EBERHARD KARLS
UNIVERSITÄT
TÜBINGEN

machine learning
new perspectives
for science

Machine Learning in Science

Conference on 9-10 July 2024 in Tübingen

VENUE – Freistil (Wöhrdstraße 25, 72072 Tübingen)

TUESDAY, 9 July 2024

09:00	**Opening Remarks** Ulrike von Luxburg, Philipp Berens (Speakers of the Cluster of Excellence "Machine Learning", University of Tübingen)
09:15	**Using Computational Models to Understand Neural Mechanisms Underlying Mental Disorders** Tobias Hauser (University Hospital, Computational Psychiatry, University of Tübingen)
10:00	**Machine Learning in Clinical Brain Research** Kerstin Ritter (Hertie Institute for AI in Brain Health, University of Tübingen)
10:45	**Coffee Break**
11:15	**Machine Learning Applications in Marketing Science** Aseem Behl (School of Business and Economics, University of Tübingen)
11:45	**Lifelong Learning and Language Models** Çağatay Yildiz (Cluster of Excellence "Machine Learning", University of Tübingen)
12:15	**Machine Learning in Clinical Workflows of Medical Imaging** Thomas Küstner (University Hospital, Medical Image and Data Analysis, University of Tübingen)
13:00	**Lunch**
14:15	**Mechanistic Models of Neural Computations** Jakob Macke (Cluster of Excellence "Machine Learning", University of Tübingen)
15:00	**AI, Law and Society - in Search of Blind Spots of AI Regulation** Alina Wernick (Cluster of Excellence "Machine Learning", University of Tübingen)
15:45	**Group Picture**
16:00	**Poster Session - Cluster Projects and AIMS Fellows - Coffee**
19:00	**Dinner**

WEDNESDAY, 10 July 2024

09:00	**The Emerging Science of Benchmarks** Moritz Hardt (Max Planck Institute for Intelligent Systems, Tübingen)
09:45	**Automated Machine Learning for Science** Katharina Eggensperger (Cluster of Excellence "Machine Learning", University of Tübingen)
10:15	**Ethics and Evidence** Markus Ahlers (Cluster of Excellence "Machine Learning", University of Tübingen)
10:45	**Coffee Break**
11:15	**Strengthening Graph Neural Networks, with Applications to Mass Spectrometry** Stefanie Jegelka (Keynote) (Department of Computer Science, Technical University of Munich)
12:15	**Quantifying Differences Between Probabilistic Causal Models** Stephan Eckstein (Department of Mathematics, University of Tübingen)
13:00	**Closing Remarks** Ulrike von Luxburg, Philipp Berens (Speakers of the Cluster of Excellence "Machine Learning", University of Tübingen)
13:15	**Lunch**
14:15 - 15:30	**General Assembly – Cluster member groups only**

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6th Annual Conference 2024

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Poster Session

TUESDAY, July 9, 2024 (4:00 to ~6:30 pm)

	Individual Cluster Projects	
1.	**Francesco Carnazza**, Federico Carollo, Miriam Klopotek, Sabine Andergassen, Georg Martius, Igor Lesanovsky	Machine learning dynamics of order parameters
2.	**Valentyn Boreiko*, Alexander Panfilov***, Václav Voráček, Jonas Geiping, Matthias Hein	Universal Threat Model for Language Models
3.	**Gege Gao**, Weiyang Liu, Anpei Chen, Andreas Geiger, Bernhard Schölkopf	GraphDreamer: Compositional 3D Scene Synthesis from Scene Graphs
4.	**Moritz Haas**, Albert Agisha, Ulrike von Luxburg, Bedartha Goswami	Estimating Spatial Correlation Requires Correcting for Anisotropic Temporal Autocorrelation: A Bias Correction for EOFs, Climate Networks and Beyond
5.	**Ekaterina Kneschaurek**, Constantin Völter, Vladimir Starostin, Valentin Munteanu, Mikhail Romodin, Maik Hylinski, Dmitry Lapkin, Alexander Gerlach, Alexander Hinderhofer, Frank Schreiber	Deep learning-based feature detection on 2D surface X-ray scattering data
6.	**David Künstle**, Ulrike von Luxburg, Felix A. Wichmann	Machine learning approaches for psychophysical scaling with ordinal comparisons

7.	**Michela Petriconi**, Güner Dilsad Er, Katharina Eggensperger, Raysa Benatti, Emilia Magnani, Nora Castner, Melis Ilayda Bal, Sabrine Chebbi, Ifeoma Nwabufo, Claire Vernade	TWiML: Tübingen Women in Machine Learning
8.	**Alessandro Simon**, Georg Martius, Martin Oettel	Unraveling the physics of patchy particles with density functional theory and ML
9.	**Siying Xu**, Kerstin Hammernik, Marcel Früh, Andreas Lingg, Jens Kübler, Patrick Krumm, Daniel Rückert, Sergios Gatidis, Thomas Küstner	Accelerate Cardiac Cine MRI using Deep Learning-based Methods
10.	**Roxana Zeraati***, **Sina Khajehabdollahi***, Emmanouil Giannakakis, Tim Jakob Schäfer, Georg Martius, Anna Levina	Long timescales required for memory tasks arise from distinct mechanisms shaped by learning curricula
	AIMS Fellows	
11.	**Pauline Ornela Megne Choudja**, Thomas Küstner	Longitudinal tracking and segmentation of lesions in PET/CT hybrid imaging
12.	**Akpoly Fifame Edwige**, Arya Samanta, Daniel Boateng, Jean-Philippe Baudouin, Yana Savytska, Kira Rehfeld	Rainfall forecasting in the Sahel region using Machine Learning techniques
13.	**Berthine Nyunga Mpinda**, Hendrik Lensch, Mehran Hosseinzadeh, Valay Bundele	Explainable Medical Image Classification
14.	**Stephen Kiilu**, Ali Bahrainian, Carsten Eickhoff	Enhancing the Reasoning Capabilities of LLMs
15.	**Immaculate Wanjiru Kimani**, Dominik Papies	Unveiling the Influence: Exploring Financial Inclusion through Social Media Influencers in Emerging Economies

	Cluster Network Projects	
	Compositionality in Minds and Machines	
16.	**Turan Orujlu**, Martin V. Butz, Charley M. Wu	Intuitive Physics through the Lens of Pearl's Causal Hierarchy
	Modeling and Understanding Spatiotemporal Environmental Interactions (MUSTEIN)	
17.	**Jannik Thümmel**, Jakob Schlör, Sebastian Hoffmann, Bedartha Goswami	Learning representations of subseasonal to seasonal ocean dynamics
18.	**Fedor Scholz**, Manuel Traub, Thomas Scholten, Christiane Zarfl, Martin V. Butz	Fully differentiable, fully distributed River Discharge Prediction
19.	**Manuel Traub**, Fedor Scholz, Thomas Scholten, Christiane Zarfl, Martin V. Butz	Efficient Scaling of Rainfall Prediction in Binarized Latent Spaces
20.	**Florian Ebmeier**, Nicole Ludwig, Jannik Thümmel, Volker H. Franz	Time Series Anomaly Detection using Probabilistic Reconstructions
	Uncovering the inner structure of medical images through generative modeling	
21.	**Nikolas Morshuis,** Matthias Hein, Christian Baumgartner	Finding diverse solutions to inverse problems
22.	**Jaivardhan Kapoor**, Jakob H. Macke, Christian F. Baumgartner	Linear aging prediction of brain MRI scans in autoencoder latent space
23.	**Sarah Müller**, Louisa Fay, Lisa Koch, Sergios Gatidis, Thomas Küstner, Philipp Berens	Benchmarking Dependence Measures to Prevent Shortcut Learning in Medical Imaging
	Probabilistic Inference in Mechanistic Models (PIMMs)	
24.	**Jonathan Schmidt**	

25.	**Guy Moss**, Julius Vetter, Cornelius Schröder, Richard Gao, Jakob H. Macke	**Sourcerer: Sample-based Maximum Entropy Source Distribution Estimation**
26.	**Jonas Beck**, , Nathanael Bosch, Michael Deistler, Kyra L. Kadhim, Jakob H. Macke, Philipp Hennig, Philipp Berens	**Diffusion Tempering Improves Parameter Estimation with Probabilistic Integrators for Ordinary Differential Equations**
27.	**Sebastian Bischoff**, Pavlin G. Poličar, Cornelius Schröder, Blaž Zupan, Jakob H. Macke, Manfred Claassen	**A new embedding method for RNA velocity data**
	Machine Learning in Education	
28.	**Hanqi Zhou**, David Nagy, Charley Wu	**Harmonizing Program Induction with Rate-Distortion Theory**