

HELMHOLTZ AI CONFERENCE 2024

AI FOR SCIENCE

12–14 JUNE 2024

CCD CONGRESS CENTER DÜSSELDORF

EVENT PROGRAM



HELMHOLTZ AI Artificial Intelligence
Cooperation Unit

HELMHOLTZ
RESEARCH FOR GRAND CHALLENGES



PROGRAM OVERVIEW

WEDNESDAY, 12 JUNE, 2024

09:00–12:00	Unconference	
11:30–13:00	Registration / Lunch	
13:00–13:15	Opening remarks & Welcome	
13:15–13:30	Helmholtz AI in 2024	
13:30–14:15	Keynote talk I	
14:15–15:15	Helmholtz Foundation Model Initiative (HFMI)	
15:15–15:45	Coffee break	
15:45–17:15	Session 1a	Session 1b
17:15–17:45	Coffee break	
17:45–18:45	Session 2a	Session 2b
18:45–20:15	Poster session incl. flying food reception	
20:15–21:30	Networking and flying dinner	

THURSDAY, 13 JUNE, 2024

09:00–09:45	Keynote talk II	
09:45–10:30	Panel Discussion	
10:30–11:00	Coffee break	
11:00–12:30	FZJ Local Session	
12:30–14:00	Lunch break	
14:00–15:30	Session 3b	Session 3a
15:30–16:00	Coffee break	
16:00–17:30	Session 4a	Session 4b
17:30–18:15	Project Call matchmaking	
18:15–19:00	Commute	
19:00–23:00	Conference dinner at Stahlwerk	

FRIDAY, 14 JUNE, 2024

09:00–10:30	AI World Café: Collaborative Conversations	
10:30–11:00	Coffee break	
11:00–12:30	Session 5a	Session 5b
12:30–12:45	Poster Prize / Closing	
12:45–14:00	Lunch	

HALLWAY | RESTAURANT | ROOM 1 | ROOM 3 | ROOM 14+15

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WELCOME NOTE

Dear conference participant,

It is a great pleasure to welcome you here at the **Helmholtz AI Conference (HAICON) 2024** in Düsseldorf. We are thrilled to come together and explore the latest advancements in the realm of artificial intelligence (AI) for science with you.

AI's rapid evolution into a widespread phenomenon over the past two years has shown the world just how potent a tool it really is. At Helmholtz AI, we aim to use this tool and push its boundaries within scientific research, development, and applications. We harness its power to aid solving the grand challenges facing society. We believe that the **Helmholtz AI Conference** is a part of the puzzle – by providing a platform for knowledge exchange, space for meaningful discussions, and an environment for potential new partnerships that will shape the future of AI for science. Novelty often happens at the interfaces – so we encourage you to learn from novel AI developments as well as applications in both your and other scientific areas.

Over the next few days, we have an exciting program lined up for you, filled with insightful talks, poster discussions and opportunities for networking and collaboration. Our speakers will share their latest research findings and explore the myriad applications of AI across a variety of scientific domains. This program booklet provides a glimpse into the exciting work that will be presented over the next three days, igniting your curiosity and possibly inspiring new research directions.

I would like to express sincere appreciation to this year's excellent keynote speakers, panelists, and reviewers for their invaluable contributions in shaping the program and ensuring the quality of the research presented. Your expertise and guidance have been instrumental in making this conference the highlight of our year.

I would also like to extend my heartfelt thanks to the organizers, whose hard work and dedication have made this event possible.

As we embark on this journey together, let us embrace the spirit of innovation and collaboration that defines Helmholtz AI – and expand the horizons of AI's potential.

Once again, **welcome to the HAICON 2024**. I am wishing you an enjoyable, memorable, and productive experience.

Sincerely,

Fabian Theis

Scientific Director

Helmholtz AI

WELCOME NOTE

Dear participant of the Helmholtz AI Conference,

In an era increasingly shaped by data, ensuring the widespread accessibility of AI is paramount for effectively tackling pressing societal issues like climate change, disaster awareness and prediction, and clean energy. By democratizing AI and making it available to a broader audience, we can amplify the impact of research efforts in addressing critical challenges across various fields.

The vision of Helmholtz AI is to foster an open and dynamic community actively involved in cutting-edge technologies, aiming to shape a future driven by data. Helmholtz AI has established an environment that fosters collaboration, and knowledge exchange across diverse research domains within applied AI. Additionally, it equips researchers with the necessary skills and resources to drive progress within their respective fields. The level of interdisciplinary exchange facilitated by Helmholtz AI is unique within the Helmholtz community.

Forschungszentrum Jülich (FZJ) is delighted to be part of Helmholtz AI and deeply committed to its mission. We host the local unit for Helmholtz Information and provide access to Europe's largest AI computing infrastructure through HAICORE and soon enough one of the world's most powerful AI systems in JUPITER, Europe's first exascale computer. Forschungszentrum Jülich is fueling the AI-transformation in Germany through its competence in the development, training, and application of large AI models and our close partnership with Helmholtz AI has fostered advancements at the intersection of artificial intelligence and scientific research.

I eagerly anticipate the stimulating discussions and exchanges at the Helmholtz AI Conference 2024 in Düsseldorf as we collectively explore the potential of AI. I also hope for fruitful dialogues on real-world AI applications that address urgent societal challenges, advancing us towards a future powered by data.

Warm regards,

Astrid Lambrecht

Forschungszentrum Jülich

GENERAL INFORMATION

VENUES

11 June

FZJ – Forschungszentrum Jülich

Wilhelm-Johnen-Straße · 52428 Jülich

12 – 14 June

CCD – Congress Center Düsseldorf

Stockumer Kirchstraße 61 · 40474 Düsseldorf

REGISTRATION COUNTER OPENING HOURS AT CCD

Wednesday, 12 June 08:00 – 18:30

Thursday, 13 June 08:00 – 18:30

Friday, 14 June 08:30 – 13:00

CONTACT

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WIFI

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MEDIA CHECK

You have already sent us your presentation in advance. If you want to make changes, upload a new version or test your presentation again, please go to the registration desk.

POSTER SESSION

Don't miss our poster session on Wednesday from 18:45–20:15.

Drinks, beverages and appetizers will be provided.

Location: Level 1, Hallway

The poster presentations will be scheduled in two groups:

- Group 1: all odd poster IDs
- Group 2: all even poster IDs

Here you can find all poster abstracts and poster IDs _____



CONFERENCE DINNER AT STAHLWERK

Enjoy a unique evening at the Stahlwerk. In addition to delicious food and drinks, a great program awaits you.

Dinner speaker: Otmar Wiestler
President of the Helmholtz Association

Date: Thursday, 13 June

Time: 19:00 – 23:00

Address: Ronsdorfer Str. 134 · 40233 Düsseldorf

AI WORLD CAFE

Date: Friday, 14 June

Time: 09:00 – 10:30

Room: Restaurant

Dive into our AI World Café, a 1.5-hour session designed for vibrant discussions on a mix of predefined and spontaneous topics. In groups of up to 10, participants will engage in three 20-minute rounds of dialogue, allowing for deep dives into subjects, idea exchange, and broadening perspectives through shifting conversations. This format encourages open dialogue and offers a platform for networking, learning, and collaborative thinking. Join us to share insights, learn from peers, and enjoy a dynamic exchange of ideas.

Poster prize award kindly sponsored by Delta

Stay tuned until the end of the conference.

On Friday, 14 June at 12:30 we will award the poster prize.



GENERAL INFORMATION

SCIENTIFIC STEERING COMMITTEE

- 👤 **Timo Dickscheid** · FZJ, Germany
- 👤 **Judith Katzy** · DESY, Germany
- 👤 **Ralf Mikut** · KIT, Germany
- 👤 **Fabian Theis** · Helmholtz Munich, Germany

ORGANIZING TEAM

- 👤 **Helene Hoffmann** · HZDR, Germany
- 👤 **Ina Ivanova** · Helmholtz Munich, Germany
- 👤 **Angela Jurik-Zeiller** · Helmholtz Munich, Germany
- 👤 **Stefan Kesselheim** · FZJ, Germany
- 👤 **Fritz Niesel** · FZJ, Germany
- 👤 **Christian Schiffer** · FZJ, Germany
- 👤 **Anna Stössel** · FZJ, Germany
- 👤 **Susanne Wenzel** · FZJ, Germany

KEYNOTE SPEAKERS

- 👤 **Kyle Cranmer** · University of Wisconsin-Madison, USA
- 👤 **Smita Krishnaswamy** · University of Yale, USA

INVITED SPEAKER

- 👤 **Lazar Atanackovic** · University of Toronto, Ontario, Canada

PANELISTS

- 👤 **Zeynep Akata** · Helmholtz Munich, Germany
- 👤 **Kyle Cranmer** · University of Wisconsin-Madison, USA
- 👤 **Smita Krishnaswamy** · University of Yale, USA
- 👤 **Fabian Theis** · Helmholtz Munich, Germany

LOCAL SESSION JÜLICH

- 👤 **Ina Brandes** · Ministry of Culture and Science of North Rhine-Westphalia, Germany
- 👤 **Timo Dickscheid** · Forschungszentrum Jülich, Helmholtz AI, Germany
- 👤 **Jenia Jitsev** · Jülich Supercomputing Centre, FZJ, Germany
- 👤 **Stefan Kesselheim** · Forschungszentrum Jülich, Helmholtz AI, Germany
- 👤 **Joachim Köhler** · Fraunhofer Institute for Intelligent Analysis and Information Systems IAIS, Germany
- 👤 **Thomas Lippert** · Jülich Supercomputing Centre, FZJ, Germany
- 👤 **Christian Schiffer** · Forschungszentrum Jülich, Helmholtz AI, Germany
- 👤 **Paul Swoboda** · Heinrich-Heine-Universität Düsseldorf, Germany

MODERATORS

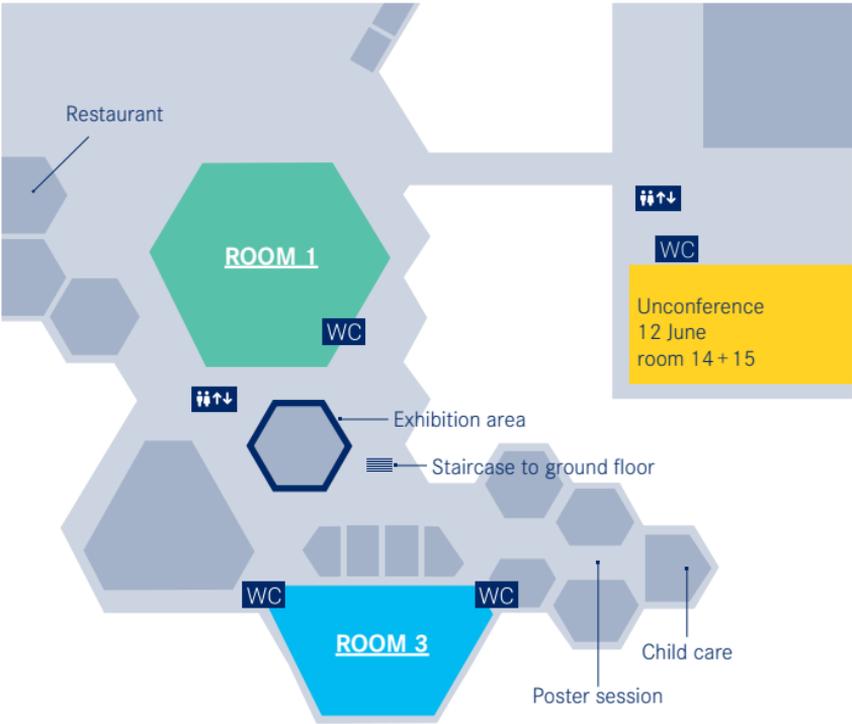
- 👤 **Charlotte Debus** · KIT, Germany
- 👤 **Peter Steinbach** · HZDR, Germany

SITE PLAN · CCD DÜSSELDORF

GROUND FLOOR



1ST FLOOR



PROGRAM · WEDNESDAY, 12 JUNE

09:00– **Unconference** · Room 14 + 15

12:00 Moderator: Peter Steinbach

11:30– **Registration / Lunch break**

13:00

Room 1

13:00– **Opening remarks and Welcome**

13:15  Astrid Lambrecht · Forschungszentrum Jülich

13:15– **Helmholtz AI in 2024**

13:30  Fabian Theis · FZJ

 Timo Dickscheid · Helmholtz Munich

13:30– **Keynote talk I**

14:15 Moderator: Peter Steinbach

13:30– **Highlights of AI advances inspired by physics**

14:15  Kyle Cranmer · University of Wisconsin-Madison

14:15– **Helmholtz Foundation Model Initiative (HFMI)**

15:15 Moderator: Charlotte Debus

14:15– **The Helmholtz Representation Model for Climate Science (HClimRep)**

 Martin Schultz · Forschungszentrum Jülich, Germany

14:27– **SOL-AI A symbiotic modular foundation model for accelerating solar energy materials development**

14:39  Stefan Kesselheim · Forschungszentrum Jülich, Germany

14:39– **3D-ABC: Towards Global 3D Above and Below Ground Carbon Stocks**

14:51  Aldino Rizaldy; Peter Steinbach · Helmholtz-Zentrum Dresden-Rossendorf, Germany

14:51– **The Human Radiome Project - Unlocking 3D Radiological Data Analysis with Next-Generation Foundation Models**

15:03  Fabian Isensee · Deutsches Krebsforschungszentrum (DKFZ), Germany

15:03– **The HFMI Synergy Unit: Building bridges and creating synergy between foundation model projects**

15:15  Stefan Kesselheim · Forschungszentrum Jülich, Germany

15:15– **Coffee break**
15:45

15:45– **Session 1a: Transparency and reproducibility of AI**
17:15
Moderator: Charlotte Debus

15:45– **DynGFN: Towards Bayesian Inference of Gene Regulatory Networks with GFlowNets**
16:03
👤 Lazar Atanackovic · University of Toronto, Vector Institute, Ontario, Canada

16:03– **An explainability framework for convolutional neural networks supporting MRI evaluation and clinical decision-making in dementia research**
16:17
👤 Devesh Singh · German Center for Neurodegenerative Diseases (DZNE), Germany

16:17– **Risk control based trustworthiness of deep learning models for remote sensing applications**
16:31
👤 Protim Bhattacharjee · German Aerospace Center (DLR), Germany

16:31– **A Kernel-based Framework for Uncertainty in Generative AI**
16:45
👤 Sebastian Gruber · Goethe University Frankfurt, Germany

16:45– **Advancing Brain Disorder Identification through Transformer-Based Models and Explainable AI**
16:59
👤 Hanning Guo · Forschungszentrum Jülich, Germany

Poster Spotlight Talks

16:59– **Cross-resolution image segmentation for mapping smallest ponds in the Arctic**
17:02
👤 Tabea Rettelbach · Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research, Potsdam University, Germany

17:02– **AI-enhanced Differentiable Ray Tracer for Optimizing Solar Thermal Power Plants Operation**
17:05
👤 Marlene Busch · German Aerospace Center (DLR), Germany

PROGRAM · WEDNESDAY, 12 JUNE

- 17:05–17:08 **Advancing AI Models in High-Dimensional Flow Cytometry Data: A Global Swarm Learning Network for Enhanced Diagnostic Accuracy**
👤 Ivan Savchuk · German Center for Neurodegenerative Diseases (DZNE) Bonn, Systeme Medicine, Germany
- 17:08–17:11 **Towards the construction of a large foundation model for protein structures with message-passing Graph Neural Networks**
👤 Karel van der Weg · Forschungszentrum Juelich, Germany
- 17:11–17:14 **Forecasting Solar Wind Speed from Solar EUV Images**
👤 Stefano Bianco · GFZ German Research Centre for Geosciences, Potsdam, Germany
- 17:15–17:45 **Coffee break**
- 17:45–18:45 **Session 2a: Applications of AI: Graph Neural Networks**
Moderator: Charlotte Debus
- 17:45–18:03 **End-to-End Track Reconstruction using Graph Neural Networks at Belle II**
👤 Lea Reuter · Karlsruhe Institute of Technology, Germany
- 18:03–18:17 **Enhancing Quality Control in Sparsely Distributed Environmental Sensor Networks with Graph Neural Networks**
👤 Elżbieta Lasota · Karlsruhe Institute of Technology, Germany
- 18:17–18:31 **Graph Neural Networks for Disease Gene Identification: Unveiling Disease-Specific Networks through Link Prediction**
👤 Nikolay Shvetsov · Max Delbrück Center for Molecular Medicine in the Helmholtz Association (MDC), Germany

Poster Spotlight Talks

- 18:31– **Multimodal Analysis of White Blood Cell**
18:34 **Differentiation in Acute Myeloid Leukemia Patients using β -Variational Autoencoder**
👤 Gizem Mert · Helmholtz Munich, University of Trento, Germany
- 18:34– **SciLitMiner: A Data Mining Platform for**
18:37 **Extracting Multimodal Experimental Datasets from Scientific Literature**
👤 Vipul Gupta · Helmholtz-Zentrum Hereon, Germany
- 18:37– **Making the most of Differentiable Propagators for**
18:40 **Small-Angle X-ray Scattering (SAXS)**
👤 Ritz Aguilar, Helmholtz-Zentrum Dresden-Rossendorf (HZDR), Germany
- 18:40– **Allele-Level KIR Genotyping Using ResNet-50 CNN**
18:43 **Architecture**
👤 Yomna Gohar · Institute of Medical Microbiology and Hospital Hygiene, Germany
- 18:43– **Physics-informed neural networks modelling**
18:46 **power grid frequency**
👤 Ulrich Oberhofer · Karlsruhe Institute of Technology, Germany

PROGRAM · WEDNESDAY, 12 JUNE

Room 3

15:45– **Session 1b: Social and Ethical Dimensions of AI**

17:15 Moderator: Peter Steinbach

15:45– **How to Transform AI Prototypes into Functional**
16:03 **Healthcare Applications for Diagnostic Assistance? (Update 2024)**

👤 Martin Dyrba · Deutsches Zentrum für Neurodegenerative Erkrankungen (DZNE), Germany

16:03– **Towards mitigating biases in single-cell analysis**

16:17 👤 Theresa Willem · Helmholtz Munich, Germany

16:17– **Ethical Perspectives on AI-Based Clinical Decision**
16:31 **Support Systems after Cardiac Surgery**

👤 Kirsten Brukamp · Protestant University Ludwigsburg, Germany

16:31– **From nuclear repository processes to illegally**
16:45 **traded spiders: An insight into the use cases of the AI Lab at the Federal Environment Agency**

👤 Luisa Bornberg · Umweltbundesamt, Leipzig, Germany

16:45– **AutoAI-Pandemics: Democratizing Machine**
16:59 **Learning for Analysis, Study, and Control of Epidemics and Pandemics**

👤 Ulisses Rocha · Helmholtz Centre for Environmental Research, Germany

Poster Spotlight Talks

16:59– **Uncovering Inductive Biases in Material Text**

17:02 **Representation for Improved Language Modeling**

👤 Nawaf Alampara · Friedrich Schiller University Jena, Germany

17:02– **ClarifAI: User-Centred Explainable AI (XAI)**
17:05 **Methods for Scientists**

👤 Yulia Grushetskaya · German Research Centre for Geosciences GFZ, Germany

17:05–
 17:08 **Federated Continual Learning Goes Online:
 a Realistic Framework for Collaborative Class-
 Incremental Tasks**

👤 Giuseppe Serra · Goethe University Frankfurt,
 Germany

17:08–
 17:11 **Learning representations of weather drivers and
 forest structure responsible for biomass loss with
 Transformer**

👤 Mohit Anand · Helmholtz Centre for Environmental
 Research - UFZ, TU Dresden, Germany

17:11–
 17:14 **Advancing functional genomics analysis with
 Bayesian modeling: Case studies in RNA decay and
 pathogen invasion models**

👤 Laura Jenniches · Helmholtz Institute for RNA-based
 Infection Research, Germany

17:15–
 17:45 **Coffee break**

17:45–
 18:45 **Session 2b: Applications of AI: Data Analysis
 Techniques**

Moderator: Peter Steinbach

17:45–
 18:03 **Adaptative Local PCA for Curvature Estimation on
 Data Manifolds**

👤 Lydia Mezrag · Montreal Institute For Learning
 Algorithms (MILA), Canada

18:03–
 18:17 **The Human Gut Microbiome Observable Universe:
 Unravelling Its Fingerprints via Dense Deep
 Clustering**

👤 Jonas Kasmanas · UFZ, University of Sao Paulo, Brazil

18:17–
 18:31 **OneProt: Unified Protein Embeddings**

👤 Erinc Merdivan · Helmholtz Munich, Germany

PROGRAM · WEDNESDAY, 12 JUNE

Poster Spotlight Talks

18:31–18:34 **Stromata: Deep Learning Framework for Enhanced High-Throughput Transcriptomics Analysis**

👤 Taras Savchyn · Max Delbrück Center for Molecular Medicine, Germany

18:34–18:37 **Recent Advances in Machine Learning for Coastal and Deep-Sea Ecosystem Monitoring based on Environmental DNA**

👤 Verena Rubel · MPI, RPTU Rheinland-Pfälzische Technische Universität Kaiserslautern-Landau, Germany

18:37–18:40 **Invariant Boltzmann generator architecture to model isothermal-isobaric ensembles**

👤 Lars Dammann · DESY, Hamburg University of Technology, Germany

18:40–18:43 **Nonlinear Activation Units to Enhance Performance of Deep Learning Single-cell Sequencing Models.**

👤 Fatima Zahra El hajji · University Mohammed VI Polytechnic (UM6P), Morocco

18:43–18:46 **VLMGender: A Benchmark for Evaluating Gender Bias in Vision-Language Assistants**

👤 Leander Gurrbach · University of Tübingen, Germany

18:45–20:15 **Poster session incl. flying food reception**

📍 – Hallway

20:15–21:30 **Networking**

📍 – Hallway

PROGRAM · THURSDAY, 13 JUNE

HALLWAY RESTAURANT ROOM 1 ROOM 3 ROOM 14+15

Room 1

09:00– Keynote talk II

09:45 Moderator: Charlotte Debus

09:00– **Neural representation-learning for generative modeling in biology**

09:45

👤 Smita Krishnaswamy · Yale University

09:45– **Panel Discussion: Generative AI for Science**

10:30 **Moderators: Charlotte Debus and Peter Steinbach**

👤 Fabian Theis, Kyle Cranmer, Zeynep Akata, Smita Krishnaswamy

10:30– Coffee break

11:00

11:00– **FZJ Local Session: North Rhine Westphalia:**

12:30 **Enabling and Accelerating AI**

Moderator: Timo Dickscheid, Stefan Kesselheim

11:00– **Introduction**

11:10 👤 Timo Dickscheid, Stefan Kesselheim

Forschungszentrum Jülich, Germany
Helmholtz AI, Forschungszentrum Jülich

11:10– **Welcome Note**

11:20 👤 Ina Brandes · Minister for Culture and Science, NRW

11:20– **Most efficient AI training at scale on JUPITER**

11:34 👤 Thomas Lippert · Forschungszentrum Jülich, Germany

11:34– **Open foundation models: reproducible science of transferable learning**

11:48

👤 Jenia Jitsev · Forschungszentrum Jülich, Germany

11:48– **Decoding Human Brain Architecture with AI**

12:02 👤 Christian Schiffer · Forschungszentrum Jülich, Germany

12:02– **GPUs and Machine Learning for Optimization**

12:16 👤 Paul Swoboda · Heinrich–Heine–University Düsseldorf, Germany

12:16– **WestAI – Service Center for Artificial Intelligence**

12:30 👤 Joachim Köhler · Fraunhofer Institute for Intelligent Analysis and Information Systems IAIS, Sankt Augustin, Germany

PROGRAM · THURSDAY, 13 JUNE

12:30– Lunch break
14:00

14:00– **Session 3b: Scalability and Efficiency**

15:30 Moderator: Charlotte Debus

14:00– **Masks, Signs, and Learning Rate Rewinding**

14:18  Advait Gadhikar · University of Saarland, Germany

14:18– **MemSpikingTM: Neuromorphic sequence learning with memristive in-memory computing – from algorithm to hardware demonstration**

14:32  Sebastian Siegel · Forschungszentrum Jülich, Germany

14:32– **Towards Energy-Efficient Satellite-Onboard Land-cover Classification with Spiking Neural Networks**

14:46  Conrad Albrecht · German Aerospace Center, Germany

14:46– **DataDream: Few-shot Guided Dataset Generation**

15:00  Jae Myung Kim · University of Tübingen, Germany

15:00– **SimulationBasedInference.jl: A flexible toolkit for Bayesian inference with process-based models**

15:14  Brian Groenke · Technical University of Berlin, Germany

15:14– **Thinking the Path to Sustainable AI in the Era of Foundation Models**

15:28  Marie Piraud · Helmholtz Munich, Germany

 Markus Götz · KIT, Germany

 Charlotte Debus · KIT, Germany

15:30– Coffee break
16:00

16:00– **Session 4a: Applications of AI: Generative Modeling**

17:30 Moderator: Charlotte Debus

16:00– **Generative Lung Architecture Modeling (GLAM)**

16:18  Ella Bahry · Max Delbrück Center for Molecular Medicine, Helmholtz Imaging, Germany

16:18– **Delineating the Effective Use of Self-Supervised Learning in Single-Cell Genomics**

16:32  Till Richter · Helmholtz Munich, TU Munich Germany

16:32– **Enhancing Gene Expression Representation**

16:46 **Learning for Improved Drug Response Prediction through Data Augmentation**

 Diyuan Lu · Helmholtz Munich, Germany

16:46– **Application and Evaluation of Generative**

17:00 **Adversarial Networks to Electroencephalography Data**

 Farah Abdellatif · Forschungszentrum Juelich, RWTH University Aachen, Germany

17:30– **Project Call matchmaking**

18:15 Moderator: Mayra Marin

18:15– Commute to Conference Dinner

19:00

19:00– **Conference dinner at Stahlwerk**

23:00

PROGRAM · THURSDAY, 13 JUNE

Room 3

14:00– 15:30 **Session 3a: Applications of AI: Earth System AI**

Moderator: Peter Steinbach

14:00– 14:18 **HPC Directions in AI Applications for Earth System Science**

👤 Stan Posey · NVIDIA Corporation, USA

14:18– 14:32 **Helmholtz Blablador: An Inference Server for Scientific Large Language Models**

👤 Alexandre Strube · Forschungszentrum Jülich, Germany

14:32– 14:46 **COMPASS: Enhancing Deep Learning Based Molecular Docking Insights for Comprehensive Analysis**

👤 Ahmet Sarigun · Max Delbrück Center – Berlin Institute for Medical Systems Biology, Germany

14:46– 15:00 **Enhancing clinical immunology through global Swarm Learning: A pioneering approach for ML-based clinical diagnostics**

👤 Stefanie Warnat-Herresthal · German Center for Neurodegenerative Diseases (DZNE) Bonn, Germany

15:00– 15:14 **Deep Learning Improved Seasonal Forecasts for the Blue Nile Basin**

👤 Rebecca Wiegels · Karlsruhe Institute of Technology, Germany

15:14– 15:28 **FastGPR: divide-and-conquer technique in neuroimaging data shortens training time and improves accuracy**

👤 Federico Raimondo · Forschungszentrum Jülich, Germany

15:30– Coffee break

16:00

16:00– 17:30	Session 4b: AI Fundamentals Moderator: Peter Steinbach
16:00– 16:18	Topological Point Cloud Clustering: Relating local features and global topology of networks and point clouds. 👤 Vincent Grande · RWTH Aachen University, Germany
16:18– 16:32	Multi-Source Auxiliary Tasks supported Monocular Depth Estimation 👤 Alessio Quercia · Forschungszentrum Juelich, Germany
16:32– 16:46	Ensemble-based Density Estimation with Randomized Moment Matching in Neural Networks 👤 Tobias Schanz · Helmholtz-Zentrum Hereon, Germany
16:46– 17:00	Why so negative? A General Approach for Neural Quasiprobabilistic Likelihood Ratio Estimation with Negatively Weighted Data 👤 Stephen Jiggins · DESY, ATLAS/FH/DESY, Germany
17:00– 17:14	Multi-output Gaussian Processes for Integration of Multi Omics Data 👤 Zahra Moslehi · Deutsches Krebsforschungszentrum (DKFZ), Goethe University Frankfurt, Germany
17:14– 17:28	Deep Differentiable Emulators for NEMO simulations 👤 Vien Minh Nguyen-Thanh · Helmholtz Zentrum Hereon, Germany
17:30– 18:15	Project Call matchmaking Moderator: Mayra Marin
18:15– 19:00	Commute to Conference Dinner
19:00– 23:00	Conference dinner at Stahlwerk

PROGRAM · FRIDAY, 14 JUNE

09:00– **AI World Café: Collaborative Conversations**

10:30 Moderator: Peter Steinbach

Room: Restaurant

- 1 **How can we obtain enough data for domain-specific multimodal foundation models?**
👤 Host: Till Korten · Helmholtz AI HZDR
- 2 **Deep-learning-based approaches for survival analysis: exchange of experiences and best practices**
👤 Host: Sebastian Starke · Helmholtz AI HZDR
- 3 **Should we? – Trustworthiness and reliability of generative models for medical image analysis**
👤 Host: Christian Schiffer · Helmholtz AI FZJ
- 4 **How can we improve and foster collaboration between AI consultant teams?**
👤 Host: Florian Kofler · Helmholtz AI, Helmholtz Munich
- 5 **How can we effectively transition AI research innovations into practical, operational AI models that deliver tangible value?**
👤 Host: Harsh Grover · Helmholtz AI DKRZ
- 6 **How to create AI agents for scientific research and coding?**
👤 Host: Erinc Merdivan · Helmholtz AI, Helmholtz Munich
- 7 **Beyond Simulations: Exploring the Thrills of Industry Collaborations for AI Researchers**
👤 Host: Fritz Niesel · Helmholtz AI FZJ
- 8 **Which fields of Earth Observation stand to benefit the most from the application of Foundation Models?**
👤 Host: Antony Zappacosta · Helmholtz AI DLR
- 9 **How should Helmholtz AI research units cooperate?**
👤 Host: Benjamin Schäfer · Helmholtz AI KIT
- 10 **Digital Twin, what does it mean?**
👤 Host: Vytautas Jancauskas · Helmholtz AI DLR
- 11 **Hybrid Models: A paradigm shift from conventional AI to solving complex problems ?**
👤 Host: Adeniyi Mosaku · Helmholtz AI DKRZ
- 12 **Gender and AI**
👤 Host: Carolin Penke · FZJ/JSC

10:30– Coffee break
11:00

Room 1

11:00– **Session 5a: AI Fundamentals**

12:30 Moderator: Charlotte Debus

11:00– **Can Graph Attention Networks learn the degree to which node properties are determined by their neighborhood?**
11:18

👤 Celia Rubio-Madrigal · CISPA Helmholtz Center for Information Security, Germany

11:18– **Self-Supervised Learning in Electron Microscopy: Towards a Foundation Model for Advanced Image Analysis**
11:32

👤 Karina Ruzaeva · Forschungszentrum Jülich, Germany

11:32– **Spectral Graph Pruning mitigates Over-Squashing and Over-smoothing in Graph Neural Networks**
11:46

👤 Adarsh Jamadandi · Saarland University / CISPA, Germany

11:46– **Negative Order Sobolev Cubatures: Preconditioners of Partial Differential Equation Learning Tasks Circumventing Numerical Stiffness**
12:00

👤 Michael Hecht · CASUS/Helmholtz-Zentrum Dresden-Rossendorf, Germany

12:14– **Near-field Holography image Denoising using Dilated Convolutional Neural Networks**
12:28

👤 Vahid Rahmani · Deutsches Elektronen-Synchrotron DESY, Germany

12:30– **Poster Prize & Closing Session**

12:45 Moderator: Charlotte Debus

12:45– Lunch
14:00

PROGRAM · FRIDAY, 14 JUNE

HALLWAY | RESTAURANT | ROOM 1 | ROOM 3 | ROOM 14+15

Room 3

- 11:00–12:30 **Session 5b: Applications of AI: AI in Science Experiments**
Moderator: Peter Steinbach
- 11:00–11:18 **DeGeSim: Conditional Denoising Diffusion Probabilistic Models as Multi-Dimensional Density Mappers for Monte Carlo Simulated Proton-Proton Collisions at the Large Hadron Collider**
👤 Stephen Jiggins · DESY, ATLAS/FH/DESY, Germany
- 11:18–11:32 **Development of a Bayesian deep-learning model to predict protein-protein interactions at a proteomic scale**
👤 Manuel Seefelder · Ulm University, Germany
- 11:32–11:46 **Multi-omics integration with Bayesian Tensor Decomposition**
👤 Kevin De Azevedo · Goethe University Frankfurt, Germany
- 11:46–12:00 **Machine learning denoising of high-resolution nanotomography data**
👤 Silja Flenner · Helmholtz-Zentrum Hereon, Geesthacht, Germany
- 12:00–12:14 **Surrogate Modelling for Core Degradation in pressurized Water Reactors**
👤 Jonas Dressner · Karlsruher Institut für Technologie, Germany
- 12:14–12:28 **Novel Machine Learning Approaches to Study Infection and Disease through Biomedical Images**
👤 Artur Yakimovich · Helmholtz-Zentrum Dresden-Rossendorf, Germany
- 12:30–12:45 **Poster Prize & Closing Session**
Moderator: Charlotte Debus
- 12:45–14:00 Lunch

MATCHMAKING

JOIN US FOR THE PROJECT CALL **MATCHMAKING!**



DAY TWO | Thursday, June 13 - HALLWAY
17:30–18:15

Helmholtz AI project calls aim to stimulate collaborations and identify novel applied ML and AI research topics. The Initiative and Networking Fund (INF) finances the project calls.

Last year's projects were allocated a budget of approximately €500k, with up to €250k funded by INF and the remainder co-financed by partnering Helmholtz Centres.

All Helmholtz Association researchers are eligible to apply in collaboration with at least one other centre.

Helmholtz AI supports high-risk, high-gain projects that utilize innovative ML, statistical learning, and AI approaches. Do you have a grand idea brewing in your mind?

Join us at the 2024 Helmholtz AI Conference for an exciting Networking and Matchmaking Session. This vibrant event is designed for researchers eager to find project partners and expand their professional network in a dynamic and welcoming atmosphere. Connect, collaborate, and innovate!

**PLEASE REGISTER TO
JOIN HERE:**



EXHIBITORS

The exhibition can be found in the hallway on level 1.

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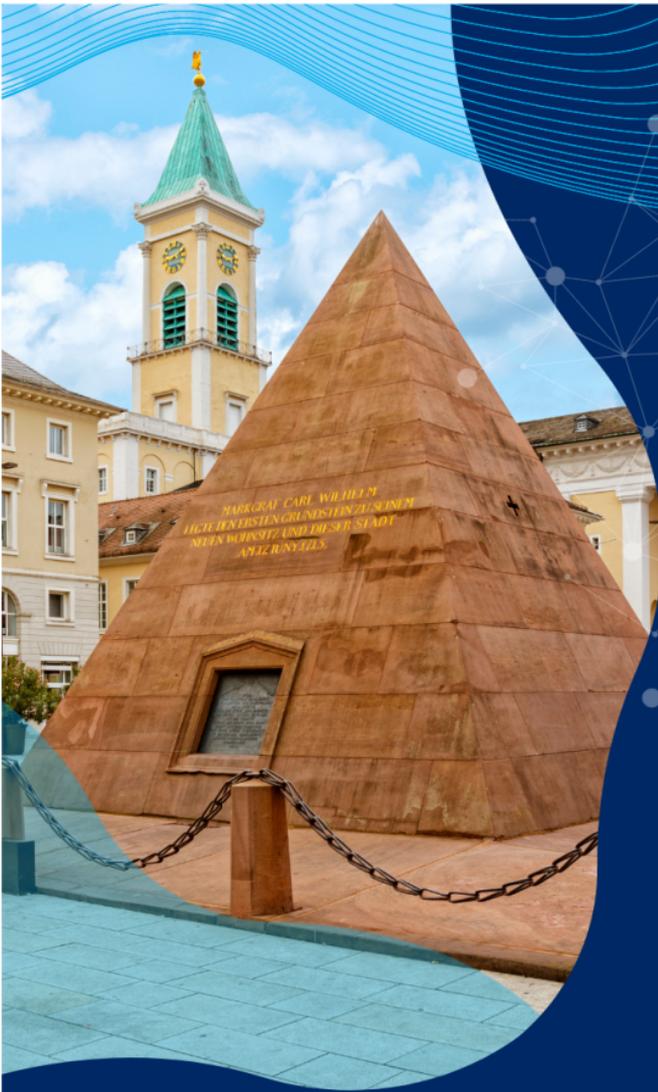
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HELMHOLTZ AI CONFERENCE 2025

3 - 5 June 2025, Karlsruhe

Stay tuned for further details and join us once again for an unmatched conference experience next year.

SEE YOU THERE!