Research
in Germany

MATHEMATICS

$$\left(\partial_t + \mathbf{v}\cdot\nabla_{\mathbf{x}}\right)f(\mathbf{v},\mathbf{x},t) = \sum_{c\in[\phi]}\sum_{[\phi]\in G/\sim_H}\alpha_{c,v}^{\phi}\left(\prod_{\phi\in[\phi]}f\left(c + \phi'(\mathbf{v})\right)\right)$$

Research in
Germany
Land of Ideas

Research
in Germany

MATHEMATICS

PREFACE

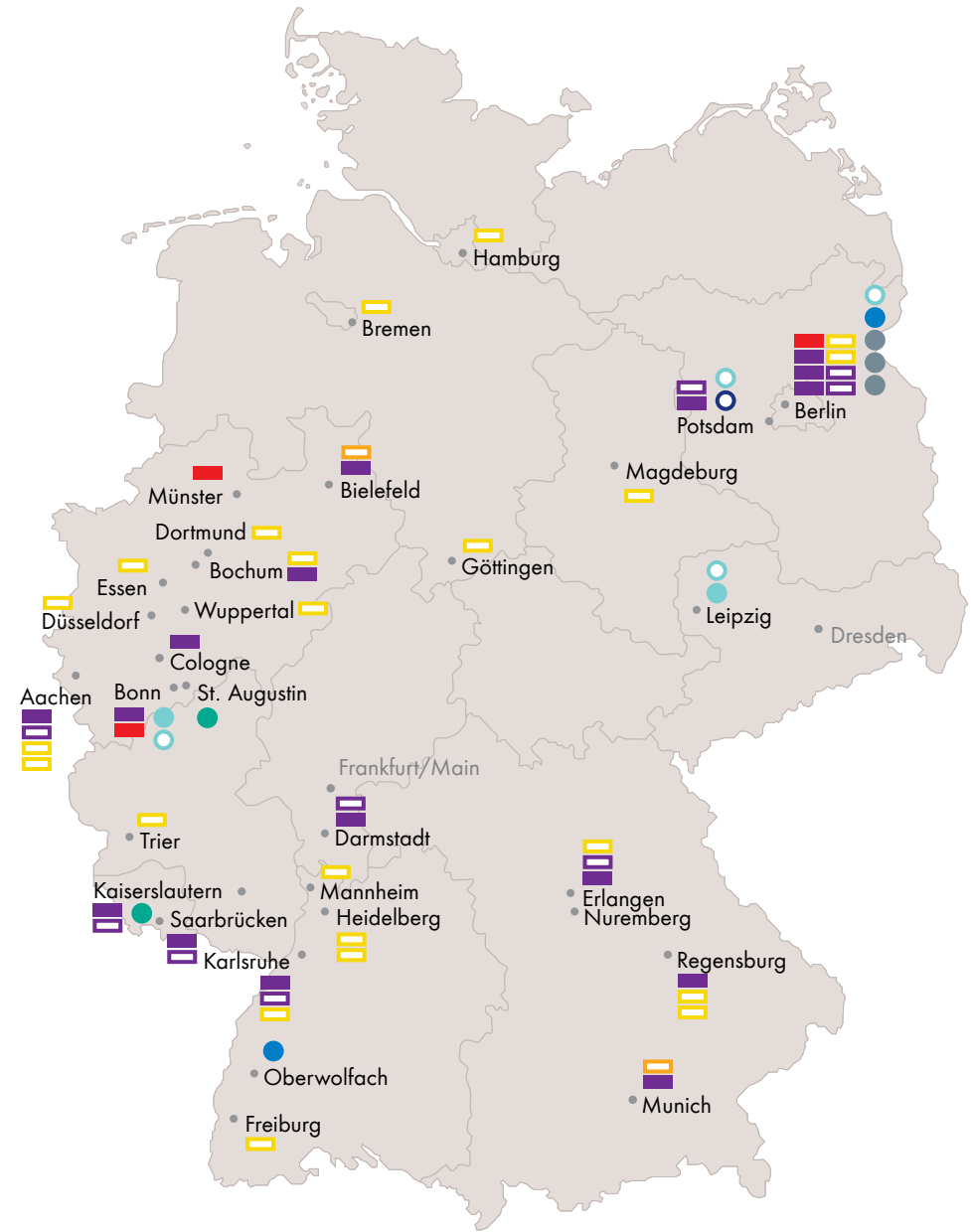This brochure provides a first insight into research in Germany in the field of mathematics.

Mathematical research in Germany is primarily conducted at universities but also at non-university research institutions. Almost all universities and many universities of applied sciences host a mathematical research section with smaller or larger working groups. Most mathematics departments refer to mathematics in a broad sense and cover a wide range of mathematical subdisciplines. Many departments have nowadays developed a more focused research profile concentrating in priority areas of mathematical research.

This brochure is intended to give an initial overview. The following map and tables highlight research consortia and graduate training programmes at universities and non-university research institutes with a main focus on mathematics.

On top of this, there is a lot more to discover: e.g. the DFG funds a multitude of individual or joint projects in the area of mathematics through individual grants. Towards the end of this brochure, you will find a link to the online database GEPRIS that provides an overview of all DFG funded research projects. You will also find additional important links for further information about programmes in the field of mathematics and profiles of German universities and research institutions.

We invite you to explore the many opportunities that Germany has to offer and welcome your feedback.

Legend

- ▭ (yellow) Research Training Groups
- ▭ (yellow/orange) International Research Training Groups
- ▭ (purple outline) Integrated Research Training Groups in Collaborative Research Centres/Transregios
- ■ (red) Clusters of Excellence
- ■ (purple) Collaborative Research Centres/Transregios
- ◯ (dark blue) Helmholtz Graduate Schools
- ◯ (cyan) International Max Planck Research Schools
- ● (green) Fraunhofer Institutes
- ● (blue) Leibniz Institutes
- ● (light blue) Max Planck Institutes
- ● (grey) Others

DFG funded Priority Programmes and Research Units are not shown on the map since they are not necessarily located at a single location; they are listed on pages 13 and 15.

Map labels: Hamburg, Bremen, Berlin, Potsdam, Magdeburg, Münster, Bielefeld, Dortmund, Bochum, Essen, Düsseldorf, Wuppertal, Göttingen, Leipzig, Dresden, Cologne, Bonn, St. Augustin, Aachen, Frankfurt/Main, Trier, Darmstadt, Kaiserslautern, Mannheim, Heidelberg, Saarbrücken, Karlsruhe, Erlangen Nuremberg, Regensburg, Oberwolfach, Freiburg, Munich

CENTRES OF RESEARCH

-FUNDED BY DFG-

Clusters of Excellence (EXC) promote cutting-edge research. They serve to strengthen the research profiles of universities or university consortia in internationally competitive fields. They create excellent training and career opportunities for early career researchers. Within the framework of the Excellence Strategy, they can receive between €3 million and €10 million annually and are funded for seven years, starting in 2019. A second seven-year period is possible.

Collaborative Research Centres (CRC) are organisational units established at universities which enable researchers to pursue an outstanding research programme crossing the boundaries of disciplines, institutes, departments and faculties. The traditional Collaborative Research Centre is generally applied for by one university and is conducted by researchers of that university. Early career support is a key objective of the Collaborative Research Centre Programme. Early career researchers may get involved in a CRC in numerous ways, for example within the framework of an Integrated Research Training Group. Collaborative Research Centres are funded for a period of up to 12 years.

Transregios (TRR) are Collaborative Research Centres in which up to three universities collaborate with each other and submit a joint application. The contributions of the cooperative partners are essential, complementary and synergetic to the joint research objective. Funding facilitates close, nationwide collaboration among the participating universities and researchers, as well as networking and shared use of resources. There is also the option of international Transregios.

Location	Institution	Title	Funded Since	Contact
CLUSTERS OF EXCELLENCE				
Berlin	Freie Universität Berlin, Humboldt-Universität zu Berlin, Technische Universität Berlin	MATH+: The Berlin Mathematics Research Center (EXC 2046)	2019	www.mathplus.de
Bonn	Rheinische Friedrich-Wilhelms-Universität Bonn	Hausdorff Center for Mathematics: Foundations, Models, Applications (EXC 2047)	2019	www.hcm.uni-bonn.de
Heidelberg	Ruprecht-Karls-Universität Heidelberg	STRUCTURES: A Unifying Approach to Emergent Phenomena in the Physical World, Mathematics, and Complex Data (EXC 2181)	2019	www.thphys.uni-heidelberg.de/~structures
Münster	Westfälische Wilhelms-Universität Münster	Mathematics Münster: Dynamics – Geometry – Structure (EXC 2044)	2019	www.uni-muenster.de/Mathematics Muenster
COLLABORATIVE RESEARCH CENTRES				
Berlin	Freie Universität Berlin	Scaling Cascades in Complex Systems (CRC 1114)	2014	www.sfb1114.de
Bielefeld	Universität Bielefeld	Taming Uncertainty and Profiting from Randonmess and Low Regularity in Analysis, Stochastics and their Applications (CRC 1283)	2017	www.sfb1283.uni-bielefeld.de
Bonn	Rheinische Friedrich-Wilhelms-Universität Bonn	The Mathematics of Emergent Effects (CRC 1060)	2012	http://sfb1060.iam.uni-bonn.de
Karlsruhe	Karlsruher Institut für Technologie	Wave Phenomena: Analysis and Numerics (CRC 1173)	2015	www.waves.kit.edu
Potsdam	Universität Potsdam	Data Assimilation – The Seamless Integration of Data and Models (CRC 1294)	2017	www.sfb1294.de
Regensburg	Universität Regensburg	Higher Invariants – Interactions between Arithmetic Geometry and Global Analysis (CRC 1085)	2013	www-app.uni-regensburg.de/Fakultaeten/MAT/sfb-higher-invariants/index.php/SFB1085

Location	Institution	Title	Funded Since	Contact
COLLABORATIVE RESEARCH CENTRES/TRANSREGIOS				
Aachen

Kaiserslau-tern

Saarbrü-cken | Rheinisch-Westfälische Technische Hochschule Aachen

Technische Universität Kaiserslautern

Universität des Saarlandes | Symbolic Tools in Mathematics and their Application (TRR 195) | 2017 | www. computeralgebra. de/sfb |
| Berlin

München

Graz (Austria)

Vienna (Austria) | Technische Universität Berlin

Technische Universität München

Technische Universität Graz

Technische Universität Wien | Discretization in Geometry and Dynamics (TRR 109) | 2012 | www.discretization.de |
| Berlin

Darmstadt

Erlangen-Nuremberg | Humboldt-Universität zu Berlin

Technische Universität Berlin

Technische Universität Darmstadt

Friedrich-Alexander-Universität Erlangen-Nürnberg | Mathematical Modelling, Simulation and Optimization. Using the Example of Gas Networks (TRR 154) | 2014 | http://trr154.fau.de |
| Bochum

Cologne | Ruhr-Universität Bochum

Universität zu Köln | Symplectic Structures in Geometry, Algebra and Dynamics (TRR 191) | 2017 | www.mi.uni-koeln. de/CRC-TRR191 |

RESEARCH UNITS
-FUNDED BY DFG-

Research Units (FOR) often contribute to establishing new research directions. Research Units are made up of a team of researchers working together on a research project which is often of an interdisciplinary nature. Research Units consist of several researchers and subprojects. The subprojects of a Research Unit are often located at several locations throughout Germany. Research Units are generally funded for up to six years.

Research Units are not shown on the map. Only the titles of the thematic focus and the project websites are listed.

Title	Funded Since	Contact
Rough Paths, Stochastic Partial Differential Equations and Related Topics (FOR 2402)	2016	www.for2402.tu-berlin.de
Symmetry, Geometry and Arithmetic (FOR 1920)	2013	www.mathi.uni-heidelberg.de/fg-sga
Structural Inference in Statistics: Adaptation and Efficiency (FOR 1735)	2012	www.mathematik.hu-berlin.de/for1735

PRIORITY PROGRAMMES

-FUNDED BY DFG-

Priority Programmes (SPP) have a programmatic focus and have the purpose of advancing knowledge in an emerging field of research through collaborative networked support.

They are characterised by their enhanced quality of research through the use of new methods and forms of collaboration in emerging fields. One programme can consist of up to 30 individual researchers and subprojects located at several institutions across Germany; it usually has one coordinating person. Priority Programmes normally receive funding for a period of six years.

Priority Programmes are not shown on the map. Only the titles of the overall themes and the project website are listed.

Title	Funded Since	Contact
Geometry at Infinity (SPP 2026)	2017	https://www.math.uni-augsburg.de/prof/diff/SPP
Non-Smooth and Complementarity-Based Distributed Parameter Systems: Simulation and Hierarchical Optimization (SPP 1962)	2016	https://spp1962.wias-berlin.de
Compressed Sensing in Information Processing (SPP 1798)	2015	www.ti.rwth-aachen.de/SPP1798
Homotopy Theory and Algebraic Geometry (SPP 1786)	2015	www.uni-due.de/~bm0032/SPP1786/Web
Reliable Simulation Techniques in Solid Mechanics. Development of Non-Standard Discretization Methods, Mechanical and Mathematical Analysis (SPP 1748)	2014	www.uni-due.de/spp1748
Software for Exascale Computing (SPP 1648)	2012	www.sppexa.de
Probabilistic Structures in Evolution (SPP 1590)	2012	www.dfg-spp1590.de

NON-UNIVERSITY RESEARCH INSTITUTIONS

Fraunhofer Society is one of the world's leading organisations for applied research with an annual research budget of 2.5 billion euros, 72 institutes and more than 26,600 employees. Fraunhofer's R&D portfolio covers a wide range of fields, including health, security, communications, transport, energy and the environment. www.fraunhofer.de

The Leibniz Association is an umbrella organisation of 93 research institutes. The annual budget amounts to 1.93 billion euros. Some 9,800 researchers – approximately 20% of them from abroad – work on a widely diverse range of subjects, including the humanities and social sciences, economics, spatial and life sciences, mathematics, natural and engineering sciences and environmental research. www.leibniz-association.eu

The Max Planck Society for the Advancement of Science is one of Germany's largest independent non-profit research organisations. The Max Planck Society has been allocated approximately 1.7 billion euros for 2018. A combined total of 15,600 researchers, postdoctoral/junior researchers and visiting researchers at 84 Max Planck Institutes conduct basic research in the natural sciences, life sciences, social sciences and humanities. One third of the researchers and more than half of the junior and visiting researchers come from abroad. www.mpg.de

Location	Institution	Contact
FRAUNHOFER INSTITUTES		
● Kaiserslautern	Fraunhofer Institute for Industrial Mathematics (ITWM)	www.itwm.fraunhofer.de
● St. Augustin	Fraunhofer Institute for Algorithms and Scientific Computing (SCAI)	www.scai.fraunhofer.de
LEIBNIZ INSTITUTES		
● Berlin	Weierstrass Institute for Applied Analysis and Stochastics Leibniz Institute in Forschungsverbund Berlin e. V. (WIAS)	www.wias-berlin.de
● Oberwol-fach	Mathematisches Forschungsinstitut Oberwolfach (MFO)	www.mfo.de
MAX-PLANCK-INSTITUTES		
● Bonn	Max Planck Institute for Mathematics (MPI-M)	www.mpim-bonn.mpg.de
● Leipzig	Max Planck Institute for Mathematics in the Sciences (MPI-MIS)	www.mis.mpg.de
OTHERS		
● Berlin	ECMath – Einstein Center for Mathematics Berlin	www.ecmath.de
● Berlin	Forschungscampus MODAL - Mathematical Optimization and Data Analysis Laboratories	www.forschungscampus-modal.de/en
● Berlin	Konrad-Zuse-Zentrum für Informationstechnik Berlin (Zuse Institute Berlin)	www.zib.de
Network of project consortia spread all over Germany	Federal Ministry of Education and Research (BMBF) Programme "Mathematics for Innovations in Industry and Services"	www.bmbf.de/de/mathematik-treiber-fuer-innovationen-3534.html (DE)

GRADUATE TRAINING

-FUNDED BY DFG-

Research Training Groups (RTG) combine an ambitious research programme at universities with comprehensive training, tailored supervision and academic freedom to form an ideal environment for a successful doctorate. Research Training Groups can also have an interdisciplinary approach. They are funded for a period of up to nine years.

International Research Training Groups (IRTG) provide opportunities for joint doctoral training programmes between German universities and universities abroad. The research and study programmes are jointly developed and supervised. Doctoral students in the programme spend six months at the partner institution.

Integrated Research Training Groups (within Collaborative Research Centres/ Transregios) offer ideal research environments for doctoral researchers. The main aim of these structured training programmes is to provide young scientists and academics with opportunities to independently carry out research at an early stage of their career. The programmes further take care to closely integrate early career researchers into an academic network. Working in Clusters of Excellence or Collaborative Research Centres projects, doctoral researchers achieve additional qualifications. As research assistants in these projects, they contribute to the Research Centre's success. They are closely involved with the projects and have access to the entire project infrastructure.

Location	Institution	Title	Funded Since	Contact
RESEARCH TRAINING GROUPS				
Aachen	Rheinisch-Westfälische Technische Hochschule Aachen	Energy, Entropy, and Dissipative Dynamics (RTG 2326)	2017	www.eddy.rwth-aachen.de
Aachen	Rheinisch-Westfälische Technische Hochschule Aachen	Experimental and Constructive Algebra (RTG 1632)	2010	www.math.rwth-aachen.de/~Graduiertenkolleg (DE)
Berlin	Freie Universität Berlin / Humboldt-Universität zu Berlin / Technische Universität Berlin	Facets of Complexity (RTG 2434)	2018	www.facetsofcomplexity.de
Berlin	Technische Universität Berlin	Differential Equation- and Data-driven Models in Life Sciences and Fluid Dynamics (DAEDALUS) (RTG 2433)	2018	https://daedalus-berlin.github.io
Bochum / Dortmund / Essen	Ruhr-Universität Bochum / Technische Universität Dortmund / Universität Duisburg-Essen	High-Dimensional Phenomena in Probability – Fluctuations and Discontinuity (RTG 2131)	2015	https://sites.google.com/site/rtg2131/
Bremen	Universität Bremen	Pi³: Parameter Identification – Analysis, Algorithms, Implementations (RTG 2224)	2016	www.math.uni-bremen.de/rtg-pi3
Düsseldorf / Wuppertal	Heinrich-Heine-Universität Düsseldorf / Bergische Universität Wuppertal	Algebro-Geometric Methods in Algebra, Arithmetic and Topology (RTG 2240)	2018	http://reh.math.uni-duesseldorf.de/~grk2240
Erlangen-Nuremberg / Regensburg	Friedrich-Alexander-Universität Erlangen-Nürnbegr / Universität Regensburg	IntComSin Interfaces, Complex Structures, and Singular Limits in Continuum Mechanics - Analysis and Numerics (RTG 2339)	2018	www.uni-regensburg.de/Fakultaeten/nat_Fak_I/GK_2339
Freiburg	Albert-Ludwigs-Universität Freiburg	Cohomological Methods in Geometry (RTG 1821)	2011	www.gk1821.uni-freiburg.de

Location	Institution	Title	Funded Since	Contact
Göttingen	Georg-August-Universität Göttingen	Discovering Structure in Complex Data: Statistics meets Optimization and Inverse Problems (RTG 2088)	2015	www.uni-goettingen.de/en/about-the-rtg/514402.html
Hamburg	Universität Hamburg	Mathematics Inspired by String Theory and QFT (RTG 1670)	2010	http://grk1670.math.uni-hamburg.de
Heidelberg Karlsruhe	Ruprecht-Karls-Universität Heidelberg Karlsruher Institut für Technologie	Asymptotic Invariants and Limits of Groups and Spaces (RTG 2229)	2016	www.groups-and-spaces.kit.edu
Heidelberg Mannheim	Ruprecht-Karls-Universität Heidelberg Universität Mannheim	Statistical Modeling of Complex Systems and Processes – Advanced Nonparametric Approaches (RTG 1953)	2013	http://rtg1953.uni-heidelberg.uni-mannheim.de
Magdeburg	Otto-von-Guericke-Universität Magdeburg	Mathematical Complexity Reduction (CoRe) (RTG 2297)	2017	www.mathcore.ovgu.de
Regensburg	Universität Regensburg	Curvature, Cycles, and Cohomology (RTG 1692)	2010	www-app.uni-regensburg.de/Fakultaeten/MAT/GK
Trier	Universität Trier	Algorithmic Optimization (ALOP) (RTG 2126)	2015	www.alop.uni-trier.de
INTERNATIONAL RESEARCH TRAINING GROUPS				
Bielefeld Seoul (South Korea)	Universität Bielefeld Seoul National University	Searching for the Regular in the Irregular: Analysis of Singular and Random Systems (IRTG 2235)	2016	https://irtg.math.uni-bielefeld.de
Munich Graz (Austria)	Technische Universität München Universität der Bundeswehr München Karl-Franzens-Universität Graz Technische Universität Graz	Optimization and Numerical Analysis for Partial Differential Equations with Nonsmooth Structures (IRTG 1754)	2011	http://igdk1754.ma.tum.de/IGDK1754

Location	Institution	Title	Funded Since	Contact
INTEGRATED RESEARCH TRAINING GROUPS IN COLLABORATIVE RESEARCH CENTRES				
Berlin	Freie Universität Berlin	Integrated Research Training Group within: Scaling Cascades in Complex Systems (CRC 1114)	2014	http://sfb1114.imp.fu-berlin.de/phd-program/irtg-program
Karlsruhe	Karlsruher Institut für Technologie	Integrated Research Training Group within: Wave Phenomena: Analysis and Numerics (CRC 1173)	2015	www.waves.kit.edu/researchtraininggroup.phpresearchtraininggroup.php
Postdam	Universität Potsdam	Integrated Research Training Group within: Data Assimilation – The Seamless Integration of Data and Models (CRC 1294)	2017	www.sfb1294.de/graduate-school
INTEGRATED RESEARCH TRAINING GROUPS IN COLLABORATIVE RESEARCH CENTRES/ TRANSREGIOS				
Aachen Kaiserslautern Saarbrücken	Rheinisch-Westfälische Technische Hochschule Aachen Technische Universität Kaiserslautern Universität des Saarlandes	Integrated Research Training Group within: Symbolic Tools in Mathematics and their Application (TRR 195)	2017	www.computeralgebra.de/sfb/graduate-programme
Berlin Darmstadt Erlangen-Nuremberg	Humboldt-Universität zu Berlin Technische Universität Berlin Technische Universität Darmstadt Friedrich-Alexander-Universität Erlangen-Nürnberg	Integrated Research Training Group within: Mathematical Modelling, Simulation and Optimization Using the Example of Gas Networks (TRR 154)	2014	https://trr154.fau.de/index.php/en/research-training-group

GRADUATE TRAINING

-AT NON-UNIVERSITY RESEARCH INSTITUTIONS-

Helmholtz Graduate Schools provide a roof under which a varied number of curricula in different fields, or across disciplines, can find a home. Helmholtz Graduate Schools constitute a valuable addition to the wide range of training programmes available within the Helmholtz Association. They offer optimal conditions for PhD students to work and enable them to create a network of contacts with fellow university researchers while also fostering the integration of participants into the research environment.

International Max Planck Research Schools (IMPRS) offer talented German and international junior scientists the opportunity to earn a doctorate under excellent research conditions. The research schools are established by one or several Max Planck Institutes. These IMPRS work in close cooperation with universities and other – sometimes international – research institutions. This provides an extraordinary framework for the graduate students to work in, and is a great advantage in interdisciplinary research projects, or in projects that require special equipment.

Location	Title	Contact
HELMHOLTZ GRADUATE SCHOOLS		
⭘ Potsdam	Helmholtz Graduate Research School GeoSim	www.geo-x.net/geosim
INTERNATIONAL MAX PLANCK RESEARCH SCHOOLS (IMPRS)		
⭘ Berlin	IMPRS for Computational Biology and Scientific Computing	www.molgen.mpg.de/IMPRS
⭘ Bonn	IMPRS for Moduli Spaces	www.mpim-bonn.mpg.de/node/78
⭘ Leipzig	IMPRS for Mathematics in the Sciences	www.imprs-mis.mpg.de
⭘ Potsdam-Golm	IMPRS for Mathematical and Physical Aspects of Gravitation, Cosmology and Quantum Field Theory	www.imprs-gcp.aei.mpg.de

SOCIETIES AND ASSOCIATIONS
IN GERMANY

Deutsche Mathematiker Vereinigung (DMV): www.mathematik.de (DE)

International Association of Applied Mathematics and Mechanics (GAMM):
www.gamm-ev.de

OPEN POSITIONS

Research in Germany: www.research-in-germany.org/jobs

Fraunhofer Society: www.fraunhofer.de/en/jobs-and-career.html

Helmholtz Association: www.helmholtz.de/en/jobs_talent

Leibniz Society: www.leibniz-gemeinschaft.de/en/careers

Max Planck Society: www.mpg.de/jobboard

FURTHER INFORMATION
RESEARCH INSTITUTIONS, PROJECTS, FUNDING, CONTACTS

The "Research in Germany" Portal: Information on research and funding opportunities, academic and research-related job portals, as well as advice on preparing a research stay or initiating a collaboration with German research organisations. www.research-in-germany.org

German Project Information System (GEPRIS): Online database providing information about all current DFG-funded research projects and contact information for the Principal Investigators. http://gepris.dfg.de

German Research Institutions (GERiT): Information on more than 25,000 institutes at German universities and non-university research institutions, searchable by geographic location, subject and other structural criteria. www.gerit.org

Website of the DFG: Further background information about DFG funding programmes, funding guidelines, and lists of currently DFG-funded activities. www.dfg.de

The German Rectors' Conference (HRK) Research Map: The interactive HRK *Research Map* database provides information on the research priorities that are of strategic institutional importance for each university. www.hrk.de/home (go to → *Research Map*)

The Higher Education Compass: Information on Germany's higher education institutions, the range of courses and programmes that they offer, their worldwide cooperation, and who to contact locally. www.hochschulkompass.de/en/study-in-germany

NOTES

Contact

DFG Deutsche
Forschungsgemeinschaft