Subdivided Module Catalogue
for the Subject

FOKUS Physics
as a Master’s with 1 major
with the degree "Master of Science"
(120 ECTS credits)

Examination regulations version: 2006
Responsible: Faculty of Physics and Astronomy
Course of Studies - Contents and Objectives

The FOKUS master study program is a special course, which provides on the one hand short time study (only 8 semesters in a consecutive Bachelor and Master program) and on the other hand puts significant emphasis on early integration of research activities. This Master study program is embedded and financed through the »Elitenetzwerk Bayern« (ENB). The master course is especially preparing the students for their later scientific work in the field of Physics. Qualified graduates may pursue doctoral work (degree Dr. rer. nat.) at doctorate-granting institutions. The goal of the studies is it to mediate special knowledge on the most important subsections of the experimental and theoretical physics and to make the students familiar with the methods of scientific and physical thinking and working. By training of analytic thinking abilities the students acquire the ability to deal later with the various fields of applications and to compile the special knowledge obtained within the Bachelor programme. During the Master thesis the student should independently work on a new thematic and temporally limited experimental or theoretical engineering-scientific task in the field of experimental or theoretical physics using well-known procedures and scientific criteria.
Abbreviations used

Course types: E = field trip, K = colloquium, O = conversatorium, P = placement/lab course, R = project, S = seminar, T = tutorial, Ü = exercise, V = lecture

Term: SS = summer semester, WS = winter semester

Methods of grading: NUM = numerical grade, B/NB = (not) successfully completed

Regulations: (L)ASPO = general academic and examination regulations (for teaching-degree programmes), FSB = subject-specific provisions, SFB = list of modules

Other: A = thesis, LV = course(s), PL = assessment(s), TN = participants, VL = prerequisite(s)

Conventions

Unless otherwise stated, courses and assessments will be held in German, assessments will be offered every semester and modules are not creditable for bonus.

Notes

Should there be the option to choose between several methods of assessment, the lecturer will agree with the module coordinator on the method of assessment to be used in the current semester by two weeks after the start of the course at the latest and will communicate this in the customary manner.

Should the module comprise more than one graded assessment, all assessments will be equally weighted, unless otherwise stated below.

Should the assessment comprise several individual assessments, successful completion of the module will require successful completion of all individual assessments.

In accordance with

the general regulations governing the degree subject described in this module catalogue:

ASPO2007

associated official publications (FSB (subject-specific provisions)/SFB (list of modules)):

15-May-2008 (2008-15)

This module handbook seeks to render, as accurately as possible, the data that is of statutory relevance according to the examination regulations of the degree subject. However, only the FSB (subject-specific provisions) and SFB (list of modules) in their officially published versions shall be legally binding. In the case of doubt, the provisions on, in particular, module assessments specified in the FSB/SFB shall prevail.
The subject is divided into

### Compulsory Courses (40 ECTS credits)

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**Thesis (30 ECTS credits)**

Master’s with 1 major FOKUS Physics (2006)
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FOKUS Research Module Type VK8A Astronomy  |  11-FM-VK8A-072-m01

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**Contents**

Specific and advanced knowledge of independent scientific work in a current research area, especially in the discipline of Astronomy, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

**Intended learning outcomes**

The students have special and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Astronomy, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

**Courses**

- FOKUS Einführungsmodul Astronomie (FOKUS Introductory Module Astronomy): V (2 weekly contact hours) + Ü/P (1 weekly contact hour), details on availability to be announced
- FOKUS Kompaktseminar Astronomie (FOKUS Block Taught Seminar Astronomy): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)

**Method of assessment**

This module has the following assessment components

1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)

Assessment components 1 and 2 will be offered in German or English.

Students must register for assessment components 1 and 2 online (details to be announced).

Details on when assessment components 1 and 2 will be offered to be announced.

To pass this module, students must pass both assessment component 1 and assessment component 2.

**Allocation of places**

--

**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--
Module title | Abbreviation
--- | ---
FOKUS Research Module Type VK8D Didactics | 11-FM-VK8D-072-m01

Module coordinator | Module offered by
chairperson of examination committee | Faculty of Physics and Astronomy

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Duration | Module level | Other prerequisites
1 semester | graduate | --

Contents
Specific and advanced knowledge of independent scientific work in a current research area, especially in the discipline of Didactics, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

Intended learning outcomes
The students have special and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Didactics, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

Courses (type, number of weekly contact hours, language — if other than German)
- FOKUS Einführungsmodul Didaktik (FOKUS Introductory Module Didactics): V (2 weekly contact hours) + Ü/P (1 weekly contact hour), details on availability to be announced
- FOKUS Kompaktseminar Didaktik (FOKUS Block Taught Seminar Didactics): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
This module has the following assessment components
1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)

Assessment components 1 and 2 will be offered in German or English. Students must register for assessment components 1 and 2 online (details to be announced). Details on when assessment components 1 and 2 will be offered to be announced. To pass this module, students must pass both assessment component 1 and assessment component 2.

Allocation of places
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Additional information
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Referred to in LPO I (examination regulations for teaching-degree programmes)
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## FOKUS Research Module Type VK8E Experimental Physics

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### Module coordinator
chairperson of examination committee

### Module offered by
Faculty of Physics and Astronomy

### ECTS
8

### Method of grading
numerical grade

### Only after succ. compl. of module(s)
-

### Duration
1 semester

### Module level
graduate

### Other prerequisites
-

### Contents
Specific and advanced knowledge of independent scientific work in a current research area, especially in the discipline of Experimental Physics, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

### Intended learning outcomes
The students have special and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Experimental Physics, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

### Courses

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### Method of assessment
This module has the following assessment components

1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)

Assessment components 1 and 2 will be offered in German or English.

Students must register for assessment components 1 and 2 online (details to be announced).

Details on when assessment components 1 and 2 will be offered to be announced.

To pass this module, students must pass both assessment component 1 and assessment component 2.

### Allocation of places
-

### Additional information
-

### Referred to in LPO I
(examination regulations for teaching-degree programmes)
-

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Module title | Abbreviation
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FOKUS Research Module Type VK8I Interdisciplinary Research Fields | 11-FM-VK8I-072-m01

Module coordinator | Module offered by
chairperson of examination committee | Faculty of Physics and Astronomy

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Duration | Module level | Other prerequisites
1 semester | graduate | -- |

Contents
Specific and advanced knowledge of independent scientific work in a current research area, especially in an interdisciplinary subject, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

Intended learning outcomes
The students have special and advanced knowledge of independent scientific work in a current research area, especially in an interdisciplinary specialist field, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

Courses (type, number of weekly contact hours, language — if other than German)
- FOKUS Einführungsmodul Interdisziplinäre Fachgebiete (FOKUS Introductory Module Interdisciplinary Research Fields): V (2 weekly contact hours) + Ü/P (1 weekly contact hour), details on availability to be announced
- FOKUS Kompaktseminar Interdisziplinäre Fachgebiete (FOKUS Block Taught Seminar Interdisciplinary Research Fields): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
This module has the following assessment components
1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)
Assessment components 1 and 2 will be offered in German or English.
Students must register for assessment components 1 and 2 online (details to be announced).
Details on when assessment components 1 and 2 will be offered to be announced.
To pass this module, students must pass both assessment component 1 and assessment component 2.

Allocation of places
--

Additional information
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Referred to in LPO I (examination regulations for teaching-degree programmes)
--
Module title | Abbreviation
--- | ---
FOKUS Research Module Type VK8T Theoretical Physics | 11-FM-VK8T-072-m01

| Module coordinator | Module offered by |
--- | ---
chairperson of examination committee | Faculty of Physics and Astronomy

| ECTS | Method of grading | Only after succ. compl. of module(s) |
--- | --- | ---
8 | numerical grade | -- |

| Duration | Module level | Other prerequisites |
--- | --- | ---
1 semester | graduate | -- |

### Contents

Specific and advanced knowledge of independent scientific work in a current research area, especially in the discipline of Theoretical Physics, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

### Intended learning outcomes

The students have special and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Theoretical Physics, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

### Courses (type, number of weekly contact hours, language — if other than German)

- **FOKUS Einführungsmodul Theoretische Physik** (FOKUS Introductory Module Theoretical Physics): V (2 weekly contact hours) + Ü/P (1 weekly contact hour), details on availability to be announced
- **FOKUS Kompaktseminar Theoretische Physik** (FOKUS Block Taught Seminar Theoretical Physics): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)

### Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

This module has the following assessment components

1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)

Assessment components 1 and 2 will be offered in German or English.

Students must register for assessment components 1 and 2 online (details to be announced).

Details on when assessment components 1 and 2 will be offered to be announced.

To pass this module, students must pass both assessment component 1 and assessment component 2.

### Allocation of places

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### Additional information

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### Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module title  
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Module coordinator  
chairperson of examination committee

Module offered by  
Faculty of Physics and Astronomy

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Duration  
1 semester

Module level  
graduate

Other prerequisites

Contents

Specific and advanced knowledge of independent scientific work in a current research area, especially in the discipline of Astronomy, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

Intended learning outcomes

The students have special and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Astronomy, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

Courses (type, number of weekly contact hours, language — if other than German)

FOKUS Einführungsmodul Astronomie (FOKUS Introductory Module Astronomy): V (3 weekly contact hours) + Ü/P (1 weekly contact hour), details on availability to be announced

FOKUS Kompaktseminar Astronomie (FOKUS Block Taught Seminar Astronomy): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

This module has the following assessment components

1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)

2. Seminar: talk (approx. 30 to 45 minutes)

Assessment components 1 and 2 will be offered in German or English.

Students must register for assessment components 1 and 2 online (details to be announced).

Details on when assessment components 1 and 2 will be offered to be announced.

To pass this module, students must pass both assessment component 1 and assessment component 2.

Allocation of places

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Additional information

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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### Module Catalogue for the Subject

**FOKUS Physics**

*Master's with 1 major, 120 ECTS credits*

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Specific and advanced knowledge of independent scientific work in a current research area, especially in the discipline of Didactics, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

### Intended learning outcomes

The students have special and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Didactics, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

### Courses

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### Method of assessment

This module has the following assessment components

1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)

Assessment components 1 and 2 will be offered in German or English.

Students must register for assessment components 1 and 2 online (details to be announced).
Details on when assessment components 1 and 2 will be offered to be announced.

To pass this module, students must pass both assessment component 1 and assessment component 2.

### Allocation of places

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### Additional information

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### Referred to in LPO I (examination regulations for teaching-degree programmes)

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### Module title
FOKUS Research Module Type VK9E Experimental Physics

### Abbreviation
11-FM-VK9E-072-m01

### Module coordinator
chairperson of examination committee

### Module offered by
Faculty of Physics and Astronomy

### ECTS
9

### Method of grading
numerical grade

### Only after succ. compl. of module(s)
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### Duration
1 semester

### Module level
graduate

### Other prerequisites
--

### Contents
Specific and advanced knowledge of independent scientific work in a current research area, especially in the discipline of Experimental Physics, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

### Intended learning outcomes
The students have special and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Experimental Physics, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

### Courses
(Consider the format: (type, number of weekly contact hours, language — if other than German))

- **FOKUS Einführungsmodul Experimentelle Physik (FOKUS Introductory Module Experimental Physics):** V (3 weekly contact hours) + Ü/P (1 weekly contact hour), details on availability to be announced
- **FOKUS Kompaktseminar Experimentelle Physik (FOKUS Block Taught Seminar Experimental Physics):** S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)

### Method of assessment
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

This module has the following assessment components

1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)

Assessment components 1 and 2 will be offered in German or English. Students must register for assessment components 1 and 2 online (details to be announced). Details on when assessment components 1 and 2 will be offered to be announced. To pass this module, students must pass both assessment component 1 and assessment component 2.

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

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**Contents**

Specific and advanced knowledge of independent scientific work in a current research area, especially in an interdisciplinary subject, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

**Intended learning outcomes**

The students have special and advanced knowledge of independent scientific work in a current research area, especially in an interdisciplinary specialist field, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

**Courses** (type, number of weekly contact hours, language — if other than German)

- FOKUS Einführungsmodul Interdisziplinäre Fachgebiete (FOKUS Introductory Module Interdisciplinary Research Fields): V (3 weekly contact hours) + Ü/P (1 weekly contact hour), details on availability to be announced
- FOKUS Kompaktseminar Interdisziplinäre Fachgebiete (FOKUS Block Taught Seminar Interdisciplinary Research Fields): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

This module has the following assessment components

1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)

Assessment components 1 and 2 will be offered in German or English.

Students must register for assessment components 1 and 2 online (details to be announced).

Details on when assessment components 1 and 2 will be offered to be announced.

To pass this module, students must pass both assessment component 1 and assessment component 2.

**Allocation of places**

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**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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### Contents

Specific and advanced knowledge of independent scientific work in a current research area, especially in the discipline of Theoretical Physics, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

### Intended learning outcomes

The students have special and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Theoretical Physics, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

### Courses (type, number of weekly contact hours, language — if other than German)

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### Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

This module has the following assessment components

1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)

Assessment components 1 and 2 will be offered in German or English.

Students must register for assessment components 1 and 2 online (details to be announced).

Details on when assessment components 1 and 2 will be offered to be announced.

To pass this module, students must pass both assessment component 1 and assessment component 2.

### Allocation of places

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### Additional information

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### Referred to in LPO I (examination regulations for teaching-degree programmes)

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### Module title

**FOKUS Research Module Type VK10A Astronomy**

### Abbreviation

11-FM-VK10A-072-m01

### Module coordinator

chairperson of examination committee

### Module offered by

Faculty of Physics and Astronomy

### ECTS

10

### Method of grading

Only after succ. compl. of module(s)

### Duration

1 semester

### Module level

graduate

### Other prerequisites

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### Contents

Specific and advanced knowledge of independent scientific work in a current research area, especially in the discipline of Astronomy, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

### Intended learning outcomes

The students have special and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Astronomy, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

### Courses (type, number of weekly contact hours, language — if other than German)

- **FOKUS Einführungsmodul Astronomie** (FOKUS Introductory Module Astronomy): V (3 weekly contact hours) + Ü/P (2 weekly contact hours), German or English, details on availability to be announced
- **FOKUS Kompaktseminar Astronomie** (FOKUS Block Taught Seminar Astronomy): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)

### Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

-This module has the following assessment components

1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)

Assessment components 1 and 2 will be offered in German or English.

Students must register for assessment components 1 and 2 online (details to be announced).

Details on when assessment components 1 and 2 will be offered to be announced.

To pass this module, students must pass both assessment component 1 and assessment component 2.

### Allocation of places

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### Additional information

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### Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module title
FOKUS Research Module Type VK10D Didactics

Abbreviation
11-FM-VK10D-072-m01

Module coordinator
chairperson of examination committee

Module offered by
Faculty of Physics and Astronomy

ECTS
10

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
Specific and advanced knowledge of independent scientific work in a current research area, especially in the discipline of Didactics, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

Intended learning outcomes
The students have special and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Didactics, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

Courses (type, number of weekly contact hours, language — if other than German)

FOKUS Einführungsmodul Didaktik (FOKUS Introductory Module Didactics): V (3 weekly contact hours) + Ü/P (2 weekly contact hours), details on availability to be announced

FOKUS Kompaktseminar Didaktik (FOKUS Block Taught Seminar Didactics): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

This module has the following assessment components
1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
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Allocation of places
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Additional information
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**Intended learning outcomes**

The students have special and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Experimental Physics, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

**Courses**

- **FOKUS Einführungsmodul Experimentelle Physik** (FOKUS Introductory Module Experimental Physics): V (3 weekly contact hours) + Ü/P (2 weekly contact hours), details on availability to be announced
- **FOKUS Kompaktseminar Experimentelle Physik** (FOKUS Block Taught Seminar Experimental Physics): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)

**Method of assessment**

This module has the following assessment components

1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
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Students must register for assessment components 1 and 2 online (details to be announced).

Details on when assessment components 1 and 2 will be offered to be announced.

To pass this module, students must pass both assessment component 1 and assessment component 2.

**Allocation of places**

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**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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### Module Catalogue for the Subject

**FOKUS Physics**

**Master's with 1 major, 120 ECTS credits**

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Specific and advanced knowledge of independent scientific work in a current research area, especially in an interdisciplinary subject, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

### Intended learning outcomes

The students have special and advanced knowledge of independent scientific work in a current research area, especially in an interdisciplinary specialist field, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

### Courses

| **FOKUS Einführungsmodul Interdisziplinäre Fachgebiete (FOKUS Introductory Module Interdisciplinary Research Fields):** V (3 weekly contact hours) + Ü/P (2 weekly contact hours), details on availability to be announced |
| **FOKUS Kompaktseminar Interdisziplinäre Fachgebiete (FOKUS Block Taught Seminar Interdisciplinary Research Fields):** S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break) |

### Method of assessment

This module has the following assessment components

1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)

2. Seminar: talk (approx. 30 to 45 minutes)

Assessment components 1 and 2 will be offered in German or English.

Students must register for assessment components 1 and 2 online (details to be announced).

Details on when assessment components 1 and 2 will be offered to be announced.

To pass this module, students must pass both assessment component 1 and assessment component 2.

### Allocation of places

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### Additional information

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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### Module title

**FOKUS Research Module Type VK10T Theoretical Physics**

### Abbreviation

11-FM-VK10T-072-m01

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### Module coordinator

Chairperson of examination committee

### Module offered by

Faculty of Physics and Astronomy

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### ECTS

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Specific and advanced knowledge of independent scientific work in a current research area, especially in the discipline of Theoretical Physics, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

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### Intended learning outcomes

The students have special and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Theoretical Physics, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

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### Courses

**FOKUS Einführungsmodul Theoretische Physik** (FOKUS Introductory Module Theoretical Physics): V (3 weekly contact hours) + Ü/P (2 weekly contact hours), details on availability to be announced

**FOKUS Kompaktseminar Theoretische Physik** (FOKUS Block Taught Seminar Theoretical Physics): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)

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### Method of assessment

This module has the following assessment components

1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)

Assessment components 1 and 2 will be offered in German or English.

Students must register for assessment components 1 and 2 online (details to be announced).

Details on when assessment components 1 and 2 will be offered to be announced.

To pass this module, students must pass both assessment component 1 and assessment component 2.

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### 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 Catalogue for the Subject FOKUS Physics

**Master's with 1 major, 120 ECTS credits**

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Specific and advanced knowledge of independent scientific work in a current research area, especially in the discipline of Astronomy, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

## Intended learning outcomes

The students have special and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Astronomy, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

## Courses (type, number of weekly contact hours, language — if other than German)

- FOKUS Einführungsmodul Astronomie (FOKUS Introductory Module Astronomy): V (4 weekly contact hours) + Ü/P (2 weekly contact hours), details on availability to be announced
- FOKUS Kompaktseminar Astronomie (FOKUS Block Taught Seminar Astronomy): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)

## Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

This module has the following assessment components
1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)

Assessment components 1 and 2 will be offered in German or English.
Students must register for assessment components 1 and 2 online (details to be announced).
Details on when assessment components 1 and 2 will be offered to be announced.
To pass this module, students must pass both assessment component 1 and assessment component 2.

## Allocation of places

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## Additional information

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## Referred to in LPO I (examination regulations for teaching-degree programmes)

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## Module Catalogue for the Subject

**FOKUS Physics**

### Master's with 1 major, 120 ECTS credits

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Specific and advanced knowledge of independent scientific work in a current research area, especially in the discipline of Didactics, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

### Intended learning outcomes

The students have special and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Didactics, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

### Courses (type, number of weekly contact hours, language — if other than German)

- FOKUS Einführungsmodul Didaktik (FOKUS Introductory Module Didactics): V (4 weekly contact hours) + Ü/P (2 weekly contact hours), details on availability to be announced
- FOKUS Kompaktseminar Didaktik (FOKUS Block Taught Seminar Didactics): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)

### Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

This module has the following assessment components

1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)

Assessment components 1 and 2 will be offered in German or English.

Students must register for assessment components 1 and 2 online (details to be announced).

Details on when assessment components 1 and 2 will be offered to be announced.

To pass this module, students must pass both assessment component 1 and assessment component 2.

### Allocation of places

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### Additional information

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### Referred to in LPO I (examination regulations for teaching-degree programmes)

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### FOKUS Research Module Type VK12E Experimental Physics

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Specific and advanced knowledge of independent scientific work in a current research area, especially in the discipline of Experimental Physics, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

### Intended learning outcomes

The students have special and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Experimental Physics, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

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### Method of assessment

This module has the following assessment components

1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)

Assessment components 1 and 2 will be offered in German or English.

Students must register for assessment components 1 and 2 online (details to be announced).

Details on when assessment components 1 and 2 will be offered to be announced.

To pass this module, students must pass both assessment component 1 and assessment component 2.

### Allocation of places

--

### Additional information

--

### Referred to in LPO I (examination regulations for teaching-degree programmes)

--
Module title

FOKUS Research Module Type VK12I Interdisciplinary Research Fields

Abbreviation

11-FM-VK12I-072-m01

Module coordinator

chairperson of examination committee

Module offered by

Faculty of Physics and Astronomy

ECTS

12

Method of grading

Only after succ. compl. of module(s)

Duration

1 semester

Module level

graduate

Other prerequisites

--

Contents

Specific and advanced knowledge of independent scientific work in a current research area, especially in an interdisciplinary subject, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

Intended learning outcomes

The students have special and advanced knowledge of independent scientific work in a current research area, especially in an interdisciplinary specialist field, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

Courses

(type, number of weekly contact hours, language — if other than German)

FOKUS Einführungsmodul Interdisziplinäre Fachgebiete (FOKUS Introductory Module Interdisciplinary Research Fields): V (4 weekly contact hours) + Ü/P (2 weekly contact hours), details on availability to be announced

FOKUS Kompaktseminar Interdisziplinäre Fachgebiete (FOKUS Block Taught Seminar Interdisciplinary Research Fields): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)

Method of assessment

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

This module has the following assessment components

1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)

2. Seminar: talk (approx. 30 to 45 minutes)

Assessment components 1 and 2 will be offered in German or English.

Students must register for assessment components 1 and 2 online (details to be announced).

Assessment details on when assessment components 1 and 2 will be offered to be announced.

To pass this module, students must pass both assessment component 1 and assessment component 2.

Allocation of places

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Additional information

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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**Contents**

Specific and advanced knowledge of independent scientific work in a current research area, especially in the discipline of Theoretical Physics, reproduction of knowledge, acquisition of social and methodological competences. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

**Intended learning outcomes**

The students have special and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Theoretical Physics, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

**Courses** (type, number of weekly contact hours, language — if other than German)

- FOKUS Einführungsmodul Theoretische Physik (FOKUS Introductory Module Theoretical Physics): V (4 weekly contact hours) + Ü/P (2 weekly contact hours), details on availability to be announced
- FOKUS Kompaktseminar Theoretische Physik (FOKUS Block Taught Seminar Theoretical Physics): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

This module has the following assessment components

1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)

Assessment components 1 and 2 will be offered in German or English.

Students must register for assessment components 1 and 2 online (details to be announced).

Details on when assessment components 1 and 2 will be offered to be announced.

To pass this module, students must pass both assessment component 1 and assessment component 2.

**Allocation of places**

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**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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Module title | Abbreviation
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FOKUS Research Module Type VKM12A Astronomy | 11-FM-VMK12A-072-m01

Module coordinator | Module offered by
chairperson of examination committee | Faculty of Physics and Astronomy

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Specific and advanced knowledge of independent scientific work in a current research area, especially in the discipline of Astronomy, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

Intended learning outcomes

The students have special and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Astronomy, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

Courses (type, number of weekly contact hours, language — if other than German)

FOKUS Einführungsmodul Astronomie (FOKUS Introductory Module Astronomy): V (2 weekly contact hours) + Ü/P (1 weekly contact hour), details on availability to be announced

FOKUS Kompaktseminar Astronomie (FOKUS Block Taught Seminar Astronomy): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)

FOKUS Miniforschungsprojekt Astronomie (FOKUS Mini Research Project Astronomy): P (2 weekly contact hours), German or English, details on availability to be announced (approx. 3 weeks, part time)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

This module has the following assessment components

1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)
3. Research project: project report (approx. 8 pages)

Assessment components 1 through 3 will be offered in German or English. Students must register for assessment components 1 through 3 online (details to be announced). Details on when assessment components 1 through 3 will be offered to be announced. To pass this module, students must pass each of the assessment components 1 through 3.

Allocation of places

Additional information

Referred to in LPO I (examination regulations for teaching-degree programmes)
Module title | Abbreviation
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FOKUS Research Module Type VMK12D Didactics | 11-FM-VMK12D-072-m01

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**ECTS** | **Method of grading** | **Only after succ. compl. of module(s)** |
--- | --- | --- |
12 | numerical grade | -- |

**Duration** | **Module level** | **Other prerequisites** |
--- | --- | --- |
1 semester | graduate | -- |

### Contents
Specific and advanced knowledge of independent scientific work in a current research area, especially in the discipline of Didactics, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g., experiments, case studies etc.).

### Intended learning outcomes
The students have special and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Didactics, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

### Courses (type, number of weekly contact hours, language — if other than German)
- **FOKUS Einführungsmodul Didaktik** (FOKUS Introductory Module Didactics): V (2 weekly contact hours) + Ü/P (1 weekly contact hour), details on availability to be announced
- **FOKUS Kompaktseminar Didaktik** (FOKUS Block Taught Seminar Didactics): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)
- **FOKUS Miniforschungsprojekt Didaktik** (FOKUS Mini Research Project Didactics): P (2 weekly contact hours), German or English, details on availability to be announced (approx. 3 weeks, part time)

### Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

This module has the following assessment components

1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)
3. Research project: project report (approx. 8 pages)

Assessment components 1 through 3 will be offered in German or English. Students must register for assessment components 1 through 3 online (details to be announced). Details on when assessment components 1 through 3 will be offered to be announced. To pass this module, students must pass each of the assessment components 1 through 3.

### Allocation of places
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### Additional information
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### Referred to in LPO I (examination regulations for teaching-degree programmes)
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Module title
FKOKUS Research Module Type VMK12E Experimental Physics

Abbreviation
11-FM-VMK12E-072-m01

Module coordinator
chairperson of examination committee

Module offered by
Faculty of Physics and Astronomy

ECTS
12

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

Duration
1 semester

Module level
graduate

Other prerequisites
--

Contents
Specific and advanced knowledge of independent scientific work in a current research area, especially in the discipline of Experimental Physics, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

Intended learning outcomes
The students have special and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Experimental Physics, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

Courses

(type, number of weekly contact hours, language — if other than German)

FOKUS Einführungsmodul Experimentelle Physik (FOKUS Introductory Module Experimental Physics): V (2 weekly contact hours) + Ü/P (1 weekly contact hour), details on availability to be announced

FOKUS Kompaktseminar Experimentelle Physik (FOKUS Block Taught Seminar Experimental Physics): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)

FOKUS Miniforschungsprojekt Experimentelle Physik (FOKUS Mini Research Project Experimental Physics): P (2 weekly contact hours), German or English, details on availability to be announced (approx. 3 weeks, part time)

Method of assessment
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

This module has the following assessment components

1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)
3. Research project: project report (approx. 8 pages)

Assessment components 1 through 3 will be offered in German or English. Students must register for assessment components 1 through 3 online (details to be announced). Details on when assessment components 1 through 3 will be offered to be announced. To pass this module, students must pass each of the assessment components 1 through 3.

Allocation of places
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Additional information
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Referred to in LPO I (examination regulations for teaching-degree programmes)
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Module title | Abbreviation
---|---
FOKUS Research Module Type VMK12I Interdisciplinary Research Fields | 11-FM-VMK12I-072-m01

Module coordinator
chairperson of examination committee

Module offered by
Faculty of Physics and Astronomy

ECTS | Method of grading | Only after succ. compl. of module(s)
---|---|---
12 | numerical grade | --

Duration | Module level | Other prerequisites
---|---|---
1 semester | graduate | --

Contents
Specific and advanced knowledge of independent scientific work in a current research area, especially in inter-disciplinary subjects, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

Intended learning outcomes
The students have special and advanced knowledge of independent scientific work in a current research area, especially in interdisciplinary specialist fields, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

Courses (type, number of weekly contact hours, language — if other than German)
- FOKUS Einführungsmodul Interdisziplinäre Fachgebiete (FOKUS Introductory Module Interdisciplinary Research Fields): V (2 weekly contact hours) + Ü/P (1 weekly contact hour), details on availability to be announced
- FOKUS Kompaktseminar Interdisziplinäre Fachgebiete (FOKUS Block Taught Seminar Interdisciplinary Research Fields): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)
- FOKUS Miniforschungsprojekt Interdisziplinäre Fachgebiete (FOKUS Mini Research Project Interdisciplinary Research Fields): P (2 weekly contact hours), German or English, details on availability to be announced (approx. 3 weeks, part time)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
This module has the following assessment components
1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)
3. Research project: project report (approx. 8 pages)

Assessment components 1 through 3 will be offered in German or English. Students must register for assessment components 1 through 3 online (details to be announced). Details on when assessment components 1 through 3 will be offered to be announced. To pass this module, students must pass each of the assessment components 1 through 3.

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 title | Abbreviation
---|---
FOKUS Research Module Type VKM12T Theoretical Physics | 11-FM-VMK12T-072-m01

Module coordinator | Module offered by
---|---
chairperson of examination committee | Faculty of Physics and Astronomy

ECTS | Method of grading | Only after succ. compl. of module(s)
---|---|---
12 | numerical grade | --

Duration | Module level | Other prerequisites
---|---|---
1 semester | graduate | --

Contents

Specific and advanced knowledge of independent scientific work in a current research area, especially in the discipline of Theoretical Physics, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

Intended learning outcomes

The students have special and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Theoretical Physics, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

Courses (type, number of weekly contact hours, language — if other than German)

- FOKUS Einführungsmodul Theoretische Physik (FOKUS Introductory Module Theoretical Physics): V (2 weekly contact hours) + Ü/P (1 weekly contact hour), details on availability to be announced
- FOKUS Kompaktseminar Theoretische Physik (FOKUS Block Taught Seminar Theoretical Physics): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)
- FOKUS Miniforschungsprojekt Theoretische Physik (FOKUS Mini Research Project Theoretical Physics): P (2 weekly contact hours), German or English, details on availability to be announced (approx. 3 weeks, part time)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

This module has the following assessment components
1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)
3. Research project: project report (approx. 8 pages)

Assessment components 1 through 3 will be offered in German or English. Students must register for assessment components 1 through 3 online (details to be announced). Details on when assessment components 1 through 3 will be offered to be announced. To pass this module, students must pass each of the assessment components 1 through 3.

Allocation of places

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Additional information

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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**Module title**

FOKUS Research Module Type VKM13A Astronomy

**Abbreviation**

11-FM-VMK13A-072-m01

**Module coordinator**

Chairperson of examination committee

**Module offered by**

Faculty of Physics and Astronomy

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**Duration**

1 semester

**Module level**

Graduate

**Other prerequisites**

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**Contents**

Specific and advanced knowledge of independent scientific work in a current research area, especially in the discipline of Astronomy, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

**Intended learning outcomes**

The students have special and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Astronomy, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

**Courses** (type, number of weekly contact hours, language — if other than German)

- **FOKUS Einführungsmodul Astronomie** (FOKUS Introductory Module Astronomy): V (3 weekly contact hours) + Ü/P (1 weekly contact hour), details on availability to be announced
- **FOKUS Kompaktseminar Astronomie** (FOKUS Block Taught Seminar Astronomy): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)
- **FOKUS Miniforschungsprojekt Astronomie** (FOKUS Mini Research Project Astronomy): P (2 weekly contact hours), German or English, details on availability to be announced (approx. 3 weeks, part time)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

This module has the following assessment components

1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)
3. Research project: project report (approx. 8 pages)

Assessment components 1 through 3 will be offered in German or English. Students must register for assessment components 1 through 3 online (details to be announced). Details on when assessment components 1 through 3 will be offered to be announced.

To pass this module, students must pass each of the assessment components 1 through 3.

**Allocation of places**

--

**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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## Module Catalogue for the Subject

### FOKUS Physics

**Master's with 1 major, 120 ECTS credits**

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Specific and advanced knowledge of independent scientific work in a current research area, especially in the discipline of Didactics, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

### Intended learning outcomes

The students have special and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Didactics, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

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<td>FOKUS Miniforschungsprojekt Didaktik (FOKUS Mini Research Project Didactics): P (2 weekly contact hours), German or English, details on availability to be announced (approx. 3 weeks, part time)</td>
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### Method of assessment

This module has the following assessment components

1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)
3. Research project: project report (approx. 8 pages)

Assessment components 1 through 3 will be offered in German or English.

Students must register for assessment components 1 through 3 online (details to be announced). Details on when assessment components 1 through 3 will be offered to be announced.

To pass this module, students must pass each of the assessment components 1 through 3.

### Allocation of places

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### Additional information

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### Referred to in LPO I (examination regulations for teaching-degree programmes)

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## Module Catalogue for the Subject FOKUS Physics

### Master's with 1 major, 120 ECTS credits

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Specific and advanced knowledge of independent scientific work in a current research area, especially in the discipline of Experimental Physics, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

### Intended learning outcomes

The students have special and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Experimental Physics, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

### Courses (type, number of weekly contact hours, language — if other than German)

- **FOKUS Einführungsmodul Experimentelle Physik (FOKUS Introductory Module Experimental Physics):** V (3 weekly contact hours) + Ü/P (1 weekly contact hour), details on availability to be announced
- **FOKUS Kompaktseminar Experimentelle Physik (FOKUS Block Taught Seminar Experimental Physics):** S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)
- **FOKUS Miniforschungsprojekt Experimentelle Physik (FOKUS Mini Research Project Experimental Physics):** P (2 weekly contact hours), German or English, details on availability to be announced (approx. 3 weeks, part time)

### Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

This module has the following assessment components

1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)
3. Research project: project report (approx. 8 pages)

Assessment components 1 through 3 will be offered in German or English. Students must register for assessment components 1 through 3 online (details to be announced). Details on when assessment components 1 through 3 will be offered to be announced. To pass this module, students must pass each of the assessment components 1 through 3.

### Allocation of places

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### Additional information

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### Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module Catalogue for the Subject
FOKUS Physics
Master's with 1 major, 120 ECTS credits

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<thead>
<tr>
<th>Module title</th>
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<tr>
<td>FOKUS Research Module Type VMK13I Interdisciplinary Research Fields</td>
<td>11-FM-VMK13I-072-m01</td>
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Module coordinator
chairperson of examination committee

Module offered by
Faculty of Physics and Astronomy

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<th>Other prerequisites</th>
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<tbody>
<tr>
<td>1 semester</td>
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Contents
Specific and advanced knowledge of independent scientific work in a current research area, especially in interdisciplinary subjects, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

Intended learning outcomes
The students have special and advanced knowledge of independent scientific work in a current research area, especially in interdisciplinary specialist fields, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

Courses (type, number of weekly contact hours, language — if other than German)

- **FOKUS Einführungsmodul Interdisziplinäre Fachgebiete (FOKUS Introductory Module Interdisciplinary Research Fields):** V (3 weekly contact hours) + Ü/P (1 weekly contact hour), details on availability to be announced
- **FOKUS Kompaktseminar Interdisziplinäre Fachgebiete (FOKUS Block Taught Seminar Interdisciplinary Research Fields):** S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)
- **FOKUS Miniforschungsprojekt Interdisziplinäre Fachgebiete (FOKUS Mini Research Project Interdisciplinary Research Fields):** P (2 weekly contact hours), German or English, details on availability to be announced (approx. 3 weeks, part time)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

This module has the following assessment components
1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)
3. Research project: project report (approx. 8 pages)

Assessment components 1 through 3 will be offered in German or English.
Students must register for assessment components 1 through 3 online (details to be announced).
Details on when assessment components 1 through 3 will be offered to be announced.
To pass this module, students must pass each of the assessment components 1 through 3.

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

**FOKUS Physics**

Master's with 1 major, 120 ECTS credits

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<th>Module title</th>
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<tbody>
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### Contents

Specific and advanced knowledge of independent scientific work in a current research area, especially in the discipline of Theoretical Physics, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

### Intended learning outcomes

The students have special and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Theoretical Physics, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

### Courses

**FOKUS Einführungsmodul Theoretische Physik** (FOKUS Introductory Module Theoretical Physics): V (3 weekly contact hours) + Ü/P (1 weekly contact hour), details on availability to be announced

**FOKUS Kompaktseminar Theoretische Physik** (FOKUS Block Taught Seminar Theoretical Physics): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)

**FOKUS Miniforschungsprojekt Theoretische Physik** (FOKUS Mini Research Project Theoretical Physics): P (2 weekly contact hours), German or English, details on availability to be announced (approx. 3 weeks, part time)

### Method of assessment

This module has the following assessment components

1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)
3. Research project: project report (approx. 8 pages)

Assessment components 1 through 3 will be offered in German or English. Students must register for assessment components 1 through 3 online (details to be announced). Details on when assessment components 1 through 3 will be offered to be announced. To pass this module, students must pass each of the assessment components 1 through 3.

### 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 title

**FOKUS Research Module Type VKM14A Astronomy**

### Abbreviation

11-FM-VMK14A-072-m01

### Module coordinator

chairperson of examination committee

### Module offered by

Faculty of Physics and Astronomy

### ECTS

14

### Method of grading

Only after succ. compl. of module(s)

### Duration

1 semester

### Module level

graduate

### Other prerequisites

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### Contents

Specific and advanced knowledge of independent scientific work in a current research area, especially in the discipline of Astronomy, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

### Intended learning outcomes

The students have special and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Astronomy, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

### Courses

**FOKUS Einführungsmodul Astronomie (FOKUS Introductory Module Astronomy): V (3 weekly contact hours) + Ü/P (2 weekly contact hours), details on availability to be announced**

**FOKUS Kompaktseminar Astronomie (FOKUS Block Taught Seminar Astronomy): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)**

**FOKUS Miniforschungsprojekt Astronomie (FOKUS Mini Research Project Astronomy): P (2 weekly contact hours), German or English, details on availability to be announced (approx. 3 weeks, part time)**

### Method of assessment

This module has the following assessment components

1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)
3. Research project: project report (approx. 8 pages)

Assessment components 1 through 3 will be offered in German or English. Students must register for assessment components 1 through 3 online (details to be announced). Details on when assessment components 1 through 3 will be offered to be announced. To pass this module, students must pass each of the assessment components 1 through 3.

### Allocation of places

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### Additional information

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### Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module title | Abbreviation
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FOKUS Research Module Type VMK14D Didactics | 11-FM-VMK14D-072-m01

Module coordinator
chairperson of examination committee

Module offered by
Faculty of Physics and Astronomy

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Duration | Module level | Other prerequisites |
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1 semester | graduate | -- |

Contents
Specific and advanced knowledge of independent scientific work in a current research area, especially in the discipline of Didactics, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

Intended learning outcomes
The students have special and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Didactics, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

Courses (type, number of weekly contact hours, language — if other than German)
- FOKUS Einführungsmodul Didaktik (FOKUS Introductory Module Didactics): V (3 weekly contact hours) + Ü/P (2 weekly contact hours), details on availability to be announced
- FOKUS Kompaktseminar Didaktik (FOKUS Block Taught Seminar Didactics): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)
- FOKUS Miniforschungsprojekt Didaktik (FOKUS Mini Research Project Didactics): P (2 weekly contact hours), German or English, details on availability to be announced (approx. 3 weeks, part time)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
This module has the following assessment components
1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)
3. Research project: project report (approx. 8 pages)

Assessment components 1 through 3 will be offered in German or English. Students must register for assessment components 1 through 3 online (details to be announced). Details on when assessment components 1 through 3 will be offered to be announced. To pass this module, students must pass each of the assessment components 1 through 3.

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 title

**FOKUS Research Module Type VMK14E Experimental Physics**

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### Contents

Specific and advanced knowledge of independent scientific work in a current research area, especially in the discipline of Experimental Physics, reproduction of knowledge, acquisition of social and methodological competen-
cies. Application of the acquired professional knowledge and methods to new scientific questions in a mini rese-
arch project (e.g. experiments, case studies etc.).

### Intended learning outcomes

The students have special and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Experimental Physics, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

### Courses (type, number of weekly contact hours, language — if other than German)

- **FOKUS Einführungsmodul Experimentelle Physik** (FOKUS Introductory Module Experimental Physics): V (3 weekly contact hours) + Ü/P (2 weekly contact hours), details on availability to be announced
- **FOKUS Kompaktseminar Experimentelle Physik** (FOKUS Block Taught Seminar Experimental Physics): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)
- **FOKUS Miniforschungsprojekt Experimentelle Physik** (FOKUS Mini Research Project Experimental Physics): P (2 weekly contact hours), German or English, details on availability to be announced (approx. 3 weeks, part time)

### Method of assessment (type, scope, language — if other than German, examination offered — if not every seme-
ster, information on whether module can be chosen to earn a bonus)

This module has the following assessment components

1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minu-
tes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)
3. Research project: project report (approx. 8 pages)

Assessment components 1 through 3 will be offered in German or English. Students must register for assessment components 1 through 3 online (details to be announced). Details on when assessment components 1 through 3 will be offered to be announced. To pass this module, students must pass each of the assessment components 1 through 3.

### Allocation of places

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### Additional information

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### Referred to in LPO I

(examination regulations for teaching-degree programmes)

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Module title

FOKUS Research Module Type VMK14I Interdisciplinary Research Fields

Abbreviation

11-FM-VMK14I-072-m01

Module coordinator

Chairperson of examination committee

Module offered by

Faculty of Physics and Astronomy

ECTS

14

Method of grading

Numerical grade

Only after successful completion of module(s)

Duration

1 semester

Module level

Graduate

Other prerequisites

--

Contents

Specific and advanced knowledge of independent scientific work in a current research area, especially in interdisciplinary subjects, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

Intended learning outcomes

The students have special and advanced knowledge of independent scientific work in a current research area, especially in interdisciplinary specialist fields, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

Courses (type, number of weekly contact hours, language — if other than German)

- FOKUS Einführungsmodul Interdisziplinäre Fachgebiete (FOKUS Introductory Module Interdisciplinary Research Fields): V (3 weekly contact hours) + Ü/P (2 weekly contact hours), details on availability to be announced
- FOKUS Kompaktseminar Interdisziplinäre Fachgebiete (FOKUS Block Taught Seminar Interdisciplinary Research Fields): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)
- FOKUS Miniforschungsprojekt Interdisziplinäre Fachgebiete (FOKUS Mini Research Project Interdisciplinary Research Fields): P (2 weekly contact hours), German or English, details on availability to be announced (approx. 3 weeks, part time)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

This module has the following assessment components
1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)
3. Research project: project report (approx. 8 pages)

Assessment components 1 through 3 will be offered in German or English.
Students must register for assessment components 1 through 3 online (details to be announced).
Details on when assessment components 1 through 3 will be offered to be announced.
To pass this module, students must pass each of the assessment components 1 through 3.

Allocation of places

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Additional information

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<td><strong>Other prerequisites</strong></td>
<td><strong>Contents</strong></td>
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<td><strong>Intended learning outcomes</strong></td>
<td><strong>Courses</strong></td>
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<td>FOKUS Einführungsmodul Theoretische Physik (FOKUS Introductory Module Theoretical Physics): V (3 weekly contact hours) + Ü/P (2 weekly contact hours), details on availability to be announced</td>
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<td>FOKUS Kompaktseminar Theoretische Physik (FOKUS Block Taught Seminar Theoretical Physics): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)</td>
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<td>FOKUS Miniforschungsprojekt Theoretische Physik (FOKUS Mini Research Project Theoretical Physics): P (2 weekly contact hours), German or English, details on availability to be announced (approx. 3 weeks, part time)</td>
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<td>To pass this module, students must pass each of the assessment components 1 through 3.</td>
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<td><strong>Allocation of places</strong></td>
<td><strong>Additional information</strong></td>
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### Module Catalogue for the Subject
**Module title**
FOKUS Research Module Type VKM16A Astronomy

**Abbreviation**
11-FM-VMK16A-072-m01

**Module coordinator**
chairperson of examination committee

**Module offered by**
Faculty of Physics and Astronomy

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**Duration**
1 semester

**Module level**
graduate

**Other prerequisites**
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### Contents
Specific and advanced knowledge of independent scientific work in a current research area, especially in the discipline of Astronomy, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

### Intended learning outcomes
The students have specific and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Astronomy, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

### Courses
(type, number of weekly contact hours, language — if other than German)

- **FOKUS Einführungsmodul Astronomie (FOKUS Introductory Module Astronomy):** V (4 weekly contact hours) + Ü/P (2 weekly contact hours), details on availability to be announced
- **FOKUS Kompaktseminar Astronomie (FOKUS Block Taught Seminar Astronomy):** S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)
- **FOKUS Miniforschungsprojekt Astronomie (FOKUS Mini Research Project Astronomy):** P (2 weekly contact hours), German or English, details on availability to be announced (approx. 3 weeks, part time)

### Method of assessment
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

This module has the following assessment components

1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)
3. Research project: project report (approx. 8 pages)

Assessment components 1 through 3 will be offered in German or English.

Students must register for assessment components 1 through 3 online (details to be announced).

Details on when assessment components 1 through 3 will be offered to be announced.

To pass this module, students must pass each of the assessment components 1 through 3.

### Allocation of places
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### Additional information
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### Referred to in LPO I (examination regulations for teaching-degree programmes)
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Module Catalogue for the Subject FOKUS Physics
Master’s with 1 major, 120 ECTS credits

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**Module coordinator**
Chairperson of examination committee

**Module offered by**
Faculty of Physics and Astronomy

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**Duration**
1 semester

**Module level**
Graduate

**Other prerequisites**
--

**Contents**
Specific and advanced knowledge of independent scientific work in a current research area, especially in the discipline of Didactics, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

**Intended learning outcomes**
The students have special and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Didactics, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

**Courses**
(type, number of weekly contact hours, language — if other than German)
- FOKUS Einführungsmodul Didaktik (FOKUS Introductory Module Didactics): V (4 weekly contact hours) + Ü/P (2 weekly contact hours), details on availability to be announced
- FOKUS Kompaktseminar Didaktik (FOKUS Block Taught Seminar Didactics): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)
- FOKUS Miniforschungsprojekt Didaktik (FOKUS Mini Research Project Didactics): P (2 weekly contact hours), German or English, details on availability to be announced (approx. 3 weeks, part time)

**Method of assessment**
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
This module has the following assessment components
1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)
3. Research project: project report (approx. 8 pages)
Assessment components 1 through 3 will be offered in German or English. Students must register for assessment components 1 through 3 online (details to be announced). Details on when assessment components 1 through 3 will be offered to be announced. To pass this module, students must pass each of the assessment components 1 through 3.

**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 title
FOKUS Research Module Type VMK16E Experimental Physics

Abbreviation
11-FM-VMK16E-072-m01

Module coordinator
chairperson of examination committee

Module offered by
Faculty of Physics and Astronomy

ECTS
16

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

Duration
1 semester

Module level
graduate

Other prerequisites
--

Contents
Specific and advanced knowledge of independent scientific work in a current research area, especially in the discipline of Experimental Physics, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

Intended learning outcomes
The students have special and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Experimental Physics, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

Courses (type, number of weekly contact hours, language — if other than German)

- FOKUS Einführungsmodul Experimentelle Physik (FOKUS Introductory Module Experimental Physics): V (4 weekly contact hours) + Ü/P (2 weekly contact hours), details on availability to be announced
- FOKUS Kompaktseminar Experimentelle Physik (FOKUS Block Taught Seminar Experimental Physics): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)
- FOKUS Miniforschungsprojekt Experimentelle Physik (FOKUS Mini Research Project Experimental Physics): P (2 weekly contact hours), German or English, details on availability to be announced (approx. 3 weeks, part time)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

This module has the following assessment components
1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)
3. Research project: project report (approx. 8 pages)

Assessment components 1 through 3 will be offered in German or English. Students must register for assessment components 1 through 3 online (details to be announced). Details on when assessment components 1 through 3 will be offered to be announced. To pass this module, students must pass each of the assessment components 1 through 3.

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

**FOKUS Research Module Type VMK16I Interdisciplinary Research Fields**

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### Module coordinator

chairperson of examination committee

### Module offered by

Faculty of Physics and Astronomy

### ECTS

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### Contents

Specific and advanced knowledge of independent scientific work in a current research area, especially in interdisciplinary subjects, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

### Intended learning outcomes

The students have special and advanced knowledge of independent scientific work in a current research area, especially in interdisciplinary specialist fields, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

### Courses (type, number of weekly contact hours, language — if other than German)

- **FOKUS Einführungsmodul Interdisziplinäre Fachgebiete (FOKUS Introductory Module Interdisciplinary Research Fields):** V (4 weekly contact hours) + Ü/P (2 weekly contact hours), details on availability to be announced
- **FOKUS Kompaktseminar Interdisziplinäre Fachgebiete (FOKUS Block Taught Seminar Interdisciplinary Research Fields):** S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)
- **FOKUS Miniforschungsprojekt Interdisziplinäre Fachgebiete (FOKUS Mini Research Project Interdisciplinary Research Fields):** P (2 weekly contact hours), German or English, details on availability to be announced (approx. 3 weeks, part time)

### Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

This module has the following assessment components

1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)
3. Research project: project report (approx. 8 pages)

Assessment components 1 through 3 will be offered in German or English. Students must register for assessment components 1 through 3 online (details to be announced). Details on when assessment components 1 through 3 will be offered to be announced.

To pass this module, students must pass each of the assessment components 1 through 3.

### Allocation of places

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### Additional information

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### Referred to in LPO I (examination regulations for teaching-degree programmes)

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Module title | Abbreviation
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FOKUS Research Module Type VKM16T Theoretical Physics | 11-FM-VMK16T-072-m01

Module coordinator | Module offered by
chairperson of examination committee | Faculty of Physics and Astronomy

ECTS | Method of grading | Only after succ. compl. of module(s)
16 | numerical grade | --

Duration | Module level | Other prerequisites
1 semester | graduate | --

**Contents**

Specific and advanced knowledge of independent scientific work in a current research area, especially in the discipline of Theoretical Physics, reproduction of knowledge, acquisition of social and methodological competencies. Application of the acquired professional knowledge and methods to new scientific questions in a mini research project (e.g. experiments, case studies etc.).

**Intended learning outcomes**

The students have special and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Theoretical Physics, and are able to reproduce the acquired knowledge, to apply the acquired methods, to summarise a sub-area of the current research area in an oral presentation and to successfully implement the acquired knowledge and methods in a mini research project.

**Courses** (type, number of weekly contact hours, language — if other than German)

- FOKUS Einführungsmodul Theoretische Physik (FOKUS Introductory Module Theoretical Physics): V (4 weekly contact hours) + Ü/P (2 weekly contact hours), details on availability to be announced
- FOKUS Kompaktseminar Theoretische Physik (FOKUS Block Taught Seminar Theoretical Physics): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)
- FOKUS Miniforschungsprojekt Theoretische Physik (FOKUS Mini Research Project Theoretical Physics): P (2 weekly contact hours), German or English, details on availability to be announced (approx. 3 weeks, part time)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

This module has the following assessment components

1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)
3. Research project: project report (approx. 8 pages)

Assessment components 1 through 3 will be offered in German or English. Students must register for assessment components 1 through 3 online (details to be announced). Details on when assessment components 1 through 3 will be offered to be announced. To pass this module, students must pass each of the assessment components 1 through 3.

**Allocation of places**

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**Additional information**

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**Module coordinator**
chairperson of examination committee

**Module offered by**
Faculty of Physics and Astronomy

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**Contents**
Independent work on a current research topic of Experimental and Theoretical Physics and implementation of scientific experiments including analysis and documentation of the results.

**Intended learning outcomes**
The students are able to independently work on a current research area of Experimental or Theoretical Physics, to conduct and analyse scientific experiments and to document the results.

**Courses** (type, number of weekly contact hours, language — if other than German)
P (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
placement report / fieldwork report / report on practical training / report on practical course / project report / report on technical course (approx. 20 pages) and talk (approx. 30 minutes) on respective topic researched Language of assessment: German or English

**Allocation of places**
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**Additional information**
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**Contents**

Introduction to current experimental or theoretical questions of a subdiscipline of Physics with special relevance to the planned topic of the Master's thesis. Summary of the required fundamental topics in a seminar presentation.

**Intended learning outcomes**

The students have advanced knowledge of a current experimental or theoretical subdiscipline of Physics with a special relevance to the intended topic of the Master's thesis. They know the current state of research in this area and are able to summarise their knowledge in an oral presentation.

**Courses** (type, number of weekly contact hours, language — if other than German)

S (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

Talk with discussion (approx. 30 to 45 minutes)

Language of assessment: German or English

**Allocation of places**

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**Additional information**

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**Contents**

Introduction to the methods of scientific work, taking into account methods of project planning. Application to theoretical and experimental questions of Physics, writing of a scientific project plan for the planned Master's thesis.

**Intended learning outcomes**

The students have knowledge of scientific methods and methodological work, including project planning methods of a current experimental and theoretical subdiscipline of Physics with special relevance to the intended topic of the Master's thesis. They are able to draft a project plan for the Master's thesis and to plan the required experimental or theoretical work. They are able to describe their projects in oral presentations.

**Courses** (type, number of weekly contact hours, language — if other than German)

R (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

talk with discussion (approx. 30 to 45 minutes)
Language of assessment: German or 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)

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<td>Managing Directors of the Institute of Applied Physics and the Institute of Theoretical Physics and Astrophysics</td>
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**Contents**

Seminár on current issues of Theoretical or Experimental Physics.

**Intended learning outcomes**

The students have advanced knowledge of a current specialist field of Experimental or Theoretical Physics. They are able to extract knowledge from professional publications and to summarise this knowledge and present it to a professional audience.

**Courses** (type, number of weekly contact hours, language — if other than German)

S (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

talk with discussion (approx. 30 to 45 minutes)

**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 Catalogue for the Subject FOKUS Physics
### Master's with 1 major, 120 ECTS credits

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<td>Advanced Practical Course Master</td>
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### Module coordinator
Managing Director of the Institute of Applied Physics

### Module offered by
Faculty of Physics and Astronomy

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### Duration
1 semester

### Module level
graduate

### Other prerequisites
11-A3

### Contents
Principles of Nuclear, Atomic and Molecular Physics, experiments on cryogenic temperatures and correlated systems, properties of solids, surfaces and interfaces. Experiments on the following topics: X-rays - nuclear magnetic resonance (NMR) - quantum Hall effect - optical pumping and spectroscopy in the field of optics - Hall effect - superconductivity - laser - solid-state optics

### Intended learning outcomes
Knowledge of conducting experiments, analysing and documenting experimental results, basic knowledge of issuing scientific publications, application of modern evaluation systems, working on a task based on publications and acquiring practical experimental methods.

### Courses

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### Method of assessment
This module has the following assessment components

1. Lab course in part 1 (Fortgeschrittenen-Praktikum Master/Advanced Practical Course Master Part 1): a) Preparing the experiment will be considered successfully completed if an oral test (approx. 30 minutes) is passed prior to the experiment. b) Performing and evaluating the experiment will be considered successfully completed if a test is passed. Students must prepare an experiment log (approx. 8 pages).

2. Lab course in part 2 (Fortgeschrittenen-Praktikum Master/Advanced Practical Course Master Part 2): a) Preparing the experiment will be considered successfully completed if an oral test (approx. 30 minutes) is passed prior to the experiment. b) Performing and evaluating the experiment will be considered successfully completed if a test is passed. Students must prepare an experiment log (approx. 8 pages).

Language of assessment: German or English

Students must register for assessment components 1 and 2 online (details to be announced).

Students will be offered one opportunity to retake element a) and/or element b) in the respective semester. To pass an assessment component, they must pass both elements (a and b) in the same semester.

To pass this module, students must pass both assessment component 1 and assessment component 2.

### 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 title
Module Type 4A Special Training Astronomy

### Abbreviation
11-SF-4A-072-m01

### Module coordinator
Managing Director of the Institute of Theoretical Physics and Astrophysics

### Module offered by
Faculty of Physics and Astronomy

### ECTS
4

### Method of grading
numerical grade

### Only after succ. compl. of module(s)
--

### Duration
1 semester

### Module level
graduate

### Other prerequisites
--

### Contents
Specific, advanced knowledge of one or more of the Faculty's current research areas in the field of Astronomy.

### Intended learning outcomes
The students have specific and advanced knowledge of one or more current research areas of the faculty in the field of Astronomy.

### Courses
(type, number of weekly contact hours, language — if other than German)
V + R (no information on SWS (weekly contact hours) and course language available)

### Method of assessment
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (approx. 90 minutes) or b) talk (approx. 30 minutes) or c) oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or d) project report (approx. 8 pages)

### Allocation of places
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### Additional information
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### Referred to in LPO I
(examination regulations for teaching-degree programmes)
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<td>Managing Director of the Institute of Applied Physics</td>
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</table>

**Contents**

Specific, advanced knowledge of one or more of the Faculty's current research areas in the field of Didactics.

**Intended learning outcomes**

The students have specific and advanced knowledge of one or more current research areas of the faculty in the field of Didactics.

**Courses** (type, number of weekly contact hours, language — if other than German)

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

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (approx. 90 minutes) or b) talk (approx. 30 minutes) or c) oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or d) project report (approx. 8 pages)

**Allocation of places**

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**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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**Contents**

Specific, advanced knowledge of one or more of the Faculty's current research areas in the field of Experimental Physics.

**Intended learning outcomes**

The students have specific and advanced knowledge of one or more current research areas of the faculty in the field of Experimental Physics.

**Courses** (type, number of weekly contact hours, language — if other than German)

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

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (approx. 90 minutes) or b) talk (approx. 30 minutes) or c) oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or d) project report (approx. 8 pages)

**Allocation of places**

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**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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## Module Catalogue for the Subject

### FOKUS Physics

**Master's with 1 major, 120 ECTS credits**

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### Contents

Specific, advanced knowledge of one or more of the Faculty's current research areas.

### Intended learning outcomes

The students have specific and advanced knowledge of one or more current research areas of the faculty in an interdisciplinary field.

### 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) talk (approx. 30 minutes) or c) oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or d) project report (approx. 8 pages)

### Allocation of places

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### Additional information

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### Referred to in LPO I

(examination regulations for teaching-degree programmes)

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### Contents
Specific, advanced knowledge of one or more of the Faculty's current research areas in the field of Theoretical Physics.

### Intended learning outcomes
The students have specific and advanced knowledge of one or more current research areas of the faculty in the field of Theoretical Physics.

### Courses
(type, number of weekly contact hours, language — if other than German)

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

### Method of assessment
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (approx. 90 minutes) or b) talk (approx. 30 minutes) or c) oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or d) project report (approx. 8 pages)

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

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Module title: 5A Special Training Astronomy
Abbreviation: 11-SF-5A-072-m01

Module coordinator:
Managing Director of the Institute of Theoretical Physics and Astrophysics

Module offered by:
Faculty of Physics and Astronomy

ECTS: 5
Method of grading: numerical grade
Only after succ. compl. of module(s): --

Duration: 1 semester
Module level: graduate
Other prerequisites: --

Contents:
Specific, advanced knowledge of one or more of the Faculty's current research areas in the field of Astronomy.

Intended learning outcomes:
The students have specific and advanced knowledge of one or more current research areas of the faculty in the field of Astronomy.

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) talk (approx. 30 minutes) or (c) oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or (d) project report (approx. 10 pages)

Allocation of places:
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Additional information:
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- **Module coordinator**: Managing Director of the Institute of Applied Physics
- **Module offered by**: Faculty of Physics and Astronomy
- **ECTS**: 5
- **Numerical grade**: Only after succ. compl. of module(s)
- **Duration**: 1 semester
- **Module level**: Graduate
- **Other prerequisites**: --

**Contents**

Specific, advanced knowledge of one or more of the Faculty's current research areas in the field of Didactics.

**Intended learning outcomes**

The students have specific and advanced knowledge of one or more current research areas of the faculty in the field of Didactics.

**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) talk (approx. 30 minutes) or c) oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or d) project report (approx. 10 pages)

**Allocation of places**

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**Additional information**

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### Contents

Specific, advanced knowledge of one or more of the Faculty's current research areas in the field of Experimental Physics.

### Intended learning outcomes

The students have specific and advanced knowledge of one or more current research areas of the faculty in the field of Experimental Physics.

### Courses

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### Method of assessment

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### Referred to in LPO I (examination regulations for teaching-degree programmes)

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### Module Coordinator

Managing Directors of the Institute of Applied Physics and the Institute of Theoretical Physics and Astrophysics

### Module Offered by

Faculty of Physics and Astronomy

### Contents

Specific, advanced knowledge of one or more of the Faculty's current research areas.

### Intended Learning Outcomes

The students have specific and advanced knowledge of one or more current research areas of the faculty in an interdisciplinary field.

### 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) talk (approx. 30 minutes) or (c) oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or (d) project report (approx. 10 pages)

### Allocation of Places

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### Additional Information

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### Referred to in LPO I

(examination regulations for teaching-degree programmes)

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### Module Title
Module Type 5T Special Training Theoretical Physics

### Abbreviation
11-SF-5T-072-m01

### Module Coordinator
Managing Director of the Institute of Theoretical Physics and Astrophysics

### Module offered by
Faculty of Physics and Astronomy

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### Duration
1 semester

### Module Level
graduate

### Other Prerequisites
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### Contents
Specific, advanced knowledge of one or more of the Faculty's current research areas in the field of Theoretical Physics.

### Intended Learning Outcomes
The students have specific and advanced knowledge of one or more current research areas of the faculty in the field of Theoretical Physics.

### 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) talk (approx. 30 minutes) or (c) oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or (d) project report (approx. 10 pages)

### Allocation of Places
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### Additional Information
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**Contents**

Specific, advanced knowledge of one or more of the Faculty's current research areas in the field of Astronomy.

**Intended learning outcomes**

The students have specific and advanced knowledge of one or more current research areas of the faculty in the field of Astronomy.

**Courses** (type, number of weekly contact hours, language — if other than German)

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

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (approx. 90 minutes) or b) talk (approx. 30 minutes) or c) oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or d) project report (approx. 12 pages)

**Allocation of places**

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**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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**Contents**

Specific, advanced knowledge of one or more of the Faculty's current research areas in the field of Didactics.

**Intended learning outcomes**

The students have specific and advanced knowledge of one or more current research areas of the faculty in the field of Didactics.

**Courses** (type, number of weekly contact hours, language — if other than German)

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

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (approx. 90 minutes) or b) talk (approx. 30 minutes) or c) oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or d) project report (approx. 12 pages)

**Allocation of places**

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**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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Module Type 6E Special Training Experimental Physics

**Abbreviation**  
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**Duration**  
1 semester

**Module level**  
graduate

**Other prerequisites**  
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### Contents

Specific, advanced knowledge of one or more of the Faculty's current research areas in the field of Experimental Physics.

### Intended learning outcomes

The students have specific and advanced knowledge of one or more current research areas of the faculty in the field of Experimental Physics.

### Courses

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**Contents**
Specific, advanced knowledge of one or more of the Faculty's current research areas.

**Intended learning outcomes**
The students have specific and advanced knowledge of one or more current research areas of the faculty in an interdisciplinary field.

**Courses** (type, number of weekly contact hours, language — if other than German)
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Specific, advanced knowledge of one or more of the Faculty's current research areas in the field of Theoretical Physics.

**Intended learning outcomes**

The students have specific and advanced knowledge of one or more current research areas of the faculty in the field of Theoretical Physics.

**Courses** (type, number of weekly contact hours, language — if other than German)

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

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**Allocation of places**

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**Additional information**

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Specific, advanced knowledge of one or more of the Faculty's current research areas in the field of Astronomy.

**Intended learning outcomes**

The students have specific and advanced knowledge of one or more current research areas of the faculty in the field of Astronomy.

**Courses** (type, number of weekly contact hours, language — if other than German)

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

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

- a) written examination (approx. 90 minutes) or b) talk (approx. 30 minutes) or c) oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or d) project report (approx. 16 pages)

**Allocation of places**

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**Additional information**

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**Contents**

Specific, advanced knowledge of one or more of the Faculty's current research areas in the field of Didactics.

**Intended learning outcomes**

The students have specific and advanced knowledge of one or more current research areas of the faculty in the field of Didactics.

**Courses** (type, number of weekly contact hours, language — if other than German)

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

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

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**Allocation of places**

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**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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### Module Catalogue for the Subject
**FOKUS Physics**

**Master's with 1 major, 120 ECTS credits**

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Specific, advanced knowledge of one or more of the Faculty's current research areas in the field of Experimental Physics.

**Intended learning outcomes**

The students have specific and advanced knowledge of one or more current research areas of the faculty in the field of Experimental Physics.

**Courses** (type, number of weekly contact hours, language — if other than German)

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

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**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 Title

**Module Type 8I Special Training Interdisciplinary Research Fields**

**Abbreviation**: 11-SF-8I-072-m01

### Module Coordinator

Managing Directors of the Institute of Applied Physics and the Institute of Theoretical Physics and Astrophysics

### Module Offered by

Faculty of Physics and Astronomy

### ECTS

8

### Method of Grading

Numerical grade

### Only after succ. compl. of module(s)

- -

### Duration

1 semester

### Module Level

Graduate

### Other Prerequisites

- -

### Contents

Specific, advanced knowledge of one or more of the Faculty's current research areas.

### Intended Learning Outcomes

The students have specific and advanced knowledge of one or more current research areas of the faculty in an interdisciplinary field.

### 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) talk (approx. 30 minutes) or (c) oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or (d) project report (approx. 16 pages)

### Allocation of Places

- -

### Additional Information

- -

### Referred to in LPO I

(examination regulations for teaching-degree programmes)

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<thead>
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<td>Module Type 8T Special Training Theoretical Physics</td>
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</thead>
<tbody>
<tr>
<td>1 semester</td>
<td>graduate</td>
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### Contents
Specific, advanced knowledge of one or more of the Faculty's current research areas in the field of Theoretical Physics.

### Intended learning outcomes
The students have specific and advanced knowledge of one or more current research areas of the faculty in the field of Theoretical Physics.

### Courses
(type, number of weekly contact hours, language — if other than German)

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

### Method of assessment
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (approx. 90 minutes) or b) talk (approx. 30 minutes) or c) oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or d) project report (approx. 16 pages)

### Allocation of places
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### Additional information
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### Referred to in LPO 1
(examination regulations for teaching-degree programmes)

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<td>chairperson of examination committee</td>
<td>Faculty of Physics and Astronomy</td>
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<tr>
<td>1 semester</td>
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<td>Registration for assessment to be carried out electronically. Deadlines will be announced separately. Please consult with your supervisor.</td>
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### Contents
Mostly independent processing of an experimental or theoretical task in a current research area of Experimental or Theoretical Physics, especially according to known procedures and scientific aspects; writing of the thesis.

### Intended learning outcomes
The students are able to independently work on an experimental or theoretical task from a current research area of Theoretical Physics, especially in accordance with known methods and scientific aspects and to summarise their results in a final paper.

### Courses
(type, number of weekly contact hours, language — if other than German)

no courses assigned

### Method of assessment
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

written thesis (approx. 40 pages)

### Allocation of places
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### Additional information
--

### Referred to in LPO I
(examination regulations for teaching-degree programmes)

--
**Module title**
Supersymmetry I and II

**Abbreviation**
11-SUS-092-m01

**Module coordinator**
Managing Director of the Institute of Theoretical Physics and Astrophysics

**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**
Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.

**Contents**


**Intended learning outcomes**
The students have knowledge of the mathematical and physical principles of supersymmetry and supersymmetric models. They understand the theory’s formalism and recognise its connections to other models as well as its importance for phenomenology of elementary particles.

**Courses**
(type, number of weekly contact hours, language — if other than German)
V + R (no information on SWS (weekly contact hours) and course language available)

**Method of assessment**
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) 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**
--

**Additional information**
--

**Referred to in LPO I**
(examination regulations for teaching-degree programmes)
--
**Module title** | **Abbreviation**
---|---
Renormalization Group Methods in Field Theory | 11-RMFT-102-m01

**Module coordinator** | **Module offered by**
---|---
Managing Director of the Institute of Theoretical Physics and Astrophysics | Faculty of Physics and Astronomy

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</table>

**Contents**
Renormalisation group methods for non-linear partial differential equations, field theoretical contexts and non-analysed behaviour of cryogenic temperatures.

**Intended learning outcomes**
The students gain an overview of non-linearities in partial differential equations and their solution on the basis of the renormalisation group method.

**Courses** (type, number of weekly contact hours, language — if other than German)
V + R (no information on SWS (weekly contact hours) and course language available)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) 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**
--

**Additional information**
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**Referred to in LPO I** (examination regulations for teaching-degree programmes)
--
Module title | Abbreviation
---|---
Spintronics | 11-SPI-102-m01

Module coordinator | Module offered by
Managing Director of the Institute of Applied Physics | Faculty of Physics and Astronomy

ECTS | Method of grading | Only after succ. compl. of module(s)
---|---|---
6 | numerical grade | --

Duration | Module level | Other prerequisites
---|---|---
1 semester | graduate | Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.

Contents

This lecture covers the basic principles of spin transport, with a particular emphasis on the phenomena of giant magnetoresistance and tunnel magnetoresistance. As a last point, we discuss new phenomena from the field of spin dynamics and current-induced spin phenomena.

Intended learning outcomes

The students know the basic principles of spin transport models and the applications of spin transport in information technology. They have gained an overview of current findings in this field (giant magnetoresistance, tunnel magnetoresistance).

Courses (type, number of weekly contact hours, language — if other than German)

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

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) 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)

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<td>11-AST-092-m01</td>
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<tbody>
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<td>Managing Director</td>
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<td>of the Institute</td>
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<td>of Theoretical</td>
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<td>Physics and</td>
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<tr>
<td>Astrophysics</td>
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<table>
<thead>
<tr>
<th>Contents</th>
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<tbody>
<tr>
<td>Theoretical Astrophysics, models for the description of complex observation results, numeric simulations.</td>
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<table>
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<tr>
<th>Intended learning outcomes</th>
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</thead>
<tbody>
<tr>
<td>The students have basic knowledge of the methods of Theoretical Astrophysics. They are able to design complex observations and to test the models with the help of simulations.</td>
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<tr>
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<td>R + V (no information on SWS (weekly contact hours) and course language available)</td>
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<tr>
<th>Additional information</th>
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<th>Referred to in LPO I (examination regulations for teaching-degree programmes)</th>
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</table>
Module title: Strong Interaction in Accelerator Experiments

Abbreviation: 11-WWB-102-m01

Module coordinator: Managing Director of the Institute of Applied Physics

Module offered by: Faculty of Physics and Astronomy

ECTS: 3

Method of grading: numerical grade

Duration: 1 semester

Module level: graduate

Other prerequisites: Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.

Contents:

German contents available but not translated yet.

QCD Jet Simulation. Hadronproduktion in Elektron-Proton-Kollisionen. Hadronproduktion in Proton-Proton-Kollisionen

Intended learning outcomes:

German intended learning outcomes available but not translated yet.


Courses:

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

Method of assessment:

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) 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:

Additional information:

Referred to in LPO I (examination regulations for teaching-degree programmes)
Module title: Methods in Surface Spectroscopy
Abbreviation: 11-MSS-102-m01

Module coordinator: Managing Director of the Institute of Applied Physics
Module offered by: Faculty of Physics and Astronomy

ECTS: 4
Method of grading: numerical grade
Only after succ. compl. of module(s): --

Duration: 1 semester
Module level: graduate
Other prerequisites: Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.

Contents
Boundary conditions of experiments: Ultra-high vacuum, surface sensibility, light-matter-interaction, principles of photoelectron spectroscopy (PES), one-particle image of PES, three step model, many-particle effects, line shape, satellites, Fermi liquid, quasiparticles, exemplary systems and spectra, measurements with synchrotron radiation, related experimental methods.

Intended learning outcomes
The students know the physical principles and experimental methods of surface spectroscopy. They are able to conduct, evaluate and interpret simple measurements.

Courses (type, number of weekly contact hours, language — if other than German)
V (no information on SWS (weekly contact hours) and course language available)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) 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)
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### Module title
Practical Course Astrophysics

### Abbreviation
11-APP-111-m01

### Module coordinator
Managing Director of the Institute of Theoretical Physics and Astrophysics

### Module offered by
Faculty of Physics and Astronomy

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### Duration
1 semester

### Module level
graduate

### Other prerequisites
Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.

### Contents
Astrophysical experiments in the fields of detectors, telescopes, methodology, analysis and astronomic observations.

### Intended learning outcomes
The students have mastered experimental methods of Astrophysics and are able to analyse and interpret the measuring data and present the results. They are familiar with the working methods of observational Astronomy and with basic techniques of detecting electromagnetic radiation. They are able to plan and evaluate observations and measurements and to present the results.

### Courses
(P no information on SWS (weekly contact hours) and course language available)

### Method of assessment
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) Preparing, performing and evaluating the experiments will be considered successfully completed if a Testat (exam) is passed. Experiments that were not successfully completed can be repeated once. Or b) discussion to test the candidate's understanding of the physics-related contents and results of the experiment (approx. 20 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.

### Allocation of places
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### Additional information
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</table>

**Contents**

Principles of interaction between particles and matter. Particle detectors for space and time measurement, determination of momentum, energy and particle identification. Conception of particle detectors in examples.

**Intended learning outcomes**

The students know the physical principles and the basic structure of particle detectors. They know the functions and applications of different types of detectors, they can explain the measurement of physical values and have basic knowledge of the conception of detector systems.

**Courses**

(type, number of weekly contact hours, language — if other than German)

V + Ü (no information on SWS (weekly contact hours) and course language available)

**Method of assessment**

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) 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)

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<td>11-MAS-111-m01</td>
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<td>Managing Director of the Institute of Theoretical Physics and Astrophysics</td>
<td>Faculty of Physics and Astronomy</td>
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<td>graduate</td>
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</table>

**Contents**

Introduction to a field of modern Astrophysics, e.g. extra-galactic jets.

**Intended learning outcomes**

The students know the current state of research on the modern topic of Astrophysics. They know the physical values and are to plan and conduct observations in this area. This includes the ability to conceptualise a specific observational project and e.g. to apply for observation time at large telescopes.

**Courses**

(type, number of weekly contact hours, language — if other than German)

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

**Method of assessment**

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes)

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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)

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**Contents**

Current topics of Experimental Physics. Accredited academic achievements, e.g. in case of change of university or study abroad.

**Intended learning outcomes**

The students have advanced competencies corresponding to the requirements of a module of Experimental Physics of the Master's programme. They have knowledge of a current subdiscipline of Experimental Physics and understand the measuring and/or evaluation methods necessary to acquire this knowledge. They are able to classify the subject-specific contexts and know the application areas.

**Courses** (type, number of weekly contact hours, language — if other than German)

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

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Language of assessment: German, English

**Allocation of places**

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## Current Topics in Experimental Physics

### Abbreviation
11-EXE6-111-m01

### Module coordinator
chairperson of examination committee

### Module offered by
Faculty of Physics and Astronomy

### ECTS
6

### Method of grading
numerical grade

### Only after succ. compl. of module(s)
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### Duration
1 semester

### Module level
graduate

### Other prerequisites
Approval by examination committee required.

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Current topics of Experimental Physics. Accredited academic achievements, e.g. in case of change of university or study abroad.

### Intended learning outcomes
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Language of assessment: German, English

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Module title | Current Topics in Experimental Physics
---|---
Abbreviation | 11-EXE7-111-m01

Module coordinator | chairperson of examination committee
Module offered by | Faculty of Physics and Astronomy

ECTS | Method of grading | Only after succ. compl. of module(s)
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Duration | Module level | Other prerequisites
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Language of assessment: German, English

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**Intended learning outcomes**

The students know the principles of the theoretical description of electron-electron interactions in one dimension.

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(type, number of weekly contact hours, language — if other than German)

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

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Language of assessment: German, English

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**Contents**

a) metal-insulators and topological insulators  

b) transport phenomena  

c) magnetic impurities in metals. Kondo effect and heavy fermions  

d) electron-phonon interaction  

e) one-dimensional conductors  

**Intended learning outcomes**

The students have advanced knowledge of the theoretical description of solid-state phenomena. They know the mathematical or theoretical methods and are able to apply them to problems of solid-state theory and understand the connections to experimental results. The individual students have elaborated on an advanced topic of solid-state theory and have discussed this topic in a seminar presentation.

**Courses** (type, number of weekly contact hours, language — if other than German)

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Language of assessment: German, English

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**Intended learning outcomes**
The students have in-depth knowledge of Theoretical Elementary Particle Physics.

**Courses** (type, number of weekly contact hours, language — if other than German)
V (no information on SWS (weekly contact hours) and course language available)

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Language of assessment: German, English

**Allocation of places**

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### Contents

Aside from string theory, quantum loop gravity (QLG) is one of the most important approaches to a quantum mechanical description of gravity. General relativity is formulated in Hamiltonian formalism and the elemental variables are identified with the corresponding Poisson brackets. These variables are quantised in the typical manner on discretised graphs, so-called spin networks. In doing so, e.g. a quantisation of elemental volumes appears. Therefore, QLG belongs to the speculative theories which paint a picture of the constitution of space and time.

### Intended learning outcomes

The students know the principles of quantum loop gravity. They have acquired advanced knowledge of a selected topic and have proved their knowledge in a seminar presentation.

### Courses

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Language of assessment: German, English
### Module Catalogue for the Subject

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**Module Catalogue for the Subject**

**FOKUS Physics**

**Master's with 1 major, 120 ECTS credits**

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Current topics of Theoretical Physics. Accredited academic achievements, e.g. in case of change of university or study abroad.

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The students have advanced competencies corresponding to the requirements of a module of Theoretical Physics of the Master's programme. They have advanced specialist knowledge of a subdiscipline of Theoretical Physics and have mastered the required methods. They are able to apply the acquired methods to current problems of Theoretical Physics.

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Language of assessment: German, English

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<td>Current Topics in Theoretical Physics</td>
<td>11-EXT8-111-m01</td>
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<tbody>
<tr>
<td>chairperson of examination committee</td>
<td>Faculty of Physics and Astronomy</td>
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<tbody>
<tr>
<td>1 semester</td>
<td>graduate</td>
<td>Approval by examination committee required.</td>
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</table>

**Contents**

Current topics of Theoretical Physics. Accredited academic achievements, e.g. in case of change of university or study abroad.

**Intended learning outcomes**

The students have advanced competencies corresponding to the requirements of a module of Theoretical Physics of the Master’s programme. They have advanced specialist knowledge of a subdiscipline of Theoretical Physics and have mastered the required methods. They are able to apply the acquired methods to current problems of Theoretical Physics.

**Courses** (type, number of weekly contact hours, language — if other than German)

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

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (approx. 120 minutes, for modules with less than 4 ECTS credits approx. 90 minutes; unless otherwise specified) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) or c) project report (approx. 8 to 10 pages, time to complete: 1 to 4 weeks) or d) presentation/seminar presentation (approx. 30 minutes)

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)

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<table>
<thead>
<tr>
<th>Module title</th>
<th>Abbreviation</th>
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<tbody>
<tr>
<td>FOKUS Research Module Applied Semiconductor Physics and Devices</td>
<td>11-FM-SPD-102-m01</td>
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**Module coordinator**
chairperson of examination committee

**Module offered by**
Faculty of Physics and Astronomy

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<tr>
<td>1 semester</td>
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<td>11-KM-2</td>
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**Contents**
Specific and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Semiconductor Physics and Components, reproduction of knowledge, acquisition of social and methodological competencies. Principles of Semiconductor Physics. Introduction to key theories on semiconductors. Components from the areas of electronics and photonics.

**Intended learning outcomes**
The students have special and advanced knowledge of independent scientific work in Applied Semiconductor Physics. They are familiar with the properties of semiconductors, they have gained an overview of the electronic and phononic band structures of important semiconductors and the resulting electronic, optical and thermal properties. They know the realisation possibilities of low-dimensional charge carrier systems on the basis of semiconductors and their technological importance. They have acquired advanced knowledge of a special topic and are able to summarise their knowledge in an oral presentation.

**Courses**
(Halbleiterphysik und Bauelemente (Applied Semiconductor Physics and Devices): V (3 weekly contact hours) + U/P (1 weekly contact hour), German or English, once a year (winter semester)
Kompaktseminar Halbleiterphysik und Bauelemente (Block Taught Seminar Applied Semiconductor Physics and Devices): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)

**Method of assessment**
This module has the following assessment components
1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)

Assessment components 1 and 2 will be offered in German or English.
Students must register for assessment components 1 and 2 online (details to be announced). Assessment component 1 will be offered once a year in the winter semester; details on when assessment component 2 will be offered to be announced.
To pass this module, students must pass both assessment component 1 and assessment component 2.

**Allocation of places**
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**Additional information**
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**Referred to in LPO I** (examination regulations for teaching-degree programmes)
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<tr>
<td>FOKUS Research Module Quantum Transport in Semiconductor Nanostructures</td>
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<td>1 semester</td>
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</table>

**Contents**

Specific and advanced knowledge of independent scientific work in the field of quantum transport. Transport phenomena that cannot be observed in classical electronic switches appear in highly miniaturised electronic components. The research module provides insights into production techniques, characteristics and application fields of modern nanoelectronic components, which function on the basis of ballistic and coherent transport.

**Intended learning outcomes**

The students have special and advanced knowledge of independent scientific work in the current research area of quantum transport. They have mastered the basics of electronics of nanostructures in theory and practice. They know functions and applications of respective components and are able to reproduce the acquired knowledge, to apply the acquired methods and to summarise a field of the current research area in an oral presentation.

**Courses** (type, number of weekly contact hours, language — if other than German)

Quantentransport in Halbleiter-Nanostrukturen (Quantum Transport in Semiconductor Nanostructures): V (3 weekly contact hours) + Ü/P (1 weekly contact hour), German or English, once a year (summer semester)
Kompaktseminar Quantentransport in Halbleiternanostrukturen (Block Taught Seminar Quantum Transport in Semiconductor Nanostructures): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

This module has the following assessment components
1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)

Assessment components 1 and 2 will be offered in German or English.
Students must register for assessment components 1 and 2 online (details to be announced).
Assessment component 1 will be offered once a year in the summer semester; details on when assessment component 2 will be offered to be announced.
To pass this module, students must pass both assessment component 1 and assessment component 2.

**Allocation of places**

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**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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<table>
<thead>
<tr>
<th>Module title</th>
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<td>FOKUS Research Module Methods in Surface Spectroscopy</td>
<td>11-FM-MSS-102-m01</td>
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<td>11-TQM, 11-KM2, 11-FK2 (or 11-T3, 11-E5, 11-E7)</td>
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</table>

**Contents**

Experimental determination of the electronic structure of solids and surfaces: Band dispersion and band gaps, quasiparticles, electronic correlations, etc.

**Intended learning outcomes**

The students know the physical principles and experimental methods of surface spectroscopy. They are able to conduct, evaluate and interpret simple measurements. They have acquired advanced knowledge of a subdiscipline and are able to summarise their knowledge in an oral presentation.

**Courses** (type, number of weekly contact hours, language — if other than German)

Methods in Surface Spectroscopy: V (3 weekly contact hours), usually English, once a year (winter semester)
Kompaktseminar (Block Taught Seminar) Applications of Surface Spectroscopy: S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

This module has the following assessment components
1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)

Assessment components 1 and 2 will be offered in German or English.
Students must register for assessment components 1 and 2 online (details to be announced).
Assessment component 1 will be offered once a year in the winter semester; details on when assessment component 2 will be offered to be announced.
To pass this module, students must pass both assessment component 1 and assessment component 2.

**Allocation of places**

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**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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<table>
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<tr>
<td>FOKUS Research Module Methods in Surface Spectroscopy with Mini Research Project</td>
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### Module coordinator
chairperson of examination committee

### Module offered by
Faculty of Physics and Astronomy

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### Duration
1 semester

### Module level
graduate

### Other prerequisites
11-TQM, 11-KM2, 11-FK2 (or 11-T3, 11-E5, 11-E7)

### Contents
Experimental determination of the electronic structure of solids and surfaces: Band dispersion and band gaps, quasiparticles, electronic correlations

### Intended learning outcomes
The students have gained insights into a modern research area neighbouring on different areas of "Condensed Matter", they have acquired basic knowledge for the application of modern methods of surface spectroscopy (photo emission, Auger spectroscopy, spectroscopy with synchrotron radiation etc.) and are able to interpret and present the results obtained with these methods in a presentation or a poster.

### Courses (type, number of weekly contact hours, language — if other than German)
- Methods in Surface Spectroscopy: V (3 weekly contact hours), usually English, once a year (winter semester)
- Kosmologie (Cosmology): V (3 weekly contact hours) + Ü/P (1 weekly contact hour), German or English
- Kompaktseminar (Block Taught Seminar) Applications of Surface Spectroscopy: S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)
- Miniforschungsprojekt zu Surface Spectroscopy (Mini Research Project Surface Spectroscopy): P (2 weekly contact hours)

### Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

This module has the following assessment components
1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)
3. Research project: project report (approx. 8 pages)

Assessment components 1 through 3 will be offered in German or English. Students must register for assessment components 1 through 3 online (details to be announced). Assessment component 1 will be offered once a year in the winter semester; details on when assessment components 2 and 3 will be offered to be announced.

To pass this module, students must pass each of the assessment components 1 through 3.

### Allocation of places
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### Additional information
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<table>
<thead>
<tr>
<th>Module title</th>
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<td>FOKUS Research Module High Energy Astrophysics</td>
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<tr>
<td>1 semester</td>
<td>graduate</td>
<td>11-A4, 11-KET</td>
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</table>

**Contents**

Specific and advanced knowledge for independent scientific work in the research area of High-Energy Astrophysics.

**Intended learning outcomes**

The students have special and advanced knowledge of independent scientific work in the field of High-Energy Astrophysics. They have knowledge of cosmology and/or Plasma Astrophysics (cf. modules 11-AKM, 11-APL). They are able to reproduce and summarise the acquired knowledge in a seminar presentation.

**Courses** (type, number of weekly contact hours, language — if other than German)

- Plasma-Astrophysik (Plasma-Astrophysics): V (3 weekly contact hours) + Ü/P (1 weekly contact hour), German or English, once a year (summer semester)
- Kosmologie (Cosmology): V (3 weekly contact hours) + Ü/P (1 weekly contact hour), German or English
- Kompaktseminar Hochenergie-Astrophysik (Block Taught Seminar High Energy Astrophysics): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

This module has the following assessment components

1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)

Assessment components 1 and 2 will be offered in German or English.

Students must register for assessment components 1 and 2 online (details to be announced). Details on when assessment component 2 will be offered to be announced.

Lectures and exercises will cover either plasma-astrophysics or cosmology (as announced by or agreed upon with the lecturer).

To pass this module, students must pass both assessment component 1 and assessment component 2.

**Allocation of places**

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**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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### Module title

**FOKUS Research Module High Energy Astrophysics with Mini Research Project**

| Abbreviation | 11-FM-HAS-MF-111-m01 |

### Module coordinator

Chairperson of examination committee

### Module offered by

Faculty of Physics and Astronomy

### ECTS

16

### Method of grading

Numerical grade

### Only after succ. compl. of module(s)

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### Duration

1 semester

### Module level

Graduate

### Other prerequisites

11-A4, 11-KET

### Contents

Specific and advanced knowledge for independent scientific work in the research area of High-Energy Astrophysics.

### Intended learning outcomes

The students have special and advanced knowledge of independent scientific work in the field of High-Energy Astrophysics. They are able to reproduce and summarise the acquired knowledge in an oral presentation. They are able to apply the acquired methods, to conduct and evaluate astrophysical experiments and to present the obtained results.

### Courses (type, number of weekly contact hours, language — if other than German)

- **Plasma-Astrophysik (Plasma-Astrophysics):** V (3 weekly contact hours) + Ü/P (1 weekly contact hour), German or English, once a year (summer semester)
- **Kosmologie (Cosmology):** V (3 weekly contact hours) + Ü/P (1 weekly contact hour), German or English
- **Kompaktseminar Hochenergie-Astrophysik (Block Taught Seminar High Energy Astrophysics):** S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)
- **Astrophysikalisches Praktikum (Practical Course Astrophysics):** P (4 weekly contact hours)

### Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

This module has the following assessment components

1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)
3. Lab course (research project): a) Preparing, performing and evaluating the experiments will be considered successfully completed if a Testat (exam) is passed. Students will be given one opportunity to repeat experiments they did not pass. Or b) discussion to test the students' understanding of the physics-related contents and results of the experiment (approx. 20 minutes).

Assessment components 1 and 2 will be offered in German or English. Students must register for assessment components 1 through 3 online (details to be announced). Details on when assessment component 2 will be offered to be announced.

Lectures and exercises will cover either plasma-astrophysics or cosmology (as announced by or agreed upon with the lecturer).

To pass this module, students must pass both assessment component 1 and assessment component 2.

### Allocation of places

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### Additional information

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### Referred to in LPO I (examination regulations for teaching-degree programmes)

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## Module Catalogue for the Subject
**FOKUS Physics**

**Master's with 1 major, 120 ECTS credits**

### Module title
**FOKUS Research Module Spectroscopy and Nano-Optics**

### Abbreviation
11-FM-NOS-F-111-m01

### Module coordinator
Chairperson of examination committee

### Module offered by
Faculty of Physics and Astronomy

### ECTS
10

### Method of grading
Numerical grade

### Only after succ. compl. of module(s)
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### Duration
1 semester

### Module level
Graduate

### Other prerequisites
11-KM, 11-TQM

## Contents
Specific and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Nano-Optics, reproduction of knowledge, acquisition of social and methodological competencies.

## Intended learning outcomes
The students have special and advanced knowledge of independent scientific work in a current research area, especially in the field of nano-optics, and are able to reproduce the acquired knowledge, to apply the acquired methods and to summarise a sub-area of the current research area in an oral presentation.

## Courses
### Festkörper-Spektroskopie (Solid State Spectroscopy)
- V (3 weekly contact hours) + Ü/P (1 weekly contact hour), German or English, once a year (summer semester)

### Kompaktseminar Nano-Optik und Spektroskopie (Block Taught Seminar Nano-Optics and Spectroscopy)
- S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)

## Method of assessment
This module has the following assessment components
1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)

Assessment components 1 and 2 will be offered in German or English.

Students must register for assessment components 1 and 2 online (details to be announced). Assessment component 1 will be offered once a year in the summer semester; details on when assessment component 2 will be offered to be announced.

To pass this module, students must pass both assessment component 1 and assessment component 2.

## Allocation of places
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## Additional information
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**Contents**

Specific and advanced knowledge of independent scientific work in a current research area, especially in the specialist field of Nano-Optics and Spectroscopy, reproduction of knowledge, acquisition of social and methodological competencies.

**Intended learning outcomes**

The students have special and advanced knowledge of independent scientific work in a current research area, especially in the field of nano-optics and spectroscopy, and are able to reproduce the acquired knowledge, to apply the acquired methods and to summarise a sub-area of the current research area in an oral presentation.

**Courses** (type, number of weekly contact hours, language — if other than German)

Nano-Optik (Nano-Optics): V (2 weekly contact hours) + Ü/P (1 weekly contact hour), German or English, once a year (summer semester)

Kompaktseminar Nano-Optik (Block Taught Seminar Nano-Optics): S (2 weekly contact hours), German or English, details on availability to be announced (block taught seminar (3 days), usually held during semester break)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

This module has the following assessment components

1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)

Assessment components 1 and 2 will be offered in German or English.

Students must register for assessment components 1 and 2 online (details to be announced). Students must meet certain prerequisites to qualify for admission to assessment component 1. The lecturer will inform them about the respective details at the beginning of the course.

Assessment component 1 will be offered once a year in the summer semester; details on when assessment component 2 will be offered to be announced.

To pass this module, students must pass both assessment component 1 and assessment component 2.

**Allocation of places**

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**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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<td>Principles of two- and threedimensional Röntgen imaging</td>
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**Module coordinator**  
Managing Director of the Institute of Applied Physics

**Module offered by**  
Faculty of Physics and Astronomy

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**Duration**  
1 semester

**ECTS**  
graduate

**Other prerequisites**  
Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.

**Contents**

Physics of X-ray generation (X-ray tubes, synchrotron). Physics of the interaction between X-rays and matter (photon absorption, scattering), physics of X-ray detection. Mathematics of reconstruction algorithms (filtered rear projection, Fourier reconstruction, iterative methods). Image processing (image data pre-processing, feature extraction, visualisation,...). Applications of X-ray imaging in the industrial sector (component testing, material characterisation, metrology, biology, ...). Radiation protection and biological radiation effect (dose, ...).

**Intended learning outcomes**

The students know the principles of generating X-rays and of their interactions with matter. They know imaging techniques using X-rays and methods of image processing as well as application areas of these methods.

**Courses**

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

**Method of assessment**

(TYPE, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) 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.

**Allocation of places**

- -

**Additional information**

- -

**Referred to in LPO I**
(examination regulations for teaching-degree programmes)
Module title | Abbreviation
---|---
Introduction to Electron Microscopy | 11-IEM-111-m01

Module coordinator | Module offered by
Managing Director of the Institute of Applied Physics | Faculty of Physics and Astronomy

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</tr>
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</table>

Contents


Intended learning outcomes

The students have basic knowledge of modern research methods of electron microscopy up to an atomic level. They know microscoping procedures that are used in practice in labs and the industry as well as electron-microscopic methods for chemical analysis. They are able to evaluate the efficiency of different research methods.

Courses

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Method of assessment

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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 title: Field Theory in Solid State Physics

Abbreviation: 11-FTFK-112-m01

Module coordinator: Managing Director of the Institute of Theoretical Physics and Astrophysics

Module offered by: Faculty of Physics and Astronomy

ECTS: 8

Method of grading: Only after succ. compl. of module(s) at numerical grade

Duration: 1 semester

Module level: graduate

Other prerequisites: Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.

Contents
This will usually be a course on quantum many particle physics using the method of functional integration. An outline could be:
1 Coherent states and review of second quantization
2 The functional integral formalism at finite temperatures T
3 Perturbation theory at T=0
4 Order parameters and broken symmetry
5 Green's functions
6 The Landau theory of Fermi liquids
7 Further developments

Intended learning outcomes
The students have mastered the principles of quantum field theory in many-particle systems. They are able to apply the acquired methods to current problems of Theoretical Solid-State Physics.

Courses (type, number of weekly contact hours, language — if other than German)
V + R (no information on SWS (weekly contact hours) and course language available)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) 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.

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 title

Concepts of Theoretical Astroparticle physics

### Abbreviation

11-ATT-111-m01

### Module coordinator

Managing Director of the Institute of Theoretical Physics and Astrophysics

### Module offered by

Faculty of Physics and Astronomy

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### Duration

1 semester

### Module level

graduate

### Other prerequisites

Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective details at the beginning of the course. Registration for the course will be considered a declaration of will to seek admission to assessment. If students have obtained the qualification for admission to assessment over the course of the semester, the lecturer will put their registration for assessment into effect. Students who meet all prerequisites will be admitted to assessment in the current or in the subsequent semester. For assessment at a later date, students will have to obtain the qualification for admission to assessment anew.

### Contents

Concepts of Theoretical Astro-Particle Physics, e.g. Dark matter, cosmic radiation, neutrinos, baryogenesis, cosmic accelerators, dark energy, inflation.

### Intended learning outcomes

The students have basic knowledge of the concepts of Theoretical Astroparticle Physics. They are able to describe phenomena of Astroparticle Physics on the basis of methods of Theoretical Physics and to find solution approaches for problems.

### Courses

(type, number of weekly contact hours, language — if other than German)

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

### Method of assessment

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) 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.

### Allocation of places

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### Additional information

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### Referred to in LPO I

(examination regulations for teaching-degree programmes)

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**Contents**

Mathematical foundations of the theory of relativity; differential forms; brief summary of special relativity; elements of differential geometry; electrodynamics as an example of a relativistic gauge theory; field equations of general relativity; stellar models; introduction to cosmology; Hamiltonian formulation

**Intended learning outcomes**

The students are familiar with the basic physical and mathematical concepts of general relativity. They have a mathematical understanding of the formulation of general relativity on the basis of differential forms. They are able to apply the acquired knowledge to problems of Astrophysics and cosmology.

**Courses** (type, number of weekly contact hours, language — if other than German)

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

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

- a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) 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.

**Allocation of places**

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**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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Module title | Abbreviation
--- | ---
Special Theory of Relativity | 11-SRT-112-m01

Module coordinator | Module offered by
Managing Director of the Institute of Theoretical Physics and Astrophysics | Faculty of Physics and Astronomy

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Contents
Mathematical principles; differential forms; special relativity; Minkowski space; Lorentz transformation, Hamiltonian equation of motion; relativistic free particle

Intended learning outcomes
The students are familiar with the physical concepts and mathematical principles of special relativity. They are familiar with modern mathematical formulation of special relativity. They are able to apply the acquired knowledge to problems of special relativity.

Courses (type, number of weekly contact hours, language — if other than German)
V + R (no information on SWS (weekly contact hours) and course language available)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination in groups (approx. 30 minutes per candidate, for modules with less than 4 ECTS credits approx. 20 minutes) 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.

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 title
- **FOKUS Research Module**

### Abbreviation
- **11-FM4-112-m01**

### Module coordinator
- chairperson of examination committee

### Module offered by
- Faculty of Physics and Astronomy

### ECTS
- **8**

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

### Contents
- Specific and advanced knowledge of independent scientific work in a current research area.

### Intended learning outcomes
- The students have special and advanced knowledge of independent scientific work in a current research area. They have mastered the basics in theory and practice. They are able to reproduce the acquired knowledge, to apply the acquired methods and to summarise a topic of the selected research area in an oral presentation.

### Courses
- **FOKUS Vorlesung zu aktuellen Forschungsthemen (FOKUS Lecture on Topics in Current Research):** V (2 weekly contact hours) + Ü/P (1 weekly contact hour), German or English, details on availability to be announced
- **FOKUS Kompaktseminar (FOKUS Block Taught Seminar):** S (2 weekly contact hours), German or English, details on availability to be announced

### Method of assessment
- This module has the following assessment components
  1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
  2. Seminar: talk (approx. 30 to 45 minutes)

- Assessment components 1 and 2 will be offered in German or English.
- Students must register for assessment components 1 and 2 online (details to be announced).
- Details on when assessment components will be offered to be announced.
- To pass this module, students must pass both assessment component 1 and assessment component 2.

### Allocation of places
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### Additional information
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### Referred to in LPO I
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## Contents
Specific and advanced knowledge of independent scientific work in a current research area.

## Intended learning outcomes
The students have special and advanced knowledge of independent scientific work in a current research area. They have mastered the basics in theory and practice. They are able to reproduce the acquired knowledge, to apply the acquired methods and to summarise a topic of the selected research area in an oral presentation.

## Courses

**FOKUS Vorlesung zu aktuellen Forschungsthemen (FOKUS Lecture on Topics in Current Research):**
- V (3 weekly contact hours) + Ü/P (1 weekly contact hour), German or English, details on availability to be announced
- FOKUS Kompaktseminar (FOKUS Block Taught Seminar):
  - S (2 weekly contact hours), German or English, details on availability to be announced

## Method of assessment
This module has the following assessment components
1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)

Assessment components 1 and 2 will be offered in German or English. Students must register for assessment components 1 and 2 online (details to be announced). Details on when assessment components will be offered to be announced.

To pass this module, students must pass both assessment component 1 and assessment component 2.

## Allocation of places
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## Additional information
--

## Referred to in LPO I
(examination regulations for teaching-degree programmes)
--
**Module title**  
FOKUS Research Module

**Abbreviation**  
11-FM8-112-m01

**Module coordinator**  
chairperson of examination committee

**Module offered by**  
Faculty of Physics and Astronomy

**ECTS**  
12

**Method of grading**  
numerical grade

**Duration**  
1 semester

**Module level**  
graduate

**Other prerequisites**  
--

**Contents**  
Specific and advanced knowledge of independent scientific work in a current research area.

**Intended learning outcomes**  
The students have special and advanced knowledge of independent scientific work in a current research area. They have mastered the basics in theory and practice. They are able to reproduce the acquired knowledge, to apply the acquired methods and to summarise a topic of the selected research area in an oral presentation.

**Courses**  

| FOKUS Vorlesung zu aktuellen Forschungsthemen (FOKUS Lecture on Topics in Current Research): V (4 weekly contact hours) + Ü/P (2 weekly contact hours), German or English, details on availability to be announced |
| FOKUS Kompaktseminar (FOKUS Block Taught Seminar): S (2 weekly contact hours), German or English, details on availability to be announced |

**Method of assessment**  

| This module has the following assessment components |
| 1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages) |
| 2. Seminar: talk (approx. 30 to 45 minutes) |

Assessment components 1 and 2 will be offered in German or English. Students must register for assessment components 1 and 2 online (details to be announced). Details on when assessment components will be offered to be announced. To pass this module, students must pass both assessment component 1 and assessment component 2.

**Allocation of places**  
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**Additional information**  
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**Referred to in LPO I** (examination regulations for teaching-degree programmes)  
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### FOKUS Research Module with Mini Research Project

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### Contents
Specific and advanced knowledge of independent scientific work in a current research area.

### Intended learning outcomes
The students have special and advanced knowledge of independent scientific work in a current research area. They have mastered the basics in theory and practice. They are able to reproduce the acquired knowledge, to apply the acquired methods and to summarise a topic of the selected research area in an oral presentation. They are able to successfully implement the acquired methods in a mini research project and to write down the results in a report.

### Courses
- **FOKUS Vorlesung zu aktuellen Forschungsthemen** (FOKUS Lecture on Topics in Current Research): V (2 weekly contact hours) + Ü/P (1 weekly contact hour), German or English, details on availability to be announced
- **FOKUS Kompaktseminar** (FOKUS Block Taught Seminar): S (2 weekly contact hours), German or English, details on availability to be announced
- **FOKUS Miniforschungsprojekt** (FOKUS Mini Research Project): P (2 weekly contact hours), German or English, details on availability to be announced

### Method of assessment
This module has the following assessment components:
1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)
3. Research project: project report (approx. 8 pages)

Assessment components 1 and 3 will be offered in German or English.

Students must register for assessment components 1 and 3 online (details to be announced).

Details on when assessment components will be offered to be announced.

To pass this module, students must pass each of the assessment components 1 through 3.

### Allocation of places
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### Additional information
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**Contents**

Specific and advanced knowledge of independent scientific work in a current research area.

**Intended learning outcomes**

The students have special and advanced knowledge of independent scientific work in a current research area. They have mastered the basics in theory and practice. They are able to reproduce the acquired knowledge, to apply the acquired methods and to summarise a topic of the selected research area in an oral presentation. They are able to successfully implement the acquired methods in a mini research project and to write down the results in a report.

**Courses** (type, number of weekly contact hours, language — if other than German)

- **FOKUS Vorlesung zu aktuellen Forschungsthemen** (FOKUS Lecture on Topics in Current Research): V (3 weekly contact hours) + Ü/P (1 weekly contact hour), German or English, details on availability to be announced
- **FOKUS Kompaktseminar** (FOKUS Block Taught Seminar): S (2 weekly contact hours), German or English, details on availability to be announced
- **FOKUS Miniforschungsprojekt** (FOKUS Mini Research Project): P (2 weekly contact hours), German or English, details on availability to be announced

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

This module has the following assessment components:

1. Topics covered in lectures and exercises: written examination (approx. 90 minutes) or talk (approx. 30 minutes) or oral examination of one candidate each or oral examination in groups (approx. 30 minutes) or project report (approx. 8 pages)
2. Seminar: talk (approx. 30 to 45 minutes)
3. Research project: project report (approx. 8 pages)

Assessment components 1 and 3 will be offered in German or English. Students must register for assessment components 1 and 3 online (details to be announced). Details on when assessment components will be offered to be announced.

To pass this module, students must pass each of the assessment components 1 through 3.

**Allocation of places**

--

**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

--
Module title
FOKUS Research Module with Mini Research Project

Abbreviation
11-FM8-MF-112-m01

Module coordinator
chairperson of examination committee

Module offered by
Faculty of Physics and Astronomy

ECTS
16

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
Specific and advanced knowledge of independent scientific work in a current research area.

Intended learning outcomes
The students have special and advanced knowledge of independent scientific work in a current research area. They have mastered the basics in theory and practice. They are able to reproduce the acquired knowledge, to apply the acquired methods and to summarise a topic of the selected research area in an oral presentation. They are able to successfully implement the acquired methods in a mini research project and to write down the results in a report.

Courses (type, number of weekly contact hours, language — if other than German)
- FOKUS Vorlesung zu aktuellen Forschungsthemen (FOKUS Lecture on Topics in Current Research): V (4 weekly contact hours) + Ü/P (2 weekly contact hours), German or English, details on availability to be announced
- FOKUS Kompaktseminar (FOKUS Block Taught Seminar): S (2 weekly contact hours), German or English, details on availability to be announced
- FOKUS Miniforschungsprojekt (FOKUS Mini Research Project): P (2 weekly contact hours), German or English, details on availability to be announced

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
This module has the following assessment components
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2. Seminar: talk (approx. 30 to 45 minutes)
3. Research project: project report (approx. 8 pages)

Assessment components 1 and 3 will be offered in German or English.
Students must register for assessment components 1 and 3 online (details to be announced).
Details on when assessment components will be offered to be announced.
To pass this module, students must pass each of the assessment components 1 through 3.

Allocation of places
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Additional information
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Referred to in LPO I (examination regulations for teaching-degree programmes)
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**Contents**
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The students have special and advanced knowledge of independent scientific work in a current research area. They have mastered the basics in theory and practice. They are able to reproduce the acquired knowledge, to apply the acquired methods and to summarise a topic of the selected research area in an oral presentation.

**Courses** (type, number of weekly contact hours, language — if other than German)

- FOKUS Vorlesung zu aktuellen Forschungsthemen (FOKUS Lecture on Topics in Current Research): V (2 weekly contact hours) + Ü/P (1 weekly contact hour), German or English, details on availability to be announced
- FOKUS Kompaktseminar (FOKUS Block Taught Seminar): S (2 weekly contact hours), German or English, details on availability to be announced

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

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**Allocation of places**
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**Additional information**
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**Referred to in LPO I** (examination regulations for teaching-degree programmes)
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Module title | Abbreviation
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FOKUS Research Module | 11-FM6A-112-m01

Module coordinator | Module offered by
chairperson of examination committee | Faculty of Physics and Astronomy

ECTS | Method of grading | Only after succ. compl. of module(s)
10 | numerical grade | --

Duration | Module level | Other prerequisites
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Courses (type, number of weekly contact hours, language — if other than German)

- **FOKUS Vorlesung (FOKUS Lecture)**: V (3 weekly contact hours) + Ü/P (1 weekly contact hour), German or English, details on availability to be announced.
- **FOKUS Kompaktseminar (FOKUS Block-Taught Seminar)**: S (2 weekly contact hours), German or English, details on availability to be announced.

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

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Module title | Abbreviation
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FOKUS Research Module | 11-FM8A-112-m01

Module coordinator | Module offered by
chairperson of examination committee | Faculty of Physics and Astronomy

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Courses (type, number of weekly contact hours, language — if other than German)
- FOKUS Vorlesung zu aktuellen Forschungsthemen (FOKUS Lecture on Topics in Current Research): V (4 weekly contact hours) + Ü/P (2 weekly contact hours), German or English, details on availability to be announced
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**Courses (type, number of weekly contact hours, language — if other than German)**

- FOKUS Vorlesung zu aktuellen Forschungsthemen (FOKUS Lecture on Topics in Current Research): V (2 weekly contact hours) + Ü/P (1 weekly contact hour), German or English, details on availability to be announced
- FOKUS Kompaktseminar (FOKUS Block Taught Seminar): S (2 weekly contact hours), German or English, details on availability to be announced
- FOKUS Miniforschungsprojekt (FOKUS Mini Research Project): P (2 weekly contact hours), German or English, details on availability to be announced

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**Allocation of places**

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**Additional information**

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**Referred to in LPO 1 (examination regulations for teaching-degree programmes)**

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## Module Catalogue for the Subject

**FOKUS Physics**

Master's with 1 major, 120 ECTS credits

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### Courses (type, number of weekly contact hours, language — if other than German)

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Abbreviation | 11-FM8A-MF-112-m01

Module coordinator

Module offered by: Faculty of Physics and Astronomy

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Duration: 1 semester
Module level: graduate
Other prerequisites: --

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