Dr. Manuel Brenner (Ph.D. Physics)

Junior Group Leader in Machine Learning for Neuroscience & Psychiatry
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My research focuses on developing **interpretable machine learning models** for **real-world time series data** in clinical and neuroscientific settings (EEG, fMRI, spike trains, behavior), with a strong focus on interpretability, multimodal data, and data integration across subjects. I've published 10+ peer-reviewed papers, including first-author papers at the top AI conferences (ICLR, NeurIPS, ICML), and contribute to open-source codebases accompanying all method papers. My work is represented across the machine learning, computational neuroscience, and psychiatry communities, including contributions to the European IMMERSE consortium and presentations at CNS, the Bernstein Conference, neuromatch, Dynamics Days, and the Computational Psychiatry conference.

Career

from 09/25	Junior Group Leader Ernst-Strüngmann Institute (ESI) & DYNAMIC consortium Interdisciplinary research group bridging the ESI and Goethe University's Department of Psychiatry. Focus on machine learning for dynamical systems in neuroscience & psychiatry
01/25-08/25	Postdoctoral Researcher, Interdisciplinary Center for Scientific Computing Heidelberg (Machine Learning for Human Behavior Group) Supervision: Prof. Georgia Koppe
07/24-12/24	Researcher for the AIHealth Innovation Cluster Heidelberg & Mannheim
11/19-06/24	PhD Student, Central Institute for Mental Health Mannheim (Theoretical Neuroscience Group) "Learning Interpretable Dynamical Systems Models from Multimodal Empirical Time Series" Supervision: Prof. Daniel Durstewitz, final grade: 1.0 (magna cum laude)
9/12-07/18	B.Sc. and M.Sc. in Physics, Heidelberg University: Research focus on theoretical particle physics and quantum physics

Main Publications

2025	**Brenner, M.**, Weber, E., Koppe, G., Durstewitz, D.: Learning Interpretable Hierarchical Dynamics Models from Time Series Data, *ICLR 2025*
2024	**Brenner, M.**, Hemmer, C., Monfared, S., Durstewitz, D.: Almost-Linear RNNs Yield Highly Interpretable Symbolic Codes in Dynamical Systems Reconstruction, *NeurIPS 2024*
2024	**Brenner, M.,** Hess, F., Koppe, G., Durstewitz, D.: Integrating Multimodal Data for Joint Generative Modeling of Complex Dynamics, *ICML 2024*
2024	**Brenner, M.**, Durstewitz, D.: Krisenhafte Veränderungen in Gehirn und Psyche, *Der Nervenarzt (Springer Medizin)*
2023	**Brenner, M.**, Koppe, G., Durstewitz, D.: Multimodal Teacher Forcing for Reconstructing Nonlinear Dynamical Systems, *AAAI 2023, Workshop MLDS*
2022	**Brenner, M.,** Hess, F. et al. Tractable Dendritic RNNs for Reconstructing Nonlinear Dynamical Systems, *ICML 2022*

Co-Author Publications

2024 Göring, N., Hess, F., Monfared, Z., **Brenner, M.,** Durstewitz, D.:
Out-of-Domain Generalization in Dynamical Systems Reconstruction, *ICML 2024*

2024 Hemmer, C., **Brenner, M.,** Hess, F., Durstewitz, D.:
Optimal Network Topologies for Dynamical Systems Reconstruction, *ICML 2024*

2024 Myin-Germeys, I., Reininghaus, U., **Brenner, M.,** et al.: Experience Sampling Methodology as a Digital Clinical Tool for More Person-centred Mental Health Care: An Implementation Research Agenda, *Psychological Medicine*

2024 Reininghaus, U., Schwannauer, M., **Brenner, M.,** et al.: Strategies, processes, outcomes, and costs of implementing experience sampling-based monitoring in routine mental health care in four European countries, *BMC Psychiatry*

2023 Hess, F., Monfared, Z., **Brenner, M.,** Durstewitz, D.:
Generalized Teacher Forcing for Learning Chaotic Dynamics, *ICML 2023*

Preprints

2025 **Brenner, M.**, Koppe, G. (2025), Uncovering the Functional Roles of Nonlinearity in Memory, arXiv:2506.07919, under review

2025 **Cao, H.**, Brenner, M. et al. (2025), MTLcomb: multi-task learning combining regression and classification tasks for joint feature selection, under review

2024 **Brenner, M.**, Mier, D., Schmidt, S. N.L., Lis, S., Kirsch, P., Durstewitz, D., Koppe, G., Digital twins of human social interactions reveal behavioral strategies in exchange games, psyarxiv preprint, under review

All method papers are accompanied by **open-source GitHub repositories**. In total, I contributed to 5+ public codebases with documentation and tutorials to support reproducibility and adoption in the research community.

Conferences & Reviewing

Reviewer for NeurIPS (2023, 2025), ICLR (2024, 2025), ICML (2022, 2024).

Organizer of tutorial at CNS 2023 and workshop at Bernstein Conference 2025

Presentations & Posters at Bernstein Conference 2021, neuromatch 3.0, Dynamics Days 2025 and Computational Psychiatry 2025

Teaching & Supervision

External referee for doctoral dissertation Noah Jones, Massachusetts Institute of Technology (MIT), 2025
Seminar Organizer, *AI Safety* (2025): First to host an undergraduate/graduate seminar on AI Safety at my institution.
Undergraduate & Graduate Supervision: Supervised 15+ students at the bachelor's and master's levels.
Head Teaching Assistant under Prof. Daniel Durstewitz (2020–2024): Developed and graded exercise sheets and coding projects. Taught tutorials in Computational Statistics, Time Series Analysis & Recurrent Neural Networks, Dynamical Systems Theory in Machine Learning and Machine Learning for Real-world Problems.

Science Communication

Writer on *Medium & Towards Data Science* (since 2019): Published 80+ articles on machine learning, AI with up to 15,000+ monthly views and 4,000+ followers
Host of the *Transformative Ideas Podcast* (since 2020), recording 30+ long-form discussions on topics such as AI, neuroscience, and climate change

Skills

Languages	German (native), English (proficient), French (advanced)
Programming	Python (advanced), Julia (basic), Matlab (basic), LaTeX (advanced)

Grants and Fellowships

07/25	**Heidelberg Future Leaders Forum (selected)**
07/25	**Young Marsilius Fellow Interdisciplinary Research & Science Communication (selected)**
04/24-12/24	**AI Health Bridge Funding Grant (AIHealth Innovation Cluster)**
	PhD and Postdoctoral Research Position (approx. **56 700€**). Support for collaborative projects for AI researchers bridging clinical and research institutions.

Creative Projects

Music producer as Ease and Composure, including the release of four albums
Bass player in jazz trio *triolog.*, including the release of two albums
Author of the book *Two Souls* (2022, ISBN: 978-3750299085)