A meeting by Research Leaders for Research Leaders in the MPG

September 19-20, 2023 | Harnack-House | Berlin

MPG *LeadNet* Symposium 2023

LeadNet

Max Planck LeadNet Symposium 2023

Editor:

Jannik Mielke

MPG LeadNet Steering Committee:
Gabriele Bixel
Katja Krause
Frank Ohme
Johannes Rebelein

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Welcome to the MPG LeadNet Symposium 2023

The MPG LeadNet Steering Committee wishes you a successful and stimulating participation!

Gabriele Bixel, BMS

Katja Krause, GSHS

Franke Ohme, CPTS

Johannes Rebelein, BMS

Program Overview

Tuesday | September 19, 2023

12:00 – 13:00	Registration
13:00 – 13:15	**Welcome** by LeadNet Steering Committee
Science Talks across MPG Sections	
13:15 – 13:45	**Hassan Salem** | MPI for Biology, BMS *Beetle-microbe symbioses: Endless forms most functional*
13:45 – 14:15	**Simona Vegetti** | MPI for Astrophysics, CPTS *Strong gravitational lensing and long baseline interferometry, a pathway to new physics*
14:15 – 14:45	**Hana Gründler** | MPI for Art History, GSHS *From the Underground with Love. Art, Ethics and Politics in the ČSSR and Beyond, 1968-1978*
MPG Career Tracks	
14:45 – 15:15	**Bernhard Keimer** | Director of MPI for Solid State Research | Chairperson of MPG Scientific Council *Tenure track in the MPG*

15:15 – 15:30	**Ilka Schiessler-Gäbler** | MPG Headquarters *From advanced researcher to established researcher*
15:30 – 16:00	Coffee Break
Promoting Science and Scientists	
16:00 – 17:00	Keynote **Patrick Cramer** | MPG President *Leadership: Lessons learned at different institutions*
17:00 – 17:15	Coffee Break
17:15 – 18:15	**Panel Discussion on Leadership and Career Tracks in the MPG** *Chairs*: Gabriele Bixel, Frank Ohme *Panel participants:* **Nicole Dubilier** | Director of MPI for Marine Microbiology | Co-Founder of MPG LeadNet **Bernhard Keimer** | Director of MPI for Solid State Research | Chairperson of MPG Scientific Council **Ilka Schießler-Gäbler** | MPG Headquarters
18:15 – 19:15	Dinner
19:15 – 21:00	**Poster Session** and Evening Event

Wednesday | September 20, 2023

Career Focus: MPG, Academia, and Industry	
09:00 – 09:30	**Nicole Dubilier** | Director of MPI for Marine Microbiology | Co-Founder of MPG LeadNet *There is no right or wrong path in science*
09:30 – 10:00	**Carsten Wotjak** | Director *in vivo* Neuropharmacology, Boehringer Ingelheim | Former MPRGL *Small step or giant leap – from academic to industrial research*
10:00 – 10:30	**Ulrich Betz** | Senior Vice President Innovation Merck *355 years of curiosity and innovation*
10:30 – 11:00	Coffee Break
Parallel Workshops	
11:00 – 13:00	**Workshop I: Panel Discussion on Scientific Career Tracks** *Topics*: Career Tracks in Academia and Industry, WissZeitVG *Chairs*: Katja Krause, Johannes Rebelein *Panel participants*: **Georg Jongmanns** | HIS-Institut für Hochschulentwicklung e.V. **Gisela Kopp** | Spokesperson Junge Akademie | Hector Pioneer Fellow, University of Konstanz **Henning Rockmann** | Leiter der Berliner Geschäftsstelle | Bereichsleiter Grundsatzfragen bei

	Hochschulrektorenkonferenz **Carsten Wotjak** | Director *in vivo* Neuropharmacology, Boehringer Ingelheim | Former MPRGL *Language*: EN or DE (chairs will provide brief summaries in EN)
11:00 – 13:00	**Workshop II: MPG Services & Research Programs** ***Steffi Heinecke*** | International Programs within MPG: **Dioscuri Centers** ***Paweł Dłotko*** / Dioscuri Centre in Topological Data Analysis, Warsaw, Poland *Data, their shape, and what we can learn from it.* **Sandra Vengadasalam** | Max Plank Digital Library (MPDL) *MPDL Roadshow: Good tools, happy scientists - happy scientists, good research!* **Wiebke Möbius** | Max Planck BioImaging Core Unit Network (MaxBI) *Introducing MaxBI*
11:00 – 13:00	**Workshop III: Science Communication** **Karmelina Kulpa** | Max Plank Digital Library (MPDL) *feat.* **Rosa Schneider** | kurzgesagt – In a Nutshell *Short-Form Content & Science? YES! Make your research accessible to everyone.*
13:00 – 14:00	Lunch
14:00 – 15:00	**Concluding Remarks and Upcoming LeadNet Symposium 2024**
15:00 – 18:00	Satellite Meeting **Max Planck Research Group Leaders**

Speakers at the MPG LeadNet Symposium 2023

ULRICH BETZ

Senior Vice President Innovation Merck

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355 years of curiosity and innovation

Dr. Ulrich Betz is Senior Vice President Innovation at Merck and Chairman of the Board of Future Insight e.V.. He has been appointed by the Federal President of the Federal Republic of Germany as a member of the German Council of Science and Humanities (Wissenschaftsrat). He is also a member of the LOEWE scientific advisory board for Hesse as well as a member of the board of the German Chemical Society (GDCh).

Uli is an accomplished R&D manager with >25 years of experience in the pharmaceutical and chemical industry and has worked at various scientific and managerial positions at Bayer and Merck. Uli received his PhD in functional genomics and immunology from the University of Cologne, worked for his diploma thesis at the Max Planck Institute for Immunology and studied biochemistry and physiological chemistry at the University of Tübingen.

He is a co-inventor of the anti-viral drugs Letermovir (Prevymis) and Pritelivir and has won several innovation awards such as the German Industry Innovation Award and two International Business Awards (Stevie Gold Awards Executive of the Year – Pharmaceuticals and Innovator of the Year). Ulrich is author and co-author of >100 publications and patents (e.g., Cell, Nature Medicine, Nature Biotechnology, Cell Reports, books).

PATRICK CRAMER

MPG President
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Leadership: Lessons learned at different institutions

Patrick Cramer is the president of the Max Planck Society, since June 2023.

Born 1969 in Stuttgart, Patrick Cramer studied chemistry at the Universities of Stuttgart and Heidelberg. He then worked at the University of Bristol (UK) and Cambridge (UK) as a research student before receiving the diploma in chemistry from the University of Heidelberg in 1995. Patrick Cramer performed his doctoral studies at EMBL Grenoble (France) and received the doctorate from the University of Heidelberg in 1998. A two-years postdoctoral position at Stanford University (USA) was followed by a tenure-track position as professor of biochemistry at the Ludwig Maximilian University of Munich (LMU) from 2001 to 2003.

Patrick Cramer became full professor at the LMU in 2004 and stayed there for 10 years as the director of the Gene Center of the LMU. He then joined the MPG as a director at the Max Planck Institute of Biophysical Chemistry (2014-2021), which has become the Max Planck Institute for Multidisciplinary Sciences in 2022.

He is a member of the German National Academy of Sciences Leopoldina as well as the European Molecular Biology Organization (EMBO) and, since 2020, also of the US National Academy of Sciences (NAS).

NICOLE DUBILIER

Director of MPI for Marine Microbiology
Founder of MPG LeadNet
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There is no right or wrong path in science

Nicole Dubilier is a Director at the Max Planck Institute for Marine Microbiology in Bremen, Germany where she heads the Symbiosis Department. Her lab studies the diversity, ecology and evolution of symbioses between microorganisms and marine

invertebrates from environments such as deep-sea hydrothermal vents and cold seeps, as well as shallow-water coral reefs and sea grass meadows. Using a wide array of methods ranging from single gene analyses to omics, whole organism physiology and *in-situ* experimental work, Dubilier and her team have revealed how beneficial interactions with microorganisms allow animals to thrive in nutrient poor environments.

Nicole Dubilier moved from the USA to Germany as a teenager and gained her PhD in Marine Zoology at the University of Hamburg, Germany. After a two year post-doctoral fellowship at Harvard University, she joined the Max Planck Institute for Marine Microbiology in 1997. Dubilier's awards and honors include the Leibniz Prize (Germany's most prestigious research prize), a Gordon and Betty Moore Marine Microbial Initiative Investigator Award, and a European Research Council Advanced Grant. She is an elected Fellow of the German National Academy of Sciences (Leopoldina), the European Molecular Biology Organization (EMBO), the American Academy of Microbiology, the European Academy of Microbiology, and the Academy of Sciences and Humanities Hamburg, and was the President of the International Society of Microbial Ecology (2020-2022). She serves on many national and international advisory boards, scientific councils and other commissions of trust, and is engaged in advancing gender equity in science.

HANA GRÜNDLER

W2 Group Leader, MPI for Art History
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From the Underground with Love. Art, Ethics and Politics in the ČSSR and Beyond, 1968-1978

Hana Gründler is a Permanent Senior Research Scholar and Head of the Research Group *Ethico-Aesthetics of the Visual* at the Kunsthistorisches Institut in Florenz – Max Planck Institute. She studied philosophy and art history at the Universities of Milan and Frankfurt am Main, where she also received her PhD. Her research areas include the intersections of philosophy and art (history), extending from the early modern period to the present time, with a focus on the ethical and political implications of visual and material culture. She has been a visiting professor at the Institute of Philosophy at the Freie Universität in Berlin, at the Department of Art and Visual History at Humboldt-University in Berlin and at the Department of Art History at the University of Vienna.

Since 2020 she is member of the editorial board of the *Zeitschrift für Ideengeschichte* as well as of the *Zeitsprünge. Forschungen zur Frühen Neuzeit*.

Currently Hana Gründler is writing a book on Czech art and philosophy as resistant practices, 1948–1990. Among her publications are the monographs *Wittgenstein. Anders Sehen. Zur Familienähnlichkeit von Kunst, Ästhetik und Philosophie* (Berlin 2008) as well as *Die Dunkelheit der Episteme. Zur Kunst des aufmerksamen Sehens* (Berlin 2019). Recently she has published the special issues of the *kritische Berichte* "Phenomenon Colour: Aesthetics – Epistemology – Politics" (Munich 2022) and of the *Zeitsprünge* "Practices of Imagination" (Frankfurt am Main 2023) as well as articles on the ethical dimension of art and visibility. She is also a co-editor of the *Edition Giorgio Vasari* and editor of Leon Battista Alberti's moral dialogue *Über die Seelenruhe* (Berlin 2022).

BERNHARD KEIMER

Director of MPI for Solid State Research
Chairperson of MPG Scientific Council
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Tenure track in the MPG

Bernhard Keimer was born in 1964 in Ratingen and studied physics at the Technical University of Munich and at the Massachusetts Institute of Technology, where he received his PhD in 1991. After serving as Assistant, Associate, and Full Professor at Princeton University, he was appointed Director at the Max Planck Institute for Solid State Research in 1998. He is currently Honorary Professor and Chair of the University Council at the University of Stuttgart, and Adjunct Professor at the University of British Columbia. From 2020-2023, he served as Chair of the Scientific Council of the MPG. Scientific awards include the Gottfried Wilhelm Leibniz Prize (2011) and the Kamerlingh Onnes Prize (2022).

HASSAN SALEM

MPI for Biology
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Beetle-microbe symbioses: Endless forms most functional

Hassan Salem is interested in the evolutionary processes that shape mutually beneficial species interactions, with emphasis on why they form and how they are maintained. Research in his lab involves studying herbivore-microbe interactions across multiple biological scales to characterize the currencies that define these partnerships, and describe the developmental profiles contributing to their persistence.

Hassan Salem studied Biology at Ealham College (Richmond, USA) and completed a Masters's degree at Miami University (Oxford, USA) in Botany. In 2010, Hassan moved to the Max Planck Institute for Chemical Ecology in Jena to perform his PhD studies in Evolutionary Biology. In 2016, he went as Humboldt Fellow to Emory University (Atlanta, USA). From 2016 to 2018, Hassan spent two years at the Institute for Advanced Studies in Berlin (Wissenschaftskolleg zu Berlin). Afterwards, he became a post-doctoral Fellow at the Smithsonian National Museum of Natural History in Washington D.C. Since 2020, Hassan is a Max Planck Research Group Leader at the MPI for Biology in Tübingen. He is also research associate at the Smithsonian Tropical Research Institute in Panama.

ILKA SCHIESSLER-GÄBLER

MPG Headquarters
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From advanced researcher to established researcher

Ilka Schießler-Gäbler (studied in Germany and South Africa, LL.M.) has been working for the Max Planck Society for the Advancement of Science since 2005. A lawyer by training, she has been involved in the promotion of young scientists. As part of a secondment to the Federal Ministry of Education and Research, she has been part of

a project group on the Freedom of Science Act from October 2007 to April 2008. As an officer, she has now been looking after PhDNet, the Career Steps Network, and the establishment of an MPG-wide alumni system for several years. Since 2018, she has also held the position of deputy head of the "Programs and Networks" unit in the Human Resources Development & Opportunities department, which she took over at the end of 2021. Today, her and her team's focus is on the enhancement of programmatic support for scientists at all career levels (undergraduates to W2 position holders) and the coordination of target group-specific networks. Together with a colleague, she also heads the GV's internal working group for career structures, dealing internally with all matters relating to the redesign of the WissZeitVG.

SIMONA VEGETTI

MPI for Astrophysics

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Strong gravitational lensing and long baseline interferometry, a pathway to new physics

Simona Vegetti has obtained her PhD in 2010 from the University of Groningen in the Netherlands. She then moved to MIT with a Pappalardo Fellowship.

Since 2013 she has been at the Max Planck Institute for Astrophysics, first as a postdoctoral fellow, then as a Max Planck Research Group Leader (2015-2020), and now as a Lise Meitner Research Group Leader (since 2021). In 2017 she was awarded an ERC starting grant to constrain the properties of dark matter with very high-angular resolution observations of strongly lensed galaxies.

CARSTEN WOTJAK

Director In vivo Neuropharmacology, Boehringer Ingelheim
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Small step or giant leap – from academic to industrial research

After his graduation in Biology at the University Leipzig and his PhD studies at the Max Planck Institute of Psychiatry (Munich)/LMU Munich, Carsten Wotjak has established and run a mouse behavioral lab at the ZMNH (UKE Hamburg), followed by a stay at the NIMH (London) funded by the Otto-Hahn Medal. In 2000, he returned to the Max-Planck Institute of Psychiatry, where he has run the Research Group “Neuronal Plasticity” until 2019. In November 2019, he has joined Boehringer Ingelheim Pharma GmbH & Co KG as Director for *In Vivo* Neuropharmacology. During his time in the MPG, Dr. Wotjak has served various functions, including Academic Head of the animal facility (MPIPsych), Academic Coordinator of a major construction site (MPIPsych), Spokesperson of the Scientific Staff Members of the BMS/MPG, Member of the PeKo BMS/MPG and Senator of the MPG. He is faculty member of several grad schools, including Max Planck School of Cognition. His major research interests are translational studies on key symptoms of psychiatric diseases, including fear, anxiety, and cognitive impairments, and the development of novel drugs for the therapy of mental health problems

Workshops

Workshop I: Panel Discussion on Scientific Career Tracks

One aim of this workshop is to explore career paths across various sectors (academy, business, politics, etc.) and institutions (universities, independent research institutions, corporations, etc.). In so doing, we will pay particular attention to the challenges and best practices when transitioning between sectors. A second aim of the workshop is to discuss the WissZeitVG. We will ask whether this law is a hindrance or an opportunity for academic careers and inquire whether a revised WissZeitVG could prompt Germany to reconsider its academic career trajectories so as to keep promoting the best science it can.

GEORG JONGMANNS
HIS-Institut für Hochschulentwicklung e.V.

GISELA KOPP
Sprecherin Junge Akademie
Hector Pioneer Fellow, University of Konstanz

HENNING ROCKMANN
Leiter der Berliner Geschäftsstelle
Bereichsleiter Grundsatzfragen bei
Hochschulrektorenkonferenz

CARSTEN WOTJAK
Director *In vivo* Neuropharmacology, Boehringer Ingelheim

Workshop II: MPG Services & Research Programs

The Max Planck Society has lots to offer to enable great science. Learn in this workshop about international programs, cutting edge tools to make your (digital) life easier, and how BioImaging is brought to the next level.

STEFFI HEINECKE
Administrative Headquarters of the Max Planck Society

Programme Coordinator Dioscuri – Centres of Excellence in Central and Eastern Europe and Policy Officer for Relations with CIS, Ukraine, and Georgia

PAWEŁ DŁOTKO

Dioscuri Programme (MPG initiated)

Data, their shape, and what we can learn from it.

SANDRA VENGADASALAM

Max Plank Digital Library (MPDL)

MPDL Roadshow: Good tools, happy scientists - happy scientists, good research!

WIEBKE MÖBIUS

Max Planck BioImaging Core Unit Network (MaxBI)

Introducing MaxBI

Workshop III: Science Communication

Have you ever wondered how and why visual communication is vital for your work as a researcher? This joint hands-on workshop of the Max Planck Digital Library and “kurzgesagt – in a nutshell” will give you insights into short-form scientific content trends, the importance of storytelling, and the science community on social media. Learn how to successfully build your brand online and ways to reach a broad audience with your scientific findings!

KARMELINA KULPA
Max Plank Digital Library (MPDL)

Short-Form Content & Science? YES! Make your research accessible to everyone.

ROSA SCHNEIDER
kurzgesagt – In a Nutshell

Short-Form Content & Science? YES! Make your research accessible to everyone.

Participants & Posters

Diego Alburez-Gutierrez

Max Planck Institute for Demographic Research | Rostock

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Research field: Diego Alburez-Gutierrez leads the Kinship Inequalities Research Group at the MPI for Demographic Research. His research is concerned with how the differences in kin presence, availability, and resources create distinct environments for individuals to develop, support each other, and obtain a sense of shared identity. His previous research has focused on the lived experience of death, the inter-generational transmission of memory, and the multi-generational demand for care time. Diego advocates for the study of kinship in demography from an empirical, theoretical, and methodological perspective with a particular interest in improving our understanding of populations in the global South.

Mariya Antonosyan

Max Planck Institute for Geoanthropology | Jena

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Poster: Life at the Crossroads: Biomolecular Insights into Human-Environment Interactions during the Chalcolithic-Bronze Age Transition in the Lesser Caucasus

Research field: I am a postdoctoral researcher at the Department of Archaeology, MPI-GEA. In my research, I am using traditional archaeological methods combined with novel proteomics and stable isotope techniques to explore human lifeways in the face of major environmental and socioeconomic transitions.

Agnes Anna Arndt

Max Planck Institute for Human Development | Berlin

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Research field: Modern and Contemporary European History; Knowledge and Cultural History of Law and Economics; Emotions in the Spheres of Law, Politics and Economics; Theories and Methods of Transnational and Comparative Research

Philip Bittihn

Max Planck Institute for Dynamics and Self-Organization | Göttingen

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Poster: Emergent Dynamics in Living Systems Driven by Growth and Division

Research field: The aim of my group is to understand how the inherent activity of individual living cells allows large groups of them to self-organize on larger scales and show emergent collective dynamics with complex biological functions. A particular focus is on growth and division – a driving force inherent to, indispensable for as well as unique to living matter. Working at the interface between physics and biology, we use mathematical models, high-performance numerical simulations and analytical tools to discover universal mechanisms and conditions under which this activity leads to certain structures, patterns and dynamics. Many of the systems we investigate are directly inspired by biological systems, such as bacterial colonies, tissue spheroids, tumors or embryos. The behavior of these multicellular substrates, which we investigate in collaboration with experimental biophysicists and microbiologists, arises from the inherent coupling between physical processes (mechanical interactions, flows, diffusion) and biological processes (metabolism, regulated gene expression). Our models try to capture the minimal ingredients necessary to produce certain observed behavior. However, the results we obtain often have direct implications for applications, such as antibiotic resistance or the interpretation of biophysical measurements. Using the same modeling approach, we can also access parameter regimes and design properties which do not directly correspond to real biological systems or which are – at least currently – experimentally inaccessible. Still incorporating life-like activity such as growth and division, this allows us to explore hypothetical scenarios, which teach us why evolution might have favored certain solutions or how artificial living matter would have to be designed in order to achieve controlled self-organization or self-assembly into desired structures. The long-term vision is that our fundamental research will pinpoint universal organizational principles of existing active and living matter, and at the same time provide the tools to design and control its behavior in (bio)technological or medical applications.

Alexander Blum

Max Planck Institute for the History of Science | Berlin

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Research field: I work in the history and philosophy of modern physics, trying to understand the way we have (implicitly and de facto) structured our knowledge of the world in these, our most highly formalized, scientific theories – though I'm skeptical of

that word, "theories", and am looking for better way to parse the formalized, structured knowledge that is created and employed in the sciences.

Roza Bouchal

Max Planck Institute of Colloids and Interfaces | Potsdam

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Poster: Advanced electrolytes for sustainable batteries

Research field: Today's lithium (Li)-ion batteries play an important role in our society, but they fall short in a number of areas, including the use of scarce raw materials and flammable solvent electrolytes. Therefore, our research aims to develop sustainable batteries for a truly fossil-free society. Our interest is beyond Li-ion batteries such as zinc, manganese, magnesium and other chemistry batteries. The approach is to adjust electrolyte composition according to the battery chemistry following three axes: i) The design and characterization of battery electrolytes. ii) Integration of the innovative electrolytes in full battery cells. iii) Characterizing and understanding the role of the electrolyte in the battery cell.

Paola Carrillo-Bustamante

Max Planck Institute for Infection Biology | Berlin

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Poster: Mosquito metabolism shapes the life-history strategies of Plasmodium parasites

Research field: Malaria represents still a major global health burden. Although it is transmitted by mosquitoes, their complex biological traits are often neglected by current eradication strategies. I use bottom-up modeling approaches that integrate knowledge gained in laboratory and field settings into mathematical models of development dynamics and transmission. The aim? Understand how single mosquito traits might influence malaria transmission and evolution. This is a novel approach that can identify unknown mechanisms or misconceptions in the way transmission occurs.

Patience Chatukuta

Max Planck Institute for Biology | Tübingen

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Poster: Unveiling the Mysteries of the Horned Melon: Genomic Adventures in the Heart of African Cucurbits!

Research field: I am interested in the development of genomic resources for under-researched African crops, particularly horned melon which is resistant to many pathogens that affect other members of the cucurbit family. Our new research group will focus on using horned melon accessions from Zimbabwe to generate genomic and transcriptomic data of this plant. This data will be used to annotate the horned melon genome and identify structural variants associated with phenotype diversity. The genetic loci associated with nematode resistance will be mapped and used in the future as targets for improvement of nematode resistance in the cucurbit family.

Viktor Colic

Max Planck Institute for Chemical Energy Conversion | Mülheim an der Ruhr

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Research field: The Electrochemistry for Energy Conversion Group is a part of the MPI for Chemical Energy Conversion in Mülheim a.d. Ruhr. The group primarily aims to utilize electrochemical methods coupled with surface science and other instrumental analysis techniques to investigate the links between surface and electrolyte properties and electrocatalytic activity. The focus is on reactions that are of interest for energy conversion, storage and utilization. A particular focus is laid on reactions that are limiting the performance of energy conversion devices for hydrogen utilization: the oxygen evolution reaction in electrolyzers and the oxygen reduction reaction in fuel cells. Additionally, the application of electrochemical reactions for the generation of high-value chemical products, e.g., hydrogen peroxide is of high interest. In this regard the group seeks to investigate multicomponent alloys and oxides, complex solid solutions and high entropy alloys and their properties as electrocatalysts. To this aim, we cooperate primarily with researchers in materials science in order to synthesize materials that cannot be reached through “classical “electrochemical methods.

Serena Ding

Max Planck Institute of Animal Behavior | Konstanz

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Research field: C. elegans has recently emerged as a model for several striking collective behaviours such as aggregation, wurmuration, towering, and network formation. Combining the powerful experimental accessibility of this major lab model organism with the knowledge that collective phenomena are widespread and highly relevant for many nematodes, I exploit different nematode species to understand how

and why they behave collectively. I seek to dissect the proximate mechanisms of nematode collective behaviour using tools from quantitative behavior and modelling, as well as integrating fitness measurements to demonstrate the function of collective behaviour in ecologically relevant nematode groups.

Paweł Dłotko

Dioscuri Programme (MPG initiated) | Warschau

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Poster: The shape of things to come

Research field: I am working in a field of appied and computational topology - a dysycpline in between mathematics and computer science aiming to build geometrical and topological descripros of various types of data. I am very interested to talk and get inspired by other dyscyplines of science and help them solve their problems in mathematically rigorous way.

Matthieu Domenech de Cellès

Max Planck Institute for Infection Biology | Berlin

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Research field: The research in my lab focuses on the population biology of infectious diseases, with a view to understanding how individual-level mechanisms of infection translate into population-level dynamics. The core of our research is the use of mathematical modeling and of statistical inference to formalise biologically motivated hypotheses, to rigorously test those hypotheses on long-term epidemiological data, and to provide actionable information for public health.

Alex Faesen

Max Planck Institute for Multidisciplinary Sciences | Faßberg

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Poster: Protein metamorphosis as responsive signalling node

Research field: The reversible activation of signalling proteins or complexes plays a central role in the regulation of biochemical switches in signal transducing systems. An unusual class of signalling proteins acts by reversibly changing their three-dimensional structure (metamorphosis), thereby triggering the assembly of signalling

complexes and in some cases large effector complexes. Over the last few years, it has become clear that this relatively unstudied signal transduction mechanism is essential in a growing number of biological pathways, including cell division, DNA damage signalling, bacterial immunity and autophagy.

Paul Hartogh

Max Planck Institute for Solar System Research | Göttingen

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Poster: Mysteries in the Jupiter system

Research field: I am working on the investigation of atmospheres and gases in the solar system. This includes planetary atmospheres, atmospheres and (volcanic?) plumes of moons and atmospheres of small bodies including comets and objects in the asteroid belt. I am principal investigator of a space instrument that is on its way to Jupiter.

Steffi Heinecke

Administrative Headquarters of the Max Planck Society | München

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Research field: Programme Coordinator Dioscuri – Centres of Excellence in Central and Eastern Europe and Policy Officer for Relations with CIS, Ukraine, and Georgia in the Division for International Relations at the Administrative Headquarters of the Max Planck Society.

Walid Hetaba

Max Planck Institute for Chemical Energy Conversion | Mülheim an der Ruhr

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Research field: In the electron microscopy and XPS group, we investigate materials at the micro- and nanoscale and up until atomic resolution. By investigating catalyst samples, we aim to relate the structure and function of the materials. This helps with the development of improved catalysts and processes. Transmission electron microscopy (TEM) is a versatile method as it allows the use of a wide variety of different techniques in a single instrument. Not only can we image the investigated samples at high resolution but also perform electron diffraction experiments. These techniques can be combined with analytical investigations such as energy dispersive

X-ray spectroscopy (EDS) and electron energy-loss spectrometry (EELS). These methods allow for the study of the elemental composition and the local electronic structure of the investigated material with high spatial resolution. Using X-ray photoelectron spectroscopy (XPS) as an additional capability of our group, we can determine the chemical composition and the electronic structure of the surface of solids. Next to supporting all research groups at the institute, we also develop new methods to improve the applied techniques. A special focus of our group's research is the investigation of air sensitive catalyst samples. Since some catalysts change upon contact with air, it is essential to inertly transfer them to the setups. To achieve this, we developed unique methods which facilitate not only the inert transfer, but also optimal workflows during TEM- and XPS measurements. In addition, we establish new methods for EELS- and XPS data evaluation. For this, we use and improve current methods of data science and machine learning, including simulation, unsupervised machine learning and neural networks.

Nicole Hiekel

Max Planck Institute for Demographic Research | Rostock

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Research field: Nicole Hiekel leads the Independent Research Group "Gender Inequalities and Fertility" at the Max Planck Institute for Demographic Research (MPIDR) in Rostock. At the intersection of demography and sociology, she studies the interaction of social and gender inequalities with demographic processes in partnership and family life courses.

Genevieve Housman

Max Planck Institute for Evolutionary Anthropology | Leipzig

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Research field: My research group (Skeletal Genomics) studies the functional genomics of complex traits in human and nonhuman primates, with a particular focus on the skeleton.

Hannes Hübener

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Research field: I work on first-principles computational techniques for the description of strong light-matter coupling.

Victor M. Iminjili

Max Planck Institute for Geoanthropology | Jena

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Poster: Archaeoinformatic and stable isotopic perspectives on ecological and economic change in ancient eastern Africa

Research field: I am an environmental archaeologist interested in using biomolecular approaches (including isotope biochemistry, zoology by mass spectrometry (zooms), and genetics among others) to study human-environment interactions in eastern Africa from the late Pleistocene to the late Holocene. I am also interested in using archaeological knowledge to enrich conversations about food security and other challenges facing African societies.

Adam Izdebski

Max Planck Institute for Geoanthropology | Jena
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Research field: Human Ecology and Enviornmental History - Biodiversity, Climate Change, Epidemics - Late Holocene (1000 BCE-present) - Europe & Mediterranean

Deepak Jha

Max Planck Institute for Geoanthropology | Jena

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Research field: My main research focus is understanding the intricate relationship between humans and the environment in Asia. To achieve this, I utilize stable isotopic techniques, both at the bulk and biomolecular level, to decipher changes in climatic conditions and their impact on prehistoric human populations. Additionally, I extract charcoal and polycyclic aromatic hydrocarbons from archaeological samples to gain insights into human-induced fire events and the role of fire in human evolution. For my research, I rely on a variety of analytical instruments, such as the Isotope Ratio Mass Spectrometer (IRMS) coupled with a Gas Chromatography-Mass Spectrometer (GCMS) via Conflo and Dual-Inlet, Kiel IV Carbonate Device, Organic Elemental Analyzer, and Gas Bench. These cutting-edge tools enable me to generate proxy-based records for paleoenvironmental reconstruction. Overall, my research

contributes to the broader understanding of human-environment interactions in historical contexts and enhances our knowledge of how past civilizations coped with changing climates, providing valuable insights for our own future.

Felix M. Key

Max Planck Institute for Infection Biology | Berlin

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Poster: Within-patient eco-evolutionary mechanisms promoting opportunistic, nosocomial infections

Research field: Microbial pathogens are shaped by their evolutionary history, which provides them the genomic framework to cause disease. The Key lab aims to uncover the genetic mechanisms and phenotypic variation that underlay emergence and adaptation of infectious microbes. Therefore, we develop methods to track microbial evolution on dramatically different timescales by leveraging ancient DNA from archaeological specimens as well as high-definition genomic data from clinical samples. Understanding the mechanisms of infectious disease emergence and adaptation holds promise to improve disease prevention, intervention and to develop more targeted therapies.

Rahab Kinyanjui

Max Planck Institute for Geoanthropology | Jena

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Poster: Paleobotanical Research-Opportunities and challenges

Research field: I study and analyze plants macro-microfossils to reconstruct ancient landscapes, paleoenvironments and paleoclimates in Kenya and East African region. In addition, I study plants micro-fossils to investigate and document human-environment interactions since Holocene period (ca. 10,000-year BP) to present.

Jörgen Kornfeld

Max Planck Institute for Biological Intelligence | Martinsried

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Poster: Brain Connectomics: The matrix is all you need?

Daniel Ming-Kang Lee

Max Planck Institute for Molecular Genetics | Berlin

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Research field: During mammalian development, defined cellular programs entail concerted actions of tissue-specific transcription factors and ubiquitously expressed chromatin modifiers. Mutations of these regulators often lead to embryonic lethality during gastrulation, which coincides with the developmental window where multi-lineage specification is established. A group of key chromatin modifiers, termed Polycomb repressive complexes, represses an array of developmental genes in a cell-specific manner. Understanding how these chromatin regulators, including the Polycomb proteins, orchestrate multi-lineage specification is especially crucial as their aberrant expressions are frequently reported in various pathologies including cancers.

Elena A. Levashina

Max Planck Institute for Infection Biology | Berlin

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Research field: Malaria-causing parasites have to survive in two different hosts - humans and mosquitoes and use the resources and cues produced by the hosts to adapt their biological programs. We are mostly interested in the mosquito side of the journey. We use genetical, biochemical, cell biology, field and theoretical approaches to understand how mosquitoes recognise and eliminate parasites and the evolutionary strategies of parasites that allow them to survive, especially in the changing environment.

Thomas Manke

Max Planck Institute of Immunobiology and Epigenetics | Freiburg

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Research field: Head of Bioinformatics. My team supports NGS analysis and bioinformatics for all groups @ MPI-IE

David Meierhofer

Max Planck Institute for Molecular Genetics | Berlin

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Research field: Mass Spectrometry Facility

Wiebke Möbius

Max Planck Institute for Multidisciplinary Sciences | Göttingen

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Poster: Introducing Max Planck BioImaging Core Unit Network (MaxBI)

Research field: We study the biology of the myelinating glia cells in mouse models. Our main focus is myelin maintenance and axonal pathology in dysmyelinating disease models. Since I am heading the electron microscopy facility at the city campus, we study myelin with transmission electron microscopy, immunoelectron microscopy and volume EM by focused ion beam scanning EM (FIB-SEM).

Leonhard Möckl

Max Planck Institute for the Science of Light | Erlangen

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Poster: Tracing structure-function relationships in glycocalyx biology

Research field: The Möckl Group uses light to investigate and influence biological systems. Two key questions are in the focus of our research. The first one deals with a longstanding mystery in cell biology: How does the glycocalyx regulate, and how is it regulated by, cellular state? The second one is about novel therapeutic compounds: How can we use precise light activation of tailored substances to kill cancer cells at defined locations in the body without harming healthy tissue? Our research is located at the intersection of experimental optics, biophysics, and medicine. With this integrated approach, we strive to achieve a novel understanding of fundamental processes in general cell biology as well as to unlock innovative approaches for therapeutic intervention and diagnosis.

Inaam Nakchbandi

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Research field: Unraveling the matrix. The extracellular matrix not only holds cells together and gives the organs their shape, but it also affects cell behavior in health and disease. Two disease entities in which matrix plays unusual roles are cancer and fibrosis. In cancer, a matrix protein called fibronectin stimulates cell proliferation and hence supports tumor growth. Decreasing fibronectin amount genetically or pharmacologically diminished cancer progression by decreasing angiogenesis. Additionally, two fibronectin isoforms suppress the immune response against cancer: the EDA-isoform inhibits the function of anti-cancer cells, while EDB-fibronectin prevents their recruitment. In line with this, patients with cancer have a better prognosis when fibronectin expression is low. In fibrosis, an excess of collagen deposition destroys the microarchitecture of the organs and jeopardizes their function. A change in matrix composition and hence the receptors recognizing the matrix modulates for the amount of collagen produced. This suggests that the matrix itself controls the accumulation of more matrix. Of particular interest is a molecule that we developed by taking advantage of these findings. This molecule inhibits matrix production and improves organ function in in vivo models of liver as well as lung fibrosis. Thus, the extracellular matrix is not an inert bystander. It actively changes cell behavior and affects disease progression. A better understanding of its contribution will therefore help reveal novel approaches to treating disease.

Polina Novikova

Max Planck Institute for Plant Breeding Research | Köln

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Research field: Polyploid organisms have more than two sets of chromosomes as a result of a whole-genome duplication or a whole-genome hybridization. Polyploidy is often associated with extreme environments, where it can be triggered by external stress and in case of a successful establishment, can provide an adaptive advantage in harsh conditions. At the same time, the establishment of polyploid populations includes cellular adaptation to another extreme condition - polyploidy itself. We study the interplay between adaptation and polyploidy to understand molecular mechanisms of adaptation to doubled genomes, genomic and organismal consequences of polyploidization, and its ecological importance.

Mateusz Odziomek

Max Planck Institute of Colloids and Interfaces | Potsdam

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Poster: Nanoporous carbonaceous electrocatalysts for organic synthesis

Research field: In my research, I am dedicated to advancing the field of organic reactions by implementing electrification techniques to create more sustainable pathways. The primary goal is to eliminate the use of toxic and harsh reactants, as well as high temperatures, by employing potential and current to drive the reactions. To achieve this, I focus on developing novel nanoporous carbonaceous electrocatalysts.

Ohad Parnes

Max Planck Institute for the History of Science | Berlin

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Research field: History of the life sciences and modern medicine, focusing on evolutionary theory and epigenetics as well as the history of immunology and autoimmunity and chronic disease in the twentieth century. Epistemology of the Neurosciences.

Maryna Polyakova

Max Planck Institute for Human Cognitive and Brain Sciences | Leipzig

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Poster: Application of tech trees in reasearch: example of personalized tools for dementia

Jörg-Uwe Pott

Max Planck Institute for Astronomy | Heidelberg

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Poster: MICADO – ELT’s First Light Imager

Research field: I am a staff member in the Galaxies and Cosmology department at the Max Planck Institute for Astronomy. I am leading the workgroup JuHeart, which is tackling various challenges of experimental astrophysics. Our scientific goal is to spatially resolve and analyse the black hole environments at the heart of active galaxies and stellar systems. I also act as the instrument scientist of the ELT first-light instrument MICADO. Optical high-angular resolution instrumentation is one of my research foci.

Martina Preiner

Max Planck Institute for Terrestrial Microbiology | Marburg
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Poster: Mineral surfaces as protoenzymes: how to connect cofactors and heterogeneous catalysis

Research field: The last universal common ancestor (LUCA) arose in an environment of rocks and water on early Earth about 4 billion years ago. We can connect LUCA's metabolism to its geochemical roots through top-down comparative bioinformatics and through bottom up geochemical laboratory studies, using minerals and inorganic redox partners (hydrogen, metal ions) instead of catalysts as enzymes. The mechanisms that link top down and bottom up approaches, however, are under-investigated. Our group wants to change that by experimentally connecting central metabolic cofactors and enzymatic reactions that were present in LUCA to early Earth geochemical reaction partners with a focus on CO2 fixation. The goal is to understand the transition from environmental reactions to genetically encoded metabolic functions. We are interested in how the key molecules of metabolic pathways were selected in early chemical evolution. By charting the so far underexplored interactions between chemically active environments and metabolism we hope to gain insights into their coevolution before they became separated by the origin of cellular organization. We aim to close gaps between geo- and biochemistry and open the doors to new, unseen approaches to directly connect cells/microbes with their environment, both their cradle and their habitat.

Laurel Raffington

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Poster: Measuring the “Long Arm of Childhood” in Real-Time: Epigenetic Pathways of Socioeconomic Disparities in Physical and Cognitive Health Across the Lifespan

Research field: My research experience and expertise are in the areas of developmental psychology, epigenetics, neuroscience, and behavioral genetics. The problem I study is that children who grow up in low-income homes are at higher risk for poor health and early mortality for their entire lives. It is difficult to study the effects of childhood social conditions on adult health, however, because sometimes these negative impacts are not evident for years or even decades. My recent research focuses on the hypothesis that epigenetic DNA-methylation profile scores (MPSs) can allow researchers to “see” – in real time – the impact of children’s social environments on their lifelong risk for poor cognitive and physical health. Specifically, I have taken

MPSs developed in studies of adult aging, disease, cognition, and mortality, and calculated these same MPSs in children. My research is some of the first to show that children and adolescents growing up in low socioeconomic status families and in neighborhoods with concentrated disadvantage, and from minoritized racial/ethnic groups, already show the molecular signatures of faster biological aging, worse cognitive health, and higher adult BMI, as measured by their MPSs. This work is important because it implies that the molecular effects of social inequality arise early in the life course. MPSs might be useful as a surrogate end point in evaluation of programs and policies to address the childhood social determinants of lifelong health disparities. In an ongoing project, I am examining whether giving mothers unconditional cash gifts affects their baby's MPSs of aging-related physical and cognitive health.

Farrah Raza

Max Planck Institute for Social Anthropology | Halle

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Research field: The ethics of organ donation and transplantation is a live issue globally and is linked to a number of complex medical, legal and regulatory questions. Calls for legal reform in organ donation and transplantation in a number of jurisdictions, including in the UK and Germany, have resulted in different policy options. Currently, the jurisdictions of the study include the UK and Germany. The UK recently adopted an ‘opt-out’ system whereby individuals are deemed to consent to donation upon death unless there is an explicit objection or statutory exemption that applies. While the law provides an over-arching framework, a greater insight into how discretion is exercised in decisions about patient consent and autonomy, organ optimisation and resource allocation can reveal how different layers of decision-making intermesh within the clinical setting. The project will fill in a gap in the scholarship by conducting a novel study of decision-making processes by carrying out an investigation of the ‘middle layers’ of decision-making. In order to capture the complexity of how the law is negotiated and translated into practice at the various levels of decision-making, this project will consist of two key workstreams.

Helena Reichlova

Dioscuri Centre for Spin Caloritronics and Magnonics at the Institute of Physics of the Czech Academy of Sciences | Prag

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Poster: Dioscuri Centre for Spin Caloritronics and Magnonics

Research field: In October 2023 I will open the Dioscuri Centre for Spin Caloritronics and Magnonics at the Institute of Physics of the Czech Academy of Sciences. My main focus is to study spin transport phenomena in materials with compensated magnetic order. We aim to develop more energy efficient concepts for future IT technology.

Patrick Roberts

Max Planck Institute for Geoanthropology | Jena

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Research field: As Independent W2 Research Group Leader of the isoTROPIC Research Group and Lead Scientist of the Department of Archaeology at the Max Planck Institute of Geoanthropology, I am committed to applying multidisciplinary approaches to studying past human interactions with climatic and environmental change as well as the deep roots of the Anthropocene and our species' influencing of the Earth system. As PI of the ERC-funded PANTROPOCENE project, I am particularly interested in exploring the degree to which past human land use and landcover change in the tropics led to major shifts in the operation of different parts of the Earth system on local, regional, and global scales, as well as what this means for contemporary conservation and sustainability challenges. I have authored the academic monograph 'Tropical; Forests in Prehistory, History Modernity' published by Oxford University Press and the popular book 'Jungle: How Tropical Forests Shaped the World and Us' published by Penguin/Viking Random House. I apply a variety of different methodologies to the study of human and planetary history, including stable isotope analysis, palaeoecology, dendrochronology, remote sensing, computational archaeology, urban studies, and land use and land cover modelling. I am also committed to close collaboration with Indigenous and local stakeholder communities and have coordinated repatriation processes and the adaptation of research into policy. I have taken part in UNESCO symposia that bring together archaeologists and anthropologists together to discuss potential solutions for the conservation of ecological and cultural heritage in global tropical forest environments. In 2021, I was awarded the Heinz Maier Leibniz Prize, the top award for early career investigators in Germany and the first time that it has been awarded to an archaeologist. I am also a National Geographic Explorer.

Stefanie Rudolf

Max Planck Institute for the History of Science | Berlin

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Research field: My current project studies the medical systems and traditions in Syriac (and other Aramaic varieties) before and during the Abbasid era. These systems are not only heirs of the Greek medical tradition but incorporate the earlier Mesopotamian local traditions. These traditions including "magical" rituals and recipes had been in use until the 19th century and can grant us a look through the last millennia as well as a more nuanced picture of the various approaches to healing.

Nico Scherf

Max Planck Institute for Human Cognitive and Brain Sciences | Leipzig

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Poster: Artificial Cognitive Neuroimaging

Research field: Understanding how thought emerges from matter is one of the most exciting questions about our universe. How can a network of cells map, navigate, and understand its surroundings? What fundamental structures and dynamics give rise to a neural system's cognitive functions? Experimental methods such as high-resolution structural and functional magnetic resonance imaging, spectroscopy, microscopy, or single-cell sequencing give us unique views into the brain's structures and processes. To validate our understanding of the underlying computational principles, we also study neural network models in silico. Ultimately, we will need to integrate these complementary perspectives to understand how neural systems work, and, how they fail. Analysing such complex systems is challenging, as we have to explore, quantify, and interpret high-dimensional data with intricate dependencies. Our group develops tools that help uncover the underlying hidden patterns. On one hand, we use artificial intelligence (AI) to build tools that help us make sense of patterns in neural data. On the other hand, we use AI agents as virtual model organisms to study fundamental principles of representation learning and to validate analytical methods. We focus on the geometrical and topological aspects of neural data to help us reveal their underlying structures. We want to contribute conceptual and computational tools to map, explore, and understand neural systems that help us improve cognitive science, AI, and clinical practice.

Stephan Schiffels

Max Planck Institute for Evolutionary Anthropology | Leipzig

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Research field: I am group leader for population genetics at the Department for Archaeogenetics of the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany. My research group at the MPI investigates human history by means of

Genetics, and develops computational methods to model and analyse ancient and modern genomic data.

Alexander Schnegg

Max Planck Institute for Chemical Energy Conversion | Mülheim an der Ruhr

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Research field: The EPR research group at MPI CEC develops and applies advanced electron paramagnetic resonance (EPR) methods to study paramagnetic states in materials and molecules relevant to the next generation of sustainable chemical energy conversion and storage. Catalysts often adopt paramagnetic states and catalytic reactions follow radical mechanisms. Our group applies EPR methods to assign, quantify, and characterize these paramagnetic states. Current research focuses on the formation of radicals in the liquid phase and during electrochemical catalytic reactions, and on the characterization of transition metal (TM) and main group active sites via their electron spin coupling parameters. The group operates a unique array of advanced multi-frequency EPR spectrometers (3 GHz to THz). In cases where spin transition energies are not accessible to commercially available EPR spectrometers or where paramagnetic states are too short-lived during catalytic reactions, new spectroscopic tools are developed.

Albrecht Sigler

Max Planck Institute for Multidisciplinary Sciences | Göttingen

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Research field: Molecular mechanisms of central synapse formation and function in vertebrates. Non-antibiotic properties of tetracycline antibiotics. Morphometric analysis of microscopy imaging data. Safe and secure local data storage systems.

Mateusz Sikora

Dioscuri Programme (MPG initiated)

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Poster: How Posttranslational Modifications Affect Protein Interactions?

Research field: In the newly established Dioscuri Centre for Modelling of Posttranslational Modifications we are using computational biophysics tools to decipher the role of protein modification in protein-protein interactions. The importance

of Post-Translational Modifications (PTMs) was highlighted during the pandemic, where one such modification – glycans decorating the SARS-CoV-2 spike protein - became one of the critical factors hindering the development of vaccines. Because glycans weakly interact with proteins and are poor antibody targets, they form a molecular shield around spike proteins, making them nearly invisible to the immune system. Using computer simulations, together with group of Gerhard Hummer at MPI of Biophysics in Frankfurt we predicted imperfections in glycan shield that can allow interactions with antibodies and can be used in vaccine constructs. In the Dioscuri Centre we are building on the idea of protein interaction fine-tuning, not only by glycans, but other PTMs in general. Since PTMs are potent cancer biomarkers, play a role in metastasis and are crucial in development of anti-cancer and anti-viral vaccines, our findings might have a broader impact.

Manvendra Singh

Max Planck Institute for Multidisciplinary Sciences | Göttingen

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Research field: My research interests cover a broad span of evolution, genetics, and genomics to uncover the mechanisms underlying the biological significance of human endogenous retroviruses (HERVs) in human health and disease. I dominantly use single-cell biology, computational and mathematical techniques overlaid with genetic and epigenetic functional experiments to conduct our research. I primarily focus on the various mechanisms of co-option of endogenous viruses and retrotransposons for human physiology in various states. Endogenous viruses can be viewed as molecular fossils deposited in the genome during past viral invasions. By excavating and analysing such genomic relics, we can explore viral evolution at a depth unreachable when studying modern viruses. This information can yield critical insights and predictions relevant to pathogenic viruses circulating now and those threatening to trigger the next pandemic. We are actively studying the origin and function of genes, coding and non-coding, and other regulatory sequences that have emerged from human HERVs or retrotransposons. We aim to assess the extent to which mobile elements have contributed to the advent of biological innovation. Our research uses an integrative approach that lays on a foundation of bioinformatics and comparative genomics. The findings and patterns deciphered at the computer are then taken to the wet lab to test specific hypotheses in the most appropriate experimental systems, often in collaboration with other laboratories that complement our expertise. These include functional analyses in vitro and ex vivo in mammalian cells and genetic analyses in model organisms. Currently, we aim to resolve multiple interactions between the neurons and HERVs in the health and disease of humans. We are resolving a complex inter- and intracellular regulatory crosstalk between metabolism and innate immune response that is in part mediated by a specific subset of HERVs and their derived products that are differentially activated upon hypoxia in brain cells.

Óscar Ricardo Solís Torres

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Research field: North America has long been a focal point in discussions of the tempo and causation of Late Pleistocene megafaunal extinctions, playing a prominent role in debates relating to the relative impacts of human arrival and climate change on the demise of large mammals during this period. However, the majority of this discussion has centred on the temperate and subarctic regions of Canada and the United States of America. Even though Mexico is now not only home to early evidence for Homo sapiens in the Americas and also hosted megafauna within tropical ecosystems, where their loss is argued to have been felt particularly in the form of ecosystem dynamics, species distributions, and even the carbon cycle. Currently, I am undertaken a multidisciplinary analysis of megafaunal remains uncovered from the drowned caves of the Yucatan Peninsula. These caves have been documented as providing well preserved paleontological records in submerged, secure contexts. Nevertheless, there has been limited taphonomic and scientific work undertaken on these remains. I am appliying taphonomy (including cutmark analysis, site formation studies), radiocarbon dating, palaeoproteomics, and stable isotope analysis to megafaunal remains from different localities to assess the interactions between our species and megafauna in this region and to build up more detailed records of megafaunal chronology and ecology in a little-studied portion of the Americas.

Maria Stefanova

Max Planck Institute for Molecular Genetics | Berlin

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Poster: Multiscale structural role of TOP2 in chromatin spatial architecture

Research field: The way our genes are organized in the nucleus plays a crucial role in controlling their activity, impacting our development and overall health. In our study, we investigate how topoisomerases (TOP2), influence this organization. To understand TOP2's impact, we conducted experiments where we removed both Top2A and Top2B enzymes from human cells and studied how their absence affected various aspects of chromatin structure. Our findings revealed several noteworthy changes in the chromatin structure due to the absence of TOP2. First, we observed the emergence of new connections between different regions of chromatin, which we termed "regions of increased interactions." These regions cover a vast portion of the genome, totaling about 300 million base pairs. These newly formed interactions occurred at the boundaries between active domains (gene-rich regions) and LADs

(gene-poor regions) and were associated with increased gene activity, marked by higher transcriptional output. Moreover, these regions exhibited positive DNA supercoiling, which is linked to active chromatin. Second, the absence of TOP2 led to significant changes in the positioning of different chromatin compartments and their association with the nuclear lamina. Interestingly, the regions with increased interactions, as well as the gained and lost LADs, showed a preference for upregulated genes, indicating a potential regulatory role of TOP2 in gene expression. Lastly, we observed that TOP2 influences nucleosome positioning around CTCF sites, affecting the overall arrangement of chromatin. These changes in nucleosome positioning and increased interactions were mostly limited to a particular stage of the cell cycle, the G1 phase. In summary, our study demonstrates the essential role of TOP2 in preserving the integrity of human chromatin architecture, particularly during the G1 phase of the cell cycle. By understanding how TOP2 shapes our genetic blueprint, we gain valuable insights into the intricate mechanisms governing gene regulation.

Grzegorz Sumara

Dioscuri Centre for Metabolic Diseases, Nencki Institute of Experimental Biology, Polish Academy of Sciences | Warschau

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Research field: Our lab focuses on the elucidation of signalling pathways that play a role in metabolic diseases. Perturbations in signaling cascades regulating basic metabolic processes of adipose tissue, intestine and liver often result in metabolic diseases. Excessive absorption of lipids in intestines promotes adiposity. Elevated lipogenesis and lipolysis in combination with reduced energy dissipation are the hallmarks of obesity and type 2 diabetes (T2D). Increased lipogenesis also contributes to the development of liver steatosis. Moreover, metabolic perturbations resulting from obesity and diabetes contribute to the age-related muscle wasting, commonly referred as sarcopenia. In my research group we aim at understanding of the complex signaling network regulating the above-mentioned basic metabolic processes. For this purpose, we combine cell biology, biochemical and omics approaches with mouse genetics. Using high throughput siRNA-based screening we identified a number of novel kinases regulating lipolysis, including ERK3. Targeted mouse genetics approach let us to establish members of Protein kinase D family as central regulators of adipocytes, enterocytes and hepatocytes metabolism. We plan to further investigate the identified pathways and, in parallel, to utilize screening approaches to find other, noncanonical signaling modules (components of the ubiquitin system) regulating metabolism. By determining essential signaling networks in adipose tissue, intestine or muscle we aim to contribute to more targeted pharmacological strategies for treatment of metabolic (related) diseases such as obesity, T2D, atherosclerosis or sarcopenia.

Marcus Taylor

Max Planck Institute for Infection Biology | Berlin

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Research field: Cells use sophisticated networks of proteins to sense and process chemical information. The taylor lab investigates how these molecular networks self-organise to encode and decode information. By combining high resolution microscopy with synthetic and chemical biology approaches, we investigate this problem in the context of infection and immune cell activation. Our long-term vision is to be able to re-engineer cellular signalling systems to control cell behaviour and function.

Ronald Ulbricht

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Benjamin Vernot

Max Planck Institute for Evolutionary Anthropology | Leibzig

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Poster: Student-led investigation of environmental DNA analysis

Research field: We study human history, with a particular focus on ancient DNA extracted from sediments. Most ancient DNA is retrieved from bones or teeth - but many sites lack such skeletal elements. Furthermore, bones and teeth are deposited upon death, but an individual sheds DNA throughout their entire life, in principle leaving a trace of their presence where they lived and worked. In addition to human DNA, most sediment samples contain abundant DNA from flora and fauna, providing insight into the environment in which ancient people lived.

Wolfgang Wagermaier

Max Planck Institute of Colloids and Interfaces | Potsdam

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Research field: A central goal of my research is to characterize structure-function relations in biological and bio-inspired materials to elucidate biological and mechanical

functions as well as material design. One main approach in our research strategy are in-operando investigations, where we characterize material structures (e.g., in bone) and properties during formation or deformation due to external stimuli.

John Weir

Friedrich Miescher Laboratory of the Max Planck Society | Tübingen

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Poster: Modulation of DNA repair in meiosis by the Mer3 helicase

Research field: Meiotic recombination is at the center of both the beautiful diversity of eukaryotic life on earth, and key to our own genetic individuality. The molecular control mechanisms underpinning meiotic recombination are not well understood in detail. We use a combination of structural biology, biochemical reconstitutions and yeast genetics to gain further insights into meiosis. Meiotic recombination is initiated through programmed double-stranded DNA breaks. The number, timing and positioning of these breaks is tightly controlled at several levels. Furthermore, DNA repair pathways in meiosis are modified in order to create outcomes not normally found outside of the germline. Our research has been focused on the control of double-strand break formation, and on how the outcome of DNA damage is modified in meiosis.

Tracy Wietecha

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Justus Wilke

Max Planck Institute for Multidisciplinary Sciences | Göttingen

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Research field: I am fascinated by neuroimmunology and focus on how autoimmune and inflammatory processes contribute to neuropsychiatric phenotypes.

Anina Woischnig

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Yingke Wu

Max Planck Institute for Polymer Research | Mainz

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Poster: Detection of intracellular parameters in single living cell with nanodiamond quantum sensor

Research field: In living biological systems, various biological reactions are constantly proceeding, causing an inhomogeneous distribution of different species, temperatures, and forces at the nanoscale. Local and quantitative detection of these environmental parameters and molecules including transient reactive structures with limited lifetimes will advance our understanding of living systems. However, current methods for measuring certain quantities at the nanoscale are often limited to strict conditions such as low temperature or vacuum and are not suitable for use in living systems. In our group, we are aiming to use nanodiamond (ND) quantum sensing technology for in-situ probing and manipulating the intracellular parameters such as temperature, pH, and radical species in living systems to establish communications between NDs and cells, and solve current challenges in biology and medicine. In order to significantly improve sensing accuracy, we are currently exploring the “seeded growth” preparation method, small organic molecules such as adamantanes are used as precursors (or “seeds”) instead of small crystals and exposed to high-pressure and high-temperature (HPHT) reaction conditions. These organic precursor molecules could potentially enhance nucleation to form higher-quality NDs with distinct defects. Pre-organization of the defect atoms in the organic precursor molecules could provide new opportunities for the controlled growth of distinct color centers within the ND lattice. We aim to obtain high-quality NDs with a certain number of color centers in the defined location.

Sally Chengji Xing

Max Planck Innovation | Berlin

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Research field: Sally Chengji Xing is a residential predoctoral fellow MPIWG history of science in Berlin and incoming associate professor of US history at Nankai University. She is interested in thinking and writing US history from transnational and global perspectives. Her book manuscript in progress, “Pacific Crossings”: The China Foundation and a Negotiated Translation of American Science to China, 1913-1949″, examines how the American intellectuals in the first half of the twentieth century

influenced the establishment of modern Chinese scientific education, and were in turn, influenced by their encounters with China. Her multi-archival research has been funded by the Society for Historians of American Foreign Relations (SHAFR), the Tokyo Foundation for Policy Research, the Gilder Lehrman Institute of American History, Rockefeller Archive Center, the Consortium for History of Science, Technology and Medicine and numerous other graduate research fellowships at Columbia University. Her long-term research explores Sino-American intellectual history in transnational approaches, from early 20th century all the way to the late 1960s.

Lukas Zeininger

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Poster: Droplet Optics: From Responsive Emulsions to Pathogen Sensors

Research field: Autonomous regulation of chemical reactivity represents a fundamental ability of living organisms. In Nature, chemical information can be processed with high fidelity and highest substrate specificities are achieved as multiple individual or combinations of independent chemical equilibrium-driven transformations are translated into a specific response. This cross-check capability and self-regulation behavior forms the basis for the high complexity and specificity achieved within biological systems and is further fundamental for the complex emergent behavior observed in multibody systems, for instance their self-regulated ability to communicate, move, evolve, and self-organize into patterns or networks. In our group, we are interested in the bioinspired generation of artificial soft materials that exhibit chemo-intelligence in that they are capable to autonomously interact with their environment and operate in response to (bio)chemical cues. More specifically, we seek to dissect and emulate individual autonomous capabilities of biological colloids by using our own, synthetically minimal, and structurally highly defined complex soft colloids, based on both active complex emulsions and responsive polymers. It is our mission to explore the basic mechanisms that govern interactions between natural and artificial soft materials and to gain a basic physicochemical understanding of the thermodynamics and dynamics of these new types of active soft matter. Our findings help to unravel fundamental mechanisms of inter-colloidal communication in Nature and we use our discoveries to create new, transformative application concepts, e.g. in soft robotics and biomimicry, solar energy conversion and catalysis, dynamic optical coatings, environmental remediation and monitoring, as well as in chemo- and biosensing platforms.

Katja Zieske

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Poster: Sustainability lessons from Andean herders and farmers: 10,000 years of bio-engineering

Research field: My research focuses on the pre-Columbian agrarian landscapes in two diverse and extreme regions: the high Andean plateaus and the Eastern rainforests of Northwestern Argentina. I combine multiple lines of evidence to understand past land and water management (archaeobotany, GIS, satellite imaging, soil analyses) and contribute with this data to assess sustainable practices in the face of climate change. An important part of the research is science outreach and collaboration with local communities (both indigenous and other local communities). Currently, in this region, the radical increase in lithium mining projects is causing several social and environmental disruptions, our work aims to include these wider processes that frame the archaeological research to contribute to the local needs (e.g., cultural heritage projects).

Miguel Zumalacarregui

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Poster: Probing dark matter with lensed gravitational waves

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General Information

Conference Venue

The MPG LeadNet Symposium 2023 takes place at the Harnack House of the MPG.

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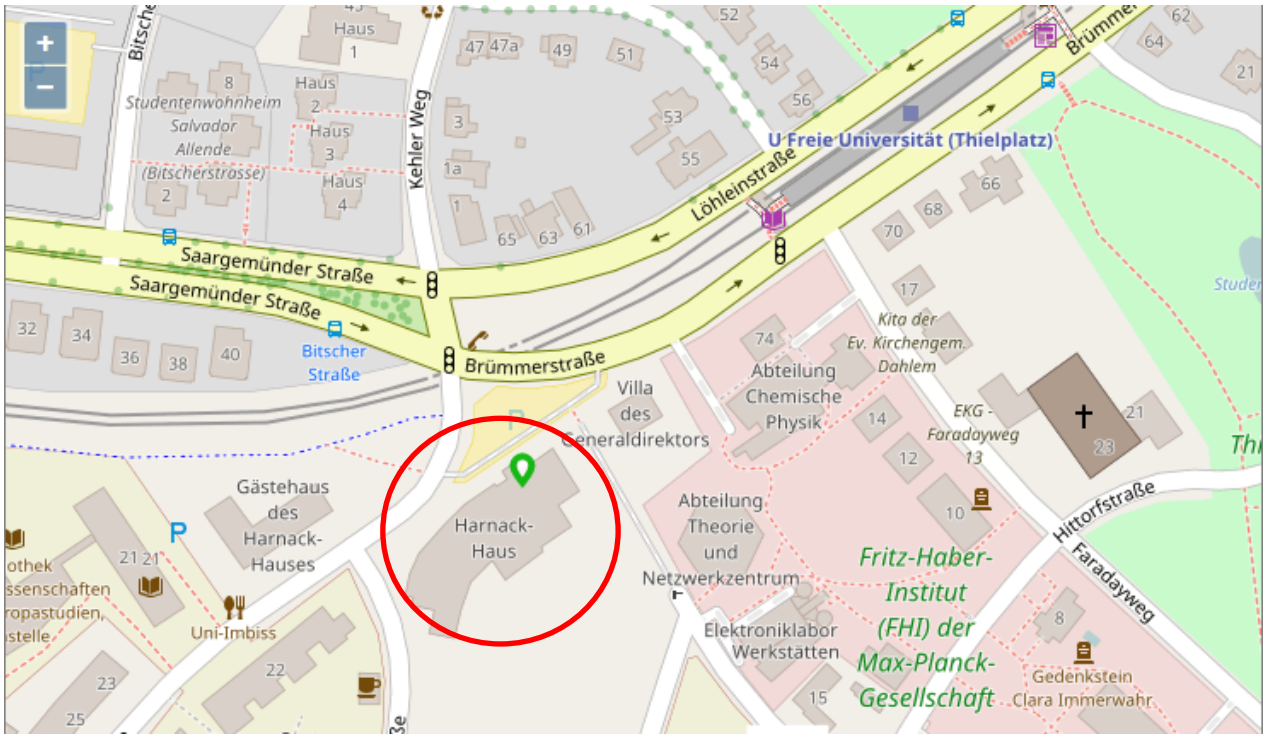

Wi-Fi Internet at the Harnack House

Please use the Wi-Fi network in the Harnack House and use the following information:

Username: HH-GUEST
Password: Oxygen.08

Websites and telephone numbers

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Ihnestr. 16-20
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Phone: + 49 30 8413-3800
Email: info@harnackhaus-berlin.mpg.de

Public transport website: www.bvg.de
Airport website (Schönefeld): www.berlin-airport.de

Group photo and pictures during the conference

We will take a group photo after the presentation of President Patrick Cramer!

During the MPG LeadNet Symposium 2023 photographs will be taken of speakers and participants. If you do not agree, please inform the organizers.

MPG LeadNet Steering Committee

Members of the Steering Committee

Gabriele Bixel

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PD Dr. Gabriele Bixel is Senior Staff Scientist and Project Group Leader at the Max-Planck-Institute for Molecular Biomedicine. She studied biochemistry at the University of Tübingen, where she also received her PhD. In 2007, she became a Member of the Medical Faculty (PD) at the University of Münster. Over the past twenty years her research focus has been and continues to be vascular biology. Her major research interests are the bone and bone marrow microenvironment, vascular regeneration after bone injury, and blood flow dynamics in the healthy and regenerating bone microvasculature. Gabriele Bixel has served various functions, including Member of the MPG LeadNet Steering Group, Spokesperson of the Scientific Staff Members of the BMS/MPG, Member of the BMS Perspective Committee and Senator of the MPG.

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Katja Krause, professor of the history of science at the Technical University Berlin, leads the Max Planck Research Group “Experience in the Premodern Sciences of Soul and Body” at the Max Planck Institute for the History of Science and is Head of the Elkana-Forum. Her research rethinks the relationship between experience and

science in the premodern sciences of living beings. She is interested in the continuities and discontinuities of scientific practices and ideals from premodernity to the present. Among her recent publications are *Aquinas on Seeing God* (Marquette University Press, 2020) and the edited collection *Premodern Experience of the Natural World in Translation* (Routledge, 2023). After earning her PhD in philosophy at King's College London, Katja Krause held postdoctoral fellowships in the history of science at the MPIWG and Harvard University and an assistant professorship in medieval thought at Durham University.

FRANK OHME

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Frank Ohme was born in 1983 and received his Diplom in Physics from the University of Jena in 2008. His early research on numerical simulations of black holes led him to the MPI for Gravitational Physics in Potsdam, where he graduated in 2012. After his PhD, Frank moved to Cardiff University (UK) and became heavily involved in analyzing the data of gravitational-wave detectors, most famously of the LIGO instruments. He was part of the LIGO and Virgo team that won the Special Breakthrough Prize in Fundamental Physics for the first measurement of gravitational waves in 2015. Since 2017, Frank has been leading an independent research group at the MPI for Gravitational Physics in Hannover, focusing on theoretical models of binary mergers and their observation through gravitational waves. When his mind is not in the sky, Frank is also a successful water polo referee at an international level, having officiated at the Tokyo2020 Olympic Games.

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From 2007 to 2012, Johannes Rebelein pursued his studies in Biotechnology at TU Braunschweig. He then transitioned to the University of California in Irvine (UCI, USA) to research the metalloenzyme nitrogenase. In 2016 he received his PhD degree in Biological Sciences from UCI. As an EMBO Long-Term Fellow Johannes constructed

artificial metalloenzymes at the University of Basel (Switzerland) from 2017 to 2020. Since 2020, he is leading his independent Emmy Noether research group for Microbial Metalloenzymes at the Max Planck Institute for Terrestrial Microbiology in Marburg. Johannes characterizes and engineers metalloenzymes to elucidate the underlying principals and mechanisms of metalloenzyme catalysis. The aim of the Microbial Metalloenzymes group is to engineer and design novel metalloenzymes for CO_2 reduction for biofuel and bioplastics formation.

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Acknowledgments

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Notes

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