



Fellows

2022

J a h r e
25



Hanse-Wissenschaftskolleg
Institute for Advanced Study

Fellows

2022

25
J a h r e



Hanse-Wissenschaftskolleg
Institute for Advanced Study

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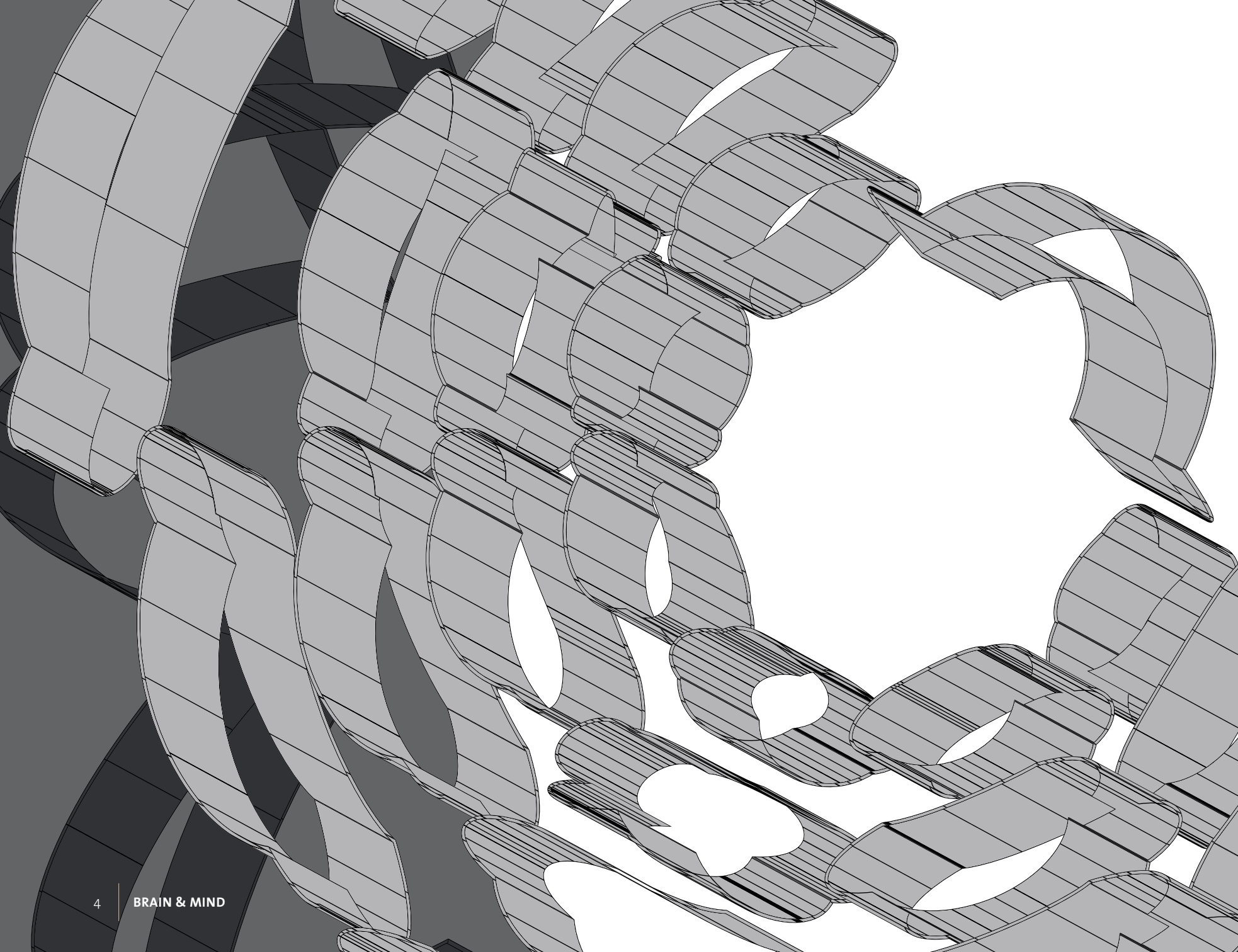
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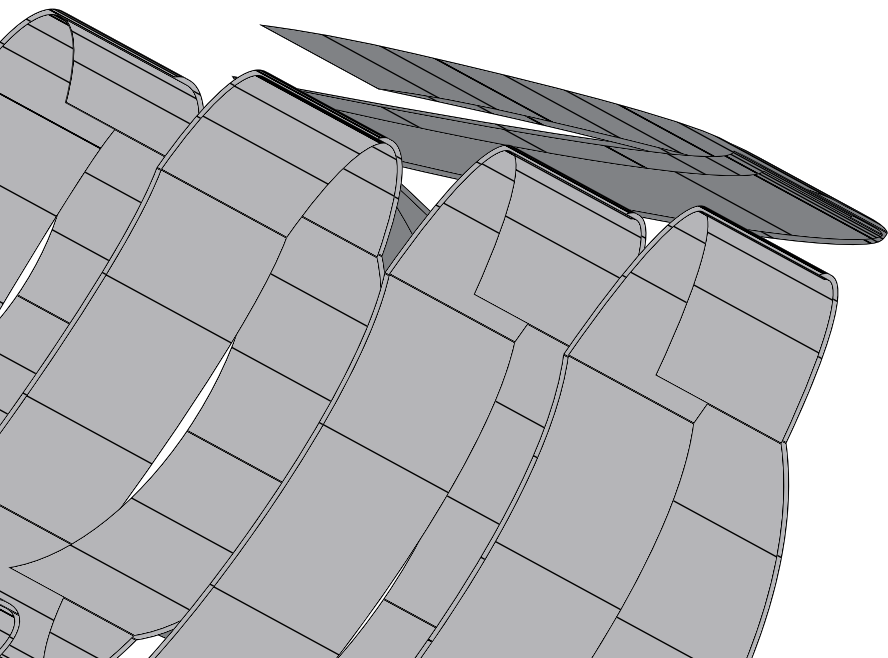
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Brain & Mind

2022

● **Kevin Barz**

Fellow

Fellowship

February–May 2022

Home institution at time of application

Mainfranken Theater

Würzburg

Germany

Cooperation partner

Jonas Hennicke

Oldenburgisches Staatstheater



Technical Ballroom—The Theater of the Digital Natives

The aim of the cross-disciplinary theatre project *Technical Ballroom—The Theater of the Digital Natives* at the Oldenburgisches Staatstheater is to further develop the experience with digitality throughout the Corona pandemic to create a multimedia stage and artistic program.

Rather than dispense with the analog, that is, the space shared between audience and performer, and transferring it to the digital, my research focuses on the translation of the digital into the analog: How can digital media become a new means of stage technology? What possibilities do digital media create in terms of aesthetics and content? How do new media change the relationship between spectators and performers? Technical Ballroom should

become a social medium for confronting the means of digitalization while preserving the theatrical convention of collective reception as a social function.

To be able to deal with topics such as artificial intelligence, gamification, virtual and augmented reality, algorithms, social media, data sets, or robotics in a fully participatory way, the basis is the Technical Ballroom itself: I am trying to develop a technically highly equipped stage as a framework in the Exerzierhalle of the Staatstheater. My three-month fellowship will be devoted to developing this as well as curating an artistic program and creating my own performances.

● **Prof. Dr. Gerhard Fischer**

Fellow

Fellowship

April–June 2022

Home institution at time of application

University of Colorado, Boulder
Department of Computer Science
Boulder, CO
USA

Cooperation partners

Prof. Dr. Susanne Boll
Universität Oldenburg

Prof. Dr. Karsten Wolf
Universität Bremen



Identifying and Exploring Design Trade-Offs for Quality of Life in Human-Centered Design

Human-centered design should not be grounded only in an understanding of new media and technologies in terms of productivity, efficiency, reliability, and economics; it should also explore innovative socio-technical environments that contribute to human creativity, gratification, enjoyment, and quality of life. It is a complex issue with no correct solution or right answers.

Design trade-offs are the most basic characteristics of design. They are universal and they make us aware that there are no decontextualized “sweet spots.” Unlike design prescriptions, trade-offs broaden design spaces by 1) avoiding simplistic solutions to complex problems and 2) revealing interesting

new approaches that synthesize the strengths and minimize the weaknesses of the binary choice that trade-offs present in the first place.

During my fellowship at the HWK, I aim to work closely with scientists in the region to further explore initial theoretical foundations and analyze system developments for design trade-offs in specific problem domains, including: 1) artificial intelligence (replacing human beings) versus intelligence augmentation (empowering human beings); 2) multi-dimensional aspects of learning; and 3) self-driving cars versus driver-assistance systems. I will focus on writing a book integrating and documenting these developments.

● Dr. Daniel Kristanto

Joint Research Fellow
co-funded by Medizinische Fakultät Oldenburg

Fellowship

July 2022–January 2023

Home institution at time of application

Hong Kong Baptist University
Institute of Computational and
Theoretical Studies
Hong Kong

Cooperation partners

Prof. Dr. Andrea Hildebrandt
Universität Oldenburg

Univ.-Prof. Dr. Dr. René Hurlemann
Karl-Jaspers-Klinik
Bad-Zwischenahn



Mining the Adolescent Brain to Create Predictive Profiles of Substance Use Vulnerability

Substance use is known for its negative effects on individuals' cognitive development and mental health and it may even lead to premature death. Thus, the development of effective, early, and accurate preventive interventions is of high relevance to society.

This project aims to contribute to addiction disorder prevention by identifying vulnerability on the basis of neural properties before behavioral manifestations become evident. We thus aim to develop a predictive model that builds upon state-of-the-art data analysis techniques of multimodal neuroimaging data.

The anticipated results have the potential to significantly contribute to the development of purposeful, individualized healthcare interventions for addiction disorders. Furthermore, the findings could inspire future basic research on the development of brain properties during adolescence that lead to substance use, as well as the cognitive processes associated with the identified neural vulnerability profiles toward addiction disorders.

● Dr. Marta Majewska

Junior Fellow

Fellowship

January–October 2022

Home institution at time of application

Polish Academy of Sciences
Institute of Physical Chemistry
Poland

Cooperation partners

Prof. Dr. Henrik Mouritsen
Prof. Dr. Karl-Wilhelm Koch
Prof. Dr. Ilia A. Solov'yov
PD Dr. habil. Izabella Brand
Universität Oldenburg



Does the Putative Bird Magnetoreceptor Protein Cryptochrome 4 Anchor to Cell Lipid Membranes?

Magnetoreception is an organism's ability to detect a magnetic field and use this sense for navigation. The protein Cryptochrome4 (Cry4) is hypothesized to be the light-dependent magnetic sensor in the eye of night-migratory songbirds. Upon illumination, Cry4 becomes magnetic-sensitive and can interact with Earth's magnetic field. For this inner compass to be effective, Cry4 must align inside the cell by anchoring to a reference structure.

The hypothesized reference molecules are lipids or proteins in a cell membrane. Therefore, understanding the interactions between Cry4 and membrane lipids and proteins is crucial to understanding magnetic compass detection pathways in migratory birds. Vibration spectroscopy gives detailed information on lipid-protein interactions directly in a membrane of interest and will be applied in this study.

Because there is almost no access to animal-derived samples of the bird's retina, biologically relevant model cell membranes with carefully selected lipid composition will be created. To the best of our knowledge, no one has ever studied lipid-Cry or lipid-protein-Cry interactions before. Therefore, the proposed research has the potential to provide the first experimental proof of Cry4 interactions with membrane lipids or proteins and could provide very important data on how the cryptochrome-mediated mechanism of avian magnetoreception works.

● Cand. Dr. João Manuel Rodrigues

Junior Fellow

Fellowship

June–September 2022

Home institution at time of application

Libphys-UNL at Nova University of Lisbon
Biosignals Lab/Faculty of Science
and Technologies
Lisbon
Portugal

Cooperation partners

Dr. Felix Putze
Prof. Dr.-Ing. Tanja Schultz
Universität Bremen



LabLinking Analytics: Processing and Summarizing Joint Remote-Experiments Data in Everyday Activity Scenarios

The Cognitive Systems Lab introduced the LabLinking (LL) system, which envisions experiments without borders, that is, experiments that are not limited by a physical space, a specific set of instruments, sensors, or devices available in a lab, thus promoting cooperation and shared expertise in conducting remote joint experiments. This project proposes several contributions to improve the current system for experiments that require motion analysis, a topic that has applicability to many domains, ranging from the arts (in dance or martial arts) to industry (worker's motion), or even to everyday activities. Considering the amount of data acquired, we propose contributions to the analytical layer of the system, providing real-time

processing of the records and displaying it in a summarized and meaningful way, more interpretable to any user, even those unfamiliar with signal analysis. We also propose to explore a specific use-case with the LL system. This will provide relevant quantitative measures of motion synchrony between two subjects performing specific gestures and remotely connected to LL, with potential for use as a training system for dance movements or work motions. Finally, we expect to have several outcomes, namely public datasets, joint publications in the signal processing domain and data visualization, as well as new processing layers to the LL and a new mode of experiment.

● Prof. Dr. Silke Schicktanz

Fellow

Fellowship

February–September 2022

Home institution at time of application

Universitätsmedizin Göttingen
Institut für Ethik und Geschichte der Medizin
Göttingen
Germany

Cooperation partners

Prof. Dr. Mark Schweda
Prof. Dr. Andreas Hein
Universität Oldenburg



Human-Machine Interaction in Dementia Care: Implementing Empowerment and Developing 'Co'-Intelligent Cooperation

In western societies, the number of people with dementia is increasing. Engineers are attempting to develop new technologies to help care for people with dementia. Such technology can make everyday activities such as cooking, personal hygiene, or walking easier. This would allow people with dementia to keep living in their own homes and live independently. For those living in nursing homes, such technology can help professional caregivers in their daily tasks or help predict potential problems. In my project, I want to analyze the ethical aspects of such technologies and how they empower patients and caregivers, i.e., how they give them a greater sense of control over their own lives and jobs. Empowerment

stands for a concept of strengthening the interests and needs of a group of people that has been powerless or dependent. My ethical analysis will be complemented by interview data. We have interviewed lay people and experts about their moral attitudes towards and experiences with such systems. Finally, I want to reflect more deeply on how cooperation between humans and such technology can be enhanced by better understanding the cognitive competencies and limitations of each. My research is based on close collaboration with researchers from medical ethics and engineering. Together, we will organize seminars and a workshop and jointly analyze data already collected.

● **Prof. Dr. Sabine Sielke**

Fellow

Fellowship

September–October 2022

Home institution at time of application

Universität Bonn
Institut für Anglistik, Amerikanistik
und Keltologie (IAAK)
North American Studies Program
Bonn
Germany

Cooperation partner

Prof. Dr. phil. Peter Schneck
Universität Osnabrück



Memory, Mediation, Seriality: Recognizing Literary and Cultural Studies, Remembering the Subject

Without memory, human life would be devoid of meaning. Consequently, memory became a crucial concept in the humanities as well as in the social and natural sciences. At the same time, literary and cultural studies approach memory with entirely different methods than the cognitive sciences. This raises the question as to what cognitive science can do for literary and cultural studies and vice-versa. Can, for instance, neurophysiology inform how we remember a novel or film and in what ways text- and image-recall differ?

My book project explores such questions by focusing on three well-known US-American authors who themselves interrogated how the brain and the mind work: Emily Dickinson (1830–86), Henry James (1843–1916), and Gertrude Stein (1874–1946). My interest is in both

their literary interventions and in how other media have serially memorialized these writers, e.g., in advertisements echoing Stein's famous lines, in cinematic adaptations of James's fiction, and in art, cartoons, and video games featuring Dickinson's poems.

My aim is to map a common ground between cultural studies and the cognitive sciences and to mark its limits. As I interrogate how memory in cognition and cultural practice involves a kind of updating or seriality and how literary and cultural studies can inform cognition research—which cannot measure the effect of distinct media formats on memory processes—our sense of what it means to be human also transforms.

● Prof. Dr. Myat Su Yin

Junior Fellow

Fellowship

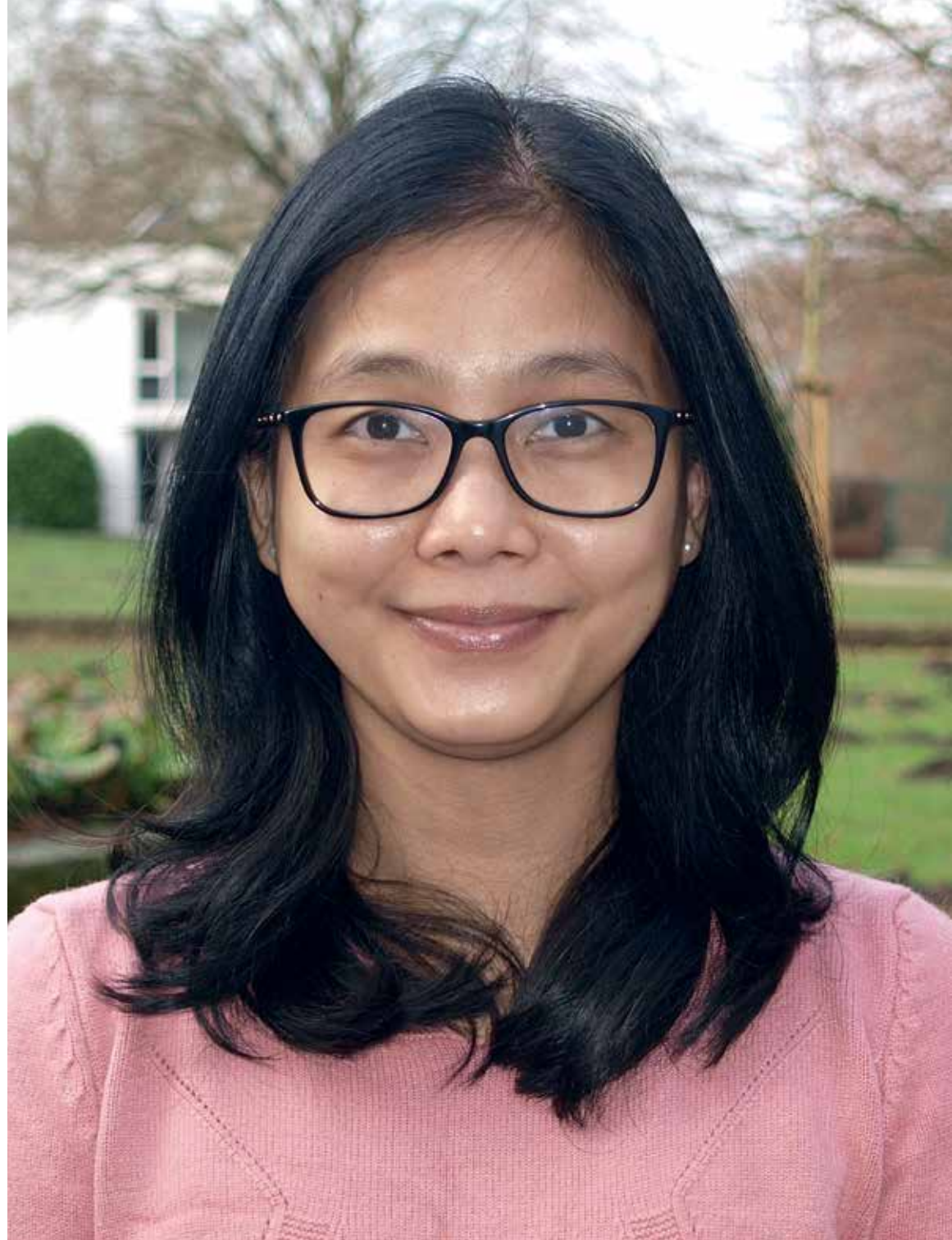
December 2021–April 2022

Location

Mahidol University
Faculty of Information and
Communication Technology
Bangkok
Thailand

Cooperation partners

Prof. Dr. Michael Beetz
Prof. Dr. Gabriel Zachmann
Universität Bremen



Representation of and Reasoning about Surgical Procedures for Intelligent Virtual Training Environments

To devise effective tutoring strategies, it is essential in surgical training systems to understand the sources of errors in surgical procedures. Errors can arise for a variety of reasons, including lack of technical ability, lack of knowledge of anatomy, and failure to understand the task. Identifying the cause of errors requires knowledge of what actions were taken, how they were carried out, and what effects they had. This requires the simultaneous representation of low-level motion data and high-level symbolic information, as well as the relation between them. Once the performance errors have been identified, generation of formative feedback also requires representation of information at these two levels.

Communication with the student should occur using the language that surgeons commonly use in discussing surgery and to which the students are accustomed.

My work focuses on representing surgical procedures at multiple levels to capture the symbolic and kinematic description of the procedure and the relation between them with the aim of effectively analyzing and discussing procedures and to communicate about them.

● **Prof. Dr. Bin Zhou**

Fellow

Fellowship

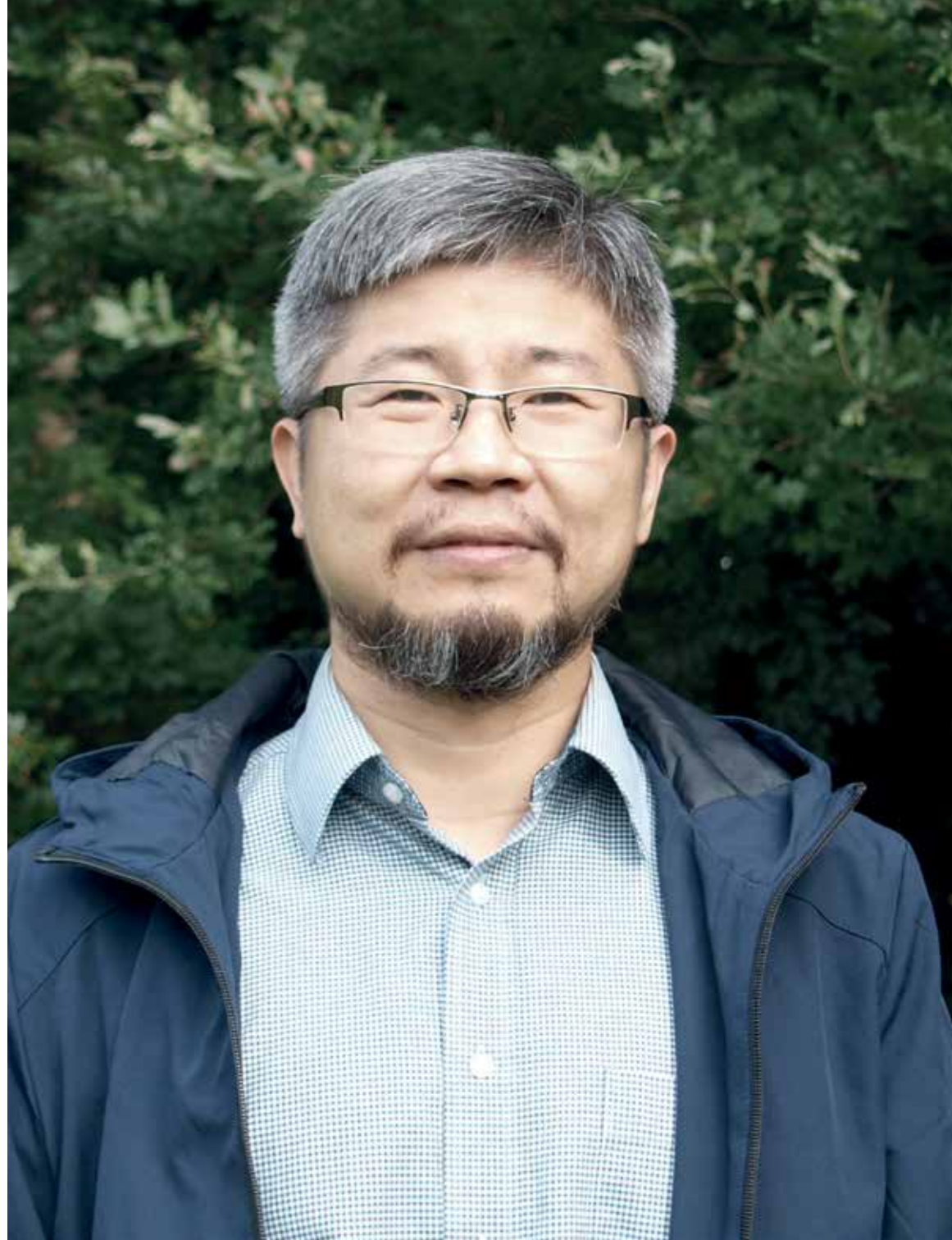
September 2021–July 2022

Home institution at time of application

Chinese Academy of Sciences

Institute of Psychology

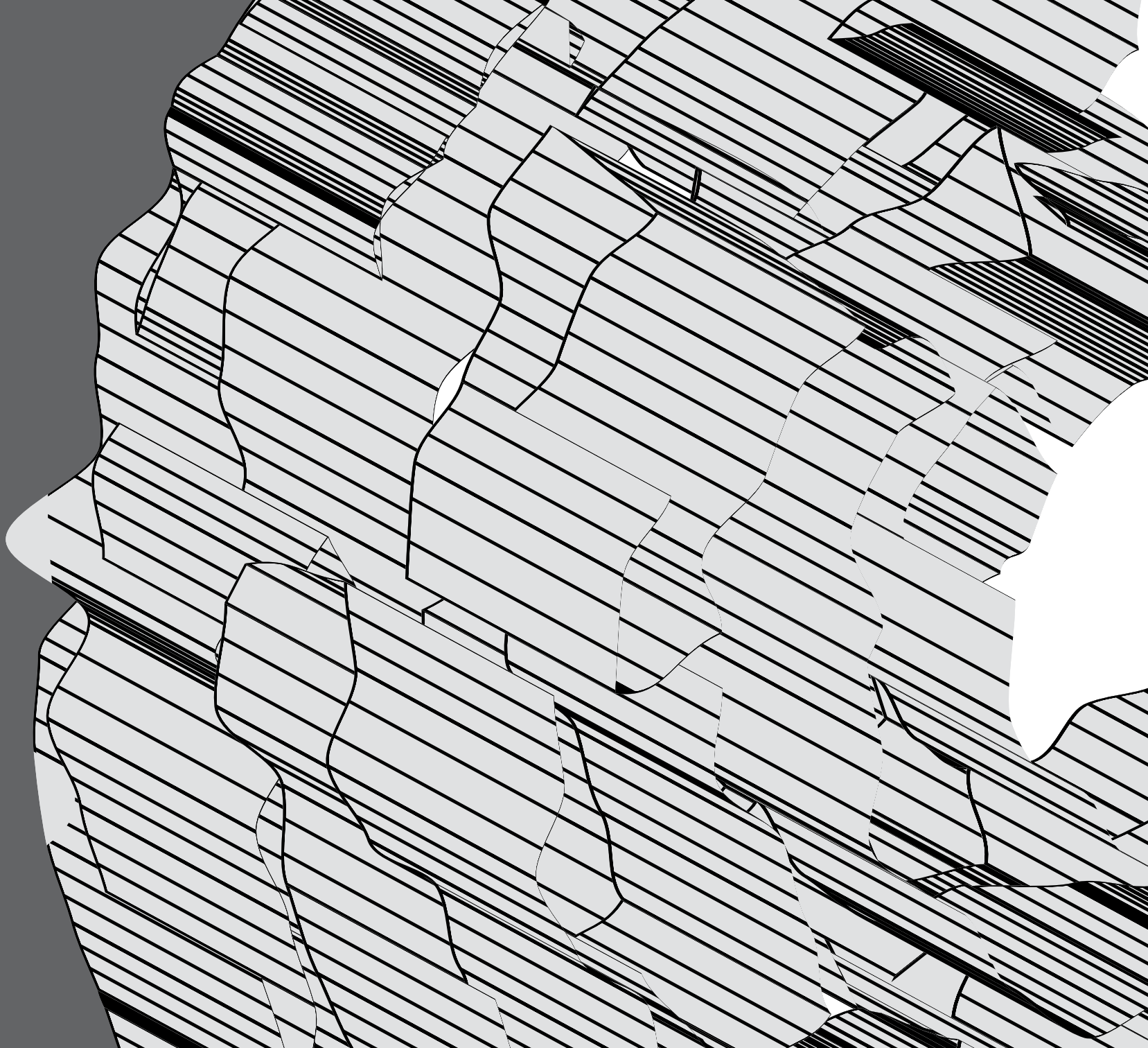
People's Republic of China

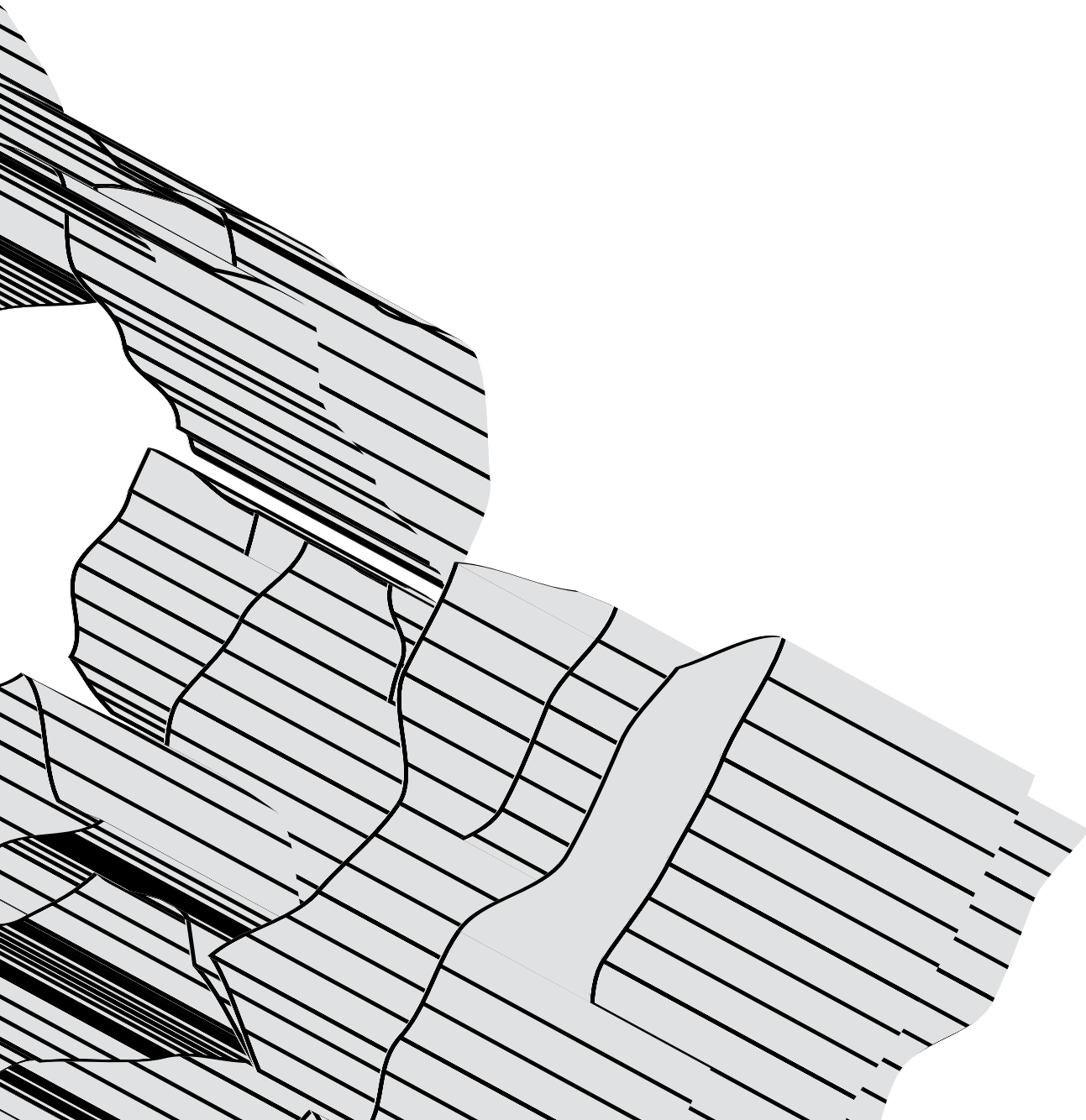


Object Processing and Its Role in Time Perception

Perceiving the passage of time is an intrinsic aspect of our daily experience. Such temporal experience is often attached to the perception of objects and events. The close relationship between object representation and subjective time is clearly reflected in phenomena where perceived properties of an object modulate how long the subjective duration of the object is. This suggests that a comprehensive understanding of how subjective time, especially in the sub-second-to-second range, is generated by our mind and requires an analysis of object processing and its link with time perception.

The proposed project treats objects represented in the brain as the basis for clarifying why and how objects processed in our mind are important for duration perception. Objects are often embedded in situations alongside other objects in spatiotemporal context; their representation and perceptual interactions with other objects are also dependent on the time window in which they are processed. Thus, the project also critically examines the influence of perceptual organization and processing time windows on subjective duration of single objects. By adopting an object-based perspective, I aim to go beyond previous frameworks emphasizing either perceptual grouping or perceptual strength, and to provide a new way of looking at duration perception in a broader context.





Earth 2022

● Prof. Dr. Raeid M. M. Abed

Fellow

Fellowship

July–September 2022

Home institution at time of application

Sultan Qaboos University
Biology Department
College of Science
Muscat
Sultanate of Oman

Cooperation partners

Dr. Dirk de Beer
Prof. Dr. Rudolf Amann
Max-Planck-Institut für Marine Mikrobiologie
Bremen

Prof. Dr. Meinhard Simon
Institut für Chemie und Biologie des Meeres (ICBM)
Universität Oldenburg

Asst. Prof. Dr. Dagmar Wöbken
Universität Wien



Metabolic Activity of Microorganisms in Microbial Mats Thriving at Saturation-Level Salinity and Their Potential Use in Biofuel Production

Man can tolerate only a limited range of environmental conditions, whereas microbes thrive under the most intense circumstances. We now know that where there is liquid water there is life. So what we previously considered an inhospitable environment is now seen as yet another habitat for extremophilic microbes.

In this project, I will study microbial mats from Oman subject to multiple extreme environmental conditions. These mats are found under a layer of three–five centimeters of salt and exposed to temperatures that can reach up to 60° Celsius, and very high UV and light intensities. I will investigate the types and activity of microbes in these mats—particularly the

archaeal community. I will also explore the potential use of halophilic and halotolerant archaea and microalgae in these mats in the production of biogas and biodiesel respectively. Furthermore, I will use a suite of molecular and geochemical techniques to study the adaptation and tolerance of these microbes to salt saturation and during tidal events.

The project will reveal which microbial processes are susceptible to very high salt stress and which ones remain viable to maintain the functioning and survival of the whole ecosystem. Such data are important for greater understanding of Earth's past and future, and for astrobiologists in their search for life on other planets.

● **Asst. Prof. Dr. Marshall Bowles**

Fellow

Fellowship

October–November 2022

Home institution at time of application

Louisiana Universities Marine
Consortium (LUMCON)
Chauvin, LA
USA

Cooperation partner

Prof. Dr. Kai-Uwe Hinrichs
MARUM – Zentrum für Marine
Umweltwissenschaften
Universität Bremen



A Highly Resolved Spatial Analysis of the Biogeochemistry of a Common Salt Marsh Grass Rhizosphere

Coastal areas are very important globally for storing carbon, but are also very susceptible to environmental change (e.g., sea-level rise). We are still learning a great deal about natural coastal areas that are often dominated by the presence of marsh grasses. In the sediment where marsh grass grows, a diverse group of microbes has been identified; we have observed them respiring carbon dioxide and methane, both important greenhouse gases. However, important features of how marsh grasses or their roots and microbes interact are not yet understood. A complication to progress in understanding how roots and microbes interact is their size, with plant roots in the millimeter scale and microbes in the micrometer scale. Any technique used to describe the interaction between roots and microbes must be able to work over very small spatial scales.

A newly developed technique called Mass Spectrometry Imaging allows microbes to be identified in two-dimensional space so we can see how groups of microbes interact with roots. My project applies this technique using natural samples and, through experiments, simulates the effects of global climate change, i.e., increasing salt concentrations related to sea-level rise. The goal is to determine how greenhouse gas emissions and plant microbe interactions are influenced by high-resolution, two-dimensional analysis.

The HWK fellowship and unique expertise at MARUM enable this work; it is one of the few places where imaging of this type may be done.

● Prof. Dr. Peter D. Clift

Fellow

Fellowship

July–October 2022

Home institution at time of application

Louisiana State University
Department of Geology and Geophysics
Baton Rouge, LA
USA

Cooperation partners

Prof. Dr. Katharina Pahnke-May
Institut für Chemie und Biologie
des Meeres (ICBM)
Universität Oldenburg
PD Dr. Mahyar Mohtadi
MARUM – Zentrum für Marine
Umweltwissenschaften
Universität Bremen



Temporal Evolution of the Asian-Australian Monsoon and its Impact on Global Climate

Collisions between continental plates cause mountains to be uplifted which then affect regional climate by diverting and reshaping atmospheric currents. The collision between India and Asia starting 55 million years ago has formed the largest mountains on Earth and strongly affected the climate. Sediment eroded from these peaks by monsoon rains breaks down in the hot, wet conditions and removes CO₂, a greenhouse gas from the atmosphere, thereby cooling Earth over millions of years. Recent work, however, suggests that parts of Southwest Asia and southern China may not be responsible for cooling for the last 16 million years, but then why is Earth cooling? Other regions, like the Bay of Bengal, the Sea of Japan, and Northwest Australia, have not been as

closely examined, although they have been sampled by scientific drilling. In this fellowship I will compile existing data from across the Asia-Pacific region to see how they compare and test if other regions, especially New Guinea, where mountains have formed more recently, are critical in driving climate change. Where needed, new geochemical data will be collected. The work will be used to plan future collaborative expeditions by US, German, and Asian scientists. Understanding how the climate in this densely settled and economically significant region is affected by long-term changes improves our overall ability to predict future climate change driven by other factors such as solar heating or greenhouse gas concentrations.

● Dr. Leonie Tabea Esters

Junior Fellow

Fellowship

November 2021–February 2022

Home institution at time of application

Uppsala Universitet
Institutionen för geovetenskaper
Uppsala
Sweden

Cooperation partner

Dr. Mariana Ribas Ribas
Institut für Chemie und Biologie
des Meeres (ICBM)
Universität Oldenburg



Oceanic Turbulence in Coastal Regions— Driver for Air-Sea Gas Exchange

The rapidly changing climate is a significant threat to our society. Societies rely on accurate climate predictions. Oceans are particularly important in this regard. Covering over 70 % of Earth's surface, oceans form one of the largest sinks for atmospheric greenhouse gases. Thus, adequate descriptions of how the oceans absorb or release greenhouse gases are essential for predicting how much of the greenhouse gases remain in the atmosphere.

Current descriptions of the exchange processes diverge greatly in their predictive value. This divergence is particularly distinctive in coastal areas. Coastal seas differ from open-ocean dynamics and make up 10.5 % of the global ocean area. Most of these

descriptions assume that the wind alone is responsible for the volume of greenhouse gases exchanged between the atmosphere and the ocean. When the wind is calmer, less gas is exchanged and when the wind is stronger, more gas is exchanged. However, we know that the actual processes are far more complex. The main driver of the exchange process is the intensity of turbulence in the uppermost meters of the ocean.

In my project I aim to reduce the uncertainties in the air-sea gas exchange descriptions in coastal areas and to understand the specific processes that control exchange. I will measure the gas flux and oceanic turbulence at two coastal sites in the Baltic and North Seas.

● **Prof. Dr. Juan Manuel
García-Ruiz**

Fellow

Fellowship

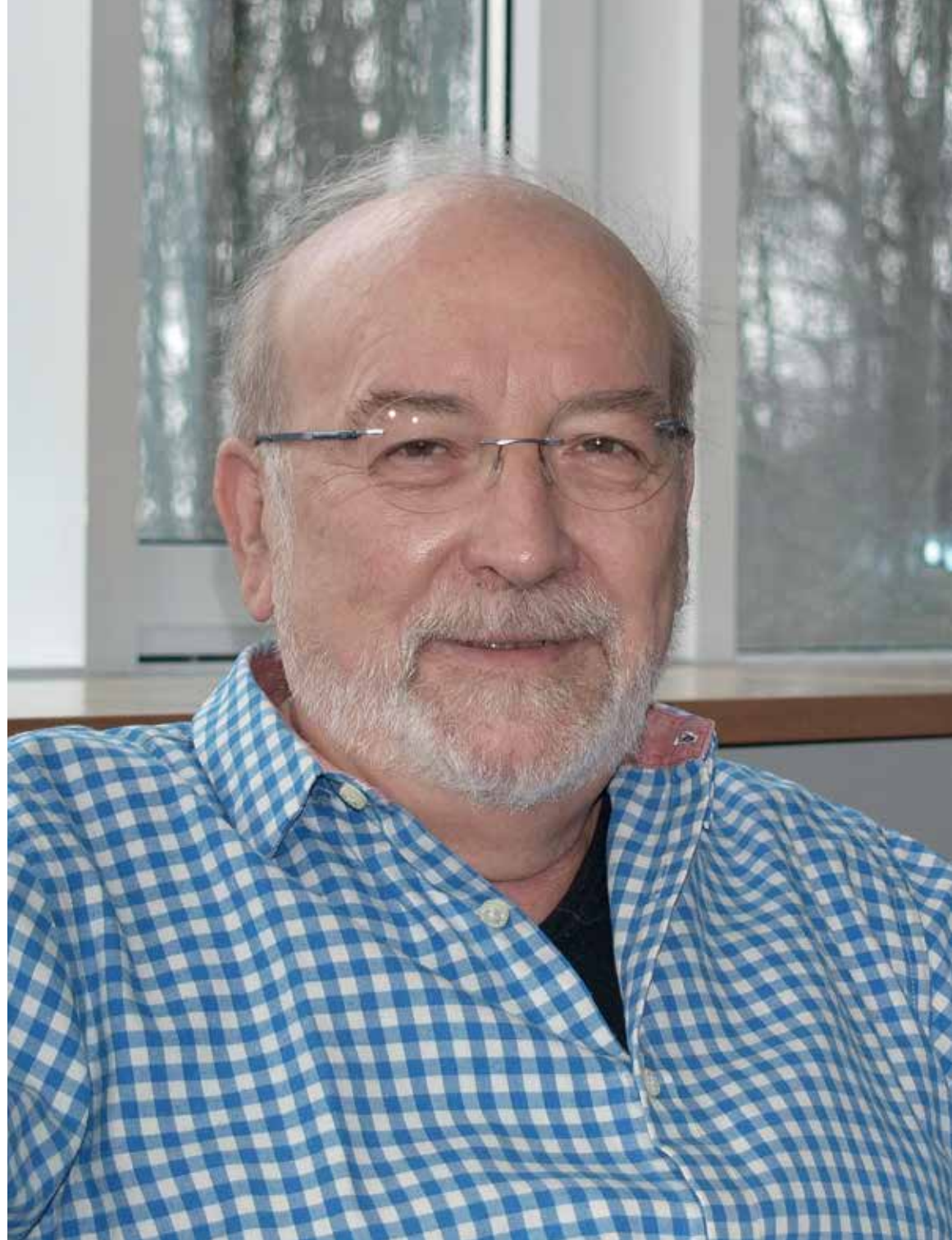
January–July 2022

Home institution at time of application

Universidad de Granada
Instituto Andaluz de Ciencias
de la Tierra
Armillá
Spain

Cooperation partner

Prof. Dr. Wolfgang Bach
Fachbereich Geowissenschaften
Universität Bremen



Biomorphs in Science and Art

The belief in a clear boundary in symmetry, which divides the realm of biology and sensuality from the realm of minerals and cold rationality, is deeply rooted in our minds. This belief has important implications in science, for instance in efforts to detect primitive life on Earth, Mars, and elsewhere, but it has also permeated and fragmented the arts, dividing them into two forms, one of perfect beauty and one of moral symbols. Italo Calvino has described the artists, respectively, as “artists of the crystals” and “artists of the flame.” Then there is the divide between abstraction and empathy pointed out earlier by Wilhelm Worringer. The discovery of biomorphs and other purely self-organized mineral structures that form in the absence of life has shown that this boundary is not as rigid as previously thought.

I plan to explore the universe of biomorphs, to 1) understand the physics and chemistry behind the formation of these fascinating structures; 2) test the geochemical plausibility of biomorph formation under the reducing atmosphere of the early Earth; 3) reveal the limits of complexity reachable by mineral self-organization; and 4) study how scientific ideas permeate art and mind, and how knowledge of the lack of a scientific basis for the perceived boundary of symmetries could affect the arts.

● Dr. ir. Veerle Ann Ida Huvenne

Fellow

Fellowship

October 2021–February 2022

November 2022–March 2023

Home institution at time of application

National Oceanography Centre

Marine Geoscience

Southampton

United Kingdom

Cooperation partners

Prof. Dr. Gerhard Bohrmann

Prof. Dr. Dierk Hebbeln

MARUM – Zentrum für Marine

Umweltwissenschaften

Universität Bremen



Multi-Scale Habitat Mapping of Deep-Sea Environments Based on Marine Robotic Survey Data

The deep ocean is the last frontier on the planet, but is increasingly impacted by human activities. To support its effective management, there is an urgent need for a better understanding of its spatial patterns in biodiversity. While it is impossible to sample every part of the ocean, habitat mapping (a series of techniques to map the spatial distribution of environmental conditions) can provide crucial information and allows us to predict species occurrences based on environmental information.

The aim of my project is to map the habitats, quantify the spatial environmental variability, and investigate its influence on the distribution of specific species in two complex deep-sea environments: a region of cold-water coral mounds, and a hydrothermal vent field.

Because of their distinct 3D morphology, complex deep-sea environments have a high biodiversity, making them priority areas for conservation. However, they are particularly challenging to study. Thanks to the latest marine robots, they can now be investigated in detail.

During my project, habitat mapping will be adapted to the particular scales of the two study areas, incorporating fine-scale information collected with marine robots. Predictive maps of cold-water coral species will result in a better understanding of their environmental requirements, while habitat maps of the hydrothermal vent field will show the relation between species, the rapidly changing terrain characteristics, and geochemical gradients.

● Prof. Dr. Manfred Lenzen

Fellow

Fellowship

June–November 2022

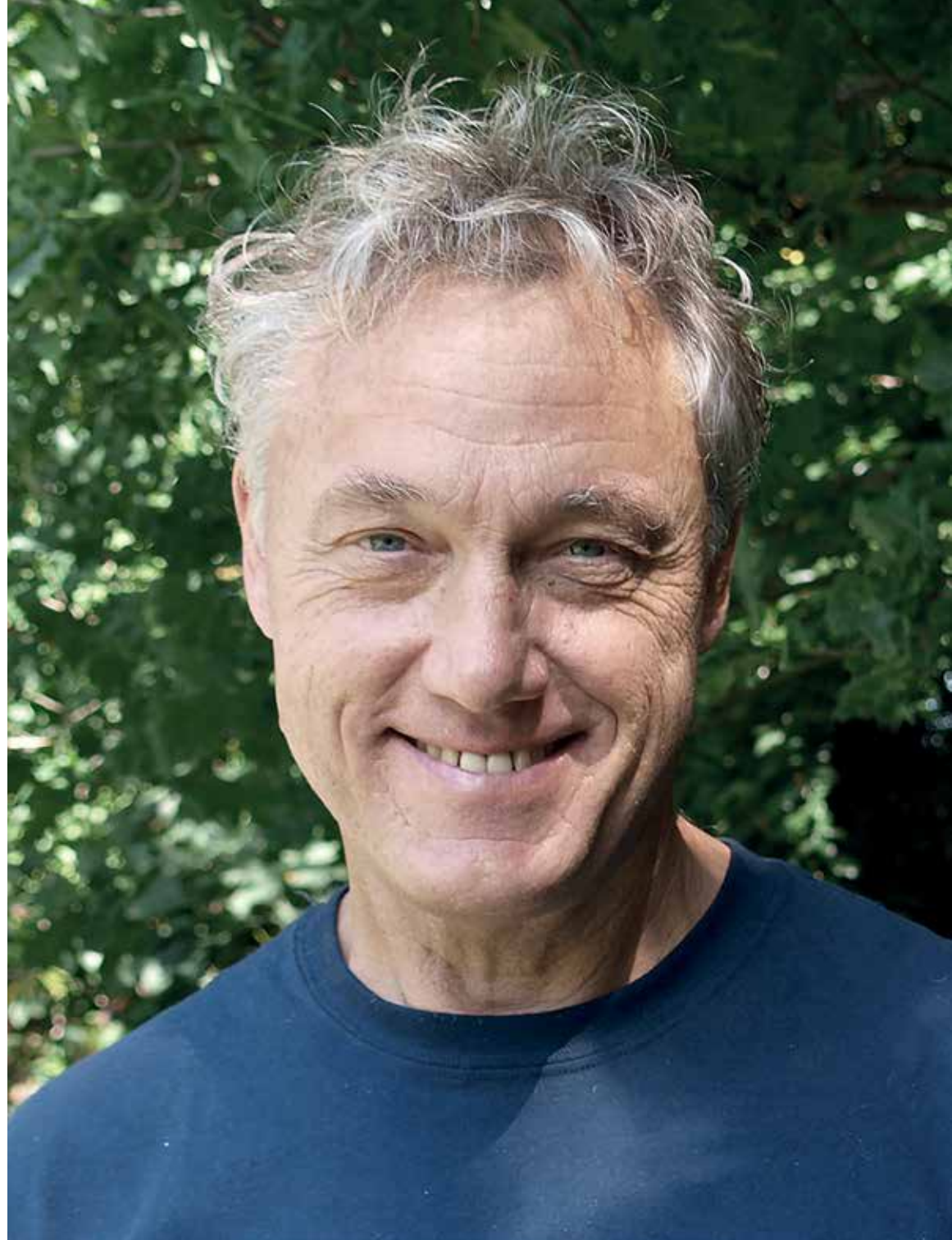
Home institution at time of application

The University of Sydney
Integrated Sustainability Analysis (ISA)
School of Physics
Sydney
Australia

Cooperation partners

Prof. Dr. Bernd Blasius
Institut für Chemie und Biologie
des Meeres (ICBM)
Universität Oldenburg

Dr. Christian Lutz
Gesellschaft für Wirtschaftliche
Strukturforschung (GWS) mbH
Osnabrück



New Analytical Approaches for Exploring Sustainable Future Pathways

Recent decades have brought humans' economic activities into an ever-increasing conflict with their biophysical environment. On one hand, human disturbance of geo-chemical and biological cycles is reaching magnitudes comparable to those of natural processes. On the other hand, there is not a single country that meets the basic needs of its citizens at a globally sustainable level of resource use within planetary boundaries. Seeing how even within the Sustainable Development Goals, efforts to address human development contradict efforts to address the global environment, we need to reconsider growth.

Recent research has shown that a high quality of life is possible at lower growth and environmental impact. However, there are no quantitative scenarios

that map out such deep societal and economic transitions which would allow for new strategies to reconcile development and sustainability goals within narrowing windows of opportunity.

The aim of this project is to develop new scenario modelling capabilities—economic interdependence, resilience, rapid technological innovation, and circular-economy principles—that can shape future research on societal transitions and new mitigation pathways in a drastically changing world. It brings together three partners—the Gesellschaft für Wirtschaftliche Strukturforchung, the Universität Oldenburg, and the University of Sydney.

● Dr. Anna Lichtschlag

Twin Fellow

Fellowship

December 2022

Home institution at time of application

National Oceanography Centre

Ocean BioGeosciences

Southampton

United Kingdom

Cooperation partners

Dr. Ir. Veerle Ann Ida Huvenne

Fellow EARTH

Hanse-Wissenschaftskolleg

Prof. Dr. Gerhard Bohrmann

MARUM – Zentrum für Marine

Umweltwissenschaften

Universität Bremen



Temporal Variability of Hydrothermal Activity at the Kemp Caldera, Southern Ocean

Submarine hydrothermal vents are of global importance as they return buried substances from the Earth's interior to the sea floor and thus, over geologic time, control the composition of seawater and provide essential elements to the biosphere. In addition, they support complex ecosystems of organisms that have developed unique adaptations to these systems in otherwise often only sparsely inhabited parts of the ocean. However, due to their generally remote locations, we often have only snapshots of the geochemical processes that proceeded at these hydrothermal sites, their spatial distribution, and especially their evolution over time. One exciting example of hydrothermal activity is the Kemp caldera, located in the southernmost part of the

Atlantic, where unique morphological features and many different types of hydrothermal venting exist.

In this project, I am collaborating with scientists at the Universität Bremen and the National Oceanography Centre's Habitat Mapping Group to combine data sets from several German and British expeditions to the Kemp Caldera and to evaluate geochemical data from sediment cores to explain the long-term variability of hydrothermal activity in the Kemp Caldera. Ultimately, these analyses will help us better understand the geochemical, biological, and morphological evolution of hydrothermal systems and their driving forces, and thus their impact on the planet.

● **Assoc. Prof. Dr. Shauna Murray**

Fellow

Fellowship

June–November 2022

Home institution at time of application

University of Technology Sydney
Climate Change Cluster
Sydney
Australia

Cooperation partners

Dr. Uwe John
Alfred-Wegener-Institut,
Helmholtz-Zentrum für Polar-
und Meeresforschung (AWI)
Bremerhaven

PD Dr. Mona Hoppenrath
Senckenberg am Meer
Wilhelmshaven



The Role of Selection in the Evolution of Toxin-Producing Dinoflagellates in the Sea

Phytoplankton, or marine single-celled algae, inhabit marine and freshwaters. One group of microalgae, the dinoflagellates, can occasionally dominate an ecosystem under certain conditions. Dinoflagellates can produce highly toxic compounds, which cause damage to aquaculture and fishing industries if they accumulate into seafood, as part of a harmful algal bloom (HAB). Saxitoxin (STX), produced by species of the dinoflagellate *Alexandrium*, is considered a “Schedule 1 Chemical Weapon” under a United Nations Convention, and acts as a neurotoxin. Along the east coast of Australia, the major boundary current is the East Australian Current. In this region, STXs occur in seafood, and can lead to substantial economic and health impacts. For example, a single bloom

of *Alexandrium* led to a loss of ~\$ AUD 23 million to the Tasmanian seafood industry.

In the species *Alexandrium pacificum*, large differences in toxicity can occur in strains from the New South Wales south coast region compared to other areas. In my project, I examine the genetic and population ecological basis for differences among strains. I also examine the role of evolution via selection in the evolution of differences among strains, including differences in toxicity. If targeted genetic tools can be developed as an early warning system for HABs in this region, the information gained will be important to accurately predict harmful algal related toxicity in Australia’s largest shellfish aquaculture region.

● Dr. Beth N. Orcutt

Fellow

Fellowship

September–November 2022

Home institution at time of application

Bigelow Laboratory for Ocean Sciences
East Boothbay, ME
USA

Cooperation partners

Prof. Dr. Wolfgang Bach
Fachbereich Geowissenschaften
Universität Bremen

Prof. Dr. Kai-Uwe Hinrichs
MARUM – Zentrum für Marine
Umweltwissenschaften
Universität Bremen



Microbe-Mineral Interactions in Subsurface Oceanic Crust

Underneath the ocean, roughly 70 % of the Earth's surface is covered by marine sediments and oceanic crust. Microscopic life—microbes like bacteria and archaea—exist in this dark, deep-sea environment, cycling elements and eating carbon. Below the seafloor, there is a vast reservoir of life on Earth, yet we do not fully understand how all of the microbes get their energy to grow, the full impact of their activity on chemical cycling, and even how many microbes there are. In particular, knowledge of the extent, diversity, and function of life in the sub-seafloor rocky oceanic crust is poorly understood. For the past several years, I have been conducting novel sampling and incubation experiments within the sub-seafloor to examine how microbes interact with rocks.

For this project, I collaborate with scientists at the Universität Bremen to examine the change in mineral chemistry associated with microbial growth, to figure out which rock types microbes prefer to colonize, and how they may alter the rocks that they grow on. I also work with these scientists to determine the amount and types of microbial life colonizing these rocks to figure how much life can be supported by these fluid-rock interactions.

Ultimately, these analyses will help us to figure out which microbes are “rusting the crust” of Earth and inform us of the possibility for life on other planets with liquid water and crustal rocks.

● Dr. Covadonga Orejas Saco del Valle

Fellow

Fellowship

October 2021–July 2022

Home institution at time of application

Instituto Español de Oceanografía (IEO-CSIC)
Centro Oceanográfico de Gijón
Gijón
Spain

Cooperation partners

Prof. Dr. Dierk Hebbeln
Dr. Claudia Wienberg
Dr. Jürgen Titschack
MARUM – Zentrum für Marine
Umweltwissenschaften
Universität Bremen

Prof. Dr. André Freiwald
Senckenberg am Meer
Wilhelmshaven

Prof. Dr. Claudio Richter
Alfred-Wegener-Institut,
Helmholtz-Zentrum für Polar-
und Meeresforschung (AWI)
Bremerhaven



Biogeography of Cold-Water Coral Populations: A Story of Success and Adaptation to Different Environmental Settings in the Northern and Southern Hemispheres

Tropical corals have relatives living in the deep waters of the oceans: the so called “cold-water corals” (CWCs). Indeed, they occur everywhere in the deep oceans of the planet, also outside the tropics, populating extended areas and building reefs that act, as for their tropical relatives, as home and refuge for many other animals forming important ecosystems. Their wide geographical distribution reveals these animals’ enormous adaptability to different environments, e.g., different temperature and oxygen conditions. However, how these animals adapt to—sometimes extreme—environmental conditions is not yet well understood.

With this project, I would like to contribute to the understanding of how these animals have been adapting to different geographical features

and environments. For this, I analyze underwater videos that have been collected in three different geographic areas in the Atlantic Ocean. Furthermore, I perform experiments with living corals in aquaria, manipulating the conditions of the water (e.g., temperature, salinity) to explore the capabilities of the corals to adapt to different environments. This is especially important for considering the predictions for future ocean conditions (e.g., temperature increase, ocean acidification) in light of ongoing global change.

In addition to the academic activities to be conducted at the Hanse-Wissenschaftskolleg, this project will also be presented at two high schools in Bremen and Lower Saxony to introduce the hidden world of CWCs to young people.

● Prof. Dr. Silvio Pantoja Gutiérrez

Fellow

Fellowship

December 2022–January 2023

Home institution at time of application

Universidad de Concepción
Department of Oceanography and
FONDAP COPAS Center
Concepción
Chile

Cooperation partner

Prof. Dr. Kai-Uwe Hinrichs
MARUM – Zentrum für Marine
Umweltwissenschaften
Universität Bremen



Zooming into Laminated Sediments of the Southeastern Pacific Ocean Margin:
Sub-Annual Variability and Millennial Trends in Redox Conditions,
Sea-Surface Temperature, and Primary Production in the Upwelling Ecosystem
off Northern Chile

The expansion of low-oxygen marine waters due to global warming and eutrophication will enhance anaerobic metabolism, replacing large organisms such as fish and mollusks. This requires continuous, long-lasting ocean monitoring so that we can examine trends over time, allowing us to anticipate effects on the ocean and human well-being. I propose to analyze molecular indicators (biomarkers) of relative oxygenation of the water column, sea-surface temperature, and primary production, which I will record in well-preserved laminated sediments using an innovative method of mass spectrometry imaging developed in Prof. Hinrichs' group in Bremen. This would allow me to take measurements every six months or once annually starting

from a thousand years ago. We will analyze sediments underneath the Oxygen Minimum Zone off northern Chile (Bay of Pisagua at 19° south). If we are successful, this research would provide an unprecedented record of intra-annual variability of relevant ocean conditions for the last thousand years until today; this could connect with modern instrumental monitoring of the ocean that began only a century ago at most.

● **Assoc. Prof. Dr. Ryan Pereira**

Fellow

Fellowship

November 2022–January 2023

Home institution at time of application

Heriot-Watt University
The Lyell Centre
Edinburgh
Scotland

Cooperation partner

Prof. Dr. Thorsten Dittmar
Prof. Dr. Oliver Wurl
Institut für Chemie und Biologie des Meeres (ICBM),
Universität Oldenburg
Prof. Dr. Gesine Mollenhauer
Universität Bremen
Prof. Dr. Boris Koch
Alfred-Wegener-Institut,
Helmholtz-Zentrum für Polar-
und Meeresforschung (AWI)
Bremerhaven



Advancing Our Understanding of the Role of Organic Matter in Surface Films of Oceanic Air-Water Gas Exchange

Oceans are a global reservoir of greenhouse gases, estimated to account for 20–40 % of the post-industrial sink for anthropogenic carbon dioxide (CO₂). However, quantifying the exchange of gases such as CO₂, methane (CH₄), and nitrous oxide (N₂O) between the ocean and atmosphere is a major challenge. Understanding how the ocean's organic skin layer modulates this exchange is critical to estimating the intrinsic oceanic sinks and sources of these key greenhouse gases both now and in the future. Organic substances in the skin layer, known as surfactants, span across traditional operational definitions and are derived from multiple sources undergoing biotic and abiotic transformations along the land-ocean continuum.

This proposal will investigate a land-ocean transect from South America toward the African Continent to investigate organic matter control of air-water gas exchange. Central to this work is the application of new advanced geochemical characterization techniques to constrain the sources and reactivity potential of surfactants. This new and unique data will be incorporated into climate simulation models to examine the surfactant suppression of gas exchange, both now and in the future.

● **Research Asst. Prof. Dr. Roy E. Price**

Fellow

Fellowship

July 2022–May 2023

Home institution at time of application

Stony Brook University
School of Marine and Atmospheric Sciences
Stony Brook, NY
USA

Cooperation partners

Prof. Dr. Wolfgang Bach
Prof. Dr. Thomas Pichler
Fachbereich Geowissenschaften
Universität Bremen



Fluid-Mineral-Microbe Interactions in Saponite-Rich Hydrothermal Systems

A growing body of evidence supports the existence of hydrogen-based microbial communities using hydrogen (H_2) generated from water-rock reactions in the subsurface. However, little is known about how H_2 is generated from water-rock reactions in basalts with groundwater aquifers. With this HWK fellowship, I am attempting to dramatically improve our understanding of the mineralogical changes during water-rock reactions in the low-temperature settings of northwestern Iceland. My approach will be to use fresh tholeiite basalts from the now erupting Fagradalsfjall volcano, providing an accurate picture of the evolution of rocks and fluids over time. Perhaps the most significant contribution will come from using the unique hydrothermal flow-through apparatus coupled to μ -CT imaging.

For the first time, this approach will allow us to evaluate, in real-time, mineral evolution/dissolution of basaltic rocks, as well as porosity and permeability changes over time. My ongoing work on these systems includes artificial saponite chimney growth, which to date is a unique approach. These artificial chimneys will be evaluated in detail to determine their usefulness as astrobiology analogs. Finally, data from these experiments will be used in thermodynamic models designed to predict the liberation of H_2 from basalts and the precipitation of saponite upon mixing of vent fluids with seawater. Broadly, this work will significantly improve our understanding of the fluid-mineral-microbe interface.

● **Asst. Prof. Dr.
Alberto Robador Ausejo**

Fellow

Fellowship

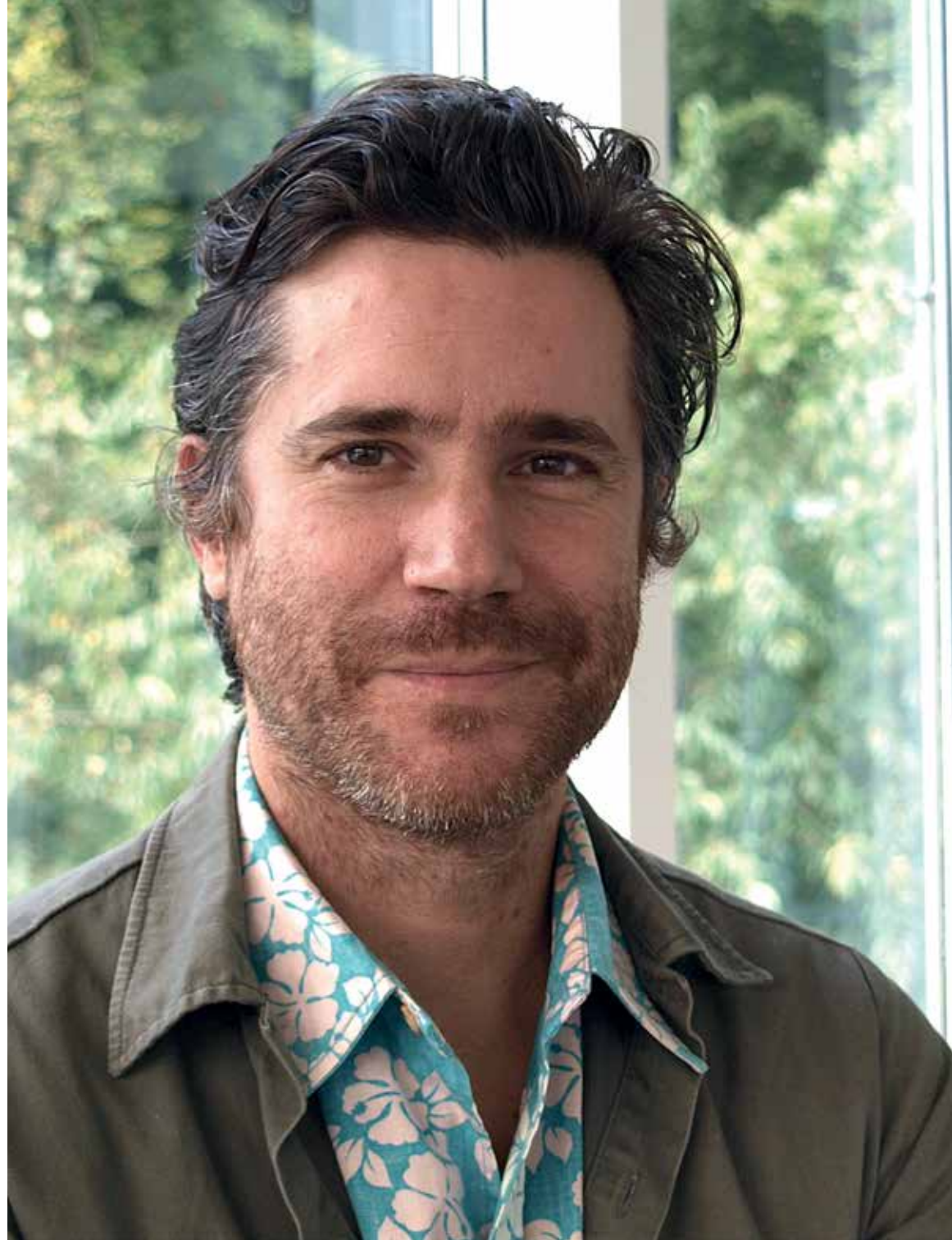
October 2021–June 2022

Home institution at time of application

University of Southern California
Marine and Environmental
Biology Section
Department of Biological Sciences
Los Angeles, CA
USA

Cooperation partner

Prof. Dr. Boris Koch
Alfred-Wegener-Institut,
Helmholtz-Zentrum für Polar-
und Meeresforschung (AWI)
Bremerhaven



Energy Bookkeeping in Ocean Ecosystems

The marine microbiome is a vital component in determining the structure and function of oceans, including the regulation of elemental cycles in response to environmental forcing (natural or anthropogenic in nature) and the balance of the global marine biomass. One of the most fundamental questions is how all microorganisms in marine ecosystems are supplied with sufficient energy to sustain power demands. Virtually every aspect of microbial behavior in a given environment requires energy supplied at a rate sufficient to meet power demands. This includes typical functions such as growth and nutrient uptake. In addition, microorganisms must sometimes use energy to combat environmental stressors. Energy turnover is therefore at the core of ecosystem function, but it is rarely if

ever quantified in field studies. Direct quantification of microbial energy metabolism in marine environments has in most cases represented an exercise in feeding and weighing bacteria, and this approach has been confounded by variations in growth rate, cell composition, and exact knowledge of molecular-energy yielding and consuming mechanisms. Here, I propose a novel experimental approach to investigate how microorganisms involved in elemental cycling evolve under different energy regimes, how they work, and the environmental processes that control their activity on both molecular and global scales.

● Dr. Luiza Teixeira-Costa

Junior Fellow

Fellowship

August 2021–July 2022

Home institution at time of application

Harvard University Herbaria
Department of Organismic
and Evolutionary Biology
Cambridge, MA
USA

Cooperation partner

Prof. Dr. Gerhard Zotz
Institut für Biologie
und Umweltwissenschaften (IBU)
Universität Oldenburg



Effects of Climate Change on the Physiology of Parasitic Flowering Plants

Climate change can affect life in multiple ways, including the interactions established between living organisms. Possible impacts on parasitic interactions raise special concern and interest, given that these relations can lead to broader ecosystem alterations. Parasitic relations among plants are no exception, as these parasitic plants are highly diverse and distributed across all continents and vegetation types, including both natural and human-made environments.

In this context, the main goal of my project is to analyze how parasitic plants and their respective hosts react to an elevated concentration of carbon dioxide in the atmosphere, which is understood to be the main driver of climate change. To do so, I use a type

of experiment shown to be very useful for climate-change research, but that has not been applied in investigations of parasitic plants so far. In the experiments, I will analyze the growth and photosynthesis of both parasite and host plants, as well the nutrients exchanged between these plants.

Results obtained by this investigation will help us understand not only how specific plants react to shifts in climate, but also how the interaction between plants can be affected. This understanding will be crucial for studies of how the distribution of parasitic plants might change in the future, as well as for planning conservation action and managing unbalanced host-parasite interactions.

● **Beatriz Vinha (doctoral candidate)**

Twin Fellow

Fellowship

January–February 2022

Home institution at time of application

Università del Salento

Dipartimento di Biologia e Scienze

Biologiche e Ambientali (DiSTeBA)

Lecce

Italy

Cooperation partners

Dr. Covadonga Orejas Saco del Valle

Dr. ir. Veerle Ann Ida Huvenne

Fellows EARTH

Hanse-Wissenschaftskolleg

Prof. Dr. André Freiwald

Senckenberg am Meer

Wilhelmshaven



Study of Occurrence, Density and Distribution Patterns of Megabenthic Fauna off Cabo Verde and Their Environmental Envelope

The Cabo Verde archipelago (off Northwest Africa) is an area with high marine biodiversity where tropical and subtropical ocean fronts and currents meet. However, little is known about the deep-sea communities of the region. In August 2021, the iMirabilis2 expedition aboard the Spanish research vessel *R/V Sarmiento de Gamboa* explored the deep-sea megabenthic habitat around the southwest of the Cabo Verde islands, for the first time using the Remotely Operated Vehicle (ROV) LUSO. Over 50 hours of high-resolution video data were collected, covering a depth distribution of 2,000 to 1,400 m of water depth. The exploration revealed a sea floor geologically characterized by volcanic features, with communities dominated mainly by cold-water corals that form dense coral gardens in some areas.

During the fellowship period, video data from the iMirabilis2 expedition will be quantitatively analyzed to identify the most conspicuous species. By applying statistical analyses and machine-learning algorithms, species occurrence and environmental data will be used to investigate which environmental factors drive species distribution in Cabo Verde and to generate predictive habitat maps to identify areas where key species are most likely to occur. This information will provide insight into the ecological requirements of the unknown deep-sea biodiversity of the region and is fundamental to assisting policymakers in the implementation of conservation and management plans.

● **Assoc. Prof. Dr. Laura Wehrmann**

Fellow

Fellowship

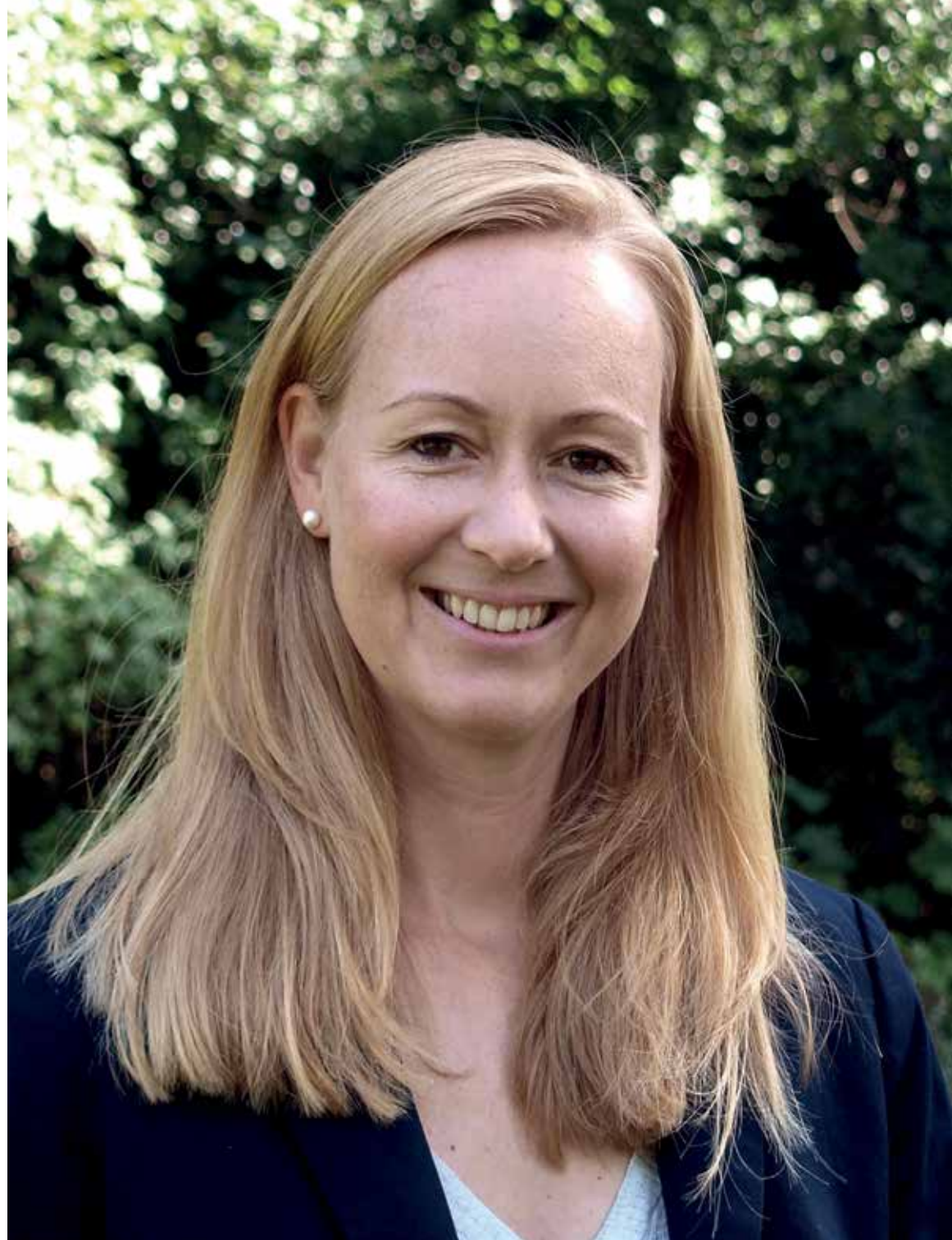
July 2022–May 2023

Home institution at time of application

Stony Brook University
School of Marine and Atmospheric Sciences
Stony Brook, NY
USA

Cooperation partners

Prof. Dr. Sabine Kasten
Dr. Grit Steinhöfel
Dr. Susann Henkel
Alfred-Wegener-Institut,
Helmholtz-Zentrum für Polar-
und Meeresforschung (AWI)
Bremerhaven

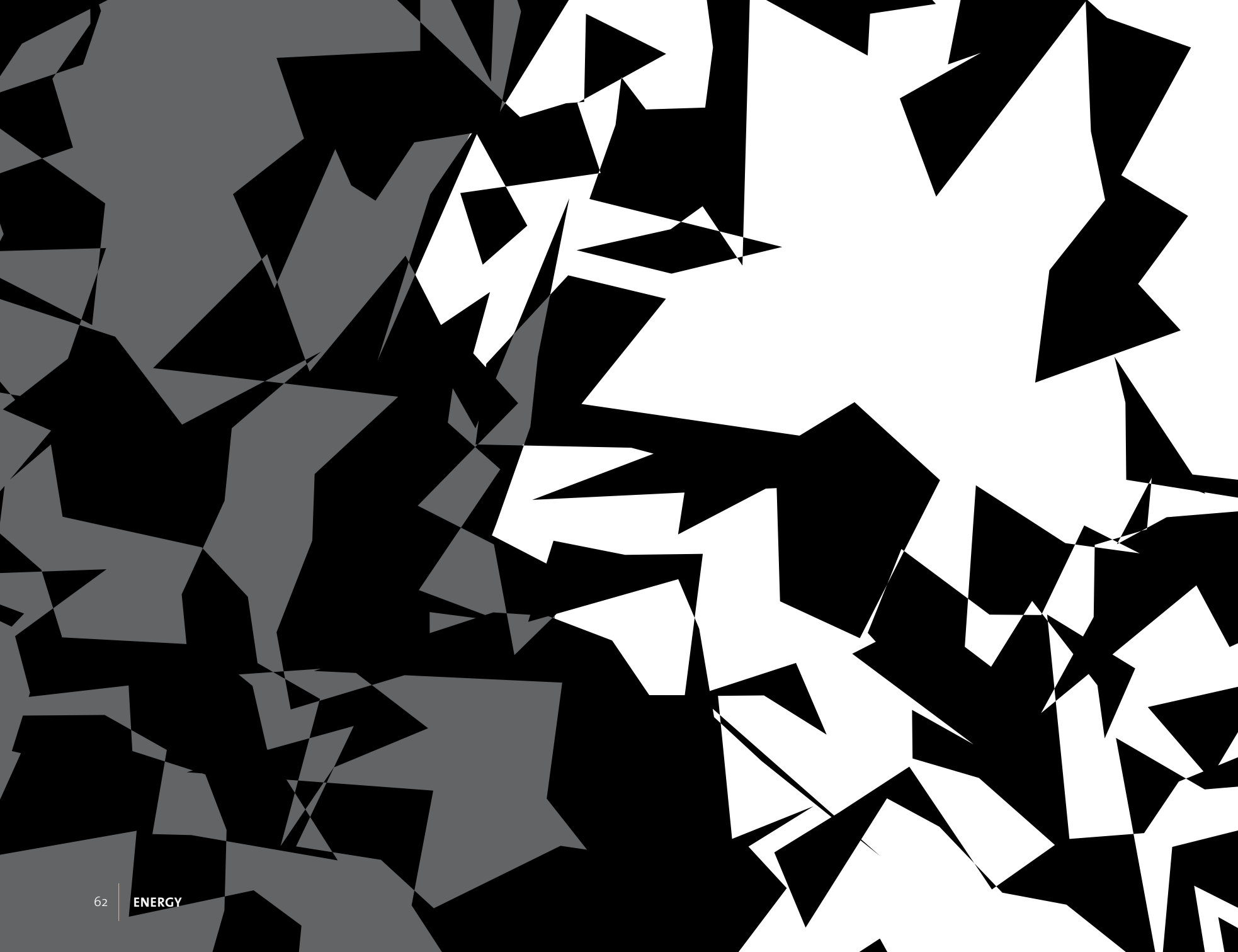


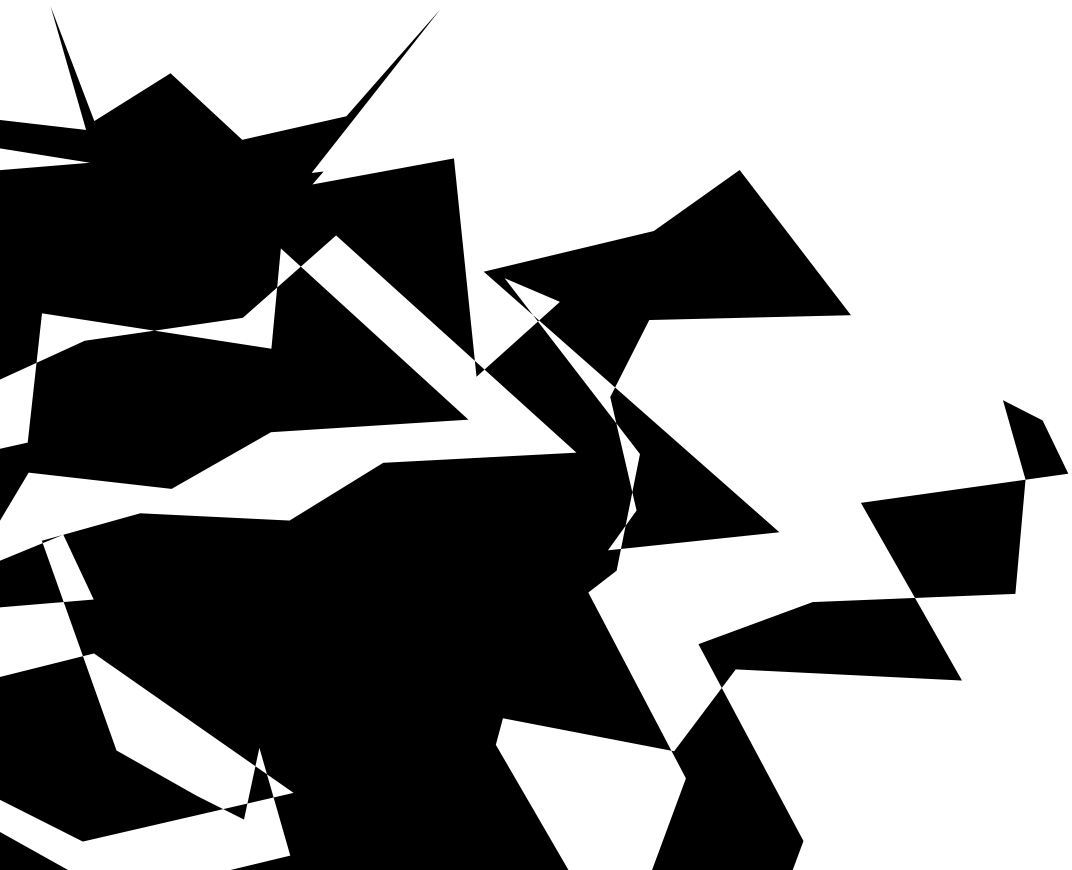
The Role of Reverse Weathering for Element Cycling in Glacially Impacted Arctic Fjords

Over long time scales, the inputs of major and minor elements to the ocean by rivers and hydrothermal vents must be balanced by removal mechanisms of these elements in the marine realm for ocean chemistry to remain relatively constant. A long-debated process that sequesters elements in ocean sediments is reverse weathering, which involves the transformation of biogenic silica, such as diatom frustules, to new clay material. However, many aspects of this process remain unknown, such as reaction rates and products and global distribution. Previous studies of this process have focused on tropical deltaic systems.

Coastal polar regions, including glacially influenced fjords, likely represent another hotspot of reverse weathering because they receive high inputs of key “ingredients”: biogenic silica and reactive iron (Fe) and aluminum (Al) oxides.

The aim of this project is to study the role of reverse weathering in glacially influenced fjords with a focus on identifying a set of key geochemical indicators in the fjord sediments and enveloping estimates of associated element fluxes across the sediment-water interface. Polar coastal ocean regions are currently undergoing rapid changes due to anthropogenic climate shifts. A further objective of this project is to gain first insights into how climate change may affect reverse weathering processes in these environments.





Energy 2022

● Prof. Dr. Stefan Heinz

Fellow

Fellowship

May–August 2022

Home institution at time of application

University of Wyoming

Department of Mathematics

Laramie, WY

USA

Cooperation partner

Prof. Dr. Joachim Peinke

ForWind – Center for Wind Energy

Universität Oldenburg



Cutting-Edge Turbulence Simulation Methods for Wind-Energy Problems

Wind-energy problems (air flow around turbines in wind farms) are characterized by extremely challenging flow regimes. The accurate and efficient analysis of these flow patterns via computational fluid dynamics (CFD) poses a huge challenge. Basically, standard CFD methods are incapable of dealing with reliable and feasible predictions of such flow regimes: they are either way too expensive computationally or are known to often provide unreliable results. Combinations of existing methods have been suggested as an alternative. However, existing methods face significant problems because of the uncontrolled balance of their elements. As a consequence, existing combination methods do not yet offer an alternative to pure methods. I have developed a

mathematical exact solution to the combination of existing computational methods. First applications in real-world conditions show the huge potential of these novel methods. For the first time, we have access to reliable simulation methods that behave stably in strongly variable conditions. In particular, for the first time we can provide reliable predictions for extreme flow regimes relevant to wind-energy problems (where all existing methods are hardly applicable).

The goal of my project is to explicitly demonstrate the advantages of our new methods for wind-energy simulations based on an existing long-term collaboration with colleagues at the Universität Oldenburg.

● **Asst. Prof. Dr. Sutapa Mondal Roy**

Fellow

Fellowship

May–July 2022

Home institution at time of application

Uka Tarsadia University
Maliba Campus Department
of Chemistry
Gujarat
India

Cooperation partner

Prof. Dr. Thorsten Gesing
Universität Bremen



Understanding Interaction Mechanism between Nanostructured Metal Oxides and Biomolecules in Terms of Average Crystallite Size, Electronic Band Gap and Quantum-Chemical Descriptors

It has been over half a century since Professor Feynmann gave a lecture titled “There’s Plenty of Room at the Bottom” to introduce the field of nanoscience and nanotechnology. Scientists are now able to develop nanostructured materials that are even smaller than a human cell by manipulating individual atoms or molecules. Nanostructured metal oxides (NMOs) are important materials for their tunable properties and diverse applications. Nature has revealed a close association between NMOs and biological systems in various instances, which opens up a novel field for understanding the interaction between NMOs and biomolecules. The aim of the present proposal is a joint experimental and theoretical investigation to discover a mechanism of interaction between NMOs, namely ZnO or MgO, and

biomolecules like DNA bases (guanine etc.) or amino acids (tryptophan etc.). The detailed experimental synthesis of these NMOs and biomolecules, and their characterizations including imaging (SEM, TEM) and spectroscopy (FTIR, UV/VIS, etc.) may uncover useful structural, electronic and quantum descriptors to establish the interaction mechanism between NMOs and biomolecules. The developed interaction mechanism will then facilitate the exploration of the biological activity of nanostructured materials from the perspective of their structural and bio-interaction parameters. This, in turn, has the potential to contribute to the discovery of novel drugs.

● **Assoc. Prof. Dr. Morgan Stefik**

Fellow

Fellowship

September 2022–January 2023

Home institution at time of application

University of South Carolina
Department of Chemistry and Biochemistry
Columbia, SC
USA

Cooperation partner

Dr. Julian Schwenzel
Fraunhofer-Institut IFAM
Bremen



Development of Advanced Porous Battery Electrodes

This project examines how function follows form in the context of batteries. The form under investigation is similar to a kitchen sponge. The function of a sponge is as much defined by its positive space, its material, as it is defined by its negative space, the voids. Similarly to how a sponge soaks up spills, battery materials soak up ions when charging or discharging. In a battery, the speed with which it can charge is similarly determined by how these components are organized in space. Specifically, this project examines how function follows form in a class of ultrafast battery materials called pseudocapacitors.

My group's PMT process allows independent variation of the material and void dimensions which uniquely informs design improvements by separating the effects of each space. Translating these lab-scale methods to industrial manufacturing remains a challenge, in part due to the 1,000x gap in length scale between the micrometer-sized particles used in modern battery manufacturing and the nanometer-sized features needed for pseudocapacitance. This project will first extend our PMT approach to nanoporous microparticles that are compatible with industrial manufacturing and then study their performance. Advancing the capabilities of energy storage devices will support broader use of sustainable energy resources.

● Dr. Oleg Tsupko

Fellow

Fellowship

November 2021–April 2022

Home institution at time of application

Space Research Institute of Russian
Academy of Sciences
Moscow
Russia

Cooperation partners

Prof. Dr. Domenico Giulini
Dr. Volker Perlick
Universität Bremen
Prof. Dr. Jutta Kunz
Universität Oldenburg



Appearance of Strongly Gravitating Objects to a Distant Observer: Black Hole Shadows and Self-Lensing of Emitting Compact Stars

In space, there are objects exhibiting very high gravitational energy: black holes and neutron stars. In such objects, a large mass is concentrated in a small region of space, which gives rise to strong gravitational fields. An effect of these fields is that light rays that pass close by these objects, or that are emitted by them, move along curved paths. This affects the image of the object that a distant observer detects: we perceive them in unusual, distorted ways. An amazing example of such an object is what is known as the black hole shadow: a very specific dark silhouette of a black hole which was recently observed in the galaxy M87. By studying the properties of this image, we can draw conclusions about the properties of the distant object itself.

In my project, I intend to focus on situations in which compact objects are surrounded by plasma. Plasma is a dispersive medium, and in this case “rainbow effects” may be observed, caused by light rays of different frequencies that are deflected by it at different angles. In other words, gravitating objects surrounded by plasma act like refractive prisms, splitting light into its spectral colors.

In my project, I will investigate how properties of such objects and their environments can be deduced from their appearance to the distant observer.

● Dr. Ying Wang

Junior Fellow

Fellowship

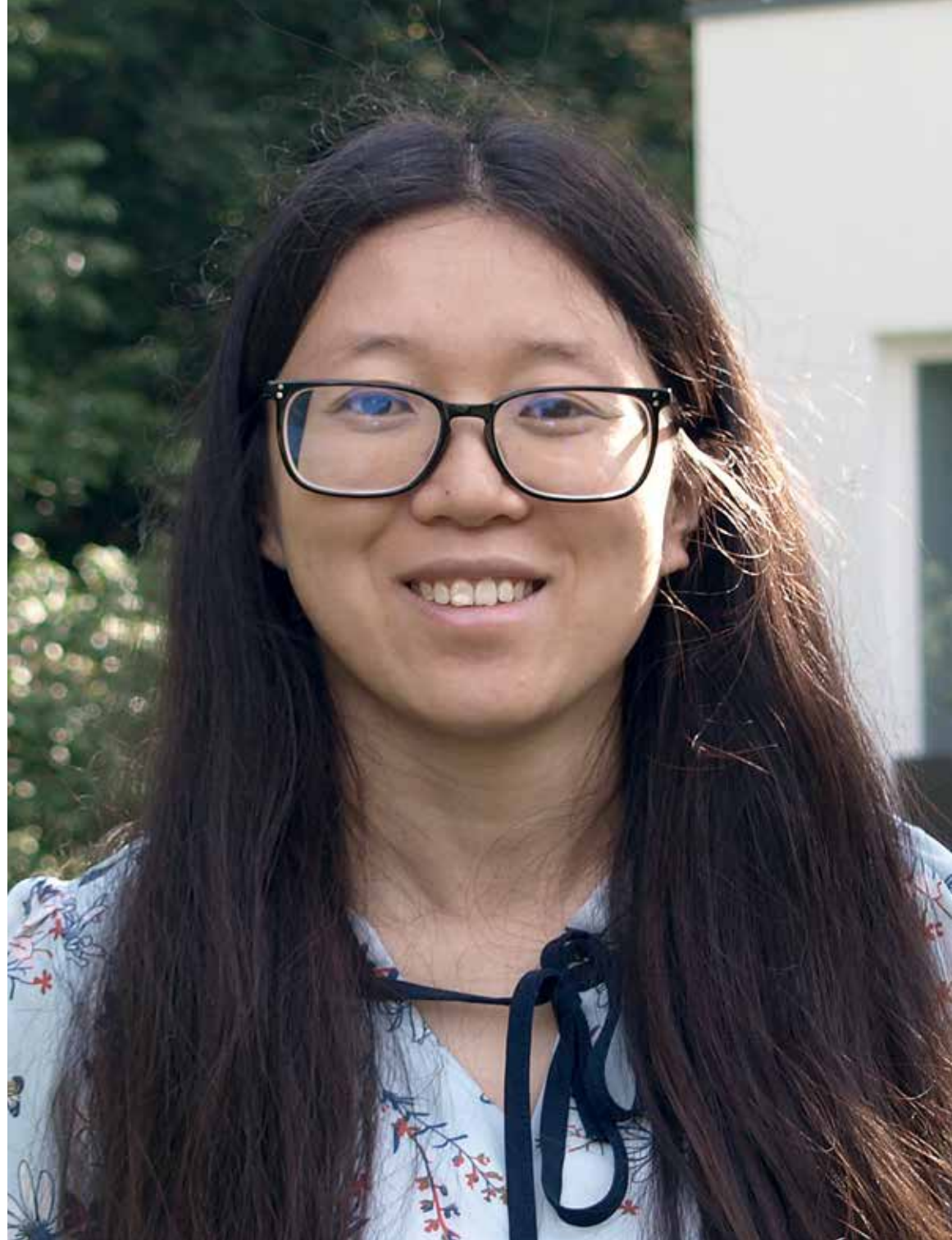
August 2022–February 2023

Home institution at time of application

Adam Mickiewicz University Poznań
Nanobiomedical Centre
Poznań
Poland

Cooperation partner

Prof. Dr. Niklas Nilius
Universität Oldenburg



Tailoring the Structure of Step Edges by Stoichiometry Adjustment in Two-Dimensional Ternary (V, Fe)₂O₃ Monolayer Oxides

Increasing environmental issues and the imminent shortage of fossil fuels are motivating researchers to exploit clean, efficient, and sustainable technologies to store and convert energy. Although binary oxide materials have shown promising properties, the flexibility for relevant applications is often limited. Ternary oxides, formed by doping additional elements into binary oxides, have the potential to overcome these problems and therefore attract more attention. Varying composition ratios can precisely tune the properties of these mixed oxides, allowing the nanoscale control of future materials production. One exciting feature of these hybrid oxide materials is their step edges, as most catalytic reactions actually take place at the step edges of a catalyst; the possibility of tuning the properties of edge sites in mixed oxides is, therefore, of utmost importance for improving and controlling the catalytic properties of surfaces. Our previously

published results successfully show the synthesis and characterization of monolayer mixed vanadium and iron oxide supported on Pt(111) substrate. Based on the results, our current and future work will focus on identifying the variation of the edge structures for both the pure vanadium oxide and the mixed oxide. The nature of edge atoms and species, the relation of edge structure, equilibration, and potential properties as a function of preparation methods (by varying the Fe content and the oxidation condition) will be discussed and reported. The technique involved in the project is a combination of experimental data and theoretical calculation. The experimental data will be obtained by scanning tunnelling microscopy (STM) and calculations performed by density functional theory (DFT) and Monte Carlo simulation, obtained with the support of collaborating theoretical physicists at the Sorbonne University, Paris.

● **Assoc. Prof. Dr. Martin Wosnik**

Fellow

Fellowship

September–October 2022

Home institution at time of application

University of New Hampshire
Department of Mechanical Engineering
Durham, NH
USA

Cooperation partners

Prof. Dr. Martin Kühn
Prof. Dr. Joachim Peinke
ForWind – Center for Wind Energy
Universität Oldenburg



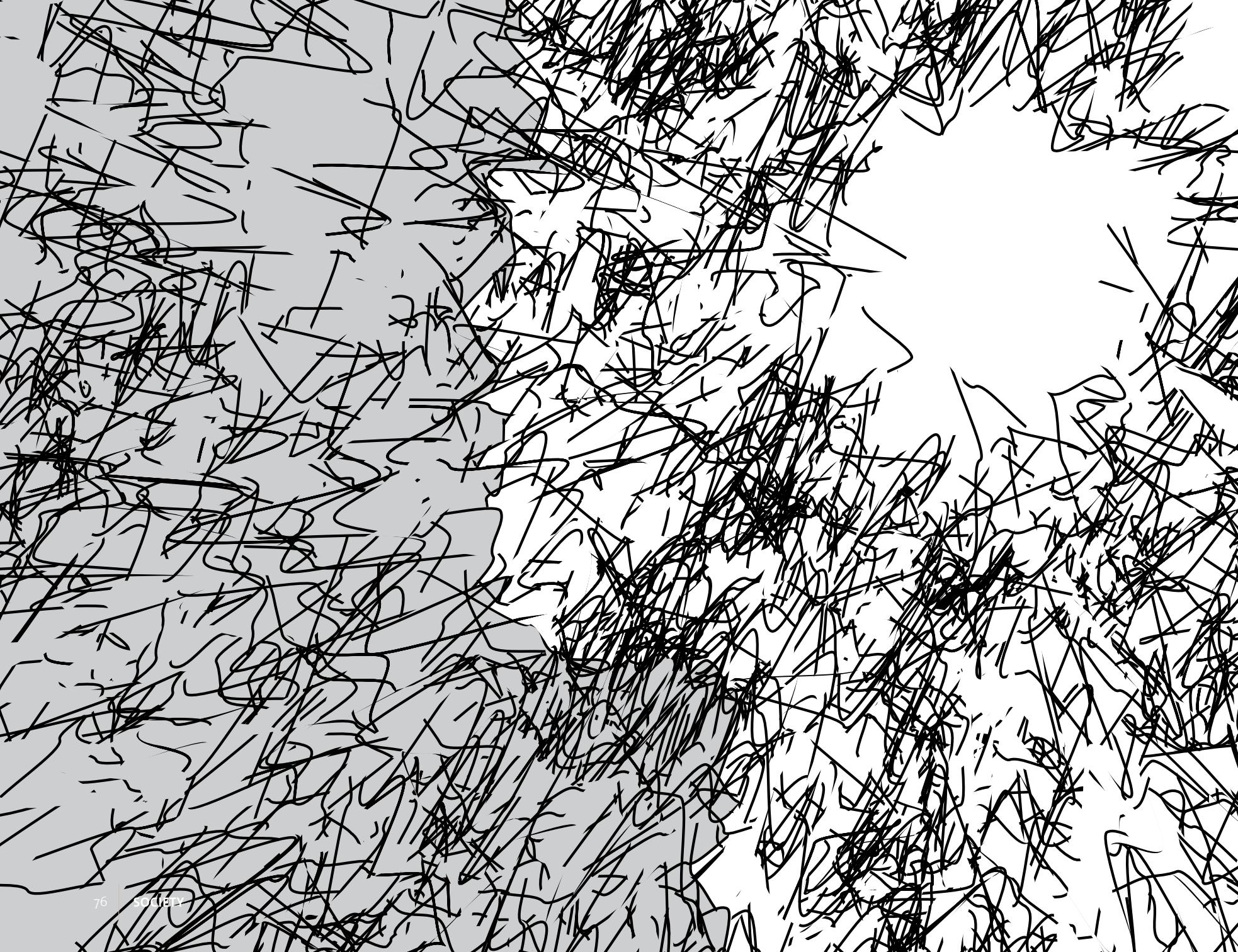
Flow Physics of Wind Turbine Wakes

Wind energy plays a key role in achieving renewable energy targets and has seen a tremendous increase in installed capacity, both on- and off-shore. However, many science and engineering challenges still exist. One of them is to understand, model, and control how wind turbines and the wake flows they generate interact with the atmosphere and with other turbines downwind. In large wind farms, these interactions can cause a significant decrease in energy yield and lead to increased wear on wind turbine components, thereby reducing turbine service life. The flow physics of wind turbine wakes, in particular with complex inflows, are not well-understood.

My project initiates and conducts collaborative studies of wind turbine wakes in two large-scale experimental facilities, at WindLab at Universität Oldenburg and at the University of New Hampshire.

Specifically, wind turbine wakes are investigated using model turbines under different inflow and boundary conditions to study flow phenomena that have high importance at the application level.

Combined with field observations in wind farms, these experiments will guide the development of flow-physics-based models. My project helps establish generally applicable results regarding wake flow-physics and wind-turbine wake development. The insights will be transferable to the practice of design, operation, and maintenance of wind farms, thereby increasing energy yield and turbine service life, and reducing energy cost.





Society 2022

● Prof. Dr. Margarita Balmaceda

Fellow

co-funded by Alexander von Humboldt-Stiftung

Fellowship

May–August 2022

Home institution at time of application

Seton Hall University

School of Diplomacy and International Relations

South Orange, NJ

USA



Coal, Steel, and Conflict in the Former USSR: Technology, Bordering, and Climate Change

This project analyzes how post-Soviet steel-related supply/production chains both create preconditions for intra-state conflicts and can contribute to their resolution. Three key cases related to conflict will be analyzed: Transnistria (Moldova) after 1989, Donetsk Oblast (Ukraine), 1991–2014, and the two Donbas (Ukraine) self-proclaimed entities (the “Luhansk People’s Republic” [LNR] and “Donetsk People’s Republic” [DNR], after 2014). In each of these cases, (coal- and) steel supply chains and

their manipulation by rent-seeking elites have played a role in actual separatist conflict (Transnistria and “DNR/LNR”) or in creating the preconditions for it (Donetsk Oblast). Russia is very much present in each of the case studies, both as interested party to these conflicts and through the openings to Russian influence created by local coal and steel elite’s rent-seeking manipulations.

● **Dr. Laura Colini**

Twin Fellow

Fellowship

March 2022

Home institution at time of application

Independent

Firenze

Italy

Cooperation partner

Prof. Dr. Hilary Silver

Fellow SOCIETY

Hanse-Wissenschaftskolleg



Multilevel Governance of Homelessness During the Coronavirus Pandemic: Challenges and Opportunities

The pandemic laid bare the special vulnerabilities of people experiencing homelessness, including advanced age, pre-existing conditions, and obstacles to self-isolation. Lockdowns also drove workers into joblessness, making it difficult to pay rents or mortgages where moratoria were not enacted. The high incidence of COVID-19 infections in congregate housing facilities like prisons, nursing homes, refugee camps, and homeless shelters has made the deconcentrating of large residences imperative. The research at HWK will involve a review of the efforts to protect vulnerable homeless people during the coronavirus crisis 2020–2021. We will compare the emergency-related policies designed by the central governments in the United States, Germany, and Italy

and look at the measures implemented at municipal level. The research focuses on discernible trends: (1) renting or buying hotels to disperse the infected or vulnerable in shelters and provision of facilities and materials to encampments; (2) moratoria on criminalization ordinances and evictions, rental bonuses, and freezes to prevent homelessness; (3) long-term policy responses. Ultimately, we aim to reveal the political obstacles to protecting the unhoused, policy gaps, and the urgency of support on the ground and to identify best practices in the urban hotbeds of the coronavirus. We conclude by questioning whether and how emergency-driven innovation has led to long-term investments and changes in public policies.

● **Prof. Dr. Francesca Fulminante**

Fellow

Fellowship

October 2022–March 2023

Home institutions at time of application

Bristol University
United Kingdom

Oxford University
United Kingdom

Roma Tre University
Italy



“Warriors” and “Weavers”: Gender Stereotypes, Identity,
and Demographic Dynamics from Italy (approx. 1000–300 BC)
To Face Modern Challenges and Impact Current Policies

The Warriors and Weavers project aims to challenge current gender stereotypes by studying burial practices and human remains of ancient Italian populations (approx. 1000–300 BC). In particular, it will adopt a comparative perspective by studying different ethnic and cultural groups such as the Latin, the Etruscans, the Greeks, and the people of Abruzzo that inhabited the Italian Peninsula during the first millennium BC at a time of great ethnic, economic, social, and political changes that led to the formation of the first cities in Western Europe. By analyzing burial rituals and demography dynamics

through a gender perspective, it will be possible to reveal the role of women and more generally gender in shaping and maintaining socio-economic and political relations in those communities. By discussing gender issues in the past, we create a distance that might allow for engagement with our own present-day gender stereotypes and gender practices and we may help contemporary communities better understand themselves as well as guide policymakers.

● **Assoc. Prof. Dr. Piers Hale**

Fellow

Fellowship

September 2021–June 2022

Home institution at time of application

University of Oklahoma
Department of the History of Science
College of Arts and Sciences
Norman, OK
USA

Cooperation partner

Prof. Dr. Anton Kirchhofer
Universität Oldenburg



Darwin in History. Evolution, Science, and Society

Historians of science have long agreed that the publication of Charles Darwin's *Origin of Species* in November 1859 was a signal event not only in the history of science, but in the history of modern western thought. A veritable "Darwin industry" of scholarship emerged as testament to this fact and the subsequent publication of Darwin's notebooks, journal, and correspondence have not only made Darwin and his works more accessible, but underlined their importance.

Darwin in History. Evolution, Science, and Society, will introduce scholars, students, and general readers to the main debates in science to which Darwin's work was intended as a contribution, as well as to the social, religious, and political debates upon which it had an impact. This includes

the "species question" in science, which sought an acceptable explanation for the new species then recently uncovered in the fossil record, raising theological concerns regarding the implied common ancestry of man and ape. Of even greater concern at the time was the suggestion that morality, conscience, and ethics were but contingent outcomes of natural selection. Such questions about human nature provided social theorists with a new perspective on old political and social issues, inspiring them to ask whether our politics should best mirror or combat our natural instincts and inclinations. Darwin's theory of evolution by means of natural selection challenged every aspect of the lives of his contemporaries, and continues to inform how we think about what it means to be human.

● **Asst. Prof. Dr. Lasisi Adeiza Isiaka**

Junior Fellow
co-funded by the HANSA-FLEX Stiftung

Fellowship

September 2021–February 2022
June–August 2022

Home institution at time of application

University of Toronto
Toronto
Canada

Cooperation partners

Dr. Inke Du Bois
Prof. Dr. Marcus Callies
Universität Bremen



Diasporic Spaces: Rethinking Digitality, Language, and Mobility

My work seeks to understand the combined impacts of language and the new media on transnational movements among West African migrants in Germany and, specifically, to assess the ways in which migration experiences, social memberships, integration, and prospects are determined and made visible by digital linguistic practices. I focus on the reliance of migrants on digital means for reorganizing relationships, maintaining identity, and interacting with host communities.

Drawing on concepts in language and diversity (ethnolinguistics, digital ethnography, and superdiversity), I examine the linguistic practices of prospective and resident migrants with a view to better understanding how the new mediascapes transform virtual togetherness, socialization processes, and mobility. While this has implications for theories of communication in transnational contexts, our understanding of mobility and sociality vis-à-vis the notion of globality can refine diasporic discourse and relevant socio-political engagements.

● Dr. Stephan Köppe

Fellow

Fellowship

August 2022

Home institution at time of application

University College Dublin
School of Social Policy, Social Work,
and Social Justice
Dublin
Ireland

Cooperation partners

Prof. Dr. Frank Nullmeier
Prof. Dr. Olaf Groh-Samberg
Universität Bremen



Housing Wealth in Germany: Inequalities, Inheritance and Political Attitudes

Access to affordable housing has made the front pages of German newspapers and become an election topic. Although Germany did not experience the astronomical rise in rent or housing prices that affected other nations in the run-up to the financial crisis, affordable housing has since become a concern across the country. Germany has also been long championed as a society of renters, but in the last decade home-ownership rates have increased gradually. This project aims to understand this dual trend of rising house prices and home ownership from the perspective of housing wealth inequalities and politics. The research draws on existing information from people since 1990 and aims to understand who has increased their housing wealth and who has lost out.

Two aspects are of particular concern. First, who has benefitted from increased house prices? We follow these people over time and aim to identify those that were left behind and those that profited, with a particular focus on younger generations. High rents reduce their savings potential for a deposit and short-term contracts limit their credit rating. Therefore, the research looks at how young Germans depend upon parents to acquire housing wealth. Second, these inequalities also shape political attitudes. The project asks if these new homeowners turn to more conservative parties that promise to protect their wealth.

● **Assoc. Prof. Dr. Liliia Korol**

Fellow

Fellowship

August 2021–August 2022

Home institution at time of application

The National University of Ostroh Academy

Ostroh

Ukraine



How and When Social Exclusion Might Create a Risk of Violence among Immigrant Youth of Post-Socialist Eastern European Background

Given increasing ethnic diversity in Europe, the harmonious integration of immigrants and their descendents, who will shape the Europe of tomorrow, is no longer an option but a pressing concern for the well-being, social cohesion, and prosperity of the host societies. And yet, anti-immigrant hostility is rising, and immigrant youth frequently face social exclusion in and outside school contexts across the EU. These negative experiences have deleterious consequences, including violence, for the successful adjustment of immigrant adolescents. Concerns over antisocial behavior, violent offenses, and radicalization among immigrant youth are growing in Europe. Yet existing research lacks comprehensive understanding of the factors that might put socially excluded immigrant youth at risk of endorsing and engaging in violence.

The research I propose aims to fill this gap in current knowledge and gain in-depth insight into the underlying processes that explain why and when social exclusion might drive immigrant adolescents to approve of and engage in violence over time. The project focuses on immigrant adolescents of Post-Socialist Eastern European (PSEE) background residing in three different European countries: Germany, Sweden, and Norway. This knowledge will contribute to preventing escalating cycles of violence from adolescence through adulthood among immigrant youth.

● **Prof. Dr. Semion Lyandres**

Fellow

Fellowship

May–June 2022

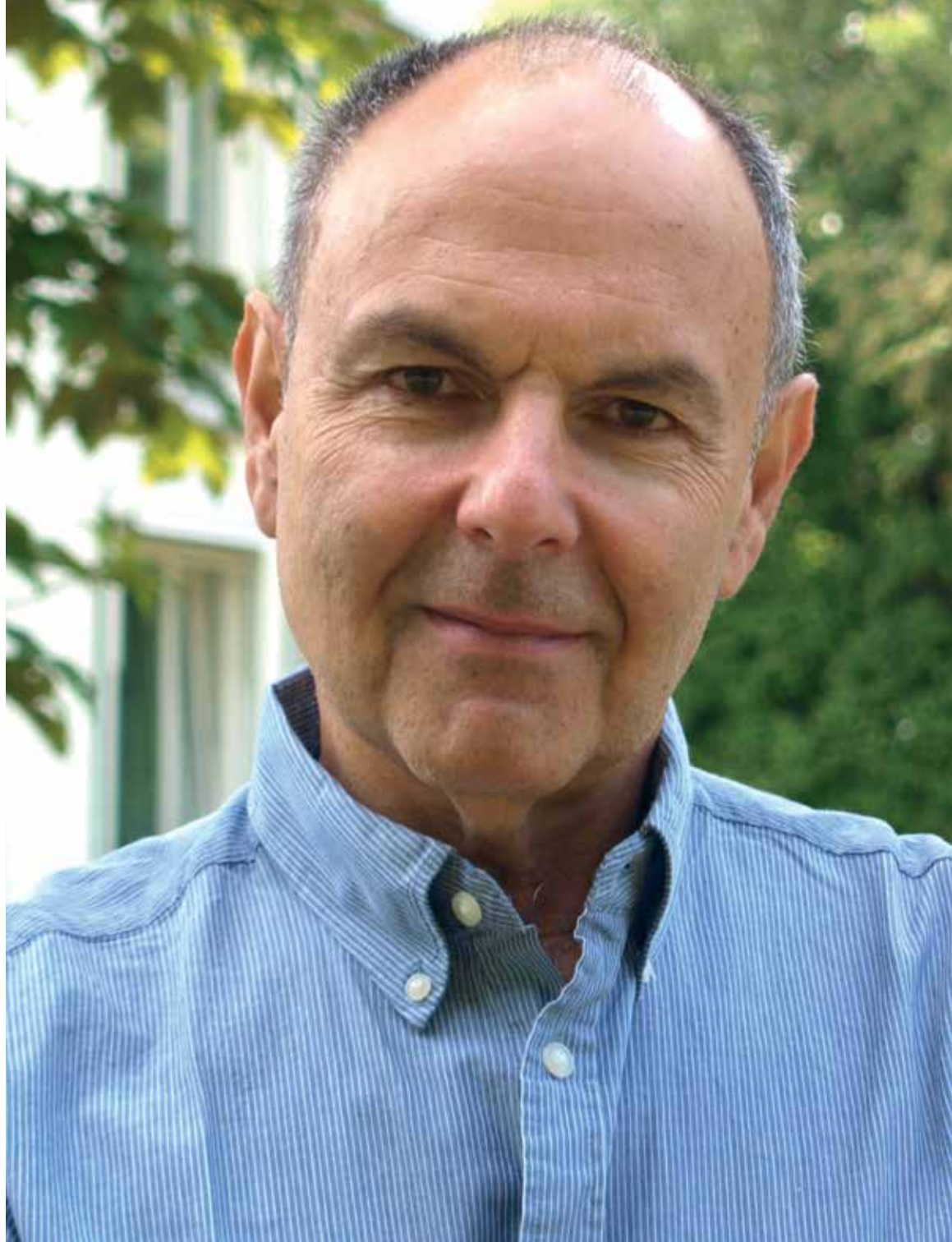
Home institution at time of application

University of Notre Dame

Department of History

Notre Dame, IN

USA



The February Days, 1917: The Downfall of the Old Regime and the Politics of Russia's Failed Attempt at Democracy

The Russian Revolution of February 1917 was a defining event of the twentieth century. In nine short days, the centuries-old tsarist regime was overthrown, and a chain of events was set in motion that led to the disintegration of the Russian empire and the rise of the Soviet regime that would come to dominate the world stage. The February Revolution also constitutes one of the most exciting, innovative, and formative events in all of Russian history.

The lessons of the Revolution transcend the year of 1917, since many of the institutions, practices, and attitudes it introduced lasted through much of

the Soviet period, with ramifications until the present day. The book I intend to write will rely on a wide range of previously unavailable archival sources to explore how pre-revolutionary ideas shaped revolutionary politics in February 1917 and defined the form and composition of the Russian Provisional Government.

More broadly, the book will focus on ideas and elite politics to explain Russia's failed transition to democracy in 1917, with global implications for modern and contemporary revolutions, including Eastern Europe and the Arab Spring.

● **Prof. Dr. Yaron Matras**

Fellow

Fellowship

October 2022–February 2023

Home institution at time of application

Aston Institute for Forensic Linguistics

Birmingham

United Kingdom

Cooperation partner

Prof. Dr. Thomas Stolz

Universität Bremen



Language, Diaspora and Civic Belonging: An Urban Case Study

This project explores attitudes to multilingualism in a global city, based on the example of Manchester, UK. I draw on collaboration between researchers and practitioners in a variety of sectors, including the city council, the health care sector, schools, community-run weekend schools that teach heritage language, local museums, and others. Using observations and interviews, I examine how practitioners experience encounters with languages in the urban environment, and how those encounters prompt them to draft and implement solutions to the challenges of providing services to a multilingual population. I describe how informal networks of practitioners, activists, and researchers help consolidate practical strategies to address language needs,

and how these help forward policies that support equal access to services, cultivation of heritage and skills, and celebration of multilingualism as a collective experience, giving rise to what I call a “city language narrative” that is used as a kind of municipal identity badge. I demonstrate how these developments contrast with language policy and statements at national level, which emphasize uniformity and tend to view language difference as a barrier to social inclusion. By contrast, the ideologies and policies that emerge in the city around practical encounters with multilingualism have the potential to offer a counter-weight to current populist movements and to strengthen commitments to multiculturalism.

● **Dr. Nikolaos Mavropoulos**

Junior Fellow

Fellowship

February–October 2022

Home institution at time of application

Independent
Thessaloniki
Greece



Colonizers or Migrants?

The Greek Community in Italian Eritrea

Greeks migrated to every corner of the world due to economic stagnation at home in the nineteenth century. In modern history, however, they did not try to establish colonies like many other Europeans. In the late nineteenth century, some established presence on the North African shores of the Mediterranean and then in the Red Sea, where they found themselves subjects of Italian colonial rule. How did the racist ideologies developing in the Italian colony impact their self-perception?

This project studies the development of ideas of whiteness among the Greeks who lived in Eritrea under Italian colonial rule. My aim is to understand the mindset of the Greek immigrants living among and between Africans and Italians. The study's starting point will be 1869, when the Italians set foot on the shores of Red Sea by occupying the settlement of Assab. It ends with the fall of Italian East Africa (Africa Orientale Italiana) in 1941, thus including the scramble for Africa, the impact of the First World War, and the rise of fascism.

● **Asst. Prof. Dr. Inna Melnykovska**

Fellow

Fellowship

November 2022–May 2023

Home institution at time of application

Central European University
Political Science Department
Vienna
Austria

Cooperation partners

Prof. Dr. Heiko Pleines
Forschungsstelle Osteuropa an der Universität
Bremen

Prof. Dr. Michael Rochlitz
Universität Bremen



Global Money, Local Politics: Big Business, Capital Mobility and the Transformation of Crony Capitalism in Russia and Ukraine

How can we effectively manage financial globalization without feeding corruption in democratizing, institutionally weak states and without empowering illiberal, kleptocratic regimes? This is a core concern of Western societies because the legitimacy of modern capitalism and democracy depends on it. Furthermore, it is crucial to promoting the values of Western democracy and to security policies around the globe, particularly in Eurasia. This project takes innovative approaches to accomplishing the goal of effective management tracing the influence of the global capital mobility of Russian and Ukrainian holdings and the off-shoring of their corporate activities on business behavior and the political and economic systems,

characterized by “crony capitalism,” in Russia and Ukraine. It highlights a new channel of external influences that has been largely overlooked in studies on democratization, Europeanization, and promoting autocracy. It contributes to an understanding of the determinants of business political strategies. It also contributes to the debates across political science, international relations, sociology, and history about the mechanisms of institutional diffusion and the interplay of agency and structures in these processes. Finally, it is policy-relevant, as it helps fine-tune US and EU financial regulations for more precise financial sanctions and effective engagement policies

● **Prof. Dr. Hilary Silver**

Fellow

Fellowship

January–October 2022

Home institution at time of application

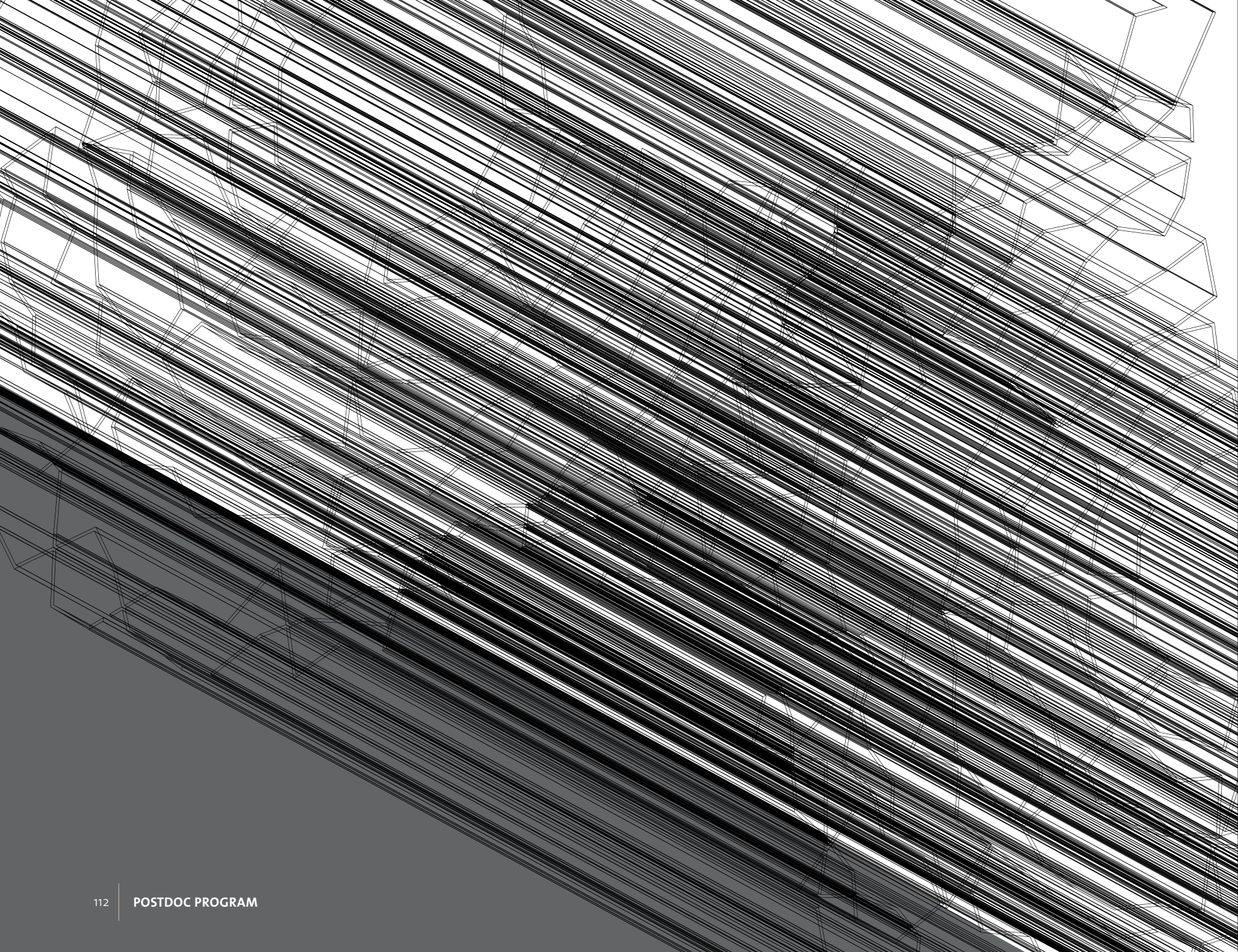
The George Washington University
Department of Sociology
Washington, D.C.
USA

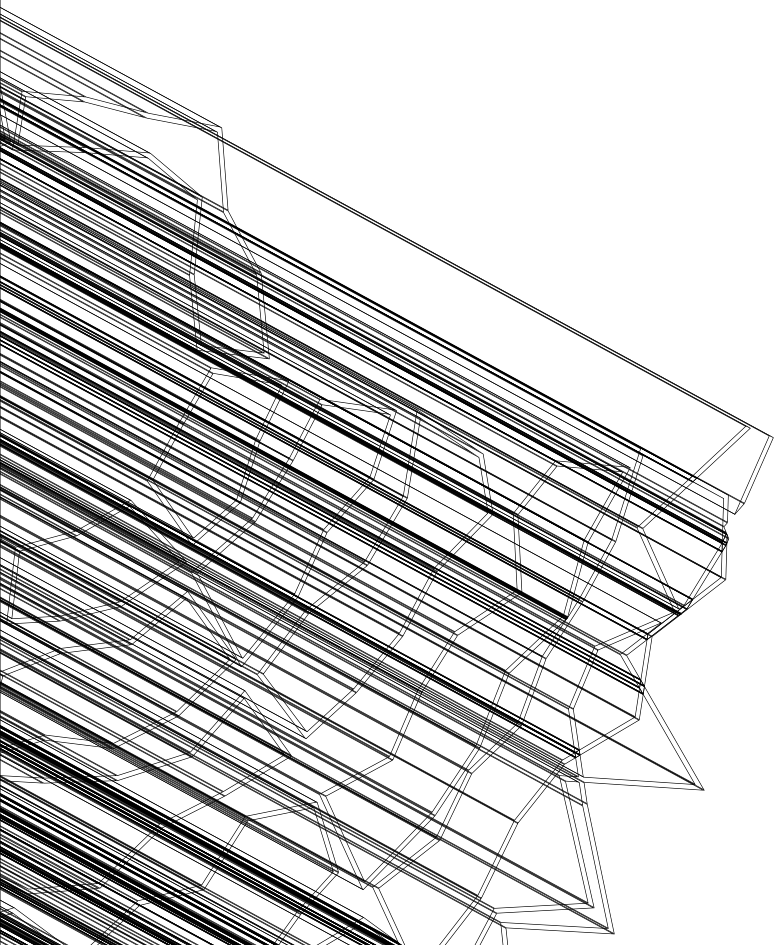


Encountering Germany: Exclusion and Integration of Migrants in West and East Berlin

The welcome culture of Germany and the rise of nationalist populism are two faces that confront migrants as they adapt to their new country. Social integration rests upon not only citizenship and labor markets, but also upon social acceptance in mundane encounters of ordinary people in their neighborhoods. Defying predictions of “parallel societies,” this study examines the neighborhood processes of migrant integration and local challenges to social cohesion in particular social settings. It contrasts two districts in the same city that has not yet reunited in every respect, Neukölln in the West and Lichtenberg in the East, with very different patterns of relations between the established population and waves of newcomers. Social science

has demonstrated the importance of neighborhood effects on economic outcomes, but less so on immigrant integration. The proposed book shows how the Germany that intellectuals imagine and politicians debate becomes concrete only in banal, face-to-face encounters in real places. Based on a decade of comparative ethnography, it recounts conflicts and accommodations over housing, schools, public services, crime, and shared public spaces. Taken together, the rich commercial life of small ethnic enterprises, meetings of district integration councils, efforts of neighborhood managers, ecumenical events, language and orientation classes in civic associations, and joyful festivals demonstrate the gradual knitting together of local communities.





Postdoc Program 2022



Dr. Stefanie Arndt

Associate Junior Fellow
July 2021–June 2024

Project Title

Snow Depth on Antarctic
Sea Ice: A Big Unknown

Home institution

Alfred-Wegener-Institut,
Helmholtz-Zentrum für Polar-
und Meeresforschung (AWI)
Bremerhaven
Germany



Dr. Go Ashida

Associate Junior Fellow
July 2020–June 2023

Project Title

Computation in the
Auditory Periphery:
Physiological Foundations
and Comparative
Modeling

Home institution

Universität Oldenburg
AG Computational
Neuroscience
Oldenburg
Germany



Dr. Anna Auguscik

Associate Junior Fellow
September 2018–June 2022

Project Title

Expedition Narratives

Home Institution

Universität Oldenburg
Institut für Anglistik und
Amerikanistik
Oldenburg
Germany



Jun. Prof. Dr. Katharina Block

Associate Junior Fellow
July 2020–June 2023

Project Title

Digitalization and Society:
Do Social Transformations
Call for New Theoretical
Paradigms?

Home institution

Universität Oldenburg
Institut für Sozialwissenschaften
Oldenburg
Germany



Dr. Thorsten Peetz

Associate Junior Fellow
July 2020–June 2023

Project Title

Digitalization and Society:
Do Social Transformations
Call for New Theoretical
Paradigms?

Home institution

Universität Bremen
SOCIMUM – Forschungs-
zentrum Ungleichheit
und Sozialpolitik
Bremen
Germany



Dr. Jan-Claas Dajka

Associate Junior Fellow
July 2022–June 2025

Project Title

Thresholds and Biodiversity—
False Friends?

Home Institution

Universität Oldenburg
Helmholtz-Institut für
Funktionelle Marine
Biodiversität (HIFMB)
Oldenburg
Germany



Dr. Marijke de Belder

Associate Junior Fellow
July 2020–January 2023

Project Title

The Morphology-Phonology
Interface

Home Institution

Universität Oldenburg
Institut für Niederlandistik
Oldenburg
Germany



Dr. Jan Matti Dollbaum

Associate Junior Fellow
July 2020–June 2023

Project Title

Bottom-Up Policy Change
in Autocracies

Home institution

Universität Bremen
Forschungsstelle Osteuropa
Bremen
Germany



Dr. Johan C. Faust

Associate Junior Fellow
July 2022–June 2025

Project Title

Fossil Remains of Glacial
Ice Algae as a New Tool
to Reconstruct Past
Ice-Sheet Activity

Home institution

Universität Bremen
MARUM – Zentrum
für Marine Umwelt-
wissenschaften
Bremen
Germany



Dr. Nicolas W. Jager

Associate Junior Fellow
July 2021–June 2024

Project Title

Social-Ecological Fit and
Intergovernmental
Cooperation in Federal Systems

Home Institution

Universität Oldenburg
Ökologische Ökonomie
Oldenburg
Germany



Dr. Rosine Kelz
Associate Junior Fellow
July 2022–June 2025

Project Title
Environmental Political Thought
for the Anthropocene

Home institution
Universität Bremen
Institut für Interkulturelle
und Internationale Studien
UNICOM
Bremen
Germany



Dr. Johanna Kuhlmann
Associate Junior Fellow
July 2022–June 2025

Project Title
Emotions and Social Policy

Home institution
Universität Bremen
SOCIUM – Forschungs-
zentrum Ungleichheit
und Sozialpolitik
Bremen
Germany



Dr. Sarah Lentz
Associate Junior Fellow
July 2021–June 2024

Project Title
Abolitionists at Home—
Slaveholders Abroad?
The Involvement of People of
German Origin in Slavery
and the Slave Trade, 1700–1850

Home Institution
Universität Bremen
Institut für
Geschichtswissenschaft
AG Frühe Neuzeit
Bremen
Germany



Dr. des. Karsten Levihn-Kutzler

Associate Junior Fellow
July 2020–February 2022

Project Title

Imperial Britain and the
Memorialization of Extinction

Home Institution

Universität Oldenburg
Institut für Anglistik
und Amerikanistik
Oldenburg
Germany



Dr. Ravi Ranjan

Associate Junior Fellow
July 2022–June 2025

Project Title

Temperature-Nutrient
Interactions in Plants
and Algae: When Do
They Matter?

Home institution

Universität Oldenburg
Helmholtz-Institut für
Funktionelle Marine
Biodiversität (HIFMB)
Oldenburg
Germany



Dr. Dirk Scheele

Associate Junior Fellow
July 2021–July 2022

Project Title

Social Isolation and
Loneliness as Risk Factors for
Psychological Disorders:
From Neurobiological
Mechanisms to Interventions

Home institution

Universität Oldenburg
Psychiatrie und
Psychotherapie
Department für
Humanmedizin
Bad Zwischenahn
Germany



Dr. Juliane Schlesier
Associate Junior Fellow
July 2021–June 2024

Project Title
Promoting Teacher-Student
Interaction in Achievement-
Emotions Situations

Home Institution
Universität Oldenburg
Institut für Pädagogik
Lehr-Lern-Forschung
Oldenburg
Germany



Dr. Ricarda Schmidt-Scheele
Associate Junior Fellow
July 2022–June 2025

Project Title
Organizations in Transitions:
Understanding the Interplay
of Organizational Change and
Sustainable Energy Transitions

Home institution
Universität Oldenburg
Institut für Sozial-
wissenschaften
Organisation & Innovation
Oldenburg
Germany



Dr. Tim Ziemer
Associate Junior Fellow
July 2020–June 2023

Project Title
Interactive Sonification
Workshop

Home institution
Universität Bremen
Medical Image Computing
Group
Bremen
Germany





Non-Resident Fellowships 2022



Prof. Dr. Oleksandr Fisun

Fellow

November 2022–April 2023

Project Title

The Puzzle of Post-Soviet Regime Change: Informal Institutions and the Origins of Competitive Politics

Cooperation

Prof. Dr. Heiko Pleines
Universität Bremen

Home institution

V.N. Karazin Kharkiv
National University
Department of Political Science
Charkiv
Ukraine



Dr. Artem Oliinyk

Fellow

August 2022–March 2023

Project Title

Controllable Transport of Quantum Vortices in Atomic Bose-Einstein Condensates for Quantum Sensors

Home institution

Taras Shevchenko
National University of Kyiv
Kyiv
Ukraine



Prof. Dr. Natalia Kudriavtseva

Fellow

October 2022–May 2023

Project Title

Crossing the Borders and Balancing Boundaries: Language Choice and Identity-Building in Ukraine's Border Zones

Home Institution

Kryvyi Rih State
Pedagogical University
Kryvyi Rih
Ukraine



Dr. Volodymyr Kulyk

Fellow

August 2022–March 2023

Project Title

National Identity and Anti-Russian Sentiment in War-Time Ukraine

Cooperation

Prof. Dr. Heiko Pleines
Universität Bremen

Home institution

National Academy of Sciences of Ukraine
Institute of Political and Ethnic Studies
Kyiv
Ukraine



Dr. Lesia V. Smyrna

Fellow

October 2022–May 2023

Project Title

The Role of Social Traumatism in Provoking Artistic Discourse: War, Society, and Artistic Consciousness

Home Institution

The Modern Art Research Institute of the National Academy of Arts of Ukraine (MARI)
Kyiv
Ukraine



Dr. Olena Uvarova

Fellow

August 2022–March 2023

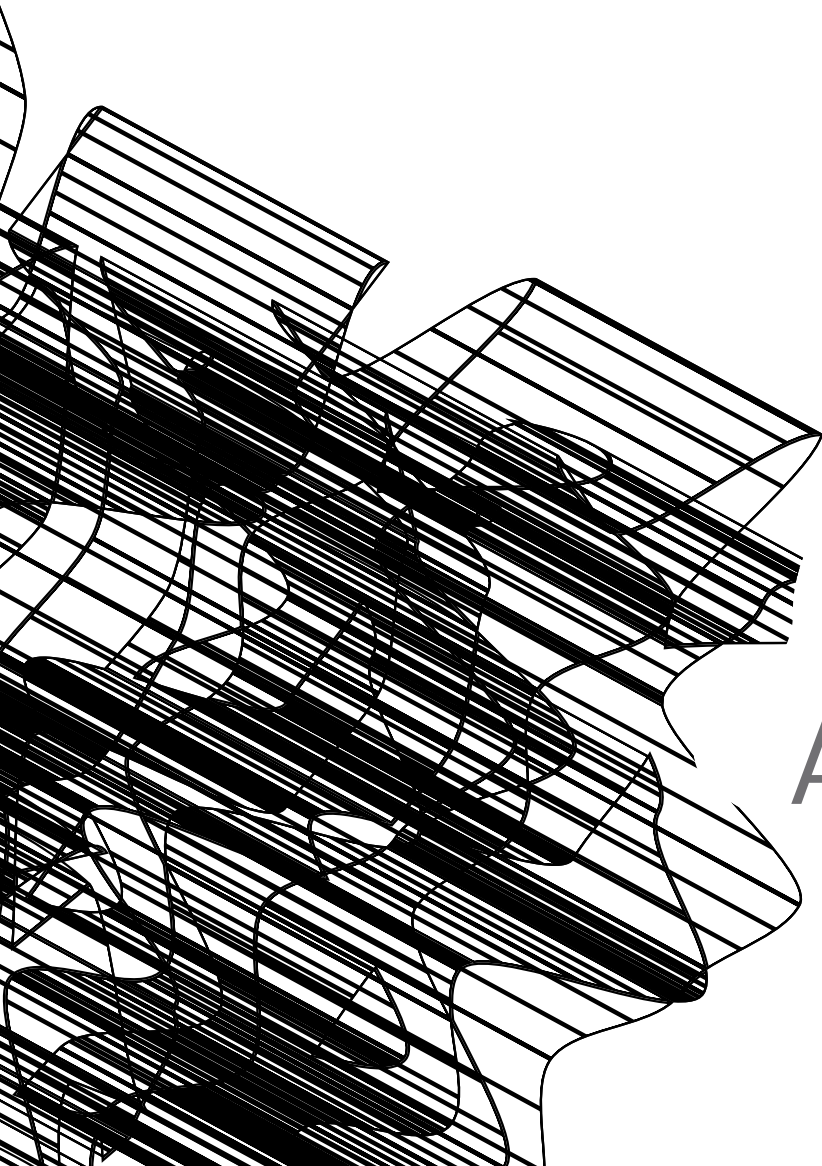
Project Title

Human-Rights Oriented Model of Business Conduct in Times of Conflict

Home Institution

Yaroslav Mudryi National Law University
Kharkiv
Ukraine





Arts & Literature 2022

● Aladin Borioli

Artist in Residence

Fellowship

October 2022–March 2023

Home institution at time of application

Independent

Bevaix

Switzerland

Cooperation partner

Dr. Dorothea Brückner

Universität Bremen



Therianthropy

I will continue to work on the film *Therianthropy*. I will focus especially on chapters 3, 4, and 5, which, while not yet fully realized, are most strongly related to the residency program and the cognitive neuroinformatics research group I wish to collaborate with. More concretely, I will edit the film, particularly the footage we made last summer with Prof. Dr. Menzel during his fieldwork near Amöneburg (Germany), where we will also film again this summer before the residency starts.

In addition, I will focus on developing experimental videos that I make with my analogue visual synthesizer. Alongside this video work, I will interview scholars directly in Bremen but also abroad with online tools and continue working on the narrative. Finally, we will develop 3D models of flying bees under the influence of pesticides using data collected from Prof. Dr. Menzel. At the end of the residency, I would like to have a public screening of the film with the residency program members and other colleagues.

● **Julia Hogan**

Writer in Residence

Fellowship

June–July 2022

Home institution at time of application

Arizona State University

Tempe, AZ

USA



Mothertongue

While at the Hanse-Wissenschaftskolleg, I will work on two novels. The first, *Mothertongue*, explores the intersections of historical and environmental violence, particularly within the American South. When Olivia moves back to her childhood home, she finds that the changed landscape reveals more about her past than she wants to remember. The second novel follows a scientist with a deep connection to an Arctic whale. Set in the near future and the distant past, this novel is heavily informed by my

conversations with scientists at other institutions such as the Alfred Wegener Institute and the European School of Governance. This novel weaves together the threads of language and identity, art and science, reality and myth-making. It is an interdisciplinary novel, and could be conceived only in such an environment. At the Hanse-Wissenschaftskolleg, I will also be working on a short story, "Those They Left Behind," in *Everything Change: Climate Anthology*, Vol III, and the story "As I Make My Crooked Way," which is to be published in *CRAFT*.

● **Lena Kußmann**

Artist in Residence

Fellowship

February 2022

Home institution at time of application

Theater an der Glocksee

Hannover

Germany



I Call It Water: Long Term Interdisciplinary Theatre Project about the Element Water in Times of Anthropocene

The topic has long been controversial, but after three years of drought and a flood catastrophe in Germany, it will require us as a society to rethink policy in the upcoming years: the distribution and handling of as well as our dependency upon water on Earth. In *I Call It Water*, we would like to take an artistic look at water from various perspectives while seeking new theatrical forms. We will focus on the problematic, acute, and human-caused issues such as the impact of drought, floods, and ecosystems within the context of climate change, policy and privatization, the economics of war and peace, pollution, and exploitation. We will also look at the global connections and impact of our activities in combination with new digital forms of theater that facilitate international

artistic work and exchange and make it approachable and tangible. We would like this project to continuously and increasingly promote exchange between artists and scientists. We place great value on not producing mere “infotainment” but on advancing artistic research on new theatrical narrative forms beyond the linear for both ourselves and our colleagues. For example, these could involve a series of connected subprojects, varied media, and fictive world-building for a possible future that could extend beyond the theater space and be experienced in analog, digital, or hybrid fashion. We would also like to further research and build upon our new working methods as an interdisciplinary collective, that we have used since our large-scale Plantkingdom project.

● **Prof. Frederick J. Reiken**

Writer in Residence

Fellowship

September–December 2022

Home institution at time of application

Emerson College

Department of Writing,

Literature & Publishing

Boston, MA

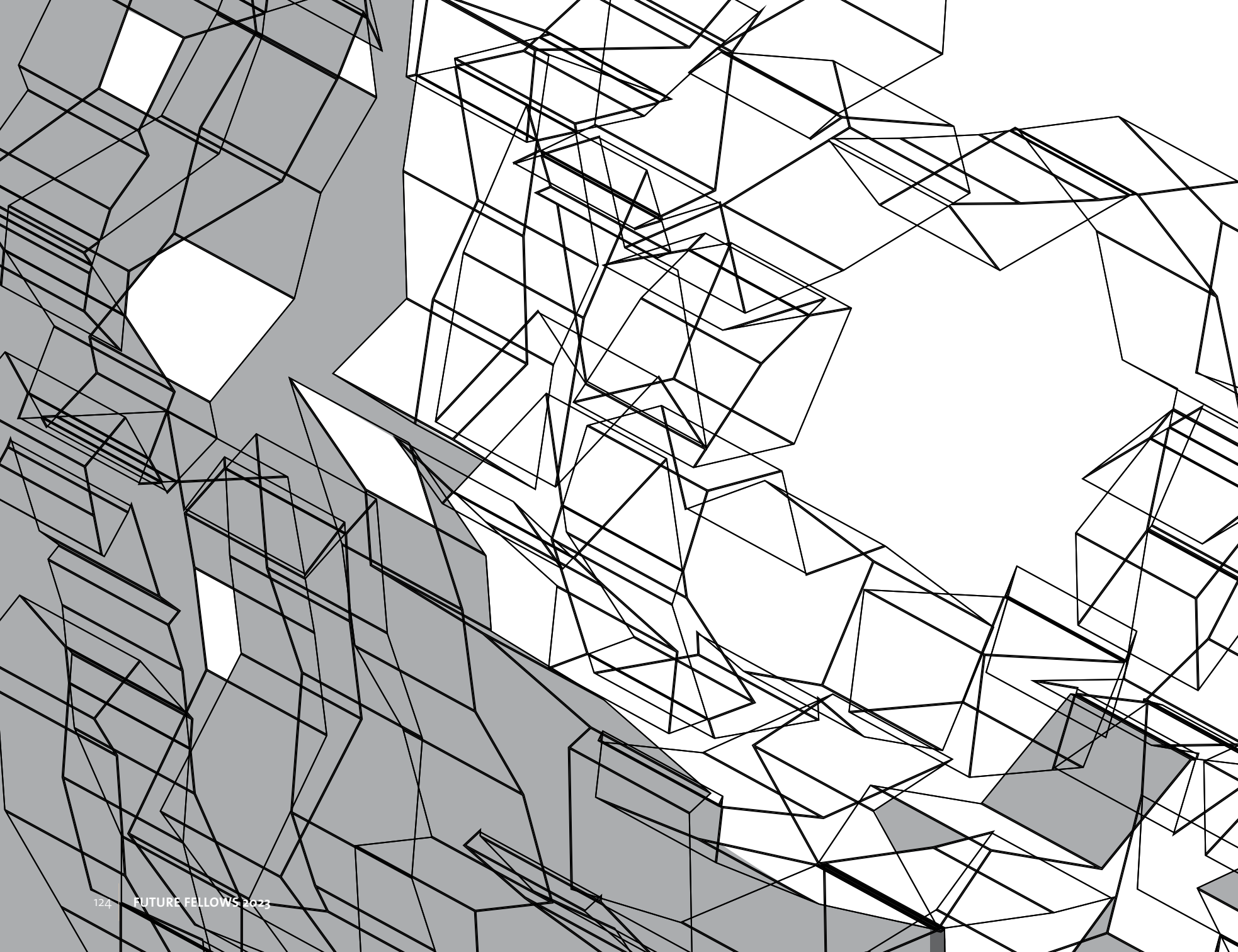
USA

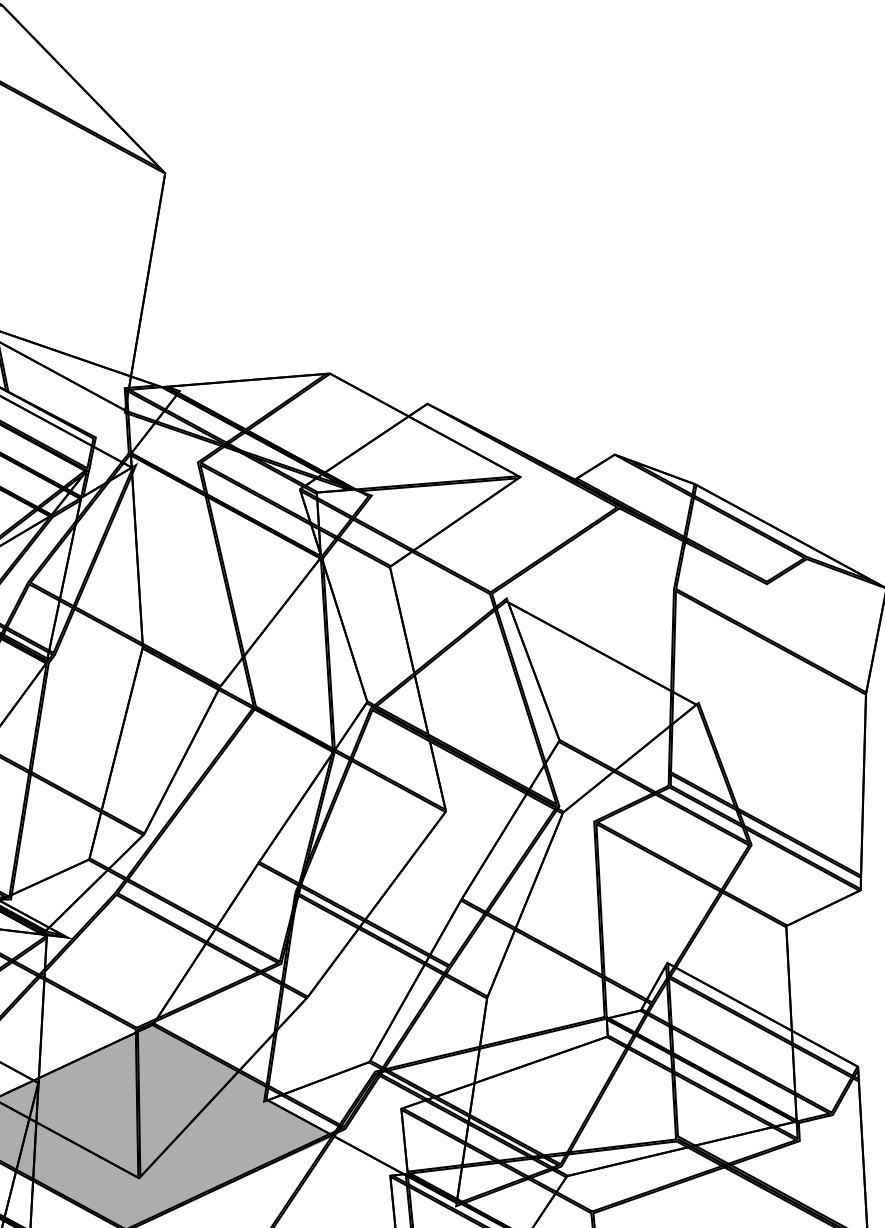


Science and Fiction and the Anthropocene

I am in the beginning phase of a new novel, one that builds on some of the scientific themes from my previous novel, *Day for Night*, which was a finalist for the Los Angeles Times Book Prize and featured a marine biologist as one of its protagonists, in narrative contexts related to endangered marine mammals as well as coral reef ecology. Though my new project is still in its nascent stage, I am drawn again to some of the same questions, with the same two indicators of ocean health—coral reefs and marine mammals—in the foreground of the narrative.

I intend to explore questions related to what possibilities remain for the preservation of these and other archetypal, wonder-inducing life forms, as we face the sobering understanding of current global warming trends and other effects of what scientists are now calling the Anthropocene epoch. As with my prior novels, I will be open to shifts in my plan as I make new discoveries in the writing process.





Future Fellows 2023

● Dr. Iris Mencke

Junior Fellow
(in cooperation with Hearing4All)

Fellowship

January–June 2023

Home institution at time of application

Max-Planck-Institut für empirische Ästhetik
Abteilung für Musik
Frankfurt am Main
Germany

Cooperation partners

Dr. Kai Siedenburg
Dr. Sebastian Puschmann
Universität Oldenburg



Tracking Uncertainty: Neural and Behavioral Correlates of Auditory Uncertainty

In daily life humans are often exposed to uncertain environments, which can be challenging because outcomes of decisions are difficult to predict with sufficient certainty. However, humans are intrinsically curious and possess an inherent drive to explore uncertain environments. Thus far, we lack a full picture of the dynamics and mechanisms with which human individuals process sensory uncertainty and how they successfully reduce uncertainty. The proposed project investigates how the human brain and behavior respond to auditory uncertainty by utilizing the inherent complexity of music, particularly that of twentieth century Western atonal music, which intrinsically possesses a high degree of uncertainty. A variety

of different analysis techniques will be employed to investigate how auditory uncertainty is represented in the brain. Additionally, by drawing on a unique sample of musicians specialized in atonal music, we will look at the effects of long-term training in this style of music. This project promises to discover novel information about how humans deal with and successfully mitigate uncertainty. It also focuses on a musical style that has largely been neglected in empirical research. Benefitting from a unique interdisciplinary convergence of neuroscience and musicology, the findings will have broad implications for the field of cognitive neuroscience and further elucidate the role that atonal music plays in Western society.

● Prof. Dr. Shuhei Ono

Fellow

Fellowship

June–August 2023

Home institution at time of application

Massachusetts Institute of Technology (MIT)
Earth, Atmospheric, and Planetary Sciences
Cambridge, MA
USA

Cooperation partners

Prof. Dr. Kai-Uwe Hinrichs
MARUM – Zentrum für Marine
Umweltwissenschaften
Universität Bremen

Dr. Gunter Wegener
Max-Planck-Institut für Marine Mikrobiologie
Bremen



Isotopologue Fractionation by Cultures Performing Anaerobic Oxidation of Methane under High Pressure

Methane is both an important energy source and a strong greenhouse gas. Understanding the sources of methane and its emission rates to the environment is essential in securing a transitional energy resource and designing a mitigation strategy for climate change.

Methane comes in different isotope configurations called isotopologues. Our laboratory has developed a novel spectroscopy technique to measure doubly isotope-substituted isotopologues ($^{13}\text{CH}_3\text{D}$ and $^{12}\text{CH}_2\text{D}_2$) to gain new insights into the biogeochemical cycles of methane in the environment. Studies so far have shown that isotopologue ratios of methane from deep marine sediments can tell the temperature of methane generation or consumption and indicates *in situ* microbe cycling of methane.

However, laboratory cultures of methanogenic and methanotrophic microbes have not reproduced signals observed in natural environments. During my sabbatical at the HWK, I propose to collaborate with Drs. Kai-Uwe Hinrichs and Gunter Wegener at MARUM – Center for Marine Environmental Sciences and Max Planck Institute for Marine Microbiology in Bremen to investigate the methane isotopologue exchange catalyzed by laboratory cultures performing anaerobic oxidation of methane. High-pressure (50 to 100 bars) culturing will better reproduce the natural geochemical conditions of marine sediments and is expected to promote a high rate of methane activation. The knowledge gained by this project will be used to estimate the geographical distributions of microbes in deep marine sediments.

● **Prof. Dr. Jing Jiang**

Fellow

Fellowship

May–September 2023

Home institution at time of application

University of Western Ontario
Dept. of Electrical & Computer Engineering
London, Ontario
Canada



Configuration and Component Sizing in Integrated Energy Systems to Reduce Carbon Footprints

Energy is the lifeblood of our modern societies. However, traditional energy systems use centralized facilities to generate electricity (e.g., use fossil fuels or nuclear units) and to process natural gas (e.g., Wintershall Dea AG), and then transfer them to consumers through power transmission lines and gas pipes. As such, (1) large energy transmission facilities may be needed even for small and remote communities; (2) such energy systems are not sustainable and can produce Green House Gas (GHG) emissions; (3) it is more difficult to incorporate locally available energy resources; and (4) as energy delivery systems span wide geographical regions, they are more susceptible to extreme weather, earthquakes, or even sabotage.

To improve overall reliability and efficiency and to reduce GHG emissions, locally available renewable energy resources should be utilized whenever possible. As a result, a new type of energy system, known as Integrated Energy Systems, has emerged. By combining electrical thermal energy with a variety of energy storage devices, one can provide a reliable energy supply to local customers. However, there are still many unanswered questions and technologies to be developed for such systems. This project investigates lifecycle carbon footprints of several energy resources commonly adopted by Integrated Energy Systems, and develops methodologies to rank them and finally determine the optimal strategies to ensure the entire system work in harmony.

● **Assoc. Prof. Dr. Oliver Zinn**

Fellow

Fellowship

October 2023–May 2024

Home institution at time of application

University of Melbourne
School of Social and Political Sciences
Parkville
Victoria
Australia

Cooperation partners

Prof. Dr. Martin Butler
Prof. Dr. Thomas Alkemeyer
Universität Oldenburg



Towards a Sociological Theory of Risk Communication

Present-day societies are confronted with a growing number of crises from climate change to the recent coronavirus pandemic and the Ukrainian war. All these require legitimate political responses that include encouragement of public commitment, for example, to sustainable living, vaccination, and less use of fossil fuel and gas. However, successful responses require voluntary support or even enforced compliance with political measures. For democratic societies, public debate is central to provide a sense of legitimacy and support for state responses, but it is increasingly characterized by controversial debate, social divisions, and fragmentation. Therefore, social-risk communication has become a major concern to secure public compliance with recommendations and legislation.

Risk communication experts have argued for a broader public engagement that would foster better regulative outcomes. However, while there is already advice literature on good risk communication available, application and implementation are limited. Available knowledge lacks conceptual integration and the consideration of broader societal conditions and changes as well as an understanding of people's engagement with risk in everyday life. This fellowship revisits key social science theories on risk and discourses in the public sphere and reviews empirical research to enhance understanding and practices of risk communication.

● **Dr. Mita Mahato**

Artist in Residence

Fellowship

January–April 2023

Home institution at time of application

Independent

USA

Cooperation partners

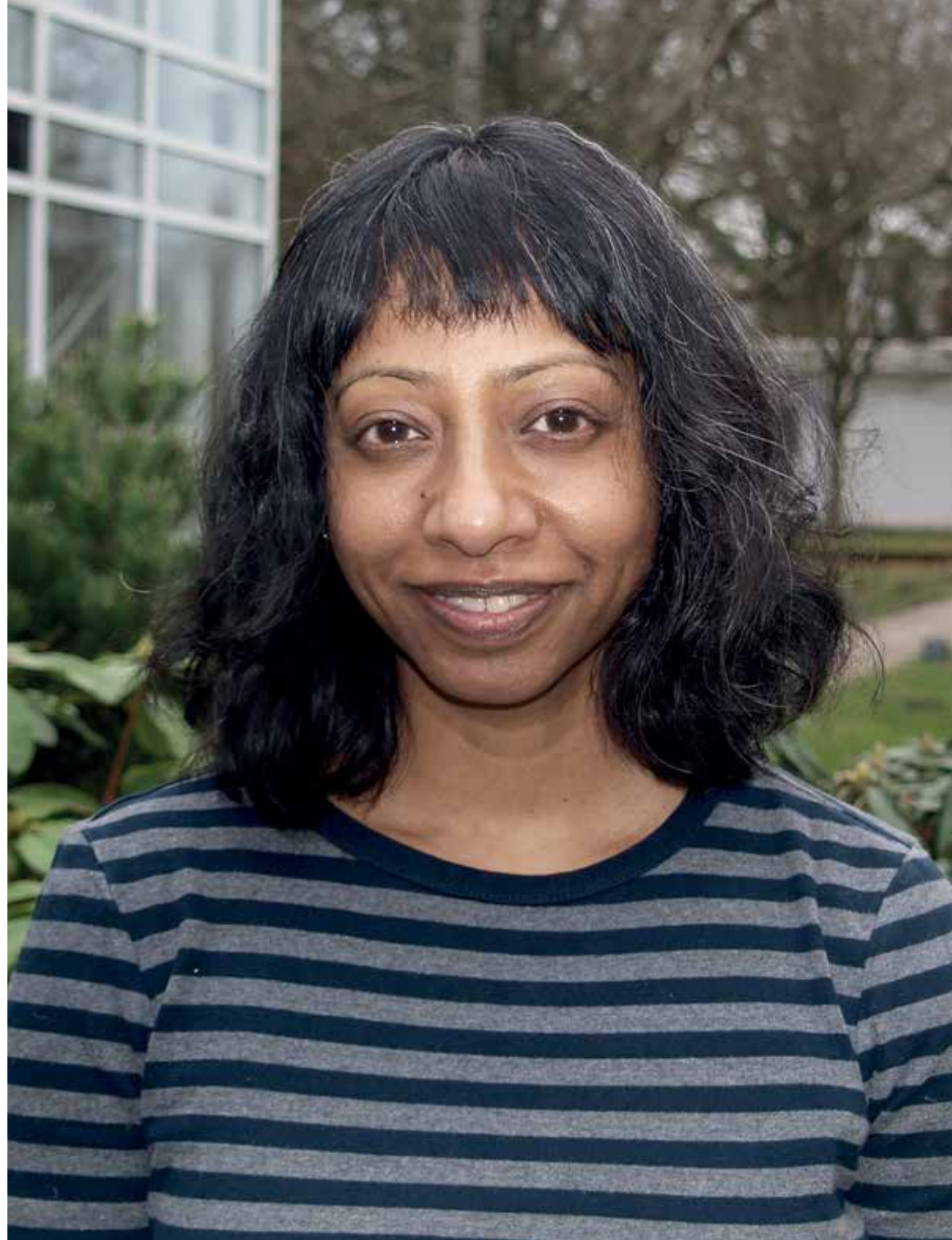
Prof. Dr. Kimberley Peters

Dr. Silke Laakmann

Helmholtz-Institut für Funktionelle

Marine Biodiversität an der

Universität Oldenburg (HIFMB)



Water Book: Connecting to Marine Biodiversity through Poetry Comics

Water Book invites artists, scientists, and participants of all ages to experiment with collage and poetry comics in an effort to think with, in, under, between, and through water. The central aims of the project are to foster understanding of the importance of marine biodiversity, appreciate connections between ocean biomes and terrestrial counterparts, understand the threats facing marine life due to climate change and associated capitalist policy, and imagine futures of thriving ecosystems.

There are three entwined components:

1. A series of public conversations and workshops that connect local water issues to marine environments
2. A creative research project focused on the unique ecosystem of whale fall
3. A collaborative print project that weaves together the first two components

The comics medium informs the project at every level: the dynamic and kinetic aspects of the medium make it well-suited to convey trans-corporeal marine realities and relations, while its approachable form is accessible to a broad range of people who may or may not be familiar with artistic processing. Moreover, integrating collage technique and poetic strategies into the comics medium invites representations of life that are many-headed, many-appendaged, and (simply put) made of many. Water Book emphasizes a necessarily communal, social, systemic approach to understanding the ocean as a space that is in relation—as composed of organisms and processes that are vitally enmeshed.

● **Isaac Yuen**

Writer in Residence

Fellowship

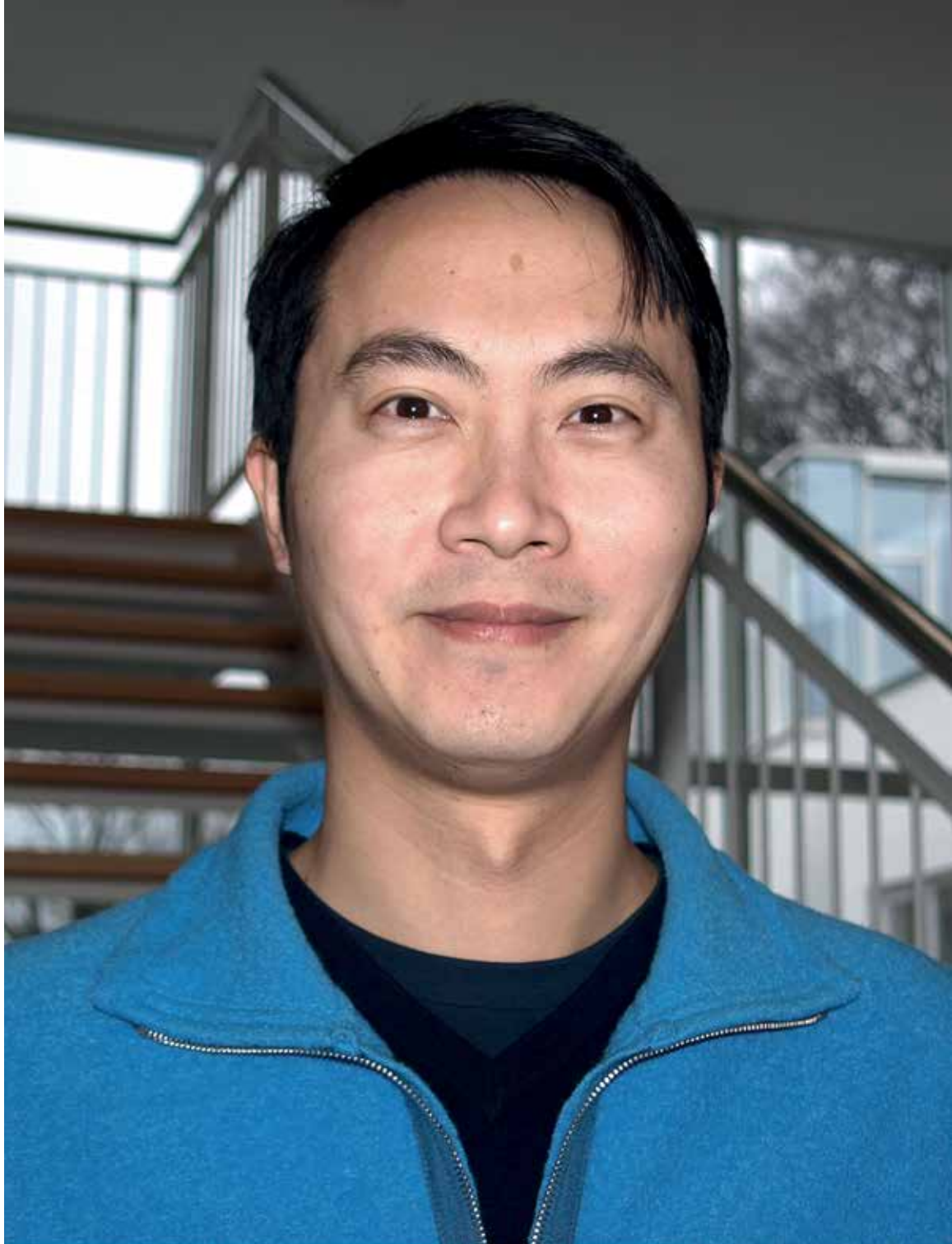
January–May 2023

Home institution at time of application

Independent

Berlin

Germany



Our Museum of the Future:
A Short Story Collection

Our Museum of the Future, a short story collection in-progress comprises a series of environmental narratives exploring science, science practitioners, and their subjects of study. Ranging across multiple disciplines, each story is conceived as part of a larger ensemble, embodying the notion that science in the twenty-first century is a collaborative venture, filled with voices spanning perspectives. Embracing the flexible and fragmentary quality inherent in short fiction, *Our Museum of the Future* will be an experiment in form, delivering narrative through field notes, abstracts, and symposium schedules, all in the service of exploring

the outer workings of science and the inner workings of scientists—the institutional barriers and existential crises, the personal motivations and doubts. Drawing stylistic inspiration from short fiction masters (Italo Calvino, Donald Barthelme, George Saunders) and nature writers (Brian Doyle, Amy Leach, Megan Mayhew Bergman), the collection will also seek to forge connections between the human and non-human world through tales that brush up against the sublime, that liminal space containing both the horror and beauty of lived experience, ever more relevant in this age of climate grief and systemic breakdown.

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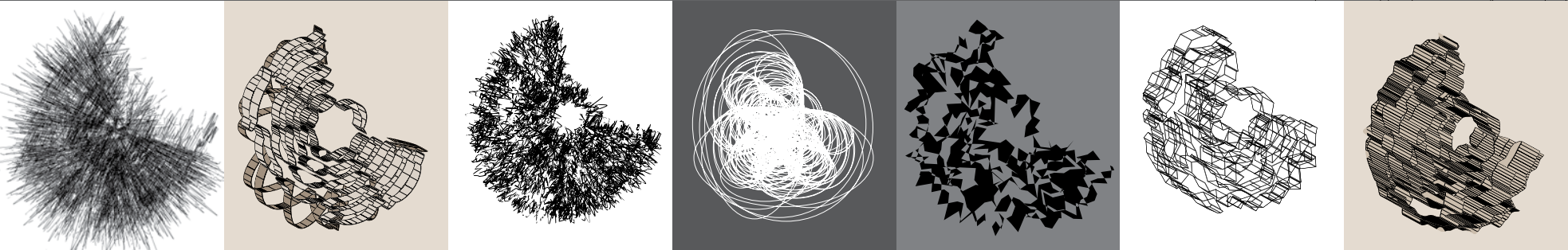
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Lehmkuhlenbusch 4
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Tel: +49 4221 9160-100

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