Resilient Society | Application of AI | Climate Change/Energy

Second Czech-German Scientific Symposium

Organised by the Saxon Academy of Sciences and Humanities in Leipzig and the Czech Academy of Sciences

Programme | Abstracts
22—23/09/25
Leipzig

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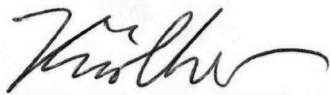
Dear Participants of the CAS-SAW Scientific Symposium,

it is our great pleasure to host this second symposium in the frame of the cooperation between the Czech Academy of Sciences and the Saxon Academy of Sciences and Humanities in Leipzig. I was more than happy that our first common symposium which took place early November 2024 in Liblice has laid the foundation for the start of a first cooperative research project. This project initiated by Professor Steger from our academy and Dr. Nitsche from the Czech Academy of Sciences investigates the question of common ethical values for medicine in Europe and is financially supported by the State Ministry of Science and Cultural Affairs of Saxony. Resulting from this project the international conference on "Common European Values for Assessment of Modern Technological Innovations in Medicine and Beyond" took place mid-July in Prague.

In our second symposium we are focusing on the three main themes: resilient society, application of artificial intelligence and climate change/energy.

The Czech Republic as well as Germany are increasingly facing problems resulting for example from an aging population and the global climate change. Therefore, I am highly convinced that it will be for the benefit of the societies in both of our countries to combine the forces of our academies and contribute together to scientific approaches for the development of solutions to these challenging issues.

The goal of our meeting is to further tighten the bonds between our two academies and I am really looking forward to potential novel joint research projects hopefully being initiated. Thus, I would like to wish all the participants of our second symposium interesting and stimulating discussions.

We are very grateful to the State Ministry of Science and Cultural Affairs of Saxony for the financial support of our symposium.

Professor Hans-Joachim Knölker
President of the Saxon Academy
of Sciences and Humanities

Foyer of Villa Klinkhardt, headquarters of the Saxon Academy of Sciences and Humanities in Leipzig

SAXON ACADEMY OF SCIENCES AND HUMANITIES IN LEIPZIG (SAW)

The Saxon Academy of Sciences and Humanities in Leipzig (SAW) – founded on July 1, 1846, as the Royal Saxon Society of Sciences – stands in the tradition of the academy concept shaped by Gottfried Wilhelm Leibniz around 1700: Bringing together scientists from various disciplines for regular exchange of ideas, discussing methods and results of specialised research in interdisciplinary dialogue, pursuing long-term research projects, and thereby linking „theoriam cum praxi."

As a scholarly society, the SAW brings together excellent scientists from wide range of fields for regular discourse. Through interdisciplinary exchange, comprehensive scientific developments are considered and new research questions are inspired. The SAW selects its full members from the regions of Saxony, Saxony-Anhalt, and Thuringia, complemented by corresponding members from across Germany and abroad. The academy has over 200 members who are organised into three classes: The Mathematical-Natural Sciences Class, the Philological-Historical Class and the Engineering Sciences Class. The Young Forum of the Saxon Academy aims to promote young scientists in Central Germany more strongly and integrate them into the academic discourse. This gives outstanding young scholars the opportunity to participate in the academic dialogue and network across disciplinary boundaries in Central Germany.

In various public event series, experts from science and politics are invited to advance the public discourse on current social and scientific policy issues. Additionally, the academy has established structural commissions where scientific discourse on current problems is conducted.

The SAW is a member of the Union of German Academies of Sciences and Humanities. In the academies programme coordinated by the Union, the largest long-term research programme in humanities and cultural sciences in the Federal Republic of Germany, the SAW currently undertakes more than 20 long-term research projects – some of them with a duration of up to 25 years. The focus areas include the creation of scientific dictionaries, historical editions and source collections, musicological editions and digital research platforms.

Another key focus of the academy is the digital humanities, where the SAW coordinates numerous collaborative projects and contributes to the National Research Data Infrastructure (NFDI). Over 100 staff members are employed at the SAW as part of these research projects.

Following an old tradition of scientific academies, the SAW awards prizes and honors, including and in collaboration with the city of Leipzig and Leipzig University, the Leipzig Science Prize, which recognises scientists who meet the highest scientific standards and help to reinforce Leipzig's reputation as a city of sciences.

CZECH ACADEMY OF SCIENCES (CAS)

The Czech Academy of Sciences is part of a Czech tradition of scientific institutions that dates back almost 300 years which began with the founding of the first enlightenment society, Societas Incognitorum, in Olomouc (1746), continued with the Prague-based Private Society of Sciences (1769), which was the basis for the Royal Czech Society of Sciences (1784), and led finally to the founding of the Emperor Franz Josef Czech Academy for Science, Literature and Art (1890–1952), the direct predecessor of the contemporary CAS.

Funding
The Czech Academy of Sciences is financed mostly from the state budget, partially from grants and other budget chapters and the CAS' own resources.

Basic research and international cooperation
The Czech Academy of Sciences is a key public non-university research institution in the Czech Republic's research, development and innovation system. It comprises a system of 52 research institutes and 2 infrastructure bodies with more than 11 thousand employees. The CAS' scientific scope encompasses a wide range of areas. Beside physical, technical, biological and chemical sciences the CAS and its 17 institutes conduct research also in the area of social sciences and humanities. The primary mission of the CAS and its institutes is to conduct top-quality research and to advance developments in scientific knowledge at the international level, while also taking into account the specific needs of both Czech society and the national culture. The Strategy AV21 research programmes is aptly characterised by the motto "Top research in the public interest", focusing on current, socially critical issues. These issues require broad-based, interdisciplinary research and inter-institutional synergy, both between CAS institutes and with other relevant external partners. In the long term the Czech Academy of Sciences supports its institutes in taking and developing further international partnerships and increasing participation in international research efforts through bilateral or multilateral collaboration program and research organisation networks on the European and global levels.

Support of excellence
The scientific policy of the Czech Academy of Sciences includes support of excellent research at its institutes. The Czech Academy of Sciences implements this support in a number of ways. One well-known avenue is the Academic Premium (Praemium Academiae) intended for scientists working on excellent research in any scientific field. Another means of support is the Otto Wichterle Award for selected promising young researchers. The Czech Academy of Sciences also supports prominent foreign scientists who are invited to collaborate with the CAS through the Jan Evangelista Purkyně Fellowship. Three of the most significant Czech scientists, Prof. Jaroslav Heyrovsky, Prof. Otto Wichterle and Prof. Antonin Holy, were researchers of three CAS institutes. One of them, Prof. Jaroslav Heyrovsky, is a Nobel Laureate.

Education

Educating young scientists and improving the quality of the national education system at all levels are crucial elements of the CAS' mission in society and an integral part of research at the Czech Academy of Sciences. CAS' educational efforts are grounded in cooperation with universities, with particular attention paid to educating students in doctoral programmes. CAS employees are also directly and extensively involved in teaching and supervising university students, while also taking part in a variety of educational and training programmes for secondary school students and teachers.

Transfer of knowledge and technology

Knowledge and technology transfer at the CAS means the application of scientific research results that bring about social change in the economy and society, especially in relation to the introduction of new technologies and services, efficient use of natural resources, creation of new jobs, support for legislation and the development of relevant public policies and other direct and indirect development of the social and cultural environment.

Website:
www.avcr.cz
www.avcr.cz/en
Social media: Bluesky, X, YouTube, LinkedIn, Instagram, Facebook

Library of the Czech Academy of Sciences

PROGRAMME

MONDAY 22/9/2025

11:45–13:00 Registration

12:00–13:00 Lunch Saxon Academy of Sciences and Humanities in Leipzig

13:00–13:10 Opening remarks
Hans-Joachim Knölker / Ondřej Santolík
Welcome address
Tim Metje

SESSION 1 Chair: Miroslac Chomát

13:10–13:40 Ladislav Kavan
Post Li-ion batteries

13:40–14:10 Martin Bertau
The future of raw material production – why we have to leave trodden paths in raw material processing

14:10–14:40 Jan Geletič
AI potential in urban environmental modelling

14:40–15:10 Manfred Wendisch
Global warming and geoengineering: methods and problems

15:10–15:40 Coffee Break

SESSION 2 Chair: Matthias Schwarz

15:40–16:10 Ingo Siegert
Biased by design? Rethinking fairness in AI through conceptual and generative perspectives

16:10–16:40 Petr Kaderka
Audio description: making the visual world accessible to the blind and partially sighted

16:40–17:10 Christian Wirth
Which trees and why?

17:10–17:40 Barbara Zitová
AI and cultural heritage

17:45–18:00 Family photo

19:00–22:00 Dinner Ratskeller Leipzig

TUESDAY 23/9/2025

SESSION 3   Chair: Harald Krautscheid

09:00–09:30	**Florian Steger** Equal access to the healthcare system as a prerequisite for participation
09:30–10:00	**Martin Víta** Mapping the landscape of AI and ML applications in science: a survey from the CAS
10:00–10:30	**Antonín Fejfar** Advances in photovoltaics for utilising solar energy

10:30–10:50   Coffee break

SESSION 4   Chair: Martin Nitsche

10:50–11:20	**Christian Schmidt** Resilience or transformation? Dependency and the need for radical change
11:20–11:50	**Julia Westermayr** Artificial intelligence in the molecular sciences: from the rules of chemical reactions to the learning and design of senses
11:50–12:20	**Vít Gvoždiak** Philosophy and the Czech public: a quantitative approach

12:20–12:30   Closing remarks

12:30–13:00   Walk to the restaurant

13:00–15:00   Lunch   Panorama Restaurant

Resilient society
Application of AI
Climate change / Energy

Venue
Saxon Academy of
Sciences and Humanities
Karl-Tauchnitz-Str. 1
04107 Leipzig

SPEAKERS AND ABSTRACTS

OPENING REMARKS | WELCOME ADDRESS

Professor Hans-Joachim Knölker

President of the Saxon Academy of Sciences and Humanities in Leipzig, Full member of
the Mathematics and Natural Sciences Class, Saxon Academy of Sciences and Humanities in Leipzig

Research focuses
- development of novel synthetic methodologies
- organometallic chemistry
- catalysis
- natural product synthesis
- biomolecular chemistry
- medicinal chemistry

Professor Ondřej Santolík

Member of the Academy Council of the Czech Academy of Sciences,
President of the International Affairs Council of the Czech Academy of Sciences,
Institute of Atmospheric Physics of the Czech Academy of Sciences

Research focuses
- Physics of space plasmas
- Linear and nonlinear wave emissions in space plasmas
- Interaction of waves with plasma medium and energetic particles
- Spacecraft data analysis and interpretation
- Spacecraft instrumentation

Dr Tim Metje

Ministerialrat, Saxon Ministry for Science, Culture and Tourism
Head of the Division for Leibniz Institutes and State-Funded Research Institutions

Chair:
Assoc. Professor Miroslav Chomát
Director of the Institute of Thermomechanics, Czech Academy of Sciences

Research focuses
- Control of electrical drives
- Electric machinery
- Power electronics
- Renewable energy

Professor Ladislav Kavan
J. Heyrovsky Institute of Physical Chemistry, Czech Academy of Sciences

Research focuses
- Nanocarbons
- Optical and Raman spectroelectrochemistry
- Oxide semiconductors
- Dye-sensitised solar cells
- Li/Zn batteries

Post Li-ion batteries

While lithium-ion (Li-ion) batteries have dominated energy storage technologies, post-lithium systems are gaining attention for addressing Li-ion limitations such as resource scarcity, safety risks, and moderate energy density. Promising alternatives include sodium-ion (Na-ion), lithium-sulfur (Li–S), and zinc-ion (Zn-ion) batteries. Na-ion systems benefit from abundant materials but offer lower energy density. Li–S batteries combine high energy density with low cost, but face safety and lifespan challenges. Zn-ion batteries are safe and inexpensive, yet limited by low energy density. Advancing these technologies requires, inter alia, a detailed understanding of the electronic structures of electrode materials. Studies using single crystals, polycrystalline, and quasi-amorphous thin films have produced useful data, though numerous open questions remain. A particularly promising direction is Zn/Li dual-ion battery with water-in-salt electrolytes (WiSE) and olivine-type cathodes such as $LiFePO_4$ or $LiMnPO_4$, which offer a balance of safety, sustainability, and performance.

Professor Martin Bertau

Full Professor of Chemical Technology, Freiberg University of Mining and Technology,
Secretary and Full member of the Mathematics and Natural Sciences Class, Saxon Academy
of Sciences and Humanities in Leipzig

Research focuses

• Development of economically viable processes for the
  energy- and resource-efficient production of technology metals

The future of raw material production – why we have to leave trodden paths in raw material processing

The present e present era has allowed us to witness far-reaching changes in society and industrial production. Events in 2022 have taught us that access to sufficient and affordable energy is crucial for industrial production. At the same time, we have experienced the most severe raw material crisis since 2017. This situation is particularly severe for the chemical industry, which relies heavily on cheap access to raw materials and energy. Both companies and national entities have learnt that neither raw materials nor energy are guaranteed to be cheap, nor is the raw material base secure.

The chemical industry is clearly a pioneer in developing and adapting novel technologies that help save energy and raw materials, and it is also a forerunner in applying more efficient methodologies. However, there is still much to be done. There is still a clear distinction between industries that process primary and secondary raw materials. This has resulted in parallel markets developing for the respective products, because in most cases the reprocessed product does not reach the quality of primary raw materials. In fact, true recycling is rare, as seen with noble metals and copper. Everything else is down-cycling, even if the secondary raw material is used to produce a product of defined composition, as in the case of scrap used in steel production. In this context, however, an alloy is obtained rather than pure iron. Consequently, the concept of advanced resources chemistry (Wertstoffchemie in German) represents a complete departure from tradition. It describes all origin-independent processes and methodologies for producing chemical raw materials. This concept removes the boundaries between primary (mining) and secondary (recycling) raw materials.

Why origin-independent? If the focus is on the product, irrespective of where the starting materials originate, then both mine products and recyclable materials are processed along a single process chain. In other words, material that has already undergone one or more product cycles is inevitably regenerated to the quality of the original product, as there is only one technology chain. Only the entry points may differ. Consequently, Advanced Resources Chemistry implements the ‚planetary boundaries' wherever possible, which in turn makes industrial chemical processes more future-proof. Yet, even in the third decade of the new millennium, the technology used for recovering and processing raw materials largely originates from the middle of the last century, when oil was abundant and climate change was not an issue. These technologies are highly susceptible to geopolitical faults, economic imbalances, price shifts and uncertainty in oil and gas production. However, to meet the demands of the forthcoming decades, modern processes must adhere to the principles of a) Climate neutrality / b) Zero-waste production / c) Low CO_2 footprint / d) Water saving / e) Use of renewable energy / f) Energy and resource efficiency. This is foreseeably the standard by which sustainable production will be assessed in the future, and the direction in which new developments must go. Replacement can be a solution to these challenges.

Dr Jan Geletič

Department of Complex Systems, Institute of Computer Science, Czech Academy of Sciences, Department of Atmospheric Physics, Faculty of Mathematics and Physics, Charles University, Czech Republic

Research focuses
• Urban climate

## AI potential in urban environmental modelling

Urban areas are increasingly vulnerable to climate change impacts, particularly heatwaves. Related changes will directly affect the thermal comfort of dwellers. Previous studies revealed interesting patterns; daytime heat stress increases more uniformly across the city, whereas nighttime heat stress exhibits greater spatial heterogeneity. They are driven by factors such as shading, land cover or material properties. However, the influence of the factors above on outdoor thermal comfort, a precise understanding of all effects and interactions or their future prediction, remains insufficiently quantified. The current most accurate models, due to the complexity of urban surroundings, are based on the large-eddy simulation principle. Although this approach enables us to simulate an urban environment in the units of meters, it requires extreme computational cost; this represents a potential for deep learning models designed to predict human thermal comfort in complex urban environments.

Professor Manfred Wendisch

Professor of Atmospheric Radiation at Leipzig University,
Full member of the Mathematical-Natural Sciences Class, Saxon Academy
of Sciences and Humanities in Leipzig

Research focuses
• Atmospheric radiation
• Arctic climate changes
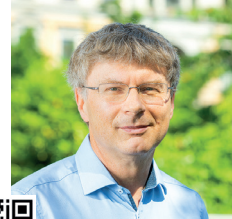
Global warming and geoengineering: methods and problems

This presentation summarises the physical principles of the atmospheric greenhouse effect, as well as methods for mitigating global warming that are currently being discussed in scientific literature. Various methods of geoengineering are introduced. These include the removal of carbon dioxide from the atmosphere and methods for reducing solar radiation. The associated challenges are evaluated. Finally, the advantages and disadvantages of actively changing the Earth's climate are discussed, including critical questions, conclusions, and perspectives.

SESSION 2

Chair:

Professor Matthias Schwarz

Professor of Mathematics in the Sciences at Leipzig University,
Secretary and Full member of the Mathematical-Natural Sciences Class,
Saxon Academy of Sciences and Humanities in Leipzig

Research focuses
• Hamiltonian dynamical systems
• Symplectic topology

Junior Professor Ingo Siegert

Head of the Mobile Dialogue Systems working group at Otto von Guericke University Magdeburg,
Member of the Young Forum, Mathematical-Natural Sciences Class,
Saxon Academy of Sciences and Humanities in Leipzig

Research focuses
• Intelligent voice assistance systems
• AI-based analyses of speech and acoustics
• Fairness in speech data

Biased by design?
Rethinking fairness in AI through conceptual and generative perspectives

Bias is a frequently cited yet ambiguously defined concept in AI discourse. Often equated with unfairness, it is in fact an inherent and necessary feature of intelligent systems. In this talk, I explore a conceptual distinction between bias, discrimination, and fairness, emphasising that fairness requires normative clarity rather than the mere absence of bias.

I then examine how generative AI models reproduce social biases despite inclusive prompts. Image generation systems like DALL·E 3 often reinforce Western beauty ideals, stereotypical gender roles, and a lack of ethnic or age diversity. These outputs reveal deeply embedded cultural assumptions that cannot be corrected through surface-level prompt design.

Taken together, these perspectives call for a more nuanced, goal-driven understanding of bias — one that critically reflects on representation and actively shapes fairer AI systems.

Dr Petr Kaderka
Czech Academy of Sciences, Czech Language Institute

Research focuses
- Audio description practices, including the integration of AI technologies,
  as well as semiotic multimodality – particularly gestures, gaze,
  and facial expressions in face-to-face interaction

Audio description: making the visual world accessible to the blind and partially sighted

This presentation explores the role of audio description (AD) in enabling access to visual content for blind and visually impaired audiences. It addresses the semiotic challenges involved in translating visual information into verbal narration and examines both the production and reception of AD through the lens of ethnographic research. Key topics include the application of the relevance principle, the granularity of descriptive detail, and the influence of linguistic choices on user experience. The talk also considers how AD practitioners navigate the balance between objectivity and creativity, and how emerging technologies are reshaping standards of quality and accessibility. By integrating theoretical insights with practical perspectives, this lecture contributes to ongoing efforts to refine AD methodologies and adapt them to diverse media environments, promoting greater inclusivity and communicative effectiveness.

Professor Christian Wirth

Professor of Functional Biodiversity Research and Head of the Botanical Garden of Leipzig University, Founding director of iDiv and external member of the Max-Planck-Institute for Biogeochemistry, Jena, Full member of the Mathematical-Natural Sciences Class, Saxon Academy of Sciences and Humanities in Leipzig

Research focuses

- Relationship between biodiversity and ecosystem functioning
- Global change biology
- Biodiversity-climate feedbacks
- Cultural ecosystem services

Which trees and why?

As climate change accelerates, Central Germany may experience a climate similar to that of Northern Italy by the end of this century. This shift poses significant challenges to our current forest ecosystems and the species that compose them. The wave of tree mortality following the prolonged drought from 2018 to 2022 was an early indicator of the profound changes we can expect in the coming decades. How can we harness biodiversity to develop nature-based solutions for the forests of the future? Which tree species will thrive in a novel climate while continuing to provide the ecosystem services – including cultural values – that we rely on? What are the opportunities and risks associated with introducing non-native tree species? Traditional forest science, shaped over the past 200 years under pre-climate change conditions, offers only limited guidance in this era of rapid transformation. This talk will introduce two innovative experimental platforms in Central Germany: the ARBOfun research arboretum and the MyDiv experiment. It will also present their interdisciplinary research programs designed to address these pressing questions, along with some initial findings.

Assoc. Professor Barbara Zitová

Institute of Information Theory and Automation (UTIA), Czech Academy of Sciences,
Charles University and Czech Technical University

Research focuses
• Image and video data processing
• AI and ML methods
• Applications in industry, surveillance, art analysis, agriculture

AI and cultural heritage

Artificial intelligence offers opportunities for analyzing historical objects in cultural heritage, transforming how we understand and preserve our past. In this talk, I will demonstrate how computational methods address diverse aspects of heritage preservation. I will present our work on revealing hidden underdrawings in paintings through advanced image processing, showing how AI uncovers artists' preliminary sketches and pentimenti, and thus providing insights into creative processes and authentication. Our algorithms for restoring degraded paintings, where their fragments have falled out, employ machine learning to find their original positions. Most innovatively, I will discuss our current project Scentinel, which extends AI applications beyond visual heritage. This initiative aims at capturing and digitally preserves cultural heritage smells. These examples illustrate how AI not only analyzes existing heritage data but creates entirely new archival possibilities.

Chair:
Professor Harald Krautscheid

Professor of Inorganic Chemistry, Leipzig University, Deputy Secretary and Full member of the Mathematical-Natural Sciences Class, Saxon Academy of Sciences and Humanities in Leipzig

Research focuses
• Molecular complexes as precursors for solid state materials
• Metal-organic frameworks

Professor Florian Steger

University professor and Director of the Institute for History, Theory and Ethics of Medicine
at the University of Ulm, Honorary professor at the State Paediatric Medical University of St. Petersburg,
Corresponding member of the Mathematical-Natural Sciences Class,
Saxon Academy of Sciences and Humanities in Leipzig

Research focuses
• Research ethics, clinical ethics, good scientific practice
• Politicised medicine
• Cultural history of medicine since antiquity

Equal access to the healthcare system as a prerequisite for participation

Equal access to healthcare should be a matter of course for everyone in Europe. Only those who have access can participate in healthcare. Questions of autonomy presuppose access. In my presentation, I will show the research results of the HERA-funded EU project that I carried out together with colleagues from Slovenia, Croatia and Poland. We have identified a whole range of ethically significant challenges that need to be addressed in order to enable this right of access in Europe. In my contribution, I will start with European norms and directives, then talk about national legislation and guidelines, and finally take a closer look at relations in medical practice. In our interdisciplinary network of scientists, we have been able to identify a number of social determinants that hinder this supposedly self-evident access. In my presentation, I will describe processes of social integration and exclusion. Becoming aware of the fact that even in Europe we do not provide every citizen with equal access to healthcare is of great importance in terms of the resilience of a society. Only awareness of this fact enables society to strive to ensure that every citizen can participate in the healthcare system.

Dr Martin Víta

Institute of Computer Science, Czech Academy of Sciences

Research focuses
• Applications of NLP: NLP for the detection of cognitive impairment

Mapping the landscape of AI and ML applications in science: a survey from the CAS

AI mapping is a cornerstone of AI HUB – one of five topics covered by the Strategy AV21 programme "AI: Artificial Intelligence for Science and Society". The main aim of this activity is to create a systematic and comprehensive overview of how AI/ML approaches are being utilised across all the institutes of the Czech Academy of Sciences. This effort is designed to foster further cooperation both within and outside the Academy and also to support knowledge transfer activities. In the first part of this talk, we are going to introduce AI mapping from the "methodological" point of view: as a set of interconnected tasks involving information extraction, text mining and NLP (e.g., training of corresponding SciBERT-based text classifiers). This process is subsequently enriched by qualitative and quantitative research. In the second part, we are going to present key results of the mapping illustrating several highlights of using AI/ML models in different scientific domains and also brief reports that may inspire potential international collaborations with diverse research groups of the Czech Academy of Sciences.

Dr Antonín Fejfar

Institute of Physics, Czech Academy of Sciences

Research focuses
- Thin films and nanostructures in photovoltaics
- Data management in the field of physics and materials science
- Open science and research infrastructures

Advances in photovoltaics for utilising solar energy

As technology for solar photovoltaics (PV) matured, it gave rise to a major industry, dominating new installations of electricity sources worldwide. The global installed photovoltaic (PV) capacity reached 1 TWp in 2022 and PV entered the terawatt scale. PV plays a pivotal role in the REPowerEU programme of the European Commission, aiming at decarbonization and reducing the dependence on energy supplies by Russia. Even more stunning are parallel developments in other countries.

The design and production of the solar cells and panels are based on highly sophisticated techniques, using nanometer-thin films, yet produced at the scale of hundreds of km2 annually.

Despite this, photovoltaics globally still provides only ~3% of primary energy consumption, and public debate about increasing this share invariably leads to doubts about the intermittency, grid capacity and stability of the required area.

In this respect, it is useful to draw parallels with other technical inventions that started as meager undertakings and came to dominate our lives (such as automotive industries or networks of irrigation or sewage systems).
Within this context, we will also review our involvement in the research of the silicon heterojunction cells with interdigitated back contacts which are developed for renewing photovoltaic production in Europe. In this field cooperation with companies and research teams in Saxony has been eminent and it is worth noting, in the context of the global story of photovoltaics.

SESSION 4

Chair:
Dr Martin Nitsche

Chair of the Department of Contemporary Continental Philosophy
at the Institute of Philosophy, Czech Academy of Sciences

Research focuses
- Contemporary European philosophy (phenomenology)
- Philosophy of religion, space, art and perception
- Societal resilience

Dr Christian Schmidt

Institute of Philosophy at Humboldt University in Berlin,
Member of the Young Forum, Philological-Historical Class, Saxon Academy
of Sciences and Humanities in Leipzig

Research focuses
- Social philosophy
- Philosophy of law and history with historical emphasis on Hegel and
  the Hegelian Left (especially Marx and the Marxism), the authors of critical theory,
  Heidegger, Foucault and the French philosophy of the 20th century

Resilience or transformation? Dependency and the need for radical change

Resilience describes a mode of crisis response. The resilient entity mobilises resources for adaptation and switches back to a normal mode of conduct. In the case of the socio-ecological transformation that responds to the multiple ecological, social, economic, and political crises, this model suggests the development of new sources of renewable, "clean" energy that fit into existing structures of production, transport, communication, economic exchange, etc. In the paper, I will argue that this is a too limited view of the necessary technological paradigm shift. In a second step, I will also question the view that technological paradigms determine social developments. While there is some need for coherence between social and technological structures, in times of paradigm shifts social and political factors can become dominant. I will discuss the need for such a reversal in the light of upcoming land-use conflicts. In the conclusion, I will try to present a comprehensive picture of technological change that includes political, economic, social, and legal dimensions.

Junior Professor Julia Westermayr

Jun.-Professor at the Wilhelm Ostwald Institute for Physical and Theoretical Chemistry, Leipzig University,
Member of the Young Forum, Mathematical-Natural Sciences Class,
Saxon Academy of Sciences and Humanities in Leipzig

Research focuses
- Machine learning in photochemistry: development of neural networks and prediction and control of photodynamic processes
- Machine learning in fragrance research
- Machine learning for spectroscopy (from vibrational spectroscopy to electron diffraction) and learning time-dependent properties of molecules and materials
- Material design / generative modelling

Artificial Intelligence in the Molecular Sciences: From the Rules of Chemical Reactions to the Learning and Design of Senses

Artificial intelligence (AI) is transforming the way we understand and design chemical systems, with far-reaching implications for sustainability, energy, and sensory applications such as taste and smell. In this talk, I will present how AI can be used to learn the fundamental rules that govern chemical reactivity and molecular behavior, particularly in complex excited-state and reactive systems. I will demonstrate how machine learning models trained on quantum chemical data can predict and interpret molecular properties, and how this combination of theory, data, and AI enables the design of novel molecules and materials. Finally, I will outline current challenges in applying AI to subjective properties such as smell and taste, and highlight opportunities for bridging molecular modeling with human perception.

Dr Vít Gvoždiak
Institute of Philosophy, Czech Academy of Sciences

Research focuses
• Philosophy of language and communication
• Semiotics
• Pragmatics

Philosophy and the Czech public: a quantitative approach

What do people mean when they talk about "philosophy"? Public conceptions of philosophy are diverse, often conflicting, and accompanied by varying views on its value, relevance, and role in society. While existing research (such as the large-scale international study by David Bourget and David Chalmers in 2020) has focused primarily on how philosophy is perceived by disciplinary specialists, this paper shifts attention to a different perspective: that of the general public. The paper introduces the main findings of a representative survey conducted among the adult population of the Czech Republic (N = 1016), which explores public understandings of philosophy, attitudes towards its societal importance, and perceptions of its usefulness. The results are interpreted within a broader socio-cultural framework, taking into account historical and educational contexts, media portrayals of philosophy, and general trends in public trust towards academic disciplines.