MAX-PLANCK-GESELLSCHAFT

Outstanding!

Junior scientists
of the Max Planck Gesellschaft
June 2017, Weimar

Contents

Outstanding!

Every year the Max Planck Society singles out a small number of junior scientists whose research we consider as particularly impressive. It is a long-standing tradition that the award recipients are honoured at a ceremony at our Annual General Meeting and in the presence of all the members of the Max Planck Society.

As research in our day and age is a global and increasingly competitive endeavour, standing out from the crowd as a young scientist is becoming ever more challenging. However, I firmly believe that one thing has remained unchanged through the years: the fact that it is in the early stages of their careers when scientists are at their most creative, most ready to break well-established paradigms, and most willing to embrace fresh ideas. It is our duty – for the sake of science and for the sake of scientists – to support this impulse and acknowledge the young researchers who have brought new insights to their fields of research and put their best and brightest

This booklet will showcase this year's award recipients. The Max Planck Society is convinced that these laureates will go on to build stellar careers, leaving their mark on their chosen research fields. Reading through the booklet, I am sure you will come to the same conclusion!

Yours sincerely,

Prof. Dr. Martin Stratmann,
President of the Max Planck Society

Impressions of the
2016 awards ceremony
at industrial monument
Alte Schmelz, St. Ingbert
near Saarbrücken

The Otto Hahn Medal

2016 award winners

The Max Planck Society has honoured up to 30 young scientists and researchers each year with the Otto Hahn Medal for outstanding scientific achievements since 1978. The prize is intended to motivate especially gifted junior scientists and researchers to pursue a future university or research career. The award is presented during the general meeting in the following year.

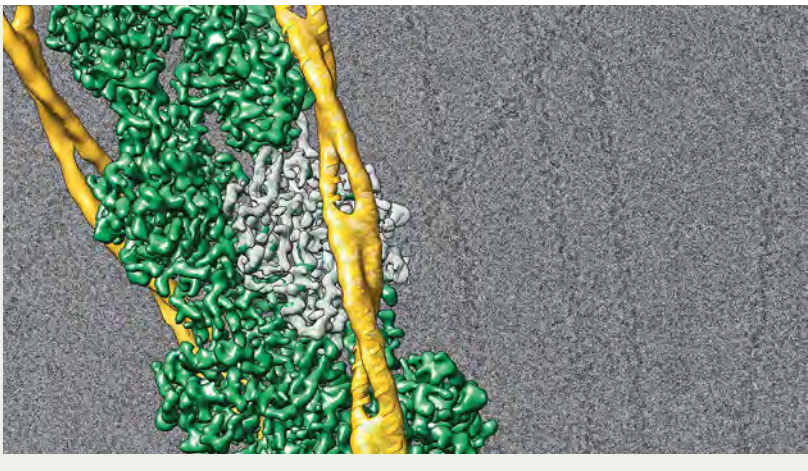

MAX-PLANCK-GESELLSCHAFT·FÜR DEN WISSENSCHAFTLICHEN NACHWUCHS

Biology
& Medicine
Section

Dr. rer. nat. Julian von der Ecken

for his structural investigation of key muscle proteins using electron cryo-microscopy

Max Planck Institute of Molecular Physiology, Dortmund
Research field: structural biology
Current activity: postdoctoral fellow at the Max Planck Institute of Molecular Physiology, Dortmund



My topic of interest	We still lack high-resolution structures of muscle proteins during their interaction. I want to determine these structures and shed light on the reaction cycle in more depth.
My motivation	Structural analysis of biomolecules enables me to be the first to visualize and decipher their architecture. This in combination with establishing state-of-the-art technologies and methods, which are needed in electron cryo-microscopy, is a fascinating challenge and pushes me forward.
My next professional station	Before I take my next step, I would like to investigate intermediate states of muscle proteins during interaction.

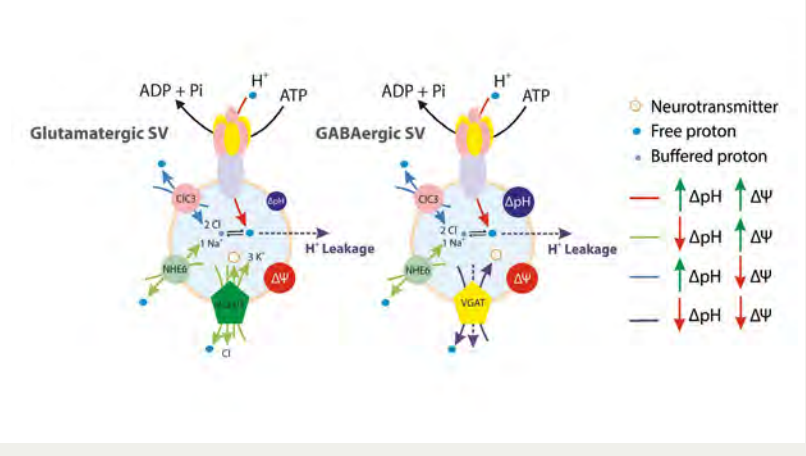
Biology
& Medicine
Section

Zohreh Farsi, PhD

for her seminal work on the regulation of the electrochemical gradient in synaptic vesicles using imaging of single vesicles

Zohreh Farsi is also a recipient of this year's Otto Hahn Award, see page 39

Max Planck Institute for Biophysical Chemistry, Göttingen
Research field: neuroscience
Current activity: postdoctoral fellow at the Max Delbrück Center for Molecular Medicine, Berlin



My topic of interest

How thousands of neurotransmitter molecules are stored in extremely small synaptic vesicles is still an open question in the field of neuroscience. Also the regulation of this process is not well understood. In my work, I tried to answer these questions using a novel microscopy approach.

My motivation

There are many unknowns about how the neurons store and release different neurotransmitter molecules. I was interested in studying how excitatory and inhibitory neurotransmitters are packaged in synaptic vesicles. This would give me a better understanding of how the brain works at the molecular level.

My next professional station

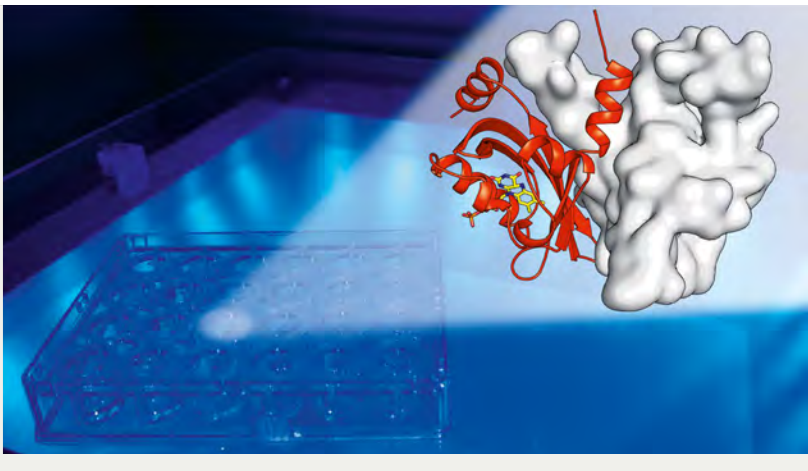
Since July 2016 I have started my postdoc in Dr. Andrew Woehler's research group at the Max-Delbrück Center for Molecular Medicine, Berlin. After finishing my project there, I would like to do another postdoc in the USA.

Biology
& Medicine
Section

Dr. rer. nat. Udo Heintz

for his work on the elucidation of the mechanism of different light-regulated transcription factors

Max Planck Institute for Medical Research, Heidelberg
Research field: molecular biology, structural biology, optogenetics
Current activity: postdoctoral fellow at the Max Planck Institute for Medical Research, Heidelberg



My topic of interest

To respond to sunlight, most organisms possess light-activated proteins called photoreceptors. I aim to understand the structural changes that occur in photoreceptors upon light-activation and how they enable organisms to control complex biological processes such as gene expression.

My motivation

Understanding the function of natural light-activated proteins not only deepens our knowledge of light-regulated processes, but also enables rational design of synthetic photoreceptors. Such proteins allow precise control of naturally light-insensitive biological processes by light and provide a novel level of insight into the working mechanism of biological systems. It has been motivating to see that my results are contributing to the development of such synthetic proteins for application in research and industry.

My next professional station

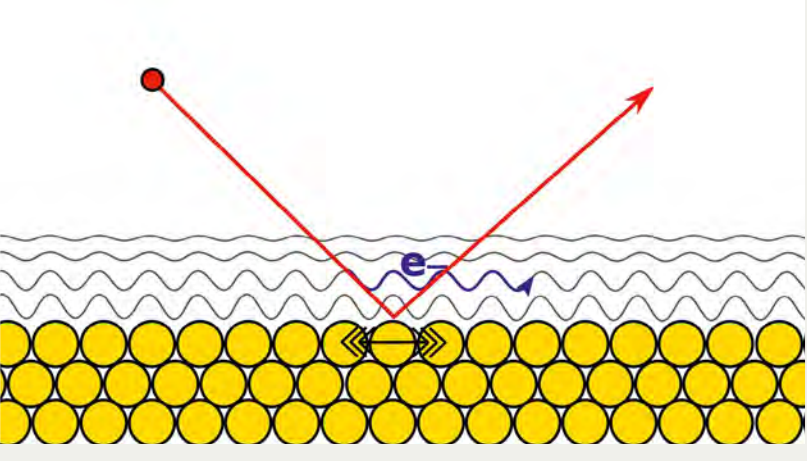
I am currently working as a postdoc at the Max Planck Institute for Medical Research in Heidelberg. To progress my career, I am looking for a position that allows me to develop my professional skills and to further advance my scientific knowledge.

Biology
& Medicine
Section

Dr. rer. nat. Svenja Maria Janke

for her theoretical description of hydrogen atoms scattering off noble metals and for the development of a new methodology to construct the global full-dimensional potential energy surface for hydrogen on gold surfaces

Max Planck Institute for Biophysical Chemistry, Göttingen
Research field: theoretical chemistry
Current activity: postdoctoral fellow at the Fritz Haber Institute of the Max Planck Society, Berlin



My topic of interest

Potential energy surfaces make it possible to describe atomic processes with comparatively low computational effort. During my dissertation, I developed a method that allows the construction of potential energy surfaces for a hydrogen atom at metal surfaces which can be used to simulate the motion of all atoms and energy loss to electronic degrees of freedom. In subsequent simulations, I was able to predict how hydrogen atoms lose their energy when scattering off gold, a prediction that was later found to be in good agreement with experiment.

My motivation

The first movie I remember watching was one about Charles Darwin's voyage on the Beagle. Since then, I have dreamt of becoming a scientist. For me, the universe is an incredibly fascinating place and I would like to learn what this world is, exactly: What is it made up of, how does it work and what is indeed possible? Method development is to me like cartography: based on my understanding of a region I can survey a small corner of the world so that it can be explored more exhaustively.

My next professional station

I have submitted two proposals for postdoctoral stipends for a project at the Duke University about method development for hybrid inorganic-organic perovskites. I would like to continue my scientific career and build up my own research group in the future.

Biology
& Medicine
Section

Dr. rer. nat.
Manuela Rebecka Kieninger

for the first demonstration of molecular and genetic switch mechanisms regulating phenotypic plasticity in animals

Max Planck Institute for Developmental Biology, Tübingen
Research field: development and differentiation
Current activity: postdoctoral fellow at the Wellcome Trust Gurdon Institute in Cambridge, UK

My topic of interest

I want to investigate how developmental processes are regulated mechanistically and how different processes influence each other. How environment shapes the phenotype is an especially fascinating topic for me. In my doctoral research I identified genes that are responsible for the regulation of phenotypic plasticity and I was able to show that these genes act in a switch-like manner. Now I am studying how replication factors regulate polarity formation of cells within a multicellular organism.

My motivation

What drives me in the first place is simple curiosity about how genes, enzymes, structural proteins and signalling molecules cooperate and form a living organism.
Of course, this question is too far-reaching to ever be answered. However, each result of a thoughtfully designed experiment is a small step in this direction. What pushes me forward is the prospect that a new and possibly unexpected result of my research will contribute to a better understanding of the development of multicellular organisms.

My next professional station

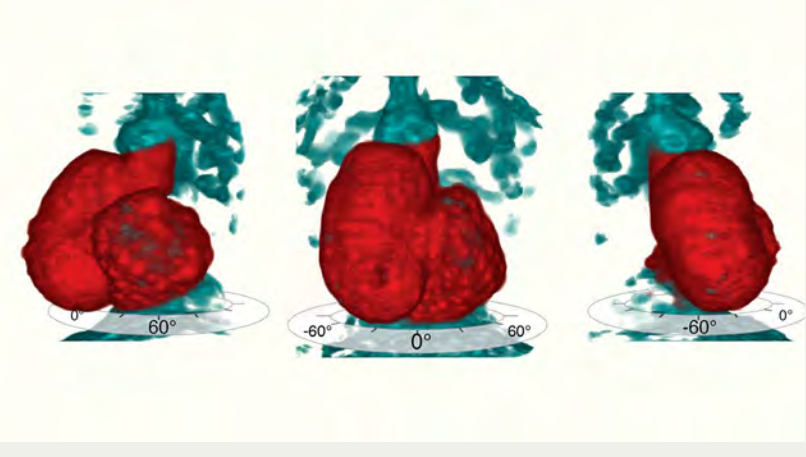
Since August 2016 I have been a postdoctoral fellow at the Gurdon Institute Cambridge UK. I am studying the interaction of cell replication and cell polarization signalling in *C. elegans.*

Biology
& Medicine
Section

Dr. rer. nat. Michaela Mickoleit

for her outstanding development of a novel high-resolution technique to image and reconstruct vertebrate hearts and their morphogenesis

Max Planck Institute of Molecular Cell Biology and Genetics, Dresden
Research field: developmental biology, image analysis, microscope engineering
Current activity: on maternity leave



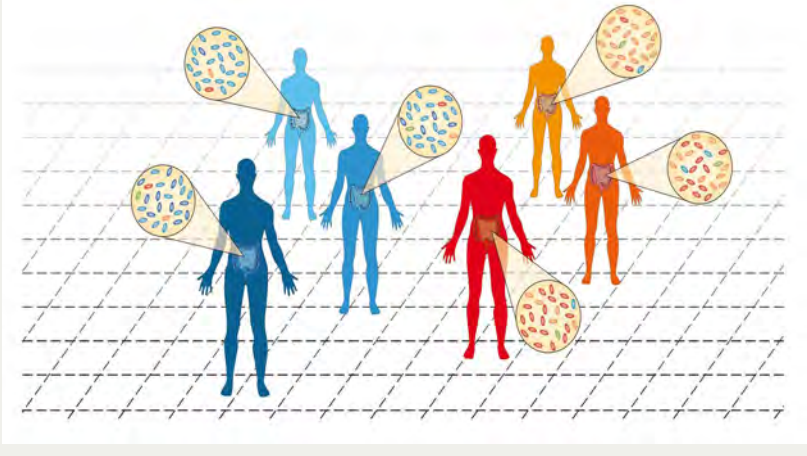
My topic of interest	How to physiologically image and reconstruct embryonic cardiac development *in vivo* with cellular resolution?
My motivation	I am enthusiastic about systematically solving fundamental problems and developing methods to answer numerous biomedical questions. High-resolution images of the beating heart in model organisms like the zebrafish give unique insights into cardiac physiology and development, but existing techniques were not physiological and too slow to resolve cardiac motion. My fast, non-invasive method to reconstruct the heart in 3D will help to understand cellular and molecular details during heart morphogenesis and congenital heart disease.
My next professional station	I have not decided on my next career steps. I wish to bring science to the public and thus I am looking for a job in science communication or teaching.

Biology
& Medicine
Section

Dr. rer. nat. Philipp Rausch

for his work on the influence of blood-group-related antigens and inflammation on the gut microbial community

Max Planck Institute for Evolutionary Biology, Plön
Research field: evolutionary biology, microbial ecology
Current activity: postdoctoral fellow at the Max Planck Institute for Evolutionary Biology, Plön



My topic of interest

We all carry a complex ecosystem of microbes within us, a diverse community which is in continuous interaction with our body and the environment. With my research I am trying to elucidate the development and structure of this intimate relationship, as well as the factors influencing it, for example in the context of disease.

My motivation

Since their emergence, multicellular organisms have interacted with bacteria in a multitude of ways. I am fascinated by the complexity and universal occurrence of those communities, which together with their host establish a 'metaorganism' that provides a new perspective on the evolution, ecology, and disease development of multicellular organisms.

My next professional station

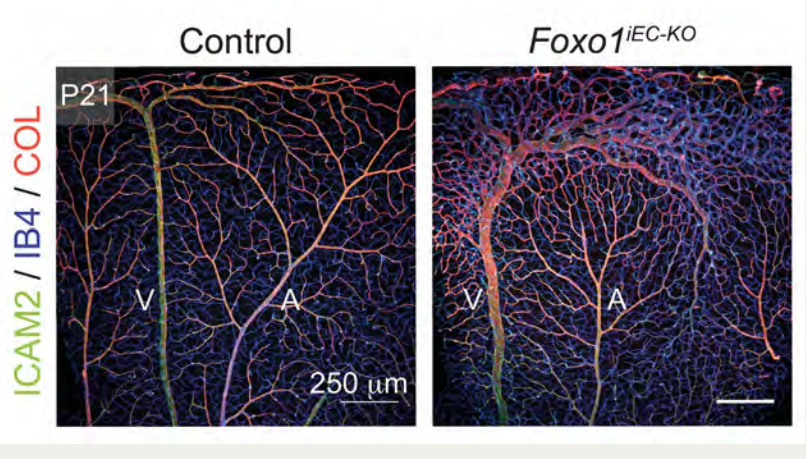
My next station will be the lab of Professor Karsten Kristiansen at the University of Copenhagen, Denmark.

Biology
& Medicine
Section

Dr. phil. nat. Kerstin Wilhelm

for her work on the role of the transcription factor FOXO1 in the regulation of endothelial metabolism and angiogenesis

Max Planck Institute for Heart and Lung Research, Bad Nauheim
Research field: angiogenesis and metabolism
Current activity: postdoctoral fellow at the Max Planck Institute for Heart and Lung Research, Bad Nauheim



My topic of interest

I want to elucidate the molecular mechanisms that are important for physiological angiogenesis. This will build the foundation for unterstanding abnormal vessel growth, often occurring in cancer for example, and find better treatments for it.

My motivation

I am fascinated by endothelial cells, because from a metabolic point of view, they are different from all other cells. They actively invade tissues that lack oxygen and nutrients. Other cells would undergo apoptosis in such an environment, while endothelial cells even proliferate. The curiosity to find out more and more about these cells and their metabolism keeps me motivated. In research in general I like the fact that every result of an experiment raises several new questions and new ideas – a never-ending story.

My next professional station

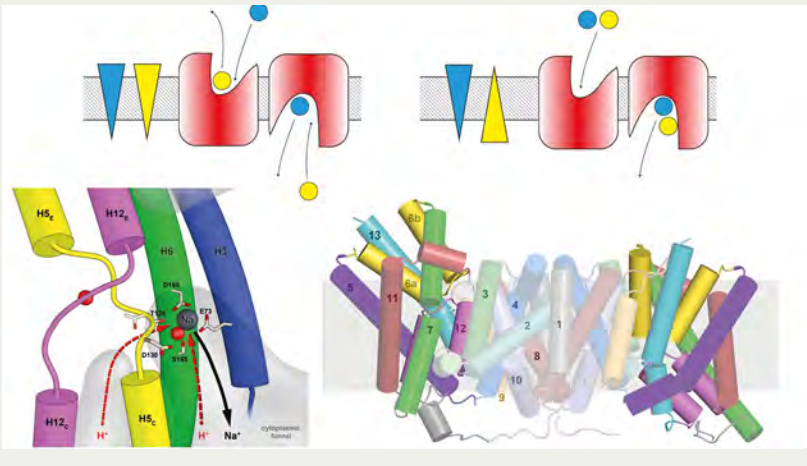
I just started a new project at the MPI in Bad Nauheim, where I am working as a postdoc now. The new topic evolved from the results that I got during my dissertation. My long-range plan is to build up my own small research group.

Biology
& Medicine
Section

Dr. phil. nat. David Wöhlert

for his groundbreaking studies on the function and high-resolution structure of two essential membrane transport proteins

Max Planck Institute of Biophysics, Frankfurt am Main
Research field: structural biology, membrane transport, biochemistry
Current activity: postdoctoral fellow at the Max Planck Institute of Biophysics, Frankfurt am Main



My topic of interest

With my research I would like to contribute to the understanding of transport processes across biological membranes on both the biochemical and the atomic level. Ideally the research should provide the basis for the selective activity modulation of the involved proteins.

My motivation

In general I find it exciting to be confronted with various problems that demand a solution in the daily lab routine. Within the topic of my PhD thesis I am fascinated by the speed at which membrane transport proteins can operate without losing their specificity. Working across the fields of structural biology and biochemistry continuously raises interesting scientific questions for investigation. Recent methodological advances in both fields will allow the structure determination of virtually every protein, providing a stimulating prospect for future research.

My next professional station

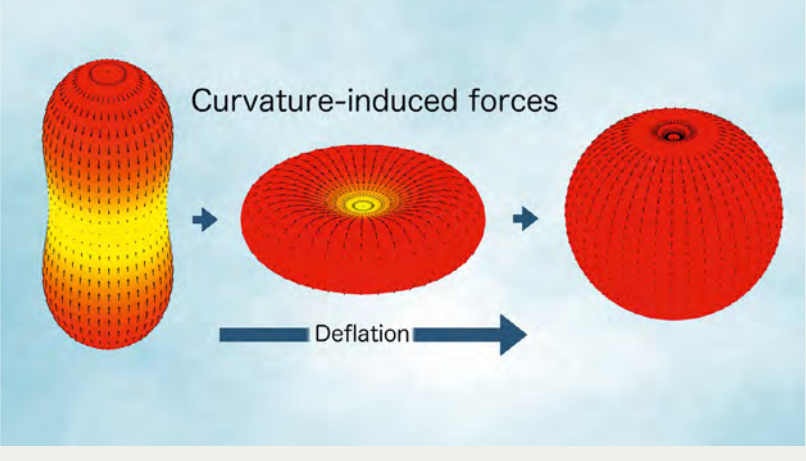
At the moment I am continuing my research on an expanded range of topics and methods at the Max Planck Institute of Biophysics. In the future I would like to gain experience abroad.

Chemistry, Physics & Technology Section

Dr. rer. nat. Jaime Agudo-Canalejo

for his research on the curvature elasticity of fluid membranes

Max Planck Institute of Colloids and Interfaces, Postdam
Research field: biophysics, soft matter, theoretical physics
Current activity: postdoctoral fellow at the Max Planck Institute of Colloids and Interfaces, Postdam



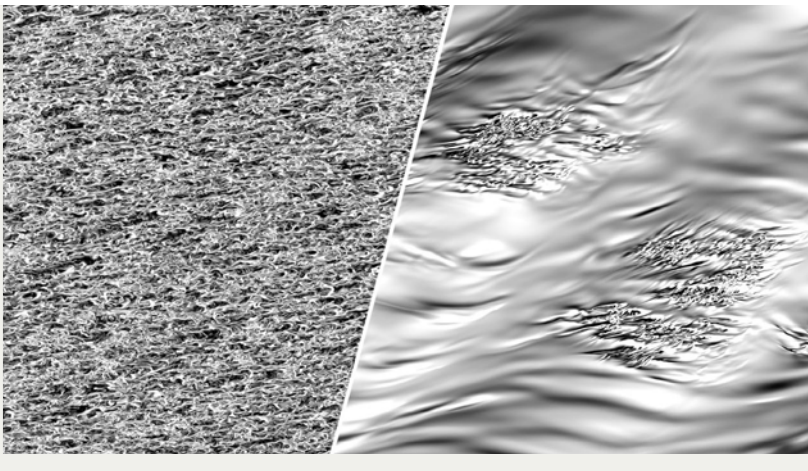
My topic of interest	In my thesis, I explored the role of membrane curvature in several processes of biological relevance, such as endocytosis. In this way I was able to provide insights on how to replicate these processes in artificial biomimetic systems.
My motivation	I think that physics and biology can benefit a lot from each other. The complexity of biology can inspire a lot of new physics, while physics can help unify biological observations into a quantitative, predictive framework. Making these connections gives me a lot of pleasure, and I hope to keep exploring them in the future.
My next professional station	Starting in August, I will be a postdoc at the University of Oxford (UK) in collaboration with Penn State University (USA). I will work, among other things, on theoretical models for the diffusion of enzymes.

Chemistry,
Physics &
Technology
Section

Dr. rer. nat. Cedrick Ansorge

for his breakthroughs in the analysis and understanding of mixing in stably stratified planetary boundary layers

Max Planck Institute for Meteorology, Hamburg
Research field: boundary-layer meteorology
Current activity: postdoctoral fellow at the Institute for Geophysics and Meteorology of the University of Cologne



My topic of interest

Turbulent exchange of heat predominantly contributes to the temperature in the planetary boundary layer, the lowest part of the earth's atmosphere. Under strong density stratification, i.e. temperature inversion as often occurs in clear-sky low-wind conditions at night, this turbulent exchange may cease locally – yielding a substantially reduced minimum temperature. My work investigates which bulk parameters of the planetary boundary layer govern the fraction of the turbulent portion and how this fraction impacts on the exchange of heat.

My motivation

I strive to understand the atmosphere's turbulent motion in the boundary layer, where humans reside. On that hunt I am time and time again fascinated by the contrast between simplicity of the governing flow equations and the multifarious phenomenology of turbulent flow.

My next professional station

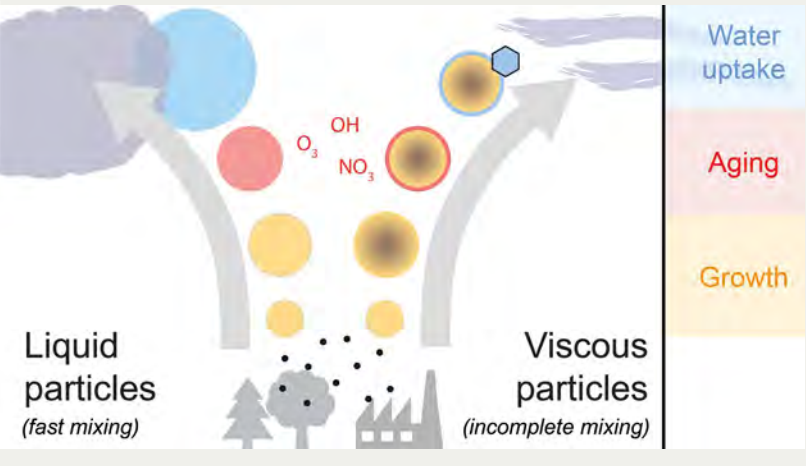
Momentarily, I am working at the Institute for Geophysics and Meteorology at the University of Cologne. I currently broaden my research incorporating new statistical methods for data analysis and interpretation in collaboration with mathematicians and further physical aspects such as surface heterogeneity. As part of this endeavour, I will visit Princeton University in autumn 2017.

Chemistry,
Physics &
Technology
Section

Dr. rer. nat. Thomas Berkemeier

for his research on the effects of phase state on the chemical reactivity and cloud formation properties of atmospheric aerosols

Max Planck Institute for Chemistry, Mainz
Research field: atmospheric chemistry and aerosol research
Current activity: postdoctoral fellow at the Georgia Institute of Technology, USA



My topic of interest

I am interested in the formation and ageing of atmospheric aerosol particles. I want to elucidate the role of principle chemical and physical processes that occur on these surfaces and am particularly interested in the importance of their phase state in this context.

My motivation

In our everyday life, we are constantly surrounded by atmospheric aerosol particles, but we still lack knowledge about their formation, ageing and role in climate change. For me, air quality is a highly valuable asset and maintaining it is a global task. Thus, I want to contribute as much as possible to a better understanding of the underlying processes.

My next professional station

I am currently investigating the formation of atmospheric aerosol particles using a room-sized smog chamber at the Georgia Institute of Technology in Atlanta, USA. I want to use the experience I gain to start my own research group.

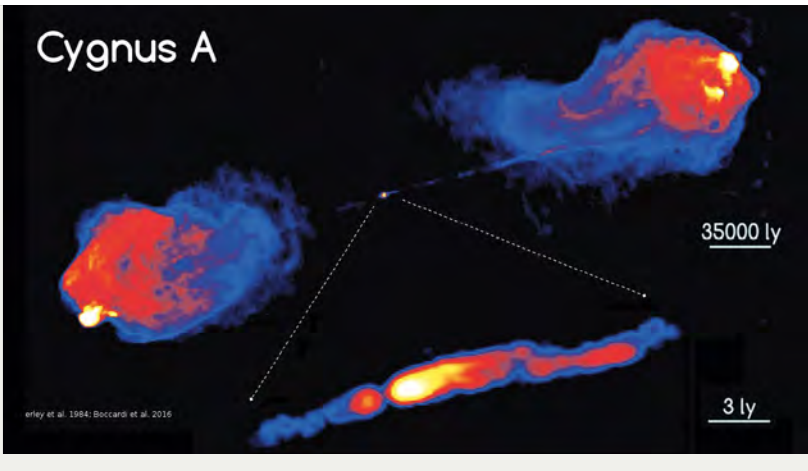
Chemistry, Physics & Technology Section

Dr. rer. nat. Biagina Boccardi

for her work on the formation and development of relativistic outflows in the galaxy Cygnus A by means of very-long-baseline interferometry at millimetre wavelengths.

Biagina Boccardi is also a recipient of this year's Otto Hahn Award, see page 39

Max Planck Institute for Radio Astronomy, Bonn
Research field: extragalactic astrophysics
Current activity: postdoctoral fellow at the Max Planck Institute for Radio Astronomy, Bonn



My topic of interest

Every galaxy in the universe is believed to host a supermassive black hole at its centre. Even though the black hole itself is invisible by definition, some galaxies show extremely bright nuclei due to the radiation emitted from the gas falling onto it. In the process, spectacular jets of relativistic matter are sometimes ejected. Through high-resolution observations, I aim to understand the physics involved in the formation of these jets.

My motivation

There are many reasons why it is worth being a researcher. But what truly motivates me and makes me progress in my work is, I think, sheer curiosity. Every aspect of nature is interesting when one takes the effort to comprehend it.

My next professional station

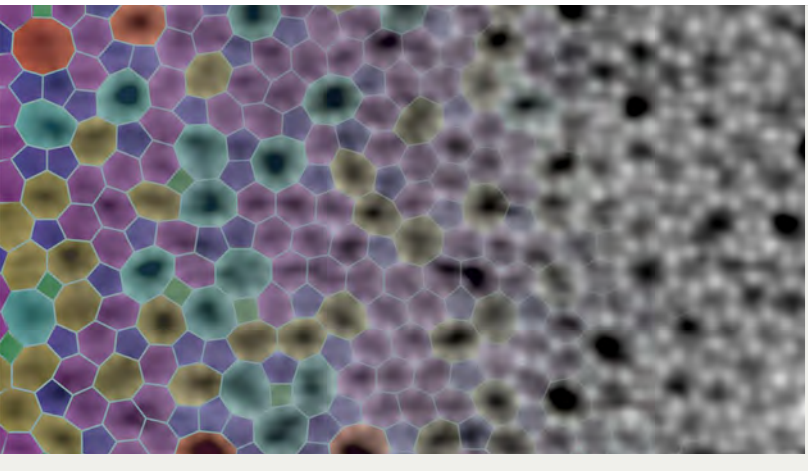
I plan to conclude some projects related to the physics of jets and then gain experience in the investigation of other astronomical objects. My next appointment is not yet decided.

Chemistry, Physics & Technology Section

Dr. rer. nat. Christin Büchner

for her important contributions to unravelling the structure of a metal-supported ultrathin two-dimensional silica film and demonstrating its transferability, thus opening up avenues for applications

Fritz Haber Institute of the Max Planck Society, Berlin
Research field: physical chemistry
Current activity: postdoctoral fellow at the Fritz Haber Institute of the Max Planck Society, Berlin



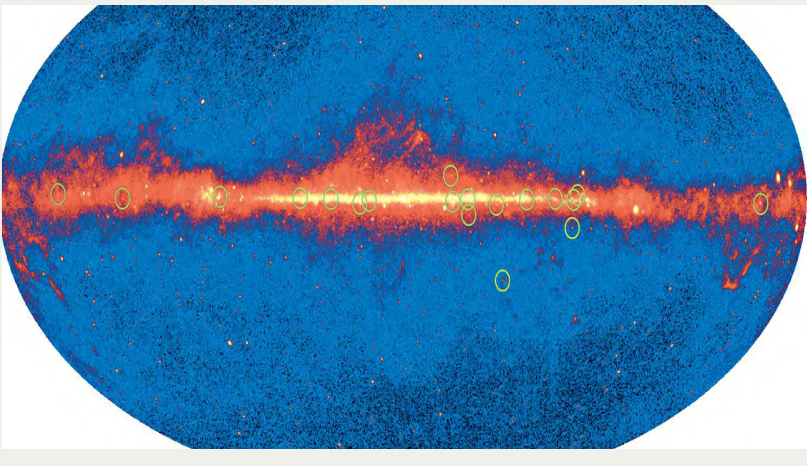
My topic of interest	I am interested in novel materials that can tackle big future challenges in energy, clean water and environmental protection. By investigating structures at the atomic level, I want to link structure and properties, so that we can design the right materials for each purpose.
My motivation	Discovery drives me. An initial puzzling observation spawns the carefully crafted study that verifies the observation, and discussion with peers leads to an agreed upon interpretation, providing a solid basis for new scientific explorations. Establishing knowledge is in itself a rewarding, albeit sometimes lengthy process.
My next professional station	In the fall, I will begin my two-year postdoctoral stay at the Lawrence Berkeley National Lab, which is funded by a fellowship from the Alexander von Humboldt Foundation, where I will study water desalination membranes.

Chemistry, Physics & Technology Section

Dr. rer. nat. Colin James Clark

for his discovery of new gamma-ray pulsars through improved data analysis

Max Planck Institute for Gravitational Physics (Albert Einstein Institute), Hannover
Research field: gamma-ray astronomy
Current activity: postdoctoral fellow at the Max Planck Institute for Gravitational Physics (Albert Einstein Institute), Hannover



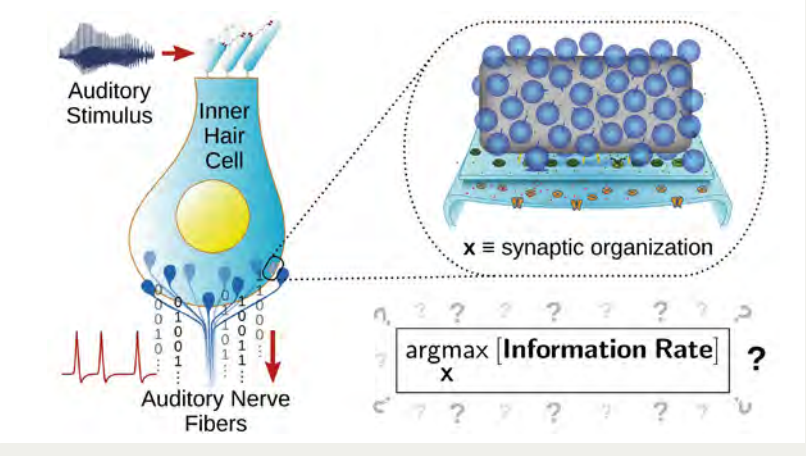
My topic of interest	My research focuses on finding and studying new pulsars (spinning neutron stars that appear to pulse like lighthouses) by searching for their gamma-ray pulsations. By performing these searches, we hope to explain the nature of unidentified gamma-ray sources and to better understand the Galactic pulsar population.
My motivation	Gamma-ray pulsars are some of the most energetic objects in the Galaxy, but their signals are very weak by the time they reach us. This makes searching for gamma-ray pulsations an extremely computationally demanding task. I find developing new ways to perform more efficient and sensitive searches to be a rewarding challenge. Finding a new signal from a previously mysterious source is always exciting!
My next professional station	I am currently continuing my research at the AEI and applying for new postdoc positions to broaden my knowledge of pulsar astronomy.

Chemistry, Physics & Technology Section

Dr. rer. nat. Mantas Gabrielaitis

for his groundbreaking analysis of information encoding by single ion channels in the inner ear and of its extraordinary energy efficiency

Max Planck Institute for Dynamics and Self-Organization, Göttingen
Research field: theoretical neurophysics
Current activity: postdoctoral fellow at the Max Planck Institute for Dynamics and Self-Organization, Göttingen



My topic of interest

Information about the world of sounds enters the human brain through auditory nerve fibres, each driven by a separate nanoscopic synapse of a sensory hair cell in the inner ear. A priori, this design makes data transmission highly vulnerable to thermal fluctuations, yet the auditory system features the highest temporal precision among all human senses. How is this possible and what is nature's rationale behind such an unexpected choice?

My motivation

A lot of progress in understanding biological phenomena has been made by using the abstractions of matter and energy. My work is driven by the belief that information-theoretic approaches add a new dimension alongside those classical notions. These approaches have a large unexploited potential to considerably further our conceptual understanding of the organization and functioning of biological systems. After all, acquisition, transformation, and storage of information are a defining feature of any living organism!

My next professional station

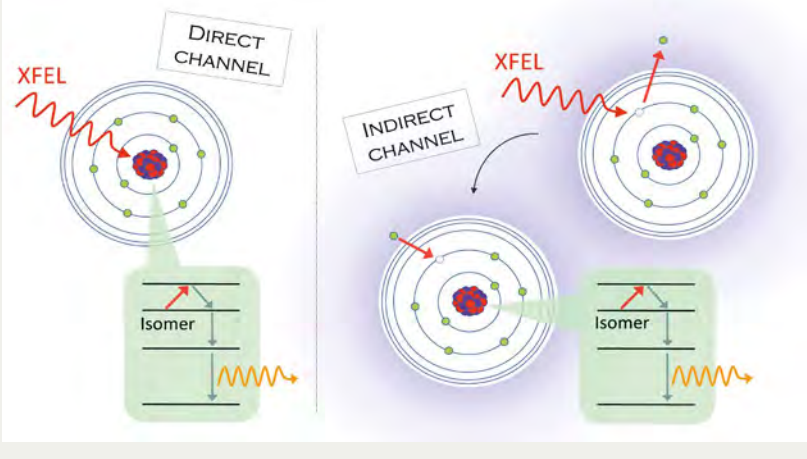
I will start as an IST fellow at the Institute of Science and Technology Austria to work on new challenging problems of information processing in biological systems.

Chemistry, Physics & Technology Section

Dr. rer. nat. Jonas Gunst

for his outstanding work on x-ray laser – nucleus interaction, in particular, for finding more efficient excitation channels for potential nuclear battery applications

Max Planck Institute for Nuclear Physics, Heidelberg
Research field: nuclear and atomic quantum dynamics
Current activity: postdoctoral fellow at the Max Planck Institute for Nuclear Physics, Heidelberg



My topic of interest

New light sources like x-ray-free-electron lasers for instance render it possible to resonantly drive atomic nuclei via x-rays. In my research, I investigate and develop methods to determine how this resonant interaction can be employed to mutually gain control between x-ray photons and nuclear transitions potentially involving interesting applications.

My motivation

The invention of the laser quickly boosted the quantum dynamical control between optical photons and atomic transitions in our everyday life. The extension to smaller wavelengths (x-rays) and higher energetic systems (atomic nuclei) holds exciting potential for applications which I consider particularly motivating. Ideas to employ long-lived, nuclear excited states (so-called isomers) as possible energy storage solutions or to use x-ray photons focusable to atomic scales as information carriers intrigue me.

My next professional station

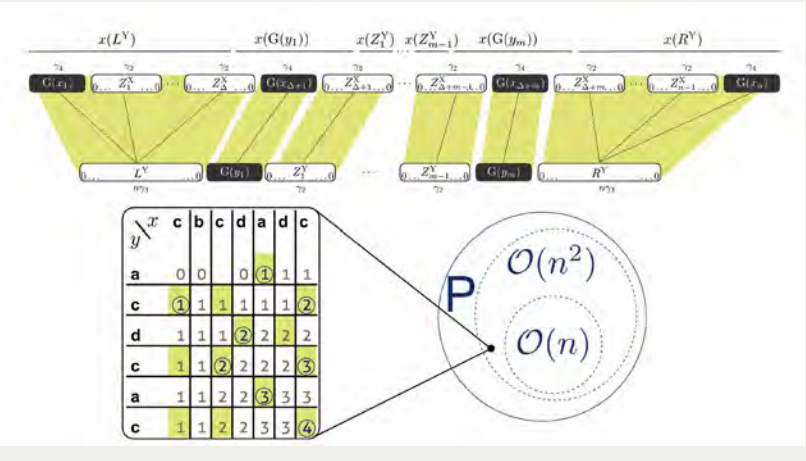
In the future, I would like to apply my expertise to innovative and exciting technologies in the field of data science. I could also imagine a position in a research and development department of a company.

Chemistry, Physics & Technology Section

Dr.-Ing. Marvin Künnemann

for bringing order into the complexity landscape of string similarity

Max Planck Institute for Informatics, Saarbrücken
Research field: algorithms and computational complexity
Current activity: postdoctoral fellow at the Max Planck Institute for Informatics, Saarbrücken



My topic of interest

Given a routinely solved algorithmic problem (such as computing the similarity of two words), how fast is the best possible algorithm that solves it? The main goal of my work is to give precise answers to such questions, taking into account the structure of the input and based on plausible hypotheses in computational complexity.

My motivation

I am intrigued by the understanding we can obtain about concepts as fickle to grasp as 'efficient computation'. Especially in light of the difficulty to prove impossibility results, I am fascinated by methods that enable us to determine, under certain hypotheses, the running time of the fastest possible algorithms. In a certain sense, such approaches make it possible to simultaneously work on faster algorithms and hardness proofs, which has great potential for future results.

My next professional station

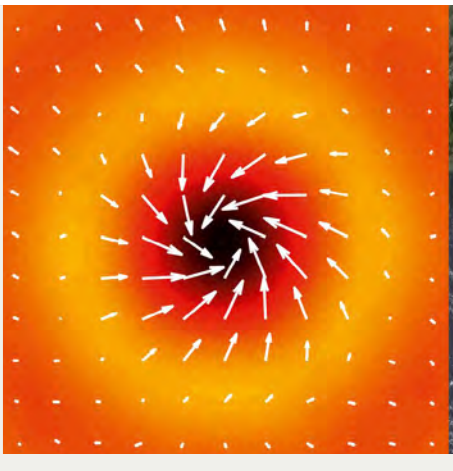
After a postdoc at the University of California, San Diego, I have returned to Max Planck Institute for Informatics to continue my research.

Chemistry,
Physics &
Technology
Section

Dr. rer. nat. Jan Langfellner

for his contributions to the development of helioseismology techniques that brought to light the influence of rotation on solar turbulent convection

Max Planck Institute for Solar System Research, Göttingen
Research field: solar physics, helioseismology
Current activity: postdoctoral fellow at the Max Planck Institute for Solar System Research, Göttingen



My topic of interest

What is the mechanism that drives supergranules? Even half a century after their discovery, we still have no idea about the origin of these convection cells – giant versions of the more familiar granules that make the solar surface well like water in a cooking pot.

My motivation

The Sun does not reveal its secrets without putting up a fight. It is intriguing to harness the power of the huge datasets from modern space-borne observatories to search amidst the seemingly chaotic turbulence structures that tell us something about the physics of the Sun and beyond.

My next professional station

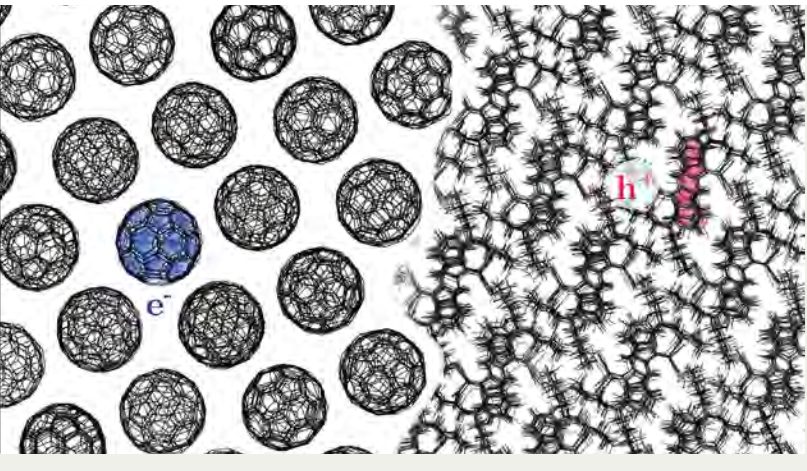
At the moment, I am continuing my research at the MPS. My further career path is still open.

Chemistry,
Physics &
Technology
Section

Dr. rer. nat. Carl Pölking

for his theoretical and computational investigation of long-range electrostatic effects in organic semiconductors and their exploitation in organic electronic devices

Max Planck Institute for Polymer Research, Mainz
Research field: organic electronics, soft-matter physics
Current activity: postdoctoral fellow at the Department of Chemistry, University of Cambridge, England



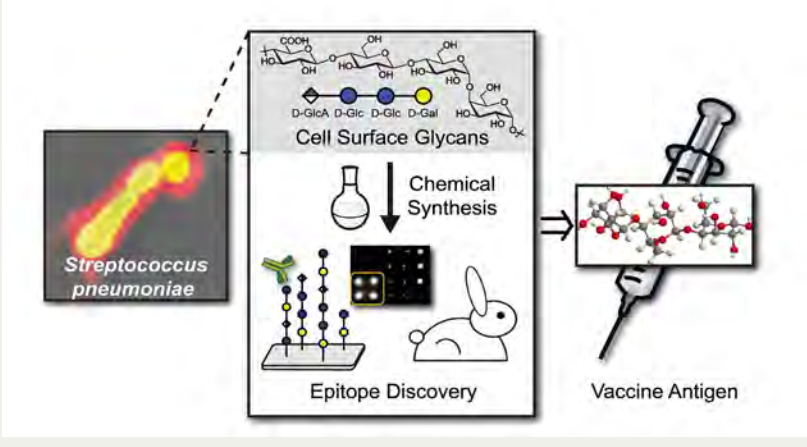
My topic of interest	How can macroscopic materials and device properties (e.g., the charge mobility in organic semiconductors, short-circuit current and open-circuit voltage of solar cells) be tuned through modification of their molecular constituents, composition and supramolecular organization? How do we design computational models that predict these properties from first principles?
My motivation	I marvel at how complex behaviour of materials on the macroscale often emerges from relatively simple interactions between their microscopic constituents. Discovering and resolving these emergent phenomena - for example, by stripping down a computational model to the essential ingredients required to observe them - provides deep insight into the many-particle world around and inside us.
My next professional station	My first postdoctoral assignment has taken me to the Department of Chemistry at the University of Cambridge, where I am presently developing machine-learning techniques to model materials and molecular properties, with the aim of data-assisted materials design.

Chemistry,
Physics &
Technology
Section

Dr. rer. nat. Benjamin Schumann

for his development of a general chemical-immunological approach for the identification of sugar antigens as vaccine candidates against bacteria

Max Planck Institute of Colloids and Interfaces, Potsdam
Research field: chemical glycobiology
Current activity: postdoctoral fellow at Stanford University, USA



My topic of interest

Cell surfaces are heavily equipped with carbohydrate structures that are of fundamental importance in human health and the development of disease, such as bacterial infections and tumorigenesis. The approaches used to study these biomolecules are limited, and I aim to use synthetic chemistry to generate tools for profiling and perturbing them. I seek to understand the roles carbohydrates play in cell-cell interactions that are important for the development of better vaccines, cancer therapeutics and diagnostic tests.

My motivation

It is becoming increasingly apparent that interdisciplinary research provides an appealing approach to solving complex and challenging scientific questions. Synthetic 'precision tools' can bring a novel perspective into biology that may be out of reach to conventional methods. I am fascinated by the idea of melding expertise in different fields to shed new light on fundamental principles of biology.

My next professional station

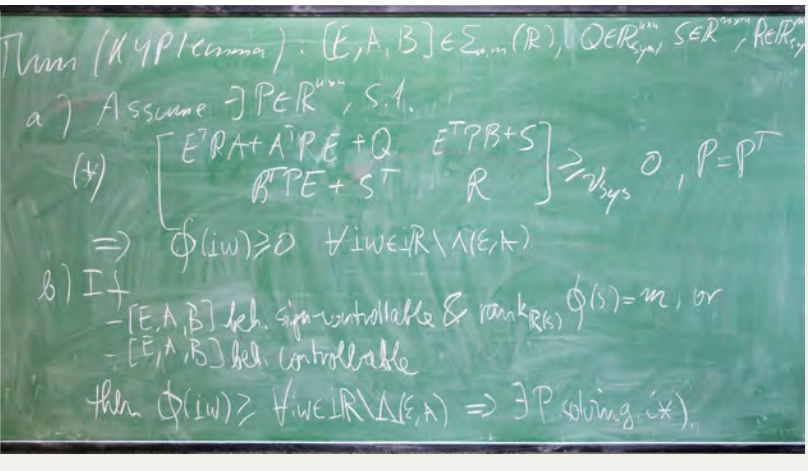
My time as a postdoc at Stanford allows me to learn new methods in biology and combine these with a chemical mindset. I aspire to lead my own research group where I can mentor students and lead a team of researchers at the interface between chemistry and biology. I am deeply inspired by the opportunities for early career scientists fostered in Germany and throughout Europe.

Chemistry,
Physics &
Technology
Section

Dr. rer. nat. Matthias Voigt

for his research on a new and closed theory and the related calculus for the analysis and optimal control of descriptor systems

Max Planck Institute for Dynamics of Complex Technical Systems, Magdeburg
Research field: systems and control theory, differential-algebraic equations, numerical linear algebra
Current activity: habilitation candidate at the Technische Universität Berlin



My topic of interest

I mainly deal with the control of differential-algebraic equations which occur during the modelling of many processes in engineering sciences. For these we need new theoretical and numerical methods to treat the algebraic constraints that are hidden in the equations.

My motivation

The solution of mathematical problems often requires a lot of patience and stamina. But it is incredibly motivating when one can put together the puzzle piece by piece until one recognizes the big picture in the end. I am fascinated by the elegance of mathematical structures. It is particularly interesting when objects from different areas can be connected.

My next professional station

In the coming years I will stay in Berlin to continue my research here. But I will also keep my eyes open for new opportunities.

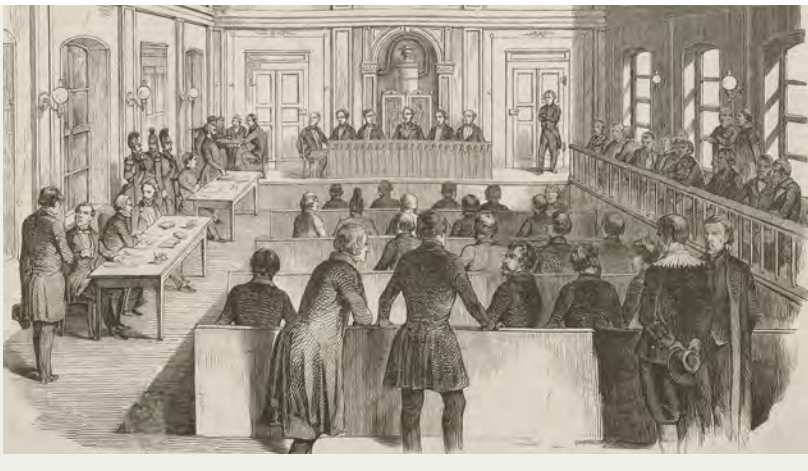
Human Sciences Section

Dr. jur. Emmanouil Billis

for his fundamental comparative legal analysis of the role of the judge in adversarial and inquisitorial systems of criminal procedure

Emmanouil Billis is also a recipient of this year's Otto Hahn Award, see page 39

Max Planck Institute for Foreign and International Criminal Law, Freiburg im Breisgau
Research field: criminal law and procedure, comparative legal research
Current activity: senior researcher at the Max Planck Institute for Foreign and International Criminal Law, Freiburg im Breisgau



My topic of interest

My dissertation focuses on the various structures which national and international criminal law systems of Western origin employ for the purpose of effective fact-finding. It starts out with the distinction between Anglo-American and Continental European procedural traditions and the widespread juxtaposition of the terms 'adversarial' and 'inquisitorial' criminal procedure. At the core of the study are the heuristic compilation of ideal types of criminal procedure and the functional application of comparative models with a view to the national and international law of criminal procedure and evidence.

My motivation

In view of our complex, interconnected, fast-paced, and technology-driven times, do the traditional forms of criminal law and procedure still meet their objectives in terms of resolving social conflicts, arriving at the truth, and ensuring fairness? What are the options? How effective are alternative mechanisms of criminal justice and do they enjoy social legitimacy? These are the issues I am passionate about, that drive my research, and that I would like to further explore in order to seek viable solutions.

My next professional station

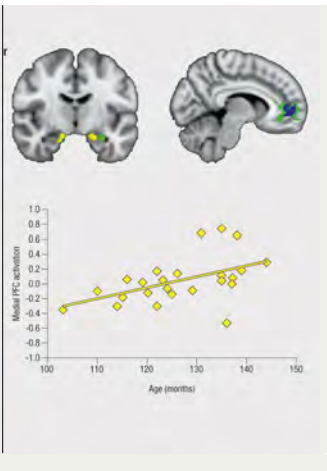
I am looking forward to continuing my work as a post-doctoral researcher at the Max Planck Institute for Foreign and International Criminal Law and abroad.

Human Sciences Section

Dr. rer. nat. Garvin Brod

for his contributions to age-comparative research on the effects of prior knowledge on learning and memory

Max Planck Institute for Human Development, Berlin
Research field: developmental psychology, learning research
Current activity: head of a research group at the German Institute for International Educational Research, Frankfurt am Main



My topic of interest

I am interested in how children use their prior knowledge to acquire new knowledge, and how we can help them to do so more effectively. Therefore, besides laboratory experiments, I'm also interested in using recent advances in learning technology to explore ways to enhance children's learning.

My motivation

Activating students' prior knowledge has been identified as the cornerstone of high-quality instruction. But what are simple techniques to reliably activate knowledge? How do they work? And are these techniques equally effective in learners of different age? In my research, I seek to make a contribution to finding answers to these questions.

My next professional station

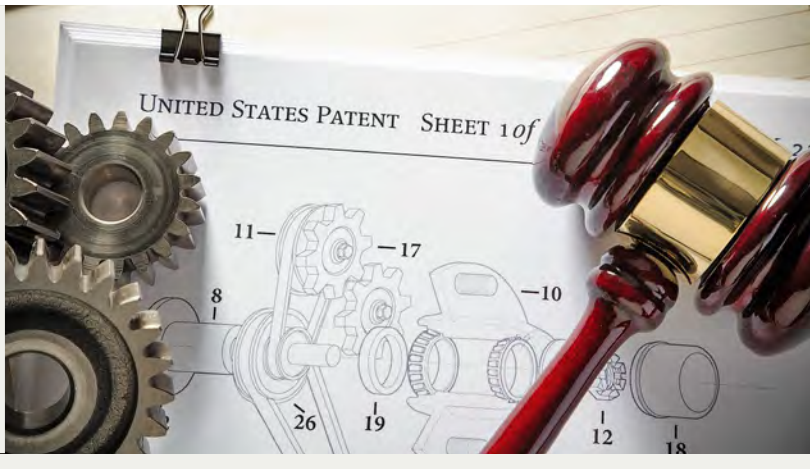
Since mid-2016, I have been a research scientist at the Center for Individual Development and Adaptive Education of Children at Risk, which is a joint centre of the German Institute for International Educational Research and of the Goethe University in Frankfurt. I'm currently building up a research group on individualized learning support.

Human Sciences Section

Dr. oec. publ. Fabian Emil Gäßler

for his excellent interdisciplinary research on the enforcement and trade of patents in Europe

Max Planck Institute for Innovation and Competition, Munich
Research field: innovation economics
Current activity: senior research fellow at the Max Planck Institute for Innovation and Competition, Munich



My topic of interest

The inventor's possibility to enforce his exclusive right against others represents a fundamental precondition for a functioning patent system. In the context of my dissertation and ongoing research, I use quantitative methods to address the question as to what extent the current institutional design in Germany is conducive to that matter and whether it qualifies in important aspects as a blueprint for a European unified system.

My motivation

For decades economists have tried to answer the question of whether patents promote technological change. It motivates me to address this big question in an international research environment by using innovative methods and data. I am particularly glad that my research in the field of innovation economics allows insights into the latest technologies.

My next professional station

I am looking forward to continuing my work as a senior research fellow at the Max Planck Institute for Innovation and Competition.

Human Sciences Section

Dr. sc. pol. Lisa Verena Kastner

for her transatlantic study on the partially successful influence of consumer groups on recent financial market reform

Max Planck Institute for the Study of Societies, Cologne
Research field: international political economy
Current activity: policy advisor at the Foundation for European Progressive Studies, Brussels, Belgium

My topic of interest

In my dissertation I was able to show that coalitions of non-financial advocacy groups traditionally considered politically weak, such as consumer groups, NGOs and trade unions, have been much more influential in leaving their imprint on financial reforms after the financial crisis in 2008 than existing political science literature predicts. I tried to understand how a poorly-resourced civil society coalition successfully lobbied decision-makers and countered financial industry attempts to prevent policy change.

My motivation

Political science scholarship has focused almost exclusively on the power of financial lobbyists; less attention has been paid to other – nonfinancial – actors, in particular civil society groups and how these groups outside of finance can affect policy change and oppose industry groups. My dissertation tried to fill this gap by showing the policy influence of presumably weak groups in financial regulation.

My next professional station

I am currently continuing with my research at the Foundation for European Progressive Studies in Brussels.

Human Sciences Section

Dr. rer. pol. Stephan Luck

for his work on liquidity provision by banks and shadow banks and on the scope for protecting financial stability by government intervention in the financial system

Max Planck for Research on Collective Goods, Bonn
Research field: economics
Current activity: economist at the Board of Governors of the Federal Reserve System, Washington D.C.; professor at Princeton University, New Jersey, USA

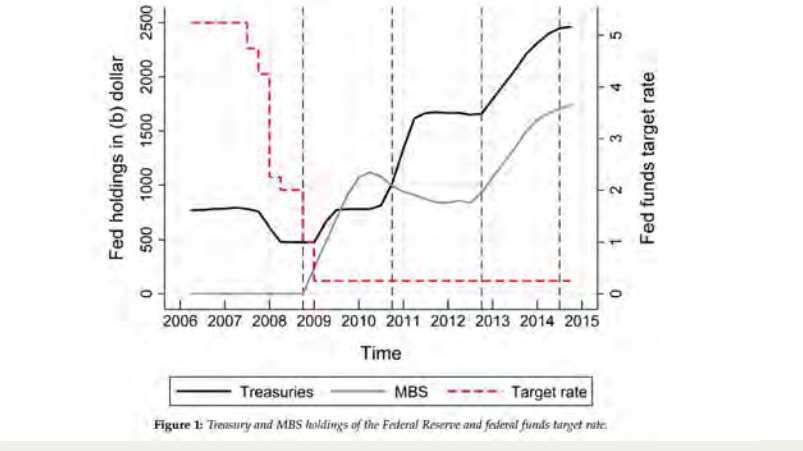


Figure 1: *Treasury and MBS holdings of the Federal Reserve and federal funds target rate.*

My topic of interest

In my most recent research, I studied the transmission mechanism of monetary policy, in particular unconventional monetary policy. I am particularly interested in how monetary policy affects financial stability as well as real economic outcomes such as employment.

My motivation

Why I do research (inspired by George Orwell)
1) sheer egoism
2) aesthetic enthusiasm
3) historical impulse
4) political purpose

My next professional station

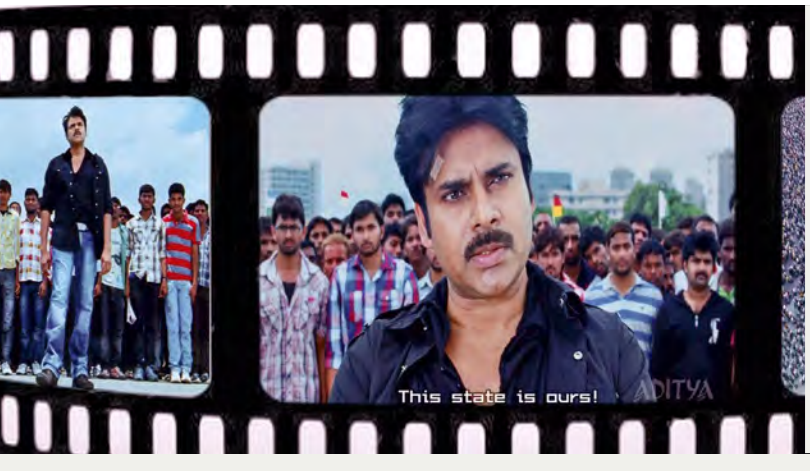
Currently, I am working as a staff economist at the Board of Governors of the Federal Reserve System in Washington D.C. I am also employed as a Lecturer at Princeton University in New Jersey.

Human Sciences Section

Dr. phil. Imke Rajamani

for her theoretically and methodologically highly innovative work on how the depiction of anger in cinema changed India's political landscape

Max Planck Institute for Human Development, Berlin
Research field: history of emotions and the media
Current activity: postdoctoral fellow at the Max Planck Institute for Human Development, Berlin



My topic of interest

How do emotions become powerful factors of political change? What can we learn from history about the relation of anger and democracy? How do popular media make and mobilize angry citizens?

My motivation

I gain my motivation from fun, curiosity and ambition:
- Fun in developing new theoretical frameworks and dealing with the sources of my research – ranging from Indian action movies to court case files
- Curiosity to discover hitherto undescribed mechanisms in the interplay of politics, media and emotions
- Ambition that my research will help in answering questions of political relevance today

My next professional station

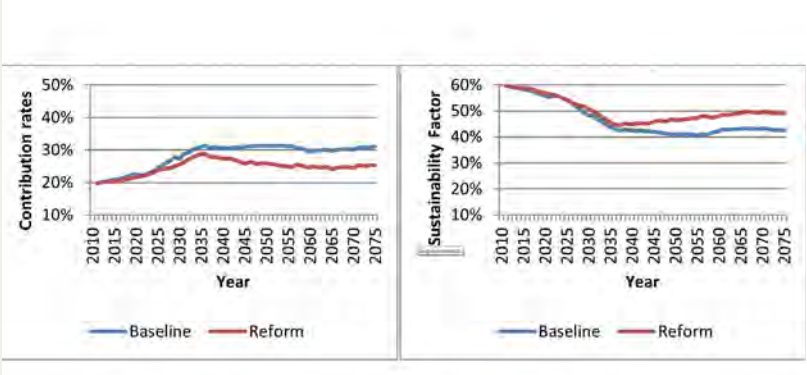
I am currently working on a project entitled 'Monsoon Feelings', which demonstrates the intermediality of concepts in the form of an interdisciplinarily edited book. And I am developing a research project, which will hopefully lead to my habilitation.

Human Sciences Section

Duarte Nuno Semedo Leite, PhD

for his analysis of the role of societal and especially science institutions in the development process from primitive to highly productive economies.

Max Planck Institute for Social Law and Social Policy, Munich
Research field: macroeconomics and economics of aging
Current activity: senior researcher at the Max Planck Institute for Social Law and Social Policy, Munich



My topic of interest

I want to know, on the one hand, how individuals take decisions according to different institutional and policy settings and, on the other hand, how different types of individuals react differently to the same policies. In my most recent research I focused on questions regarding pension systems design and how it will affect macro-economic outcomes in societies in general and Germany in particular. In addition, I am trying to answer the question of how hyperbolic discounting agents have different behaviour and how it affects their labour supply, savings and retirement decisions.

My motivation

Macroeconomics and especially aging economics have particular beauty as they seek to explain some of the phenomena in our society that directly affect welfare and the daily behaviour of populations. I want to engage in the discussion of these topics and give my contribution to explain new as well as historical phenomena and provide policy advice to overcome the challenges and profit the most from the opportunities that arise with them.

My next professional station

I will continue my research as a postdoctoral fellow at the Munich Centre for the Economics of Ageing. I am also giving some lectures at Ludwig-Maximilians-Universität in Munich. After my position at the MPI I want to pursue my academic career in a university research unit.

Human Sciences Section

Dr. jur. Oliver Unger

for his investigation into the topic of 'Actio funeraria: underlying principle and paradigmatic case of the forbidden intervention in another's affairs'

Max Planck Institute for Comparative and International Private Law, Hamburg
Research field: legal history, comparative law, european private law
Current activity: Master of Laws (LL.M.) at Harvard Law School, Cambridge, USA

My topic of interest

How does a society deal with its dead - and what is the role of the law? This question is at the heart of my research. It is of particular relevance in cases of dying persons who are isolated, impoverished or neglected: Does the law allocate such individuals' right of burial exclusively to government agencies, or does it rely on the solidarity of private individuals, such as relatives or friends of the dead? The changing relationship between state responsibility and private initiative was already defined in Roman law, and it continues to have an effect in our times. Examining this connection from the perspective of legal history is a primary concern of my research.

My motivation

Legal rules often arise out of long-forgotten cases. I try to delve down to the basis of these historical cases in order to learn about the genesis of the legal rule at issue. This is often laborious and sketchy, especially if the historical sources have gaps or lead in a false direction. Where, however, it becomes possible to shed light on a matter, the effort is worthwhile.

My next professional station

I am currently completing a research stay and post-graduate degree at Harvard Law School. My future career path is still open.

The Otto Hahn Award

The Otto Hahn Award is bestowed by the Max Planck Society every year to particularly worthy recipients of the Otto Hahn Medal.

The award provides for a long-term research residency abroad, followed by leadership of a research group with the scientist's own research concept at one of the Max Planck Institutes. The award is intended to pave the way for a long-term scientific career in Germany.

This year one scientist of each section of the Max Planck Society will be honoured with the Otto Hahn Award.

Biology & Medicine Section

Dr. Zohreh Farsi

see page 09

Chemistry, Physics & Technology Section

Dr. Biagina Boccardi

see page 20

Human Sciences Section

Dr. Emmanouil Billis

see page 30

The Reimar Lüst Fellowship

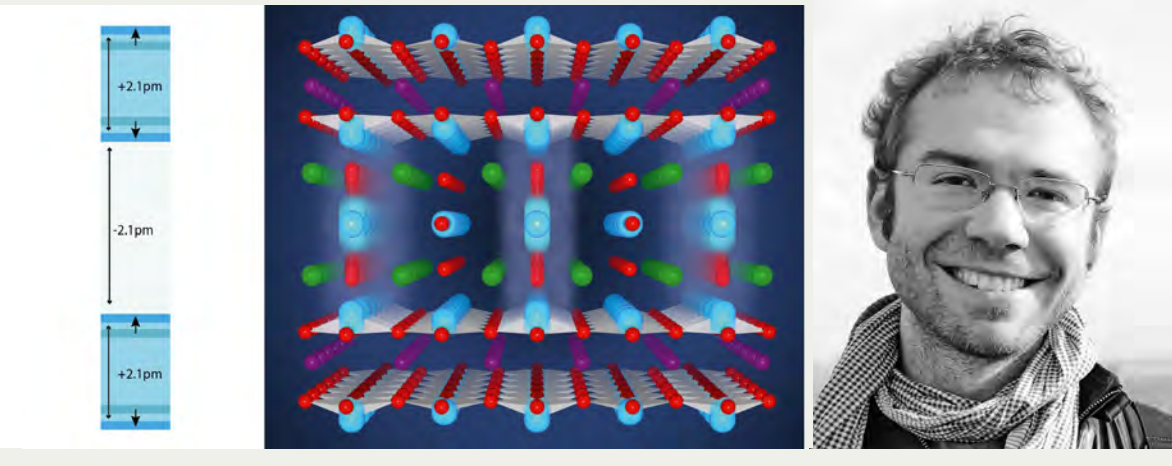
The Reimar Lüst Fellowship is financed by a fondation that was created in 1983 on the occasion of the 60th birthday of Reimar Lüst, a former president of the Max Planck Society.

The fondation's endowment consists of donations from German companies. The foundation fosters junior scientists via the two-year Reimar Lüst Fellowship, which is awarded annually.

Dr. rer. nat. Roman Mankowsky

Dissertation: ‘Nonlinear phononics and structural control of strongly correlated materials’

Max Planck Institute for the Structure and Dynamics of Matter, Hamburg
Research field: ultrafast science
Current activity: postdoctoral fellow at the Max Planck Institute Max Planck Institute for the Structure and Dynamics of Matter, Hamburg



My topic of interest	The electronic, magnetic and structural degrees of freedom of strongly correlated materials are often strongly interconnected. My research addresses the nature of their coupling and how functional properties such as insulator-metal transitions can be controlled on femtosecond timescales by selective excitation of one of these subsystems with laser pulses.
My motivation	I am fascinated by the research in elementary interactions between electronic, magnetic and structural degrees of freedom on ultrafast timescales. Laser pulses are used to specifically excite one of the subsystems and drive the investigated materials strongly out of equilibrium. To describe their emergent phases and the underlying dynamics, new theories have to be developed in close collaboration between experimental and theoretical physics. With this research, we can not only develop an understanding of physics on ultrafast timescales but also work toward the design of new photonic devices that operate more than a million times faster than current electronic devices.
My next professional station	I am planning a stay at the newly built Free Elektron Laser SwissFEL at the Paul Scherrer Institute in Switzerland to continue my studies on the ultrafast control of ferroelectric materials.

The Dieter Rampacher Prize

As a motivation for students to complete a PhD when young, the Dieter Rampacher Prize has been awarded to the youngest PhD student of the Max Planck Society every year since 1985. The prize usually goes to a young researcher aged 25 to 27. The prize also includes a monetary award.

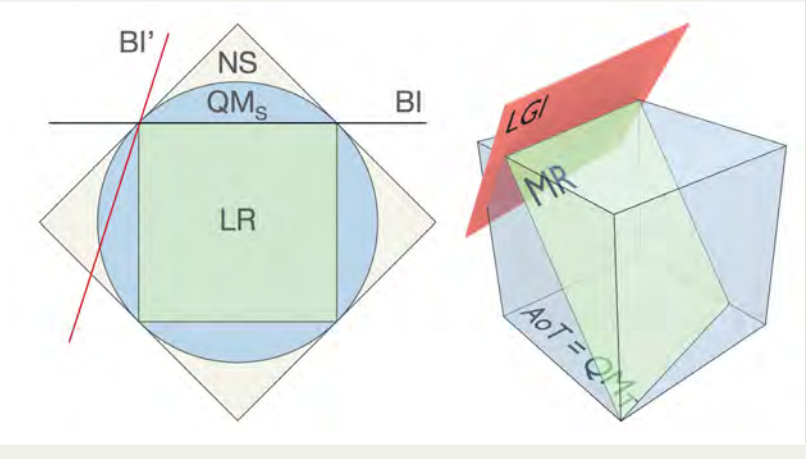
The prize was endowed by Dr. Hermann Rampacher, a Supporting Member of the Max Planck Society, in memory of his brother, Dieter Rampacher, a physics student at the TH Stuttgart, who died in battle in 1945 at the age of 20.

Carsten A. Rampacher, son of the benefactor and also a Supporting Member of the Max Planck Society, has assumed funding of the prize since 2011.

Dr. rer. nat. Lucas Clemente

Dissertation: ‘Quantum violation of classical physics in macroscopic systems’

Max Planck Institute of Quantum Optics, Garching
Research field: quantum foundations
Current activity: software engineer at Google, Zürich, Switzerland



My topic of interest	My research concerns the question of how the macroscopic behaviour of our everyday world arises out of the very different quantum behaviour on microscopic scales. I derived mathematical conditions and examined fundamental limitations of quantum behaviour.
My motivation	While quantum theory has been tested to an incredible degree on microscopic scales, quantum effects are seldom observed in our everyday macroscopic world. The curious results of applying quantum mechanics to macroscopic objects are perhaps best illustrated by the thought experiment of Schrödinger‘s cat. The frontier between both worlds is one of the fundamental questions of quantum physics, and an exciting research area.
My next professional station	In December I joined Google to work in the security and privacy department.

The Peter Hans Hofschneider Prize

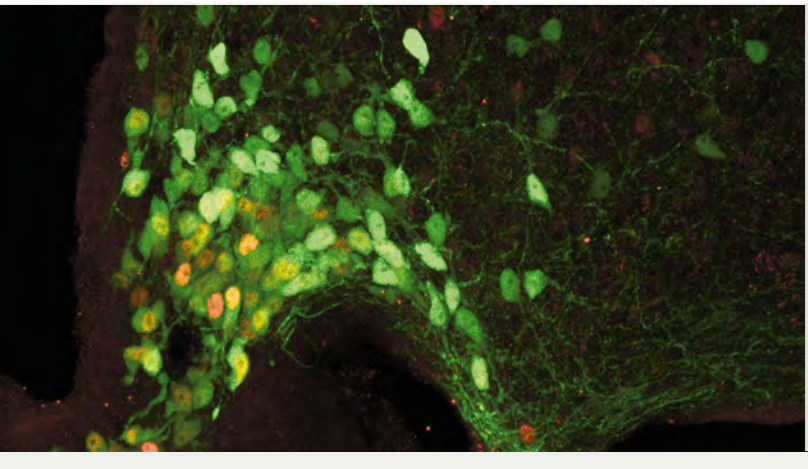
The Peter Hans Hofschneider Prize has been awarded by the Max Planck Society every two years since 2005. The award honours ground-breaking research in the area of molecular medicine.

Peter Hans Hofschneider, for whom the award is named, is regarded as a pioneer in the field of molecular biology and one of the key figures in interferon research. From 1966 onwards, he was director at the Max Planck Institute of Biochemistry in Martinsried.

Dr. rer. nat. Sophie Steculorum

for her outstanding discovery of novel regulators of the central control of feeding and systemic insulin sensitivity

Max Planck Institute for Metabolism Research, Cologne
Research field: neuroscience, physiology, development
Current activity: Max Planck Research Group Leader at the Max Planck Institute for Metabolism Research, Cologne



My topic of interest	My research aims to deepen our understanding of the fundamental principles that govern key behavioural and physiological processes such as feeding or maintenance of steady body weight and glycemia. Our work intends to further delineate neuronal networks controlling energy and glucose homeostasis by uncovering their developmental principles and their exact functions in adults.
My motivation	Considering the escalating burden of obesity and Type 2 Diabetes, there is a need to understand how our organism maintains its weight and controls appetite. Particularly troublesome, metabolic disorders are increasingly being diagnosed in childhood and have recognized roots in very early life. Early onset of obesity and diabetes has been linked to abnormal development of brain metabolic pathways. However, the mechanisms underlying this developmental programming remain elusive. One of the challenges of my research is therefore to understand the mechanisms underlying this unfortunate metabolic destiny.
My next professional station	I am currently setting up my group at the Max Planck Institute for Metabolism Research in Cologne. I joined the Institute as a Max Planck Research Group Leader in January, and it is an incredibly stimulating and exciting step for my career!

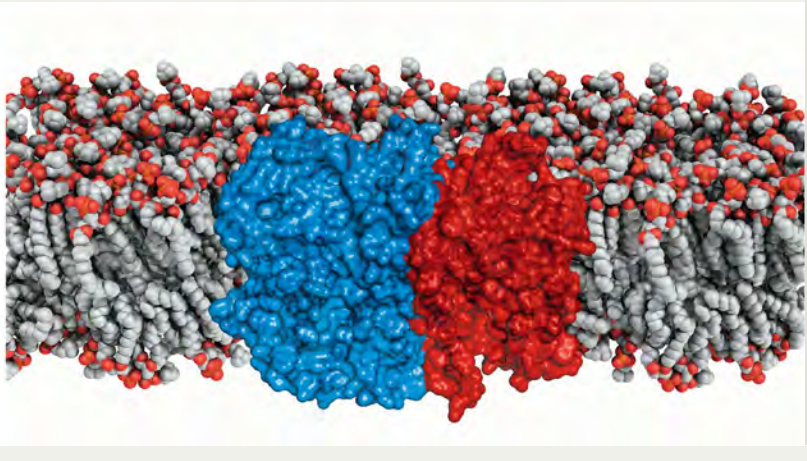
Nobel Laureate Fellowship

The Nobel Laureates of the Max Planck Society can each nominate an outstanding postdoc for a Nobel Laureate Fellowship in recognition of their achievements. The fellows receive an employment contract at a Max Planck Institute as well as resources for research. This instrument for promoting junior scientists of the Max Planck Society provides postdocs with a unique insight into the research activities of the Nobel Laureates. They also benefit from excellent national and international networks for their future career.

Dr. phil. nat. Schara Safarian

Nobel Laureate:
Prof. Dr. Hartmut Michel

Max Planck Institute of Biophysics,
Frankfurt am Main
Research field: structural biology,
protein chemistry
Current activity: postdoctoral fellow at the Max Planck Institute of Biophysics, Frankfurt am Main



My topic of interest	Membrane proteins play an essential role in the energy conservation of all living organisms. A key challenge studying these proteins is to understand their specific roles and their detailed biochemical modes of action. Methods of structural biology have proven highly useful for addressing these questions, specifically for respiratory chain enzymes. In my PhD studies, I worked on the structural determination of a unique bacterial oxidoreductase involved in the pathogenicity of several bacterial strains.
My motivation	Cytochrome *bd* oxidases belong to a unique protein family that is exclusively present in prokaryotes. Furthermore, this enzyme is crucial for the pathogenicity of certain bacterial strains. The global aim of my studies is to elucidate the biochemical mode of action of cytochrome *bd* oxidase, forming the basis for future development of antimicrobial drugs.
My next professional station	The Max Planck Institute of Biophysics offers an excellent environment for structural biology, which allows me to expand my methodological knowledge as well as providing a platform for dedicated research on selected membrane proteins. I can well imagine going abroad for a group leader position in the next several years as a new chapter in my career.

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