Dr. Jens-Bastian Eppler – Curriculum Vitae

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Education

From 2024 Postdoctoral researcher in the group of Dr. Alex Roxin

Centre de Recerca Matemàtica, Barcelona, Spain
Computational Neuroscience Group

Feb. 2025: One-month research stay with Yingxue Wang at Max Planck Florida Institute, Jupiter, FL, USA.

2022 - 2024 Postdoctoral researcher in the group of Prof. Dr. Matthias Kaschube

Department for Computer Science, Goethe University and Frankfurt Institute for Advanced Studies, Frankfurt, Germany.

Oct. - Nov. 2023: Two-month research stay with Gianluigi Mongillo at Institut de la Vision, Paris, France, supported by the PROCOPE MOBILITY stipend of the French embassy in Berlin.

2015 - 2022 PhD in Physics - Goethe University, Frankfurt, Germany

Doctoral thesis: *'Ongoing population activity dynamics in the neocortex - Representational drift in experiment and model'*

2013 - 2015 MSc in Physics - Goethe University, Frankfurt, Germany

Master thesis: *'Spontaneous Categorization in Mouse Auditory Cortex'*

2008 - 2013 BSc in Physics - Goethe University, Frankfurt, Germany

Bachelor thesis: *'Construction of a TPC test chamber in order to investigate the voltage trips of the ALICE TPC'*

2010 - 2011 Two-semester ERASMUS study period at Copenhagen University, Copenhagen, Denmark.

Research Experience

During Feb. 2024 Max Planck Florida Institute, Jupiter, FL, USA
Visiting Researcher/Postdoctoral Researcher

Work on the implementation of a preprocessing pipeline for 2-photon imagaing dataset.

From Sep. 2024 Centre de Recerca Matemàtica, Barcelona, Spain
Postdoctoral Researcher

Investigation of representational drift and its implications for the stability of neuronal codes, combining analysis of long-term population recordings from mouse hippocampus with computational and analytical models.

Oct. 2023 - Nov. 2023 Institut de la Vision, INSERM CNRS Sorbonne University, Paris, France
Visiting Researcher/Postdoctoral Researcher

Analytical description of spontaneous categorization in firing rate network models.

Jul. 2022 - Sep. 2024 Frankfurt Institute for Advanced Studies, Frankfurt am Main, Germany
Research Assistant/Postdoctoral Researcher

Analysis of neuronal population dynamics in 2-photon imaging data with a focus on the description and function of representational drift, the description and deconstruction of ongoing population dynamics by elementary operations, and signal and noise correlations under basal conditions and during fear learning.
Investigation of neuronal population response transitions in a firing rate model using complex systems theory and the analysis of the system's fixed points topology.
Development of methods to investigate the neuronal correlates of the cognitive processes as learning and forgetting, aiming to close in on understanding creativity on the level of neuronal populations.

Oct. 2015 - Jun. 2022 Frankfurt Institute for Advanced Studies, Frankfurt am Main, Germany
Research Assistant/PhD Student

Analysis of chronic neuronal population data from mouse auditory cortex, investigating the stability of cortical representations under basal conditions and during fear conditioning.
Implementation of a circuit model of chronic neuronal population activity to study the effect of different synaptic change mechanisms on neuronal activity.
Development of an algorithm for the fully automated detection of dendritic spines using deep convolutional networks.

Jan. 2015 - Sep. 2015 Frankfurt Institute for Advanced Studies, Frankfurt am Main, Germany
Research Assistant

Development and implementation of a preprocessing pipeline to automatically track and read out the activity of neurons in 2-photon videos over multiple days.

Jul. 2014 - Sep. 2015 Frankfurt Institute for Advanced Studies, Frankfurt am Main, Germany
Master Student

Computational analysis of large datasets of neuronal population recordings to understand information processing in mouse auditory cortex.
Modeling this data from mouse auditory cortex using a circuit model, reproducing key characteristics of cortical activity.

Publications

Eppler, J.-B., Galella, S., Mel, G. C., Roxin, A. (2026). *Random network structure stabilizes neural manifolds.* bioRxiv. DOI: https://doi.org/10.64898/2026.05.21.726949

Seiler*, J. P.-H., **Eppler*, J.-B.**, Dan*, O., Elpelt*, J., Kaschube§, M., Rumpel§, S. (2026). *Towards circuit mechanisms of the creative process.* Creativity Research Journal. * shared first authors, § shared last authors. DOI: https://doi.org/10.1080/10400419.2026.2646676

Eppler*, J.-B., Lai*, T., Aschauer, D. F., Rumpel§, S., Kaschube§, M. (2026). *Representational drift reflects ongoing balancing of stochastic changes by Hebbian learning.* Proceedings of the National Acadamy of Sciences. * shared first authors, § shared last authors. DOI: https://doi.org/10.1073/pnas.2503046123

Eppler, J.-B., Kaschube, M., Rumpel, S. (2025). *Statistical learning and representational drift: A dynamic substrate for memories.* Current Opinion in Neurobiology. DOI: https://doi.org/10.1016/j.conb.2025.103107

Noda, T., Kienle, E., **Eppler, J.-B.**, Aschauer, D. F., Kaschube, M., Loewenstein, Y., Rumpel, S. (2025). *Homeostasis of a representational map in the neocortex.* Nature Neuroscience. DOI: https://doi.org/10.1038/s41593-025-01982-7

Vogel, F.W., Alipek, S., **Eppler, J.-B.**, Osuna-Vargas, P., Triesch, J., Bissen, D., Acker-Palmer, A., Rumpel, S., Kaschube, M. (2023). *Utilizing 2D-region-based CNNs for automatic dendritic spine detection in 3D live cell imaging.* Scientific Reports. DOI: https://doi.org/10.1038/s41598-023-47070-3

Chambers, A. R., Aschauer, D. F., **Eppler, J.-B.**, Kaschube, M., Rumpel, S. (2022). *A stable sensory map emerges from a dynamic equilibrium of neurons with unstable tuning properties.* Cerebral Cortex. DOI: https://doi.org/10.1093/cercor/bhac445

Aschauer*, D. F., **Eppler*, J.-B.**, Ewig, L., Chambers, A., Pokorny, C., Kaschube[§], M., Rumpel[§], S. (2022). *Learning-induced biases in the ongoing dynamics of sensory representations predict stimulus generalization.*, Cell Reports. * shared first authors, [§] shared last authors. DOI: https://doi.org/10.1016/j.celrep.2022.110340

Grants & Awards

- **I'm a Scientist - KI in der Schule 2025: most popular scientist**
- **PROCOPE-MOBILITY 2023 stipend by the French embassy in Berlin**
- **Bernstein Conference Travel Grant 2023**
- **Cosyne New Attendees Travel Grant 2018**
- **Poster Prize for Best Interdisciplinary Poster at the RMN^2 meeting 2018**

Invited Talks

Sep. 2025 Bernstein Conference 2025, Workshop: Representational drift and its consequences for learning and memory (co-organized by Alex Roxin & myself), Frankfurt/Main, Germany
Eppler, J.-B., Mel, G., Roxin, A., *'Emergent representational stability from unstable neuronal activity'*

Sep. 2025 Congreso SENC 2025, Symposium: SINC^2 @ SENC, Las Palmas de Gran Canaria, Spain
Eppler, J.-B., Mel, G., Roxin, A., *'Emergent stability in random networks: Computational principles of representational similarity'*

Feb. 2025 van Vreeswijk Theoretical Neuroscience Seminar (VVTNS), online
Eppler, J.-B., *'Representational drift reflects ongoing balancing of stochastic changes by Hebbian learning'*

Sep. 2021 Bernstein Conference 2021, Workshop: Maintaining function in the presence of ongoing change, online
Eppler, J.-B., Aschauer, D. F., Rumpel, S., Kaschube, M., *'Formation of associations by learning-induced biases in the ongoing dynamics of sensory representations'*

Contributed Talks

May 2026 Hippocampus Green Meeting 2026, Barcelona, Spain
Eppler, J.-B., Galella, S, Mel, G., Roxin, A., *'Representational similarity is preserved during representational drift in random networks'*

Mar. 2026 BonnBrain 2026, Bonn, Germany
Eppler, J.-B., Galella, S, Mel, G., Roxin, A., *'Representational similarity is preserved during representational drift in random networks'*

Dec. 2025 Hospital del Mar Christmas Meeting, Barcelona, Spain
Eppler, J.-B., *'Representational similarity is preserved during representational drift in random networks'*

Sep. 2025	Congreso SENC 2025, Las Palmas de Gran Canaria, Spain **Eppler, J.-B.**, Rumpel, S., Roxin, A., *'Emergent Representational Stability from Unstable Neuronal Activity: Modeling Representational Drift'*
May 2025	BARCCSYN Conference 2025, Barcelona, Spain **Eppler, J.-B.**, Mel, G., Roxin, A., *'Emergent stability in random networks: Computational principles of representational similarity'*
Dec. 2022	4th Interdisciplinary Graduate Conference of DocColloq, online **Eppler, J-B.**, *'Learning biases the ongoing dynamics in the brain to link sensory impressions'*
Mar. 2022	SPP Computational Connectomics Meeting 2022, online Aschauer, D. F., **Eppler, J.-B.**, Stöber, T., Rumpel, S., Kaschube, M., Triesch, J., *'The dynamic connectome: dynamics of learning'*
Oct. 2020	Neuromatch 2020, online **Eppler, J.-B.**, Aschauer, D. F., Rumpel, S., Kaschube, M., *'Abrupt transitions of response patterns emerging from gradual changes of network connectivity'*
Oct. 2019	SPP Computational Connectomics Meeting 2019, Frankfurt, Germany Mateu-Fernandez, N., **Eppler, J.-B**, Hoffmann, F., Rumpel, S., Kaschube, M., Triesch, J., *'The dynamic connectome: keeping the balance'*

Teaching & Mentoring Experience

2016 - 2024: Undergraduate Mentoring

Frankfurt Institute for Advanced Studies / Goethe University Frankfurt
Co-supervision of students working on their BSc and MSc theses in computer science or physics on topics including computational and theoretical neuroscience and machine learning. Thesis titles include:

- *'Automatic visual detection and tracking of synaptic connections in live cell imaging data using deep learning'* (BSc)
- *'Comparing dropout to activity patterns in drifting recurrent networks'* (BSc)
- *'Continuous and abrupt response transitions in different regimes of a neural network model'* (BSc)
- *'The Correlation Structure in Networks of Cortical Neurons'* (BSc)
- *'Dendritic spine detection with Convolutional Neural Networks'* (BSc)
- *'Deep Learning Reveals the Network Structure Underlying Clustering in Small Neural Networks'* (BSc)
- *'Differences and Similarities of Attractors in Random Networks and Hopfield Networks'* (BSc)
- *'Effects of input-based versus activity-based updates on learning and drift in neural networks'* (BSc)
- *'Effects of Synaptic Changes to Responses in a Network Model'* (BSc)
- *'Investigating the effects of auditory cued fear conditioning on the dimensionality of neuronal representations in mouse auditory cortex'* (BSc)
- *'Learning Inverts the Stabilizing Effect of Signal Correlations on Noise Correlations in Mouse Neocortex'* (MSc)
- *'Learning Results in Slow and Abrupt Changes of Neuronal Representations in Small Networks'* (BSc)
- *'Multiple fixed-points emerge in inhibition dominated small recurrent neural networks'* (MSc)
- *'Neural Population Activity in Auditory Cortex'* (MSc)
- *'Optimizing Efficiency of Neural Population Spiking Rate Inference from Wide-Field Calcium Imaging* (BSc)
- *'Prediction of Neural Transitions in the Mouse Auditory Cortex'* (BSc)

2016 - 2024: Teaching

Goethe University Frankfurt
Teacher and teaching assistant for the courses:

- *Theoretical Neuroscience I* (WS 16/17, WS 19/20, WS 20/21 & WS 21/22)
- *Theoretical Neuroscience II* (SS 17, SS 18, SS 21 & SS 23)
- *Machine Learning II* (SS 20 & SS 21)

and the seminar:

- *Computational Neuroscience* (SS 18, WS 18/19, SS 19, SS 20, SS 22, WS 22/23, SS 23, WS 23/24 & SS 24)

Tasks included giving tutorials (offline and online), preparing and correcting problem sets and exams, preparation and realisation of seminar sessions, grading.

Organization of conferences & symposia

May 2026 *Barcelona Computational, Cognitive and Systems Neuroscience (BARCCSYN) conference 2026*
Conference Annual meeting of the BARCCSYN community.
Co-organiser with Alexandre Hyafil, Hernando Martínez Vergara and Indre Pileckyte.

Sep. 2025 *Representational drift and its consequences for learning and memory*
Workshop on representaional drift at Bernstein Conference 2025.
Co-organiser and co-chair with Alex Roxin.

Sep. 2024 *Bridging Fields in Creativity Research - Towards Circuit Mechanisms of the Creative Process*
Conference bringing together experts from the fields of creativity, systems neuroscience and artificial intelligence.
Co-organizer with Simon Rumpel, Matthias Kaschube.

Jun. 2024 *Representational drift, learning and forgetting*
Symposium on representaional drift at FENS Forum 2024.
Co-organiser and co-chair with Simon Rumpel.

2024 *FIAS Neuroscience Seminar*
Seminar on current topics in neuroscience.
Main organiser, host and chair together with Hermann Cuntz, Matthias Kaschube, Jochen Triesch.

Public Outreach & Science Communication

2026 Pint of Science Sabadell: *Why the Brain Loves Categories*

Outreach talk in a bar setting in Sabadell, Spain.

2025 Keynote talk at Bundesjugendkonferenz Medien, Rostock: *'What can and can't AI do?'*

Invited outreach talk at the national youth media conference.

2025 Talk at Lehrerseminar Heilbronn: *'Understanding AI - and learning from it'*

Invited outreach talk at a teacher seminar in collaboration with the Industriepark Artificial Intelligence.

2023 – ongoing 'Forschungsbörse'

Lectures and panel discussions in schools on topics from neuroscience and artificial intelligence.

Past events include:
- Feldbergschule Oberursel (2026, lecture): *'How do neural networks learn?'*
- Ganerben-Gymnasium Künzelsau (2024, lecture): *'The Nobel Prize 2024 for Artificial Intelligence: How do neural networks really work?'*
- Winfriedschule Fulda (2024, panel): *'How free are we, really?'*
- Georg-Fahrbach-Schule Ingelfingen (2023, lecture): *'What is Artificial Intelligence?'*

2023 – ongoing 'I'm a Scientist – Get me out of here'

Expert for the topic Artificial Intelligence. Answering questions of school students in live chats and online fora. Participated in:

- Feb 2026
- Jun 2025 (winner most popular scientist, voted by participating students)
- Dec 2024
- Feb/Mar 2024
- Sep 2023

2024 'Frankfurt hat Hirn - live'

Science communication evening event by the Frankfurt neuroscience research institutes. Member of organization team and presenter (talk: "Drawers in the Mind: How the Brain Organizes the World").

2022 - 2023 Deutsche Neurowissenschaften Olympiade (DNO)

German division of the international brain bee. Press text and communication representative for the DNO finals in Frankfurt.

2022 Participant at 'KlarText' prize for science communication

Including publication of popular science article "How does a traumatic event change the brain?" on the 'KlarText' blog (link (German)).

2022 'Mixing of the Minds' workshop

Expert at citizen dialogue on the topic of fair data use in large brain imaging experiments, organized by the European Union and the Human Brain Project.

2018 - 2019 Hessen schafft Wissen

Operation and explanation of experiments from various scientific fields (e.g. solid state physics, mechanics, electrodynamics, neuroscience) to the interested public at diverese events like the Frankfurt book fair or the 'Hessentag'. Included the development and set-up of experimental showcases.

2017 - 2018 Night of Science

Minor helper tasks at the Goethe University Frankfurt Night of Science, including operation and explanation of Physics experiments.

Peer Review Activities

- Reviewer for *Computational and Structural Biotechnology Journal*, *Nature Communications*, *Physical Review E PLOS Computational Biology*, *Proceedings of the National Academy of Sciences of the United States of America (PNAS)*, and *PRX life*.
- Abstract reviewer for the *Conference on Cognitive Computational Neuroscience (CCN)* and *Cosyne*.
- Grant reviewer for the *United States - Israel Binational Science Fundation (BSF)*.

Professional Memberships

- **Bernstein Network Computational Neuroscience**
- **Federation of European Neuroscience Societies (FENS)**
- **German Neuroscience Society (NWG)**
- **Society for Neuroscience (SfN)**
- **Spanish Neuroscience Society (SENC)**

Conference Posters

May 2026 BARCCSYN 2026, Barcelona, Spain
Eppler, J.-B., Galella, S, Mel, G., Roxin, A., *'Random network structure stabilizes neural manifolds'*

Mar. 2026 BonnBrain 2026, Bonn, Germany
Eppler, J.-B., Galella, S, Mel, G., Roxin, A., *'Representational similarity is preserved during representational drift in random networks'*

Sep. 2025 Bernstein Conference 2025, Frankfurt/Main, Germany
Eppler, J.-B., Mel, G., Roxin, A., *'Emergent representational stability from unstable neuronal activity'*

Sep 2025 Congreso SENC 2025, Las Palmas de Gran Canaria, Spain
Eppler, J.-B., Rumpel, S., Roxin, A., *'Emergent Representational Stability from Unstable Neuronal Activity: Modeling Representational Drift'*

Jun. 2024 FENS Forum 2024, Vienna, Austria
Eppler, J.-B., Kaschube, M., Rumpel, S., *'Abrupt transitions interrupt slow, ongoing representational drift in experiment and model'*

Jun. 2024 Rhine Main Neural Networks 2024, Oberwesel, Germany
Eppler, J.-B., Kaschube, M., Rumpel, S., *'Abrupt transitions interrupt slow, ongoing representational drift in experiment and model'*

Mar. 2024 Cosyne 2024, Lisbon, Portugal
Eppler, J.-B., Kaschube, M., Rumpel, S., *'Abrupt transitions interrupt slow, ongoing representational drift in experiment and model'*

Sep. 2023 Bernstein Conference 2023, Berlin, Germany
Eppler, J.-B., Kaschube, M., *'Abrupt transitions interrupt slow, ongoing representational drift in a network model'*

Sep. 2022 Bernstein Conference 2022, Berlin, Germany
Eppler, J.-B., Aschauer, D. F., Rumpel, S., Kaschube, M., *'Abrupt transitions of rnetwork esponses to gradual drift of connectivity'*

Jun. 2022 Rhine Main Neural Networks 2022, Oberwesel, Germany
Eppler, J.-B., Aschauer,, D. F. Rumpel, S., Kaschube, M., *'Abrupt transitions of activity patterns in response to gradual changes of network connectivity'*

Mar. 2021 14th Göttingen Meeting of the German Neuroscience Society, online
Eppler, J.-B., Aschauer, D. F., Rumpel, S., Kaschube, M., *'Abrupt transitions of response patterns emerging from gradual changes of network connectivity'*

Sep. 2020 Bernstein Conference 2020, online
Eppler, J.-B., Aschauer, D. F., Rumpel, S., Kaschube, M., *'Abrupt transitions of response patterns emerging from gradual changes in connectivity'*

Sep. 2019 Bernstein Conference 2019, Berlin, Germany
Eppler, J.-B., Aschauer, D. F., Rumpel, S., Kaschube, M., *'Abrupt transitions of response patterns emerging from gradual changes in connectivity'*

Sep. 2019 ESISyNC 2019, Frankfurt, Germany
Eppler, J.-B., Aschauer, D. F., Rumpel, S., Kaschube, M., *'Abrupt transitions of response patterns emerging from gradual changes in connectivity'*

Feb. 2019 Cosyne 2019, Lisbon, Portugal
Eppler, J.-B., Aschauer, D. F., Kaschube, M., Rumpel, S., *'A basis set of operations captures cell assembly dynamics under basal conditions and during learning'*

Sep. 2018 Bernstein Conference 2018, Berlin, Germany
Eppler, J.-B., Aschauer, D. F., Rumpel, S., Kaschube, M., *'A basis set of operations capturing cell assembly recombination under basal conditions and during learning'*

Jul. 2018 FENS Forum 2018, Berlin, Germany
Eppler, J.-B., Aschauer, D. F., Rumpel, S., Kaschube, M., *'Modeling the effect of structural volatility on the stability of cell assemblies'*

Jun. 2018 Rhine Main Neural Networks 2018, Oberwesel, Germany
Eppler, J.-B., Aschauer, D. F., Ewig, L., Rumpel, S., Kaschube, M., *'Modeling ongoing recombination of cell assemblies in auditory cortex'*

Mar. 2018 Cosyne 2018, Denver, CO, USA
Eppler, J.-B., Aschauer, D. F., Ewig, L., Kaschube, M., Rumpel, S., *'Long-term imaging of sensory representations reveals ongoing recombination of cell assemblies'*

Nov. 2017 Society for Neuroscience 2017, Washington, DC, USA
Eppler, J.-B., Aschauer, D. F., Ewig, L., Rumpel, S., Kaschube, M., *'How does structural volatility affect cortical representations?'*

Sep. 2017 Bernstein Conference 2017, Göttingen, Germany
Eppler, J.-B., Aschauer, D. F., Ewig, L., Schulte, L., Rumpel, S., Kaschube, M., *'How does structural volatility affect cortical representations?'*

Mar. 2017 12th Göttingen Meeting of the German Neuroscience Society, Göttingen, Germany
Eppler, J.-B., Aschauer, D. F., Chambers, A., Rumpel, S., Kaschube, M., *'Stability of sensory representations in the presence of synaptic turnover'*

Sep. 2016 Bernstein Conference 2016, Berlin, Germany
Eppler, J.-B., Aschauer, D. F., Chambers, A., Rumpel, S., Kaschube, M., *'Stability of sensory representations in the presence of synaptic turnover'*

Jul. 2016 FENS Forum 2016, Copenhagen, Denmark
Eppler, J.-B., Aschauer, D. F., Chambers, A., Rumpel, S., Kaschube, M., *'Stability of discrete cortical representations in the presence of synaptic turnover'*

Jun. 2016 Rhine Main Neural Networks, Oberwesel, Germany
Eppler, J.-B., Aschauer, D. F., Chambers, A., Rumpel, S., Kaschube, M., *'Stability of discrete cortical representations in the presence of synaptic turnover'*

Oct. 2015 Society for Neuroscience 2015, Chicago, IL, USA
Eppler, J.-B., Aschauer, D. F., Rumpel, S., Kaschube, M., *'Modeling discrete cortical representations and their stability in the presence of synaptic turnover'*

Sep. 2015 Bernstein Conference Heidelberg 2015, Heidelberg, Germany
Eppler, J.-B., Aschauer, D. F., Rumpel, S., Kaschube, M., *'Probing the robustness of cortical representations'*

Jul. 2015 CNS 2015, Prague, Czech Republic
Eppler, J.-B., Aschauer, D. F., Rumpel, S., Kaschube, M., *'Discrete representations in mouse auditory cortex and their stability in the presence of synaptic turnover'*

Jun. 2015 ESISyNC 2015, Frankfurt, Germany
Eppler, J.-B., Aschauer, D. F., Rumpel, S., Kaschube, M., *'Probing the robustness of cortical representations'*

Mar. 2015 11th Göttingen meeting of the German Neuroscience Society, Göttingen, Germany
Eppler, J.-B., Aschauer, D. F., Rumpel, S., Kaschube, M., *'Discrete representations in mouse auditory cortex and their stability in the presence of synaptic turnover'*

Sep. 2014 Bernstein Conference 2014, Göttingen, Germany
Eppler, J.-B., Aschauer, D. F., Rumpel, S., Kaschube, M., *'Discrete representations in mouse auditory cortex and their stability in the presence of synaptic turnover'*