



Research in Germany - Artificial Intelligence -



Research in Artificial Intelligence in Germany is primarily conducted at universities but also at non-university research institutes. The Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) is a major funding organisation to support artificial intelligence research. Important German research organisations such as the Fraunhofer Society (applied research), the Leibniz Association (basic and applied research) and the Max Planck Society (basic research) maintain own research institutes with a major focus on artificial intelligence. Some artificial intelligence research institutes and programmes are funded directly by the federal and state governments. There exist also private and public foundations that support artificial intelligence research in Germany, for example the Alexander von Humboldt Foundation (AvH). Graduate training is provided at universities and non-university research institutions in cooperation with universities. Here, besides the DFG also the Helmholtz Association (research on grand challenges) and the Max Planck Society offer graduate training programmes in or strongly related to artificial intelligence research. There also exist PhD programmes and PhD funding by the state governments, the German Academic Exchange Service (DAAD) and foundations.

COORDINATED RESEARCH PROGRAMMES FUNDED BY DFG

Collaborative Research Centres (CRC) [Sonderforschungsbereiche; SFB]

- established at a single university (standard CRC) or by multiple nearly equal partners (Transregio variation, up to 3 sites)
- present outstanding research programmes, crossing the boundaries of disciplines, institutes, departments and faculties
- research programme must correspond to and strengthen the research profile of host university(ies)
- may also incorporate projects at further (research) institutions (both academic and commercial, inside or outside Germany)
- funded by the DFG for a period of up to 12 years (3 four-year periods)

The following CRCs are currently funded in artificial intelligence research:

- "Providing Information by Resource-Constrained Data Analysis" (CRC 876), funded since 2011
speaker: Katharina Morik, Dortmund
contact: <https://sfb876.tu-dortmund.de>
- "Robust Vision – Inference Principles and Neural Mechanisms" (CRC 1233), funded since 2017
speaker: Matthias Bethge, Tübingen
contact: <https://uni-tuebingen.de/en/research/core-research/collaborative-research-centers/crc-1233/>
- "Data Assimilation – The seamless integration of data and models" (CRC 1294), funded since 2017
speaker: Sebastian Reich, Potsdam
contact: www.uni-potsdam.de/en/sfb1294/
- "Everyday Activity Science and Engineering (EASE)" (CRC 1320), funded since 2017
speaker: Michael Beetz, Bremen
contact: <https://ease-crc.org/>
- "Foundations of Workflows for Large-Scale Scientific Data Analysis (FONDA)" (CRC 1404), funded since 2020
speaker: Ulf Leser, Berlin
contact: <https://fonda.hu-berlin.de/>

Collaborative Research Centres/Transregios (TRR) [SFB/Transregio; TRR]

The following CRC/Transregios are currently funded in artificial intelligence research:

- "Quantitative Methods for Visual Computing" (TRR 161), funded since 2015
speaker: Daniel Weiskopf, Stuttgart; partner universities/institutions in Stuttgart, Konstanz
contact: www.sfbtr161.de
- "Crossmodal Learning: Adaptivity, Prediction and Interaction" (TRR 169), funded since 2016
speaker: Jianwei Zhang, Hamburg; partner universities/institutions in Hamburg, Beijing
contact: www.crossmodal-learning.org
- "Foundations of Perspicuous Software Systems – Enabling Comprehension in a Cyber-Physical World" (TRR 248), funded since 2019
speaker: Holger Hermanns, Saarbrücken; partner universities/institutions in Saarbrücken, Dresden
contact: www.perspicuous-computing.science

Research Units (FOR) [Forschergruppen; FOR; not displayed]

- specific medium-term research projects whose anticipated findings would not be able to be achieved within the scope of the individual grants programme but only by a coordinated effort
- proposals can be submitted to the DFG at any time, decision is made in a two-step process
- funded by the DFG up to 8 years (2 four-year periods)

Currently the following Research Units in or strongly related to artificial intelligence are funded:

- "Memristive Devices for Neural Systems" (FOR 2093), funded since 2014
speaker: Hermann Kohlstedt, Kiel
contact: www.for2093.uni-kiel.de
- "Anticipating Human Behavior" (FOR 2535), funded since 2017
speaker: Jürgen Gall, Bonn
contact: www.uni-bonn.de/forschung/Drittittel%20und%20Projekte/DFG-Verbandforschungsprojekte/for-2535%set

Priority Programmes (SPP) [Schwerpunktprogramme; SPP; not displayed]

- large research networks to unite research capacity all over Germany in an emerging field or a field expected to yield major breakthroughs in the near future
- fields chosen once a year by the DFG's Senate from proposals by scientists of all research disciplines
- enhanced quality of research through the use of new methods and forms of collaboration in emerging fields
- added value through interdisciplinary cooperation and networking
- at the beginning and after three years of funding, a call is launched to all scientists who want to contribute with a project to the given field of research
- usually funded for 6 years by the DFG (e.g. 2 three-year periods)

Currently the following Priority Programmes in or strongly related to artificial intelligence are funded:

- "Robust Argumentation Machines (RATIO)" (SPP 1999), funded since 2017
speaker: Philipp Cimiano, Bielefeld
contact: <http://ratio.sc.cit-ec.uni-bielefeld.de>
- "Scalable Data Management on Future Hardware" (SPP 2037), funded since 2017
speaker: Kai-Uwe Sattler, Ilmenau
contact: www.dfg-spp2037.de
- "Computational Connectomics" (SPP 2041), funded since 2017
speaker: Jochen Triesch, Frankfurt
contact: <https://spp2041.de/>
- "Evolutionary Optimisation of Neuronal Processing" (SPP 2205), funded since 2020
speaker: Fred Wolf, Göttingen
contact: www.uni-goettingen.de/en/mission/618330.html
- "Memristive Devices Toward Smart Technical Systems" (SPP 2262), funded since 2020
speaker: Ronald Teitzlaf, Dresden
contact: <https://gepris.dfg.de/gepris/projekt/422738993>
- "Theoretical Foundations of Deep Learning" (SPP 2298), funded since 2020
speaker: Gitta Kutyniok, München
contact: www.spp2298.de
- "Machine Learning in Chemical Engineering. Knowledge Meets Data: Interpretability, Extrapolation, Reliability, Trust" (SPP 2331), funded since 2020
speaker: Alexander Mitsos, Aachen
contact: www.chemengml.org

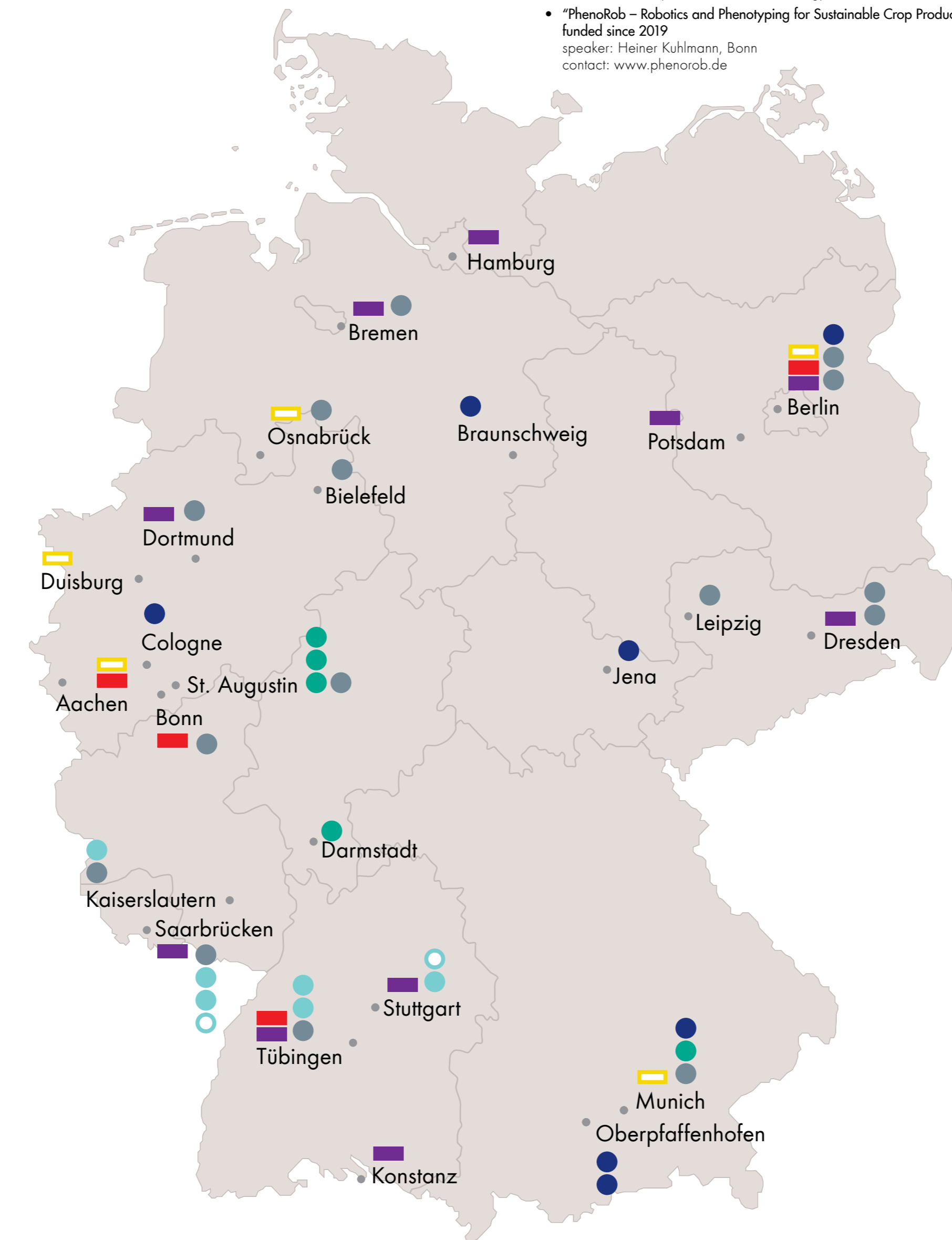
CLUSTERS OF EXCELLENCE

Clusters of Excellence (EXC) [Exzellenzcluster; EXC]

- launched by the German government in order to boost excellent research through additional funds
- project-based funding in internationally competitive fields of research at universities or university consortia
- often include doctoral training programmes
- DFG is responsible for developing and implementing this funding line

The following cluster have a strong focus in artificial intelligence research:

- "Science of Intelligence (SciAI)" (EXC 2002), funded since 2019
speaker: Oliver Brack, Berlin
contact: www.scienceofintelligence.de
- "Machine Learning: New Perspectives for Science" (EXC 2064), funded since 2019
speaker: Philipp Berens, Ulrike von Luxburg, Tübingen
contact: <https://uni-tuebingen.de/en/research/core-research/cluster-of-excellence-machine-learning/home/>
- "Internet of Production (IoP)" (EXC 2023), funded since 2019
speaker: Christian Brecher, Aachen
contact: www.iop.rwth-aachen.de/cms/~gpfz/Produktionstechnik/
- "PhenoRob – Robotics and Phenotyping for Sustainable Crop Production" (EXC 2070), funded since 2019
speaker: Heiner Kuhlmann, Bonn
contact: www.phenorob.de



RESEARCH AT NON-UNIVERSITY RESEARCH INSTITUTIONS

Fraunhofer Institutes

Fraunhofer Society is one of the world's leading organisations for applied research with an annual research budget of 2.8 billion euros, 74 institutes and more than 28,000 employees. Fraunhofer's R&D portfolio covers a wide range of fields, including health, security, communications, transport, energy and the environment.

- Fraunhofer Institute for Computer Graphics Research (IGD)
location: Darmstadt
contact: www.igd.fraunhofer.de
- Fraunhofer Institute for Cognitive Systems (IKS)
location: Munich
contact: www.iks.fraunhofer.de
- Fraunhofer Institute for Intelligent Analysis and Information Systems (IAIS)
location: St. Augustin
contact: www.iais.fraunhofer.de
- "Fraunhofer Big Data and Artificial Intelligence Alliance"
location: St. Augustin
contact: www.bigdata.fraunhofer.de
- Fraunhofer Institute for Algorithms and Scientific Computing (SCAI)
location: St. Augustin
contact: www.scai.fraunhofer.de

Max Planck Institutes

The Max Planck Society for the Advancement of Science is one of Germany's largest independent non-profit research organisations. A combined total of more than 15,300 researchers, postdoctoral/junior researchers and visiting researchers at 86 Max Planck Institutes conduct basic research in the natural sciences, life sciences, social sciences and humanities.

- Max Planck Institute for Informatics
location: Saarbrücken
contact: www.mpi-inf.mpg.de
- Max Planck Institute for Software Systems
location: Saarbrücken, Kaiserslautern
contact: <https://mpi-sw.s.org/>
- Max Planck Institute for Intelligent Systems
location: Stuttgart, Tübingen
contact: www.is.mpg.de
- Max Planck Institute for Biological Cybernetics
location: Tübingen
contact: www.mpg.de/152075/biologische-kybernetik

Helmholtz Association

The Helmholtz Association contributes to solving major challenges facing society, science and industry with world-level research in six areas: energy, earth and environment, health, key technologies, structure of matter and aeronautics, space and transport. With more than 40,000 employees in 19 research centres and an annual budget of approximately 4.8 billion euros, the Helmholtz Association is Germany's largest scientific organisation.

The following centers and institutes have a strong focus in AI research:

- Helmholtz Artificial Intelligence Cooperation Unit (HAICU)
location: across the whole network; central unit in Munich
contact: www.helmholtz.ai
- German Aerospace Center – Deutsches Zentrum für Luft- und Raumfahrt (DLR) Institute of Data Science
location: Jena
contact: www.dlr.de/content/en/institutes/institute-of-data-science.html
- German Aerospace Center – Deutsches Zentrum für Luft- und Raumfahrt (DLR) Institute of Robotics and Mechatronics
location: Oberpfaffenhofen
contact: www.dlr.de/im
- German Aerospace Center – Deutsches Zentrum für Luft- und Raumfahrt (DLR) Institute for Software Technology
location: Berlin, Braunschweig, Cologne, Oberpfaffenhofen
contact: www.dlr.de/sc

German Centers for Artificial Intelligence

- Deutsches Forschungszentrum für Künstliche Intelligenz, DFKI German Research Center for Artificial Intelligence
location: Berlin, Bremen, Kaiserslautern, Osnabrück, Saarbrücken
contact: www.dfki.de
- Berlin Institute for the Foundations of Learning and Data (BIFOLD)
location: Berlin
contact: <https://bifold.berlin>
- Tübingen AI Center – Competence Center for Machine Learning
location: Tübingen
contact: <https://tuebingen.ai>
- Munich Center for Machine Learning (MCML)
location: Munich
contact: <https://mcml.ai>
- Kompetenzzentrum Maschinelles Lernen Rhein-Ruhr (ML2R)
location: Bonn, Dortmund, St. Augustin
contact: www.ml2r.de
- Competence Center for Scalable Data Services and Solutions (ScDS)
location: Dresden, Leipzig
contact: www.scads.de
- Center for Cognitive Interaction Technology (CITEC)
location: Bielefeld
contact: www.cit-ec.de
- Center for Advancing Electronics Dresden (cfaed)
location: Dresden
contact: <https://cfaed.tu-dresden.de>

GRADUATE TRAINING FUNDED BY DFG

Research Training Groups (RTG) [Graduiertenkollegs; GRK]

- established at universities
- may have foreign partner(s) – International Research Training Groups
- promote young researchers: doctoral training within the framework of a focused research programme and a structured training strategy
- encourage early scientific independence
- high demand for this funding programme, since it permits doctoral students to work on a family of related thesis topics, thereby encouraging fruitful discussions and collaboration between them
- supported by the DFG for up to 9 years (2 four-and-a-half-year periods)

Currently the following RTG in or strongly related to artificial intelligence are funded:

- "User-Centred Social Media" (RTG 2167), funded since 2015
speaker: Norbert Fuhr, Duisburg-Essen
contact: www.is.inf.uni-due.de/projects/ucsm/index.html.en
- "Uncertainty and Randomness in Algorithms, Verification, and Logic (UNRAVEL)" (RTG 2236), funded since 2017
speaker: Joost-Pieter Katoen, Aachen
contact: www.unravel.rwth-aachen.de/cms/~afgh/UnRAVEL/?bid=1
- "Computational Cognition" (RTG 2340), funded since 2018
speaker: Gordon Pipa, Osnabrück
contact: <https://gepris.dfg.de/gepris/projekt/321892712>
- "Differential Equation- and Data-driven Models in Life Sciences and Fluid Dynamics (DAEDALUS)" (RTG 2433), funded since 2018
speaker: Wolf-Christian Müller, Berlin
contact: <https://daedalus.berlin/>
- "Continuous Verification of Cyber-Physical Systems (CONVEY)" (RTG 2428), funded since 2019
speaker: Helmut Seidl, Munich
contact: www.in.tum.de/en/research/joint-research-projects/graduation-programs/graduate-programs/

GRADUATE TRAINING AT NON-UNIVERSITY RESEARCH INSTITUTIONS

International Max Planck Research Schools (IMPRS)

Doctoral training at Max Planck Institutes in close collaboration with universities under excellent research conditions:

- IMPRS on Trustworthy Computing
speaker: Anja Feldmann, Saarbrücken
contact: www.imprs-trust.mpg.de
- IMPRS for Intelligent Systems (IS)
speaker: Katherine J. Kuchenbecker, Stuttgart
contact: <http://imprs.is.mpg.de>

SOCIETIES AND ASSOCIATIONS

- Gesellschaft für Informatik e.V. (GI), Fachbereich Künstliche Intelligenz (FBKI) – German Informatics Society, Section for Artificial Intelligence
contact: <https://fb-ki.gi.de>
- Bernstein Network Computational Neuroscience
contact: www.bernstein-netzwerk.de
- Cyber Valley
contact: <https://cyber-valley.de>
- AI Frankfurt
contact: www.ai-frankfurt.de
- Ki.NRW
contact: www.ki.nrw
- #ki_berlin
contact: <https://ki-berlin.de>

MORE RESSOURCES

- Platform Lernende Systeme – Germany's Platform for Artificial Intelligence
www.platform-lernende-systeme.de

DFG

The Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) is the central self-governing research funding organisation in Germany. It serves all branches of science and the humanities by funding research projects at universities and other research institutions. The DFG promotes excellence and quality by selecting the best research projects on a competitive basis and actively encourages international research cooperation. It is particularly dedicated to the promotion of young researchers and to gender equality in science and academia. It also advises legislatures and government agencies on scientific matters. In organisational terms, the DFG is an association under private law that receives the large majority of its funds from Germany's Federal (69%) and state (29%) governments. In 2019 the DFG's annual budget was 3.3 billion euros.

In 2019, the DFG's annual budget for computer science reached 219.4 mio. euros (2016: 198.7 mio. euros). Individual grants still form the basis of DFG's funding of computer science aside the displayed coordinated programmes. They are awarded to established and junior researchers (starting at the post-doc level) to support individual or joint projects as well as to post-docs as support for their positions, as fellowships for research stays abroad, or even to build up their own first research group.

Sources: DFG Annual Report 2019, websites Fraunhofer Society, Leibniz Association, Max Planck Society, Helmholtz Association © DFG, November 2020

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AN INITIATIVE OF THE



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