

# 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

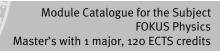


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## The subject is divided into

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### **Content and Objectives of the Programme**

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 an 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:  $\mathbf{E} = \text{field trip}$ ,  $\mathbf{K} = \text{colloquium}$ ,  $\mathbf{O} = \text{conversatorium}$ ,  $\mathbf{P} = \text{placement/lab course}$ ,  $\mathbf{R} = \text{project}$ ,  $\mathbf{S} = \text{seminar}$ ,  $\mathbf{T} = \text{tutorial}$ ,  $\ddot{\mathbf{U}} = \text{exercise}$ ,  $\mathbf{V} = \text{lecture}$ 

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:

#### ASP02007

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.



## **Compulsory Courses**

(40 ECTS credits)



Modul	e title			Abbreviation	
FOKUS Project Practical Course Physics				11-FPP-072-m01	
Modul	e coord	linator		Module offered by	
chairp	erson o	f examination committe	e	Faculty of Physics a	and Astronomy
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
10	nume	rical grade			
Durati	on	Module level	Other prerequisites		
1 seme	ester	graduate			
Contents					
		work on a current resear eriments including analy			Physics and implementation of
Intend	led lear	ning outcomes			
		are able to independent analyse scientific experi	,	•	rimental or Theoretical Physics, to
Course	<b>es</b> (type, i	number of weekly contact hours,	language — if other than Ge	rman)	
P (no i	nforma	tion on SWS (weekly cor	tact hours) and cours	e language available	e)
		sessment (type, scope, langual ole for bonus)	age — if other than German,	examination offered — if no	ot every semester, information on whether
port or	n techni		pages) and talk (appro		ctical course / project report / respective topic researched
Alloca	tion of	places			
Additio	onal inf	ormation			

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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 

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Modul	Module title				Abbreviation	
Professional Specialization FOKUS Physics				11-FS-PF-072-m01		
Module coordinator Module offered			Module offered by	<del>'</del>		
chairpe	erson o	f examination committee	9	Faculty of Physics a	and Astronomy	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
15	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ester	graduate				
Conter	nts		•			
on.  Intended  The stuate a special	ed lear udents ial relev	ning outcomes have advanced knowled	ge of a current expering ge of the Master's the	mental or theoretica	tal topics in a seminar presentati-	
Course	es (type, r	number of weekly contact hours,	language — if other than Ge	rman)		
S (no i	nforma	tion on SWS (weekly con	tact hours) and cours	e language available	e)	
		<b>sessment</b> (type, scope, languable for bonus)	age — if other than German,	examination offered — if no	ot every semester, information on whether	
talk with discussion (approx. 30 to 45 minutes) Language of assessment: German or English						
Allocation of places						
Additional information						

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



Module	e title			Abbreviation	
Scientific Methods and Project Management FOKUS Physics			:s	11-MP-PF-072-m01	
Module coordinator Module				Module offered by	<b>J</b>
chairpe	erson o	f examination commit	tee	Faculty of Physics	and Astronomy
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
15	nume	rical grade			
Duratio	n	Module level	Other prerequisites	•	
1 seme	ster	graduate			
Conten	ts				
theoret	ical an	d experimental quest			project planning. Application to t plan for the planned Master's
Intend	ed lear	ning outcomes	,		
thods o	of a cur f the M	rent experimental and aster's thesis. They ar	l theoretical subdiscipli	ne of Physics with sp plan for the Master'	including project planning me- pecial relevance to the intended is thesis and to plan the required I presentations.
Course	<b>S</b> (type, r	number of weekly contact hou	urs, language — if other than Ge	rman)	
R (no ir	nformat	tion on SWS (weekly c	ontact hours) and cours	e language availabl	e)
		sessment (type, scope, lar ble for bonus)	nguage — if other than German,	examination offered — if n	ot every semester, information on whether
talk with discussion (approx. 30 to 45 minutes) Language of assessment: German or English					
Allocation of places					
Additional information					
Referre	d to in	LPO I (examination regula	tions for teaching-degree progra	ammes)	



Module	e title			Abbreviation	
Advanced Seminar Experimental/Theoretical Physics					11-OSP-072-m01
Module	Module coordinator			Module offered by	
Managing Directors of the Institute of Applied Physics and the Institute of Theoretical Physics and Astrophysics				Faculty of Physics a	and Astronomy
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
4	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	ts				
Semina	ar on cu	ırrent issues of Theoretic	al or Experimental Ph	ysics.	
Intend	ed lear	ning outcomes			
are abl	e to ext	-	•	•	ental or Theoretical Physics. They this knowledge and present it to
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ge	rman)	
S (no ir	nformat	tion on SWS (weekly cont	act hours) and cours	e language available	e)
		<b>sessment</b> (type, scope, langua lle for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether
talk wit	th discı	ussion (approx. 30 to 45 i	ninutes)		
Allocation of places					
Additional information					
Referred to in LPO I (examination regulations for teaching-degree programmes)					



Module title					Abbreviation
Advanced Practical Course Master					11-PFM-072-m01
Module coordinator				Module offered by	
Managing Director of the Institute of Applied Physics Faculty of Physic			Faculty of Physics a	and Astronomy	
ECTS	Meth	od of grading	Only after succ. co	mpl. of module(s)	
6	(not)	successfully completed	11-E1, 11-E2		
Duratio	ion Module level Other prerequisites				
1 semester graduate 11-A3			11-A3		
Contents					

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

Fortgeschrittenen-Praktikum Master (Advanced Practical Course Master) Part 1: P (3 weekly contact hours), German or English

Fortgeschrittenen-Praktikum Master (Advanced Practical Course Master) Part 2: P (3 weekly contact hours), German or English

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

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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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 

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## **Compulsory Electives**

(40 ECTS credits)



## **Compulsory Electives Specialisation Physics**

(24 ECTS credits)



Module	e title		Abbreviation		
Modul	Module Type 4A Special Training Astronomy				11-SF-4A-072-m01
Module	Module coordinator Module offered by			Module offered by	
Managing Director of the Institute of Theoretical Physics and Astrophysics			eoretical Physics	Faculty of Physics a	and Astronomy
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
4	nume	rical grade			
Duratio	on	Module level	Other prerequisites		
1 seme	ster	graduate			
Conten	nts				
Specifi	c, adva	nced knowledge of one o	or more of the Faculty	's current research a	reas in the field of Astronomy.
Intend	ed lear	ning outcomes			
	dents   Astron	•	ed knowledge of one	e or more current res	earch areas of the faculty in the
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ge	rman)	
V + R (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)
		<b>sessment</b> (type, scope, langua le for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether
		mination (approx. 90 min oral examination in group			oral examination of one candi- rt (approx. 8 pages)
Allocation of places					
Additional information					
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)				



Module	Module title Abbreviation					
Module	e Type A	4D Special Training Dida	11-SF-4D-072-m01			
Module	e coord	inator				
Manag	ing Dire	ector of the Institute of A	oplied Physics	Faculty of Physics a	and Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
4	nume	rical grade				
Duratio	n	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	ts					
Specifi	c, adva	nced knowledge of one o	or more of the Faculty	's current research a	reas in the field of Didactics.	
Intend	ed lear	ning outcomes				
The stu			ed knowledge of one	or more current res	earch areas of the faculty in the	
Course	<b>S</b> (type, r	number of weekly contact hours,	anguage — if other than Ger	rman)		
V + R (r	no infor	mation on SWS (weekly	contact hours) and co	urse language avail	able)	
		<b>sessment</b> (type, scope, langua	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
		mination (approx. 90 mir oral examination in group			oral examination of one candition of one candition of one candition.	
Allocat	Allocation of places					
Additional information						
	<del></del>					
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)					
	<del></del>					



Module	Abbreviation Abbreviation					
	<del>,</del>	4E Special Training Expe		11-SF-4E-072-m01		
Modul	e coord	inator		Module offered by		
Manag	ing Dire	ector of the Institute of A	oplied Physics	Faculty of Physics a	and Astronomy	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
4	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conter	ıts					
	Specific, advanced knowledge of one or more of the Faculty's current research areas in the field of Experimental Physics.					
Intend	ed lear	ning outcomes				
		have specific and advand mental Physics.	ced knowledge of one	e or more current res	earch areas of the faculty in the	
Course	<b>S</b> (type, r	number of weekly contact hours,	language — if other than Ge	rman)		
V + R (1	no infor	mation on SWS (weekly	contact hours) and co	ourse language avail	able)	
		sessment (type, scope, langua	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
	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						
Additional information						
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)					



Module	e title	,		Abbreviation		
Module Type 4I Special Training Interdisciplinary Research Fiel				Fields	11-SF-4l-072-m01	
Module	Module coordinator Mod					
Managing Directors of the Institute of Applied Physics and the Institute of Theoretical Physics and Astrophysics				Faculty of Physics and Astronomy		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
4	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	its					
Specifi	c, adva	nced knowledge of one o	or more of the Faculty	's current research a	reas.	
Intend	ed lear	ning outcomes				
	ıdents   iplinary		ed knowledge of one	e or more current res	earch areas of the faculty in an in-	
Course	<b>S</b> (type, r	number of weekly contact hours, I	anguage — if other than Ger	rman)		
V + R (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)	
		<b>Sessment</b> (type, scope, langua le for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
		mination (approx. 90 mir oral examination in group			oral examination of one candi- rt (approx. 8 pages)	
Allocation of places						
Additional information						
Referred to in LPO I (examination regulations for teaching-degree programmes)						



Modul	le title		Abbreviation				
Module Type 4T Special Training Theoretical Physics 11-SF-4T-072-m01							
Modul	le coord	linator		Module offered by	•		
Managing Director of the Institute of Theoretical Physics and Astrophysics				Faculty of Physics and Astronomy			
ECTS	Meth	od of grading	Only after succ. cor	npl. of module(s)			
4	nume	rical grade					
Durati	on	Module level	Other prerequisites	•			
1 seme	ester	graduate					
Conte	nts						
Specif Physic		anced knowledge of one	or more of the Faculty	's current research a	reas in the field of Theoretical		
Intend	led lear	ning outcomes					
		have specific and advan etical Physics.	ced knowledge of one	e or more current res	earch areas of the faculty in the		
Course	<b>es</b> (type, i	number of weekly contact hours,	language — if other than Ge	rman)			
V + R (	no info	rmation on SWS (weekly	contact hours) and co	ourse language avail	able)		
		<b>sessment</b> (type, scope, langu ble for bonus)	age — if other than German,	examination offered — if no	ot every semester, information on whether		
		mination (approx. 90 mi oral examination in grou			oral examination of one candi- rt (approx. 8 pages)		
Allocation of places							
Additional information							
Referr	Referred to in LPO I (examination regulations for teaching-degree programmes)						



Module title					Abbreviation	
Module Type 5A Special Training Astronomy					11-SF-5A-072-m01	
Module	e coord	inator		Module offered by		
Managing Director of the Institute of Theoretical Physics and Astrophysics			neoretical Physics	Faculty of Physics and Astronomy		
ECTS	Metho	od of grading	Only after succ. cor	npl. of module(s)		
5	nume	rical grade				
Duratio	on	Module level	Other prerequisites	3		
1 seme	ster	graduate				
Conten	its		•			
Specifi	c, adva	nced knowledge of one o	or more of the Faculty	ı's current research a	areas in the field of Astronomy.	
Intend	ed lear	ning outcomes				
The stu		•	ed knowledge of one	e or more current res	earch areas of the faculty in the	
Course	<b>S</b> (type, r	number of weekly contact hours,	anguage — if other than Ge	rman)		
V + R (r	no infor	mation on SWS (weekly	contact hours) and co	ourse language avail	able)	
		<b>sessment</b> (type, scope, langua	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
		mination (approx. 90 mir oral examination in group			oral examination of one candi- rt (approx. 10 pages)	
Allocation of places						
Additional information						
Referred to in LPO I (examination regulations for teaching-degree programmes)						



Module	e title			Abbreviation			
Modulo	e Type	5D Special Training Dida		11-SF-5D-072-m01			
Module	e coord	inator		Module offered by			
Manag	ing Dire	ector of the Institute of A	pplied Physics	Faculty of Physics a	and Astronomy		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)			
5	nume	rical grade					
Duratio	on	Module level	Other prerequisites	i e			
1 seme	ster	graduate					
Conten	its						
Specifi	c, adva	nced knowledge of one	or more of the Faculty	's current research a	areas in the field of Didactics.		
Intend	ed lear	ning outcomes					
The stu			ced knowledge of one	e or more current res	earch areas of the faculty in the		
Course	<b>S</b> (type, r	number of weekly contact hours,	language — if other than Ge	rman)			
V + R (r	no infor	mation on SWS (weekly	contact hours) and co	ourse language avail	able)		
		<b>sessment</b> (type, scope, langua le for bonus)	age — if other than German,	examination offered — if no	ot every semester, information on whether		
		mination (approx. 90 min oral examination in group			) oral examination of one candi- rt (approx. 10 pages)		
Allocat	ion of p	olaces					
Additional information							
Referre	ed to in	LPO I (examination regulation	s for teaching-degree progra	ammes)			



Modul	Module title Abbreviation							
Modul	Module Type 5E Special Training Experimental Physics 11-SF-5E-072-m01							
Modul	e coord	linator		Module offered by				
Manag	ging Dir	ector of the Institute of A	pplied Physics	Faculty of Physics a	and Astronomy			
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)				
5	nume	rical grade						
Durati	on	Module level	Other prerequisites					
1 seme	ester	graduate						
Conte	nts							
Specif Physic		anced knowledge of one	or more of the Faculty	's current research a	reas in the field of Experimental			
Intend	ed lear	ning outcomes						
		have specific and advan mental Physics.	ced knowledge of one	e or more current res	earch areas of the faculty in the			
Course	<b>es</b> (type, i	number of weekly contact hours,	language — if other than Ge	rman)				
V + R (	no info	rmation on SWS (weekly	contact hours) and co	ourse language avail	able)			
		sessment (type, scope, langu	age — if other than German,	examination offered — if no	ot every semester, information on whether			
		mination (approx. 90 mi oral examination in grou			) oral examination of one candi- rt (approx. 10 pages)			
Allocation of places								
Additional information								
Referr	ed to in	LPO I (examination regulation	ns for teaching-degree progra	ımmes)				



Modul	e title			Abbreviation		
Modul	e Type	51 Special Training Interd	lisciplinary Research	Fields	11-SF-5I-072-m01	
Modul	e coord	inator		Module offered by		
Managing Directors of the Institute of Applied Physics and the Institute of Theoretical Physics and Astrophysics				Faculty of Physics and Astronomy		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
5	nume	rical grade				
Durati	on	Module level	Other prerequisites	1		
1 seme	ester	graduate				
Conte	nts		•			
Specif	ic, adva	nced knowledge of one o	or more of the Faculty	's current research a	reas.	
Intend	ed lear	ning outcomes				
	udents   ciplinary		ed knowledge of one	e or more current res	earch areas of the faculty in an in-	
Course	<b>es</b> (type, r	number of weekly contact hours, l	anguage — if other than Ge	rman)		
V + R (	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)	
		<b>sessment</b> (type, scope, langua le for bonus)	${\sf ge-if}$ other than German,	examination offered — if no	ot every semester, information on whether	
		mination (approx. 90 mir oral examination in group		-	) oral examination of one candi- rt (approx. 10 pages)	
Alloca	tion of p	olaces				
Additional information						
Referred to in LPO I (examination regulations for teaching-degree programmes)						



Modul	le title		Abbreviation			
Module Type 5T Special Training Theoretical Physics 11-SF-5T-072-m01						
Modul	le coord	linator		Module offered by		
-	ging Dire	ector of the Institute of T sics	heoretical Physics	Faculty of Physics and Astronomy		
ECTS	Meth	od of grading	Only after succ. cor	npl. of module(s)		
5	nume	rical grade				
Durati	ion	Module level	Other prerequisites			
1 seme	ester	graduate				
Conte	nts					
Specif Physic		anced knowledge of one	or more of the Faculty	's current research a	reas in the field of Theoretical	
Intend	led lear	ning outcomes				
		have specific and advan etical Physics.	ced knowledge of one	e or more current res	earch areas of the faculty in the	
Course	<b>es</b> (type, i	number of weekly contact hours,	language — if other than Ge	rman)		
V + R (	(no info	rmation on SWS (weekly	contact hours) and co	ourse language avail	able)	
		<b>sessment</b> (type, scope, langu ble for bonus)	age — if other than German,	examination offered — if no	ot every semester, information on whether	
		mination (approx. 90 mi oral examination in group			) oral examination of one candi- rt (approx. 10 pages)	
Allocation of places						
Additional information						
Referred to in LPO I (examination regulations for teaching-degree programmes)						



Module Type 6A Special Training Astronomy  Module coordinator  Managing Director of the Institute of Theoretical Physics	Module offered by Faculty of Physics and Astronomy					
	<u> </u>					
Managing Director of the Institute of Theoretical Physics	Faculty of Physics and Astronomy					
and Astrophysics						
ECTS Method of grading Only after succ.	compl. of module(s)					
6 numerical grade						
Duration Module level Other prerequisi	ites					
semester graduate						
Contents						
Specific, advanced knowledge of one or more of the Fac	ulty's current research areas in the field of Astronomy.					
Intended learning outcomes						
The students have specific and advanced knowledge of field of Astronomy.	one or more current research areas of the faculty in the					
<b>Courses</b> (type, number of weekly contact hours, language $-$ if other than	n German)					
V + R (no information on SWS (weekly contact hours) and	d course language available)					
<b>Method of assessment</b> (type, scope, language — if other than Germ module is creditable for bonus)	nan, examination offered $-$ if not every semester, information on whether					
a) written examination (approx. 90 minutes) or b) talk (a date each or oral examination in groups (approx. 30 min	• • • • • • • • • • • • • • • • • • • •					
Allocation of places						
Additional information						
<del></del>						
Referred to in LPO I (examination regulations for teaching-degree p	rogrammes)					



Module title Abbreviation								
Module Type 6D Special Training Didactics 11-SF-6D-072-mo1								
Module	coord	inator		Module offered by				
Manag	ing Dire	ector of the Institute of A	oplied Physics	Faculty of Physics a	and Astronomy			
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)				
6	nume	rical grade						
Duratio	n	Module level	Other prerequisites					
1 seme	ster	graduate						
Conten	ts							
Specifi	c, adva	nced knowledge of one o	or more of the Faculty	's current research a	reas in the field of Didactics.			
Intend	ed lear	ning outcomes						
The stu			ed knowledge of one	e or more current res	earch areas of the faculty in the			
Course	<b>S</b> (type, r	number of weekly contact hours,	anguage — if other than Ger	rman)				
V + R (r	o infor	mation on SWS (weekly	contact hours) and co	urse language avail	able)			
		<b>sessment</b> (type, scope, langua le for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether			
		mination (approx. 90 mir oral examination in group			oral examination of one candition of one candition of one candition.			
Allocat	Allocation of places							
Additional information								
Referre	d to in	LPO I (examination regulation	s for teaching-degree progra	immes)				



Modul	e title			Abbreviation			
Module Type 6E Special Training Experimental Physics					11-SF-6E-072-m01		
Modul	e coord	inator		Module offered by			
Manag	ing Dire	ector of the Institute o	f Applied Physics	Faculty of Physics a	and Astronomy		
ECTS	Meth	od of grading	Only after succ. c	ompl. of module(s)			
6	nume	rical grade					
Duratio	on	Module level	Other prerequisit	es			
1 seme	ster	graduate					
Conter	ıts		,				
Specifi Physic		inced knowledge of or	ne or more of the Facu	lty's current research a	areas in the field of Experimental		
Intend	ed lear	ning outcomes					
		have specific and adv mental Physics.	anced knowledge of o	ne or more current res	search areas of the faculty in the		
Course	<b>S</b> (type, r	number of weekly contact hou	ırs, language — if other than	German)			
V + R (ı	no infor	rmation on SWS (week	ly contact hours) and	course language avai	lable)		
		sessment (type, scope, landle for bonus)	nguage — if other than Germa	n, examination offered — if n	ot every semester, information on whether		
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							
Additio	onal inf	ormation					

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 

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Module	e title		Abbreviation			
Module Type 61 Special Training Interdisciplinary Research Field				Fields	11-SF-6I-072-m01	
Module	e coord	inator		Module offered by	•	
Managing Directors of the Institute of Applied Physics and the Institute of Theoretical Physics and Astrophysics				Faculty of Physics and Astronomy		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
6	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate				
Conten	its		•			
Specifi	c, adva	nced knowledge of one o	or more of the Faculty	's current research a	ireas.	
Intend	ed lear	ning outcomes				
The stu terdisc		•	ed knowledge of one	e or more current res	earch areas of the faculty in an in-	
Course	<b>S</b> (type, r	number of weekly contact hours, I	anguage — if other than Ger	rman)		
V + R (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)	
		<b>sessment</b> (type, scope, langua le for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
		mination (approx. 90 mir oral examination in group			oral examination of one candi- rt (approx. 12 pages)	
Allocat	ion of p	olaces				
Additional information						
Referred to in LPO I (examination regulations for teaching-degree programmes)						



Modul	le title		Abbreviation			
Module Type 6T Special Training Theoretical Physics 11-SF-6T-072-mo						
Module coordinator Module offered by						
-	ging Dire	ector of the Institute of T sics	heoretical Physics	Faculty of Physics and Astronomy		
ECTS	Meth	od of grading	Only after succ. cor	npl. of module(s)		
6	nume	rical grade				
Durati	on	Module level	Other prerequisites			
1 seme	ester	graduate				
Conte	nts					
Specif Physic		anced knowledge of one	or more of the Faculty	's current research a	reas in the field of Theoretical	
Intend	led lear	ning outcomes				
		have specific and advan etical Physics.	ced knowledge of one	e or more current res	earch areas of the faculty in the	
Course	<b>es</b> (type, i	number of weekly contact hours,	language — if other than Ge	rman)		
V + R (	no info	rmation on SWS (weekly	contact hours) and co	ourse language avail	able)	
		<b>sessment</b> (type, scope, langu ble for bonus)	age — if other than German,	examination offered — if no	ot every semester, information on whether	
		mination (approx. 90 mi oral examination in group			) oral examination of one candi- rt (approx. 12 pages)	
Allocation of places						
Additional information						
Referred to in LPO I (examination regulations for teaching-degree programmes)						



Module title	'	Abbreviation			
Module Type 8A Special Training Astronomy			11-SF-8A-072-m01		
Module coordinator		Module offered by			
Managing Director of the Institute of Thand Astrophysics	neoretical Physics	Faculty of Physics and Astronomy			
ECTS Method of grading Only after succ. com		npl. of module(s)			
numerical grade					
Duration Module level	Other prerequisites	5			
ı semester graduate					
Contents					
Specific, advanced knowledge of one of	or more of the Faculty	y's current research a	areas in the field of Astronomy.		
ntended 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)					
<b>Method of assessment</b> (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for 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					
Additional information					
Referred to in LPO I (examination regulations for teaching-degree programmes)					



Module title					Abbreviation	
Module Type 8D Special Training Didactics					11-SF-8D-072-m01	
Module coordinator Module offered				Module offered by	i by	
Managing Director of the Institute of Applied Physics			oplied Physics	Faculty of Physics and Astronomy		
ECTS	ECTS Method of grading Only after succ. con			npl. of module(s)		
8	nume	rical grade				
Duratio	on	Module level	Other prerequisites	i		
1 seme	ster	graduate				
Conten	its					
Specifi	c, adva	nced knowledge of one o	or more of the Faculty	's current research a	reas in the field of Didactics.	
Intend	ed lear	ning outcomes				
The students have specific and advanced knowledge of one or more current research areas of the faculty in the field of Didactics.						
Course	<b>S</b> (type, r	number of weekly contact hours,	language — if other than Ge	rman)		
V + R (r	no infor	mation on SWS (weekly	contact hours) and co	ourse language avail	able)	
<b>Method of assessment</b> (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for 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						
Additional information						
Referre	Referred to in LPO I (examination regulations for teaching-degree programmes)					



Module title Abbreviation						
Module Type 8E Special Training Experimental Physics				11-SF-8E-072-m01		
Module coordinator Module offered I				Module offered by		
Managing Director of the Institute of Applied Physics			Applied Physics	Faculty of Physics a	Faculty of Physics and Astronomy	
ECTS	CTS Method of grading Only after succ.		Only after succ. co	ompl. of module(s)		
8	nume	rical grade				
Duratio	on	Module level	Other prerequisite	S		
1 seme	ester	graduate				
Conter	nts		,			
Specifi Physic		inced knowledge of one	e or more of the Facult	y's current research a	areas in the field of Experimental	
Intend	ed lear	ning outcomes				
The students have specific and advanced knowledge of one or more current research areas of the faculty in the field of Experimental Physics.						
Course	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)						
<b>Method of assessment</b> (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for 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						
Additional information						

 $\textbf{Referred to in LPO I } \ (\text{examination regulations for teaching-degree programmes})$ 



Module title					Abbreviation	
Module Type 8I Special Training Interdisciplinary Research Fields					11-SF-8I-072-m01	
Module coordinator Module offere				Module offered by	l by	
Managing Directors of the Institute of Applied Physics and the Institute of Theoretical Physics and Astrophysics				Faculty of Physics and Astronomy		
ECTS	CTS Method of grading Only after succ. com		pl. of module(s)			
8	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ester	graduate				
Conten	nts					
Specifi	ic, adva	nced knowledge of one o	or more of the Faculty	's current research a	reas.	
Intend	ed lear	ning outcomes				
	udents iplinary	•	ed knowledge of one	e or more current res	earch areas of the faculty in an in-	
Course	<b>es</b> (type, r	number of weekly contact hours, l	anguage — if other than Ge	rman)		
V + R (1	no infor	mation on SWS (weekly	contact hours) and co	ourse language avail	able)	
		<b>sessment</b> (type, scope, langua le for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether	
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						
Additio	onal inf	ormation	•			
Referred to in LPO I (examination regulations for teaching-degree programmes)						



Module title  Module Type 8T Special Training Theoretical Physics					Abbreviation
					11-SF-8T-072-m01
Module coordinator Module offer			Module offered by		
Managing Director of the Institute of Theoretical Physics and Astrophysics			Theoretical Physics	Faculty of Physics and Astronomy	
ECTS Method of grading Only a		Only after succ. co	nly after succ. compl. of module(s)		
8	nume	rical grade			
Duratio	on	Module level	Other prerequisites	5	
1 seme	ester	graduate			
Conter	ıts				
Specifi Physic		inced knowledge of one	e or more of the Facult	y's current research a	areas in the field of Theoretical
Intend	ed lear	ning outcomes			
The students have specific and advanced knowledge of one or more current research areas of the faculty in the field of Theoretical Physics.					
Course	<b>es</b> (type, r	number of weekly contact hours	s, language — if other than Ge	rman)	
V + R (no information on SWS (weekly contact hours) and course language available)					
<b>Method of assessment</b> (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for 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					
Additional information					
Referred to in LPO I (examination regulations for teaching-degree programmes)					



Module title					Abbreviation
Supersymmetry I and II					11-SUS-092-m01
Module coordinator				Module offered by	
Managing Director of the Institute of Theoretical P and Astrophysics			neoretical Physics	Faculty of Physics and Astronomy	
ECTS Method of grading		Only after succ. con	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**

Supersymmetry I: Grassmann variable. Coleman-Mandula theorem and Haag-Lopuszanski-Sohnius theorem. Supersymmetry: Algebra and multiplets. Superfield formalism. Breaking of supersymmetry. Supersymmetry II: Minimal supersymmetric standard model. Higgs sector. The spectrum of supersymmetric par-

Supersymmetry II: Minimal supersymmetric standard model. Higgs sector. The spectrum of supersymmetric particles. Phenomenology of LEP, Tevatron and LHC, supersymmetric neutrino mass models. Violation of R-parity.

#### **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 is creditable for 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)

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Module	title	·			Abbreviation	
Renorn	nalizat	ion Group Methods i	n Field Theory		11-RMFT-102-m01	
Module	coord	inator		Module offered by		
Managi and As			of Theoretical Physics	tical Physics Faculty of Physics and Astronomy		
ECTS	Meth	od of grading	Only after succ. cor	npl. of module(s)		
6	nume	rical grade				
Duratio	n	Module level	Other prerequisites	Other prerequisites		
Duration Module level  1 semester graduate		sessment. The lectuat the beginning of sidered a declaration dents have obtaine the course of the sessment into effected to assessment i sessment at a later	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 fo admission to assessment anew.			
Conten	ts					
		on group methods fo aviour of cryogenic to	•	ential equations, fiel	ld theoretical contexts and non-	

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 is creditable for 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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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 



Spintronics			
philionics	11-SPI-102-m01		
Module coordinator	Module offered by		
Managing Director of the Institute of Applied	Faculty of Physics and Astronomy		
CTS Method of grading Only	mpl. of module(s)		
6 numerical grade			
Ouration Module level Othe	Other prerequisites		
sess at th side dent the c sess ted t	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.		

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).

 $\textbf{Courses} \ (\textbf{type, number of weekly contact hours, language} - \textbf{if other than German})$ 

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 is creditable for 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)



Module	Module title Abbreviation						
Theore	tical As	strophysics			11-AST-092-m01		
Module	coord	inator		Module offered by			
Manag and As	_	ector of the Institute of Th	eoretical Physics	Faculty of Physics a	and Astronomy		
ECTS	Metho	od of grading	Only after succ. cor	npl. of module(s)			
6	nume	rical grade					
Duratio	n	Module level	Other prerequisites	i e			
1 seme	ster	graduate					
Conten	ts						
Theore	tical As	trophysics, models for th	e description of com	plex observation res	sults, numeric simulations.		
Intende	ed lear	ning outcomes					
		have basic knowledge of and to test the models w			. They are able to design complex		
Course	<b>S</b> (type, r	number of weekly contact hours, l	anguage — if other than Ge	rman)			
R + V (r	no infor	mation on SWS (weekly o	contact hours) and co	ourse language avail	able)		
		sessment (type, scope, langua le for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether		
written	exami	nation (approx. 120 minu	tes)				
Allocat	ion of p	olaces					
Additio	nal inf	ormation					
Referre	d to in	<b>LPO I</b> (examination regulation	s for teaching-degree progra	ammes)			



at the beginning of the course. Registration for the course will be c sidered a declaration of will to seek admission to assessment. If st	Module tit	tle		Abbre	viation	
Managing Director of the Institute of Applied Physics  Faculty of Physics and Astronomy  Only after succ. compl. of module(s)  numerical grade   Duration  Module level  Other prerequisites  Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective dat the beginning of the course. Registration for the course will be cidered a declaration of will to seek admission to assessment. If st	Strong Int	teraction in Accelerator	Experiments	11-WW	/B-102-m01	
ECTS Method of grading  Only after succ. compl. of module(s)  numerical grade   Duration Module level  1 semester graduate  Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective dat the beginning of the course. Registration for the course will be cidered a declaration of will to seek admission to assessment. If st	Module co	oordinator		Module offered by		
numerical grade   Duration Module level Other prerequisites  semester graduate Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective dat the beginning of the course. Registration for the course will be coidered a declaration of will to seek admission to assessment. If st	Managing	Director of the Institute	e of Applied Physics	Faculty of Physics and Ast	ronomy	
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 dat the beginning of the course. Registration for the course will be calculated a declaration of will to seek admission to assessment. If stored a declaration of will to seek admission to assessment.	ECTS M	ethod of grading	Only after succ. co	ompl. of module(s)		
graduate  Certain prerequisites must be met to qualify for admission to assessment. The lecturer will inform students about the respective dat the beginning of the course. Registration for the course will be coidered a declaration of will to seek admission to assessment. If st	3 nu	umerical grade				
sessment. The lecturer will inform students about the respective d at the beginning of the course. Registration for the course will be c sidered a declaration of will to seek admission to assessment. If st	Duration	Module level	Other prerequisit	Other prerequisites		
sessment into effect. Students who meet all prerequisites will be a ted to assessment in the current or in the subsequent semester. For	1 semeste	er graduate	sessment. The led at the beginning of sidered a declarate dents have obtain the course of the sessment into efforted to assessment sessment at a late	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 fo		

Asymptomatic freedom/confinement. Hadron production in e+/e- collisions. QCD coherence/interference phenomena. QCD Jet simulation. Hadron production in electron-proton collisions. Hadron production in proton-proton collisions.

### **Intended learning outcomes**

The students know the basic organisation of QCD processes. They are able to interpret results of accelerator experiments. They have knowledge of methods of data analysis, understand the underlying theories and are able to apply them.

 $\textbf{Courses} \ (\textbf{type, number of weekly contact hours, language} - \textbf{if other than German})$ 

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 is creditable for 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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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 



Module title					Abbreviation	
Metho	ds in S	urface Spectroscopy	/		11-MSS-102-m01	
Module	e coord	linator		Module offered I	by	
Manag	ing Dir	ector of the Institute	of Applied Physics	Faculty of Physic	s and Astronomy	
ECTS	Meth	od of grading	Only after succ. co	mpl. of module(s)		
4	nume	erical grade				
Duratio	on	Module level	Other prerequisite	Other prerequisites		
1 semester		graduate	sessment. The lect at the beginning of sidered a declarate dents have obtained the course of the sessment into effected to assessment	urer will inform stu the course. Regist on of will to seek a ed the qualification emester, the lectur ct. Students who m in the current or in r date, students wil	qualify for admission to as- idents about the respective details cration for the course will be con- idmission to assessment. If stu- in for admission to assessment over the will put their registration for as- neet all prerequisites will be admit- ithe subsequent semester. For as- ill have to obtain the qualification for	
Conten		ditions of overviews	nto Illtro high vocuum o	urface consibility	light matter interaction numeric	
Bound les of p	ary cor hotoe	lectron spectroscopy	y (PES), one-particle imag	ge of PES, three ste	light-matter-interaction, princip p model, many-particle effects a, measurements with synchro	

### **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.

 $\textbf{Courses} \ (\textbf{type, number of weekly contact hours, language} - \textbf{if other than German})$ 

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 is creditable for 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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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 



Modul	e title				Abbreviation
Practic	al Cou	rse Astrophysics			11-APP-111-m01
Modul	e coord	linator		Module offered by	I.
Manag and As		ector of the Institute of Th	neoretical Physics	Faculty of Physics a	and Astronomy
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
6	(not)	successfully completed			
Duratio	on	Module level	Other prerequisites		
Conter Astrop	nts	experiments in the fields	sessment. The lecturate the beginning of sidered a declaration dents have obtained the course of the sessment into effect ted to assessment it sessment at a later admission to assess	rer will inform stude the course. Registrat in of will to seek adn d the qualification for mester, the lecturer t. Students who mee in the current or in th date, students will h sment anew.	alify for admission to asents about the respective details tion for the course will be consission to assessment. If stuor admission to assessment over will put their registration for aset all prerequisites will be admitted subsequent semester. For aspave to obtain the qualification for analysis and astronomic observations.
tions.					
Intend	ed lear	ning outcomes			
measu and wi	ring da th basi	ta and present the result	s. They are familiar w gelectromagnetic rad	ith the working meth	e to analyse and interpret the nods of observational Astronomy e to plan and evaluate observati-
Course	S (type, i	number of weekly contact hours,	anguage — if other than Ge	rman)	
P (no i	nforma	tion on SWS (weekly cont	act hours) and cours	e language available	e)
		sessment (type, scope, langua ole for bonus)	ge — if other than German,	examination offered — if no	ot every semester, information on whether
(exam)	is pas e candi	sed. Experiments that we	re not successfully c	ompleted can be rep	ccessfully completed if a Testat beated once. Or b) discussion to of the experiment (approx. 20 mi-

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)



Modul	e title				Abbreviation	
Particl	le Radia	ation Detectors			11-DTS-111-m01	
Modul	e coord	dinator		Module offered by		
Manag	ging Dir	ector of the Institute	of Applied Physics	Faculty of Physics a	and Astronomy	
ECTS	Meth	od of grading	Only after succ. c	ompl. of module(s)		
4	nume	erical grade				
Durati	on	Module level	Other prerequisit	Other prerequisites		
<b>Duration</b> 1 semester		graduate	sessment. The led at the beginning of sidered a declarated dents have obtain the course of the sessment into eff ted to assessmen	eturer will inform stude of the course. Registration of will to seek add ned the qualification for semester, the lecturer ect. Students who mee t in the current or in the er date, students will h	alify for admission to asents about the respective details tion for the course will be connission to assessment. If stuor admission to assessment over will put their registration for aset all prerequisites will be admitted subsequent semester. For astave to obtain the qualification for	

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 is creditable for 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

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 



Module	title				Abbreviation
Modern Astrophysics					11-MAS-111-m01
Module	coord	inator		Module offered by	
Managing Director of the Institute of Theoreti and Astrophysics			heoretical Physics	Faculty of Physics and Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
4	nume	rical grade			
Duration	1	Module level	Other prerequisites		
1 semester graduate		sessment. The lecturation at the beginning of sidered a declaration dents have obtained the course of the sessment into effected to assessment i	trer will inform stude the course. Registrat on of will to seek adm d the qualification fo mester, the lecturer t. Students who mee n the current or in th date, students will h	alify for admission to as- nts about the respective details ion for the course will be con- nission to assessment. If stu- r admission to assessment over will put their registration for as- t all prerequisites will be admit- e subsequent semester. For as- ave to obtain the qualification for	

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 is creditable for 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

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 



Modul	e title				Abbreviation	
Curren	t Topic	s in Experimental Ph	nysics		11-EXE5-111-m01	
Module	e coord	linator		Module offered b	y	
chairpe	erson o	of examination comm	nittee	Faculty of Physics	s and Astronomy	
ECTS	Meth	od of grading	Only after succ. co	mpl. of module(s)		
5	nume	erical grade				
Duratio	on	Module level	Other prerequisites	Other prerequisites		
1 seme	ster	graduate	Approval by examin	xamination committee required.		
Conten	its					
Curren	•		ysics. Accredited academ	ic achievements, e	.g. in case of change of university	
Intend	ed lear	ning outcomes				
sics of derstar	the Ma	aster's programme. T measuring and/or ev	hey have knowledge of a	current subdiscipli sary to acquire this	s of a module of Experimental Phy- ine of Experimental Physics and un- knowledge. They are able to classi	
Course	S (type,	number of weekly contact h	ours, language — if other than Ge	erman)		
V + R (r	no info	rmation on SWS (we	ekly contact hours) and c	ourse language ava	ailable)	
Metho	d of as	sessment (type scope	language — if other than German	examination offered — if	not every semester, information on whether	

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for 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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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 



Modul	e title				Abbreviation	
Curren	t Topic	s in Experimental Phys	ics		11-EXE6-111-m01	
Modul	e coord	inator		Module offered b	by	
chairp	erson o	f examination committe	ee	Faculty of Physic	s and Astronomy	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
6	nume	rical grade				
Duratio	on	Module level	Other prerequisites	Other prerequisites		
1 seme	ster	graduate	Approval by examin	Approval by examination committee required.		
Conter	its					
	t topics ly abroa		cs. Accredited academi	c achievements, e	e.g. in case of change of university	
Intend	ed lear	ning outcomes				
sics of dersta	the Ma	ster's programme. They	y have knowledge of a uation methods necess	current subdiscipl sary to acquire this	ts of a module of Experimental Phy- ine of Experimental Physics and un- s knowledge. They are able to classi	
Course	<b>S</b> (type, i	number of weekly contact hour	s, language — if other than Ge	rman)		
	٠ ,	emotion on CMC (woold	y contact hours) and co	ourco languago av	ailabla)	

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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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 



woaute	title				Abbreviation
Current	Topic	s in Experimental Phys	ics		11-EXE7-111-m01
Module	coord	inator		Module offered by	
chairpe	rson o	f examination committe	ee	Faculty of Physics a	and Astronomy
ECTS	Metho	od of grading	Only after succ. cor	npl. of module(s)	
7	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 semes	ster	graduate	Approval by examination committee required.		
Content	ts				
Current or study	•		s. Accredited academ	ic achievements, e.g	g. in case of change of university
ntende	d lear	ning outcomes			
sics of t derstan	the Ma Id the r	ster's programme. They	have knowledge of a lation methods necess	current subdisciplin sary to acquire this k	of a module of Experimental Phye of Experimental Physics and unmowledge. They are able to classi
Courses	<b>5</b> (type, r	number of weekly contact hours	s, language — if other than Ge	rman)	
V + R (n	o infor	mation on SWS (weekl	contact hours) and co	ourse language avail	lahle)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for 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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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 



Modul	e title				Abbreviation	
Curren	t Topic	s in Experimental Phys	ics		11-EXE8-111-mo1	
Modul	e coord	inator		Module offered b	by The state of th	
chairpe	erson o	f examination committe	ee	Faculty of Physic	s and Astronomy	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
8	nume	rical grade				
Duratio	on	Module level	Other prerequisites	Other prerequisites		
1 seme	ster	graduate	Approval by examin	Approval by examination committee required.		
Conter	its					
	t topics ly abroa		cs. Accredited academi	c achievements, e	e.g. in case of change of university	
Intend	ed lear	ning outcomes				
sics of dersta	the Ma	ster's programme. They	y have knowledge of a uation methods necess	current subdiscipl sary to acquire this	ts of a module of Experimental Phy- ine of Experimental Physics and un- sknowledge. They are able to classi	
Course	S (type, i	number of weekly contact hour	s, language — if other than Ge	rman)		
	• •	mation on CMC (woold	y contact hours) and co	ource language av	ailahla)	

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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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 



Module	e title				Abbreviation
Electro	n Elect	ron Interaction			11-EEW-102-m01
Module	Module coordinator			Module offered by	
Managing Director of the Institute of Theoretical and Astrophysics			of Theoretical Physics	Faculty of Physics a	and Astronomy
ECTS	Meth	od of grading	Only after succ. cor	mpl. of module(s)	
4	nume	rical grade			
Duration Module level C		Other prerequisites	Other prerequisites		
1 semester graduate		sessment. The lectuat the beginning of sidered a declaration dents have obtained the course of the sessment into effected to assessment	urer will inform stude the course. Registrat on of will to seek admed the qualification for emester, the lecturer of the current or in the date, students will h	alify for admission to as- nts about the respective details ion for the course will be con- nission to assessment. If stu- or admission to assessment over will put their registration for as- et all prerequisites will be admit- e subsequent semester. For as- ave to obtain the qualification for	

1. Introduction, systems, Landau theory2. Interacting electron gas. 3. One-dimensional electron gas (without interaction). 4. Introduction to boson phase fields and interactions. 5. Calculation of correlation functions. 6. Method of functional integrals. 7. Renormalisation groups. 8. Consideration of spin. 9. One-dimensional lattice models. 10. Impurities in Luttinger liquids

### Intended learning outcomes

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

**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 is creditable for 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)

Abbreviation



Module title

modute title				Appleviation		
Theore	tical S	olid State Physics 2			11-TFK2-111-m01	
Module	Module coordinator			Module offered by		
Managing Director of the Institute of Theoretical Physi and Astrophysics			of Theoretical Physics	Faculty of Physics and Astronomy		
ECTS	Meth	od of grading	Only after succ. cor	mpl. of module(s)		
8	nume	rical grade				
Duratio	Duration Module level		Other prerequisites	Other prerequisites		
		graduate	sessment. The lectuat the beginning of sidered a declaration dents have obtained the course of the sessment into effected to assessment in	urer will inform stude the course. Registrat on of will to seek adn d the qualification fo emester, the lecturer ct. Students who mee in the current or in th date, students will h	alify for admission to asents about the respective details tion for the course will be connission to assessment. If stuor admission to assessment over will put their registration for aset all prerequisites will be admitted subsequent semester. For astance to obtain the qualification for	

### **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)

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 is creditable for 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**

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 



		MASSAU-	O WENTER OF	55 W, \. F. F.	
Module	e title				Abbreviation
Introdu	uction t	o Elementary Particle Th	eory		11-ETT-111-m01
Module	Module coordinator			Module offered by	
_	ing Dire	ector of the Institute of Th sics	neoretical Physics	Faculty of Physics a	and Astronomy
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
4	nume	rical grade			
Duratio	on	Module level	Other prerequisites	•	
1 semester graduate		sessment. The lectuat the beginning of sidered a declaration dents have obtained the course of the sessment into effected to assessment i	trer will inform stude the course. Registrat on of will to seek adn d the qualification for mester, the lecturer t. Students who mee n the current or in th date, students will h	alify for admission to as- ents about the respective details cion for the course will be con- nission to assessment. If stu- or admission to assessment over will put their registration for as- et all prerequisites will be admit- e subsequent semester. For as- ave to obtain the qualification for	
Conten	its				
		n Particle Physics. Quark I in the standard model. I			e processes in quantum electro- ucleon scattering.
Intend	ed lear	ning outcomes			
The stu	ıdents	have in-depth knowledge	e of Theoretical Eleme	entary Particle Physic	CS.
Course	<b>S</b> (type, r	number of weekly contact hours,	language — if other than Ge	rman)	
V (no ii	nforma	tion on SWS (weekly con	tact hours) and cours	e language available	e)
		sessment (type, scope, langua ble for bonus)	age — if other than German,	examination offered — if no	ot every semester, information on whether
groups project (appro Assess and wi examir	(appro report x. 30 m ment o Il be an	ox. 30 minutes per candid (approx. 8 to 10 pages, t inutes) ffered: When and how of	date, for modules wit ime to complete: 1 to ften assessment will der observance of Se	h less than 4 ECTS cr 4 weeks) or d) preso be offered depends o	idate each or oral examination in redits approx. 20 minutes) or c) entation/seminar presentation on the method of assessment 3 ASPO (general academic and
Allocat	ion of <sub> </sub>	places			
Additio	nal inf	ormation			

 $\textbf{Referred to in LPO I } \ (\text{examination regulations for teaching-degree programmes})$ 



Module	title				Abbreviation	
Quantum Loop Gravity					11-QSG-102-m01	
Module	Module coordinator			Module offered by	'	
Managing Director of the Institute of Theore and Astrophysics			of Theoretical Physics	Faculty of Physics	and Astronomy	
ECTS	Meth	od of grading	Only after succ. cor	npl. of module(s)		
4	nume	rical grade				
Duratio	n	Module level	Other prerequisites	Other prerequisites		
1 semester graduate			sessment. The lecturate the beginning of sidered a declaration dents have obtained the course of the sessment into effect ted to assessment at a later	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 admission to assessment anew.		
Conten	ts					
				•	ant approaches to a quantum me ormalism and the elemental varia	

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

V + 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 is creditable for 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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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 

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Module title					Abbreviation
Current Topics in Theoretical Physics					11-EXT5-111-m01
Module coordinator				Module offered by	
chairperson of examination committee			ee	Faculty of Physics and Astronomy	
ECTS	Meth	ethod of grading Only after succ. co		npl. of module(s)	
5	nume	rical grade			
Duratio	on	Module level	Other prerequisites	;	
1 seme	ester	graduate	Approval by examination committee required.		
Conter	nts				
	t topics abroad.		. Accredited academic	achievements, e.g. i	n case of change of university o

### **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 is creditable for 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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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 



Module	e title		Abbreviation		
Curren	t Topic	s in Theoretical Phy	11-EXT6-111-m01		
Module coordinator				Module offered by	
chairperson of examination committee			nittee	Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ. co	mpl. of module(s)	
6	nume	erical grade			
Duratio	on	Module level	Other prerequisites	5	
1 semester graduate		Approval by examir	Approval by examination committee required.		
Conten	ıts	-	<b>.</b>		

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 is creditable for 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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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 



Module	e title		Abbreviation		
Curren	t Topic	s in Theoretical Phys		11-EXT7-111-m01	
Modul	e coord	linator		Module offered by	I.
chairperson of examination committee			ittee	Faculty of Physics and Astronomy	
ECTS	Meth	ond of grading Only after succ.		ompl. of module(s)	
7	nume	rical grade			
Duratio	on	Module level	Other prerequisites	5	
1 semester graduate		Approval by examir	Approval by examination committee required.		
Conten	its				
Curren	t topics	of Theoretical Physic	cs. Accredited academic	achievements, e.g. i	n case of change of university o

### **Intended learning outcomes**

study abroad.

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 is creditable for 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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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 



Module	Module title				Abbreviation	
Current Topics in Theoretical Physics					11-EXT8-111-mo1	
Module coordinator				Module offered by		
chairperson of examination committee			2	Faculty of Physics and Astronomy		
ECTS	Metho	od of grading	ling Only after succ. compl. of module(s)			
8	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 seme	ster	graduate	Approval by examination committee required.			
Conten	ıts					
	Current topics of Theoretical Physics. Accredited academic achievements, e.g. in case of change of university or study abroad.					
Intand	Intended learning automos					

### **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 is creditable for 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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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 



6 numerical grade  Duration Module level Other prerequises sessment. The at the beginnin sidered a decladents have obtathe course of the sessment into each of the course	Module offered by  Faculty of Physics and Astronomy  compl. of module(s)  sites  isites must be met to qualify for admission to asecturer will inform students about the respective details g of the course. Registration for the course will be contration of will to seek admission to assessment. If studened the qualification for admission to assessment over		
Managing Director of the Institute of Applied Physics  ECTS Method of grading Only after succ 6 numerical grade  Duration Module level Other prerequisessment. The at the beginnin sidered a decladents have obtather course of the sessment into each of the sessment of the sessment into each of the sessm	Faculty of Physics and Astronomy  compl. of module(s)  sites  isites must be met to qualify for admission to asecturer will inform students about the respective details g of the course. Registration for the course will be contation of will to seek admission to assessment. If studened the qualification for admission to assessment over		
ECTS Method of grading  6 numerical grade   Duration Module level Other prerequisessment. The at the beginnin sidered a decladents have obtative course of the sessment into each of the course of the course of the sessment into each of the course of	isites isites must be met to qualify for admission to asecturer will inform students about the respective details g of the course. Registration for the course will be conration of will to seek admission to assessment. If studened the qualification for admission to assessment over		
6 numerical grade  Duration Module level Other prerequises sessment. The at the beginnin sidered a decladents have obtathe course of the sessment into each of the course	isites  isites must be met to qualify for admission to asecturer will inform students about the respective details g of the course. Registration for the course will be conration of will to seek admission to assessment. If studined the qualification for admission to assessment over		
Duration Module level Other prerequisessment. The at the beginnin sidered a decla dents have obtained to be sessment into expressions.	isites must be met to qualify for admission to asecturer will inform students about the respective details of the course. Registration for the course will be contation of will to seek admission to assessment. If studined the qualification for admission to assessment over		
graduate  Certain prerequisessment. The at the beginnin sidered a decla dents have obtained the course of the sessment into experience.	isites must be met to qualify for admission to asecturer will inform students about the respective details of the course. Registration for the course will be contation of will to seek admission to assessment. If studined the qualification for admission to assessment over		
sessment. The at the beginnin sidered a decla dents have obtained the course of the sessment into each of the sessment int	ecturer will inform students about the respective details g of the course. Registration for the course will be con- ration of will to seek admission to assessment. If stu- ained the qualification for admission to assessment over		
Semester graduate Certain prerequisites must be met to quality for admission to assessment. The lecturer will inform students about the respective deat 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 the course of the semester, the lecturer will put their registration for sessment into effect. Students who meet all prerequisites will be acted to assessment in the current or in the subsequent semester. For sessment at a later date, students will have to obtain the qualificate admission to assessment anew.  Contents  Physics of X-ray generation (X-ray tubes, synchrotron). Physics of the interaction between X-rays and matter ton absorption, scattering), physics of X-ray detection. Mathematics of reconstruction algorithms (filtered respective deat the beginning of the course.			
	mage processing (image data pre-processing, feature ex		
characterisation, metrology, biology,). Radiation pro-			
Intended learning outcomes			
The students know the principles of generating X-rays a techniques using X-rays and methods of image process	and of their interactions with matter. They know imaging ing as well as application areas of these methods.		
$\textbf{Courses} \ (\text{type, number of weekly contact hours, language} - \text{if other th} \\$	an German)		
V + $R$ (no information on SWS (weekly contact hours) an	nd course language available)		
<b>Method of assessment</b> (type, scope, language $-$ if other than Germodule is creditable for bonus)	man, examination offered $-$ if not every semester, information on whether		

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	e title				Abbreviation	
Introdu	Introduction to Electron Microscopy				11-IEM-111-m01	
Module	Module coordinator			Module offered by		
Managi	ing Dire	ector of the Institute of A	pplied Physics	Faculty of Physics a	nd Astronomy	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
4	nume	rical grade				
Duratio	Duration Module level Other pro		Other prerequisites	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.		nts about the respective details ion for the course will be consission to assessment. If sturadmission to assessment over will put their registration for astall prerequisites will be admites ubsequent semester. For as-		

1. Microscopy with light and electrons. 2. Electrons and their interaction with a specimen. 3. Electron diffraction (selected-area ED, convergent beam ED, basics of electron crystallography, comparison with the X-ray diffraction technique). 4. Transmission electron microscopy (the instrument, contrast mechanisms, principles of image formation, imaging of microstructure). 5. Can we see atoms? High-resolution electron microscopy (principle of image formation, image simulation). 6. Scanning electron microscopy (the instrument, contrast mechanisms). 7. Chemical analysis with the electron microscope (energy-dispersive X-ray microanalysis, electron energy loss spectroscopy). 8. Sample preparation. Electron microscopy and complementary techniques.

### **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** (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 is creditable for 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
Field TI	neory i	n Solid State Physics			11-FTFK-112-m01
Module	Module coordinator			Module offered by	
Managing Director of the Institute of Theoretical Physic and Astrophysics			Theoretical Physics	Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ. cor	npl. of module(s)	
8	nume	rical grade			
Duration Module level		Other prerequisites			
1 semester graduate		sessment. The lectuat the beginning of sidered a declaration dents have obtained the course of the sessment into effected to assessment in	arer will inform stude the course. Registrat on of will to seek adm d the qualification fo emester, the lecturer t. Students who mee n the current or in th date, students will h	alify for admission to as- nts about the respective details ion for the course will be con- nission to assessment. If stu- or admission to assessment over will put their registration for as- et all prerequisites will be admit- e subsequent semester. For as- ave to obtain the qualification for	

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 is creditable for 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)

Master's with 1 major FOKUS Physics (2006)	JMU Würzburg • generated 23-Aug-2021 • exam. reg.	page 59 / 125
	data record Master (120 ECTS) FOKUS Physik - 2006	



Module title					Abbreviation	
Concepts of Theoretical Astroparticle physics					11-ATT-111-m01	
Module	coord	inator		Module offered by		
Managi and Ast	_	ector of the Institute of T sics	heoretical Physics	retical Physics Faculty of Physics and Astronomy		
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)		
4	nume	rical grade				
Duratio	n	Module level	Other prerequisites	Other prerequisites		
1 seme.		graduate	sessment. The lecturation at the beginning of sidered a declaration dents have obtained the course of the sessment into effect ted to assessment i	urer will inform stude the course. Registrat on of will to seek admed the qualification for emester, the lecturer of the current or in the date, students will h	alify for admission to as- nts about the respective details ion for the course will be con- nission to assessment. If stu- r admission to assessment over will put their registration for as- t all prerequisites will be admit- e subsequent semester. For as- ave to obtain the qualification for	

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.

 $\textbf{Courses} \ (\textbf{type, number of weekly contact hours, language} - \textbf{if other than German})$ 

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 is creditable for 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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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 



Module title					Abbreviation	
Genera	l Theo	ry of Relativity			11-ART-112-m01	
Module	e coord	inator		Module offered b	y	
Manag and As			of Theoretical Physics	Faculty of Physics	and Astronomy	
ECTS	Meth	od of grading	Only after succ. cor	npl. of module(s)		
4	nume	rical grade				
Duratio	n	Module level	Other prerequisites	<b>;</b>		
1 seme		graduate	sessment. The lectuat the beginning of sidered a declaration dents have obtaine the course of the sessment into effected to assessment is	urer will inform stud the course. Registr on of will to seek ac d the qualification emester, the lecture it. Students who me in the current or in date, students will	ualify for admission to as- lents about the respective details ation for the course will be con- lmission to assessment. If stu- for admission to assessment over er will put their registration for as- eet all prerequisites will be admit- the subsequent semester. For as- have to obtain the qualification fo	
ments	of diffe	rential geometry; ele		nple of a relativistic	ummary of special relativity; ele- gauge theory; field equations of nulation	
Intende	ed lear	ning outcomes				
mather	natical	understanding of th		relativity on the bas	of general relativity. They have a sis of differential forms. They are logy.	
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)						
<b>Method of assessment</b> (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)						

a) written examination (approx. 90 minutes) or b) oral examination of one candidate each or oral examination ir 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					Abbreviation
Special Theory of Relativity					11-SRT-112-m01
Module	coord	inator		Module offered by	
Managi and As	_	ector of the Institute of T sics	heoretical Physics	oretical Physics Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
4	nume	rical grade			
Duratio	n	Module level	Other prerequisites		
1 seme		graduate	sessment. The lecturation at the beginning of sidered a declaration dents have obtained the course of the sessment into effected to assessment i	trer will inform stude the course. Registrat on of will to seek adm d the qualification fo mester, the lecturer t. Students who mee n the current or in th date, students will h	alify for admission to as- nts about the respective details ion for the course will be con- nission to assessment. If stu- or admission to assessment over will put their registration for as- et all prerequisites will be admit- e subsequent semester. For as- ave to obtain the qualification for

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.den.

**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 is creditable for 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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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 



# **Compulsory Electives Research Modules Physics**

(16 ECTS credits)



Modul	e title		Abbreviation		
FOKUS	S Resea	rch Module Type VK8A		11-FM-VK8A-072-m01	
Modul	e coord	inator		Module offered by	
chairp	erson o	f examination committ	ee	Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ. cor	npl. of module(s)	
8	nume	rical grade			
Duration Module level Other pre		Other prerequisites	5		
1 seme	1 semester graduate				
Conto	Contonte				

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)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for 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)



Modul	e title		Abbreviation		
FOKUS	Resea	rch Module Type VK8D D	oidactics		11-FM-VK8D-072-m01
Module coordinator				Module offered by	
chairp	erson o	f examination committee	9	Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
8	nume	rical grade			
Duration Module level Other p		Other prerequisites			
1 seme	1 semester graduate				
Conton	Contonte				

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) +  $\ddot{U}/P$  (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 is creditable for 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)



Modul	e title				Abbreviation
FOKUS	Resea	rch Module Type VK	8E Experimental Physics	3	11-FM-VK8E-072-m01
Module coordinator				Module offered by	
chairp	erson o	f examination comm	nittee	Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ. co	mpl. of module(s)	
8	nume	rical grade			
Duration Module level Other prerequisite		s			
1 semester graduate					
Conter	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)

 $\textbf{Method of assessment} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination offered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination offered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language}) \ (\textbf{type}, \textbf{language}) \$ module is creditable for 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**

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



Modul	e title		Abbreviation			
FOKUS Research Module Type VK8I Interdisciplinary Research Fields					11-FM-VK8I-072-m01	
Module coordinator				Module offered by		
chairp	erson o	f examination committee	9	Faculty of Physics and Astronomy		
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
8	nume	rical grade				
Duration Module level O		Other prerequisites				
1 seme	1 semester graduate					
Conton	Contonts					

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 is creditable for 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)



Module title					Abbreviation	
FOKUS Research Module Type VK8T Theoretical Physics					11-FM-VK8T-072-m01	
Module coordinator				Module offered by		
chairperson of examination committee			nittee	Faculty of Physics and Astronomy		
ECTS	Meth	od of grading	Only after succ. co	mpl. of module(s)		
8	nume	erical grade				
Duration Module level Other pre		Other prerequisite	s			
1 semester graduate						
Conto	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)

 $\textbf{Method of assessment} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination offered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination offered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language}) \ (\textbf{type}, \textbf{language}) \$ module is creditable for 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**

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



Module title					Abbreviation
FOKUS	Resea	rch Module Type VK9A A	stronomy		11-FM-VK9A-072-m01
Module coordinator				Module offered by	
chairp	erson o	f examination committee	9	Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
9	nume	rical grade			
Duration Module level Other p		Other prerequisites			
1 semester graduate					
Conton	Contoute				

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) +  $\ddot{U}/P$  (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 is creditable for 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)



Module title					Abbreviation
FOKUS	Resea	rch Module Type VK9	D Didactics		11-FM-VK9D-072-m01
Module coordinator				Module offered by	
chairp	erson o	f examination commi	ittee	Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ. co	mpl. of module(s)	
9	nume	rical grade			
Duration Module level Other prere		Other prerequisite	S		
1 semester graduate					
Conto	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) +  $\ddot{U}/P$  (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 is creditable for 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)



Module	e title		Abbreviation		
FOKUS Research Module Type VK9E Experimental Physics					11-FM-VK9E-072-m01
Modul	e coord	inator		Module offered by	
chairpe	chairperson of examination committee			Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ. co	mpl. of module(s)	
9	nume	rical grade			
Duration Module level Other prerequisit		Other prerequisites	5		
1 seme	1 semester graduate				
Conter	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 (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)

 $\textbf{Method of assessment} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination offered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination offered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language}) \ (\textbf{type}, \textbf{language}) \$ module is creditable for 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**

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



Modul	e title		Abbreviation			
FOKUS Research Module Type VK9I Interdisciplinary Research Fields					11-FM-VK9I-072-m01	
Module coordinator				Module offered by		
chairp	erson o	f examination committee	9	Faculty of Physics and Astronomy		
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
9	nume	rical grade				
Duration Module level Ot		Other prerequisites				
1 semester graduate						
Conton	Contonto					

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 is creditable for 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)



Module title					Abbreviation	
FOKUS	Resea	rch Module Type VK	T Theoretical Physics		11-FM-VK9T-072-m01	
Module coordinator				Module offered by		
chairp	erson o	f examination comm	ittee	Faculty of Physics	Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ. co	ompl. of module(s)		
9	nume	rical grade				
Durati	Duration Module level Other prerequi		Other prerequisit	es		
1 seme	1 semester graduate					
Conto	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 (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)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for 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 --Referred to in LPO I (examination regulations for teaching-degree programmes)



Modul	e title		Abbreviation			
FOKUS Research Module Type VK10A Astronomy			IOA Astronomy		11-FM-VK10A-072-m01	
Module coordinator				Module offered by	Module offered by	
chairp	erson o	f examination comm	ittee	Faculty of Physics a	Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ. c	ompl. of module(s)		
10	nume	rical grade				
Duration Module level Other prerequi		Other prerequisit	es			
1 seme	1 semester graduate					
Conto	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 se-

mester break)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for 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)



Modul	e title		Abbreviation		
FOKUS Research Module Type VK10D Didactics					11-FM-VK10D-072-m01
Modul	e coord	inator		Module offered by	
chairp	erson o	f examination committ	ee	Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ. co	mpl. of module(s)	
10	nume	rical grade			
Durati	Duration Module level Other prere		Other prerequisites	5	
1 seme	1 semester graduate				
Canta	Contonto				

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) +  $\ddot{U}/P$  (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 is creditable for 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)



Modul	e title		Abbreviation		
FOKUS	Resea	rch Module Type VK10E E		11-FM-VK10E-072-m01	
Module coordinator Mod				Module offered by	
chairpe	erson o	f examination committee	2	Faculty of Physics and Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
10	nume	rical grade			
Duratio	Duration Module level Other prerequisit				
1 seme	1 semester graduate				
Conter	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 (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)

 $\textbf{Method of assessment} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination of fered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination of fered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language}) \ (\textbf{type}, \textbf{language})$ module is creditable for 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**



Modul	e title		Abbreviation			
FOKUS	Resea	rch Module Type VK10I I	11-FM-VK10I-072-m01			
Module coordinator Module offer				Module offered by		
chairpe	chairperson of examination committee			Faculty of Physics and Astronomy		
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)		
10	nume	rical grade				
Duratio	Duration Module level Other prerequis		Other prerequisites			
1 seme	1 semester graduate					
Conter	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 (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)

 $\textbf{Method of assessment} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination of fered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination of fered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language}) \ (\textbf{type}, \textbf{language})$ module is creditable for 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**



Module title				'	Abbreviation	
FOKUS Research Module Type VK10T Theoretical Physics				S	11-FM-VK10T-072-m01	
Module coordinator				Module offere	Module offered by	
chairp	erson o	f examination comn	nittee	Faculty of Phy	Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ.	compl. of module(	s)	
10	nume	rical grade				
Durati	Duration Module level Other prerequ		Other prerequisi	tes		
1 semester graduate						
Conto	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 (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)

 $\textbf{Method of assessment} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination of fered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination of fered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language}) \ (\textbf{type}, \textbf{language})$ module is creditable for 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**



Modul	e title		Abbreviation			
FOKUS Research Module Type VK12A Astronomy					11-FM-VK12A-072-m01	
Module coordinator				Module offered by	Module offered by	
chairp	erson o	f examination comm	ittee	Faculty of Physics and Astronomy		
ECTS	Meth	od of grading	Only after succ. co	ompl. of module(s)		
12	nume	rical grade				
Durati	Duration Module level Other prerequi		Other prerequisite	es		
1 seme	1 semester graduate					
Conto	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 (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 is creditable for 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)



Modul	e title		Abbreviation			
FOKUS Research Module Type VK12D Didactics					11-FM-VK12D-072-m01	
Module coordinator				Module offered by	Module offered by	
chairp	erson o	f examination comm	ittee	Faculty of Physics a	Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ. co	ompl. of module(s)		
12	nume	rical grade				
Durati	Duration Module level Other prerequ		Other prerequisit	es		
1 seme	1 semester graduate					
Conto	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)

 $\textbf{Method of assessment} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination offered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination offered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language}) \ (\textbf{type}, \textbf{language}) \$ module is creditable for 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**



Modul	e title		Abbreviation			
FOKUS Research Module Type VK12E Experimental Physics				cs	11-FM-VK12E-072-m01	
Module coordinator				Module offered by	Module offered by	
chairp	erson o	f examination comm	ittee	Faculty of Physics	Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ. c	ompl. of module(s)		
12	nume	rical grade				
Durati	Duration Module level Other prerequisit		es			
1 seme	1 semester graduate					
Conto	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) +  $\ddot{U}/P$  (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** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for 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)



Module	e title	,		Abbreviation	
FOKUS	Resea	rch Module Type VK12I Ir	11-FM-VK12l-072-m01		
Module coordinator Module offer				Module offered by	
chairpe	chairperson of examination committee			Faculty of Physics and Astronomy	
ECTS	Metho	od of grading	Only after succ. con	mpl. of module(s)	
12	nume	rical grade			
Duratio	Duration Module level Other prereq				
1 seme	1 semester graduate				
Conten	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)

 $\textbf{Method of assessment} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination offered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination offered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language}) \ (\textbf{type}, \textbf{language}) \$ module is creditable for 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**



Module	e title		Abbreviation		
FOKUS	Resea	rch Module Type VK12T 1		11-FM-VK12T-072-m01	
Module coordinator Module				Module offered by	
chairpe	erson o	f examination committee	2	Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
12	nume	rical grade			
Duratio	Duration Module level Other prerequi		Other prerequisites		
1 seme	1 semester graduate				
Conten	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)

 $\textbf{Method of assessment} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination offered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination offered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language}) \ (\textbf{type}, \textbf{language}) \$ module is creditable for 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**



Module title				,	Abbreviation	
FOKUS Research Module Type VKM12A Astronomy			(M12A Astronomy		11-FM-VMK12A-072-m01	
Module coordinator				Module offered	Module offered by	
chairp	erson o	f examination comm	nittee	Faculty of Phys	Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ.	compl. of module(s	)	
12	nume	rical grade				
Durati	Duration Module level Other p		Other prerequis	ites		
1 semester graduate						
Conto	ntc	•	<u>.</u>			

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 is creditable for 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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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 



Modul	e title		Abbreviation		
FOKUS	FOKUS Research Module Type VMK12D Didactics				11-FM-VMK12D-072-m01
Modul	e coord	inator		Module offered by	
chairp	erson o	f examination committee	2	Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
12	nume	rical grade			
Duration Module level		Other prerequisites			
1 semester graduate					
Contor	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) +  $\ddot{U}/P$  (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 is creditable for 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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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 

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	data record Master (120 ECTS) FOKUS Physik - 2006	



Module	e title		Abbreviation		
FOKUS	Resea	rch Module Type VMK12	11-FM-VMK12E-072-m01		
Module coordinator Module offer				Module offered by	
chairpe	chairperson of examination committee			Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
12	nume	rical grade			
Duratio	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 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) +  $\ddot{U}/P$  (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 is creditable for 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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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 



Modul	e title		Abbreviation		
FOKUS	S Resea	rch Module Type VN	11-FM-VMK12l-072-m01		
Module coordinator Module offe				Module offered	by _
chairp	erson o	f examination comn	nittee	Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ. cor	npl. of module(s)	
12	nume	rical grade			
Duration Module level		Other prerequisites	Other prerequisites		
1 semester graduate					
Contonto					

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 (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 is creditable for 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	e title		Abbreviation		
FOKUS	FOKUS Research Module Type VKM12T Theoretical Physics				11-FM-VMK12T-072-m01
Module	Module coordinator N				
chairpe	erson o	f examination committee		Faculty of Physics and Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
12	nume	rical grade			
Duratio	Duration Module level		Other prerequisites		
1 semester graduate					
Conten	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 is creditable for 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

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 

Master's with 1 major FOKUS Physics (2006)	JMU Würzburg • generated 23-Aug-2021 • exam. reg.	page 88 / 125
	data record Master (120 ECTS) FOKUS Physik - 2006	



Module title					Abbreviation	
FOKUS	FOKUS Research Module Type VKM13A Astronomy				11-FM-VMK13A-072-m01	
Module coordinator				Module offere	Module offered by	
chairperson of examination committee			nittee	Faculty of Phys	Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ.	compl. of module(s	s)	
13	nume	rical grade				
Duration Module level		Other prerequis	Other prerequisites			
1 semester graduate						
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) +  $\ddot{U}/P$  (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 is creditable for 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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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 

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	data record Master (120 ECTS) FOKUS Physik - 2006	



Module title					Abbreviation	
FOKUS	FOKUS Research Module Type VMK13D Didactics				11-FM-VMK13D-072-m01	
Module coordinator				Module offere	Module offered by	
chairperson of examination committee			nittee	Faculty of Phys	Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ.	compl. of module(	s)	
13	nume	erical grade				
Duration Module level		Other prerequis	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 (3 weekly contact hours) +  $\ddot{U}/P$  (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 is creditable for 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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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 

Master's with 1 major FOKUS Physics (2006)	JMU Würzburg • generated 23-Aug-2021 • exam. reg.	page 90 / 125
	data record Master (120 ECTS) FOKUS Physik - 2006	



Module title					Abbreviation	
FOKUS	S Resea	rch Module Type VM	11-FM-VMK13E-072-m01			
Module coordinator				Module offe	Module offered by	
chairp	erson o	of examination comr	nittee	Faculty of Ph	Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ	compl. of module	e(s)	
13	nume	erical grade				
Duration Module level		Other prerequi	Other prerequisites			
1 semester graduate						
Conto	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 (3 weekly contact hours) +  $\ddot{U}/P$  (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 is creditable for 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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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 



Modul	e title		Abbreviation		
FOKUS	Resea	rch Module Type VMK13I	11-FM-VMK13I-072-m01		
Modul	Module coordinator Mo				
chairp	erson o	f examination committee	!	Faculty of Physics and Astronomy	
ECTS	Metho	od of grading	Only after succ. con	npl. of module(s)	
13	nume	rical grade			
Duration Module level		Other prerequisites			
1 semester graduate					
<i>c</i> .	Contonto				

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 is creditable for 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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	data record Master (120 ECTS) FOKUS Physik - 2006	İ



Modul	e title		Abbreviation		
FOKUS	FOKUS Research Module Type VKM13T Theoretical Physics				11-FM-VMK13T-072-m01
Modul	e coord	inator		Module offered by	
chairpe	chairperson of examination committee			Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ. co	mpl. of module(s)	
13	nume	rical grade			
Duratio	Duration Module level		Other prerequisites	Other prerequisites	
1 semester graduate					
Conter	ıts				

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 (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 (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for 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

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 

Master's with 1 major FOKUS Physics (2006)	JMU Würzburg • generated 23-Aug-2021 • exam. reg.	page 93 / 125
	data record Master (120 ECTS) FOKUS Physik - 2006	



Module title FOKUS Research Module Type VKM14A Astronomy			Abbreviation			
			M14A Astronomy		11-FM-VMK14A-072-m01	
Modul	e coord	linator		Module offere	d by	
chairp	chairperson of examination committee			Faculty of Phys	Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ	compl. of module(s	s)	
14	nume	rical grade				
Duration Module level O		Other prerequis	Other prerequisites			
1 semester graduate						
Conto	ntc	•				

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) +  $\ddot{U}/P$  (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 is creditable for 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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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 



Module title			Abbreviation		
FOKUS	FOKUS Research Module Type VMK14D Didactics				11-FM-VMK14D-072-m01
Modul	Module coordinator			Module offered by	
chairp	chairperson of examination committee			Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ. c	ompl. of module(s)	
14	nume	rical grade			
Duration Module level Other p		Other prerequisit	es		
1 semester graduate					
Conto	ntc	•			

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) +  $\ddot{U}/P$  (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 is creditable for 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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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 



Modul	Module title				Abbreviation
FOKUS	FOKUS Research Module Type VMK14E Experimental Physics				11-FM-VMK14E-072-m01
Modul	Module coordinator Module				
chairpe	chairperson of examination committee			Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ. con	compl. of module(s)	
14	nume	rical grade			
Duratio	Duration Module level		Other prerequisites		
1 semester graduate					
Conten	nts				

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 (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 is creditable for 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

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 



Modul	Module title				Abbreviation
FOKUS	S Resea	rch Module Type V	11-FM-VMK14l-072-m01		
Module coordinator Module offered				Module offered by	/ /
chairp	chairperson of examination committee			Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ. con	npl. of module(s)	
14	nume	erical grade			
Duration Module level Other prerequisites					
1 semester graduate					
<i>c</i> .			·		

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 is creditable for 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	FOKUS Research Module Type VKM14T Theoretical Physics				11-FM-VMK14T-072-m01	
Modul	e coord	linator		Module offe	red by	
chairp	chairperson of examination committee			Faculty of Ph	Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ	. compl. of module	e(s)	
14	nume	rical grade				
Duration Module level Other prerequi		sites				
1 semester graduate						
Conto	ntc	•				

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 (3 weekly contact hours) +  $\ddot{U}/P$  (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 is creditable for 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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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 



Modul	Module title				Abbreviation
FOKUS	FOKUS Research Module Type VKM16A Astronomy				11-FM-VMK16A-072-m01
Modul	Module coordinator			Module offered by	
chairp	chairperson of examination committee			Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ. co	mpl. of module(s)	
16	nume	rical grade			
Duration Module level		Other prerequisites	Other prerequisites		
1 semester graduate -					
Conto					

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)

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 is creditable for 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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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 



Module title			Abbreviation		
FOKUS	FOKUS Research Module Type VMK16D Didactics				11-FM-VMK16D-072-m01
Modul	Module coordinator			Module offered by	
chairp	chairperson of examination committee			Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ. co	ompl. of module(s)	
16	nume	rical grade			
Duration Module level O		Other prerequisite	es		
1 semester graduate					
C 4					

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) +  $\ddot{U}/P$  (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 is creditable for 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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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 



Module title			Abbreviation			
FOKUS Research Module Type VMK16E Experimental Physics				11-FM-VMK16E-072-m01		
Modul	e coord	linator		Module offe	red by	
chairp	chairperson of examination committee			Faculty of Ph	Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ	compl. of module	e(s)	
16	nume	erical grade				
Duration Module level 0		Other prerequi	Other prerequisites			
1 semester graduate						
Conto	ntc					

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) +  $\ddot{U}/P$  (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 is creditable for 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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 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 

Master's with 1 major FOKUS Physics (2006)	JMU Würzburg • generated 23-Aug-2021 • exam. reg.	page 101 / 125
	data record Master (120 ECTS) FOKUS Physik - 2006	



Module title					Abbreviation	
FOKUS Research Module Type VMK16I Interdisciplinary Research Fields					11-FM-VMK16I-072-m01	
Modul	e coord	inator		Module offered by		
chairp	chairperson of examination committee			Faculty of Physics and Astronomy		
ECTS	Metho	Method of grading Only after su		npl. of module(s)		
16	16 numerical grade					
Duration Module level		Other prerequisites				
1 seme	1 semester graduate					
Camban	Cambonto					

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 is creditable for 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)



Modul	e title			Abbreviation		
FOKUS Research Module Type VKM16T Theoretical Physics				}	11-FM-VMK16T-072-m01	
Module coordinator				Module offered by		
chairpe	chairperson of examination committee			Faculty of Physics and Astronomy		
ECTS	Meth	thod of grading Only after succ. co		npl. of module(s)		
16	numerical grade					
Duration Module level		Other prerequisites				
1 semester graduate						
Conter	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 is creditable for 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

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 



Module title					Abbreviation	
FOKUS Research Module Applied Semiconductor Physics and Devices				nd Devices	11-FM-SPD-102-m01	
Module coordinator Module				Module offered by		
chairperson of examination committee			ee	Faculty of Physics and Astronomy		
ECTS	Meth	ethod of grading Only after succ. co		npl. of module(s)		
10 numerical grade						
Duration Module level		Other prerequisites				
1 semester graduate		11-KM-2				
Conten	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** (type, number of weekly contact hours, language — if other than German)

Halbleiterphysik und Bauelemente (Applied Semiconductor Physics and Devices): V (3 weekly contact hours) + Ü/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)

 $\textbf{Method of assessment} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination offered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination offered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language}) \ (\textbf{type}, \textbf{language}) \$ module is creditable for 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

## **Additional information**

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 



Module title					Abbreviation	
FOKUS Research Module Quantum Transport in Semiconductor Nanostructu-					11-FM-QTH-102-m01	
res						
Modul	Module coordinator Module offered by					
chairperson of examination committee Faculty of P			Faculty of Physics a	cs and Astronomy		
ECTS	Method of grading Only after succ. com		npl. of module(s)			
10	o numerical grade					
Duration Module level		Other prerequisites				
1 semester graduate						
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.

 $\textbf{Courses} \ (\textbf{type}, \, \textbf{number of weekly contact hours, language} - \textbf{if other than German})$ 

Quantentransport in Halbleiter-Nanostrukturen (Quantum Transport in Semiconductor Nanostructures): V (3 weekly contact hours) + U/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 is creditable for 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
Additional information
Referred to in LPO I (examination regulations for teaching-degree programmes)



Module title					Abbreviation	
FOKUS Research Module Methods in Surface Spectroscopy				,	11-FM-MSS-102-m01	
Module coordinator				Module offered by		
chairperson of examination committee			nittee	Faculty of Physics and Astronomy		
ECTS	Meth	ethod of grading Only after succ. co		npl. of module(s)		
8	nume	numerical grade				
Duratio	on	Module level	Other prerequisites	5		
1 semester graduate		11-TQM, 11-KM2 , 11	11-TQM, 11-KM2, 11-FK2 (or 11-T3, 11-E5, 11-E7)			
Conter	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 is creditable for 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)



Module	e title			Abbreviation			
FOKUS Research Module Methods in Surface Spectroscopy with Mini Research					11-FM-MSS-MF-102-m01		
Project	Project						
Module	Module coordinator Module offered by						
chairperson of examination committee Faculty of Physics				Faculty of Physics a	nd Astronomy		
ECTS	ECTS Method of grading Only after succ. com			npl. of module(s)			
12 numerical grade							
Duration Module level Other prerequisites							
1 semester graduate		11-TQM, 11-KM2, 11-FK2 (or 11-T3, 11-E5, 11-E7)		11-E7)			
Conten	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 con-

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for 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 I through 3.
Allocation of places
Additional information
Referred to in LPO I (examination regulations for teaching-degree programmes)



Module title					Abbreviation	
FOKUS Research Module High Energy Astrophysics					11-FM-HAS-111-mo1	
Module coordinator				Module offered by		
chairperson of examination committee			nittee	Faculty of Physics and Astronomy		
ECTS	Meth	thod of grading Only after succ. co		mpl. of module(s)		
10	nume	merical grade				
Duration Module level			Other prerequisites	5		
1 semester graduate		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 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.

 $\pmb{\textbf{Courses}} \ (\textbf{type}, \textbf{number of weekly contact hours}, \textbf{language} - \textbf{if other than German})$ 

Plasma-Astrophysik (Plasma-Astrophysics): V (3 weekly contact hours) +  $\ddot{U}/P$  (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 is creditable for 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 **Additional information Referred to in LPO I** (examination regulations for teaching-degree programmes)



Modul	e title		Abbreviation			
FOKUS	Resea	rch Module High En	ergy Astrophysics with M	ini Research Project	11-FM-HAS-MF-111-m01	
Modul	e coord	linator		Module offered by		
chairperson of examination committee			nittee	Faculty of Physics and Astronomy		
ECTS	Meth	od of grading	Only after succ. cor	Only after succ. compl. of module(s)		
16	nume	rical grade				
Duration		Module level	Other prerequisites	3		
1 semester graduate		graduate	11-A4, 11-KET	11-A4, 11-KET		
Conter	nts					

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)

 $\textbf{Method of assessment} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination of fered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination of fered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language}) \ (\textbf{type}, \textbf{language})$ module is creditable for 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 Additional information $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Modul	le title	Abbreviation			
FOKUS	S Resea		11-FM-NOS-F-111-mo1		
Modu	le coord	linator		Module offered by	Į.
chairp	erson o	f examination comm	nittee	Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ. co	Only after succ. compl. of module(s)	
10	nume	rical grade			
Durati	Duration Module level		Other prerequisite	s	
1 semester		graduate	11-KM, 11-TQM		
Conte	nts		`		
Specif	ic and a	advanced knowledge	e of independent scientif	c work in a current re	esearch area, especially

### **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.

specialist field of Nano-Optics, reproduction of knowledge, acquisition of social and methodological competen-

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

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** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for 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 Additional information $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$



Modul	e title			Abbreviation	
FOKUS	S Resea	rch Module Nano-Optic	s and Spectroscopy		11-FM-NOS-N-111-m01
Modul	e coord	inator		Module offered by	
chairp	chairperson of examination committee			Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ. cor	npl. of module(s)	
8	numerical grade				
Durati	Duration Module level		Other prerequisites		
1 seme	ester	graduate			
Conto					

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) +  $\ddot{U}/P$  (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 is creditable for 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 --Additional information --Referred to in LPO I (examination regulations for teaching-degree programmes) ---



Module title		Abbreviation		
FOKUS Resea	arch Module		11-FM4-112-m01	
Module coor	dinator		Module offered by	
chairperson of examination committee			Faculty of Physics and Astronomy	
ECTS Meth	nod of grading	Only after succ. co	Only after succ. compl. of module(s)	
8 num	erical grade			
Duration Module level		Other prerequisite	Other prerequisites	
1 semester graduate				
Contents				

### **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** (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) +  $\ddot{U}/P$  (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 is creditable for 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.

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 

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 -Additional information --



Modul	e title	'		Abbreviation		
FOKUS	Resea	rch Module			11-FM6-112-m01	
Modul	e coord	linator		Module offered by		
chairp	chairperson of examination committee			Faculty of Physics and Astronomy		
ECTS	Meth	od of grading	Only after succ. cor	Only after succ. compl. of module(s)		
10	nume	rical grade				
Duration Module level		Module level	Other prerequisites	Other prerequisites		
1 semester graduate						
Conter	ıts	,	,			

### **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 (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

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for 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 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**

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 



Module title					Abbreviation
FOKUS Research Module				1	1-FM8-112-m01
Module coordinator				Module offered by	
chairp	chairperson of examination committee			Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ. co	mpl. of module(s)	
12	nume	numerical grade			
Durati	Duration Module level		Other prerequisite	Other prerequisites	
1 seme	ester	graduate			
Conte	nte				

### 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** (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

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for 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 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**

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 



Modul	e title			Abbreviation	
FOKUS	S Resea	rch Module with Min	i Research Project		11-FM4-MF-112-m01
Modul	e coord	linator		Module offered by	
chairp	chairperson of examination committee			Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ. o	compl. of module(s)	
12	nume	numerical grade			
Durati	Duration Module level		Other prerequisit	Other prerequisites	
1 seme	ester	graduate			
Conto	ntc				

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 (2 weekly contact hours) +  $\ddot{U}/P$  (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 is creditable for 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

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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	Resea	rch Module with Mini R	esearch Project		11-FM6-MF-112-m01	
Modul	e coord	inator		Module offered by		
chairp	chairperson of examination committee			Faculty of Physics and Astronomy		
ECTS	Meth	od of grading	Only after succ. cor	Only after succ. compl. of module(s)		
14 numerical grade						
Durati	Duration Module level		Other prerequisites			
1 seme	ester	graduate				
Contor						

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) +  $\ddot{U}/P$  (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 is creditable for 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

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#### **Additional information**

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



Modul	e title			Abbreviation	
FOKUS	Resea	rch Module with Mi	ni Research Project		11-FM8-MF-112-m01
Modul	e coord	linator		Module offered by	
chairp	chairperson of examination committee			Faculty of Physics and Astronomy	
ECTS	Meth	od of grading	Only after succ. co	mpl. of module(s)	
16	numerical grade				
Durati	on	Module level	Other prerequisite	es	
1 seme	ester	graduate			
C 4					

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) +  $\ddot{U}/P$  (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 is creditable for 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

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#### **Additional information**

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



Modul	e title		Abbreviation		
FOKUS	Resea	rch Module		11-FM4A-112-m01	
Modul	e coord	linator		Module offered	by
chairp	erson c	of examination comn	nittee	Faculty of Physi	cs and Astronomy
ECTS	Meth	od of grading	Only after succ.	compl. of module(s)	
8	nume	erical grade			
Durati	on	Module level	Other prerequis	ites	
1 semester graduate					
Conte	nts				
Specif	ic and a	advanced knowledge	e of independent scien	tific work in a curren	t research area.
	م ما ام م				

#### 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 (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) +  $\ddot{U}/P$  (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 is creditable for 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 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)



Modul	e title	·			Abbreviation
FOKUS	Resea	rch Module			11-FM6A-112-m01
Module coordinator				Module offered by	
chairp	chairperson of examination committee			Faculty of Physics and Astronomy	
ECTS	Metho	od of grading	Only after succ. co	Only after succ. compl. of module(s)	
10 numerical grade					
Durati	Duration Module level		Other prerequisites	Other prerequisites	
1 seme	ester	graduate			
Conter	nte				

### 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 (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

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for 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 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** 

 $\textbf{Referred to in LPO I} \ \ (\text{examination regulations for teaching-degree programmes})$ 



Module ti	itle	Abbreviation		
FOKUS Re	esearch Module		11-FM8A-112-m01	
Module c	oordinator		Module offered by	
chairperson of examination committee			Faculty of Physics and Astronomy	
ECTS N	lethod of grading	Only after succ. cor	Only after succ. compl. of module(s)	
12 n	umerical grade			
Duration Module level		Other prerequisites	Other prerequisites	
1 semester graduate				
Contents				

### **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** (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) +  $\ddot{U}/P$  (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** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for 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 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					Abbreviation
FOKUS Mini Research Project					11-FM4A-MF-112-m01
Modul	e coord	linator		Module offered by	
chairp	chairperson of examination committee			Faculty of Physics and Astronomy	
ECTS	Meth	Method of grading Only after succ. cor		mpl. of module(s)	
12	nume	numerical grade			
Duration		Module level	Other prerequisite	Other prerequisites	
1 semester		graduate			
Contact					

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 (2 weekly contact hours) +  $\ddot{U}/P$  (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 is creditable for 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

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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 with Mini Research Project					11-FM6A-MF-112-m01	
Module coordinator				Module offered	Module offered by	
chairperson of examination committee			nittee	Faculty of Physic	Faculty of Physics and Astronomy	
ECTS	Meth	hod of grading Only after succ. co		compl. of module(s)	mpl. of module(s)	
14	nume	rical grade				
Duration Module level		Other prerequisi	Other prerequisites			
1 semester		graduate				
Contents						

### **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

 $\textbf{Method of assessment} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination of fered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language} - \textbf{if other than German, examination of fered} - \textbf{if not every semester, information on whether} \ (\textbf{type}, \textbf{scope}, \textbf{language}) \ (\textbf{type}, \textbf{language})$ module is creditable for 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**

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



Module title				Abbreviation	
FOKUS Research Module with Mini Research Project				11-FM8A-MF-112-m01	
Module coordinator				Module offered by	
chairperson of examination committee			nittee	Faculty of Physics and Astronomy	
ECTS	Meth	thod of grading Only after succ. co		npl. of module(s)	
16	nume	rical grade			
Duration		Module level	Other prerequisite	Other prerequisites	
1 semester		graduate			
Control					

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) +  $\ddot{U}/P$  (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 is creditable for 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

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#### **Additional information**

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



## **Thesis**

(30 ECTS credits)



Module title					Abbreviation	
Master Thesis FOKUS Physics					11-MA-PF-072-m01	
Module coordinator				Module offered by		
chairperson of examination committee			2	Faculty of Physics and Astronomy		
ECTS	ECTS Method of grading		Only after succ. compl. of module(s)			
30	nume	rical grade				
Duratio	on	Module level	Other prerequisites			
1 semester		graduate	Registration for assessment to be carried out electronically. Deadlines will be announced separately. Please consult with your supervisor.			
Conter	nts		•			
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						
<b>Method of assessment</b> (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)						
written thesis (approx. 40 pages)						
Allocation of places						
Additional information						
Referre	ed to in	LPO I (examination regulation	is for teaching-degree progra	ımmes)		