



Czech Academy  
of Sciences



Sächsische Akademie  
der Wissenschaften zu Leipzig

# Czech-German Scientific Symposium

Organized by  
the **CZECH ACADEMY OF SCIENCES**  
and  
the **SAXON ACADEMY OF SCIENCES  
AND HUMANITIES IN LEIPZIG**

on  
**ENERGY, SUSTAINABLE AGRICULTURE  
and RESILIENT SOCIETY**

**Programme and Abstracts**  
4<sup>TH</sup> — 5<sup>TH</sup> NOVEMBER 2024, LIBLICE

*The photo on the front page was provided  
by Stanislava Kyselová / Akademie věd ČR*



Dear Participants,

It is my great honour and pleasure to welcome you to the first symposium resulting from the new collaboration between the Czech Academy of Sciences and the Saxon Academy of Sciences and Humanities in Leipzig. This collaboration, formalized by the signing of a scientific cooperation agreement in 2023, represents a significant step towards strengthening scientific ties between our institutions and regions.

The symposium focuses on three key topics that are crucial for our future: energy, sustainable agriculture, and resilient society.

**1. Energy:** In this section, we will explore innovative approaches to the production, transportation, storage, and utilization of energy in all its forms. We will discuss activities in Strategy AV21 sustainable energy program, energy processing of waste, ceramic composites for heat conversion applications, thermophysical property research and the challenges of climate resilient development.

**2. Sustainable Agriculture:** This part of the symposium will focus on methods and technologies that enable food production with minimal environmental impact. We will address sustainable agriculture under climate change and its changes over time and technological revolutions, the CzechGlobe warning systems, and the impacts of the food system on human health.

**3. Resilient Society:** In this section, we will discuss how we can strengthen the resilience of our societies. We will talk about strategies for improving societal resilience, the resilience of academic institutions, ethical issues in the use of AI technology in the treatment of geriatric patients, and the future of minority languages in Europe.

I believe that sharing knowledge and experience in these areas will enable us to face global challenges more effectively and contribute to the sustainable development of our societies, and also with respect to our regions.

I wish you inspiring and fruitful discussions and look forward to the outcomes of this symposium.

A handwritten signature in blue ink, appearing to read 'Eva Zažímalová'.

**Professor Eva Zažímalová**

*President of the Czech Academy of Sciences*





# CONTENTS

---

Czech Academy of Sciences (CAS) .....	6
Saxon Academy of Sciences and Humanities in Leipzig (SAW) .....	8
Programme .....	9
Opening remarks.....	11
Session Chairs .....	12
DAY 1 abstracts .....	14
DAY 2 abstracts .....	21

# 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 performing 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 the Czech society and the national culture. The Strategy AV21 research programmes aptly characterised by the motto "Top research in the public interest" which focuses 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. Over 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 Czech most significant scientists Prof. Jaroslav Heyrovský, Prof. Otto Wichterle and Prof. Antonín Holý were researchers of three CAS institutes. One of them Prof. Jaroslav Heyrovský 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 on 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 changes 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.

Please visit our website at [www.avcr.cz](http://www.avcr.cz) or [www.avcr.cz/en](http://www.avcr.cz/en)

and follow us on  [@CzechAcademy](https://twitter.com/CzechAcademy) or [@Akademie\\_ved\\_CR](https://twitter.com/Akademie_ved_CR).

# **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 specialized 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 organized 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 recognizes scientists who meet the highest scientific standards and help to reinforce Leipzig's reputation as a city of sciences.

<b>registration</b>			
12:00	13:00	Lunch	Chateau Restaurant
13:00	13:10	<b>Opening remarks</b>	David HONYS, Hans-Joachim KNÖLKER
<b>Session 1</b>		<b>Chair</b>	Jiří PLEŠEK
13:10	13:40	Hans WIESMETH	The Challenges of Climate Resilient Development
13:40	14:10	Lenka BARTOŠOVÁ	Warning systems operated by CzechGlobe for the Czech Republic
14:10	14:40	Martin NITSCHÉ	Societal resilience - a multi-system approach
14:40	15:10	Markus RICHTER	Thermophysical Property Research – An Evergreen in Science and Industry
15:10	15:40	Coffee break	
<b>Session 2</b>		<b>Chair</b>	Matthias SCHWARZ
15:40	16:10	Christian SCHMIDT	Resilience or Transformation? Dependency and the Need for Radical Change
16:10	16:40	Karel KLEM	Sustainable agriculture under climate change: research on expected impacts, and opportunities for adaptation or mitigation
16:40	17:10	Miroslav CHOMÁT	Activities in Strategy AV21 Program Sustainable Energy
17:10	17:40	Kateřina MACHOVCOVÁ	Complicated relationship between academic leadership and resilience
17:40		Close of day 1	
18:45	18:55	Family photo	Marble Hall or foyer of the Chateau Restaurant
19:00		Welcome by Eva ZAŽÍMALOVÁ	Chateau Restaurant
19:00	21:00	Dinner	Chateau Restaurant

<b>registration</b>			
<b>Session 3</b>		<b>Chair</b>	Harald KRAUTSCHEID
9:00	9:30	Michal ŠYC	Resource recovery in waste-to-energy
9:30	10:00	Gabriele STANGL	Food System and One Health
10:00	10:30	Gero VOGL	The endangered Future of Minority Languages in Europe as viewed by Physicists
10:30	10:50	Coffee break	
<b>Session 4</b>		<b>Chair</b>	David HONYS
10:50	11:20	Michael SCHEFFLER	Micro-Macro Cellular Ceramic Composites for Heat Conversion Applications
11:20	11:50	Roman HOBZA	Sustainable agriculture through the changes of time and the never-ending technological revolutions
11:50	12:20	Florian STEGER	An ethical assessment of the implementation of an artificial intelligence-based technology into the geriatric patient treatment and continuity of care
12:20	12:30	<b>Closing remarks</b>	David HONYS, Hans-Joachim KNÖLKER
12:30	13:30	Lunch	Chateau Restaurant
The scientific programme will take place in the Marble Hall, 1st floor.			

- Energy
- Sustainable Agriculture
- Resilient Society

## OPENING REMARKS

---



### **Professor David Honys**

*President of the Council for International Affairs of the Czech Academy of Sciences  
Member of the Academy Council of the Czech Academy of Sciences  
Institute of Experimental Botany of the Czech Academy of Sciences*

David Honys defended his doctoral thesis at the Faculty of Science of Charles University, Prague in 2000, and he worked as a postdoctoral fellow at the University of Leicester (2002–2003). Since 1994, he has been working at the Institute of Experimental Botany of the CAS as a researcher, since 2004, he has been the head of the Laboratory of Pollen Biology and between 2007 and 2012 he served as the Deputy Director. Since 2017, he has been a member of the CAS Economic Council. Currently, he serves CAS as the Deputy Vice-President, the Member of the Academy Council and the President of the Council for International Affairs. David Honys has long been involved in the developmental biology of plants in relation to their reproduction. In 2021, he was appointed Professor of genomics and proteomics at Masaryk University. He is a member of the subject area boards of doctoral study programs of Charles University, Masaryk University and the Czech University of Life Sciences Prague. He also lectures advanced semester courses at Charles University.



### **Professor Hans-Joachim Knölker**

*President of the Saxon Academy of Sciences and Humanities in Leipzig  
Professor of Organic Chemistry, Technical University of Dresden*

Hans-Joachim Knölker studied chemistry at the universities of Göttingen and Hannover (Germany), where he received his Ph.D. with Eckehardt Winterfeldt in 1985. After postdoctoral studies in 1986 in the research group of K. Peter C. Vollhardt at the University of California in Berkeley (USA), he returned to Germany to complete his habilitation in 1990 at the University of Hannover. In 1991, he was appointed as full professor on the chair of organic chemistry at the University of Karlsruhe, where he served as dean of the faculty from 1995 to 1997. In 2001, he accepted a position as Professor of Organic Chemistry at the Technische Universität Dresden from which he retired in September 2024. Professor Knölker was a visiting scientist in India as fellow of the Indian National Science Academy and he received twice (in 1998 and 2007) the award of the Japan Society for the Promotion of Science. In 2006, he was elected as an Ordinary Member of the Saxon Academy of Sciences and became a fellow of the Royal Society of Chemistry. Since 2011, he is the editor-in-chief of the series “The Alkaloids” (Academic Press, London) and since January 2024, he is the President of the Saxon Academy of Sciences and Humanities in Leipzig.

## SESSION CHAIRS

---



### **Professor David Honys**

*President of the Council for International Affairs of the Czech Academy of Sciences  
Member of the Academy Council of the Czech Academy of Sciences  
Institute of Experimental Botany of the Czech Academy of Sciences*

David Honys defended his doctoral thesis at the Faculty of Science of Charles University, Prague in 2000, and he worked as a postdoctoral fellow at the University of Leicester (2002–2003). Since 1994, he has been working at the Institute of Experimental Botany of the CAS as a researcher, since 2004, he has been the head of the Laboratory of Pollen Biology and between 2007 and 2012 he served as the Deputy Director. Since 2017, he has been a member of the CAS Economic Council. Currently, he serves CAS as the Deputy Vice-President, the Member of the Academy Council and the President of the Council for International Affairs. David Honys has long been involved in the developmental biology of plants in relation to their reproduction. In 2021, he was appointed Professor of genomics and proteomics at Masaryk University. He is a member of the subject area boards of doctoral study programs of Charles University, Masaryk University and the Czech University of Life Sciences Prague. He also lectures advanced semester courses at Charles University.



### **Professor Harald Krautscheid**

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

Harald Krautscheid, born 1964 in Pforzheim, Germany, studied Chemistry at Universität Karlsruhe (T.H.). He received his doctoral degree in 1991 under supervision of Dieter Fenske. After a postdoctoral stay in the group of Tom B. Rauchfuss at the University of Illinois at Urbana-Champaign, USA, he returned to Karlsruhe, where he completed his habilitation in 1996. In 2002 he was appointed full professor for Inorganic Chemistry at Universität Leipzig. His research interests concern synthesis and characterization of Metal-Organic Frameworks (MOFs), heteronuclear complexes as precursors for inorganic materials and chemical vapor deposition experiments. Harald Krautscheid acted as Dean and Dean of student affairs of Faculty of Chemistry and Mineralogy. Since 2007 he is a full member of Sächsische Akademie der Wissenschaften, currently he is deputy secretary of the Mathematical-Natural Sciences Class.





## **Dr Jiří Plešek**

*Member of the Academy Council of the Czech Academy of Sciences  
Institute of Thermomechanics of the Czech Academy of Sciences*

Jiří Plešek graduated from the Faculty of Mechanical Engineering of the Czech Technical University in 1984. He finished his PhD degree at the former Czechoslovak Academy of Sciences in 1992. In 1993, he co-founded a limited company serving to industrial needs in the fields of thermal, stress and seismic analyses of mechanical parts, namely, the components of nuclear power plants. He moved to the Institute of Thermomechanics of the Czech Academy of Sciences in 1997, serving as the head of the department of Impacts and Waves in Solids, the deputy director and, finally, the institute's director for the period of 2013–2021. Currently, he holds the position of a member of the Academy Council, presides over the Committee for Energy Research and is a board member of the Czech Technology Agency. He teaches two full-semester courses at the Czech Technical University, Continuum Mechanics and Plasticity and Creep.



## **Professor Matthias Schwarz**

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

Matthias Schwarz studied mathematics and physics at Ruhr-Universität Bochum from 1987 to 1992. His diploma thesis resulted in the monograph Morse Homology, published 1993 with Birkhäuser. He received his PhD with a thesis on Multiplicative structures in Floer homology in 1995 under his advisors Helmut Hofer and Eduard Zehnder at the ETH Zürich. After a postdoc year in Cambridge, he spent 3 years as Assistant Professor in Stanford and Chicago. 1999–2000 he directed an independent research group at the MPI for Mathematics in the Sciences in Leipzig. Since 2000 he holds the Chair for Mathematics in the Sciences at Leipzig University. From 2003 to 2010 he was one of the principal coordinators of the DFG-priority program Global Differential Geometry. He became Ordinary Member of the Saxonian Academy of Sciences in 2015, acting as Secretary of the Mathematical-Natural Sciences Class since 2024. 2011–2017 he was part of the rectorship of Leipzig University as Vice-Rector for Research and spent 2017/18 as member at the Institute for Advanced Study in Princeton. His research expertise lies in Hamiltonian Dynamical Systems and Symplectic Topology.

# DAY 1 ABSTRACTS

(in order of presentation)

---

**Monday | 4 November 2024**



### **Professor Hans Wiesmeth**

*Former President of the Saxon Academy of Sciences and Humanities in Leipzig  
Professor of Economics, Technical University of Dresden*

Hans Wiesmeth, born in 1950, was President of the Saxon Academy of Sciences and Humanities at Leipzig from 2016 to 2023 and Professor of Economics at the Technical University of Dresden (TUD) until his retirement in 2015. From 1981 to 1992 he held a professorship in economics at the University of Bonn. He was Vice-Rector Research at TUD from 1993 to 2000, Dean of HHL – Leipzig Graduate School of Management from 2005 to 2010 and President of DIU – Dresden International University from 2010 to 2014. He has been Visiting Professor at various international universities, including the University of Western Ontario in London, Canada, in the academic year 1986/87, and York University in Toronto, Canada, in the academic year 1988/89. He participated in various national and international research projects, in particular EU projects on environmental issues.

### **The challenges of climate resilient development**

Our societies are facing ever-increasing impacts of the harmful effects of climate change. “Climate resilience” means the ability to prepare for, recover from, and adapt to these impacts. Climate change is a global problem – the causes and the far-reaching effects can affect anyone, but efforts to adapt to these impacts are limited to the local level, to the neighbourhoods along a river, to mountainous areas, as well as to flatlands, etc. Nevertheless, despite all these efforts to adapt to climate change, there always are “surprises” in terms of further weather extremes and there probably always will be. Consequently, climate resilience, as defines above, is good, but not good enough. It would be better to curb climate change and reduce greenhouse gas emissions worldwide. This would be a “higher” version of climate resilience. Since the Kyoto-Protocol in 1997, many attempts have been made to combat climate change – but so far without resounding success. The presentation discusses economic reasons for this observation. However, proposals for more progress in mitigating climate change are also fraught with difficulties.



## **Dr Lenka Bartošová**

*Global Change Research Institute of the Czech Academy of Sciences*

Lenka Bartošová got the degree of Ing. and Ph.D. in Plant production at MENDELU in Brno. After the Ph.D. studies, since 2007, she has been working as a researcher at MENDELU, since 2010 as a researcher at Global Change Research Institute CAS. Since 2015 she is working as an assistant professor at MENDELU. Her research interest is phenology, long term phenological data analysis mainly of flood plain forests ecosystems. She operates the website phenophase.cz, which provides information on phenology from a number of locations, where observers are mainly university students, but also teachers and primary school pupils or volunteers from the general public. She has participated and is participating in a number of research projects focused on the impact of drought on the Czech landscape and agriculture or adaptation and mitigation to climate change.

### **Warning systems operated by CzechGlobe for the Czech Republic**

Within the Czech Republic, we operate several web portals that aim to inform either a specific interest group (e.g. farmers) or provide information and data for the general public. The oldest of these is intersucho.cz, which provides information on the occurrence and duration of drought and is primarily focused on agricultural (soil) drought. Agrorisk.cz is a website operated primarily for the agricultural sector and provides information on biotic and abiotic risks in agriculture. Firerisk.cz provides information on the potential occurrence of fires throughout the Czech Republic. The last one is climrisk.cz, which offers the possibility to look into projected future climate conditions and work with a variety of climate parameters for which the user can download data or just view the projected future development.



## **Assoc. Prof. Martin Nitsche**

*Institute of Philosophy of the Czech Academy of Sciences*

Martin Nitsche serves as the Chair of the Department of Contemporary Continental Philosophy at the Institute of Philosophy of Czech Academy of sciences in Prague. His research focuses on phenomenology, phenomenological topology, philosophy of art, aesthetics, phenomenology of religious experience, and resilience theory. Nitsche formulated the “transitive-topological model of phenomenology” (Methodical Precedence of Intertwining. An Introduction to a Transitive - Topological Phenomenology, 2018). He also co-authored Phenomenological Investigations of Sonic Environments (Palgrave Macmillan 2024) and published Die Ortschaft des Seins. Martin Heideggers phänomenologische Topologie (2013). He was the guest editor of an Open Philosophy topical issue “Philosophy and Sonic Research - Thinking with Sounds and Rhythms” (2021).

## Societal resilience - a multi-system approach

The aim of the presentation is to introduce the basic features of multisystemic theories of resilience (especially Michael Ungar) and to show the possibilities of its application in the specific conditions of the Czech Republic. I will focus mainly on the reflection of the activities of the research programme of the Czech Academy of Sciences “Societal resilience for the 21st century”; specifically on the description of the former military zone Ralsko, on the application of multisystemic resilience to the social situation of this area and on the reflection of how local conditions modify the multi-system approach to resilience.



### Professor Markus Richter

*Professor of Applied Thermodynamics, Chemnitz University of Technology*

Markus Richter has been a Full Professor of Applied Thermodynamics at Chemnitz University of Technology since 2019 and an Adjunct Full Professor at the University of Western Australia. His research focuses on the accurate measurement and modeling of thermophysical properties of fluid mixtures. After earning his PhD from Ruhr-University Bochum in 2011, he became a Junior Professor there in 2016. A year earlier, he was selected for the prestigious Emmy Noether Program of the German Research Foundation (DFG) and now serves as the spokesperson for the DFG Research Unit ‘Archimedes’. He was inducted into the “Young College” of the North Rhine-Westphalian Academy of Sciences in 2018 and the Saxon Academy of Sciences in 2024. His international experience includes multiple postdoctoral stays at the National Institute of Standards and Technology in Boulder, Colorado.

## Thermophysical Property Research – An Evergreen in Science and Industry

At first glance, thermophysical property research may not appear to be at the forefront of scientific innovation, but it holds a critical role in both scientific advancement and industrial applications. The study of how fluid substances behave under varying conditions of pressure, temperature, and composition is not confined to specific trends but remains a constant necessity, underpinning progress across diverse fields. From energy systems to chemical engineering, the demand for accurate data on properties like density, speed of sound, phase behavior, viscosity, and thermal conductivity is ever-present, making this research a true evergreen in both academia and industry. Today, this work is particularly vital in supporting the global energy transition. Innovations in renewable energy, cryogenic hydrogen storage, and developing more efficient refrigeration systems rely on accurately understanding the thermophysical behavior of the fluids involved. These can be asymmetric systems, such as oil-refrigerant mixtures or cryogenic hydrogen with its isomer composition (para- and ortho-hydrogen). Addressing the challenges posed by such mixtures requires groundbreaking approaches, demonstrating that thermophysical property research continues to push scientific boundaries while remaining indispensable to real-world solutions.

---

## SESSION 2 | Chair – Professor Matthias Schwarz



**Dr Christian Schmidt**

*Centre for Social Critique, Humboldt University in Berlin*

Christian Schmidt is member of the Young Forum of the Saxon Academy of Sciences and Humanities. He is a private lecturer for philosophy and works as scientific senior advisor at the Centre for Social Critique at the Humboldt-Universität zu Berlin. His philosophical interests lie in the field of 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 and Heidegger, Foucault and the French philosophy of the 20th century. Publications include „Karl Marx – Zur Einführung“ (Junius) and „Postsäkulare Politik? Emanzipation, jüdische Erfahrungen und religiöse Gemeinschaften heute“ (Wallstein) co-edited with Lutz Fiedler.

### **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.



**Dr Karel Klem**

*Global Change Research Institute of the Czech Academy of Sciences*

Karel Klem received the MSc (Ing) degree (1991) in plant production from Mendel University in Brno and PhD (2003) in General plant production from Czech University of Life Sciences Prague. He worked at the Agricultural Research Institute Kroměříž as a researcher in the area of crop production, plant protection, plant ecophysiology and remote sensing till 2009. Since 2009 he is working

at Global Change Research Institute CAS and currently, he leads the Domain of environmental effects on terrestrial ecosystems. Since 2022 is a member of Management Board of ESFRI infrastructure AnaEE ERIC. He specializes in the effects of climate change on agriculture and forestry, experiments with the effect of elevated CO<sup>2</sup> concentration, the effects of drought, increased temperature and ecosystem processes, including fluxes of GHG at the level of plant/soil. In recent years, he has focused on the long-term carbon sequestration technologies and reductions of N<sub>2</sub>O and CH<sub>4</sub> emissions.

## **Sustainable agriculture under climate change: research on expected impacts, and opportunities for adaptation or mitigation**

Research on the impacts of climate change and the development of adaptation and mitigation measures is carried out in the Czech Republic in close connection with the European Research Infrastructure (ESFRI) AnaEE ERIC. The main factors that are studied are elevated CO<sup>2</sup> concentration, drought, increased temperature, and UV radiation. In most experiments, the effect of a interactions of several factors is investigated. The impacts of climate change are studied at several hierarchical levels, from the molecular level (metabolomics and transcriptomics), through plant physiology, to the level of production parameters. The development of adaptation measures and strategies includes the methods for field and laboratory plant phenotyping, testing of genetic resources and genotypes, and the development of new technologies for soil moisture conservation. Adaptation measures in agriculture are often intertwined with climate change mitigation, with the main research objective being to understand the mechanisms of long-term soil carbon storage and the reduction of N<sub>2</sub>O and CH<sub>4</sub> emissions. The main focus is on the storage of carbon in the form of mineral-associated organic matter (MAOM) in the soil through regenerative agriculture principles that include no-till technologies, intercropping or the application of composts stimulating soil fungi.



### **Assoc. Prof. Miroslav Chomát**

*Director, Institute of Thermomechanics of the Czech Academy of Sciences*

Miroslav Chomát obtained his M.Sc. degree in electrical power engineering from the Czech Technical University in Prague in 1988 and the Ph.D. degree in electrical engineering from the Czech Academy of Sciences in 1994. Currently, he is the director of the Institute of Thermomechanics of the Czech Academy of Sciences. Since 2015, he has been an associate professor at the Faculty of Electrical Engineering of the Czech Technical University in Prague. During 1999 – 2000, he worked at the University of Wisconsin-Madison as an honorary research fellow. He has authored or co-authored more than 100 scientific publications, edited two scientific book publications, and was responsible for a number of research projects. His research interests include electrical drives, power electronics, and renewable energy sources. He is a senior member of the IEEE, fellow of the IET, and Chartered Engineer of the Engineering Council, UK.

## Activities in Strategy AV21 Program Sustainable Energy

The research program Sustainable Energy of the Strategy AV21 links 12 scientific institutes of the Czech Academy of Sciences with each other and with external partners from academia and industry to address interdisciplinary energy issues. Key topics of the research program include new materials for photovoltaics, next-generation batteries and hydrogen technologies, advanced materials and technologies for nuclear fusion, and technologies to ensure the safety of nuclear power plants. The program also addresses related issues such as minimizing the environmental impact of recovering energy from fuel by combustion, the impact of energy transition on society, and forecasting renewable energy production or electricity market prices.



**Dr Kateřina Machovcová**

*Institute of Psychology of the Czech Academy of Sciences*

Kateřina Machovcová, Ph.D. is a researcher and lecturer. She has received her doctoral degree in social psychology at the Faculty of Social Sciences, Masaryk University. In her research she focuses on well-being, leadership, diversity and inclusion particularly within educational sector with specific focus in higher education. She is experienced in qualitative research methods, but has participated on number of mixed methods projects. As a lecturer she participates at teacher training program in health education and is involved in teaching social psychology and prevention of risk behaviour.

### **Complicated relationship between academic leadership and resilience**

In the context of unrelenting change, and global crises, the level of stress experienced by individuals and organisations is on the rise. This situation has prompted a debate on strategies for fostering resilience across various systems, in which leadership plays a pivotal role (Förster & Ducheck, 2017; Bowman, 2022). The resilience of leaders is of critical importance not only for their own capacity to navigate challenging situations but also for enhancing the resilience of the organisation (Bartone, 2017). The capacity to effectively manage and learn from adverse conditions is a significant predictor of success during periods of crisis (Bennis & Thomas, 2002). Crises are characterised by high levels of salience and urgency, thus the decision-making process in such contexts is frequently complicated by uncertainty, risk and time constraints (Wu et al., 2021). Leaders are required to navigate complex scenarios filled with contradictions and effective crisis management may necessitate the adoption of paradoxical behaviours. This presentation will examine these dynamics through the lens of academic middle managers at Czech public universities (N=31), highlighting three distinct areas: personal commitments of leaders, group belonging and competing interests and (im)possibility of supporting everyone.



# DAY 2 ABSTRACTS

(in order of presentation)

---

**Tuesday | 5 November 2024**



### **Dr Michal Šyc**

*Director, Institute of Chemical Process Fundamentals  
of the Czech Academy of Sciences*

Michal Šyc works at the Institute of Chemical Process Engineering of the Czech Academy of Sciences. Since 2016, he has held the position of Head of the Department of Environmental Engineering, and since 2022, he has assumed the role of Director of the Institute. His research focuses on waste management, especially waste-to-energy and related processes, as well as urban mining. Throughout his career, he has actively participated in and coordinated numerous national and international projects. In addition, he has authored or co-authored more than 40 papers published in peer-reviewed scientific journals. His h-index is 20 and he has almost 1300 citations.

### **Resource recovery in waste-to-energy**

The presentation summarizes the possibilities of resource recovery in the waste-to-energy, especially with regard to the recovery of metals and salts in the treatment of fly ash.



### **Professor Gabriele Stangl**

*Professor of Human Nutrition, Martin Luther University Halle-Wittenberg*

Gabriele Stangl is a German nutrition scientist and professor of human nutrition at the Martin Luther University Halle-Wittenberg, Halle (Saale). Her primary research areas include new sources of nutrients, health aspects of food and their ingredients and molecular effects of nutrients, with particular focus on vitamin D and other photoproducts. She studied nutrition science at the Technical University Munich and medicine at Ludwig Maximilian University Munich. She received her doctorate in 1993, with a thesis on the physiology of dietary fatty acids. In 1998, she completed her habilitation at the TUM School Munich. In 2003, Stangl was appointed professor of nutrition science at University Hamburg, but moved to the University Halle in 2004. Stangl is committee member of the German Nutrition Society. In 2012 she was elected to the German National Academia of Sciences Leopoldina, and in 2013 to the Saxon Academy of Sciences and Humanities in Leipzig.

## Food System and One Health

Supplying the world's growing population with enough healthy food while reducing the negative environmental impact of food production is an enormous challenge. There is a general consensus that we need to transform the global food system if we are to meet this challenge. The global food system is linked to three major problems: (1) undernourishment and food insecurity, (2) overweight and unhealthy diets, and (3) the environmental impact of food production. Currently, six of the nine planetary boundaries are transgressed, with the global food production being the largest driver of that transgression. For transition of the global food system and to increase the resilience of the food system, we need a termination of conflicts, decent economic growth, regulations and legislation, new technologies, reduction of inequalities, education and changes in personal eating patterns.



### Professor Gero Vogl

*Professor emeritus of Physics, University of Vienna*

Gero Vogl was born in Bielitz (Bielsko) and grew up in Austria. He studied physics at Universität Wien, then was assistant, later on Dozent at Technische Universität München where he habilitated with research on radiation damage in metals and on the problems of the first wall of a fusion reactor. He was appointed professor at Freie Universität Berlin and Hahn-Meitner-Institut, Berlin changing there his interests to diffusion in materials. Most of the research of his group was performed with neutrons at the ILL Grenoble. Vogl then followed a call to Universität Wien where he added materials investigations by X-rays to his methods using synchrotron radiation and developing new methods for the study of single atoms. More recently Vogl widened his interests to diffusion and spread outside physics, in particular in nature and in languages.

## The endangered Future of Minority Languages in Europe as viewed by Physicists

The retreat and vanishing of languages in our globalized world, and particularly also in Europe, is a recurrent theme and some aspects may be described as diffusion processes. All states of the European Union stress their willingness to save their minority languages – reality is sometimes different. We have studied issues from a still multiethnic and multilingual regime, the Austrian-Hungarian monarchy, before the breakdown of that Empire smoothened many of the distinctions. We investigated the retreat of Slovenian in Carinthia [Prochazka and Vogl, PNAS] and of German in Hungary [Vogl and Prochazka, Diffusion Fundamentals] before World War 1, in the period between the wars, and after World War 2. This was possible due to minute censuses available both in Austria and in Hungary. We show that Slovenian language will survive in Austria, if the support from Austrian government continues, and we hope for the same development for the German language in Hungary. We would like to determine the development of the Czech-German language border in the period between the wars, but unfortunately no detailed census data are available from the time of the first Czech Republic. Our question is: was the language border moving between 1918 and 1939 or was it stable as in the period before World War 1, a time for which the detailed censuses of the Austrian-Hungarian monarchy are available.



### **Professor Michael Scheffler**

*Professor of Materials Engineering - Non-Metallic Materials, Otto von Guericke University Magdeburg*

Michael Scheffler received a Ph.D. from Martin-Luther University, Halle, Germany, 1993. From 1994 to 1998, he was senior scientist in the Institute for Physical High Technology, Jena, Germany, and afterward, he moved to the University of Erlangen-Nuremberg, Germany. In 2003, he was granted a DFG scholarship for a stay at the University of Washington in Seattle, WA, USA. After this 2-years visit, he became head of division of the Center for Advanced Energy Research (ZAE Bayern), Erlangen. In 2006, Michael moved to Brandenburg Technical University, Cottbus, Germany, and established a professorship for lightweight ceramics, and in 2009, he moved to Otto-von-Guericke University in Magdeburg, Germany, as a professor for materials technology of nonmetallic inorganic materials and composites. His research focuses on fundamental aspects of polymer-derived ceramics, on cellular ceramics, on coatings for materials protection. Since 2019, Michael is a member of the Saxon Academy of Sciences and Humanities.

### **Micro-Macro Cellular Ceramic Composites for Heat Conversion Applications**

*Ulf Betke, Franziska Scheffler and **Michael Scheffler***

Mankind faces unprecedented challenges, particularly with regard to reducing emissions, conserving energy, and saving resources. The demand for thermal energy, both as process heat and for space heating, represents a significant share of energy consumption. One way to reduce the associated demand for primary energy in this context is the use of waste heat or renewable heat sources. This requires suitable active materials for efficient heat conversion and storage. The utilization of low-temperature heat and/or waste heat can be achieved with the help of microporous adsorbents such as zeolites and metal-organic frameworks (MOFs), which, however, need to be properly supported. The first part of this contribution provides an overview of the combination of macroporous support structures with microporous adsorbents, with a focus on ceramic foams as supports. In the second part, options for increasing the share of microporous components on such macroporous supports are discussed, and, finally, a perspective on existing and potential applications of such material combinations in heat conversion is provided.



## **Dr Roman Hobza**

*Institute of Biophysics of the Czech Academy of Sciences*

Roman Hobza, Ph.D. (1976), graduated in genetics and molecular biology from the Faculty of Science at Masaryk University. At the Institute of Biophysics of the Czech Academy of Sciences, he specializes in modern genomic methods. He delivers lectures on evolutionary genomics at the Faculty of Science, Masaryk University, and at the University of South Bohemia.

### **Sustainable agriculture through the changes of time and the never-ending technological revolutions**

Agriculture, and especially breeding, has been shaped and advanced by new technologies since ancient times. Over the past two centuries, there has been a significant breakthrough, particularly due to the understanding and application of genetic knowledge. A certain pinnacle has been reached with the development of methods that allow us to actively modify the genomes of organisms, such as TALEN or CRISPR-Cas. Currently, genome editing techniques can be a key tool in breeding practices. However, not only these methods belong to the category of New Breeding Techniques. How we succeed in combining the possibilities of basic research with practical applications depends on overcoming many barriers, particularly those related to legislation, media presentation, and public understanding. Multinational corporations, which set the rules of what is possible and feasible, will also play a significant role.



## **Professor Florian Steger**

*Professor and Director of the Institute of the History, Philosophy and Ethics of Medicine, Ulm University*

Florian Steger has been Full Professor and Director of the Institute of the History, Philosophy and Ethics of Medicine at Ulm University since July 2016. Before that, since 2011, in the same function at the Institute for History and Ethics of Medicine at the Martin-Luther-University Halle-Wittenberg. Chairman of the Research Ethics Committee at Ulm University and the Commission „Responsibility in the Conduct of Science“ (Good Scientific Practice), Head of Clinical Ethics, University Hospital Ulm, member of the Senate. In 2014, Leibniz-Professor at the University of Leipzig. 2009–2014, member of the Junge Akademie. 2008, habilitation at the University Erlangen-Nuremberg. 2003, Bavarian Habilitation Grant of the Bavarian Ministry for Science. 2002, PhD at the Ruhr-University Bochum. Studies of medicine, classical philology and history. Scholarship holder and now liaison professor of the German National Academic Foundation.

International visiting professorships in Rijeka (Croatia), Riga (Latvia), Łódź (Poland) and Moscow (Russia). 2018 Medal „Universitatis Lodziensis Amico“ by the University of Łódź (Poland) and Honorary Professor of Semmelweis University, Budapest (Hungary). Corresponding Member 2019 of the Saxon Academy of Sciences and 2020 of the Göttingen Academy of Sciences. 2021 Honorary Professor Saint Petersburg State Pediatric Medical University. 2021 Full Member of the Heidelberg Academy of Sciences. 2022 Corresponding Member Abroad of the Austrian Academy of Sciences.

## **An ethical assessment of the implementation of an artificial intelligence-based technology into the geriatric patient treatment and continuity of care**

The introduction of artificial intelligence-based technology into practice shall improve the geriatric patient treatment and continuity of care. The use of artificial intelligence to process and analyze data automatically, aims at an evidence-based evaluation of the patient's health condition and recommending treatment options. However, its development and introduction raise ethical questions, e.g. changes of the patient-physician relationship and the current social reality are expected. We have to discuss concerns of privacy, accuracy, transparency, and explainability. And last but not least we have to think about an insufficient data basis, an intensifying of existing inequalities and systematic discrimination considering a fair access. The patient-physician relationship, social reality, redistribution of resources, fair access, as well as data-related aspects of the artificial intelligence-based system could conflict with the ethical principles of autonomy, non-maleficence, beneficence, and social justice. In my talk I would like raising awareness of these ethical challenges.





[www.avcr.cz/en](http://www.avcr.cz/en)  
Czech Academy of Sciences  
Národní 3, Prague