



FACTS, FIGURES, PEOPLE

2022 | 2023

Member of the Helmholtz Association



SHAPING CHANGE

**At Forschungszentrum Jülich,
almost 7,250 people have been working
hand in hand on this mission together with
1,217 visiting scientists from 79 countries.**

**We are one of the major interdisciplinary
research institutions in Europe and, being a
member of the Helmholtz Association,
we contribute to solving the major
social challenges of our time.**

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We want to remain a strong player in the national and international science landscape in the future. This is why I intend to create as much space as possible for research, creativity and innovation.

Prof. Astrid Lambrecht



PROF. ASTRID LAMBRECHT, NEW CHAIR OF THE BOARD OF DIRECTORS

Prof. Astrid Lambrecht is the new Chair of the Board of Directors of Forschungszentrum Jülich. She has been appointed for five years and succeeds Prof. Wolfgang Marquardt, who headed Forschungszentrum Jülich from 1 July 2014 until his retirement on 31 July 2023. Lambrecht has already been a member of Jülich's Board of Directors since 2021. In her new role, she wants to focus strongly on further development and modernization.

Astrid Lambrecht, born in 1967 in Mülheim an der Ruhr, studied physics in Essen and London and received her doctorate in 1995 at the Paris research institute Laboratoire Kastler Brossel (LKB). In 2002, she habilitated at the Pierre and Marie Curie University in Paris. Her field of research is quantum physics.

Before joining Forschungszentrum Jülich, Astrid Lambrecht was head of the Physics scientific division at the Centre national de la recherche scientifique (CNRS) in Paris since 2018. The new Jülich Chair gained a lot of experience in numerous international science organizations and also brought her expertise to policy advice through the French Parliamentary Office for the Evaluation of Scientific and Technological Choices (OPECST). Lambrecht is a supervisory board member of the French research institution CEA.

Among other awards, she received the French Order of Merit of the Legion of Honour in 2019.

NEW TO THE BOARD OF DIRECTORS: DR. PETER JANSENS

Dr. Peter Jansens has been a new member of the Board of Directors since 1 January 2023. The 56-year-old chemical engineer is responsible for the scientific division Energy & Climate, which is comprised of the Institute of Energy and Climate Research, the Institute for Sustainable Hydrogen Economy, and the Central Institute for Engineering, Electronics and Analytics. Previously, he worked at the Dutch chemical group DSM, most recently as CEO of the Olatein joint venture.



RESEARCH AT JÜLICH AT A GLANCE

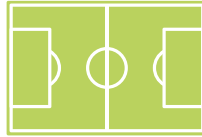
11

Institutes



18

Branch offices
in Germany
and abroad



238

football fields

would fit into the
1.7 square kilometres of
Forschungszentrum
Jülich's campus



948

million euros

of revenue for
Forschungszentrum
Jülich in 2022



Supercomputer
JUWELS,
quantum computer
JuPSI

Jülich Supercomputing
Centre



Atmospheric
simulation chamber
SAPHIR

Institute of Energy and
Climate Research



900 MHz NMR
spectrometer

Institute of Biological
Information Processing



EBRAINS

Institute of Neurosciences
and Medicine

SELECTED RESEARCH INFRASTRUCTURES ON THE JÜLICH CAMPUS

3

Research focus areas



Information



Energy



Bioeconomy



78

New patent applications

in 2022



2,801

Publications

in 2022



EMPHASIS

Institute of Bio- and Geosciences



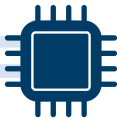
Electron microscopes PICO and KRIOS

Ernst Ruska-Centre



Particle accelerator COSY

Nuclear Physics Institute



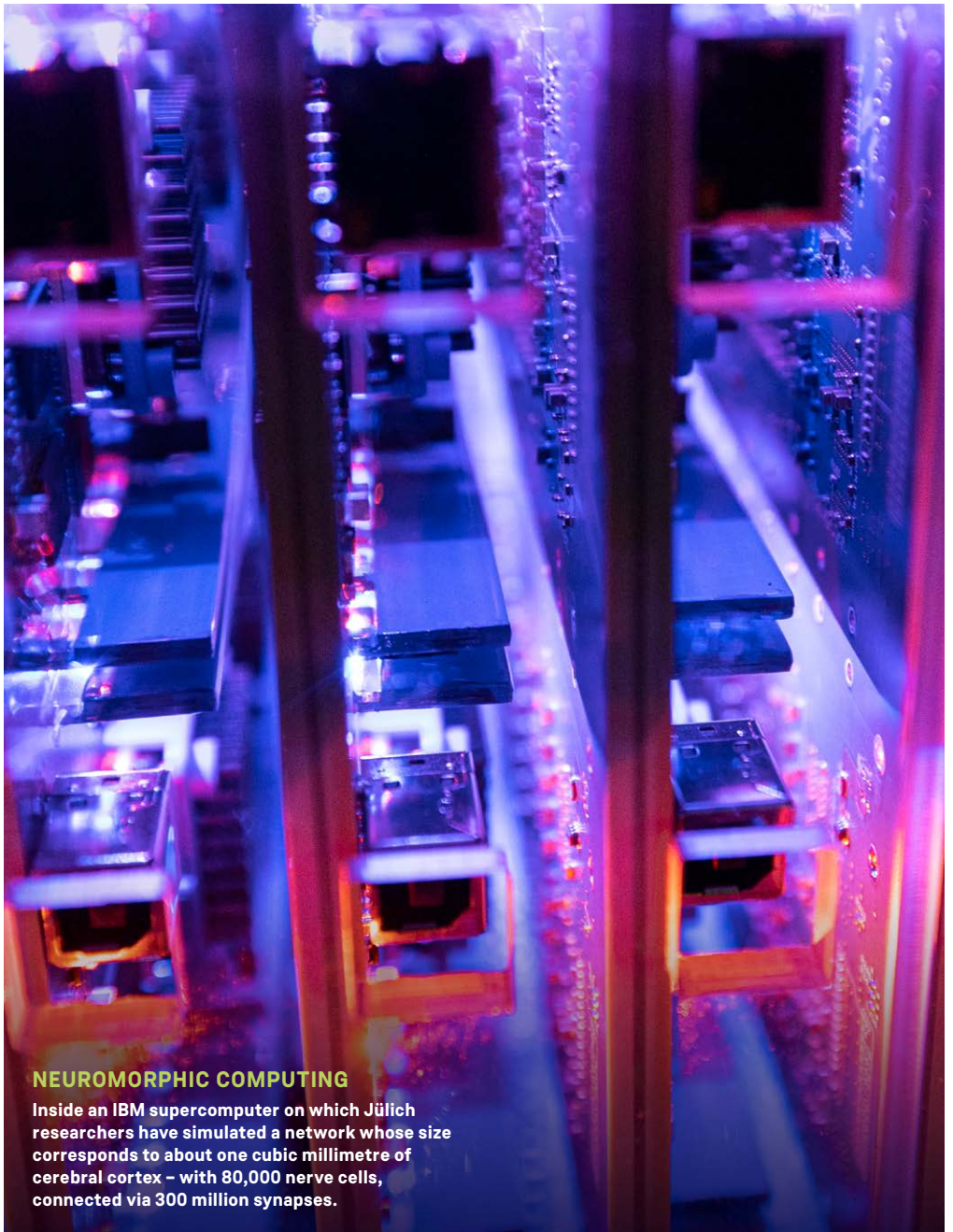
Nanotechnology

Helmholtz Nano Facility



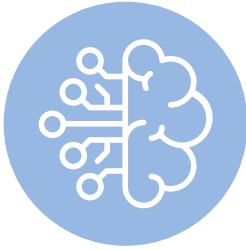
Quantum technology

Helmholtz Quantum Center (in the planning stage)



NEUROMORPHIC COMPUTING

Inside an IBM supercomputer on which Jülich researchers have simulated a network whose size corresponds to about one cubic millimetre of cerebral cortex - with 80,000 nerve cells, connected via 300 million synapses.



FOCUS INFORMATION

The field of Information links the areas of simulation and data sciences of high-performance-computing (HPC), quantum computing, brain research, neuromorphic computing and the research on bio-based and nanoelectronic-based information technologies of the future.

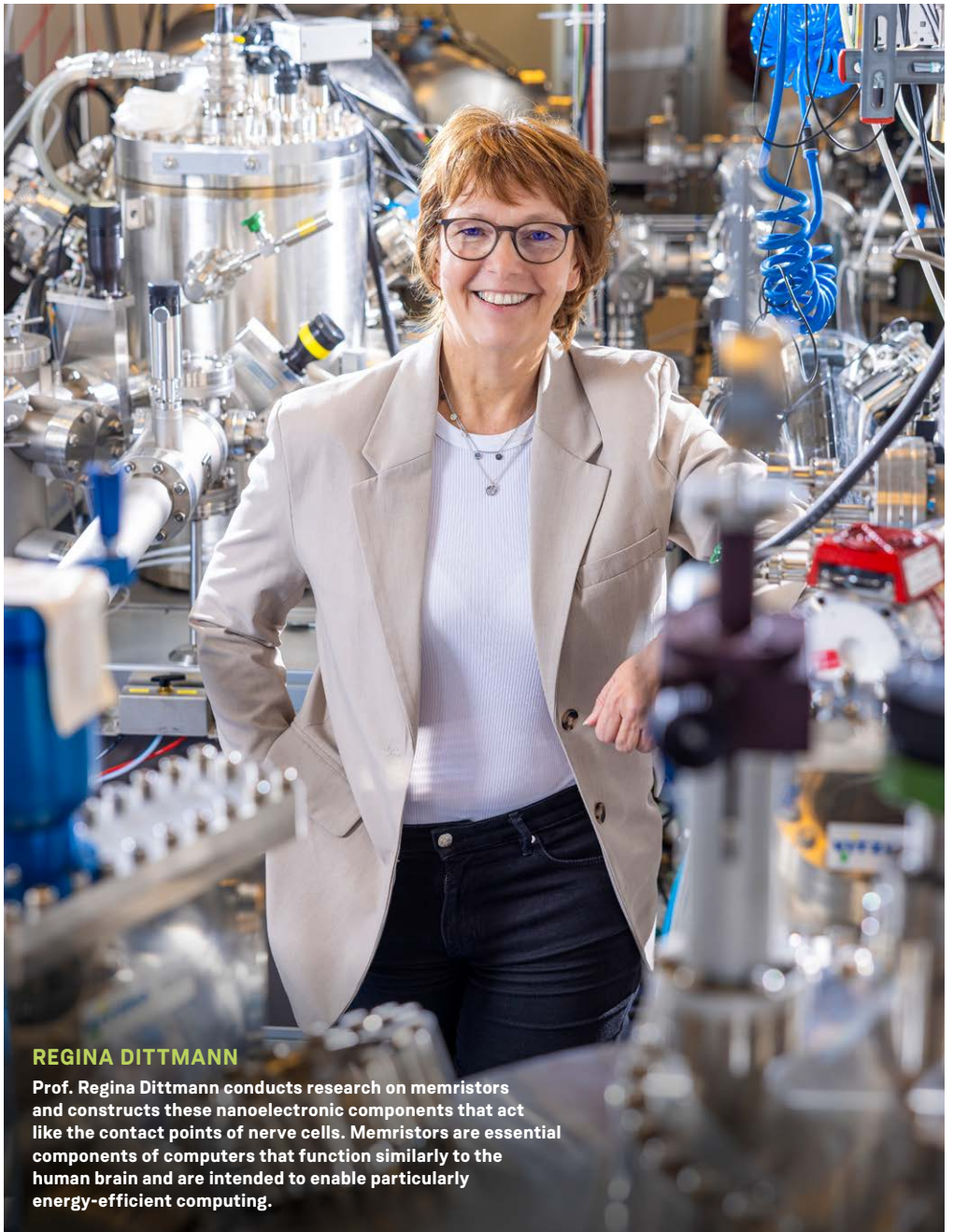
The Jülich supercomputers JUWELS and JURECA are currently among the most powerful in the world and use simulations to help answer complex questions in areas such as climate research, neuroscience and materials research. Jülich will also be the site of JUPITER, the first European supercomputer of the exascale class. Jülich researchers are developing modular hardware architectures for this. Artificial intelligence and big data methods, on which many research results are based, play an important role here.

Another focus in Future Computing is quantum technology. Jülich scientists are researching it from the basics to application. In the joint project QSolid, which is coordinated by Forschungszentrum Jülich, a complete quantum computer based on cutting-edge, German technology will be created in the next few years. With its

user infrastructure for quantum computing JUNIQ (Jülicher Nutzer-Infrastruktur für Quantencomputing), Jülich also offers science and industry access to various quantum systems and supports users in developing algorithms and applications for quantum computing.

Technology-based information processing is closely linked to research on biological systems. Learning from the brain – the basis for innovative, energy-efficient computing concepts such as neuromorphic computing. Jülich researchers develop components, architecture and software concepts needed for neuromorphic computers.

Decoding the human brain in all its complexity using digital methods is the vision of the EU-funded Human Brain Project. Artificial intelligence helps to develop a high-resolution atlas of the brain.



REGINA DITTMANN

Prof. Regina Dittmann conducts research on memristors and constructs these nanoelectronic components that act like the contact points of nerve cells. Memristors are essential components of computers that function similarly to the human brain and are intended to enable particularly energy-efficient computing.

Quantum computers**FEWER ERRORS**

Quantum computers are significantly more prone to errors than conventional computers. Thanks to two methods that Jülich researchers were involved in developing, this could change in the future. The papers were published by the scientific journal Nature.

Nanoelectronics**EXOTIC STATE WITH POTENTIAL**

2D materials consist of a single layer of atoms. In certain 2D materials, Jülich scientists have, for the first time, found Fermi arcs – unusual electronic states that open up new applications for the materials in the information technologies of the future.

Brain research**DECODING NETWORKS**

In the journal Science, Jülich researchers explain which methods are needed to understand the brain with its various networks – from contacts of individual nerve cells to connections between brain regions.

Supercomputing**EUROPEAN EXASCALE COMPUTER**

The decision has been made: the Jülich campus will be home to the first European supercomputer capable of performing more than a trillion computing operations per second (exaflop/s).

Artificial intelligence (AI)

ACCESSIBLE TO ALL

The AI revolution is largely taking place behind the closed doors of companies. Jülich researchers and their organization LAION intend to change that. Together with partners, they created the largest freely accessible image-text database for the development of independent AI models.

Structural biology

KNOWING MORE ABOUT A DEADLY DISEASE

Special proteins formed in the brain, known as prions, are considered to trigger Creutzfeldt-Jakob disease (CJD) if they are misfolded. Researchers from Jülich and Düsseldorf have discovered why two prion variants that occur in humans lead to different clinical pictures of CJD.

Parkinson's research

FIRST INSIGHT

In the brain, Parkinson's disease involves the aggregation of faulty alpha-synuclein proteins to form fibre-like strands, so-called fibrils. A research team with Jülich participation was able to visualize for the first time how fat-like substances – lipids – influence the arrangement of the synuclein proteins within the fibrils.

Quantum computers

NOVEL QUANTUM BIT

Jülich researchers have succeeded in incorporating a topological insulator into a conventional superconducting quantum bit for the first time. This is a step towards topological quantum bits, which are presumably less prone to error than conventional ones.



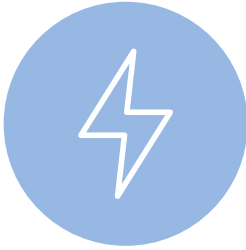
STEFAN TAUTZ

Prof. Stefan Tautz, with colleagues from the University of Graz, has developed a method that makes it possible to see how electrons are distributed spatially in a molecule. In the ERC Synergy project “Orbital Cinema”, he is working on one day capturing even the ultrafast movements of electrons so that quantum processes and chemical reactions may be observed as in a cinema.



CO₂ CATCHER

Measuring cells containing carbon nanofibres: the liquid nitrogen needed to cool the samples down to measurement temperature is the cause of the mist. Fleeces made from the nanofibres can efficiently separate CO₂ from industrial waste gases.



FOCUS ENERGY

The EU wants to be climate neutral by 2050. To achieve this goal, CO₂ emissions are to be reduced by 55 per cent compared to 1990 by 2030. At the same time, it is vital to secure the electricity supply, even in times of crises, and to keep industry competitive. Jülich scientists have been modelling scenarios to find out how these goals can be achieved. They make recommendations for a future energy system based on renewable energies and develop technologies for it.

Hydrogen plays a key role: it is intended to replace fossil fuels, store energy, enable mobility and serve as a basic material for the chemical industry, both efficiently and cost-effectively. It is also to be “green”, that is, produced with the help of renewable energies.

Jülich research on this topic is diverse: from material development for electrolysis plants and fuel cells or solar modules to the analysis of electrochemical processes and the transport, storage and use of hydrogen. Batteries are indispensable as energy storage devices. Jülich researchers optimize established systems and develop new battery types. Jülich is also pursuing a value chain in the research

into technologies for storing electricity in high-energy chemicals (“Power-to-X”), for example for use as fuel.

The energy system is one of the most important human influences on the climate and the atmosphere, both regionally and globally. Jülich scientists investigate the exact effects of these influences by studying physical and chemical processes in the atmosphere. They use findings from experimental research and computer simulations to advance existing climate models, act as experts and advise politicians and the public on necessary measures.



DIRK WITTHAUT

Prof. Dirk Witthaut is investigating the circumstances under which line outages can occur in power grids, which may lead to dangerous cascades of failures. He is also conducting research into the control systems that ensure that the generation and consumption of electricity remain balanced.

Energy system

REHEARSED ENERGY TRANSITION

Forschungszentrum Jülich is in the process of setting up a real laboratory for future energy systems on its premises, the Living Lab Energy Campus. Controlled by an IT platform as well as predictive and adaptive algorithms, the technology, energy sources and consumption of systems and buildings are to be optimally coordinated.

Hydrogen

ADVANTAGEOUS BUBBLE FORMATION

The productivity of processes in which gases such as the energy carrier hydrogen are released can be significantly increased if gas bubbles can form in the pores of the catalyst used. This is what researchers from Jülich and Erlangen-Nuremberg have discovered.

Hydrogen

FOCUS ON AFRICA

In March 2023, during her trip to South Africa and Namibia, Federal Research Minister Bettina Stark-Watzinger presented the results of analyses conducted by Jülich researchers in the H₂ Atlas Africa project. The message: Southern Africa has enormous potential for the production of green hydrogen.

Photovoltaics

IDENTIFYING PERFORMANCE LOSSES

Researchers at the Jülich branch office HI-ERN developed an algorithm that makes it possible to detect, independently of weather data, a reduction in the output of photovoltaic modules and to determine the extent of the deficit.

Energy materials

FASTER REPAIR FOR TURBINES

Ceramic coatings protect gas turbines from the high heat generated during operation, for example in aircraft engines. In the future, minor damage to the layers could be repaired using a new procedure developed by researchers at Jülich.

Atmosphere and climate

MEASUREMENTS AT AN ALTITUDE OF 36 KILOMETRES

In the summer of 2022, a balloon carried the infrared spectrometer GLORIA-B, developed by scientists from Jülich and Karlsruhe, to a height of up to 36 kilometres above Canada. The device thus measured trace gases and aerosols well above altitudes accessible to aircraft.

Atmosphere and climate

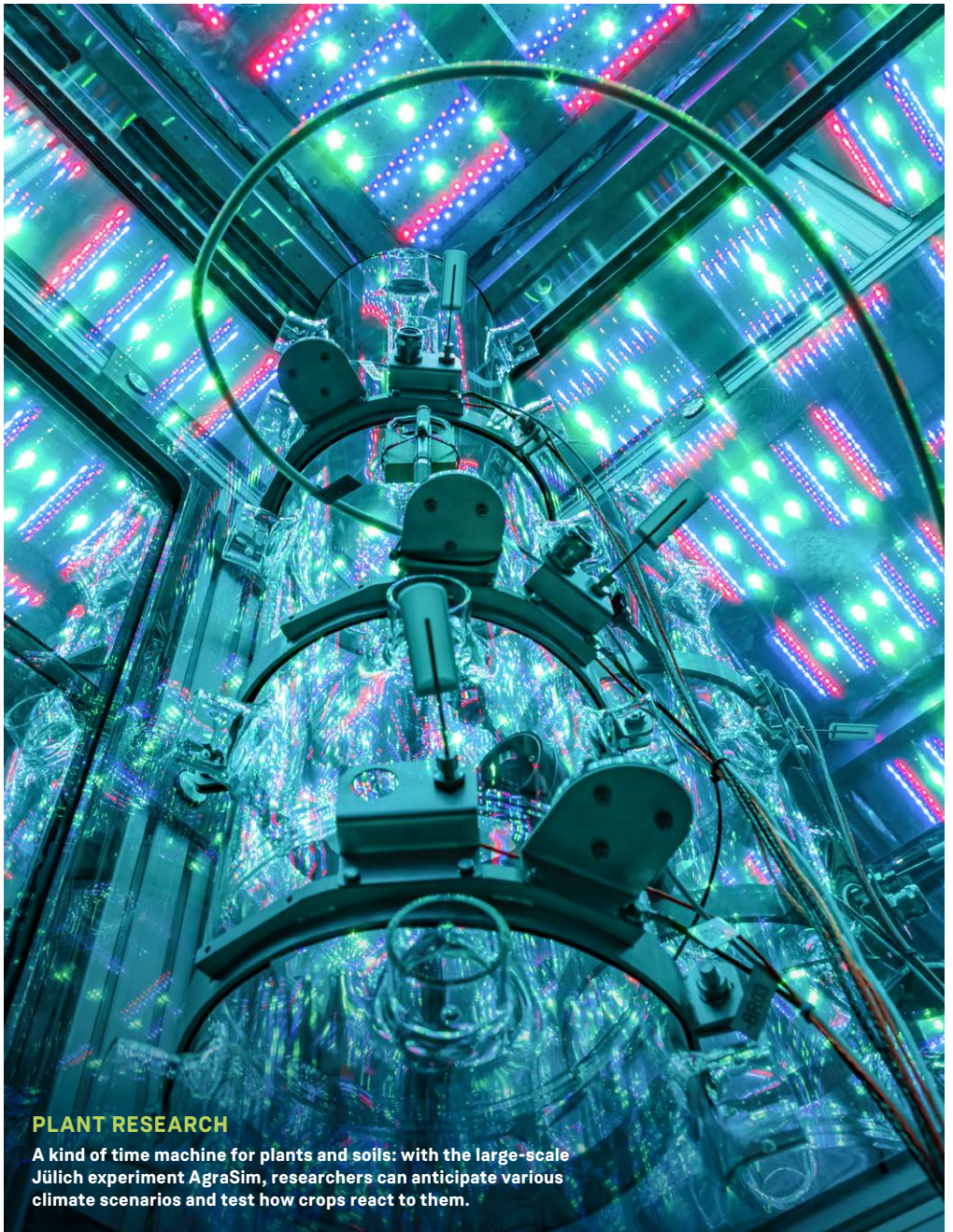
FLYING FOR RESEARCH

Since November 2022, a third long-haul aircraft of the Lufthansa Group has been in service for the European project IAGOS, so that a total of nine airliners are now collecting measurement data on the composition of the atmosphere. Forschungszentrum Jülich coordinates IAGOS Germany.

ANNE CAROLINE LANGE

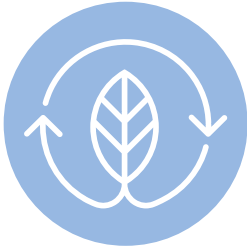
Dr. Anne Caroline Lange used the Jülich chemical transport calculation model EURAD-IM to infer, from the measured air pollution over Germany, the amount of pollutants emitted by the various sources – traffic, industry and households. According to this, the Federal Environment Agency has so far made a good estimate of emission levels.





PLANT RESEARCH

A kind of time machine for plants and soils: with the large-scale Jülich experiment AgraSim, researchers can anticipate various climate scenarios and test how crops react to them.



FUTURE FIELD BIOECONOMY

Sustainable bioeconomy is a bio-based circular economy that manages without fossil raw materials, instead relying on the efficient use of biological resources such as plants, animals or microorganisms. Scientists at Forschungszentrum Jülich have been developing new value creation processes, for example.

They use customized microorganisms and biological catalysts to produce, from renewable raw materials or waste such as plant residues, valuable substances for medicines, bioplastics or even fuels. In biotechnology, automation, miniaturization and digitization play an important role in shortening development times and making them more predictable.

Agriculture and plant research are also part of the bioeconomy. Researchers use experimental data from trial fields and simulations of soil-plant interactions to help optimize yields, reduce fertilizer use and address changes caused by climate change.

Digital monitoring supports tailored irrigation and can show stress in plants at an early stage. It is to be demonstrated in the Rhine-land region, which serves as a model region in

this respect, how the switch to a fossil-free economy can succeed after coal-fired power generation has been phased out. One building block for this is the BioökonomieREVIER initiative. It is coordinated by Forschungszentrum Jülich and networks the local actors. For more than ten years now, scientific expertise and modern infrastructures in important fields of the bioeconomy have been pooled in the Bioeconomy Science Center, which is the competence centre of Forschungszentrum Jülich as well as the universities of Bonn and Düsseldorf and of RWTH Aachen University.

JULIA FRUNZKE

Prof. Julia Frunzke is co-spokesperson of the new Collaborative Research Centre SFB1535 “Microbial Networking”. It focuses on the exchange of nutrients and information in complex microbial communities. The design or targeted manipulation of such communities has great medical and biotechnological application potential.



Agriculture

VINEYARDS AND THE CLIMATE

Researchers investigated whether CO₂ emissions from vineyard soils can be reduced by working carbon-rich organic matter into it. Up to 50 per cent of the carbon escaped from the soil again as CO₂ within two years.

Biotechnology

MORE SUSTAINABLE DRUG PRODUCTION

The agent metaraminol is used in medicines to treat low blood pressure. Jülich researchers developed a way to produce metaraminol biotechnologically using a renewable raw material.

Simulations

FLASH FLOOD WARNING

Jülich scientists are involved in the development of a better warning system against flooding from small and medium-sized rivers. The system is based on hydrological computer models fed with data from the latest weather surveillance radar methods.

Simulations

NITRATE POLLUTION FORECASTS

Germany must report annually to the EU on the extent to which the measures of the 2020 Fertilizing Ordinance reduce nitrate pollution of water bodies. Jülich computer models help to predict the future effects of the measures.

Shaping Change WITH RESEARCH

The Rhineland region is a region in transition – away from the climate-damaging use of lignite and towards sustainable value chains. Structural change is one of the central social challenges not only for the Rhineland lignite region but for the whole of North Rhine-Westphalia.

Forschungszentrum Jülich is actively helping to shape this process. With scientific excellence, it contributes to developing innovations and products, attracting new cooperation partners to the region, maintaining high-quality jobs and creating new ones. The region is to become a model for new economic activity in this way.

Funded by the federal and state governments, and together with regional partners from industry, science and civil society, the focus is on projects from Forschungszentrum Jülich's three strategic areas of research – Bioeconomy, Energy and Information.

PROJECTS INCLUDE:

- The BioökonomieREVIER initiative, which aims to develop a bio-based economy.
- The iNEW innovation platform, which is intended to help establish a circular economy based on carbon dioxide (CO₂).
- The Helmholtz Cluster for a Sustainable and Infrastructure-Compatible Hydrogen Economy (HC-H2) with various plans for demonstration in the hydrogen demonstration region.
- The infrastructure platform Ernst Ruska-Centre 2.0 for the development of innovative materials with next-generation electron microscopes.

OPENING OF HC-H2

The Helmholtz Hydrogen Cluster HC-H2, the largest structural change project in the Rhineland region, was opened in September 2022. HC-H2 emerged from Forschungszentrum Jülich with Prof. Peter Wasserscheid as its founding director. The North Rhine-Westphalian Minister President Hendrik Wüst, his Minister of Science Ina Brandes and State Secretary at the Federal Ministry of Education and Research Judith Pirscher attended the opening.



MATTHIAS MEIER-GRÜLL

Dr. Matthias Meier-Grüll is working on Agri-PV systems that allow land to be used for both photovoltaics and agriculture.

He is testing this technology with national and international users in the Rhineland region and beyond.



BioökonomieREVIER

TEST FOR REGIONAL VALUE CREATION

In 2022, farmers in the Rhineland region tested the cultivation of safflower and Indian cress for the first time. These plants supply substances that are interesting for packaging, cosmetics and the chemical and pharmaceutical industries. BioökonomieREVIER supports scientists during cultivation and harvesting with a view to further possibilities of utilization.

BioökonomieREVIER

SUSTAINABLE FIBRE MANAGEMENT OFFENSIVE

Three industrial companies worked together with BioökonomieREVIER to develop a concept to advance research into new industrial applications for plant fibres over the next few years.

INEW

CO₂ ELECTROLYSIS INSTEAD OF COAL

Jülich scientists have reached an important milestone in the climate-friendly production of the chemical raw material carbon monoxide (CO), which, until now, has mostly been produced from coal. For CO₂-to-CO electrolysis, they designed a cell stack with high efficiency.

Hydrogen showcase project

POWER AND HEAT FOR THE HOSPITAL

Showcase project at Hermann Josef Hospital in Erkelenz: two innovative hydrogen technologies – solid oxide fuel cells and liquid organic hydrogen carriers – are being combined to provide a climate-friendly energy supply for the clinic. The project is coordinated by the Helmholtz Hydrogen Cluster (HC-H2).

INSTITUTES AND SECTIONS

1 Ernst Ruska-Centre for Microscopy and Spectroscopy with Electrons

- Physics of Nanoscale Systems
- Materials Science and Technology
- Structural Biology

- Cellular Structural Biology
- Structural Biochemistry
- Neutron Scattering and Biological Matter
- Technical and Administrative Infrastructure

2 Institute for Advanced Simulation

- Jülich Supercomputing Centre
- Quantum Theory of Materials
- Theoretical Physics of Living Matter
- Theoretical Nanoelectronics
- Theory of Strong Interactions
- Computational Biomedicine
- Theoretical Neuroscience
- Civil Safety Research
- Data Analytics and Machine Learning
- Materials Data Science and Informatics

5 Institute of Energy and Climate Research

- Materials Synthesis and Processing
- Microstructure and Properties
- Techno-economic Systems Analysis
- Plasma Physics
- Photovoltaics
- Nuclear Waste Management
- Stratosphere
- Troposphere
- Fundamental Electrochemistry
- Energy Systems Engineering
- Systems Analysis and Technology Evaluation
- Helmholtz Institute Erlangen-Nürnberg for Renewable Energy
- Helmholtz Institute Münster
- Theory and Computation of Energy Materials
- Electrochemical Process Engineering

3 Institute of Bio- and Geosciences

- Biotechnology
- Plant Sciences
- Agrosphere
- Bioinformatics
- Computational Metagenomics

4 Institute of Biological Information Processing

- Molecular and Cellular Physiology
- Mechanobiology
- Bioelectronics
- Biomacromolecular Systems and Processes
- Theoretical Physics of Living Matter

6 Nuclear Physics Institute

- Experimental Hadron Structure
- Experimental Hadron Dynamics
- Theory of Strong Interactions
- Large Scale Nuclear Physics Equipment

7 Institute for Sustainable Hydrogen Economy

- Catalytic Interfaces*
- Catalyst Materials*
- Reaction Engineering*
- Process and Plant Engineering*

(* for chemical hydrogen storage)

8 Institute of Neurosciences and Medicine

- Structural and Functional Organisation of the Brain
- Molecular Organization of the Brain
- Cognitive Neuroscience
- Medical Imaging Physics
- Nuclear Chemistry
- Computational and Systems Neuroscience
- Brain and Behaviour
- Computational Biomedicine
- JARA-Institute Brain structure-function relationships
- JARA-Institute Molecular neuroscience and neuroimaging

9 Jülich Centre for Neutron Science

- Neutron Scattering and Biological Matter
- Quantum Materials and Collective Phenomena
- Neutron Analytics for Energy Research
- Neutron Methods

10 Peter Grünberg Institute

- Quantum Theory of Materials
- Theoretical Nanoelectronics
- Quantum Nanoscience
- Quantum Materials and Collective Phenomena
- Microstructure Research
- Electronic Properties
- Electronic Materials
- Quantum Control
- Semiconductor Nanoelectronics
- JARA-Institute Energy-efficient information technology
- JARA-Institute Quantum Information
- Institute for Quantum Computing Analytics
- Institute for Functional Quantum Systems
- Institute for Neuromorphic Compute Nodes
- Institute for Neuromorphic Software Ecosystems
- Technical Services and Administration

11 Central Institute of Engineering, Electronics and Analytics

- Engineering and Technology
- Electronic Systems
- Analytics

RESEARCH INFRASTRUCTURES

Scientists at Forschungszentrum Jülich have access to extensive, highly specialized research infrastructures. Facilities such as the Helmholtz Nano Facility (HNF), the Ernst Ruska-Centre for Microscopy and Spectroscopy with Electrons (ER-C) or the Jülich Centre for Neutron Science (JCNS) complement each other and, as world-class infrastructures, are also available to external researchers.

On the roadmap of the ESFRI (European Strategy Forum on Research Infrastructures) are research infrastructures that are of impor-

tance for Europe, strategically and as regards research policy. These include EMPHASIS, for plant phenotyping, PRACE, for the network of European supercomputers, and IAGOS, for research into the Earth's atmosphere – all of which are coordinated by Jülich. EBRAINS, the digital research infrastructure of the Human Brain Project (HBP), has also been on the ESFRI roadmap since 2021. The Ernst Ruska Centre 2.0 has been on the German roadmap for research infrastructures since 2019.

RESEARCH INSTRUMENTS AND FACILITIES

HELMHOLTZ NANO FACILITY (HNF)



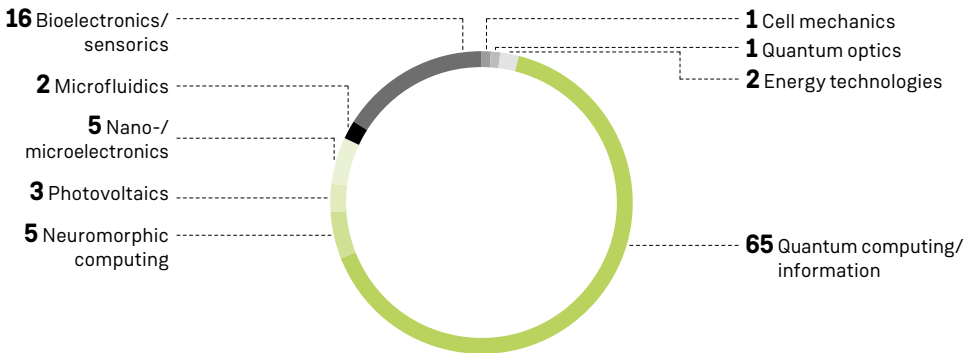
A NanoCluster, housed in the HNF, in which core components of the hybrid qubit are manufactured.

The Helmholtz Nano Facility (HNF) provides scientists with instruments and knowledge for the production and research of nanostructures. Unique throughout Europe, the HNF is a research infrastructure for researching, producing and characterizing nanostructures and atomic structures for information technology. Work at the HNF focuses on quantum computing, the components of which are based on the laws of quantum mechanics and use qubits for computing.

As a state-of-the-art clean room facility with 1,000 m² of clean room of ISO classes 1-3, the HNF offers resources in production, synthesis, characterization and the integration of structures, devices and circuits.

Usage according to research area¹⁾

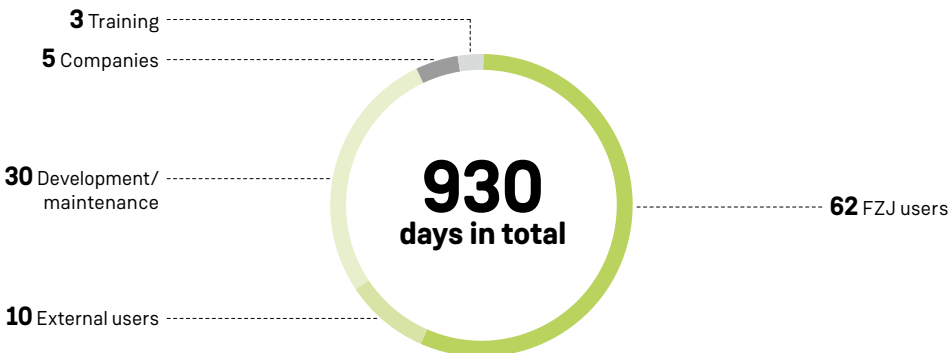
2022, in per cent



1) **Bioelectronics:** the combination of biological and electronic systems | **Cell mechanics:** behaviour of cells under different mechanical conditions | **Nano-/microelectronics:** electronic components with a very low energy requirement for processing or storing information | **Energy technology:** energy generation systems | **Photovoltaics:** converting light into energy/increasing the efficiency of solar cells | **Microfluidics:** behaviour of liquids in the smallest space | **Quantum optics:** systems for the interaction between light and matter | **Quantum computing:** circuits based on the laws of quantum mechanics | **Neuromorphic computing:** computers and circuits modelled on the brain

Allocated usage time²⁾

2022, in per cent



2) Days of use, rounded

EUROPEAN INFRASTRUCTURE FOR MULTI-SCALE PLANT PHENOMICS AND SIMULATION FOR FOOD SECURITY IN A CHANGING CLIMATE (EMPHASIS)

The European Infrastructure for Multi-Scale Plant Phenomics and Simulation for Food Security in a Changing Climate (EMPHASIS) is a plant phenotyping infrastructure distributed

across Europe. Here, the external appearance of plants, the phenotype, is analyzed and measured; for example the architecture of roots or the number of leaves. The development of the European infrastructure is being coordinated at the Jülich Institute of Bio- and Geosciences as part of the EU-funded EMPHASIS-PREP project. EMPHASIS supports scientists in studying plants in different environments to enable more efficient crop production in a changing climate, to ensure future food security and to trigger a sustainable European agricultural economy. Information systems for data collection and a platform with mathematical models are linked by EMPHASIS at a European level, knowledge and new technologies are shared and scientific education is supported. Thus, researchers from Europe are given access, for instance, to the facilities of the Jülich Plant Phenotyping Centre (JPPC).

EMPHASIS builds on the EU research infrastructure projects EPPN/EPPN2020 and will expand the portfolio of phenotyping infrastructures, integrate national infrastructures and ensure sustainable and long-term use of the infrastructures.

207

**facilities across Europe
for plant phenotyping in the
EMPHASIS database**

25

**European countries are
members of the EMPHASIS
Support Group**

144

**transnational research projects
in EPPN2020 with scientists
from 37 countries**



The JUNIQ building dampens shaking, for the reason that quantum computer systems need a vibration-free location.

JÜLICH UNIFIED INFRASTRUCTURE FOR QUANTUM COMPUTING (JUNIQ)

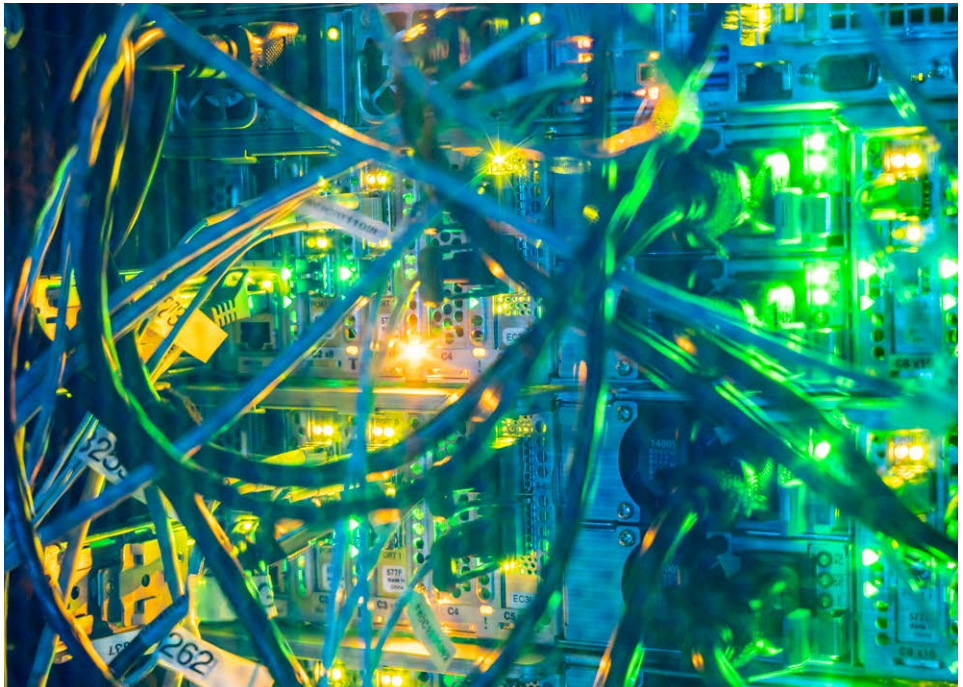
Quantum computing and quantum annealing are considered the computing methods of the future when it comes to solving extremely complex problems. While there is still a long way to go before these technologies will be fully developed, the first experimental systems, prototypes and commercial devices can already be used today. The Jülich UNified Infrastructure for Quantum computing (JUNIQ) provides German and European users with access to various of these quantum machines. JUNIQ thus permits science and industry early first steps into the practice of quantum computing. Moreover, JUNIQ supports users in the development of algorithms and applications for quantum computing.

Since the beginning of 2022, JUNIQ has included a quantum annealer with more than 5,000 qubits from the company D-Wave. It is housed in the UNIQ building, which was built specifically for this purpose. Additional systems are located at Jülich while others are in partner facilities. At the beginning of 2024, a quantum simulator from the French start-up PASQAL will go into operation at Jülich. The simulator will be closely linked to the Jülich supercomputer JUWELS, which is also part of JUNIQ.

JÜLICH SUPERCOMPUTING CENTRE (JSC)

The Jülich Supercomputing Centre (JSC) provides computing capacity of the highest performance class to scientists at Forschungszentrum Jülich, at universities and research institutions in Germany and Europe as well as to the industry. The Centre also supports them in their research projects. It responds at short notice to new user requirements such as the use of cloud services or artificial intelligence (AI), to interactive supercomputing or to the development of concepts and services for long-term data curation.¹⁾

Since the introduction of the Top500 list of the world's fastest supercomputers, the systems operated at the JSC have consistently ranked among the 20 fastest. Along with the JURECA system, JUWELS is a system that, together with a GPU-based booster module, currently provides a computing power of 85 quadrillion computing operations per second (85 petaflops²⁾).



Lines for data transfer from supercomputers

Users according to region

In computing time projects peer-reviewed by an independent panel of experts

Germany	1,250
Europe (without Germany)	250
Countries outside Europe	100

Energy efficiency (flops per watt) plays an increasingly important role in the operation of high-performance and supercomputers. The JUWELS booster available at Jülich is one of the most energy-efficient systems in the world. It is used for a wide range of applications, from basic research to climate and materials research to life and engineering sciences.

Forschungszentrum Jülich – a partner in the German Gauss Centre for Supercomputing – was selected to be the site of the first European exascale computer. In 2024, JUPITER will be installed: the first system in Europe to exceed the threshold of one trillion computing operations per second – this is a 1 with 18 zeros. At the JSC, it will share an environment with quantum computers and neuromorphic computers. JUPITER will be available to a wide range of European users from science,

Users

- In 2022, the computers JUWELS and JURECA operated at the JSC were used by almost **1,600** scientists in some **345** projects.
- In addition, more than **1,000** users were involved in smaller collaborative projects with the JSC in 2022.
- About **10** per cent of users consume about **90** per cent of the resources, since Jülich, as a national supercomputing centre, primarily supports large-scale projects.

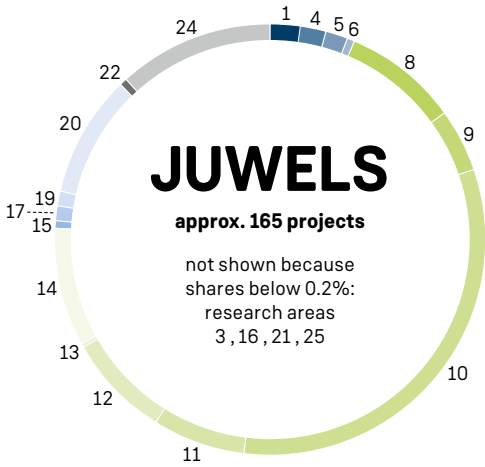
industry and the public sector. The German contribution will be part of the national supercomputer infrastructure, which is provided by the Gauss Centre for Supercomputing. The European supercomputing initiative EuroHPC JU (European High Performance Computing Joint Undertaking) and German government agencies are funding the exascale computer with a total budget, shared equally, of €500 million. JUPITER will help solve pressing scientific questions, such as climate change and sustainable energy production, as well as enable the intensive use of artificial intelligence.

1) Activities required to maintain research data over the long term so that it remains available for reuse and retention

2) The computing power of computer systems is expressed in floating point operations per second (FLOPS). This value indicates how many floating point number operations (additions or multiplications) can be performed by a system in one second.

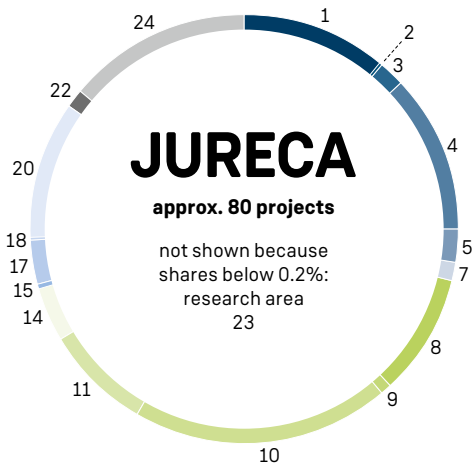
Usage according to research area

As of November 2022



Research areas

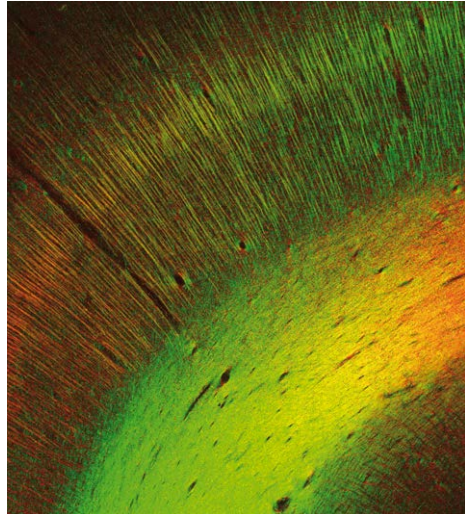
- 1 Fundamentals of biology and medicine
- 2 Microbiology, virology and immunology (JURECA only)
- 3 Medicine
- 4 Neuroscience
- 5 Chemical solid state and surface research
- 6 Analytics/method development (JUWELS only)
- 7 Physical and theoretical chemistry (JURECA only)
- 8 Condensed matter physics
- 9 Optics, quantum optics and physics of atoms, molecules and plasmas
- 10 Particles, nuclei and fields
- 11 Statistical physics, soft matter, biological physics, nonlinear dynamics
- 12 Astrophysics and astronomy (JUWELS only)
- 13 Mathematics (JUWELS only)
- 14 Atmospheric, marine and climate research
- 15 Geophysics and geodesy
- 16 Geochemistry, mineralogy and crystallography (JUWELS only)
- 17 Water research
- 18 Process engineering, technical chemistry (JURECA only)
- 19 Mechanics and constructive mechanical engineering (JUWELS only)
- 20 Thermal energy technology, thermal machines, fluid mechanics
- 21 Materials technology (JUWELS only)
- 22 Materials science
- 23 Electrical engineering and information technology (JURECA only)
- 24 Informatics
- 25 Construction and architecture (JUWELS only)



EBRAINS

EBRAINS is a new digital research infrastructure created as part of the EU-funded Human Brain Project (HBP). The aim is to promote brain research and to translate scientific findings into brain-inspired innovations in computing, medicine and industry. To this end, multidisciplinary neuroscience works closely with the developers of state-of-the-art information technologies and uses powerful computers to assemble the ever-growing knowledge about the brain from different research fields.

Being the first research infrastructure of its kind in the world, EBRAINS offers access through a web portal to the most comprehen-



Nerve fibres of the visual cortex in the brain, shown using Polarized Light Imaging.

EBRAINS in figures

As of June 2023

- More than **500** scientists at **155** European partner institutions from **19** countries are involved in the development of EBRAINS.
- EBRAINS contains almost **1,000** data sets; **242** models and **206** analysis programmes from **2,037** scientists.
- EBRAINS “Medical Informatics Platform” is installed in **45** European hospitals. It offers data protection compliant access to **29,000** data sets of patients with, e.g., dementia, epilepsy or traumatic brain injuries.
- **1,431** institutions in Europe and around the world use EBRAINS.

sive database on the human brain to date as well as to powerful digital tools, for example for simulation or AI-based analytical methods. The EBRAINS Computing Services coordinated by the Jülich Supercomputing Centre form the computationally powerful basis of EBRAINS and make it possible to integrate platforms and solutions from the various EBRAINS services into complex workflows. The offer also includes the extremely high-resolution 3D atlas of the human brain developed by the Jülich Institute of Neuroscience and Medicine, supercomputing methods specially developed for neuroscientists and “neuromorphic” computers inspired by the brain.

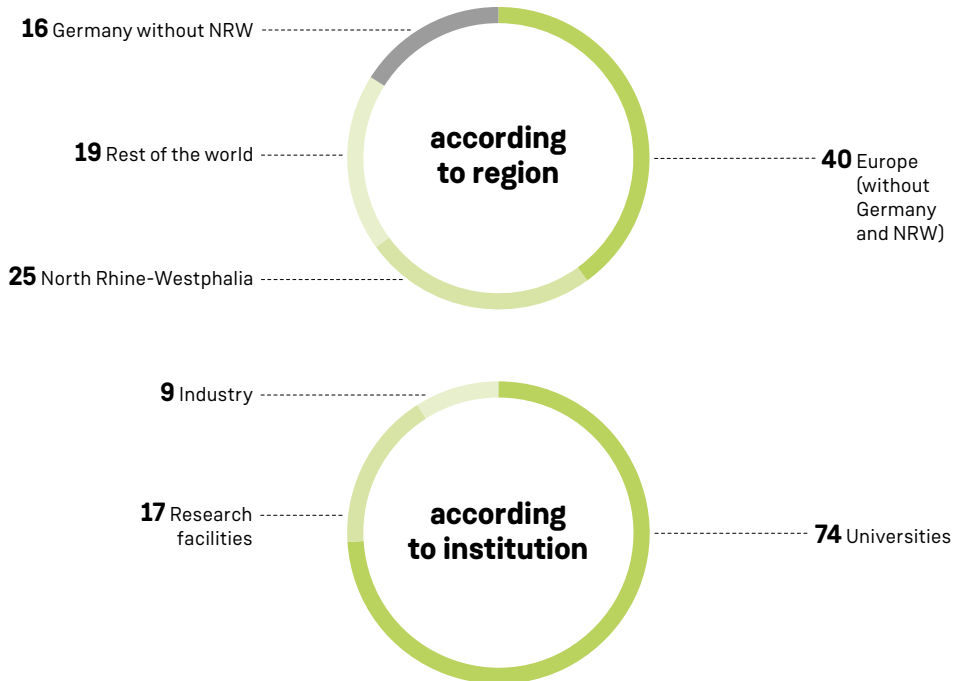
ERNST RUSKA-CENTRE (ER-C)

The Ernst Ruska-Centre for Microscopy and Spectroscopy with Electrons (ER-C) is the national research infrastructure for ultra-high resolution electron microscopy. It is jointly operated by Forschungszentrum Jülich and RWTH Aachen University. The electron optical instruments provided and further developed by the ER-C can be used to investigate

and describe structures at the atomic and molecular levels. The knowledge gained helps, for example, to develop innovative materials, to better understand the structure of proteins and to investigate medical substances. In addition to PICO, one of only three electron microscopes in the world that correct the important lens error of chromatic aberration, KRIOS

External users

2022, in per cent (rounded)



is now also available for this purpose: a high-performance device with which biological samples can be examined in their natural state on the nanometre scale. In the ER-C 2.0 project, the Centre's infrastructure is being specifically expanded as part of the national roadmap for research infrastructures.

The ER-C creates incentives for companies working with novel materials and technologies to settle in the Rhineland region and contribute to the development of a competence region for innovative materials technologies and, ultimately, to the success of structural change.

Usage according to research area

2022, in per cent (rounded)

■ 1 Energy research

- Catalytic nanoparticles
- Fuel cells and batteries
- Gas separation membranes
- Photovoltaic materials
- Thermoelectric materials

■ 2 Fundamental solid state research

- Complex and novel materials
- Heterogeneous interfaces
- Lattice defects

■ 3 Information technology

- Ferroelectric materials
- Magnetic nanoparticles
- Semiconductor nanostructures
- Memristive memory for neuromorphic computers

■ 4 Principles of electron optics

- Novel measurement techniques and analytical methods

■ 5 Principles of the life sciences

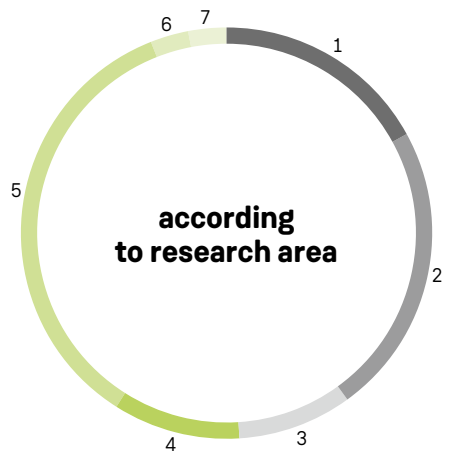
- Structure and function of mitochondrial membrane protein complexes
- Protein folding and protein biosynthesis
- Protein properties and interactions
- Functional protein dynamics
- Autophagy
- ESCRT (endosomal sorting complexes required for transport)

■ 6 Cryo-electron microscopy method development

- Development of sample preparation methods
- Development of novel cryo-scanning transmission electron microscopy techniques
- Development of image analysis software

■ 7 Drug development

- Industry



OTHER RESEARCH INFRASTRUCTURES

ESS Competence Centre

Coordinates the Jülich contributions to the European Spallation Source ESS, the world's most powerful neutron source.

Imaging Core Facility (ICF)

Pools the imaging methods of neurosciences and medicine.

Jülich Centre for Structural Biology (JuStruct)

Combines infrastructure and expertise on atomic-resolution structural biology methods.

Jülich Synchrotron Radiation Laboratory (JSRL)

Operates state-of-the-art photoemission spectrometers and photoemission electron microscopes at the synchrotron sources DESY (Hamburg), ELETTRA (Trieste, Italy) and BESSY (Berlin).

Jülich Centre for Neutron Science (JCNS)

Operates neutron scattering instruments at top sources in Germany, Europe and worldwide.



Aerial view of the ESS, which is currently being built in Lund, Sweden.

Cooler Synchrotron COSY

Particle accelerator and storage ring for using proton and deuteron beams.

SAPHIR and SAPHIR-PLUS

For researching processes in the atmosphere.

Biomolecular NMR Center

With ultra high-field spectroscopy for structural biology.

Membrane Centre

For developing membrane systems for new energy-efficient technologies.

Helmholtz Energy Materials Characterization Platform (HEMCP)

For materials research in energy technologies.

ENVRI-FAIR

Makes data from all European Earth system research freely accessible worldwide via the European Open Science Cloud (EOSC).

Helmholtz Quantum Center (HQC)

Technology laboratory on the quantum computing research spectrum, from quantum materials to quantum computer systems.

Terrestrial Environmental Observatories (TERENO)

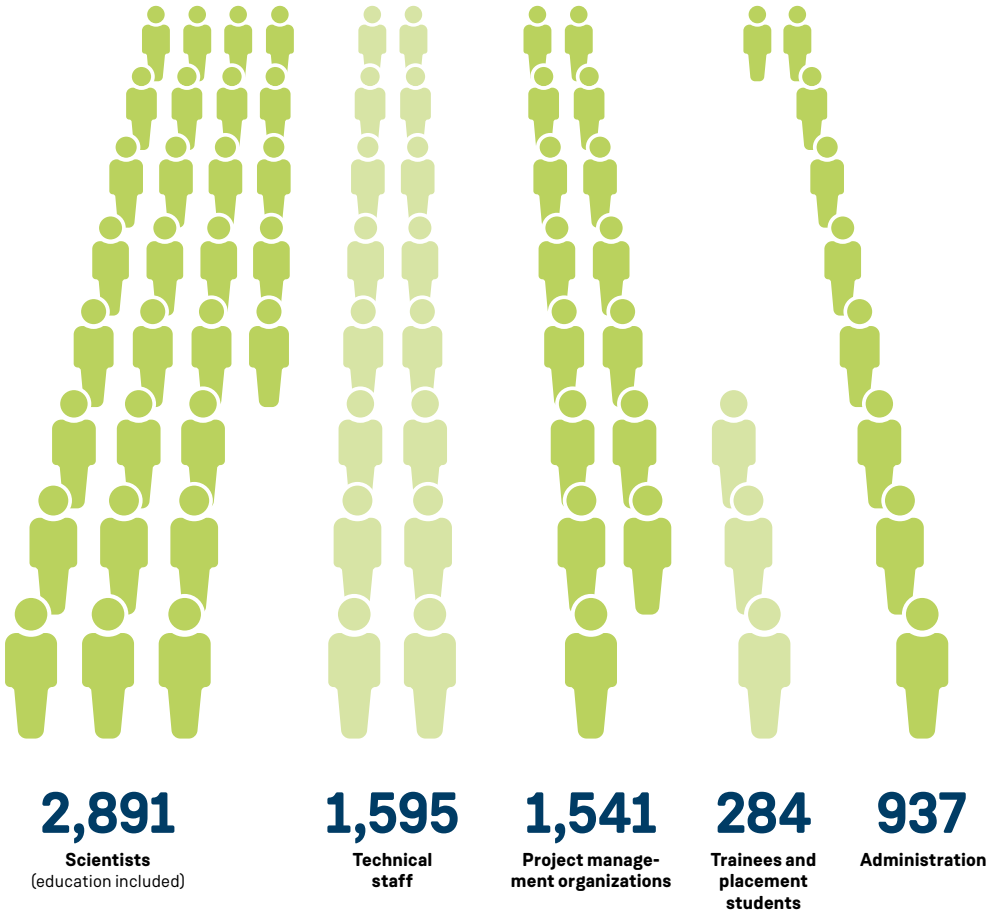
Captures long-term regional impacts of global change – ecological, social and economic – across Germany.



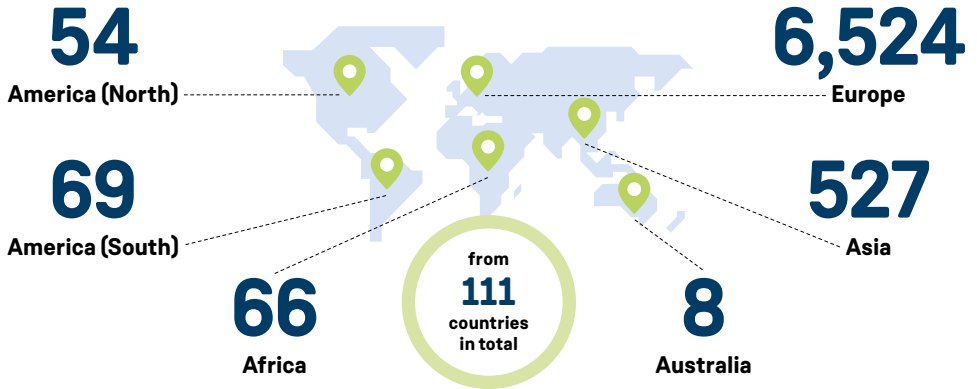
**Measuring instruments in TERENO's Eifel/
Lower Rhine Valley Observatory**

TRANSFER AT JÜLICH AT A GLANCE

7,248
Employees¹⁾

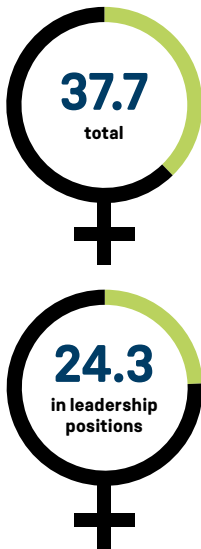


STAFF ACCORDING TO NATIONALITY¹⁾

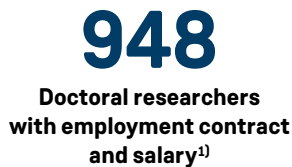


PROPORTION OF WOMEN

In per cent, FTE (full-time equivalent)



NATIONAL RESEARCH PROJECTS



1) As of 31 December 2022

JÜLICH IN THE PUBLIC EYE

VISIT OF THE HEAD OF STATE

Federal President Frank-Walter Steinmeier visited the Helmholtz Institute Erlangen-Nürnberg for Renewable Energy (HI ERN), a branch of Forschungszentrum Jülich, during his information and meeting tour with the diplomatic corps. He gained an impression of the broad and ambitious research on the sustainable energy supply of the future. Steinmeier then toured the world's first commercial filling station that uses Erlangen's LOHC technology to store hydrogen using a liquid carrier. The

HI ERN was founded in 2013. The institute's directors are Prof. Peter Wasserscheid, Prof. Karl Mayrhofer and Prof. Christoph Brabec. Today, more than 170 scientists at the institute conduct research on a climate-friendly, sustainable and affordable energy supply for future generations.





EXPERIENCING RESEARCH

Around 20,000 people were drawn to Forschungszentrum Jülich on Open Day. The campus, almost two square kilometres in size, had opened its doors and invited the public to learn about the work at one of the largest research centres in Europe. In over 300 different presentations, more than 60 institutes vividly demonstrated what research can do for a changing society. The topics presented ranged from digitalization to climate change and energy transition. Jülich scientists answered questions about their field of expertise and explained the significance it can have for everyday life.

20,000

visitors came to Forschungszentrum Jülich on “Open Day”



PROMOTING YOUNG TALENT

JULAB – AWAKENING THE RESEARCH INSTINCT

Forschungszentrum Jülich wants to get young people excited about science. They are the discoverers and idea generators of the society of tomorrow – through the JuLab Schools Laboratory, learners and teachers gain access to the fascinating world of research.

Experimental days

After the corona-related restrictions of the previous years, the JuLab Schools Laboratory could hold its classroom events again in 2022 and welcomed a total of 2,352 students. More than 100 experimental days on more than 20 different topics were organized. The latest addition to JuLab’s programme was the “Accelerator Physics” experimental day, which it had developed together with the Nuclear Physics Institute.

Online formats

Following the positive experience with the “Mission: online research” format, JuLab has included interactive online offers on “Brain

research” and “Big data in health research” in its programme. JuLab also participated in the nationwide “Maus-Türöffner-Tag” – an initiative by the popular German children’s television programme “Sendung mit der Maus”, internationally known as “Mouse TV”, and organized by German public broadcasting institution WDR – with the online event “Mission: brain”. Finally, JuLab participated in the nationwide Read Aloud Day: Jülich scientist Johanna Nelkner read from the children’s book “Bifidos Reise – mit Charme durch den Darm” (Bifido’s journey – a charming bowel traveller) using a video conference platform and spoke about her research.

Events

On Open Day in August 2022, JuLab presented the main research areas of Forschungszentrum Jülich across the JuLab building – vividly and with hands-on experiments. In addition, JuLab organized the Helmholtz School Student Congress “Energy – Research – Society” in November 2022, which was attended by 140 senior school students. Jülich energy researchers presented their work through lectures, workshops, guided tours of the institute, exhibits and a panel of experts.

Training courses

In 2022, Julab conducted a total of 15 training courses with 283 participants, including 210 teachers and educators. Some of these trainings dealt with the use of experimental kits developed by JuLab on the topics of DNA, soil,



Sparking interest in energy research, among other things: this was accomplished on Open Day.



Participants in a project course at Forschungszentrum Jülich

electricity and ferromagnetism. The kits can be borrowed. Another two-day training course designed by JuLab was aimed exclusively at teachers and dealt with radioactivity.

JuLab is also the network coordination body of the children’s research foundation “Stiftung Kinder forschen” for the district of Düren. It supports learning facilitators from daycare centres and primary schools with regular further training.

JuLab prepared scripts and experimental material and held workshops for the nationwide children’s research day “Tag der kleinen Forscher”. Employees of Forschungszentrum Jülich used this offer to conduct experiments on the “Mysterious Earth” in their children’s day-care centres and schools.

Project courses, holiday offers and workshop

Senior school students from three schools in the region attended project courses at For-

schungszentrum Jülich. Coordinated by JuLab and embedded in a framework programme, the students were involved in the current research topics of agricultural photovoltaics, going viral and algae in the bioeconomy. They worked on their own questions over the course of a school year.

More than 200 children and young people took part in the JuLab’s several-day holiday offers: laboratory internship in microbiology, career exploration internship in biology-chemistry, JuGirls – STEM for girls, discovery weeks and the Helmholtz holiday camp.

As part of a weekly afternoon workshop and with mentors from JuLab, students worked in a small group on their own electronics and programming projects.

VOCATIONAL ORIENTATION, VOCATIONAL TRAINING AND DUAL STUDIES

Forschungszentrum Jülich offers a wide range of opportunities for career orientation. In 2022, 104 school students were accepted for their compulsory school internships, while 151 students were supervised in the context of compulsory internships and voluntary study-related internships.

As one of the region’s largest companies that takes on trainees, Forschungszentrum Jülich

Vocational training positions

New trainees in 2022

Occupations	Total	incl. a dual study programme
Laboratory technicians	25	6
Electricians	11	-
Metal workers	11	-
Office staff	11	-
Mathematical-technical software developers	23	23
Other	3	-
Total	84	29

looks back on more than 60 years of experience in vocational training and assumes a special social responsibility for securing the next generation of skilled workers. Each year, it offers trainee positions in one of over 20 different occupations that require formal training. Since its foundation, about 5,500 young people have received qualified vocational training. Many former trainees are still employed at Forschungszentrum Jülich today.

In 2022, 89 apprentices completed their training. 63 of them (71 per cent) passed the exam with the top grades of either “very good” or “good”.

Forschungszentrum Jülich is partnering with neighbouring universities in offering five dual study programmes in the natural sciences as well as in the commercial and technical fields. A dual study programme combines profound training at Jülich, for example as a mathematical-technical software developer (MATSE), with a bachelor’s degree at a university of applied sciences, such as a “Bachelor of Science – Applied Mathematics and Computer Science”.

INTERNATIONAL EXCHANGE

Every year, students from all over the world come to Jülich to gain experience early on in a research-intensive environment. The mobility of young researchers fosters their scientific

development, propels the transfer of ideas and intensifies the international collaborations of Forschungszentrum Jülich.

In 2022, for example, in the RISE programme, the German Academic Exchange Service (DAAD) awarded 12 scholarships to bachelor students for an internship at Jülich.

In the context of the Palestinian-German Science Bridge (PGSB), seven bachelor students and ten master students worked at Jülich, as did 38 doctoral researchers and five postdocs. In 2022, the PGSB fellows released a total of 20 publications.

The Georgian-German Science Bridge (GGSB) made it possible for four master students and doctoral researchers to conduct research at Jülich in 2022.

The China Scholarship Council (CSC) programme supported the stay of ten doctoral researchers and three postdocs at Jülich in 2022.

PROMOTING YOUNG SCIENTIFIC TALENT

Young researchers make a significant contribution to scientific progress through their commitment and innovative ideas. It is a declared objective of Forschungszentrum Jülich to promote them. The measures are based on the principles of diversity and inclusion, innovation and networking, and scientific excellence.

There are centre-wide programmes for EU qualification levels R1 (doctoral researchers) and R2 (postdocs). In addition, so-called excellence programmes are aimed at young scientists at all career levels who wish to pursue a scientific career with the goal of a leadership role. The Jülich Center for Doctoral Researchers and Supervisors (JuDocS) and the Career Center and Postdoc Office offer broad support and advice.

Innovation and entrepreneurship are promoted through the JUICE programme: it helps to

examine and develop research results in such a way that they can lead to technologies, products or applications. The internal and external networking of young researchers is supported by the doctoral networking programme and the advice on the Researcher Grants of the Helmholtz Information & Data Sciences Academy.

Judocs – Jülich Center for Doctoral Researchers and Supervisors

The structured doctoral support of JuDocS forms the basis for the subject-specific offers in the institutes, research training groups and graduate schools, such as HITEC (Helmholtz Interdisciplinary Doctoral Training in Energy and Climate Research) or HDS-LEE (Helmholtz School for Data Science in Life, Earth and Energy).

JuDocS offers Jülich doctoral researchers a targeted onboarding process including a



The young scientists Dr. Simon Rosanka, Dr. Yuri Kutovyi, Dr. Franz Kaiser, Dr. Tarini Prasad Mishra (from left) and Dr. Fengshan Zheng (not in the picture) were awarded the 2022 Excellence Prize of Forschungszentrum Jülich for their outstanding dissertations and achievements in the postdoctoral phase.

half-day introductory event, which was held 12 times in 2022. A total of 305 doctoral students were involved in this way. In addition, JuDocS supports doctoral researchers with an interdisciplinary transferable skills programme, a low-threshold counselling service in case of supervision conflicts, and independent monitoring of the progress of the respective doctoral project. In 2022, 52 compulsory courses and seven optional courses were offered in the transferable skills programme. A total of 623 doctoral students participated in them.

As early as 2021, JuDocS began to focus more on the supervisors of doctoral researchers as an important target group in the doctoral process. The expansion of corresponding offers was further developed and intensified in 2022. For example, JuDocs now also provides onboardings for supervisors. The participants of the event, which was held twice in 2022, overwhelmingly rated it as very helpful.

In the course of 2022, 1,364 supervised doctoral researchers¹⁾ worked at Forschungszentrum Jülich. Around 33 per cent of them were

women and around 43 per cent came from abroad. They were supervised by the institutes, the doctoral supervisors and the academic supervisors at Jülich, adding up to around 460 people. As of 31 December 2022, there were 309 postdocs at Jülich, including 108 women. Some 50 per cent of all postdocs came from abroad.

Young investigators groups

Forschungszentrum Jülich offers superb starting conditions for a scientific leadership career to excellent postdocs with the opportunity to set up their own young investigators group. In 2022, four new groups were established at Forschungszentrum Jülich. There was a cumulative total of 18 young investigators groups. Four of the group heads held a junior professorship; there was one W2 professorship and one W3 professorship each; four of the group heads were funded by the EU through an ERC Starting Grant.

1) This figure also includes doctoral researchers who do not have a contract with Forschungszentrum Jülich, but are financed through scholarships, for example.

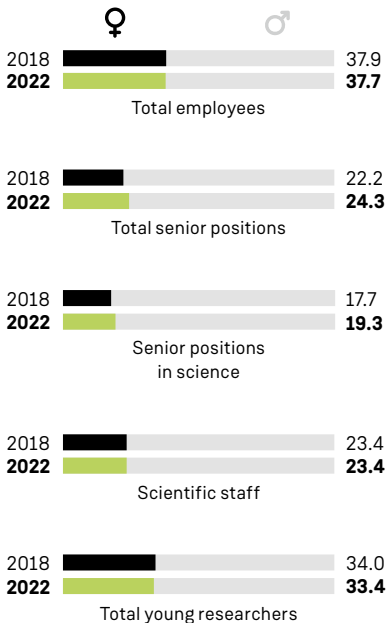
STAFF

Forschungszentrum Jülich offers a wide range of career opportunities in science, technical or administrative infrastructures and in research management. Our staff are committed to ensuring that our research meets the highest scientific standards and contributes to solving social problems. Their motivation, creativity and potential is the driving force behind the shaping of research

for a changing society. Collegiality and diversity are the basis for us, as a multidisciplinary research centre with an international workforce, to make the most of our opportunities. In addition to excellent research infrastructures, we offer support in balancing work and family life. We want to make real equality of opportunity possible.

Proportion of women in Forschungszentrum Jülich's workforce

In per cent, FTE (full-time equivalent)



Staff overview

As of 31 December 2022

Area	Number ¹⁾
Research and technical staff	4,486
of which research staff incl. individuals in scientific training	2,891
· of which doctoral researchers	948
· of which scholarship holders	12
· of which student assistants	131
· of which joint appointments with universities ²⁾	164
· of which W3 professors	72
· of which W2 professors	87
· of which W1 professors	5
of which technical staff	1,595
Project management organizations	1,541
Administration	937
Trainees and placement students	284
Total	7,248

1) Only employees with a contract paid by Jülich are included
 2) Not including members of the Board of Directors
 2) Including 144 employees covered by collective agreements with the intention of obtaining a doctorate

SHAPER OF CHANGE: PROF. WOLFGANG MARQUARDT

Prof. Wolfgang Marquardt, Chairman of the Board of Directors of Forschungszentrum Jülich since 2014, retired on 31 July 2023. He had also been Vice-President of the Helmholtz Association and Coordinator of the Research Field Information.



His tenure was characterized by the change and growth of Forschungszentrum Jülich: he initiated a participatory strategy process that set the direction for its reorientation. The concentration on the areas of research Information, Energy and Bioeconomy defined the development of the scientific profile.

Interdisciplinary cooperation and the continuously increasing integration of research fields became the decisive factors in the design of research. Marquardt brought quantum computing, neuromorphic computing and Jülich's hydrogen research into focus. One of his particular concerns was Forschungszentrum Jülich's commitment to structural change in the Rhineland region. In this way, Forschungszentrum Jülich follows its mission to enable innovations in all areas of society and to harness them in its claim of "research for a changing society" through use-inspired basic research.

In order to secure scientific excellence, it was important to Marquardt to further raise the profile of Forschungszentrum Jülich and strengthen its position in scientific competition.

APPOINTMENTS, PROFESSORIAL APPOINTMENTS

APPOINTMENTS

Jülich scientists were offered the following chairs in 2022¹⁾:

- 1 **Dr. Yulia Arinicheva Skåtun**
Institute of Energy and Climate Research
▶ Western Norway University of Applied Sciences, Department of Safety, Chemistry and Biomedical Laboratory Sciences
- 2 **Dr. Apurv Dash**
Institute of Energy and Climate Research
▶ Denmark Technical University, Department of Energy Conversion and Storage
- 3 **Dr. Marvin Kaminski**
Helmholtz Nano Facility
▶ HRW University of Applied Sciences, Institute of Measuring and Sensor Technology
- 4 **Dr. Patrick Preuster**
Institute of Energy and Climate Research
▶ Bochum University of Applied Sciences, Chair of Energy Process Engineering
- 5 **Prof. Christian Grefkes**
Institute of Neurosciences and Medicine
▶ Goethe University, Frankfurt am Main, Chair of Neurology
- 6 **Dr. Anil Kumar Dasanna**
Institute of Biological Information Processing
▶ Indian Institute of Technology Palakkad

- 7 **Dr. Jiarul Midya**
Institute of Biological Information Processing
▶ Indian Institute of Technology Bhubaneswar
- 8 **Dr. Yicheng Zhao**
Institute of Energy and Climate Research
▶ University of Electronic Science and Technology of China, Department of Semiconductors
- 9 **Dr. Ning Li**
Institute of Energy and Climate Research
▶ South China University of Technology, Department of Materials Science
- 10 **Dr. Liang-Yin Kuo**
Institute of Energy and Climate Research
▶ Ming Chi University of Technology, Department of Chemical Engineering
- 11 **Dr. Namkyu Lee**
Institute of Biological Information Processing
▶ Yonsei University, Department of Mechanical Engineering

📍 **Forschungszentrum Jülich**

1) Not including appointments to universities that resulted in a joint appointment with Forschungszentrum Jülich

JOINT PROFESSORIAL APPOINTMENTS WITH UNIVERSITIES

In the case of a joint appointment, the appointed person holds the office of a professor at a university and, at the same time, has a

position at Forschungszentrum Jülich GmbH. In 2022, the following scientists were newly appointed to professorships.

Number of joint professorial appointments with universities

As of 31 December 2022

University	Number of professorial appointments) ¹⁾	of which new appointments in 2022
RWTH Aachen University	67	6
FH Aachen University	6	1
Ruhr Universität Bochum	5	–
University of Bonn	14	2
HHU Düsseldorf	24	2
University of Duisburg-Essen	6	–
FAU Erlangen-Nürnberg	5	–
University of Cologne	18	–
KU Leuven	1	–
UCL Louvain	1	–
JGU Mainz	1	–
University of Münster	1	–
Goethe University, Frankfurt	1	–
Saarland University	1	–
University of Stuttgart	2	–
Aarhus University	1	–
University of Wuppertal	9	2
University of Würzburg	1	1
Total	164	14

1) Not including members of the Board of Directors

New appointments in 2022

Name	Institute	University
Prof. Sebastijan Brezinsek	Institute of Energy and Climate Research	Heinrich Heine University Düsseldorf
Prof. Timo Kurt Dickscheid	Institute of Neurosciences and Medicine	Heinrich Heine University Düsseldorf
Prof. Lotte Geck	Central Institute for Engineering, Electronics and Analytics	RWTH Aachen University
Prof. Michaela Hegglin Shepherd	Institute of Energy and Climate Research	University of Bonn
Prof. Moritz Helias	Institute of Neurosciences and Medicine	RWTH Aachen University
Prof. Andreas Jupke	Institute of Bio- and Geosciences	RWTH Aachen University
Prof. Andreas Kleefeld	Institute for Advanced Simulation, Jülich Supercomputing Centre	FH Aachen University of Applied Sciences
Peter Grünberg Institute	Peter Grünberg Institut	Julius-Maximilians-Universität of Würzburg
Prof. Simon Fritjof Musall	Institute of Biological Information Processing	RWTH Aachen University
Prof. Andreas Petzold	Institute of Energy and Climate Research	University of Wuppertal
Prof. Wolfgang Rheinheimer	Institute of Energy and Climate Research	RWTH Aachen University
Prof. Ribana Roscher	Institute of Bio- and Geosciences	University of Bonn
Prof. Francesca Santoro	Institute of Biological Information Processing	RWTH Aachen University
Prof. Maria Estela Suarez Garcia	Institute for Advanced Simulation, Jülich Supercomputing Centre	University of Bonn

ACCOLADES

International

Name	Award
Prof. Gereon Fink Institute of Neurosciences and Medicine	Elected to the Academia Europaea
Dr. Georgios Gkatzelis Institute of Energy and Climate Research	ERC Starting Grant
Prof. Olivier Guillion Institute of Energy and Climate Research	Appointed Fellow and Global Ambassador of the American Ceramics Society
Dr. Heidi Heinrichs Institute of Energy and Climate Research	ERC Starting Grant
Prof. Thomas Lippert Institute for Advanced Simulation, Jülich Supercomputing Centre	Listed among the "People to Watch 2022" of the journal HPCwire
Dr. Ian Marius Peters Institute of Energy and Climate Research, Helmholtz Institute Erlangen-Nürnberg for Renewable Energy	ERC Starting Grant
Prof. Stefan Tautz Institute of Energy and Climate Research	ERC Synergy Grant
Prof. Robert Vaßen Institute of Energy and Climate Research	SOFT Innovation Prize of the European Commission
Prof. Harry Vereecken Institute of Bio- and Geosciences	Alfred Wegener Medal of the European Geoscience Union
Prof. Martin Winter Institute of Energy and Climate Research, Helmholtz Institute Münster	<ul style="list-style-type: none"> • Henry B. Linford Award of the Electrochemical Society • IALB Research Award of the International Automotive Lithium Battery Association • Appointed Fellow of the Materials Research Society

National

Name	Award
Prof. Wulf Amelung Institute of Bio- and Geosciences	Elected to the German National Academy of Sciences Leopoldina
Dr. Taner Esat Peter Grünberg Institute	Gehard Ertl Young Investigator Award of the German Physical Society
Dr. Lea Eggemann Institute of Energy and Climate Research	Science Award of the Fraunhofer Institute UMSICHT
Dr. Gabriela Figueroa Miranda and Dr. Viviana Rincón Montes Institute of Biological Information Processing	Innovation Award of the State of North Rhine-Westphalia
Dr. Vincent Mourik Peter Grünberg Institute	Accepted into “Junges Kolleg” of the North Rhine-Westphalian Academy for Sciences and Arts
Prof. Francesca Santoro Institute of Biological Information Processing	Early Career Award of the German National Academy of Sciences Leopoldina

Helmholtz Association awards

Name	Award
Dr. Franz Nikolas Kaiser Institute of Energy and Climate Research	Excellence Prize of Forschungszentrum Jülich
Dr. Yurii Kutovyi Institute of Biological Information Processing	Excellence Prize of Forschungszentrum Jülich
Dr. Tarini Prasad Mishra Institute of Energy and Climate Research	Excellence Prize of Forschungszentrum Jülich
Dr. Simon Rosanka Institute of Energy and Climate Research	Excellence Prize of Forschungszentrum Jülich
Dr. Fengshan Zheng Ernst Ruska-Centre for Microscopy and Spectroscopy with Electrons	Excellence Prize of Forschungszentrum Jülich

PUBLICATIONS

BETTER ASSESSMENT OF SCIENTIFIC PERFORMANCE

Forschungszentrum Jülich signed the San Francisco Declaration on Research Assessment (DORA), a declaration on improving the assessment of scientific results, in May 2023.

The global DORA initiative aims to replace the so-called Impact Factor (IF) as the key indicator for the scientific performance and productivity of researchers and institutions. The IF is a calculated number whose value reflects the influence of a scientific journal. It is not a measure of the quality of an individual article in a journal, but provides information on how often all articles in a particular journal have been cited in other scientific publications in

the past. The IF has been criticized as it can lead to bias and inaccuracy in the evaluation of research results.

The DORA principles stipulate that, in addition to scientific publications, other research outputs such as data sets and research software are also taken into account as indicators of research quality. Among other things, the principles have an impact on the recruitment and evaluation of scientific staff. Forschungszentrum Jülich will review and, if necessary, adapt relevant organizational and personnel procedures.

The ten journals with the most publications by Jülich researchers in 2022

Journal	Number of publications
Physical Review B	41
Nature Communications	40
Nuclear Fusion	39
Atmospheric Chemistry and Physics	37
Scientific Reports	33
Physical Review D	30
Advanced Engineering Materials	24
Journal of the Electrochemical Society	24
Physical Review Letters	23
NeuroImage	20



The Central Library is responsible for supplying Forschungszentrum Jülich with literature and information. It is committed to the principles of open science.

Jülich publications

Jülich publications in the last five years

Year	Total	in peer-reviewed journals	of which with researchers from other institutions	Books, other publications	Doctoral theses, habilitations
2018	2,319	1,714	1,351 78.8%	458	147
2019	2,398	1,891	1,443 76.3%	400	107
2020	2,473	1,827	1,391 76.1%	533	113
2021	3,017	2,383	1,811 76.0%	507	127
2022	2,801	2,282	1,927 84.4%	403	116

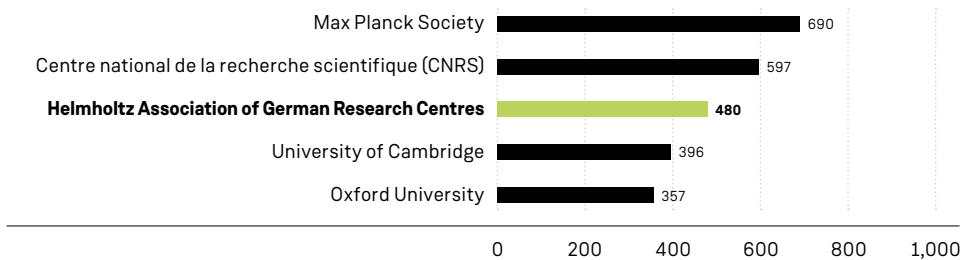
JÜLICH IN THE VANGUARD OF THE NATURE INDEX

The Nature Index is an annual ranking of more than 10,000 leading international research institutions. It is based on the number of an institution’s academic publications in 82 international scientific journals selected by an independent panel. It measures Count (summing up the number of publications with at least one authorship from the institution) and Share (indicating the relative share of authorship of an institution in each article). The

Helmholtz Association, to which Forschungszentrum Jülich belongs, ranked third among European institutions and 11th in the international ranking in the Nature Index 2022. Among all 18 Helmholtz Centres, Jülich ranks third, and 23rd nationally.

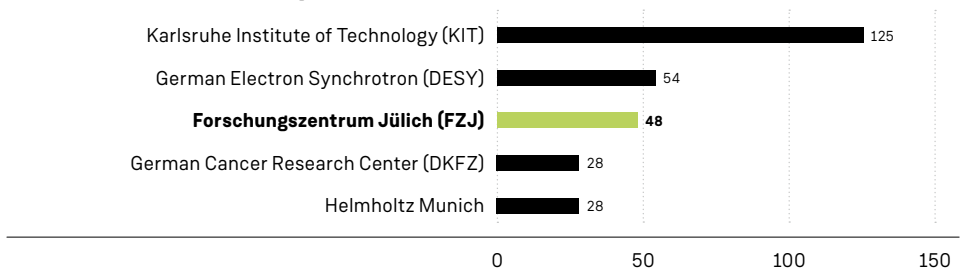
The top 5 in Europe

Institutions with Share¹⁾ according to “Nature Index” (as of May 2023)



The top 5 in the Helmholtz Association

Institutions with Share¹⁾ according to “Nature Index” (as of May 2023)



1) Proportion of authorship of an institution in each article



Prof. Wulf Amelung



Prof. Christoph J. Brabec



Prof. Simon Eickhoff



Prof. Thomas Kirchartz



Dr. Hendrik Poorter



Prof. Michael Saliba



Prof. Björn Usadel



Dr. Wolfgang Zeier

JÜLICH RESEARCHERS MUCH CITED

Among the most frequently cited researchers in the world are eight Jülich scientists: Prof. Simon Eickhoff from the Institute of Neurosciences and Medicine; Prof. Björn Usadel from Bioinformatics; Dr. Hendrik Poorter from Plant Sciences; Prof. Michael Saliba, who heads the Helmholtz Young Investigators Group FRONTRUNNER at Forschungszentrum Jülich; Prof. Christoph Brabec from the Helmholtz Institute Erlangen-Nürnberg for Renewable Energy; Prof. Wulf Amelung from Agrosphere; Prof. Thomas Kirchartz from the Institute of Photovoltaics; and Dr. Wolfgang Zeier from the Helmholtz Institute Münster.

They were listed as “Highly Cited Researchers” by the Web of Science Group, which is part of Clarivate Analytics. This means that their publications are among the one per cent of the most cited papers in their field in the year of publication. Only those scientists who are involved in several of these particularly influential publications will be accepted as one of the “Highly Cited Researchers”.

8

**Jülich researchers are among the
“Highly Cited Researchers”**

PUBLICATIONS WITH INTERNATIONAL PARTNERS

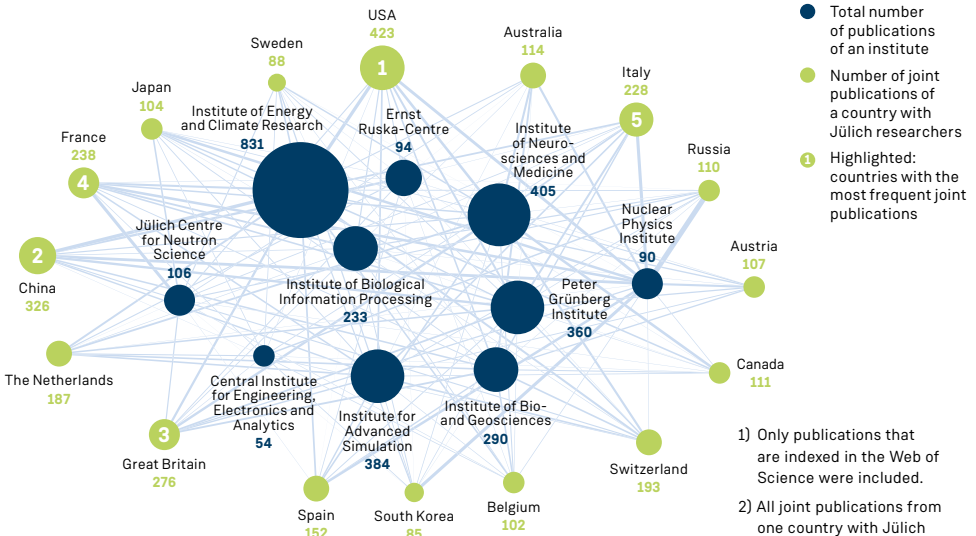
The international orientation of Jülich research is reflected in numerous joint publications with scientists all over the world. In 2022, there were 1,512 publications with international partners¹⁾ involving scientists from 89 other countries. 24 countries had a

share of 3 per cent or more in these joint publications, 35 countries at least 2 per cent. On average, each of the joint publications was cited about 4.6 times by other researchers (citation rate 4.62).

International network of Jülich institutes

In relation to the respective total number of publications, there was a particularly high proportion of joint publications of Jülich institutes with 16 countries. The width of the connection lines shows the scope of the collaboration between an institute and a country relative to the total output of the institute and the country²⁾ – “Salton’s Collaboration Strength”. It is calculated using the formula

$$\text{Saltons Collaboration Strength} = \frac{\text{Number of joint publications of institute with partner country}}{\sqrt{\text{Total number of institute publications} \times \text{Total number of publications of partner country with Jülich}}}$$



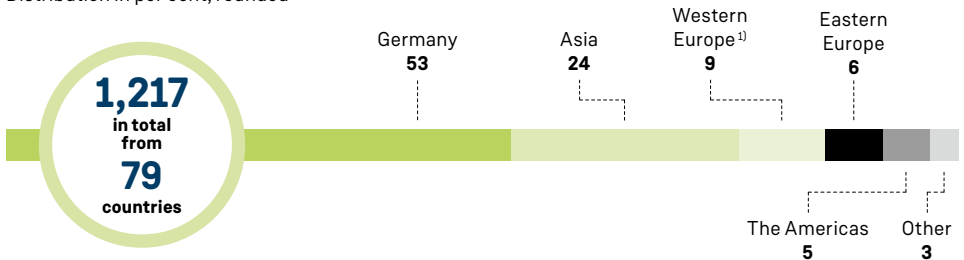
COOPERATIONS

Forschungszentrum Jülich works closely with numerous partners in Germany and abroad. In 2022, it was involved in 572 nationally funded research projects, 122 of which had a contract volume of €1 million or more. 267 projects were carried out together with several partners, and 66 research associations were coordinated by Jülich.

At the EU level in 2022, Forschungszentrum Jülich was involved in 176 projects from the Horizon 2020 and Horizon Europe framework programmes for research and innovation as well as from the DIGITAL and EURATOM 2027 programmes. Of these, Forschungszentrum Jülich coordinated 31 projects. In 39 projects, the Jülich contract volume exceeded €1 million.

Visiting scientists in 2022

Distribution in per cent, rounded



1) Excluding Germany

Participation in EU programmes in 2022

Programme	Number of project grants	Coordinated by Forschungszentrum Jülich	Funding amount Forschungszentrum Jülich (in euros)
Horizon 2020	139	27	143,565,854
Horizon Europe	32	4	24,481,856
Euratom 2027	4	-	16,978,756
Digital Europe (DIGITAL)	1	-	200,375
All programmes, total	176	31	185,226,841

EU-funded projects involving Forschungszentrum Jülich in 2022

Funding grant exceeding €1 million

Acronym	Project title	Jülich contract volume (in euros)
EUROfusion¹⁾	European Consortium for the Development of Fusion Energy (Horizon 2020)	23,167,296
EUROfusion	European Consortium for the Development of Fusion Energy (Horizon Europe)	16,542,962
HBP SGA3	Human Brain Project Specific Grant Agreement 3	18,439,806
CETP	Clean Energy Transition Partnership	7,877,261
C 3D MAGIC	Three-Dimensional Magnetization Textures: Discovery and Control on the Nanoscale	6,841,603
ICEI	Interactive Computing E-Infrastructure for the Human Brain Project	5,203,968
VirtualBrain Cloud	Personalized Recommendations for Neurodegenerative Disease	3,736,729
C ERA CoBioTech	Cofund on Biotechnologies	3,621,683
C GNeuS	Global Neutron Scientists	3,310,200
C IntelliAQ	Artificial Intelligence for Air Quality	2,498,761
EURAD	European Joint Programme on Radioactive Waste Management	2,387,521
C HPCQS	High Performance Computer and Quantum Simulator hybrid	2,348,167
C PRACE-6IP	PRACE 6th Implementation Phase Project	2,076,741
Solar Cofund 2	SOLAR-ERA.NET Cofund 2	2,016,413
eBRAIN-Health	eBRAIN-Health-Actionable Multilevel Health Data	1,992,772
C ENVRI-FAIR	ENVIRONMENTAL RESEARCH INFRASTRUCTURES BUILDING FAIR SERVICES ACCESSIBLE FOR SOCIETY, INNOVATION AND RESEARCH	1,914,475
CSP ERANET	Joint Programming Actions to Foster Innovative CSP Solutions	1,783,693
C DEEP-SEA	DEEP-Software for Exascale Architectures	1,762,172
EUPEX	European Pilot for Exascale	1,750,713
EoCoE-II	Energy Oriented Center of Excellence: toward Exascale for Energy	1,674,700

1) EUROfusion was approved as of 01.01.2021 under Horizon Europe, with the predecessor project EUROfusion under Horizon 2020 being simultaneously extended until the end of 2022.

TRANSFER

Acronym	Project title	Jülich contract volume (in euros)
C LightCas	Light-Controlled Synthetic Enzyme Cascades	1,498,125
C QNets	Open Quantum Neural Networks: from Fundamental Concepts to Implementations with Atoms and Photons	1,486,439
C PRO_PHAGE	Impact and Interaction of Prophage Elements in Bacterial Host Strains of Biotechnological Relevance	1,482,672
C CM3	Controlled Mechanical Manipulation of Molecules	1,465,944
GEOTHERMICA	GEOTHERMICA - ERA NET Cofund Geothermal	1,463,494
C Genies	Gas-water-mineral interfaces in confined spaces: unravelling and upscaling coupled hydro-geochemical processes	1,450,931
SOLAR-ERA.NET Cofund	SOLAR-ERA.NET Cofund	1,268,804
C AISee	AI- and Simulation-Based Engineering at Exascale	1,203,204
C OpenSuperQ	An Open Superconducting Quantum Computer	1,196,431
POP2	Performance Optimisation and Productivity 2	1,193,710
C BRAIN-ACT	Biohybrid Synapses for the Interactive Neuronal Networks	1,166,644
C VIRTUAL TIMES	Exploring and Modifying the Sense of Time in Virtual Environments	1,161,574
AgroServ	Integrated Services supporting a sustainable Agroecological transition	1,098,022
BlueBio	ERA-NET Cofund on Blue Bioeconomy – Unlocking the Potential of Aquatic Bioresources	1,096,938
EPI SGA2	Specific Grant Agreement 2 of the European Processor Initiative	1,078,789
C srEDM	Search for Electric Dipole Moments Using Storage Rings	1,072,207
TELEGRAM	Toward Efficient Electrochemical Green Ammonia Cycle	1,061,114
EMERGE	Emerging Printed Electronics Research Infrastructure	1,009,793
C SusCrop	ERA-NET Cofund on Sustainable Crop Production	1,007,800

C Forschungszentrum Jülich as coordinator

Industry cooperations and industry partners in contract research

Selection

Information



Bayer AG, SAP SE
Medical informatics

Siemens AG, Bayer Technology Services, IBM Deutschland GmbH
Smart data/AI

Infineon Technologies AG, IQM Germany GmbH, Bull
Quantum computing/
quantum technology

ParTec Cluster Competence Center GmbH, Siemens AG
Supercomputing/HPC/exascale/
quantum computing

Airbus Deutschland GmbH
Exascale

Mercedes-Benz AG, Robert Bosch GmbH, Volkswagen AG, BMW AG
Quantum technology in the
automotive industry

D-Wave Systems
Quantum annealer

Intel
GreenEdge Electronics

Surface, Aixtron
Neurotechnologies, AI

Energy



Robert Bosch GmbH
Fuel cells/SOFC

Siemens AG
Electrocatalysts,
hydrogen production,
electrolyzers

Volkswagen AG
Solid-state batteries

BASF, Shell Global Solutions International BV
Green chemistry/
hydrogen technology

BASF, BMW AG
Solid-state batteries

Hydrogenius LOHC Technologies GmbH
Hydrogen research/LOFC

Rolls Royce LTD
Materials research

BASF, Siemens Energy, thyssenkrupp nucera
Low-temperature electrolysis

FEV Europe, RWE
Fuel synthesis

Thyssenkrupp
Membranes for gas separation

Sunfire Fuel Cells GmbH, Robert Bosch
Fuel cells

AGFA, Ford Motor Company, Audi AG
Hydrogen production

Lufthansa Technik AG, Siemens AG, Rolls Royce LTD
Materials research

Bioeconomy



EnzyMaster Deutschland GmbH
Biotechnology

CUREVAC AG
Vaccine development

RWE
Renewable energy

Sense up
Biotechnology

Novozymes
Biodegradation of eco-polymers

Henkel
Bio-based products

BYK-Chemie
Enzymatic alternatives
in the plastics processing
industry

PATENTS AND LICENSES

PATENT PORTFOLIO

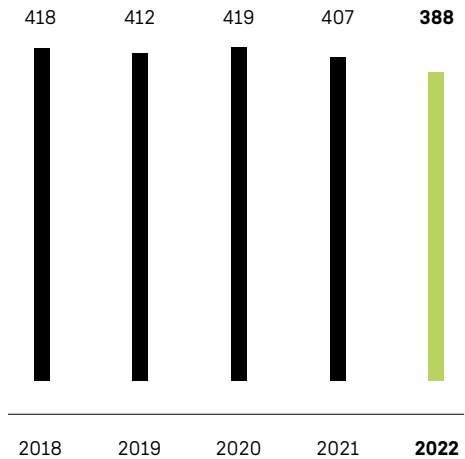
Jülich research generates innovations from which industry and society benefit and which result in property rights and license agreements. Property rights include inventions for which patent applications have been filed as well as patents granted. An invention is patentable if it is novel, involves an inventive step and is commercially usable.

The patent portfolio is made up of the patent families and the total number of property rights. A patent family, in turn, consists of one or more patents in Germany or abroad that relate to one patentable technology. The total number also includes European patent applications and international applications under the Patent Cooperation Treaty (PCT), each of which comprises several individual property rights. The PCT is an international treaty that makes it possible to apply for a patent for all contracting states of the PCT by filing a single patent application.

A license grants the licensee the use of an industrial property right, of know-how or software. For example, a company or research institution can use a patent of Forschungszentrum Jülich as a licensee.

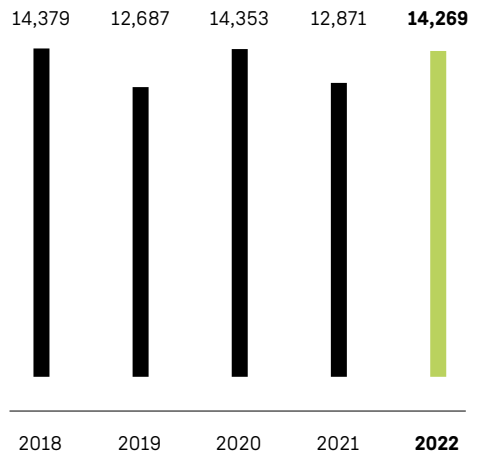
Patent families

2018-2022



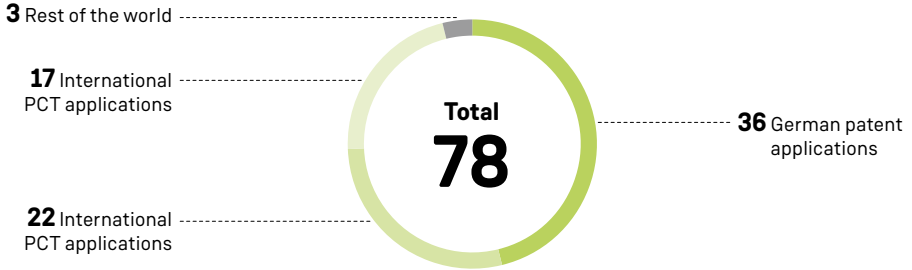
Total number of property rights

2018-2022

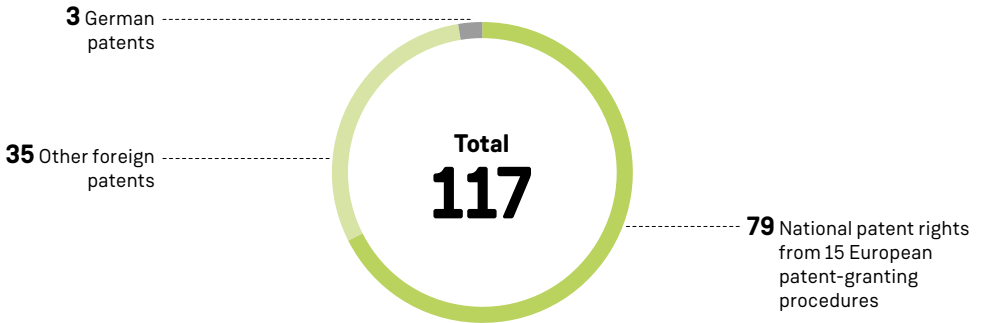


CURRENT PATENT ACTIVITIES

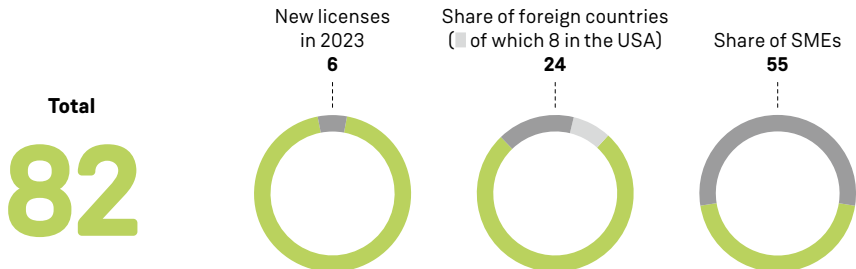
New patent applications in 2022



Patents granted in 2022



Licenses in 2022



JARA – JÜLICH AACHEN RESEARCH ALLIANCE

The RWTH Aachen University of Excellence and Forschungszentrum Jülich have been pooling their expertise in the Jülich Aachen Research Alliance (JARA) since 2007. Oriented towards the major challenges facing society, they carry out joint projects in the five research sections: brain research (JARA-BRAIN), sustainable energy (JARA-ENERGY), particle physics and antimatter (JARA-FAME), future information technologies (JARA-FIT) and soft matter research (JARA-SOFT) as well as in the JARA Center for Simulation and Data Sciences (JARA-CSD). JARA was one of the first cooperations between a university and a research institution in Germany. It contributes to developing the German scientific landscape further towards overcoming the juxtaposition of university and non-university teaching and research.

JARA in figures

As of 31 December 2022

Professorial appointments	
Joint professorial appointments ¹⁾	67
Publications	2022
All institutions involved in JARA ²⁾	2,708
Joint publications	1,081

1) Not including members of the Board of Directors

2) Peer-reviewed publications



In the clean room of the Helmholtz Nano Facility, researchers from the JARA section FIT used a germanium-tin alloy to produce a new type of transistor. Electrons can move faster in this material than in silicon, which makes lower voltages possible during operation.



VINCENT MOURIK

In the GeBaseQ project, Dr. Vincent Mourik from the JARA Institute for Quantum Information is working on the development of a novel material platform for semiconductor quantum bits based on silicon and germanium. The Federal Ministry of Education and Research is funding the project with €4.8 million.

JARA-FIT

QUANTUM BUS

Physicists from the JARA-FIT section succeeded in using a device called a quantum bus to transport electrons as carriers of quantum information over a distance of around 500 nanometres. The quantum bus is intended to pave the way to a quantum computer that will also function with several million quantum bits.

JARA-ENERGY

NOVEL BATTERY

Researchers from the JARA-ENERGY section, together with Israeli colleagues, have developed a titanium-air battery and successfully tested it in the laboratory. Titanium is an interesting power storage medium as each atom can donate up to four electrons for charge transfer.

JARA-FIT

SECOND MAGNETIC VORTEX VARIANT

Tiny magnetic vortex structures in materials, so-called skyrmions, are the basis of some innovative concepts for particularly energy-efficient information processing. JARA-FIT researchers, together with Swedish colleagues, have now for the first time proven the existence of anti-skyrmions experimentally.

JARA-CSD

BRAIN AND QUANTUM MECHANICS

To study how the brain stores and processes information, JARA scientists have used methods from a theory that is usually applied to quantum mechanical systems.

PROJECT MANAGEMENT JÜLICH

As one of the leading project management organizations in Germany, Project Management Jülich (PtJ) supports its clients in the federal and state governments and the European Commission in realizing their funding policy goals. PtJ implements research and innovation funding programmes that are geared towards socio-political needs, integrating national and European funding. PtJ manages projects along the entire innovation chain, from basic research to market entry. One of the goals is the advancement of funding instruments to accelerate the innovation process. Through regional networking of science and industry, the aim here is to exploit, in particular, local innovation potential.

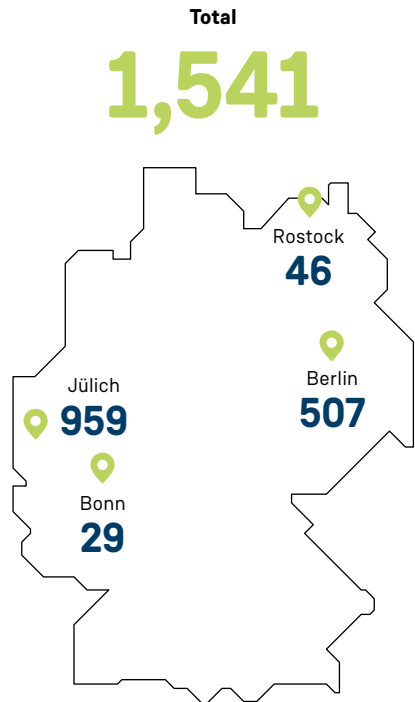
PtJ has pooled its expertise into three business areas: Energy and Climate, Sustainable Development and Innovation, and Research and Society NRW. Expertise in central cross-cutting topics and tasks such as Digitalization, Circular Economy, Technical Communication or Monitoring and Evaluation are brought together by PtJ into areas of competency. These areas are managed by interdisciplinary teams and are closely interlinked with all PtJ business areas.

PROJECT MANAGEMENT JÜLICH IN FIGURES¹⁾

The funding volume managed by PtJ rose to almost €2.674 billion in 2022. The number of ongoing projects increased to 36,496. Of these, 20,539 projects, with a funding volume of almost €2.369 billion, were accounted for by federal programmes. For the programmes

PtJ employees

According to location, 2022



1) As of 31 December 2022

of federal states, PtJ managed a total of 15,957 projects with a funding volume of around €305 million.

PtJ's main client was the Federal Ministry of Education and Research (BMBF) with a share of 46 per cent of the funding volume managed, followed by the Federal Ministry for Economic Affairs and Climate Action (BMWK) with 32 per cent and the Federal Ministry of Digital and Transport (BMDV) with 7 per cent. Other federal authorities were accounted for at 4 per cent. The states had a share of 11 per cent in 2022.

About €1,526 million of the funding volume went to the area of expertise Sustainable Development and Innovation, almost €884 million to the area of expertise Energy and Climate and almost €264 million to the area of expertise Research and Society NRW.

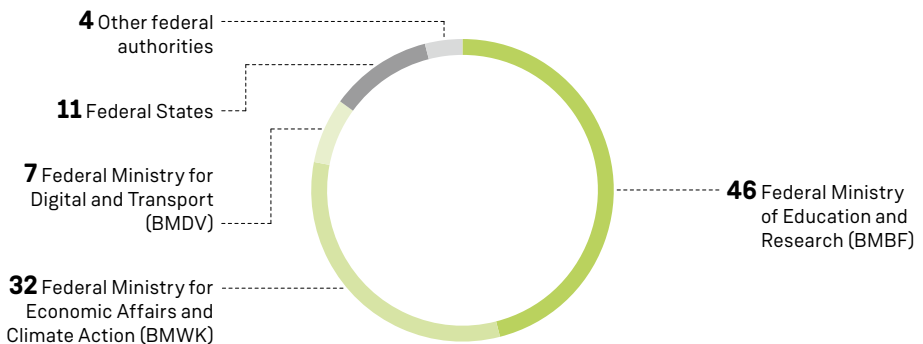


The Berlin office of Project Management Jülich moved into the new “3 Höfe” building in 2022. This brings the office’s staff – previously spread across three buildings – closer together.

On 31 December 2022, PtJ had 1,541 employees at its four locations in Jülich, Berlin, Rosstock and Bonn.

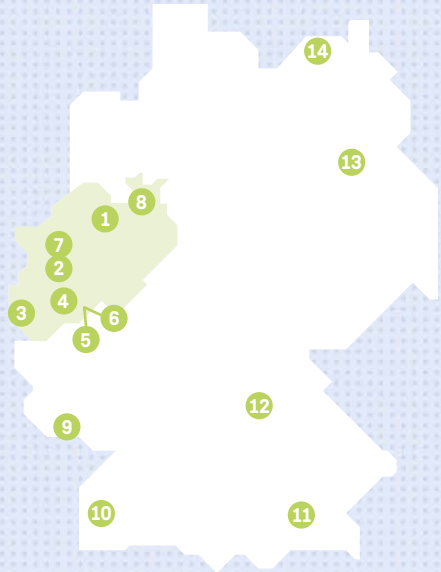
Funding sources

2022, in per cent (rounded)



WORK AT OTHER LOCATIONS

Forschungszentrum Jülich operates branch offices in Germany and abroad with unique, large-scale facilities, including joint institutes with universities and the sites of the project managements.



- 1 Münster**
Helmholtz-Institute Münster (HI MS): Ionics in Energy Storage Cooperation with RWTH Aachen University and the University of Münster (WWU Münster)
- 2 Düsseldorf**
External Funding Management division runs the office of the **biotechnology cluster BIO.NRW**
- 3 Aachen**
Peter Grünberg Institute (PGI-2, PGI-13, PGI-14, PGI-15), Institute of Energy and Climate Research (IEK-12), Institute for Advanced Simulation (IAS-9) at RWTH Aachen University and Technologiezentrum Aachen
- 4 Cologne**
Institute of Neurosciences and Medicine (INM-5) at the University Hospital Cologne
- 5 Bonn**
Project Management Jülich
- 6 Bonn**
Institute of Bio- and Geosciences (IBG-2) at the agricultural experimental campus of the University of Bonn
- 7 Duisburg**
Institute of Energy and Climate Research (IEK-5) at the NanoEnergieTechnikZentrum (NETZ) of the University of Duisburg-Essen
- 8 Bielefeld**
Institute of Bio- and Geosciences (IBG-5) at the Center for Biotechnology (CeBiTec) of Bielefeld University
- 9 Saarbrücken**
Peter Grünberg Institute (PGI-12) at Saarland University
- 10 Freiburg**
Institute of Neurosciences and Medicine (INM-1) operates **Coordination Site of the Bernstein Network** at the University of Freiburg for the elucidation of neuronal processes Aufklärung neuronaler Prozesse



- 11 Garching**
Jülich Centre for Neutron Science (JCNS) operates the **Heinz Maier-Leibnitz Zentrum** at the research reactor in Garching along with the Technical University of Munich and the Helmholtz-Zentrum Hereon
- 12 Erlangen/Nuremberg**
Helmholtz Institute Erlangen-Nürnberg for Renewable Energy (HI ERN) in cooperation with Friedrich-Alexander Universität Erlangen-Nürnberg (FAU) and Bayerisches Zentrum für angewandte Energieforschung e.V.
- 13 Berlin**
Project Management Jülich
- 14 Rostock**
Project Management Jülich
- 15 Brussels (Belgium)**
Peter Grünberg Institute (PGI-8) at the Helmholtz Office Brussels
- 16 Grenoble (France)**
Jülich Centre for Neutron Science (JCNS) operates an instrument at the high-flux reactor of the Institut Laue-Langevin (ILL); shareholder along with the Commissariat à l’Energie Atomique (CEA, France), the Centre national de la recherche scientifique (CNRS, France) and the Science and Technology Facilities Council (STFC, UK)
- 17 Trieste (Italy)**
Peter Grünberg Institute (PGI-6) operates Beamline at the Synchrotron Trieste
- 18 Bangkok (Thailand)**
Institute of Bio- and Geosciences (IBG-2) with the National Science and Technology Development Agency (NSTDA) on a sustainable bioeconomy

BODIES AND COMMITTEES

BODIES

PARTNERS' MEETING

The Partners' Meeting is the principal decision-making body of Forschungszentrum Jülich GmbH. It is composed of members representing the two partners: the Federal Republic of Germany and the federal state of North Rhine-Westphalia.

SUPERVISORY BOARD

MinDir Stefan Müller

Chair

Federal Ministry of Education and Research

The Supervisory Board supervises the lawfulness, expedience and economic efficiency of management. It makes decisions on important research-related and financial issues of the company.

BOARD OF DIRECTORS

Prof. Dr. Astrid Lambrecht

Chair

The Board of Directors conduct the business affairs of Forschungszentrum Jülich GmbH in accordance with the partnership agreement. They report to the Supervisory Board. The contact for all questions and concerns relating to the Board of Directors is the Office of the Board of Directors.

COMMITTEES

SCIENTIFIC AND TECHNICAL COUNCIL

Prof. Dr. Martin Riese

Chair

Institute of Energy and Climate Research

The Scientific and Technical Council (WTR) advises the Partners' Meeting, the Supervisory Board and the Board of Directors on all issues associated with the strategic orientation of Forschungszentrum Jülich and on all scientific and technical issues of general importance.

SCIENTIFIC ADVISORY COUNCIL

Dr. Martin Keller

Chair

National Renewable Energy Laboratory, USA

The Scientific Advisory Council advises Forschungszentrum Jülich on scientific and technical issues of general importance. This includes Jülich's strategy and planning of research and development activities, the promotion of the optimal usage of research facilities, and any questions relating to collaborations with universities and other research institutions.

> www.fz-juelich.de/en/about-us/organization/company-bodies-committees

FINANCES

FINANCING IN 2022

In 2022, Forschungszentrum Jülich received institutional funding from the federal and state governments amounting to €466 million, which represented 48 per cent of total financing, to cover operating expenses to implement investment measures. In addition, Forschungszentrum Jülich's third-party funding totalled €491 million, representing 52 per cent of the total funding.

Third-party funding consists of the acquisition of international (EU funding) and national project funding, of R&D and infrastructure services (contracts), and of project management organizations on behalf of the Federal Republic of Germany and the federal state of North Rhine-Westphalia. National project funding includes funding from the federal government, the state government, the DFG and other domestic bodies.



Financing in 2022 covers all research areas of Forschungszentrum Jülich as well as other statutory tasks. The majority of Forschungszentrum Jülich's financing (> 90 per cent)

comes from public funds. The remainder originates from cooperations with industry partners.

BUDGET OF THE RESEARCH AREAS IN 2022

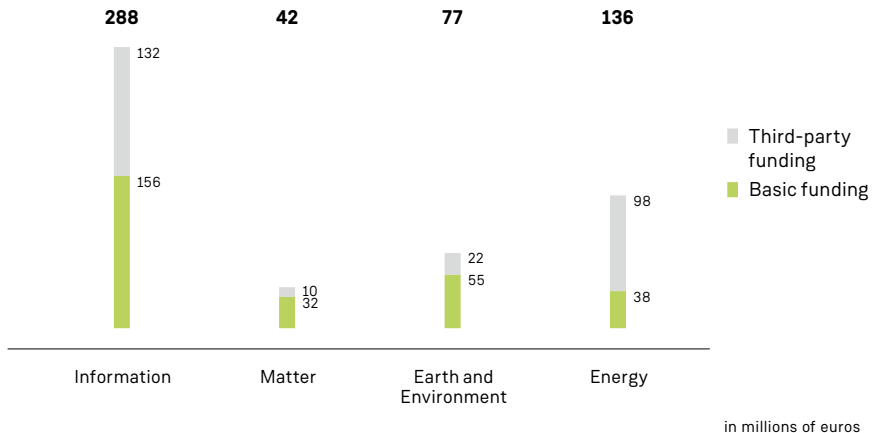
In 2022, all four research areas of the Helmholtz Association at Forschungszentrum Jülich – Energy, Earth and Environment, Matter, and Information – and their programmes were in the fourth round of the

programme-oriented research (POF IV). The full costs of the four research areas amounted to €543 million in 2022 and are shown below in their percentage distribution.



Below is a breakdown of basic and third-party funding into individual research areas. Third-party funding per research area is be-

tween 24 and 72 per cent. Only third-party funds that are allocated programmatically were taken into account.



CONTACT

CORPORATE COMMUNICATIONS

Dr. Anne Rother Head

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 52425 Jülich, Germany
 Tel.: + 49 2461 61-4661
 Fax: + 49 2461 61-4666
 info@fz-juelich.de
 www.fz-juelich.de

VISITOR SERVICES

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PUBLICATION DETAILS

Facts and figures · Published by: Forschungszentrum Jülich GmbH · 52425 Jülich, Germany · Editorial team: Annette Stettien, Dr. Frank Frick, Anne Rother (responsible under German press law) · Authors: Dr. Frank Frick, Annette Stettien · Graphics and layout: SeitenPlan GmbH Corporate Publishing · Translation: ROTPUNKT-Texte & Bild · Picture credits: Forschungszentrum Jülich (p. 25, 46, 47), Forschungszentrum Jülich/Markus Axer, David Gräbel, Katrin Amunts (p. 37), Forschungszentrum Jülich/Kurt Fuchs (p. 44), Forschungszentrum Jülich/Stefan Hense (p. 45 top), Forschungszentrum Jülich/Sascha Kreklau (cover (all), p. 8, 10, 13, 14, 16, 19, 22, 26, 30, 34, 41, 45 bottom, 59, 61 top/second from right, 69), Forschungszentrum Jülich/Ralf-Uwe Limbach (p. 4, 5, 20, 33, 52, 61 top right and bottom/second from left and bottom/second from right, 70), Forschungszentrum Jülich/Kurt Steinhäuser (p. 50), Arjen Biere (p. 61 bottom left), Perry Nordeng/ESS (p. 40), private (p. 61 top/second from left), Michael Reitz (p. 73), Uni Bonn/PhenoRob (p. 61 top left), Rolf K. Wegst, Justus Liebig University Gießen (p. 61 bottom right) · Print: Schloemer Gruppe GmbH · Print run: 2,800

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As of August 2023



Forschungszentrum Jülich received the TOTAL E-QUALITY award in October 2023 for successfully implementing equal opportunities and diversity.



