OFFICIAL ANNOUNCEMENT

RWTH AACHEN UNIVERSITY

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Course of Study-Specific Examination Regulations

for the Master's Course of Study

in Physics

at RWTH Aachen University

Originally Published May 11, 2016,

Now Issued in Their Eighth Revised Version

Dated March 6, 2023,

Published as a Complete Version

Please note: This publication is an English translation. Only the German original of these regulations as published in the Official Announcements of RWTH Aachen University ("Amtliche Bekanntmachungen") is legally binding.

Based on §§ 2 (4) and 64 of the Higher Education Act of the State of North Rhine-Westphalia (Higher Education Act; HG) in the version of the announcement dated September 16, 2014 (Law and Official Gazette of the State of North Rhine-Westphalia; GV. NRW p. 547), most recently amended by Article 1 of the Act on Membership of University Hospitals in the Employers' Association of North Rhine-Westphalia, dated June 30, 2022 (GV. NRW, p. 780b), RWTH Aachen University (RWTH) has issued the following regulations:

ISSUED BY DIVISION 1.1 OF DEPARTMENT 1.0 ON BEHALF OF THE RECTOR OF RWTH AACHEN UNIVERSITY
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I. General

§ 1
Scope of Application and Academic Degree

(1) These examination regulations apply to the Master's course of study in Physics at RWTH Aachen University. They only apply in conjunction with the currently valid version of the General Examination Regulations (GER), supplementing it with an additional set of course-specific regulations. In cases of doubt, the provisions of the General Examination Regulations take priority.

(2) Students who successfully complete the Master's course of study are awarded the academic degree of "Master of Science RWTH Aachen University (M. Sc. RWTH)."

§ 2
Objectives of the Course of Study and Language Provisions

(1) This Master's degree program builds upon the Bachelor's degree program in physics in accordance with § 2 (3) GER.

(2) The overall educational objectives are set out in § 2 (1, 3 and 4) GER.

(3) The degree program is predominantly taught in English.

(4) Examinations may be taken in German or English, in agreement with the examiner in question.

§ 3
Admission Requirements

(1) An essential requirement for admission is a recognized first university degree according to § 3 (4) GER.

(2) To meet the educational prerequisites that are necessary to be able to successfully complete the Master's course of study in Physics, the applicant must have the necessary knowledge evidenced by credit points (CP) in the following areas:

- A total of 17 CP corresponding to the modules of Experimental Physics IV, Experimental Physics Va, and Experimental Physics Vb.
- A total of 16 CP corresponding to the modules of Theoretical Physics III and Theoretical Physics IV.
- A total of 9 CP corresponding to the Advanced Lab Course module.

The credit points must have been earned for assessments comparable to those required by the Bachelor's degree program in physics at RWTH Aachen University.

In addition, all applicants are required to provide proof of having completed the Graduate Record Examination (GRE) Subject Test in Physics. For admission, applicants must have scored at least 700 on the GRE Subject Test in Physics (Scaled Score). In exceptional cases where the applicant can demonstrate that taking the GRE Subject Test in Physics would impose an exceptional hardship on them, admission may also be granted on the basis of the GRE General Test upon application to the Examination Board. In this case, the applicant must be among the top 25% (in the 75th percentile rank or higher) on the GRE General Test in the Quantitative Reasoning measure (GRE-QR).

Applicants who are citizens of a member state of the European Union or of the European Economic Area (EEA) as well as “Bildungsinländerinnen” or “Bildungsinländer”, i.e. non-German citizens who have a German school leaving certificate or university degree, are exempt from this obligation to submit proof of a completed GRE.

(3) For admission conditional on the completion of additional requirements, § 3 (6) GER applies. If additional requirements corresponding to more than 40 credit points are imposed, admission to the Master’s course of study will be denied.

(4) Students must prove they have completed all additional requirements potentially imposed before they can register for the compulsory modules of the 3rd semester according to the curriculum (see attachment).

(5) For this Master’s course of study, proficiency in the English language must be proven according to § 3 (9) GER.

(6) If admission is dependent on the completion of additional requirements and one or more of these requirements can only be completed in German, then, in addition to the language skills as outlined in paragraph 5, the candidate must also provide evidence of sufficient proficiency in German pursuant to § 3 (7a) GER.

(7) When determining whether the admission requirements are met, § 3 (12) GER applies.

(8) General regulations for the recognition of prior assessments and exams are stipulated in § 13 GER.

§ 4
Standard Period of Study, Curriculum, Credit Points, and Scope of Study

(1) The standard period of study is four semesters (two years) full-time, including preparation of the Master’s thesis. The course of study may be commenced in either semester.

The program consists of two mandatory elective sections (one of which is a specialization section), a Master's seminar and a Master's practical. Students must choose from one of seven specializations – Experimental Particle Physics, Astroparticle Physics and Cosmology, Quantum Field Theory and Gauge Theories, Experimental Condensed Matter Physics, Nanoelectronics, Condensed Matter Theory, and Quantum Technology.
For successful completion of the degree program, a total of 120 credit points must be acquired. The Master’s examination is comprised of the following components:

Specialization section (modules depending on specialization)	30 CP
Mandatory elective section (specialization, special, or minor subject modules)	30 CP
Master’s seminar	15 CP
Master’s practical	15 CP
Master’s thesis	25 CP
Master’s final colloquium	5 CP
Total	120 CP

In the specialization section (30 CP), the following modules must be successfully completed, depending on the specialization. Please also refer to the curriculum (appendix).

Experimental Particle Physics:
1. Particle Physics I (10 CP)
2. Particle Physics II (10 CP)
3. Laboratory Course Particle Physics (10 CP)

Astroparticle Physics and Cosmology:
1. Particle Physics I or Quantum Field Theory of Particle Physics I (10 CP)
2. Theory of Relativity and Cosmology (10 CP)
3. Astroparticle Physics (10 CP)

Quantum Field Theory and Gauge Theories:
1. Quantum Field Theory of Particle Physics I (10 CP)
2. Theory of Relativity and Cosmology (10 CP)
3. Quantum Field Theory of Particle Physics II (10 CP)

Experimental Condensed Matter Physics:
1. Condensed Matter Physics I (10 CP)
2. Condensed Matter Physics II (10 CP)
3. Laboratory Course Solid State Physics (10 CP)

Nanoelectronics:
1. Condensed Matter Physics I (10 CP)
2. Novel Materials and Devices for Information Technology 1 (5 CP)
3. Novel Materials and Devices for Information Technology 2 (5 CP)
4. Laboratory Course Nanoelectronics (10 CP)

Quantum Technology:
1. Condensed Matter Physics I or Theoretical Solid State Physics or Quantum Theory of Condensed Matter I (10 CP)
2. Hardware Platforms for Quantum Technology (5 CP)
3. Laboratory Course Quantum Technology (5 CP)
4. Quantum Information (10 CP)

Condensed Matter Theory:
1. Theoretical Solid State Physics (10 CP)
2. Quantum Theory of Condensed Matter I (10 CP)
3. Quantum Theory of Condensed Matter II or Computational Physics or Quantum Information or Statistical Physics (10 CP)

(2) The degree program comprises between 10 and 18 modules, including the Master's thesis module. All modules are specified in the module handbook. The CP of the assessments that are to be taken in the individual modules are weighted according to § 4 (4) GER.

§ 5
Obligatory Attendance in Classes

(1) According to § 5 (2) GER, obligatory attendance can only be stipulated in the following course types:

1. Tutorials
2. Seminars and introductory seminars ("Proseminare")
3. Colloquia

4. Lab courses
5. Excursions

(2) Classes with obligatory attendance in accordance with paragraph 1 shall be indicated as such in the module handbook.

§ 6
Exams and Exam Deadlines

(1) General regulations on exams and exam periods are stipulated in § 6 GER.

(2) If successful completion of modules, exams, or module components according to § 5 (4) GER is stipulated as a precondition for participation in other exams, this is indicated in the module handbook.

§ 7
Types of Exams

(1) General regulations on types of exams are stipulated in § 7 GER.

(2) Written exams shall last a minimum of 60 and a maximum of 180 minutes. The duration for the relevant modules is specified in the module handbook.

(3) Oral exams shall last a minimum of 20 minutes and a maximum of 40 minutes. An oral exam may be carried out as a group exam with up to four candidates.

(4) Term papers range from 10 pages to a maximum of 200 pages. Students are typically given from two weeks to a maximum of three months to complete a term paper.

(5) The written version of an oral presentation shall be between 5 and 50 pages long. The presentation shall last at least 20 minutes and at the most 60 minutes.

(6) The following applies to colloquia in detail: They shall last for a minimum of 30 to a maximum of 60 minutes.

(7) The examiner specifies the duration of the exam and, if applicable, other modalities of the exam at the start of the course.

(8) Admission to module examinations may be conditional on the successful completion of module components as examination requirements in accordance with § 7 (15) GER. For the relevant modules, this is outlined in the module handbook. At the start of the semester, or by the the first session of the course, the instructor shall provide the students with precise criteria online in the CMS regarding opportunities to improve their grades by completing module components, specifically indicating the number and type of tutorials that can be taken for extra credit and the methods of correction and assessment.

§ 8
Assessment and Grading

(1) General regulations for assessing exams and the formation of grades are stipulated in § 10 GER.

(2) If an exam consists of several partial assessments, each assessment must be passed, i.e. be completed with the grade of at least "sufficient" (4.0).

(3) A module has been passed if all associated exams have been passed with a grade of at least "sufficient" (4.0), and all other credit points or module components have been achieved according to the relevant course of study-specific examination regulations.

(4) The overall grade is formed from the grades of the module and the grade of the Master's thesis in accordance with § 10 (10) GER. The grades for the Master's thesis and Master's final colloquium are weighted with twice the value of their credit points.

§ 9
Examination Board

The responsible examination board according to § 11 GER is the Examination Board for Physics at the Faculty of Mathematics, Computer Science and Natural Sciences.

§ 10
Retaking Exams or Rewriting the Master's Thesis, and the Loss of the Right to Take an Exam

(1) General regulations governing retaking exams or rewriting the Master's thesis, and the loss of the right to take exams are stipulated in § 14 GER.

(2) Modules that can be freely selected within a specialization of this Master's program can be substituted, provided this is permitted according to the module handbook. It is not possible to substitute mandatory modules.

§ 11
Deregistration, Non-Attendance, Withdrawal, Deception, Non-Compliance

(1) General provisions on deregistration, non-attendance, withdrawal, deception, or non-compliance are stipulated in § 15 GER.

(2) The following applies to deregistering from seminars and lab courses: Deregistration from block courses is possible until one day before the first day of the course.

II. Master's Examination and Master's Thesis

§ 12
Type and Scope of the Master's Examination

(1) The Master's examination consists of

1. exams that are to be completed based on the structure of the course of study according to § 4 (2) and detailed in the module handbook, as well as

2. the Master's thesis and the Master's final colloquium.

(2) The order in which students shall take the courses is based on the curriculum (Appendix 1). The Master's thesis can only be registered when both this and the Master's practical have been passed.

§ 13
Master's Thesis

(1) General provisions for the Master's thesis are stipulated in § 17 GER.

(2) Further details regarding the supervision of the Master's thesis are outlined in § 17 (2) GER.

(3) The thesis can usually be written in German or English, in agreement with the examiner in question.

(4) The Master's thesis writing time is usually six months at maximum alongside studies. In justified exceptional cases, the writing time can be extended by a maximum of up to six weeks upon application to the relevant examination board in accordance with § 17 (7) GER. The written work should not exceed 80 pages, excluding appendices.

(5) The candidate presents the results of their Master's thesis in a Master's final colloquium – § 7 (12) GER in connection with § 7 (6) apply accordingly. The Master's final colloquium may be held before the Master's thesis is submitted.

(6) The work required for preparing and writing the Master's thesis as well as for the colloquium shall correspond to 30 credit points.

§ 14
Acceptance and Assessment of the Master's Thesis

(1) General provisions on the acceptance and assessment of the Master's thesis are stipulated in § 18 GER.

(2) Three printed and bound copies of the Master's thesis are to be submitted to the Central Examination Office by the set deadline.

III. Final Provisions

§ 15
Viewing of Examination Records

The reviewing of exam documents is carried out in accordance with § 22 GER.

§ 16
Entry into Force, Publication, and Transitional Provisions

(1) These regulations shall be published in the official announcements (“Amtliche Bekanntmachungen”) of RWTH Aachen University and will enter into force on the day after publication.

(2) These regulations apply to all students who are enrolled in the Physics Master’s course of study at RWTH.

(3) Students who started their studies in this Master's degree program before the 2016/2017 winter semester and passed all module exams within the standard period of study, may submit an application to the responsible examination board for deletion of the worst of the weighted module grades from the modules that are, per curriculum, assigned to their first year of study.

(4) Module components passed before the 2015/2016 winter semester are accepted for all exam attempts offered for a course.

Issued based on the resolutions of the Faculty Council of the Faculty of Mathematics, Computer Science and Natural Sciences from May 13, 2020, February 3, 2021 and February 8, 2023, as well as the emergency resolution of the Dean of the Faculty of Mathematics, Computer Science and Natural Sciences from June 3, 2020.

It is pointed out that, in accordance with § 12 (5) NRW HG, any claims regarding a violation of procedural or formal requirements of the regulatory or other autonomous rights of the University may no longer be asserted after one year has elapsed since the official publication of this announcement unless:

1) the announcement has not been properly published,
2) the Rectorate has objected, prior to publication, to the decision of the committee adopting the regulations,
3) the University has been previously notified about the defect of form or of procedure in a complaint, specifying the infringed legal provision and the fact which gives rise to the defect, or
4) the legal consequence of the exclusion of complaints was not pointed out in the public announcement.

Rector
of RWTH
Aachen University

Aachen, dated March 6, 2023

sgd. Rüdiger

Univ.-Prof. Dr. rer. nat. Dr. h. c. mult. Rüdiger

Appendix 1: Curriculum

Curriculum – Physics M.Sc.			**Particle Physics**			**Condensed Matter Physics**			
			Experimental Particle Physics	**Astroparticle Physics and Cosmology**	**Quantum Field Theory and Gauge Theories**	**Experimental Condensed Matter Physics**	**Nanoelectronics**	**Quantum Technology**	**Condensed Matter Theory**
	Class hours	**Credits**							
1st Semester									
Particle Physics I	V4 Ü2	10	10	10					
Quantum Field Theory of Particle Physics I	V4 Ü2	10			10				
Theory of Relativity and Cosmology	V4 Ü2	10		10	10				
Condensed Matter Physics I	V4 Ü2	10				10	10	10	
Theoretical Solid State Physics	V4 Ü2	10							10
Quantum Theory of Condensed Matter I	V4 Ü2	10							10
Novel Materials and Devices for Information Technology 1	V2 Ü1	5					5		
Hardware Platforms for Quantum Technology	V2 Ü1	5						5	
Elective Courses (from courses above or specialization or subsidiary courses)			20	10	10	20	15	15	10
			30	**30**	**30**	**30**	**30**	**30**	**30**
2nd Semester									
Particle Physics II	V4 Ü2	10	10						
Quantum Field Theory of Particle Physics II	V4 Ü2	10			10				
Astroparticle Physics	V4 Ü2	10		10					
Laboratory Course Particle Physics	V1 P8	10	10						
Condensed Matter Physics II	V4 Ü2	10				10			
Laboratory Course Solid State Physics	V2 P8	10				10			
Laboratory Course Nanoelectronics	V2 P8	10					10		
Laboratory Course Quantum Technology	V1 P4	5						5	
Quantum Theory of Condensed Matter II	V4 Ü2	10							10
Computational Physics	V4 Ü2	10							
Quantum Information	V4 Ü2	10						10	
Statistical Physics	V4 Ü2	10							
Novel Materials and Devices for Information Technology 2	V2 Ü1	5					5		
Elective Courses (from courses above or specialization or subsidiary courses)			10	20	20	10	15	15	20
			30	**30**	**30**	**30**	**30**	**30**	**30**
3rd Semester									
Master's Seminar		15	15	15	15	15	15	15	15
Master's Practical		15	15	15	15	15	15	15	15
			30	**30**	**30**	**30**	**30**	**30**	**30**
4th Semester									
Master's Thesis		25	25	25	25	25	25	25	25
Master's Defense Colloquium		5	5	5	5	5	5	5	5
			30	**30**	**30**	**30**	**30**	**30**	**30**
Total			**120**	**120**	**120**	**120**	**120**	**120**	**120**

Annotations: V (Vorlesung) = Lecture, Ü (Übung) = Tutorial, S (Seminar), P (Praktikum) = Lab Course

Appendix 2: Objectives of the Course of Study

The Master's degree program in physics provides students with in-depth technical knowledge as well as skills and methods in the field of physics. It is intended to lead students to a high level of scientific qualification and independence as well as to enable them to critically classify scientific findings and to act responsibly. It provides intensive, in-depth training in a subfield of physics. A minor subject allows students to gain insight into neighboring sciences or applications of physics in engineering or medicine.