics seminar)

[2] **Physics (Master of Science)**

(Po-Vers. 2015s | Master examination | Master examination - Elite study program | Physics seminar)

[3] **Physik (Bachelor of Science)**

(Po-Vers. 2010 | Regulärer Bachelorstudiengang | Module des 3. bis 6. Fachsemesters | Physikalisches Seminar)

[4] **Physik (Bachelor of Science)**

(Po-Vers. 2010 | Integrierter Bachelor- und Masterstudiengang (Forschungsstudiengang) | Module der Masterprüfung)

| Physikalisches Seminar)

[5] **Physik (Bachelor of Science)**

(Po-Vers. 2010 | Integrierter Bachelor- und Masterstudiengang (Forschungsstudiengang) | Module der Masterprüfung

| Physics seminar)

[6] **Physik (Master of Science)**

(Po-Vers. 2010 | Masterprüfung | Masterprüfung - beschleunigtes Verfahren (Forschungsstudiengang) | Physikalisches Seminar)

[7] **Physik (Master of Science)**

(Po-Vers. 2010 | Masterprüfung | Masterprüfung | Physikalisches Seminar)

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**Studien-/Prüfungsleistungen:**

Physikalisches Seminar: Experimental techniques in quantum optics (Prüfungsnummer: 757777)

Prüfungsleistung, mündliche Prüfung, Dauer (in Minuten): 45

Anteil an der Berechnung der Modulnote: 100%

weitere Erläuterungen:

Mandatory attendance, Anwesenheitspflicht

Erstablingung: SS 2015, 1. Wdh.: keine Angabe

1. Prüfer: Christoph Marquardt

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**Organisatorisches:**

This course will be held in English, i.e. seminar talks are expected to be given in English, too. This also applies to the discussion during and after the presentations.