

Program for GSO 2025



Feb 12th	Start	Duration	What	Speaker	Title
session chair: Georg Martius	09:00	00:30	Opening	Georg Martius	
	09:30	00:50	Talk	Sebastian Risi	Developmental and Self-Assembling Machines
	10:20	00:10	Discussion		
	10:30	00:30	Coffee break		
	11:00	00:25	Contributed talk	Sarthak Chandra	A biologically plausible mechanism for the self-organization of modularity, hierarchy, and mirror reversals of cortical sensory processing pathways
	11:25	00:25	Contributed talk	Bulcsú Sándor	Self-organized locomotion of robots by closing the sensorimotor loop
	11:50	00:25	Contributed talk	Anna Levina	Emergence and disappearance of criticality in foraging agents
	12:15	01:30	Lunch Break		
session chair: Pierre Schumacher	13:45	01:45	Poster session		
	15:30	00:50	Talk	Martin Butz	Guiding Self-Organization of Behavior: Introducing Active Contextualization
	16:20	00:30	Coffee break		
	16:50	00:25	Contributed talk	Cansu Sancaktar	SENSEI: Semantic Exploration Guided by Foundation Models to Learn Versatile World Models
	17:15	00:25	Contributed talk	Maximilian Mittenbühler	Automatic Response Tendencies and Meta-Control Emerge from Maximizing the Evidence of a Generative Model for Decision-Making
	17:40	00:25	Contributed talk	Michael Harre	Artificial Theory of Mind and Self-Guided Social Organisation
	18:05		End of the day		

Feb 13th	Start	Duration	What	Speaker	Title
session chair: Georg Martius	09:00	00:50	Talk	Martin Riedmiller	Intelligent agents: why data-efficiency matters and how to achieve it
	09:50	00:25	Contributed talk	Pierre Schumacher	Emergence of natural and robust bipedal walking by learning to control up to ninety muscles from biologically plausible objectives
	10:15	00:10	Discussion		
	10:25	00:30	Coffee break		
	10:55	00:50	Talk	Verena Hafner	Tool Use and Agency in Artificial Systems
	11:45	00:25	Contributed talk	Vladimir Jacimovic	Stochastic Policies and Trainable Swarms for Reinforcement Learning on Riemannian Manifolds
	12:10	00:10	Discussion		
session chair: Mikhail Propopenko	12:20	01:30	Lunch break		
	13:50	00:50	Talk	Bernhard Schölkopf	Causal representations and digital twins
	14:40	00:25	Contributed talk	Nihat Ay	Improving the Evidence Lower Bound (ELBO) for Training Generative Models
	15:05	00:10	Discussion		
	15:15	00:30	Coffee break		
	15:45	00:25	Contributed talk	Hippolyte Charvin	An Informational Parsimony Perspective on Symmetry Extraction
	16:10	00:25	Contributed talk	Andreas Schneider	What should a neuron aim for? Designing local objective functions based on information theory
	16:35	00:25	Contributed talk	Claire Glanois / Sebastian Risi	Language-Cellular Automata, Simulating Natural and Social Self-Organised Behaviors
	17:00	01:45	Poster session		
	18:45		End of poster session at venue -> transition to city center		
	19:30		Social Dinner		at Neckarmüller

Feb. 14th	Start	Duration	What	Speaker	Title
session chair: Nihat Ay	09:00	00:50	Talk	David Wolpert	Stochastic thermodynamics of Computation
	09:50	00:25	Contributed talk	Jan Dohmen	Context Inference with Transformers for Robust RL
	10:15	00:10	Discussion		
	10:25	00:30	Coffee break		
	10:55	00:25	Contributed talk	Amahury Díaz	The Origin and Evolution of Information Handling
	11:20	00:25	Contributed talk	Mikhail Prokopenko	Biological arrow of time and self-modelling tangled hierarchies
	11:45	00:25	Contributed talk	Qianyang Chen	Interpreting Ising Model as A Perception-Action Loop
	12:10	00:10	Discussion		
	12:20	01:20	Lunch break		
	13:40	00:25	Contributed talk	Sarthak Chandra	A biologically plausible mechanism for the self-organization of modularity, hierarchy, and mirror reversals of cortical sensory processing pathways
	14:05	00:20	Closing remarks		
	14:25		End of the meeting		



GSO 2025 Contributions

Title	Presentation	Authors
The Origin and Evolution of Information Handling	Oral	Díaz, Amahury and Sayama, Hiroki and Gershenson, Carlos
Interpreting Ising Model as A Perception-Action Loop	Oral	Chen, Qianyang and Prokopenko, Mikhail
Artificial Theory of Mind and Self-Guided Social Organisation	Oral	Harre, Michael and Ruiz-Serra, Jaime and Drysdale, Catherine
Self-organized locomotion of robots by closing the sensorimotor loop	Oral	Sándor, Bulcsú and András, Tamás and Harkó, Csanád and Herczeg, Ágnes; Gros, Claudius
Biological arrow of time and self-modelling tangled hierarchies	Oral	Prokopenko, Mikhail and Davies, Paul C. W. and Harré, Michael and Heisler, Marcus G.; Kuncic, Zdenka; Lewis, Geraint F.; Livson, Ori; Lizier, Joseph T.; Rosas, Fernando E.
A biologically plausible mechanism for the self-organization of modularity, hierarchy, and mirror reversals of cortical sensory processing pathways	Oral	Chandra, Sarthak and Khona, Mikail and Konkle, Talia and Fiete, Ila
Language-Cellular Automata. Simulating Natural and Social Self-Organised Behaviors	Oral	Glanois, Claire and Risi, Sebastian
Stochastic Policies and Trainable Swarms for Reinforcement Learning on Riemannian Manifolds	Oral + Poster	Jacimovic, Vladimir
Improving the Evidence Lower Bound (ELBO) for Training Generative Models	Oral + Poster	Ay, Nihat and Langer, Carlotta and van Oostrum, Jesse and Röder, Frank
Context Inference with Transformers for Robust RL	Oral + Poster	Dohmen, Jan and Banerjee, Pradeep and Datar, Adwait and Röder, Frank; Ay, Nihat; Eppe, Manfred
Emergence of natural and robust bipedal walking by learning to control up to ninety muscles from biologically plausible objectives	Oral + Poster	Schumacher, Pierre and Geijtenbeek, Thomas and Caggiano, Vittorio and Kumar, Vikash; Schmitt, Syn; Martius, Georg; Haeufle, F.B. Daniel
SENSEI: Semantic Exploration Guided by Foundation Models to Learn Versatile World Models	Oral + Poster	Sancaktar, Cansu and Gumbsch, Christian and Zadaianchuk, Andrii and Kolev, Pavel; Martius, Georg
Automatic Response Tendencies and Meta-Control Emerge from Maximizing the Evidence of a Generative Model for Decision-Making	Oral + Poster	Mittenbühler, Maximilian and Schwöbel, Sarah and Dignath, David and Kiebel, Stefan J.; Butz, Martin V.
An Informational Parsimony Perspective on Symmetry Extraction	Oral + Poster	Charvin, Hippolyte and Volpi, Nicola Catenacci and Polani, Daniel
What does it take to make artificial evolution to converge to the Levy walk strategy?	Oral + Poster	Welter, Adrian and Levina, Anna
What should a neuron aim for? Designing local objective functions based on information theory	Oral + Poster	Schneider, Andreas
Division of Labor in Robot Swarms by Surprise Minimization	Poster	Leopardi, Paolo and Kuckling, Jonas and Hamann, Heiko and Kaiser, Tanja Katharina
What is an emergent phenomenon in machine learning?	Poster	Gros, Claudius
Self-organizing systems: what, how, and why?	Poster	Gershenson, Carlos
Lifelong Evolutionary Swarms	Poster	Leuzzi, Lorenzo and Cossu, Andrea and Jones, Simon and Bacciu, Davide; Hauert, Sabine
Morphological Computation as Intrinsic Reward for Reinforcement Learning	Poster	Baiazid, Omar and Dohmen, Jan and Ay, Nihat and Eppe, Manfred
Universal and Cheap Control Architectures for Embodied Agents	Poster	Ay, Nihat and Datar, Adwait
A Self-consistency Loss for Temporally-Consistent Object-Centric Representations	Poster	Manasyan, Anna and Seitzer, Maximilian and Martius, Georg and Zadaianchuk, Andrii
Language Cellular Automata: Guiding Cellular Morphogenesis with Natural Language	Poster	Najarro, Elias and Freiberger, Matthias and Montero, Milton L. and Risi, Sebastian
Guided Continuous Sensorimotor Learning in Humanoid Robots through Human-in-the-loop Reinforcement Learning	Poster	Yordanova, Magdalena and Hafner, Verena V.
Rethinking Vision Transformers for Object-Centric Foundation Models	Poster	Traub, Manuel and Butz, Martin V.