



Research in Germany



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MATHEMATICS

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



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PREFACE

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

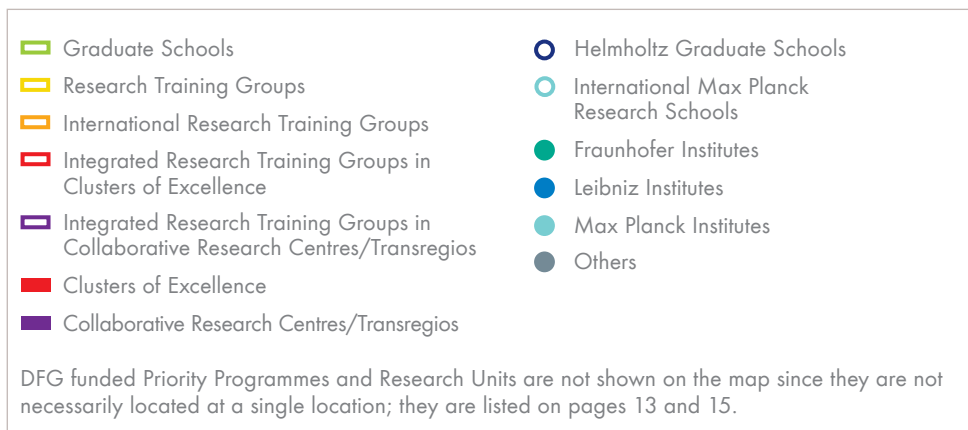
Mathematical research in Germany is primarily conducted at universities but also at non-university research institutions. Almost all universities and many universities of applied sciences host a mathematical research section with smaller or larger working groups. Most mathematics departments refer to 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.

OVERVIEW



Clusters of Excellence (EXC) were established at universities in the framework of the German Excellence Initiative and promote cutting-edge research. Their objective is to engage in scientific networking and collaboration in research fields of particular promise for the future. They also offer excellent training conditions and career opportunities for early career researchers.

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				
 Bonn	Rheinische Friedrich-Wilhelms-Universität Bonn	Mathematics: Foundations, Models, Applications - Hausdorff Center for Mathematics (EXC 59)	2006	www.hausdorff-center.uni-bonn.de
COLLABORATIVE RESEARCH CENTRES				
 Berlin	Humboldt-Universität zu Berlin	Space - Time - Matter: Analytic and Geometric Structures (CRC 647)	2004	www.raumzeitmaterie.de
 Berlin	Freie Universität Berlin	Scaling Cascades in Complex Systems (CRC 1114)	2014	www.sfb1114.de
 Bielefeld	Universität Bielefeld	Spectral Structures and Topological Methods in Mathematics (CRC 701)	2005	www.math.uni-bielefeld.de/sfb701
 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
 Münster	Westfälische Wilhelms-Universität Münster	Groups, Geometry, and Actions (CRC 878)	2010	www.math.uni-muenster.de/sfb878
 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
COLLABORATIVE RESEARCH CENTRES/TRANSREGIOS				
 Berlin Graz (Austria) Munich Vienna (Austria)	Technische Universität Berlin Technische Universität Graz Technische Universität München Technische Universität Wien	Discretization in Geometry and Dynamics (TRR 109)	2012	www.discretization.de

CENTRES OF RESEARCH

Location	Institution	Title	Funded Since	Contact
Berlin	Humboldt-Universität zu Berlin	Mathematical Modelling, Simulation and Optimization Using the Example of Gas Networks (TRR 154)	2014	http://trr154.fau.de
Darmstadt	Technische Universität Berlin			
Erlangen-Nürnberg	Technische Universität Darmstadt			
Bonn	Rheinische Friedrich-Wilhelms-Universität Bonn	Periods, Moduli Spaces and Arithmetic of Algebraic Varieties (TRR 45)	2007	www.sfb45.de
Essen	Universität Duisburg-Essen			
Mainz	Johannes Gutenberg-Universität Mainz			



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.

RESEARCH UNITS

Title	Funded Since	Contact
Rough Paths, Stochastic Partial Differential Equations and Related Topics (FOR 2402)	2015	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
Geometry and Physics of Spatial Random Systems (FOR 1548)	2011	www.gpsrs.nat.uni-erlangen.de
Statistical Regularisation and Qualitative Constraints - Inference, Algorithms, Asymptotics and Applications (FOR 916)	2008	www.stochastik.math.uni-goettingen.de/forschergruppe



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.



PRIORITY PROGRAMMES

Title	Funded From	Contact
Geometry at Infinity (SPP 2026)	2017	www.math.uni-augsburg.de/prof/diff/SPP
Non-Smooth and Complementarity-Based Distributed Parameter Systems: Simulation and Hierarchical Optimization (SPP 1962)	2016	www2.mathematik.hu-berlin.de/~spp1962
Title	Funded Since	Contact
Compressed Sensing in Information Processing (SPP 1798)	2015	www.ti.rwth-aachen.de/SPP1798
Homotopy Theory and Algebraic Geometry (SPP 1786)	2015	www.esaga.uni-due.de/spp1786
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
Transport Processes at Fluidic Interfaces (SPP 1506)	2010	www.dfg-spp1506.de
Algorithmic and Experimental Methods in Algebra, Geometry and Number Theory (SPP 1489)	2010	www.computeralgebra.de



Fraunhofer Society is one of the world's leading organisations for applied research with an annual research budget of 2 billion euros, 67 institutes and more than 23,000 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 89 research institutes. The annual budget amounts to 1.45 billion euros. Some 8,800 researchers – more than 1,100 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 2015. A combined total of more than 11,000 researchers, postdoctoral/junior researchers and visiting researchers at 83 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
● Oberwolfach	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	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/foerderungen/bekanntmachung.php?B=1150 (DE)

GRADUATE TRAINING

- FUNDED BY DFG -

Graduate Schools (GSC) were established at universities in the framework of the German Excellence Initiative. Their objective is to provide training and qualification for outstanding doctoral students from Germany and abroad within an excellent research environment. They serve as an instrument of quality assurance in promoting early career researchers and offer large networks that cover wide areas of research.

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 Clusters of Excellence or 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.

GRADUATE TRAINING

Location	Institution	Title	Funded Since	Contact
GRADUATE SCHOOLS				
 Berlin	Technische Universität Berlin Freie Universität Berlin Humboldt-Universität zu Berlin	Berlin Mathematical School (GSC 14)	2006	www.math-berlin.de
 Heidelberg	Ruprecht-Karls-Universität Heidelberg	Heidelberg Graduate School of Mathematical and Computational Methods for the Sciences (GSC 220)	2007	www.mathcomp.uni-heidelberg.de
RESEARCH TRAINING GROUPS				
 Aachen	Rheinisch-Westfälische Technische Hochschule Aachen	Experimental and Constructive Algebra (RTG 1632)	2010	www.math.rwth-aachen.de/~Graduiertenkolleg
 Berlin	Humboldt Universität zu Berlin Technische Universität Berlin	Stochastic Analysis with Applications in Biology, Finance and Physics (RTG 1845)	2011	www.mathematik.hu-berlin.de/rtg1845
 Potsdam	Universität Potsdam			
 Bochum	Ruhr-Universität Bochum	New Challenges for Cryptography in Ubiquitous Computing (RTG 1817)	2011	www.ubicrypt.hgi.rub.de
 Bochum	Ruhr-Universität Bochum	High-Dimensional Phenomena in Probability - Fluctuations and Discontinuity (RTG 2131)	2015	https://sites.google.com/site/rtg2131
 Dortmund	Technische Universität Dortmund			
 Essen	Universität Duisburg-Essen			
 Bremen	Universität Bremen	Pi3: Parameter Identification - Analysis, Algorithms, Implementations (RTG 2224)	2016	www.math.uni-bremen.de/rtg-pi3
 Freiburg	Albert-Ludwigs-Universität Freiburg	Cohomological Methods in Geometry (RTG 1821)	2011	www.gk1821.uni-freiburg.de
 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
 Göttingen	Georg-August-Universität Göttingen	Mathematical Structures in Modern Quantum Physics (RTG 1493)	2007	www.uni-goettingen.de/de/132772.html

GRADUATE TRAINING

Location	Institution	Title	Funded Since	Contact
 Hamburg	Universität Hamburg	Mathematics Inspired by String Theory and QFT (RTG 1670)	2010	http://grk1670.math.uni-hamburg.de
 Hannover	Gottfried Wilhelm Leibniz Universität Hannover	Analysis, Geometry and String Theory (RTG 1463)	2007	www.grk1463.uni-hannover.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
 Kaiserslautern	Technische Universität Kaiserslautern	Stochastic Models for Innovations in the Engineering Sciences (RTG 1932)	2013	www.mathematik.uni-kl.de/dfg-graduiertenkolleg-1932
 Osnabrück	Universität Osnabrück	Combinatorial Structures in Geometry (RTG 1916)	2013	www.mathematik.uni-osnabrueck.de/graduiertenkolleg/kombinatorische_strukturen_in_der_geometrie.html
 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
 Tübingen Stuttgart	Eberhard-Karls-Universität Tübingen Universität Stuttgart	Spectral Theory and Dynamics of Quantum Systems (RTG 1838)	2013	www.mathematik.uni-stuttgart.de/grk1838

GRADUATE TRAINING

Location	Institution	Title	Funded Since	Contact
INTERNATIONAL RESEARCH TRAINING GROUPS				
 Berlin	Humboldt-Universität zu Berlin Freie Universität Berlin	Moduli and Automorphic Forms: Arithmetic and Geometric Aspects (IRTG 1800)	2012	www2.mathematik.hu-berlin.de/~grk1800
Leiden (Netherlands)	Leiden University			
Amsterdam (Netherlands)	Universiteit van Amsterdam			
 Bielefeld	Universität Bielefeld	Searching for the Regular in the Irregular: Analysis of Singular and Random Systems (IRTG 2235)	2016	https://irtg.math.uni-bielefeld.de
Seoul (South Korea)	Seoul National University			
 Darmstadt	Technische Universität Darmstadt	Mathematical Fluid Dynamics (IRTG 1529)	2008	www.mathematik.tu-darmstadt.de/~igk
Tokyo (Japan)	The University of Tokyo Tokyo Institute of Technology Waseda University			
 Munich	Technische Universität München	Optimization and Numerical Analysis for Partial Differential Equations with Nonsmooth Structures (IRTG 1754)	2011	http://igdk1754.ma.tum.de/IGDK1754
Graz (Austria)	Universität der Bundeswehr München Karl-Franzens-Universität Graz Technische Universität Graz			
INTEGRATED RESEARCH TRAINING GROUPS IN CLUSTERS OF EXCELLENCE				
 Bonn	Rheinische Friedrich-Wilhelms-Universität Bonn	Bonn International Graduate School in Mathematics (BIGS-Mathematics) (EXC 59, HCM)	2006	www.bigs-math.uni-bonn.de
INTEGRATED RESEARCH TRAINING GROUPS IN COLLABORATIVE RESEARCH CENTRES				
 Berlin	Humboldt-Universität zu Berlin	Integrated Research Training Group "Space - Time - Matter" (CRC 647)	2008	www.raumzeitmaterie.de

GRADUATE TRAINING

Location	Institution	Title	Funded Since	Contact
 Berlin	Freie Universität Berlin	Integrated Research Training Group "Scaling Cascades in Complex Systems" (CRC 1114)	2014	www.sfb1114.de/phd-program
 Karlsruhe	Karlsruher Institut für Technologie	Integrated Research Training Group within: Wave Phenomena: Analysis and Numerics (CRC 1173)	2015	www.waves.kit.edu/irtg.php
 Münster	Westfälische Wilhelms-Universität Münster	Integrated Research Training Group "Groups, Geometry, and Actions" (CRC 878)	2010	www.math.uni-muenster.de/sfb878/research_training_group

INTEGRATED RESEARCH TRAINING GROUPS IN COLLABORATIVE RESEARCH CENTRES/TRANSREGIOS

 Berlin	Humboldt-Universität zu Berlin	Integrated Research Training Group "Mathematical Modelling, Simulation and Optimization Using the Example of Gas Networks" (TRR 154)	2014	http://trr154.fau.de/index.php/en/research-training-group
Darmstadt	Technische Universität Berlin			
Erlangen-Nuremberg	Technische Universität Darmstadt			
 Bonn	Friedrich-Alexander-Universität Erlangen-Nürnberg	Integrated Research Training Group "Periods, Moduli Spaces and Arithmetic of Algebraic Varieties" (TRR 45)	2007	www.sfb45.de/graduate-school
Essen	Rheinische Friedrich-Wilhelms-Universität Bonn			
Mainz	Universität Duisburg-Essen			
	Johannes Gutenberg-Universität Mainz			



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.

GRADUATE TRAINING

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
 Leipzig	IMPRS for Mathematics in the Sciences	www.imprs-mis.mpg.de

SOCIETIES AND ASSOCIATIONS

IN GERMANY

Deutsche Mathematiker Vereinigung (DMV): <https://dmv.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-career

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

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

Max Planck Society: www.mpg.de/jobboard

FURTHER INFORMATION

RESEARCH INSTITUTIONS, PROJECTS, FUNDING, CONTACTS

Research in
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Land of Ideas

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>



The Research Explorer: Information on more than 19 000 institutes at German universities and non-university research institutions, searchable by geographic location, subject and other structural criteria. <http://research-explorer.dfg.de>



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/higher-education-compass





Contact

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DFG Deutsche
Forschungsgemeinschaft