

**HELMHOLTZ**

RESEARCH FOR  
GRAND CHALLENGES

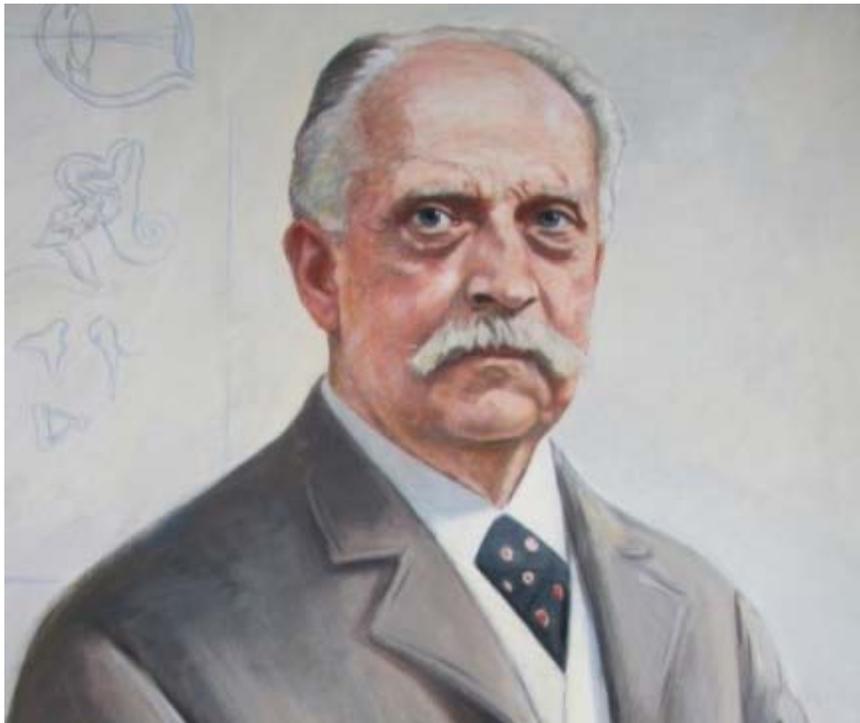
# Welcome

*Helmholtz Association  
Moscow*

[www.helmholtz.de](http://www.helmholtz.de)

## Hermann von Helmholtz – his research is our mission

---



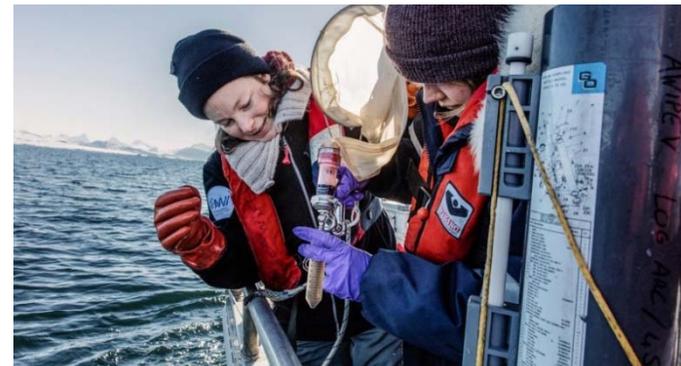
- Commitment to interdisciplinary research
- A sense for the practical:  
Contribution to creating wealth
- Founding President of the Physikalisch-Technische Reichsanstalt: Effective management of large-scale research

Hermann von Helmholtz  
(1821 – 1894)

# Helmholtz Research Mission & Strategy

---

- Systems solutions for grand challenges based on:
  - Scientific excellence
  - Interdisciplinarity and critical mass
  - long term research programs
- Helmholtz provides a highly attractive environment for talents and brilliant brains
- Profound expertise in large scale research infrastructure
- Helmholtz as a prime strategic partner at the local, national and international level
- Transfer of knowledge into economy and society

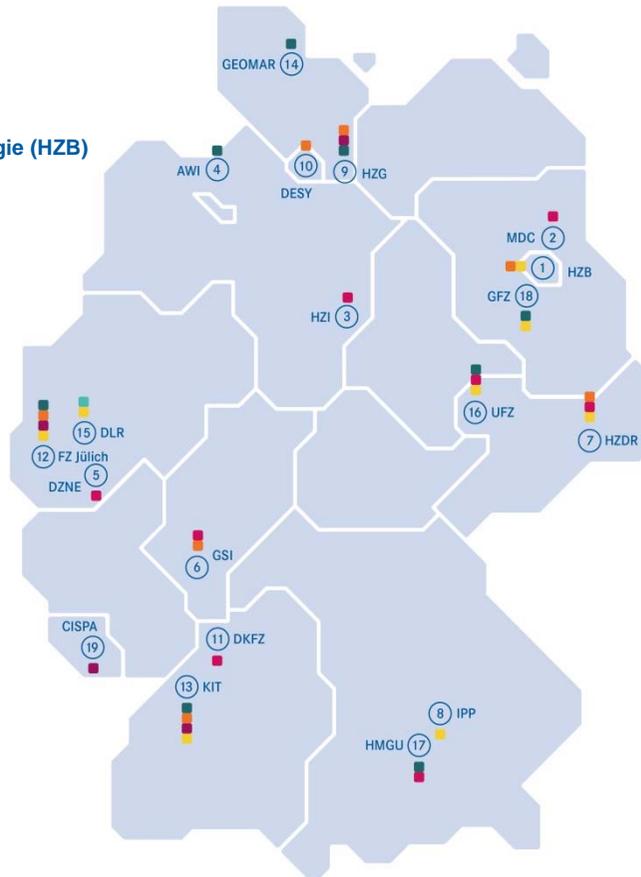


# Helmholtz Research Centers

**Research Areas:**

<span style="color: yellow;">■</span> Energy	<span style="color: green;">■</span> Aeronautics, Space and Transport
<span style="color: darkgreen;">■</span> Earth and Environment	<span style="color: orange;">■</span> Matter
<span style="color: red;">■</span> Health	<span style="color: purple;">■</span> Key Technologies

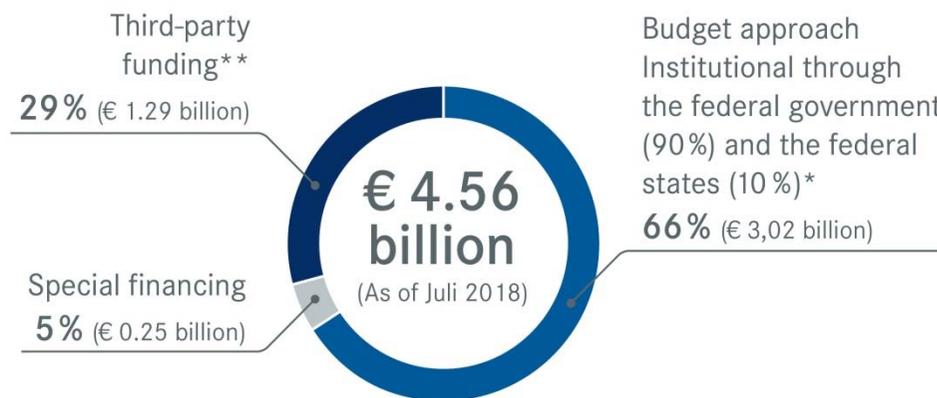
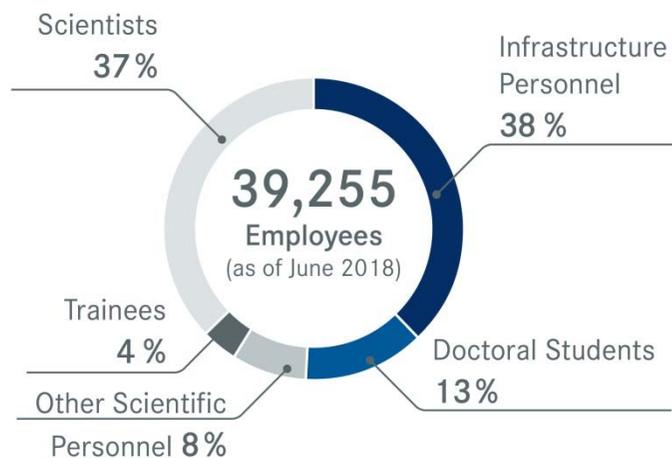
1. Berlin  
**Helmholtz-Zentrum Berlin für Materialien und Energie (HZB)**
2. Berlin-Buch  
**Max Delbrück Center for Molecular Medicine in the Helmholtz Association (MDC)**
3. Brunswick  
**Helmholtz Center for Infection Research (HZI)**
4. Bremerhaven  
**Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung (AWI)**
5. Bonn  
**German Center for Neurodegenerative Diseases (DZNE)**
6. Darmstadt  
**GSI Helmholtz Center for Heavy Ion Research**
7. Dresden  
**Helmholtz Center Dresden Rossendorf (HZDR)**
8. Garching  
**Max Planck Institute for Plasma Physics (IPP) (Associate Member)**
9. Geesthacht  
**Helmholtz Center Geesthacht Center for Material and Coastal Research (HZG)**



10. Hamburg  
**Deutsches Elektronen-Synchrotron DESY**
11. Heidelberg  
**German Cancer Research Center (DKFZ)**
12. Jülich  
**Forschungszentrum Jülich**
13. Karlsruhe  
**Karlsruhe Institute of Technology (KIT)**
14. Kiel  
**GEOMAR Helmholtz Center for Ocean Research Kiel**
15. Cologne  
**German Aerospace Center (DLR)**
16. Leipzig  
**Helmholtz Center for Environmental Research (UFZ)**
17. Munich  
**Helmholtz Center Munich – German Research Center for Health and the Environment**
18. Potsdam  
**Helmholtz Center Potsdam German Research Center for Geosciences GFZ**
19. Saarbrücken  
**Helmholtz Center for Information Security – CISPA**

# Facts and Figures

## Personnel and Students & Budget 2018



\* As of 2016, the German federal government alone is financing the pact increase so that the federal government's share is over 90%.

\*\* Including project sponsorships

# The six Research Fields of the Helmholtz Association

---



## Program-oriented Funding (PoF)

---

- Research activities in our 19 centers are organized in long-term programs, pooling the unique research competences of centers in a complementary approach to jointly tackle long-term challenges with a strategic focus.
- They are periodically reviewed by international experts:
  1. scientific assessment of centers & programs
  2. future positioning of our research fields
- PoF provides the financial, strategic and scientific framework for coherent multi-year research programs within each research field.

# Program-oriented Funding (PoF)

## Key steps

---

- **Strategic planning process** based on the criteria of
  - achieving a global leadership position,
  - covering a spectrum of innovation from basic research, R & D to applications and vice versa
- **Scientific evaluation** of the centers and programs
- **Research policy objectives** of the federal and state ministries for the strategic positioning of the research field and **proposals for new research programs**.
- **Strategic evaluation** of each research field and programs
- **Recommendations** of the senate for implementation and funding of the new programs

# Research Field Energy



# Research Field

## Energy

---

- Materials & Technologies for the Energy Transition
- Energy Systems Integration
- Nuclear Fusion
- Nuclear waste management
- R&D along the entire value chain: from fundamental research to the market



# Research Field Earth and Environment



# Research Field

## Earth and Environment

---

- Preservation and sustainable development of the natural foundations of human life and our environment
- Integrated exploration of the planet and its land, oceans, and polar regions
  - Causes and effects of global change
  - Sustainable use of resources
  - Causes and risks of natural hazards
  - Dynamics of various ecosystems



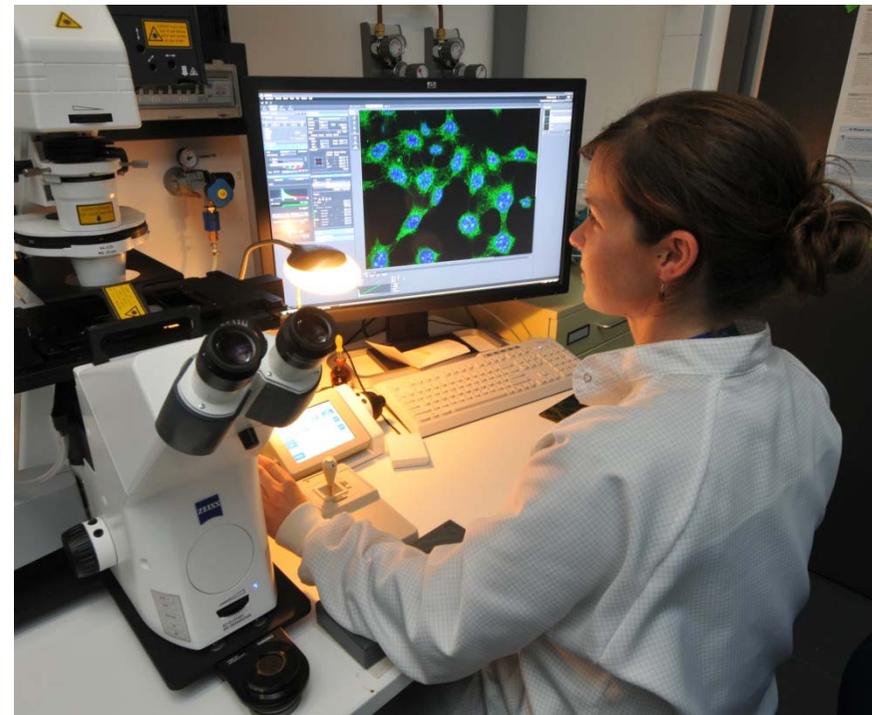
# Research Field Health



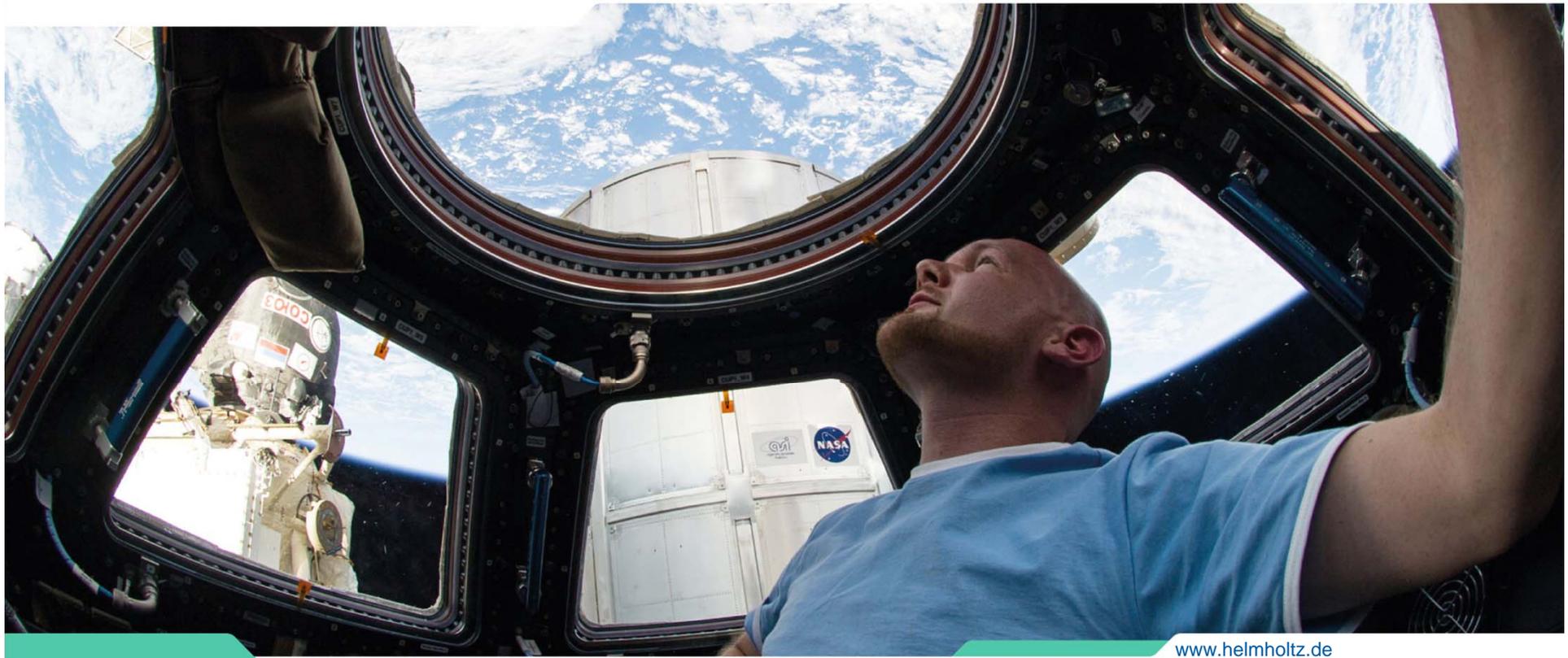
# Research Field Health

---

- Basic research on disease mechanisms
- Decoding complex systems
- Translational research
- Focus on widespread diseases
- Major challenges:
  - Preventive medicine
  - Personalized medicine
  - Proof of concept
  - E-Health & Big Data



# Research Field Aeronautics, Space and Transport



# Research Field

## Aeronautics, Space and Transport

---

- Understanding climate change using earth observation technologies
- Investigating the physics and chemistry of the global atmosphere
- Developing and bringing future technologies for mobility, communication, and security to market
- Data analysis and interpretation as a decisive catalyst
- Getting society involved



# Research Field Matter



# Research Field

## Matter

---

- Decoding the structure and function of matter - from researching the quantum universe to designing new materials and active substances
- Scientific portfolio comprises elementary particle, astroparticle, hadron and nuclear physics as well as solid-state, nuclear, plasma, molecular physics and biophysics.
- Forming the basis of unique research infrastructures that require extensive system competence



## Research Field Matter

Example: Developing and operating large-scale devices

---



- European XFEL:  
Powerful light source
- FLASH pilot facility  
(for VUV X-rays)
- PETRA III:  
Most brilliant synchrotron radiation source  
in the world
- FAIR: Antiproton and Ion Research
- The first point of contact for LHC at CERN:  
Elementary particle physics
- Exotic nuclei (Bk, Np, Am isotopes)

# Research Field

## Key Technologies



# Research Field

## Key Technologies

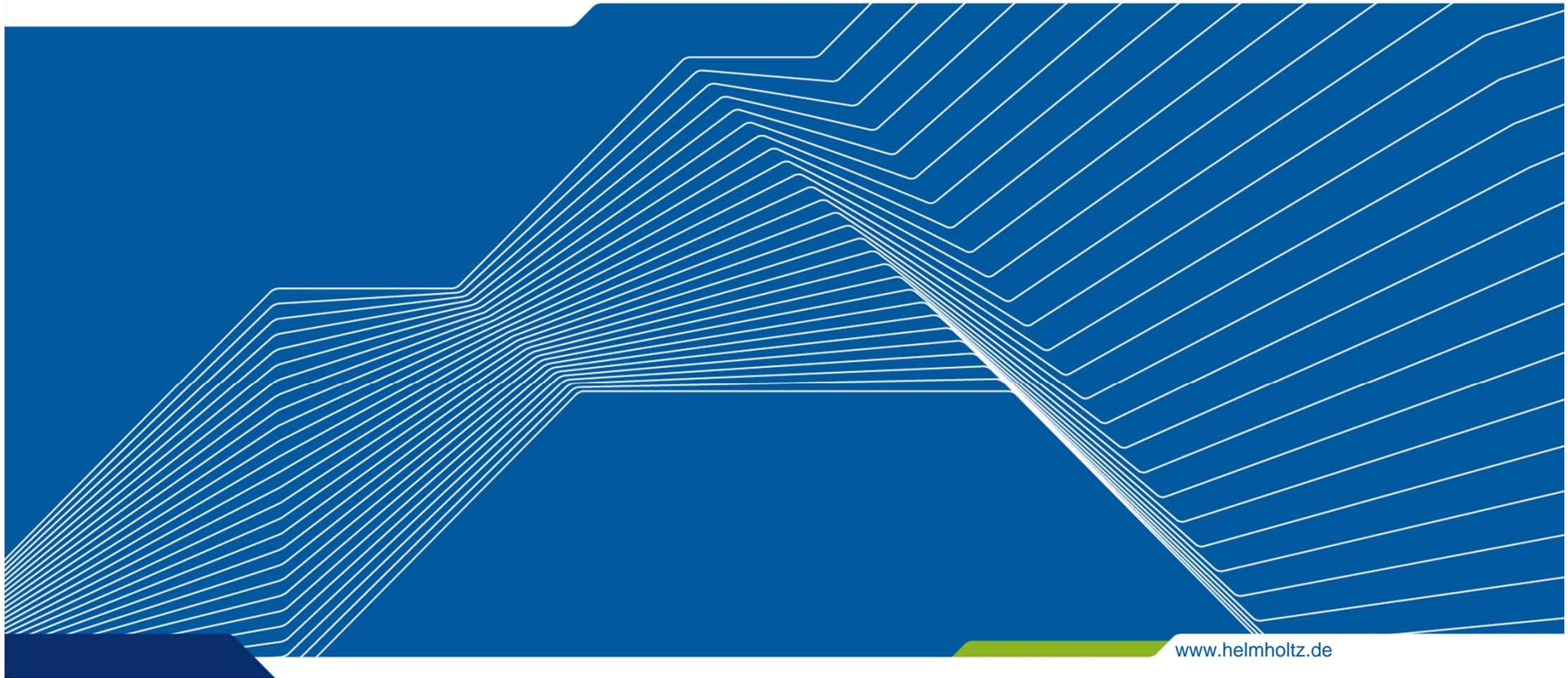
---

- Information technologies
  - Super Computer (JUQUEEN/JUROPA)
  - Nanotechnology
  - Big Data analyses
- Material Sciences
  - Nanoelectronics
  - Lightweight construction materials
- Life Sciences
  - Bioeconomy, biomedicine
  - Brain research, Alzheimer's
  - Regenerative medicine



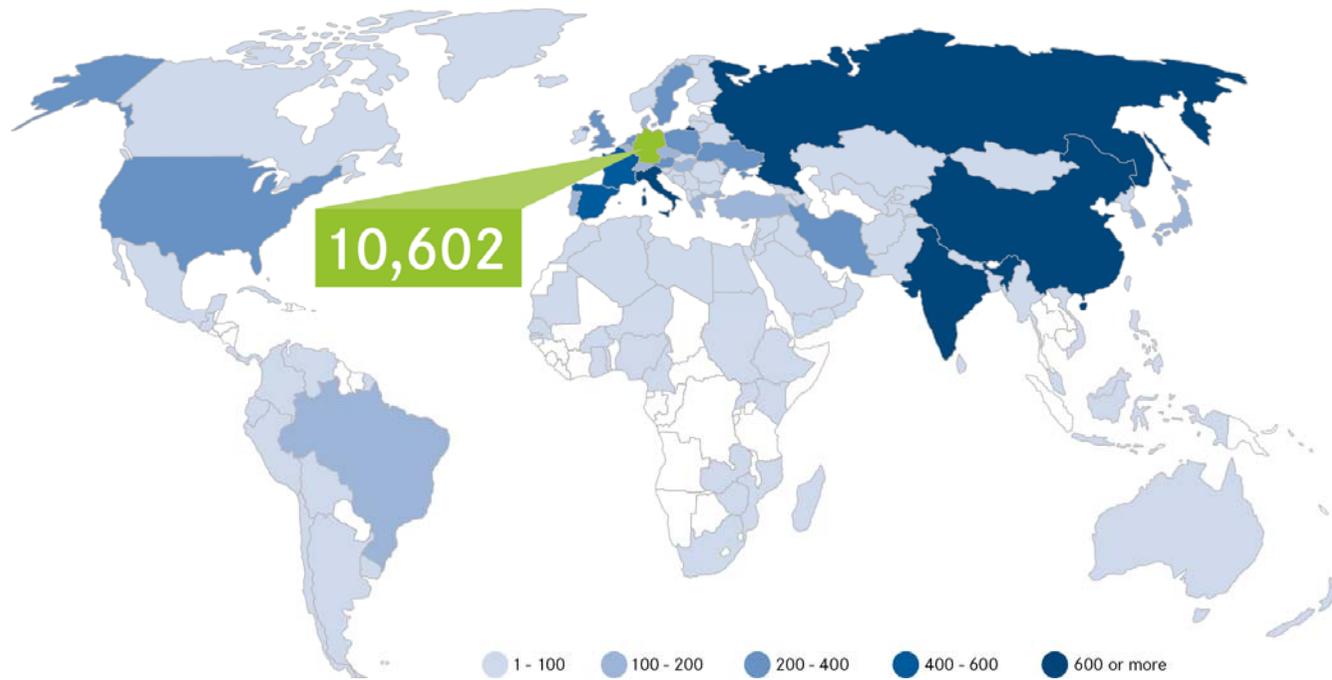
# Helmholtz International

Helmholtz Association



# Helmholtz International

Helmholtz Association: Foreign scientists and visiting researchers

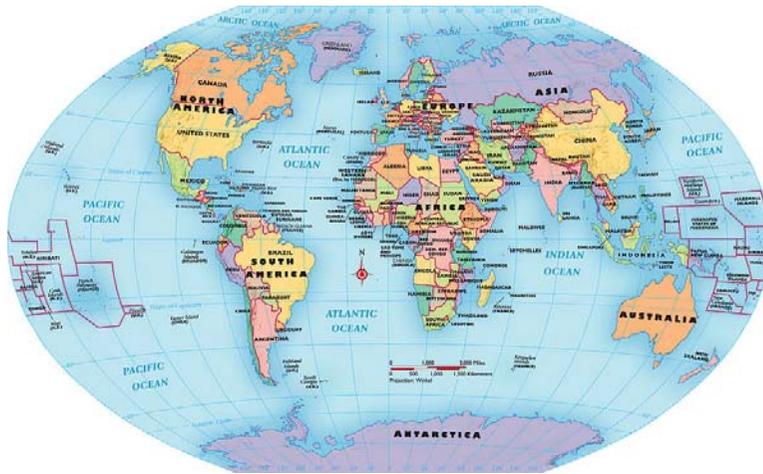


As of: 2017

# Helmholtz International

## Offices abroad

---



- 4 offices of the Helmholtz Association abroad to support international projects:
- Brussels
- Moscow
- Tel Aviv
- Peking

# Helmholtz International

## German – Russian Mega-Science

---

International project	German Partner	Russian Partner
XFEL	DESY (host)	NRC Kurchatov Institute
FAIR	GSI (host)	Rosatom, ITEP
NICA	GSI	JINR (host)
PIK	FZ Jülich	NRC Kurchatov Institute (host)

# Helmholtz International

## Funding programs for joint projects

---



- Helmholtz – Russian Foundation for Basic Research, 32 projects: 2007-2012
- Helmholtz – Russian Science Foundation, 18 projects: 2017-2019
- Next funding program planned for 2020

# HELMHOLTZ-WINTERGESPRÄCHE



- Annual event since 2016
- A strategic platform for exchanging opinions
- German and Russian representatives from science, education and politics
- Every year a new topic
- Under the patronage of Mrs. Edelgard Bulmahn, Vice-President of the German Bundestag and Prof. Andrei Fursenko, Aid to the President of the Russian Federation for Science
- Next date: 06. Feb. 2020, Moscow, Main topic – Climate Research

## Helmholtz office Moscow

---



Elena Eremenko,  
Head of the office

Malaya Pirogovskaya 5, room 24

Tel.:+7 495 981 17 63

[www.helmholtz.ru](http://www.helmholtz.ru)

[Moscow@helmholtz.de](mailto:Moscow@helmholtz.de)



Yulia Gurkina,  
Assistant



Aleksei Shipilov,  
PR and Project  
coordination

**HELMHOLTZ**

RESEARCH FOR  
GRAND CHALLENGES

**Thank you for your attention**

[www.helmholtz.de](http://www.helmholtz.de)