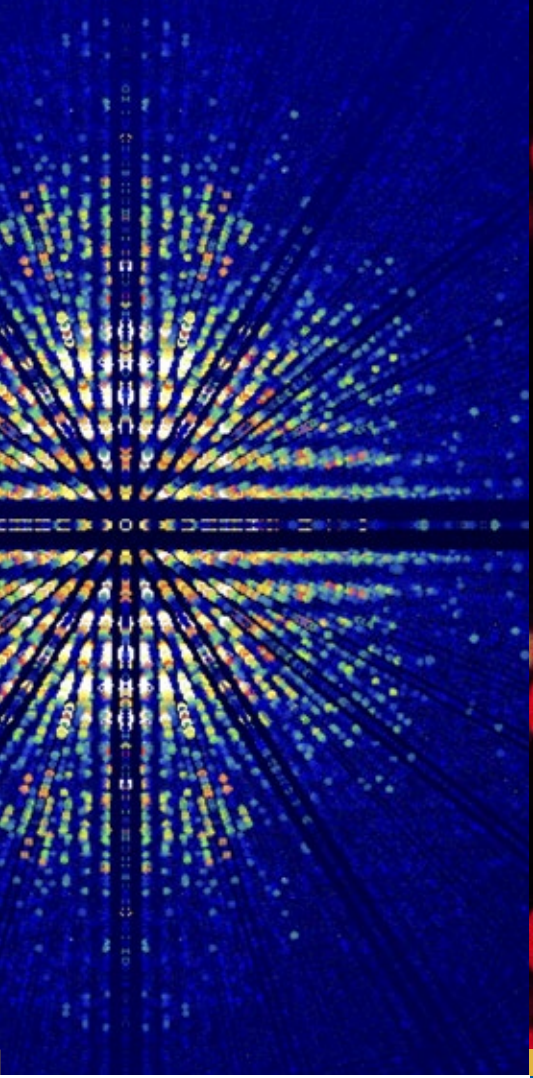
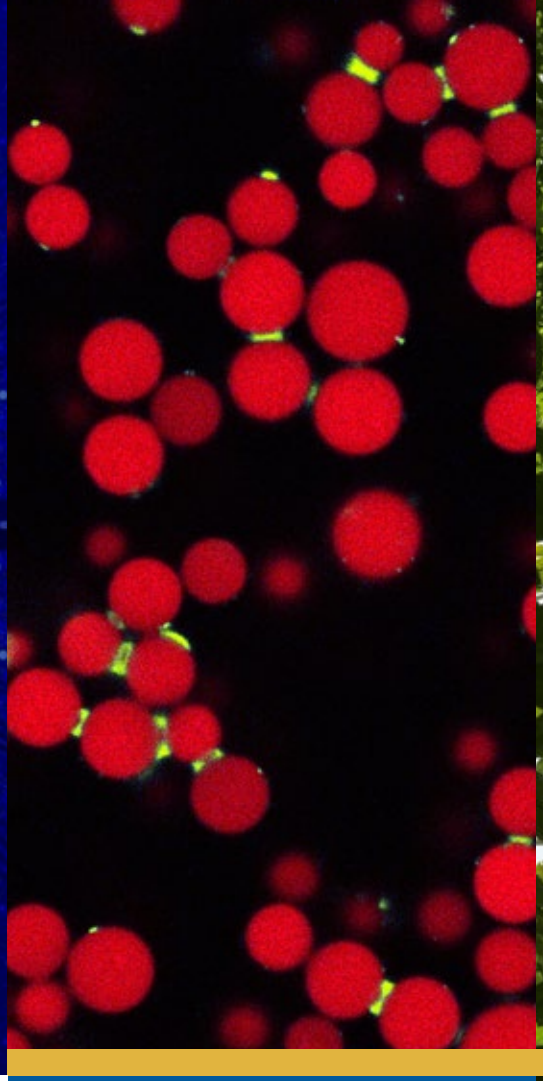


ERC PROJECTS AND THE STORIES BEHIND THEM

Ground-Breaking Research at Helmholtz

HELMHOLTZ
| ASSOCIATION

PUBLISHING INFORMATION

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HELMHOLTZ AT A GLANCE

The Helmholtz Association brings together 18 scientific-technical and biological-medical research centres. With almost 36,000 employees and an annual budget of approximately 3.8 billion, it is Germany's largest scientific organisation.

The Helmholtz Association conducts top-level research to identify and explore the major challenges facing society, science and industry in strategic programmes within six research fields: Energy; Earth and Environment; Health; Key Technologies; Structure of Matter; and Aeronautics, Space and Transport. The scientists research highly complex systems using large-scale facilities and scientific infrastructure. Their aim is to shape the future by combining research and technological developments with innovative applications and prevention strategies.

INTRODUCTION

Multidisciplinary teamwork is essential to the work of the Helmholtz Association. It allows us to produce outstanding research findings and contribute to solving the major challenges facing society. This is as true of projects within Germany as it is of those at the European level. However, this brochure has a slightly different focus. It looks at the individual funding that the European Research Council awards to excellent researchers with ground-breaking ideas. Is this focus a contradiction? Not at all: in addition to allowing individuals to pursue their own ideas, the ERC funding instruments give them scope to put together a group – a team – of people with complementary expertise. For researchers, the prospect of turning their ideas into pioneering findings is at least as attractive as the funding itself. This has helped the ERC acquire an admirable reputation in an extremely short space of time.

Helmholtz and the ERC – a success story

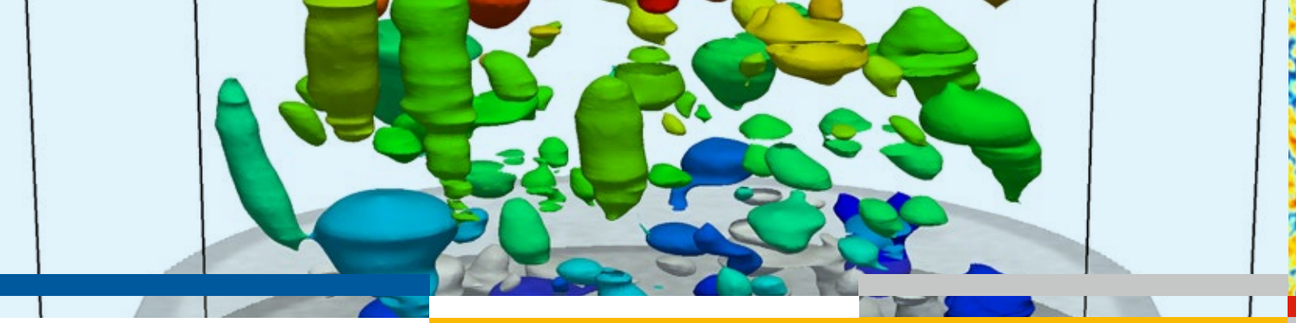
With the first funding period of the 7th Framework Programme now over, it is time to take stock. The Helmholtz centres have obtained over 50 grants – with a combined allocated budget of more than 80 million. These grants have formed the basis of numerous success stories (for a project overview, see p. 18; for statistics, see p. 22). We would like to present examples of the research behind project acronyms, from the structural biology in MitoShape to the process technology in XFLOW. How do researchers work with an ERC grant? What are some possible career paths?

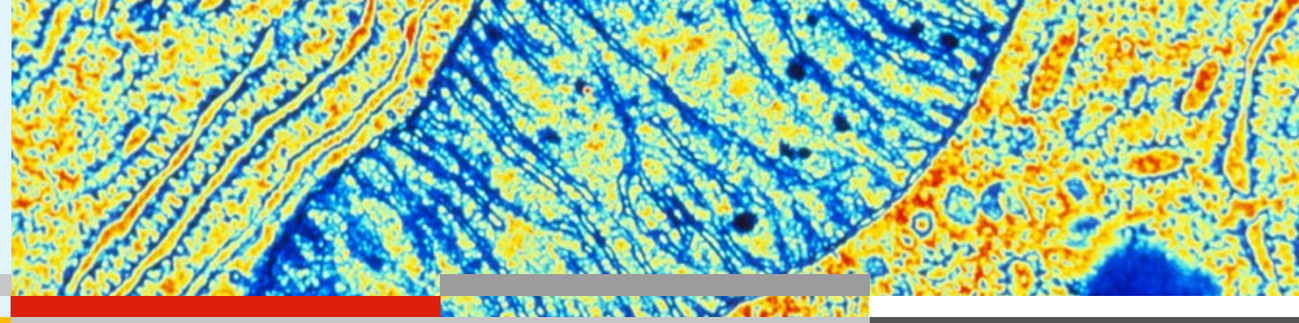
But we should also turn our attention to the future. "Horizon 2020", the European Commission's programme for promoting research and innovation, has doubled the ERC's budget. Many researchers will want to benefit from this. One thing is clear: it is worthwhile for them to apply.

Distinctive research fields – excellent research programmes

Thanks to the wide range of topics it covers in its six distinctive research fields, the Helmholtz Association offers researchers numerous entry points for ERC projects. Strategic research programmes and the use of the most modern scientific infrastructure, including large-scale facilities, characterise the work and provide a foundation for excellence. Hence, the Helmholtz centres are attractive employers for young and well-established researchers alike. The Helmholtz Association has high standards when it comes to talent management. The strategy begins with the targeted recruitment of highly qualified individuals at all levels, and then moves on to provide employees with comprehensive support so that they can develop their full potential. This support also includes services designed to assist researchers on the path to an ERC grant (see p. 24).

Kind regards,
The Helmholtz Brussels Office





XFLOW – ULTRAFAST X-RAY TOMOGRAPHY OF TURBULENT BUBBLE FLOWS

Principal investigator
Dr Markus Schubert

Grant
Starting Grant 2012

Research field
Process engineering

Panel
PE8

Host institution
Helmholtz-Zentrum Dresden-Rossendorf

Funding period
1 January 2013–31 December 2016

ERC funding
€1,172,640

What is your project about?

"In the chemical industry, many processes involve contacting gases and liquids to achieve a certain reaction. But we never know exactly what will happen when these fluids meet. Will the gas form lots of small bubbles in the liquid or accumulate to form bigger gas structures, like one big bubble? My project investigates these turbulent bubble flows, as they are called. Our understanding of these flows is still fragmentary, even though they are an extremely important aspect of processes in chemical reactors. To enhance our understanding of these gas-liquid flows, we are using imaging methods similar to those used in medicine. The challenge is that these have to be extremely fast."

What concrete research goal are you pursuing with the project?

"We want to use ultrafast X-ray tomography to gain new insights into the flow processes that take place in reactors. The knowledge gained can then be used to develop new models to predict flows and optimise processes. Our research could have a huge impact on the performance of industrial chemical reactors because the processes that we are investigating play an important role in the manufacture of fuels and cosmetics, to give just two examples. Our findings may therefore lay the foundations for developing more ecologically sound products that can be manufactured using less energy."

How is the ERC grant aiding your research?

"The grant makes my engineering work extremely high profile. It also gives me a lot of freedom to pursue my research interests independently. And the short draft proposal gives me the scope to make the necessary adjustments as the project evolves. This allows me to develop my own research interests very productively. I'm also hoping that the grant will enhance my future prospects as a researcher."

(ka)

MITOSHAPE – STRUCTURAL BASIS OF MITOCHONDRIAL INNER MEMBRANE SHAPE AND DYNAMICS

Principal investigator
Prof Oliver Daumke

Grant
Consolidator Grant 2013

Research field
Structural biology

Panel
LS1

Host institution
Max Delbrück Center for Molecular Medicine (MDC) Berlin-Buch

Funding period
1 July 2014–30 June 2019

ERC funding
€2,000,000

What is your project about?

"I am interested in how mitochondria obtain their specific shape and why they often change their shape in diseases such as Parkinson's and Alzheimer's. These are important questions that research has been grappling with for 60 years. Mitochondria are also known as the 'powerhouses of the cell' because they produce fuel molecules and thus supply energy to cells. But they also play a crucial role in cell death. Mitochondria are bounded by a double membrane: there is an outer smooth membrane and an inner invaginated one. This inner membrane is very important as the entire respiratory chain of the cell, for example, takes places there. In certain neurological diseases, however, this membrane is not correctly formed. We want to know why."

What concrete research goal are you pursuing with the project?

"Several proteins that are important for the invaginations of the inner membrane have already been identified. As structural biologists, we are now investigating the three-dimensional structure of these proteins. We want to find out how, like mini machines, they produce these invaginations. If we know more about this process, we will hopefully understand the diseases better on the molecular level."

How is the ERC grant aiding your research?

"It gives me the opportunity to focus on one project for five years together with my team. And during this time I don't have to acquire new funding. Such a long-term view is very important for tackling difficult research questions. The ERC grant is perfectly suited to a big research project of this kind, which involves four or five other researchers, all complementing one another's expertise. This deepens and consolidates my research."

(ka)

“NOTHING ELSE IN EUROPE CAN COMPETE WITH IT”

His research took him to Alaska, but the prestigious ERC grant brought Guido Grosse back to Europe. In this interview, the geologist explains how research into permafrost can even be conducted from Potsdam.

Mr Grosse, grants from the European Research Council are highly coveted. Do you remember the moment you received the invitation to interview?

I was about to head out for fieldwork on my snowmobile in northern Alaska. I finished this work earlier and turned up for the interview wind-chapped and sunburnt. I had prepared mostly on the basis of online training materials – I couldn’t exactly fly back to Europe from the US for coaching sessions.

How do you persuade people in such an important meeting?

You need to be enthusiastic about your project, make it plain that this is a great project idea and convince the panel that you really are able to pull it off and manage the remaining risks.

What is your project about?

I investigate permafrost, i.e. soils that are permanently frozen. These soils store large amounts of carbon originating from plant and animal remains, about twice as much carbon as is present in the atmosphere. Climate change is causing some of these areas to thaw rapidly, mobilising the carbon that has been stored in them for thousands of years. The result is a release of greenhouse gases like CO_2 and methane into the atmosphere. This is widely known – what is uncertain is the extent to which it is happening. The questions we ask in our project are therefore: Which areas are particularly susceptible to thawing? And how much carbon is affected?

How will you go about answering all these questions?

We intend to measure the amount and distribution of carbon in the soils in Siberia and Alaska and study thawing processes. Then we will apply the results to larger areas using remote sensing. Time series of satellite images will show us how the landscape changes, including how fast the soil is thawing, e.g. around lakes. This will enable us to create predictive models at a later stage.

What sparked your interest in this field?

I studied geology, and for my diploma thesis I did some fieldwork in the Arctic, which I found so interesting that I wanted to continue working on the topic. And that’s just what I’ve been doing since finishing my doctoral degree at the University of Potsdam and the Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research (AWI).

You have just returned to the AWI after a number of years in the US.

That’s right. After finishing my PhD I asked myself: where are the experts, where can I learn the most in a short period of time and where can permafrost be found? The University of Alaska was the perfect environment in which to continue my academic career. While in Alaska I managed to get published, secure funding for projects and establish myself as an assistant professor.

So why return?

I wanted to establish my own independent group and improve remote sensing methods. This works much better with solid long-term funding. After nearly seven years in the US, I applied for an ERC grant in autumn 2012 – with the possibility of returning to Europe and the AWI in mind. I had maintained all my old contacts while in the US.

An ERC project is no walk in the park. At what point would you say someone is ready to submit an application?

Good question! I applied for a Starting Grant just in the nick of time. A little later and I would have been competing for a Consolidator Grant instead. One of my advantages was certainly my several years of US research experience, which meant I had good publications, project leadership and international partnerships on my record. However, some people even manage to get the grant soon after finishing their PhDs.

How do you prepare an application like this?

I worked closely with former colleagues from the AWI and the centre’s EU funding specialists. Particularly for fieldwork outside of Europe, there are a lot of administrative factors to bear in mind that need careful planning.

What does the ERC grant mean for you?

Scientific independence! It offers a fantastic opportunity to build up a group of my own over an extended period of time and conduct independent research at this relatively early stage in my career. Nothing else in Europe can compete with that.

Could you have done it without the grant?

Given how important the project is to me, I would have tried to finance it without the ERC, though on a different scale. As to whether I would nonetheless have returned to Europe, who knows? So far, I’m glad I did – although Germany did take some getting used to after such a long time abroad. It was great to have colleagues at the AWI who helped smooth this transition.

(ka)

PETA-CARB – Rapid Permafrost Thaw in a Warming Arctic and Impacts on the Soil Organic Carbon Pool

Grant: Starting Grant 2013

Research field: Geosciences, polar research

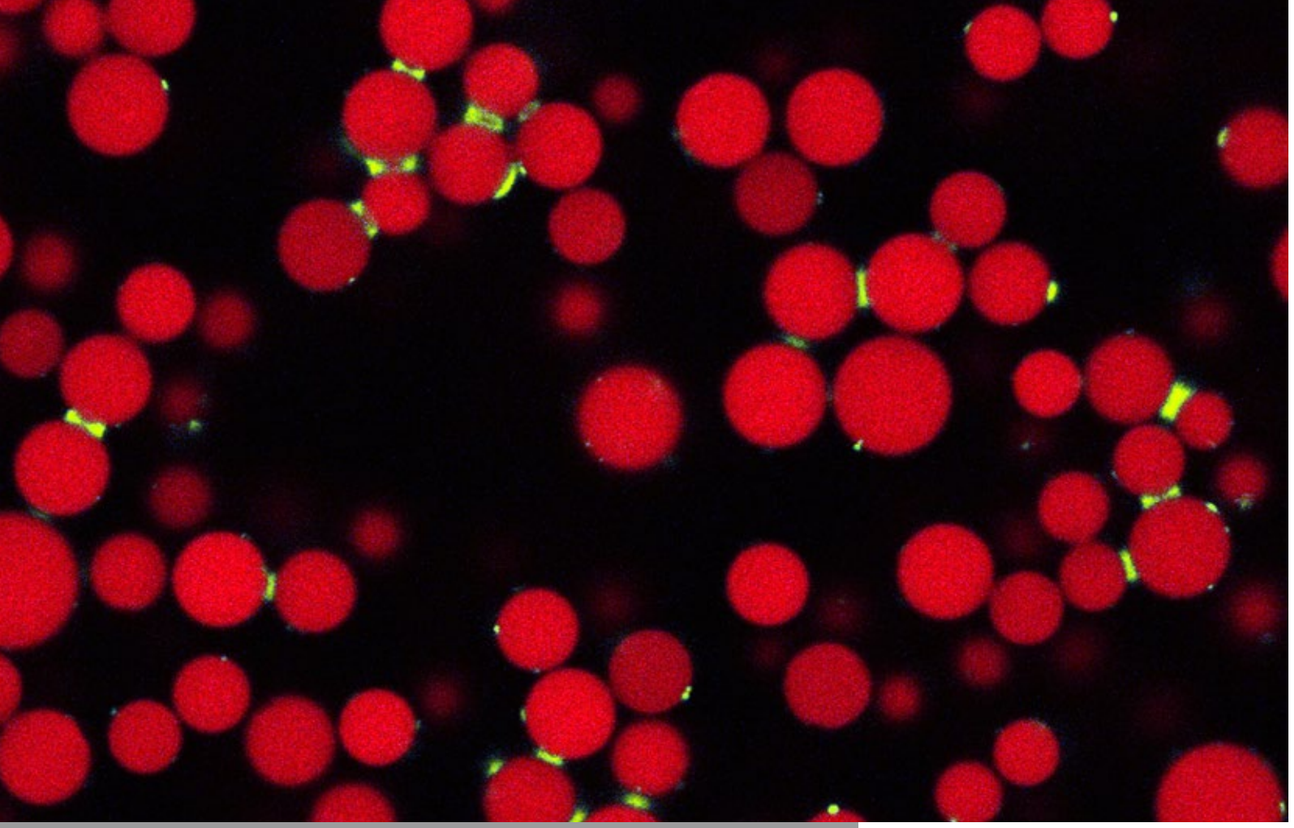
Panel: PE10

Principal investigator: Dr Guido Grosse

Host institution: Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research

Funding period: 1 November 2013–31 October 2018

ERC funding: €1,786,966



LIQUID BRIDGES FOR SOLID MATTER

Mechanical engineer Erin Koos improves material properties. Her aim: to fine-tune them in advance by combining different liquids.

The image that Erin Koos uses to explain the subject of her research is as fitting as it is simple: “Imagine a child building a sandcastle. If the child uses only dry sand, the result will always be a shapeless heap. However, as soon as a little water is added, all sorts of elaborate structures become possible.” Koos, who holds a PhD in mechanical engineering, has developed her own method of improving material properties. This method exploits the principle of capillary action, the same physical effect that holds the sand and water mixture together: water molecules penetrate between the grains of sand, forming liquid connections known as capillary bridges. Surface tension is created between the liquid and solid media, keeping the connection stable. “We transfer this concept to a scale of a few micrometres or nanometres. And when the effect is applied to suspensions, we obtain materials with very interesting properties,” explains Koos.

Suspensions are mixtures with a viscous to gel-like consistency, comprised of a liquid in which solid particles are evenly distributed, such as paint and molten chocolate. The method developed by Koos consists of adding a second, immiscible liquid to the mixture. This liquid forms bridges between the solid particles, resulting in a stable meshed structure. The advantages of this procedure over conventional suspensions go beyond stability, however. “The new method makes it possible to fine-tune the desired material properties in advance by combining different liquids,” says Koos. The method could be used to manufacture ultra-lightweight and resilient building materials, but also, for instance, filters made from glass which are both porous and robust.

“If we can describe the microstructure, it helps us predict how the material will behave in larger amounts.”

Koos came across this potential application of capillary action by chance, shortly after leaving the California Institute of Technology in Pasadena, US, to join the Applied Mechanics Working Group at the Karlsruhe Institute of Technology (KIT) in 2009. “We were investigating the cause of some quality issues experienced by a manufacturer of PVC products, and discovered that the solid particles were adsorbing tiny amounts of water during processing due to humidity in the air.” It quickly became clear to Koos that the cause was capillary action. She recognised the potential implications of the process for materials research, and developed the concept of capillary suspensions. Since August 2013, her work has been funded by the European Research Council (ERC) with a Starting Grant for young researchers.

The 33-year-old’s arrival at the KIT was anything but a coincidence, however. Koos had set herself a clear objective: “I wanted to take the next step on the road to becoming a professor and conduct independent research with a group of my own. I also wanted to experience a different academic culture.” She found both things at the KIT: a research topic that interested her, and colleagues willing to support her in developing her career. “The KIT helped me find the right funding opportunity with the ERC grant.”

Her group, comprising two PhD students and a post-doc, is still coming together. She has already been able to buy a laser microscope that generates three-dimensional images. “We use it to examine the physical processes caused by capillary action on a scale of a few micrometres,” says Koos. The nature of the capillary bridges enables the researcher to determine the force exerted between the solid particles. “And if we can describe the microstructure, it helps us predict how the material will behave in larger amounts.”

By the end of the five-year funding period, Koos hopes to understand the underlying principles and effects of capillary action in suspensions. But that is not all: “It would be nice to develop some prototypes in collaboration with industry. Then I could say: my ideas contributed to the design of this product.”

(kv)

CAPS – Capillary Suspensions: A Novel Route for Versatile, Cost-Efficient and Environmentally Friendly Material Design

Grant: Starting Grant 2013

Research field: Process engineering, material science

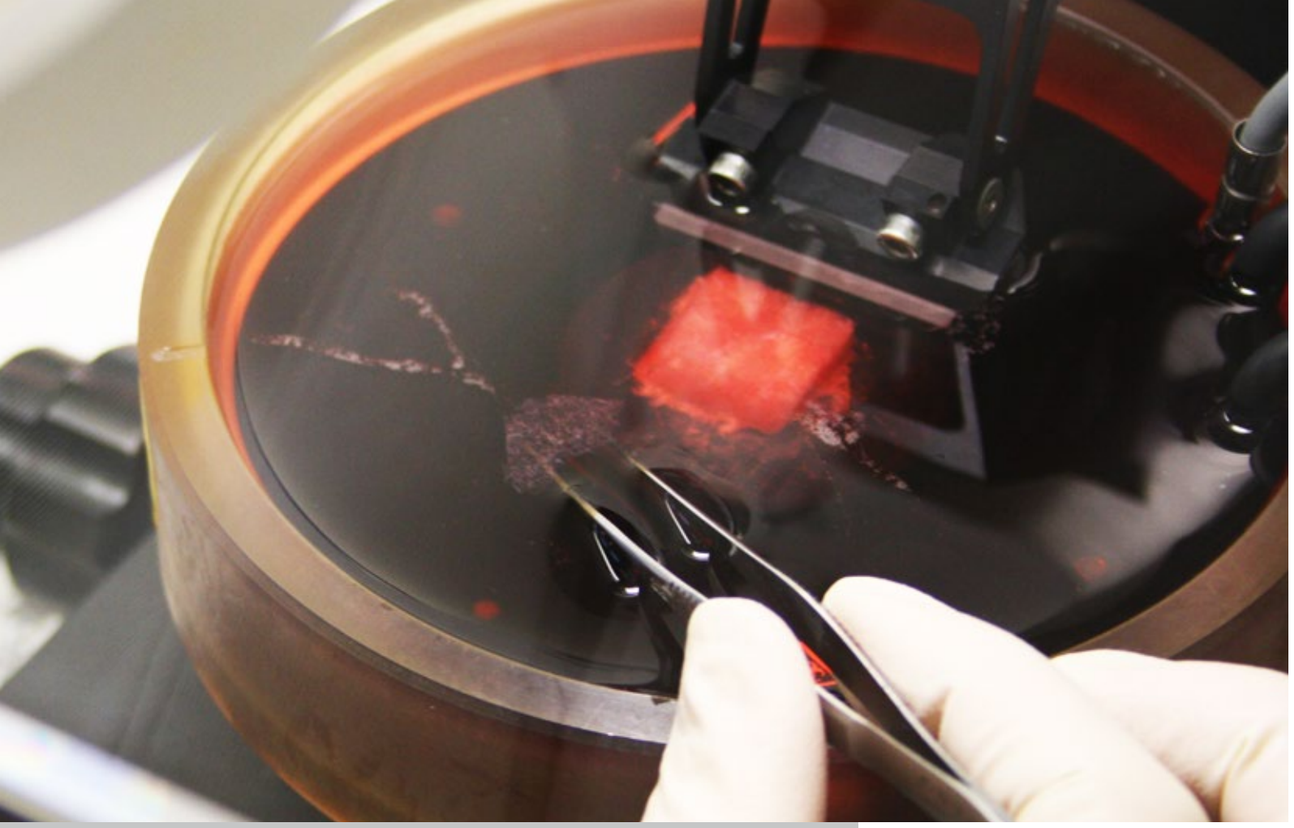
Panel: PE8

Principal investigator: Dr Erin Koos

Host institution:
Karlsruhe Institute of Technology

Funding period:
1 August 2013–31 July 2018

ERC funding: €1,489,618



HELPING THE LUNG HEAL ITSELF

Chronic lung diseases are a serious threat to many people worldwide. Can the lung heal itself? In her ERC project, biomedical scientist Melanie Königshoff is relying on close collaboration between medicine and the life sciences to find the answer.

Ms Königshoff, in 2010 you received an ERC Starting Grant for research into the regenerative potential of the human lung. What exactly is the project about?

We aim to find out to what extent the lung can repair itself, and we want to identify the switch that will trigger the regeneration process. Chronic lung diseases like pulmonary fibrosis and chronic obstructive pulmonary disease (COPD) are becoming increasingly common all over the world, but there are still very limited ways of treating the causes of these conditions.

What was your starting point?

We came across the Wnt signalling pathway in lung diseases for the first time in 2009. This cellular signalling pathway is important for many organs during embryonic development, as it activates genes that affect tissue formation. Back then, we identified this pathway, as well as a key mediator protein, in pulmonary fibrosis. In COPD, due to which patients suffer a progressive loss of lung tissue, we found that Wnt signalling was reduced. Using mouse models, we were able to show that activating the Wnt signalling pathway can counteract lung tissue loss and improve lung function.

Your ERC funding runs until 2016, so you're about halfway through now. What have been the most important milestones so far?

One of the first milestones was putting the team together for my first laboratory. An ambitious project like this can only succeed if you have dedicated researchers who are able to work in an interdisciplinary manner. It took a bit of time to reach that milestone. Now I've got an amazing team and we've produced our first results and identified key molecules involved in Wnt signal-mediated lung regeneration, which is very exciting.

What about other milestones?

Our first research goals were obviously important milestones. A particularly important one was to establish a new method to investigate human lung regeneration with the help of the ERC funding. It is essential to achieving our goal. We wanted to take the knowledge we had gained from studying animal models and transfer that to COPD patients. One of the challenges we tackle together with clinicians at Munich University Hospital is to identify suitable human sample material and get it from the operation theatre to our laboratory quickly and with all the information needed. We're now at a stage where the cycle works very well.

You made the step from mouse models to patients quite swiftly.

Yes. That was important to us. For this kind of effort to succeed, though, you need to be in the right place. The Comprehensive Pneumology Center (CPC), which is a translational centre for lung research, was set up to do exactly what we were aiming for. We cooperate with several clinical departments within the CPC, which means we have physicians and experimental researchers working under one roof. I'm a medical doctor and hold a PhD in life sciences, so this close collaboration is extremely important to me. Also, since we're part of the Helmholtz Association, we get lots of opportunities to work with other institutes.

How is that helpful?

I'll give you an example: The Institute of Stem Cell Research is part of the Helmholtz Zentrum München, and our colleagues there are also interested in Wnt signalling, as this is important for stem cell functions. Because we can discuss our observations with the team there, we can produce a more detailed analysis of the role that endogenous stem cells might play in lung regeneration. Being able to draw on this expertise is very useful. I have the perfect set-up here: close links with hospitals, on the one hand, and the Helmholtz structure with its broad range of research topics, on the other.

(kv)

PEARL – Priming Epithelial Cell Activation to Regenerate the Lung

Grant: Starting Grant 2010

Research field: Respiratory medicine

Panel: LS7

Principal investigator:
Dr Melanie Königshoff MD

Host institution: Helmholtz Zentrum München – German Research Center for Environmental Health

Funding period:
1 April 2011–31 March 2016

ERC funding: €1,291,800

SEEING THE WOOD FOR THE TREES

Thorsten Wiegand uses computer models to simulate ecosystems – and observes what happens when the tiniest factors change. All thanks to an ERC Advanced Grant.

Tens of thousands of trees represented in computer models, one by one, down to the last detail: just another day at the office for Thorsten Wiegand. A physicist by training, Wiegand works at the Helmholtz Centre for Environmental Research (UFZ) in Leipzig on one of the most important questions of modern ecology: why are ecological communities such as tropical forests made up of so many different species – does each one survive in its own niche, or are they all in competition with each other? Wiegand specialises in analysing spatial patterns and tries to recreate them in computer simulations. At the moment, he is modelling forests. “We ask the question: does the detailed information on spatial patterns provide information on how the species coexist?”

In his quest for answers, Wiegand – together with his colleague Andreas Huth – is primarily studying two large datasets built up by field researchers in Panama and Sri Lanka. The data were collected in species-rich tropical rainforest areas of 25 to 50 ha, one on flat terrain and the other on hilly. Every tree with a trunk (or stem) larger than a pencil is mapped. To begin with, the team plotted the position of each tree in computer models and analysed the spatial patterns of the mapped trees. In parallel, they worked on general simulations: what is the effect of changing the way trees compete, die or disperse their seeds? The project combines high computer power with the latest methods of ecological modelling and spatial data analysis. “It was not clear from the outset whether we would succeed in spatially modelling so many species in the forest,” says Wiegand. “The model contains between 50,000 and 100,000 trees – and every change had to be simulated for each individual tree.” The simulations for each version of the model, which involve two million parameter sets, take between one and two weeks to run – a major undertaking.

In order to obtain even better results, the group also uses data from other regions and climate zones. “It’s a give-and-take situation,” says Wiegand. “Researchers from other countries come to the UFZ and use our methods to analyse their data, and we use their findings in our next calculations.” The group is now in the hectic final stages of the project. It is time to bring it all together: can the data from the simulations explain the spatial patterns of real forests? What other findings can be derived from the models?

This pioneering research has been made possible by an Advanced Grant awarded to Wiegand in 2008 by the European Research Council. “It’s probably a once-in-a-lifetime opportunity: the chance to pursue my own creative ideas in a large team, under optimal conditions!” he says.

“We don’t get caught up in details. This helps us to stay on track when working with models comprising up to 100,000 trees.”

Although the ERC team is primarily concerned with basic research, there are also a number of concrete applications. For instance, the detailed data could help determine the carbon balance of forests. Ultimately, the results of the research could play an important part in finding ways to protect biodiversity more effectively, says Wiegand.

The physicist brings years of modelling experience to the table and has a flair for simulations. What else is important for his work in the field of ecology? “Given my research interest, I could not work in isolation as a modelling specialist,” says Wiegand. “I have to stay abreast of current discussions in biology and ecology in order to know what the hot topics are.” Of course, the structured approach that he and Andreas Huth have learned from physics is a valuable asset. “We don’t get caught up in details. This helps us to stay on track when working with models comprising up to 100,000 trees.”

(ka)

SPATIODIVERSITY – Towards a Unified Spatial Theory of Biodiversity

Grant: Advanced Grant 2008

Research field: Ecology

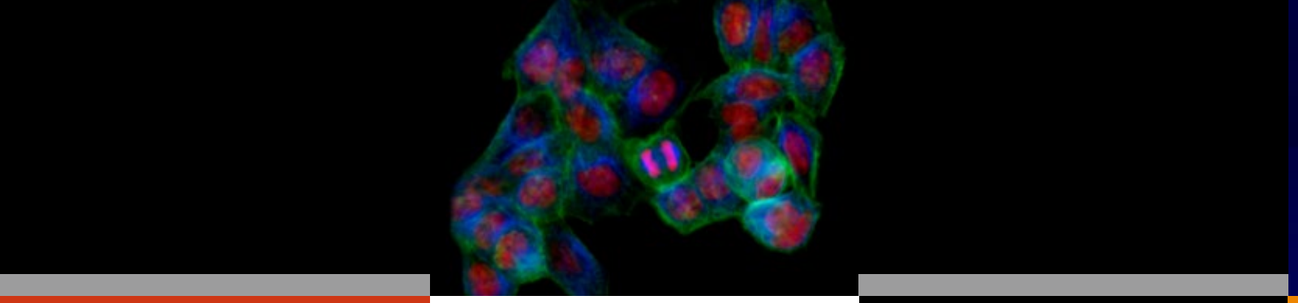
Panel: LS8

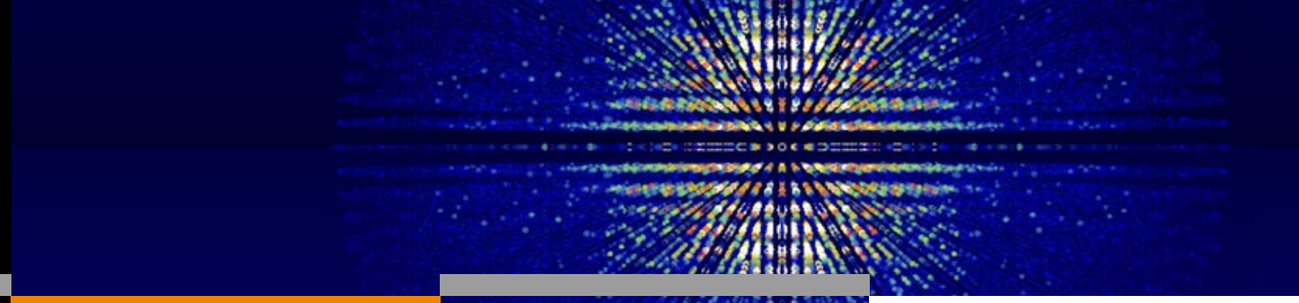
Principal investigator:
Dr Thorsten Wiegand
(joined by Prof Andreas Huth, UFZ)

Host institution: Helmholtz Centre for Environmental Research – UFZ

Funding period:
1 July 2009–30 June 2015

ERC funding: €2,177,664





SYNGENE – GLOBAL MAPPING OF SYNTHETIC GENETIC INTERACTIONS IN *DROSOPHILA*

Principal investigator
Prof Michael Boutros

Grant
Advanced Grant 2011

Research field
Genome biology

Panel
LS2

Host institution
German Cancer Research Center (DKFZ)

Funding period
1 August 2012–31 July 2017

ERC funding
€2,500,000

What is your project about?

"Genes rarely work alone; most diseases are influenced by several genes at once. But how do they work together and what specific processes do they influence? To find answers to these questions, we are analysing genes in cultured cells from different organisms – like the fruit fly *Drosophila* – and from human tumours. We are especially interested in genes that control cellular signalling pathways. This is because many tumours are caused by faulty transmission of cellular growth signals. To help us better understand the underlying processes, we are using a method called RNA interference to observe what happens when we inhibit the function of several genes at once."

What concrete research goal are you pursuing with the project?

"We are systematically cataloguing genetic interactions, which gives us an overview of each gene's interaction partners. We also rely heavily on bioinformatics to analyse very large data sets. The general idea is to produce a comprehensive digital map of the genome that will guide us in further analysing the interplay of genes. Let me give you an example to help illustrate how this works: When two people on a social network like Facebook have friends in common, there is a good chance that the two of them will know each other – even if they aren't actually connected to each other. If you apply that concept to genes, you can see how interaction profiles allow us to predict which genes perform the same function. One of our long-term goals is to be able to use these genome maps to predict which processes need to be simultaneously inhibited to make combination therapies in cancer as effective as possible."

How is the ERC grant aiding your research?

"The grant means that we can conduct a cutting-edge, high-risk research project. The ERC support gives us the freedom to develop new methods beyond what is currently technologically possible and to apply these approaches to systematically explore functional relationships in genomes. Interdisciplinary methods are particularly valuable for us. I believe that understanding how the different elements in our genome and their products are connected is one of the most exciting frontiers in genome biology."

(ka)

AXSIS – FRONTIERS IN ATTOSECOND X-RAY SCIENCE: IMAGING AND SPECTROSCOPY

Principal investigators
Dr R.W. Aßmann (photo), Prof H. Chapman, Prof P. Fromme, Prof F. Kärtner (coord.)

Grant
Synergy Grant 2013

Research field
Laser technology, accelerator physics, biology, spectroscopy

Host institution
Deutsches Elektronen-Synchrotron DESY

Funding period
1 August 2014–31 July 2020

ERC funding
€13.8 million

What is your project about?

"Our team is concerned with using the latest laser and particle accelerator technology to generate world-record short X-ray pulses that we can use, for example, to investigate matter. Normally, a sample becomes heated when light shines on it and this can be problematic, for example, if the heat damages the sample or distorts the test results. Our X-ray flashes will be about 200 times shorter than has been previously possible, so the samples will hardly be heated despite the high intensity of the light. This means that we will even be able to measure fast natural processes such as plant photosynthesis and investigate how plants capture sunlight and convert it into energy in a carbon neutral process."

What concrete research goal are you pursuing with the project?

"At the moment we are focusing on constructing a very compact accelerator and light source. Unlike its older siblings, which measure hundreds or even thousands of metres, it is to be no more than several metres long. This requires an entirely new approach. Ultimately, we want to use the accelerator to make detailed measurements of photosynthesis and to enhance our understanding of how this process works on the electronic level. It may even be possible to artificially recreate the process. The tool itself has the potential to be widely disseminated, as such a small light source could be set up just about anywhere, making it a development that could interest a great number of researchers across different fields."

How is the ERC grant aiding your research?

"The Synergy Grant has made it possible for the four of us – researchers with disciplines ranging from accelerator physics to biology – to work together as a team: a very refreshing combination of expertise! We can jointly decide from the outset how we can reach our goals and how we can best coordinate technical development with research applications. And the grant makes it financially possible for us to implement our daring and ground-breaking idea: after all, our research goal is based on the premise that we will actually succeed in developing the right facility. If we do, we will be able to apply it to some of the most fundamental processes in biology."

The interview was conducted with Ralph Wolfgang Aßmann on behalf of the team. (ka)

OVERVIEW OF ALL HELMHOLTZ ERC PROJECTS (2007–2013)

STARTING GRANTS

Call	Surname, Name	Centre	Acronym	Title	Panel	Remarks
ERC-2007-StG	Adrian, Lorenz	UFZ	MICROFLEX	Microbiology of dehalococcoides-like chloroflexi	LS5	
ERC-2007-StG	López-Schier, Hernán	HMGU	SENSORINEURAL	Elaboration and refinement of sensorineural dendritic architecture	LS1	since 2012 at HMGU
ERC-2007-StG	Rost, Bjoern	AWI	PHYTOCHANGE	New approaches to assess the responses of phytoplankton to global change	PE8	
ERC-2009-StG	Hoffmann-Vogel, Regina	KIT	NANOCONTACTS	Structural and electronic properties of nanoscale metallic contacts fabricated by thermally assisted electromigration	PE3	
ERC-2009-StG	Lickert, Heiko	HMGU	CILIARYDISEASE	Deciphering mechanisms of ciliary disease	LS3	
ERC-2009-StG	Rivalta, Eleonora	GFZ	CCMP	Physics Of Magma Propagation and Emplacement: a multi-methodological Investigation	PE10	since 2012 at GFZ
ERC-2009-StG	Spagnoli, Francesca	MDC	HEPATOPANCREATIC	Mechanisms underlying cell fate decision between pancreas and liver	LS7	
ERC-2010-StG	Cicin-Sain, Luka	HZI	CMVAGSTIMULUS	Molecular mechanisms of persistent antigenic stimulation in cytomegalovirus infection	LS6	
ERC-2010-StG	Epelbaum, Evgeny	FZJ	NUCLEAREFT	Nuclear Physics from Quantum Chromodynamics	PE2	since 2010 at Ruhr University of Bochum
ERC-2010-StG	Häußler, Susanne	HZI	RESISTOME	Towards an individualised therapy and prevention of multi-drug resistant disease	LS7	
ERC-2010-StG	Heikenwälder, Mathias	HMGU	LIVERCANCER-MECHANISM	Uncovering the mechanisms of inflammation induced liver tissue destruction and carcinogenesis	LS4	
ERC-2010-StG	Knippertz, Peter	KIT	DESERTSTORMS	Desert Storms – Towards an Improved Representation of Meteorological Processes in Models of Mineral Dust Emission	PE10	since 2013 at KIT
ERC-2010-StG	Königshoff, Melanie	HMGU	PEARL	Priming epithelial cell activation to regenerate the lung	LS7	
ERC-2010-StG	Poulet, James	MDC	BRAINSTATES	Brain states, synapses and behaviour	LS5	
ERC-2010-StG	Poy, Matthew	MDC	ISLETVASC	Molecular mechanisms regulating pancreatic islet vascularization	LS4	
ERC-2010-StG	Razansky, Daniel	HMGU	DYNAMIT	Deep Tissue Optoacoustic Imaging for Tracking of Dynamic Molecular and Functional Events	LS7	
ERC-2010-StG	Schneider, Matthias	KIT	MUSICA	Multi-platform remote sensing of isotopologues for investigating the cycle of atmospheric water	PE10	
ERC-2010-StG	Teleman, Aurelio	DKFZ	TOR-AA	Amino acid sensing by TOR	LS3	
ERC-2010-StG	Theis, Fabian	HMGU	LATENTCAUSES	Modelling latent causes in molecular networks	PE7	

Call	Surname, Name	Centre	Acronym	Title	Panel	Remarks
ERC-2011-StG	Aziz, Emad Flear	HZB	PORPHDYN	Structure and Dynamics of Porphyrin-Based Materials in Solution vs Interfaces	PE4	
ERC-2011-StG	Gotthardt, Michael	MDC	CARDIOSPLICE	CardioSplice – A systems and targeted approach to alternative splicing in the developing and diseased heart: Translating basic cell biology to improved cardiac function	LS4	
ERC-2011-StG	Heissmeyer, Vigo	HMGU	RC3H1/2 SPECIFICITY	Specificity of Rc3h1/2 proteins in post-transcriptional control of immunity and autoimmune disease	LS6	
ERC-2011-StG	Jenko, Frank	IPP	EXASCALE-PLASMATURB	Turbulence in Laboratory and Astrophysical Plasmas: Tackling Key Unsolved Problems via Peta- to Exascale Computing	PE2	
ERC-2011-StG	Koos, Christian	KIT	ENTERAPIC	Energy-Efficient Multi-Terabit/s Photonic Interconnects	PE7	
ERC-2011-StG	Luzhetskyy, Andriy	HZI	EXPLOGEN	Exploitation of actinomycetes genomics using synthetic and system biology approaches	LS9	
ERC-2011-StG	Nesterov-Müller, Alexander	KIT	COMBIPATTERNING	Combinatorial Patterning of Particles for High Density Peptide Arrays	PE8	
ERC-2011-StG	Pietschmann, Thomas	HZI	VIRAFRONT	Viral frontiers species barriers of hepatitis C virus replication	LS6	hosted by TWINCORE GmbH
ERC-2011-StG	Siemens, Jan-Erik	MDC	THERMOREG	Peripheral and Central Mechanisms of Temperature Detection and Core Body Thermoregulation	LS5	since 2013 at the University of Heidelberg
ERC-2011-StG	Stampfer, Christoph	FZJ	GQEMS	Graphene Quantum Electromechanical Systems	PE3	hosted by the RWTH Aachen
ERC-2011-StG	Zweckstetter, Markus	DZNE	DYNAMOM	New magnetic resonance techniques to determine the dynamic structure of mitochondrial outer membrane proteins and their complexes	LS1	since 2014 at DZNE
ERC-2012-StG	Kögerler, Paul	FZJ	MOLSPINTRON	Synthetic Expansion of Magnetic Molecules Into Spintronic Devices	PE5	hosted by the RWTH Aachen
ERC-2012-StG	Schubert, Markus	HZDR	XFLOW	Ultrafast X-Ray Tomography of Turbulent Bubble Flows	PE8	
ERC-2012-StG	Westmeyer, Gil	HMGU	MAGNETOGENETICS	Reverse engineering the vertrebrate molecular machinery for magnetic biomineralisation	LS9	
ERC-2013-StG	Grosse, Guido	AWI	PETA-CARB	Rapid Permafrost Thaw in a Warming Arctic and Impacts on the Soil Organic Carbon Pool	PE10	
ERC-2013-StG	Koos, Erin Crystal	KIT	CAPS	Capillary suspensions: a novel route for versatile, cost efficient and environmentally friendly material design	PE8	
ERC-2013-StG	Levkin, Pavel	KIT	DROPCELLARRAY	DropletMicroarrays: Ultra High-Throughput Screening of Cells in 3D Microenvironments	PE8	
ERC-2013-StG	Wolbers, Thomas	DZNE	AGESPACE	Spatial Navigation – A Unique Window Into Mechanisms Of Cognitive Ageing	SH4	

CONSOLIDATOR GRANTS

Call	Surname, Name	Centre	Acronym	Title	Panel	Remarks
ERC-2013-CoG	Daumke, Oliver	MDC	MITOSHAPE	Structural basis of mitochondrial inner membrane shape and dynamics	LS1	
ERC-2013-CoG	Elsner, Martin	HMGU	MICRODEGRADE	Identifying and Overcoming Bottlenecks of Micropollutant Degradation at Low Concentrations	PE10	
ERC-2013-CoG	Edbauer, Dieter	DZNE	DPR-MODELS	C9orf72 repeat expansion in FTD/ALS – from mechanisms to therapeutic approaches	LS5	
ERC-2013-CoG	Küpper, Jochen	DESY	COMOTION	Controlling the Motion of Complex Molecules and Particles	PE4	since 2014 at DESY
ERC-2013-CoG	Lüders, Tillmann	HMGU	POLLOX	Anaerobic Pollutant Degradation With Oxygen	LS9	

ADVANCED GRANTS

Call	Surname, Name	Centre	Acronym	Title	Panel	Remarks
ERC-2008-AdG	Grummt, Ingrid	DKFZ	RIBOGENES	The role of noncoding RNA in sense and antisense or orientation in epigenetic control of rRNA genes	LS2	
ERC-2008-AdG	Houben, Lothar	FZJ	INTIF	Inorganic nanotubes and fullerene-like materials: new synthetic strategies lead to new materials	PE5	hosted by the Weizmann Institute of Science, Israel
ERC-2008-AdG	Ntziachristos, Vasilis	HMGU	MSOT	Next Generation in-vivo imaging platform for post-genome biology and medicine	LS7	hosted by TU Munich
ERC-2008-AdG	Rodewald, Hans-Reimer	DKFZ	MAST-CELL-FUNCTIONS	Genetically defined and selectively mast cell-deficient mouse model to unravel the immunological roles of mast cells	LS6	since 2009 at DKFZ
ERC-2008-AdG	Wiegand, Thorsten	UFZ	SPATIODIVERSITY	Towards a Unified Spatial Theory of Biodiversity	LS8	
ERC-2009-AdG	Niehrs, Christof	DKFZ	DNADEMETHYLASE	Functions and mechanism of active DNA demethylation	LS3	since 2011 at the Institute of Molecular Biology, Mainz
ERC-2009-AdG	Ströher, Hans	FZJ	POLPBAR	Production of polarized antiprotons	PE2	
ERC-2010-AdG	Puchta, Holger	KIT	COMREC	Designed plant breeding by control of meiotic recombination	LS9	
ERC-2010-AdG	Rajewsky, Klaus	MDC	LYMPHOMA	Modeling lyphoma pathogenesis in mice – from basic mechanisms to pre-clinical models	LS6	
ERC-2011-AdG	Boetius, Antje	AWI	ABYSS	Assessment of bacterial life and matter cycling in deep-sea surface sediments	LS8	
ERC-2011-AdG	Boutros, Michael	DKFZ	SYNGENE	Global Mapping of Synthetic Genetic Interactions in Drosophila	LS2	
ERC-2011-AdG	Izsvák, Zsuzsanna	MDC	TRANSPOSOSTRESS	Impact of stress-induced transposon activities on human disease	LS7	
ERC-2011-AdG	Jentsch, Thomas Jürgen	MDC	CYTOVOLION	Ion homeostasis and volume regulation of cells and organelles	LS4	hosted by the Forschungsverbund Berlin e.V.

Call	Surname, Name	Centre	Acronym	Title	Panel	Remarks
ERC-2011-AdG	Kyewski, Bruno	DKFZ	SELF-TOLERANCE	Generating self-antigen diversity in the thymus: from gene expression patterns in single cells to the system level, an integrative approach	LS6	
ERC-2011-AdG	Ladd, Mark Edward	DKFZ	MREXCITE	Unlocking the potential of ultra-high-field MRI through manipulation of radiofrequency excitation fields in human tissue	LS7	Since 2013 at DKFZ
ERC-2011-AdG	Lewin, Gary	MDC	EXTREMOPHILE MAMMAL	Molecular exploitation of an extremophile mammal	LS5	
ERC-2012-AdG	Dunin-Borkowski, Rafal Edward	FZJ	IMAGINE	Imaging Magnetism in Nanostructures using Electron Holography	PE4	
ERC-2012-AdG	Klatzmann, David Robert	DKFZ	TRIPOD	Deciphering the regulatory T cell repertoire: towards biomarkers and biotherapies for autoimmune diseases	LS7	hosted by INSERM
ERC-2013-AdG	Götz, Magdalena	HMGU	CHRONEUROREPAIR	Chromatin states in neurogenesis – from understanding chromatin loops to eliciting neurogenesis for repair	LS3	
ERC-2013-AdG	Willnow, Thomas	MDC	BEYOND	Metabolic Basis Of Neurodegenerative Disease Disease	LS4	

SYNERGY GRANTS

Call	Surname, Name	Centre	Acronym	Title	Panel	Remarks
ERC-2013-SyG	Aßmann, Ralph Wolfgang (DESY) Chapman, Henry Nicholas (University of Hamburg) Fromme, Petra Marie-Luise (DESY) Kärtner, Franz Xaver (University of Hamburg)	DESY	AXSIS	Frontiers in Attosecond X-ray Science: Imaging and Spectroscopy		

ABBREVIATIONS

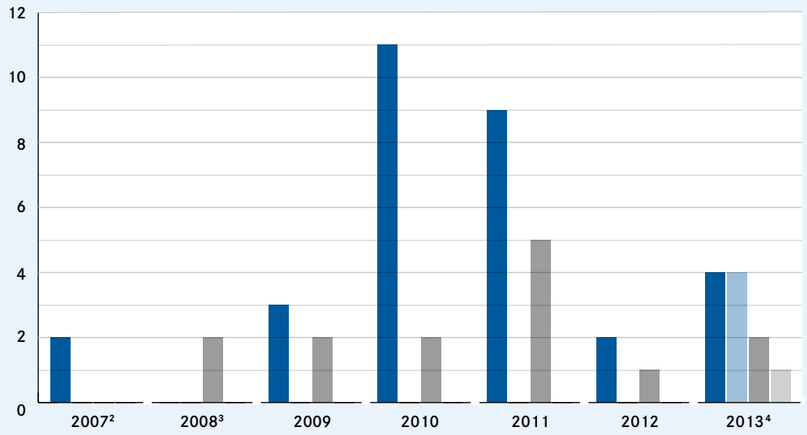
AWI	*Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research*
DESY	*Deutsches Elektronen-Synchrotron DESY*
FZJ	*Forschungszentrum Jülich*
GEOMAR	*GEOMAR Helmholtz Centre for Ocean Research Kiel*
DLR	*German Aerospace Center*
DKFZ	*German Cancer Research Center*
DZNE	*German Center for Neurodegenerative Diseases*
GSI	*GSI Helmholtz Centre for Heavy Ion Research*
UFZ	*Helmholtz Centre for Environmental Research - UFZ*
HZI	*Helmholtz Centre for Infection Research*
GFZ	*Helmholtz-Centre Potsdam - GFZ German Research Centre for Geosciences*
HZB	*Helmholtz-Zentrum Berlin für Materialien und Energie*
HZDR	*Helmholtz-Zentrum Dresden-Rossendorf*
HZG	*Helmholtz-Zentrum Geesthacht Centre for Materials and Coastal Research*
HMGU	*Helmholtz Zentrum München - German Research Center for Environmental Health*
KIT	*Karlsruhe Institute of Technology*
MDC	*Max Delbrück Center for Molecular Medicine Berlin-Buch*
IPP	*Max Planck Institute for Plasma Physics (associate member)*

PANELS

LS	*LIFE SCIENCES*
PE	*PHYSICAL SCIENCE AND ENGINEERING*
SH	*SOCIAL SCIENCES AND HUMANITIES*

STATISTICS

HELMHOLTZ ERC GRANTS PER YEAR 2007–2013[1]



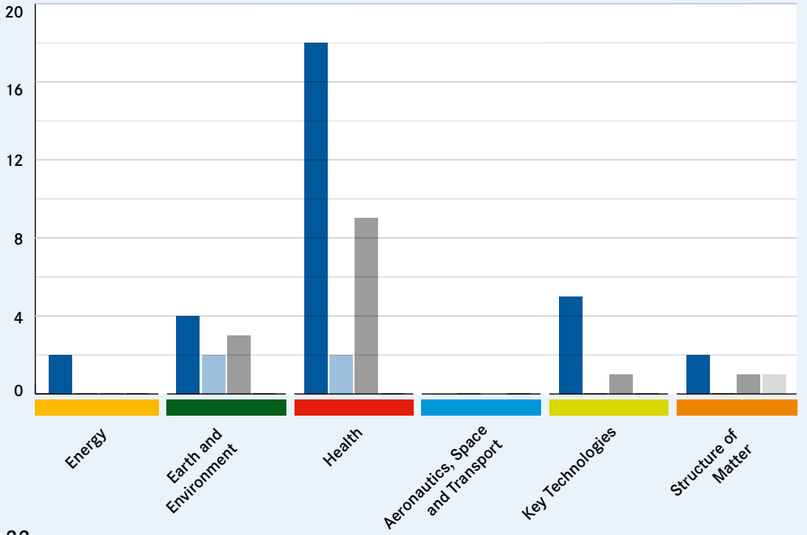
[1] This overview takes into account only those grants acquired directly through Helmholtz. Grant holders who have come from or left for other institutions are not included, nor are collaborations.

[2] No call for Advanced Grants in 2007.

[3] No call for Starting Grants in 2008.

[4] First calls for Synergy Grants in 2012, for Consolidator Grants in 2013.

ERC GRANTS OF THE HELMHOLTZ CENTRES BY RESEARCH FIELD 2007–2013



Source: Statistics of the Helmholtz Office Brussels

This overview takes into account only those grants acquired directly through Helmholtz. ERC grant holders who have come from or left for other institutions are not included, nor are collaborations.

RANKING: ERC GRANTS OBTAINED BY TOP RESEARCH ORGANISATIONS

(hosting at least 30 grants)

	Organisation [1]	Country	Starting / Consolidator Grants	Advanced Grants	Total [3 4]
1	National Centre for Scientific Research (CNRS)	FR	142	66	**208**
2	Max Planck Society	DE	67	45	**112**
3	National Institute of Health and Medical Research (INSERM)	FR	39	18	**57**
	Helmholtz Association [2]	**DE**	**35**	**14**	**49**
4	French Alternative Energies and Atomic Energy Commission (CEA)	FR	34	9	**43**
5	Spanish National Research Council (CSIC)	ES	25	15	**40**
6	National Institute for Research in Computer Science and Automatic Control (INRIA)	FR	19	12	**31**

[1] Only research organisations are listed, not institutions of higher education.

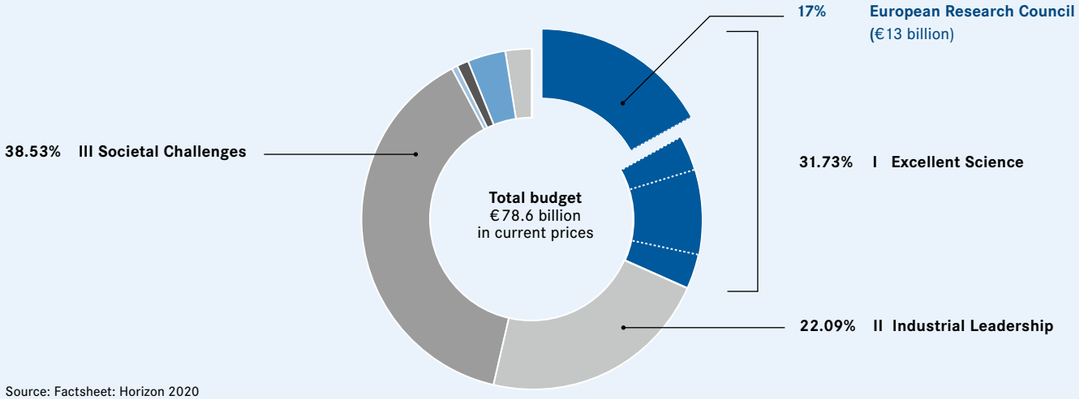
[2] In official ERC statistics only the single Helmholtz centres are listed.

[3] Source: "Annual Report on the ERC Activities and Achievements in 2013" (March 2014), page 87.

[4] Synergy Grants are not included.

To evaluate the relevance of ERC funding the following figures illustrate its share of the Horizon 2020 budget.

THE ERC WITHIN HORIZON 2020 – BUDGET 2014–2020



Source: Factsheet: Horizon 2020 budget, http://ec.europa.eu/research/horizon2020/pdf/press/fact_sheet_on_horizon2020_budget.pdf, 15 July 2014.

HELMHOLTZ: ATTRACTIVE FOR INDIVIDUAL SCIENTISTS INTERESTED IN THE ERC

Background – what does the ERC have to offer?

The European Research Council (ERC) was created in 2007 by the European Union to implement a funding programme for ground-breaking "pioneer research". Its goal is to boost excellence and creativity in European research and to promote Europe as an attractive place to work for the best researchers worldwide.

Since 2013, there have been five funding schemes for applicants:

What?	For whom?	What level of funding?
ERC Starting Grants	For junior scientists (2–7 years post PhD)	Up to €2 million for a maximum of 5 years
ERC Consolidator Grants	For junior scientists (7–12 years post PhD)	Up to €2.75 million for a maximum of 5 years
ERC Advanced Grants	For experienced and excellent scientists	Up to €3.5 million for a maximum of 5 years
ERC Synergy Grants (No calls in 2014/2015)	For groups of two to four excellent scientists	Up to €15 million for a maximum of 6 years
ERC Proof of Concept	For grant holders only. Assessing the innovative potential of ideas and inventions from ERC projects.	Up to €150,000 for a maximum of 1.5 years

Content and topics – who can apply?

The ERC funding schemes are open to all topics and addressed to excellent individual scientists from all subject areas, all disciplines and all career levels. The only selection criterion is the scientific excellence of the researchers and their projects. The ERC aims to cover all areas from basic research to application-oriented research.

What are the prospects for funding?

The ERC has acquired an admirable reputation in an extremely short time. It has continued to award grants under the "Excellent Science" pillar of Horizon 2020, the EU's Framework Programme for Research and Innovation. A considerably increased budget, now amounting to 13 billion, has boosted the attractiveness of the ERC as a funding source.

Why do research with an ERC grant at Helmholtz?

Helmholtz is an attractive employer for excellent scientists from all over the world and concentrates its work in six research fields: Energy; Earth and Environment; Health; Aeronautics, Space and Transport; Key Technologies; and Structure of Matter. The ERC programme is suitable for establishing new research topics at the Helmholtz centres. It is also possible to establish and head an own research group with an ERC grant.

Since 2007, more than 50 scientists have obtained ERC grants for Helmholtz. Many researchers highlight the scientific independence connected to the grant. Guido Grosse (p. 9), for example, says, "It offers a fantastic opportunity to build up a group of my own over an extended period of time and conduct independent research at this relatively early stage in my career."

What does Helmholtz have to offer?

- Eighteen excellent research centres throughout Germany (p. 27)
- The opportunity to work on comprehensive solutions to the most significant societal challenges in six research fields
- Research on systems of great complexity with large-scale facilities and scientific infrastructure, in close cooperation with national and international partners
- Targeted talent management
- Individual advice and support for ERC grant proposals

The Helmholtz office in Brussels offers applicants, in collaboration with the ERC support offices at the Helmholtz centres, comprehensive support in the following areas:

- Advice and support during the application procedure and analyses of applications
- Interview coaching
- Legal and financial advice regarding ERC grants
- Support during contract preparations and project execution

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Seizing the opportunity to pursue a research idea – what should I do next?

You have an excellent idea for research and would like to submit an application for an ERC grant at a Helmholtz centre? Please contact us or the Helmholtz centres if you would like to speak to our EU/ERC funding specialists.

Further information

www.helmholtz.de/erc
www.helmholtz.de/talentmanagement
ERC websites: erc.europa.eu

LOCATION OF THE RESEARCH CENTRES

1 Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research
www.awi.de

2 Deutsches Elektronen-Synchrotron DESY
www.desy.de

3 Forschungszentrum Jülich
www.fz-juelich.de

4 GEOMAR Helmholtz Centre for Ocean Research Kiel
www.geomar.de

5 German Aerospace Center (DLR)
Cologne (headquarters)
www.dlr.de

6 German Cancer Research Center
www.dkfz.de

7 German Center for Neurodegenerative Diseases (DZNE)
www.dzne.de

8 GSI Helmholtz Centre for Heavy Ion Research
www.gsi.de

9 Helmholtz Centre for Environmental Research – UFZ, Leipzig (headquarters)
www.ufz.de

10 Helmholtz Centre for Infection Research
www.helmholtz-hzi.de

11 Helmholtz Centre Potsdam – GFZ German Research Centre for Geosciences
www.gfz-potsdam.de

12 Helmholtz-Zentrum Berlin für Materialien und Energie
www.helmholtz-berlin.de

13 Helmholtz-Zentrum Dresden-Rossendorf
www.hzdr.de

14 Helmholtz-Zentrum Geesthacht Centre for Materials and Coastal Research
www.hzg.de

15 Helmholtz Zentrum München German Research Center for Environmental Health
www.helmholtz-muenchen.de

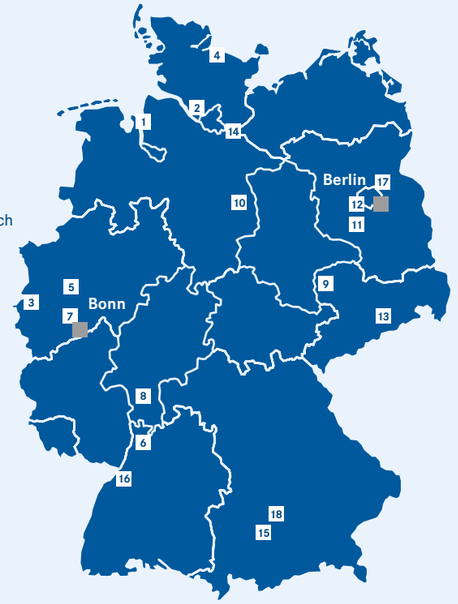
16 Karlsruhe Institute of Technology
www.kit.edu

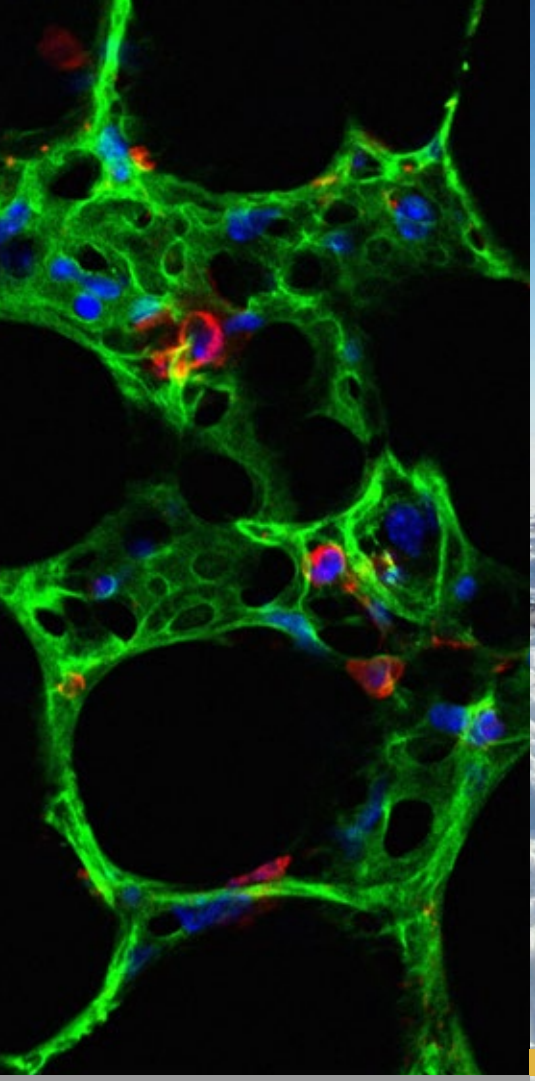
17 Max Delbrück Center for Molecular Medicine (MDC) Berlin-Buch
www.mdc-berlin.de

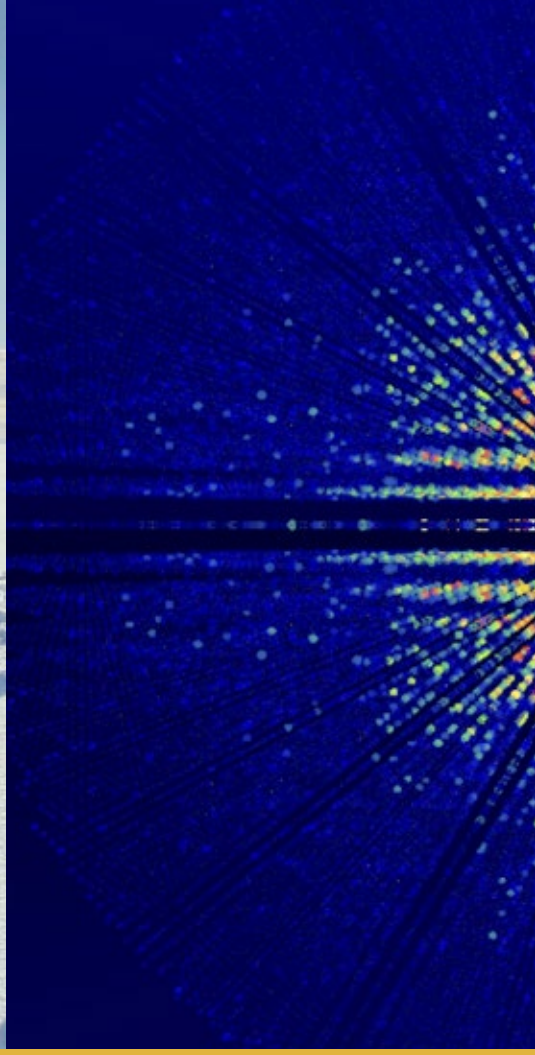
18 Max Planck Institute for Plasma Physics
(associate member)
www.ipp.mpg.de

HELMHOLTZ ASSOCIATION

Headquarters, Bonn
Helmholtz Berlin Office
www.helmholtz.de







www.helmholtz.de/en