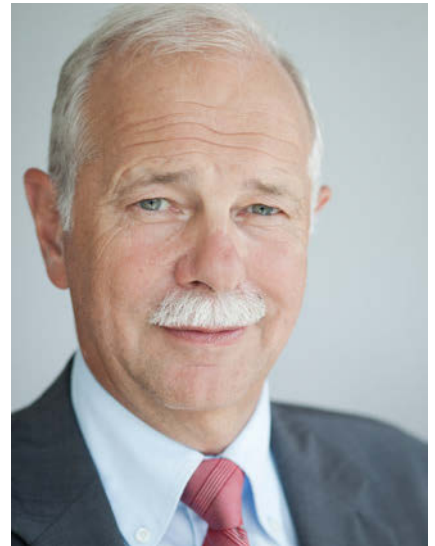


Guidelines

for the completion of PhD projects
within the Helmholtz Association

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DEAR READERS,



Prof. Dr. Jürgen Mlynek,
President of Helmholtz Association

As Germany's largest scientific organisation, the Helmholtz Association is committed to providing answers and solutions to the greatest challenges of the 21st century – the urgent issues faced by science, society and industry. The outstanding work, commitment and creativity of PhD students play a major role in the pursuit of this mission. These individuals are also the top scientists and senior managers of tomorrow.

Accordingly, the Helmholtz Association has placed the promotion of PhD students at the centre of a comprehensive talent management concept. Our aim is to identify talented junior researchers early on and provide them with the conditions they need in order to flourish. The time during and immediately after a PhD programme is of decisive importance to a researcher's future career. Alongside the universities, the Helmholtz Centres have a responsibility to provide PhD students with the best possible preparation during this period and to present them with a wide range of career options both within and beyond the scientific community. In this respect we are especially committed to encouraging women to pursue senior roles.

At the same time, the Helmholtz Centres and the universities have a responsibility towards society and the scientific community to comply with quality standards in PhD programmes, and to establish and maintain a culture of good scientific practice.

The creation of 34 Helmholtz Research Schools and Helmholtz Graduate Schools has led to a significant contribution to the establishment of quality standards in PhD programmes in recent years. In addition, the Helmholtz Centres and the President have agreed on common PhD guidelines. These guidelines define minimum standards for the creation of optimal conditions for PhD students to operate in. They contribute towards a common understanding of quality, and establish and promote a culture in which responsibility is taken at every level for the development of talented junior researchers.

As a result, the Helmholtz Association offers outstanding conditions for PhD students: exciting research topics of great social relevance and exceptional research infrastructure on the one hand, and first-class supervision and comprehensive talent management, complete with tailored training programmes, on the other.

I warmly invite you to discover our quality standards and all that we have to offer PhD students, and to become a part of our talent management culture.

A handwritten signature in blue ink, reading 'Jürgen Mlynek'. The signature is fluid and cursive, with the first name 'Jürgen' and the last name 'Mlynek' clearly distinguishable.

Jürgen Mlynek



DOCTORAL TRAINING IN THE HELMHOLTZ ASSOCIATION

The Helmholtz Association: Shaping the future with sustainable research

The Helmholtz Association is Germany's largest scientific research organisation. A total of 36,000 staff work in its 18 scientific-technical and biological-medical research centres. The Association's annual budget amounts to more than €3.8 billion.

The Helmholtz Association performs cutting-edge research which contributes substantially to solving the grand challenges of science, society and industry. Scientists at Helmholtz concentrate on researching the highly-complex systems which determine human life and the environment. For example, ensuring that society remains mobile and has a reliable energy supply that future generations find an intact environment or that treatments are found for previously incurable diseases. The activities of the Helmholtz Association focus on securing the foundations of human life long-term and on creating the technological basis for a competitive economy.

To succeed in meeting these responsibilities, the Helmholtz Association concentrates its work in six research fields: Energy, Earth and Environment, Health, Aeronautics, Space and Transport, Key Technologies plus Matter. Within the six research fields, Helmholtz scientists cooperate with each other and with external partners - working across disciplinary, organisational and national borders. Indeed, the name Helmholtz stands for concerted research in which networks form the key principle behind inquiring thought and action. Concerted research is efficient and flexible. Helmholtz uses

this research to create an effective basis for shaping the future.

Helmholtz Association researchers and technology transfer officers work with great dedication and success to translate research findings into practical applications. In doing so, they are making the Helmholtz Association's mission a reality by ensuring that the research at Helmholtz Centres is used for the benefit of business and society.

The Helmholtz Association's existing large-scale complex research infrastructure has served to create outstanding research conditions and guarantees the excellent quality of its research. The Helmholtz Association is the only German research institution for which the development, operation and management of research infrastructure on this scale is an integral part of its mission. These facilities are also available to teams at university and non-university institutions both in Germany and abroad, and serve as fulcrums for major international collaboration and networks.

Further information: www.helmholtz.de



Independent research and individual support

An interesting PhD that addresses relevant research topics can serve as a springboard for an academic career and open the door to senior positions outside the world of research. The approximately 6,500 PhD students who are educated at the Centres in cooperation with the universities are therefore a major target group of the Helmholtz Association's talent management activities.

To this end, the Helmholtz Association has set up 34 Research Schools and Graduate Schools in its Centres. These schools offer structured PhD training, which provides the early-stage researchers with excellent supervision, stable working conditions and an educational programme tailored to their individual needs. The PhD students enjoy exceptional working conditions. In addition to access to the Association's unique infrastructure, they have the opportunity to join renowned research teams and international networks.

Helmholtz Research Schools

Helmholtz Research Schools are small units focused on specific research topics. Each one brings together up to 25 outstanding young doctoral students. This gives them virtual opportunity to experience the close collaboration of a research team without which top-level research is no longer possible today.

Helmholtz Graduate Schools

Helmholtz Graduate Schools provide an umbrella structure for graduate students from different faculties. The students work

in research teams, attend seminars and lectures, and do internships. Furthermore, they receive interdisciplinary training, which covers topics far beyond their PhD field.

Professional Skills-Training for PhD students

The Helmholtz Association works with distinguished partners such as the University of Surrey, enabling it to provide a programme that includes a range of courses that aim to foster professional qualification and personal development. The programme offers specific courses for each stage of the PhD project. It is open to PhD students from all Helmholtz Centres, thus providing a platform for interdisciplinary exchange and networking.

In addition, in cooperation with their university partners all Helmholtz Centres offer further programmes and talent management tools in order to equip graduates for their future careers.

Further information: www.helmholtz.de/phd



GUIDELINES FOR THE COMPLETION OF PHD PROJECTS WITHIN THE HELMHOLTZ ASSOCIATION

PhD students make a significant contribution to the research efforts of the Helmholtz Association, and at the same time have the potential to become the senior managers of tomorrow. The Helmholtz Association offers its PhD students a wide range of training and development opportunities and equips them as fully as possible for their future career. With these Helmholtz PhD guidelines, the members of the Helmholtz Association have agreed on common standards for the completion of PhD projects. The purpose of the guidelines is to facilitate quality assurance, provide guidance to PhD students and supervisors, and promote a culture of responsible talent management.

- The Helmholtz Association endorses the objectives of the Charta der Vielfalt (Diversity Charter¹), and values and fosters the skills and talents of all PhD students accordingly. The selection, supervision and assessment of PhD students takes place without discrimination on the basis of gender, nationality, ethnic origin, religion or world view, physical ability, age, sexual orientation, or identity².
- The Helmholtz Association advocates PhD students being in paid positions subject to social security contributions, but the awarding of stipends should remain possible. In the interests of career planning, the contract period should match the expected duration of the PhD. In consultation with the supervisory committee, funding is to be sought for the period until the submission of the dissertation to the university.
- Helmholtz Centres and universities work together, pooling their competencies to provide PhD students with the best possible support. In this regard, the Helmholtz Association is committed to the contents of the white paper published by the German Rectors' Conference (HRK) and the Helmholtz Association in 2004 on the joint support of young researchers. The PhD process takes place at the universities in accordance with the respective PhD regulations.

¹ www.charta-der-vielfalt.de.

² Cf. *ibid.*



I. STATUS OF PHD STUDENTS AND GOALS OF THE PHD PROCESS

During their PhD, PhD students conduct autonomous research under supervision. As up-and-coming researchers within the Helmholtz Association, they are given appropriate support and encouragement and are welcomed into the community.

- The PhD students to whom these guidelines apply have been admitted to a PhD programme at a university, and are generally supervised by a university teacher jointly appointed by the university and a Helmholtz Centre. If this person is not employed at a Helmholtz Centre, the PhD student will also receive supervision from at least one Helmholtz researcher who holds a doctorate. This is not affected by the type of PhD (e.g. individual PhD or within a PhD programme) or funding (e.g. employment contract or stipend).
- Central to the PhD is an independent investigation of a research topic, however PhD students receive feedback from their supervisors on a regular basis. They are to be regarded as junior researchers undergoing preparation for their future careers through the process of completing a PhD.³
- Over the course of the PhD project, students mature into competent and critically minded researchers with an excellent grasp of their field of research and an established network within it. In most cases, they have published some or all of their research in peer-reviewed journals and discussed it in the relevant expert circles. Furthermore, they have a clear notion of the career direction they intend

to pursue, and are prepared to carry out activities involving medium-term responsibilities both within and beyond the scientific community.⁴

They are in a position to:

- Thoroughly examine and question complex issues.
- Understand, apply and develop theories and methods.
- Identify and carry out independent work on relevant research topics.
- Find their bearings in an international environment and build networks.

³ Cf. "First Stage Researchers", European Commission (2011): Towards a European Framework for Research Careers.

⁴ Cf. ibid. sowie LERU (2010): Doctoral degrees beyond 2010: Training talented researchers for society.



II. COMPLETION OF THE PHD PROJECT

A. PhD student-supervisor relationship

PhD students and supervisors are jointly responsible for the PhD project. Supervision is generally administered by a PhD committee or a comparable body.

- PhD students bear the primary responsibility for the completion of their PhD project and for their own academic and personal development. They conduct their research in an autonomous fashion, actively taking responsibility for its progress. Specifically, this means the following:
 - PhD students must inform themselves of their rights and responsibilities, and of the applicable PhD regulations at the relevant university.
 - PhD students must comply with the principles of good scientific practice.
 - PhD students must undertake to report to the PhD committee regularly on the concrete progress of their PhD project, taking into account the agreed schedule of work, which may be adjusted as necessary.
 - PhD students must inform the PhD committee or other appropriate body of any potential difficulties in good time, and cooperate in the search for solutions to any conflict situations.
 - PhD students must endeavour to become an active part of their working group and daily life at the Centre. They should also network within the scientific community, thereby boosting their independence.
- PhD students must keep their own career development in mind, and make use of appropriate offers and advice. The PhD committee and PhD student will discuss possible career goals for after completion of the PhD at an early stage.
- Supervisors share responsibility for the structured oversight of the PhD project and the academic and personal development of PhD students. They must possess the necessary competencies and sufficient time resources for this task. They regularly undergo further training, and keep an open mind regarding their role as supervisors.
 - Besides providing academic supervision, it is the task of supervisors to foster PhD students' independence, to give them freedom in their work, and to motivate them. Specifically, supervisors introduce PhD students to the scientific community and help them to establish their own network and cooperation partnerships; motivate them to take part in conferences and support them in the creation of contributions to this end; assist them with publication procedures; facilitate teaching and supervision experience; and make them aware of a variety of career options.
 - Supervisors serve as role models for PhD students. Accordingly, they must act in accordance with the principles of good scientific practice and hold the PhD students accountable to doing the same. Supervisors should also encourage PhD students to reflect on the scientific and ethical ramifications of their activities, and motivate them to scrutinise the subject of their research from a societal perspective.



- Supervision in the Helmholtz Centre is generally administered by three scientists holding a doctoral degree, who together comprise a PhD committee or a comparable body. Primary responsibility is held by one member of the committee (primary supervisor), with the other supervisors exercising an advisory and supporting role. At least one of the supervisors should be affiliated with a university and should have the authority to award doctoral degrees.
- At the start of the PhD, a PhD agreement is entered into between the student and supervisors. This agreement clearly sets out the responsibilities of all parties involved in the PhD process. The PhD agreement serves to provide guidance and enable quality assurance. As a minimum, it must contain the following elements: Names of the involved parties; topic and object of research; objectives; start date; approximate schedule; dates for supervision meetings; commitment to good scientific practice (e.g. pursuant to DFG standards⁵); and a reference to the applicable PhD regulations. In order to take into account the dynamic nature of scientific research, the schedule may be adjusted on an ongoing basis. PhD students and supervisors are responsible for ensuring that the application for admission to pursue a doctoral degree at the university faculties or divisions and registration at the Helmholtz Centres are effected as soon as the PhD agreement has been entered into (cf. p. 13). The Helmholtz Centre PhD agreement is to be reconciled with the PhD agreement required by the university, if applicable.
- It is advisable to create a tailored training plan that sets out the specialised and interdisciplinary learning objectives of the PhD student.⁶ To this end, supervisors and students may request support from the personnel department, the central graduate office, or the career guidance office (cf. also Section b). The training plan should be reviewed on a regular basis and adjusted as necessary.
- The PhD project and conditions should be designed to enable the PhD to generally be completed in three to four years. Ongoing and intensive oversight by the supervisors is important to ensure that this time frame is met. Meetings with the PhD committee should take place on at least a yearly basis. In addition, PhD students should have the opportunity, at least twice during the course of the PhD, to present the state of their research to a specialist audience, e.g. in colloquiums or at conferences. Any extensions of the deadline for completion of the PhD project must be anticipated in a timely manner, in consultation with the PhD committee to allow a new completion schedule to be jointly developed. In line with this completion schedule, funding is to be sought for the period until the submission deadline.

⁵ Cf. http://www.dfg.de/foerderung/grundlagen_rahmenbedingungen/gwp/.

⁶ Cf. in this regard e.g. European Science Foundation (2012): A pan-European Professional Development Framework for Researchers, and European Science Foundation (2012): Developing Research Careers in and Beyond Europe.



B. Personal and career development

Tailored support for personal and career development prepares PhD students to take on responsibilities within and beyond the scientific community.

- The core component of the academic training during the PhD is specialised further education, which can take different forms depending on the area of study. The acquisition of interdisciplinary competencies is also fostered. The Helmholtz Centres offer PhD students a diverse range of training opportunities, e.g. by way of the graduate programmes offered by the Helmholtz Research Schools and Helmholtz Graduate Schools, and by their partner universities. Supervisors actively support participation in these programmes. To ensure compatibility in terms of content and time requirements between the courses attended and the research project, PhD students should draw up a training plan in conjunction with their supervisors (see above). Participation in training courses must be documented and summarised after completion of the PhD, e.g. in the form of a certificate. Such certificates will enhance PhD graduates' career prospects and ensure international comparability of the degrees obtained.
- It is the responsibility of the Centres and supervisors to assist PhD students in developing their career prospects. Where possible, doctoral candidates should be given insight into a variety of work contexts, e.g. by means of placements and cooperation agreements. They may request career advice and, where necessary, mentoring programmes from the Centres at any time. To ensure responsible talent management, PhD students are to be supported in planning their career after completion of the PhD programme.
- Provided they are deemed appropriate in the setting of the specific research project, mobility periods are encouraged. This mobility may take place, and should be encouraged, on various levels: international (e.g. in the form of time spent abroad or co-tutoring schemes); intersectoral (e.g. in the form of industry placements); interdisciplinary (e.g. in the form of collaboration with scientists from other fields); and virtual (e.g. in the form of cooperation arrangements and networks).



III. FRAMEWORK CONDITIONS FOR THE PHD PROJECT

Optimal framework conditions for the PhD are secured through structured application and selection procedures, fixed contact persons for administrative matters, centre-wide graduate offices, schemes for balancing work and family life, support for foreign PhD students, and clearly defined conflict resolution procedures.

- PhD programmes of the Helmholtz Centres offer a structured application and selection procedure with clearly defined requirement profiles, established formal procedures, centre-specific uniform assessment criteria, and fixed contact persons. The relevant information can be found on the website of each Centre. During the selection process, applicants' personal profiles and full range of experience are taken into account. In addition to academic qualifications, which constitute the primary criterion, assessment takes into account competencies such as teaching and supervision experience (e.g. of Master and Bachelor students), team spirit, and involvement in student bodies or outreach activities.⁷
- The Helmholtz Centres provide PhD students with the necessary infrastructure for the completion of their PhD project, which may include securing test slots at large devices and opportunities to collect samples.
- Each Helmholtz Centre has graduate offices or fixed contact persons within the administrative structure able to provide PhD students with advice on the organisation of their PhD project and information about training opportunities.
- During their project, PhD students receive support in the form of flexible working hours and childcare facilities. For students taking parental leave, the Helmholtz Association strongly advocates extending the funding period to compensate for the period in which they are absent.
- PhD students from abroad sometimes face major challenges as a result of cultural and language barriers, which can affect the progress of their PhD project and their integration. To address these difficulties, the Centres offer advice and training schemes and networking opportunities. The Centres and supervisors are responsible for informing students of these opportunities. They must ensure that all information necessary for PhD projects is available at least in English, or that appropriate translation aids are made available.
- For matters involving inventions, patent protection and business ideas, the technology transfer offices of the Helmholtz Centres serve as confidential contact points for PhD students. PhD students and their supervisors have a responsibility to inform the technology transfer offices of inventions or research results that may require initiation of patent procedures before their publication.

⁷ In this regard, the Helmholtz Association observes recommendations such as those of the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers (European Commission 2005).



- The Helmholtz Centres actively encourage the formation of PhD student bodies such as the Helmholtz Juniors⁸ and other networking activities among PhD students. They should ensure that PhD students have a say in decisions affecting the support of PhD students.
- The Helmholtz Centres value excellence in the supervision and support of junior researchers, and encourage supervisors to undertake ongoing training and to share experiences among themselves.
- In the event of conflict situations, the Helmholtz Centres offer fixed contact persons and clearly defined procedures that are known to all parties involved in the PhD project.

⁸ www.helmholtz.de/juniors.



IV. QUALITY ASSURANCE AND FURTHER DEVELOPMENT

The Helmholtz Association aims to be a learning organisation that frequently questions its strategic orientation and strives towards constant further development.

- All PhD projects undertaken and supervised in the Centres of the Helmholtz Association are documented from the outset. The resulting statistical data are used in the Centres' reporting and form the basis for the Association's quality assurance procedures and strategic orientation.⁹
 - The Helmholtz Association has implemented a range of instruments for quality assurance in the support of PhD students. Central to these are assessments pursuant to programme-oriented funding and interim evaluations of the Helmholtz Graduate and Research Schools. In addition, the Helmholtz Centres are advised to systematically integrate support for PhD students into their quality assurance systems.
 - The Helmholtz Association strongly recommends that the quality standards established by the Helmholtz Research Schools and Graduate Schools be assured and, where possible, that the structures be continued following expiry of the start-up funding.
 - The Helmholtz Association welcomes the introduction of a code of conduct for supervisors, the creation of career tracking systems, and the execution of follow-up surveys by individual centres as logical quality assurance measures.
- The Helmholtz Association endeavours to liaise closely with other national and international bodies concerned with fostering PhD students with a view to sharing examples of good practice and initiating cooperation arrangements. Besides working with universities, cooperation with industry is of particular importance in this regard, in order to open up career prospects for PhD students.
 - After five years, an expert group interviews the Helmholtz Centres with regard to their experiences of the PhD Guidelines in order to discuss whether its contents are still appropriate.

⁹ The data are recorded by the competent administrative unit and include, e.g.: personal information; PhD start date; working title; academic supervisor's name and institutional affiliation; thesis supervisor's name and institutional affiliation; thesis supervisor's written approval for the acceptance of the candidate into the program; type of funding (stipend, employment contract, etc.); and contract period. In addition, supervisors must submit a final report containing the following information: submission date of thesis; date of examination; grade; if applicable, employment after completion of thesis; and new address. The administration must also be informed if a PhD is ended before completion. PhD students and supervisors are jointly responsible for compiling the data. They must ensure that the data are submitted to the relevant administrative unit (cf. p. 9) immediately after conclusion of the PhD agreement and completion of the PhD. The PhD student must consent to the recording, use and processing of the above data in the PhD agreement or in another suitable manner.

MEMBER CENTRES OF THE HELMHOLTZ ASSOCIATION

ALFRED WEGENER INSTITUTE HELMHOLTZ CENTRE FOR POLAR AND MARINE RESEARCH

Am Handelshafen 12 27570 Bremerhaven
Telefon 0471 4831-0
E-Mail info@awi.de, www.awi.de

DEUTSCHES ELEKTRONEN-SYNCHROTRON

Notkestraße 85 22607 I Hamburg
Telefon 040 8998-0
E-Mail desyinfo@desy.de, www.desy.de

GERMAN CANCER RESEARCH CENTRE

Im Neuenheimer Feld 280 I 69120 Heidelberg
Telefon 06221 42-0
E-Mail presse@dkfz.de, www.dkfz.de

GERMAN AEROSPACE CENTER (DLR)

Linder Höhe I 51147 Köln
Telefon 02203 601-0
E-Mail kommunikation@dlr.de, www.dlr.de

GERMAN CENTER FOR NEURODEGENERATIVE DISEASES (DZNE)

Sigmund-Freud-Str. 25 I 53127 Bonn
Telefon 0 228-43302-0
E-Mail information@dzne.de, www.dzne.de

FORSCHUNGSZENTRUM JÜLICH

Wilhelm-Johnen-Straße I 52428 Jülich
Telefon 02461 61-0,
E-Mail info@fz-juelich.de, www.fz-juelich.de

GEOMAR HELMHOLTZ CENTRE FOR OCEAN RESEARCH KIEL

Wischhofstr. 1-3 I 24148 Kiel
Telefon 0431 600-0
E-Mail info@geomar.de
www.geomar.de

GSF HELMHOLTZ CENTRE FOR HEAVY ION RESEARCH

Planckstraße 1 I 64291 Darmstadt
Telefon 06159 71-0,
E-Mail info@gsi.de, www.gsi.de

HELMHOLTZ-ZENTRUM BERLIN FÜR MATERIALIEN UND ENERGIE

Glienicker Straße 100 I 14109 Berlin
Telefon 030 8062-0
E-Mail info@helmholtz-berlin.de
www.helmholtz-berlin.de

HELMHOLTZ-ZENTRUM DRESDEN-ROSSENDORF

Bautzner Landstraße 400 I 01314 Dresden
Telefon 0351 260-0
E-Mail kontakt@hzdr.de, www.hzdr.de

HELMHOLTZ CENTRE FOR INFECTION RESEARCH

Inhoffenstraße 7 I 38124 Braunschweig
Telefon 0531 6181-0
E-Mail info@helmholtz-hzi.de
www.helmholtz-hzi.de

HELMHOLTZ CENTRE FOR ENVIRONMENTAL RESEARCH - UFZ

Permoserstraße 15 I 04318 Leipzig
Telefon 0341 235-0
E-Mail info@ufz.de, www.ufz.de

HELMHOLTZ-ZENTRUM GEESTHACHT CENTRE FOR MATERIALS AND COASTAL RESEARCH

Max-Planck-Straße 1 I 21502 Geesthacht
Telefon 04152 87-0
E-Mail presse@hzg.de, www.hzg.de

HELMHOLTZ ZENTRUM MÜNCHEN - GERMAN RESEARCH CENTER FOR ENVIRONMENTAL HEALTH

Ingolstädter Landstraße 1 I 85764 Neuherberg
Telefon 089 3187-0
E-Mail presse@helmholtz-muenchen.de,
www.helmholtz-muenchen.de

HELMHOLTZ CENTRE POTSDAM - GFZ GERMAN RESEARCH CENTRE FOR GEOSCIENCES

Telegrafenberg I 14473 Potsdam
Telefon 0331 288-0
E-Mail info@hmi.de, www.hmi.de

KARLSRUHE INSTITUTE OF TECHNOLOGY (KIT)

Kaiserstraße 12 I 76131 Karlsruhe
Campus Nord:
Hermann-von-Helmholtz-Platz 1
76344 Eggenstein-Leopoldshafen
Telefon 07247 82-0
E-Mail info@kit.edu, www.kit.edu

MAX DELBRÜCK CENTER FOR MOLECULAR MEDICINE (MDC) BERLIN-BUCH

Robert-Rössle-Straße 10 I 13125 Berlin
Telefon 030 9406-0
E-Mail presse@mdc-berlin.de,
www.mdc-berlin.de

MAX PLANCK INSTITUTE FOR PLASMA PHYSICS

Boltzmannstraße 2 I 85748 Garching
Telefon 089 3299-01
E-Mail info@ipp.mpg.de, www.ipp.mpg.de

MISSION OF THE HELMHOLTZ ASSOCIATION

We contribute to solving grand challenges which face society, science and industry by performing top-rate research in strategic programmes in the fields of Aeronautics, Space and Transport, Earth and Environment, Energy, Health, Key Technologies as well as Matter.

We research systems of great complexity with our large-scale facilities and scientific infrastructure, cooperating closely with national and international partners.

The guidelines for the completion of PhD projects within the Helmholtz Association have been prepared by a working group chaired by Prof. Dirk Heinz and coordinated by Nina Löchte. The Helmholtz Association would like to thank the members of the working group for their commitment.

We contribute to shaping our future by combining research and technology development with perspectives for innovative applications and provisions for tomorrow's world.

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Helmholtz Association
Ahrstraße 45, 53175 Bonn
Telephone 0228-30818-0,
Telefax 0228-30818-40

Contact

Nina Löchte
Promotion of young and early-stage researchers,
International Networking
Helmholtz Association
Berlin Office
Anna-Louisa-Karsch-Straße 2, 10178 Berlin
Telephone 030 206329-16,
Telefax 030 206329-70
E-Mail nina.loechte@helmholtz.de

Communications and Media Relations

Berlin Office
Anna-Louisa-Karsch-Straße 2, 10178 Berlin
Telephone 030-206329-57,
Telefax 030-206329-60
E-Mail info@helmholtz.de,
www.helmholtz.de

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