

Artur Schneider

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The Mathis Laboratory of Adaptive Intelligence, Geneva, EPFL

Education

01.03.2017- 30.09.2022	Ph.D., Optophysiology, Institute of Biology III, University of Freiburg, Germany
01.10.2014- 30.09.16?	M.Sc., Molecular Medicine, University of Freiburg, Germany
01.10.2011- 30.09.2014	B.Sc. Molecular Medicine, University of Freiburg, Germany

Doctoral Thesis

Title	Toolbox for the Analysis of Motor Dynamics during Unrestrained Behavior
Supervisor	Prof. Dr. Ilka Diester
Summary	We developed multiple complementary tools to help study neural processes in freely moving animals. Multifunctional approaches for combining electrophysiology and optogenetics in such settings were designed. Likewise, we presented a framework to capture 3D motion and combined it with electrophysiology to model the ongoing neural activity as a combination of multiplexed movement parameters. A virtual head-fixation approach was derived to uncover tuned neurons during unrestrained behavior
Evaluation	Summa cum laude
Date of defense	30.09.2022

Research Experience

01.04.2025- ongoing	Postdoc, Mathis Laboratory of Adaptive Intelligence , École Polytechnique Fédérale de Lausanne (EPFL), (PI: Prof. Dr. Mackenzie Mathis)
01.01.2023- 31.01.2025	Postdoc, Optophysiology , University of Freiburg, (PI: Prof. Dr. Ilka Diester)

Academic Distinctions and Funding

2022	BernsteinCortec Award - For outstanding scientific achievements in a doctoral thesis at the University of Freiburg in the interdisciplinary field of Computational Neuroscience and Neurotechnology
2022	Thomas-Bayes-Preis - For outstanding theses in the field of data analysis and modeling in the life sciences
2024-2025	StartUp funding within FOR5159 (25,000€)

Publications

Journal Articles

- J1. Zhu, H., Crompe, B. D. L., Kalweit, G., Schneider, A., Kalweit, M., Diester, I. & Boedecker, J. Multi-intention Inverse Q-learning for Interpretable Behavior Representation. arXiv: 2311.13870[cs]. <http://arxiv.org/abs/2311.13870> (Sept. 10, 2024).
- J2. De La Crompe, B., Schneck, M., Steenbergen, F., Schneider, A. & Diester, I. FreiBox: A Versatile Open-Source Behavioral Setup for Investigating the Neuronal Correlates of Behavioral Flexibility via 1-Photon Imaging in Freely Moving Mice. *eneuro* 10. Test1,2, ENEURO.0469–22.2023. ISSN: 2373-2822. <http://dx.doi.org/10.1523/eneuro.0469-22.2023> (Apr. 2023).
- J3. Eriksson, D., Schneider, A., Thirumalai, A., Alyahyay, M., de la Crompe, B., Sharma, K., Ruther, P. & Diester, I. Multichannel optogenetics combined with laminar recordings for ultra-controlled neuronal interrogation. *Nature Communications* 13. ISSN: 2041-1723. <http://dx.doi.org/10.1038/s41467-022-28629-6> (Feb. 2022).
- J4. Melbaum, S., Russo, E., Eriksson, D., Schneider, A., Durstewitz, D., Brox, T. & Diester, I. Conserved structures of neural activity in sensorimotor cortex of freely moving rats allow cross-subject decoding. *Nature Communications* 13, 7420. ISSN: 2041-1723. <https://www.nature.com/articles/s41467-022-35115-6> (Dec. 2, 2022).
- J5. Schneider, A., Zimmermann, C., Alyahyay, M., Steenbergen, F., Brox, T. & Diester, I. 3D pose estimation enables virtual head fixation in freely moving rats. *Neuron* 110, 2080–2093.e10. ISSN: 0896-6273. <http://dx.doi.org/10.1016/j.neuron.2022.04.019> (July 2022).
- J6. Eriksson, D., Heiland, M., Schneider, A. & Diester, I. Distinct dynamics of neuronal activity during concurrent motor planning and execution. *Nature Communications* 12. ISSN: 2041-1723. <http://dx.doi.org/10.1038/s41467-021-25558-8> (Sept. 2021).
- J7. Sharma, K., Jäckel, Z., Schneider, A., Paul, O., Diester, I. & Ruther, P. Multifunctional optrode for opsin delivery, optical stimulation, and electrophysiological recordings in freely moving rats. *Journal of Neural Engineering* 18, 066013. ISSN: 1741-2552. <http://dx.doi.org/10.1088/1741-2552/ac3206> (Nov. 2021).
- J8. Sun, Z., Schneider, A., Alyahyay, M., Karvat, G. & Diester, I. Effects of Optogenetic Stimulation of Primary Somatosensory Cortex and Its Projections to Striatum on Vibrotactile Perception in Freely Moving Rats. *eneuro* 8, ENEURO.0453–20.2021. ISSN: 2373-2822. <http://dx.doi.org/10.1523/eneuro.0453-20.2021> (Feb. 2021).
- J9. Eriksson, D., Schneck, M., Schneider, A., Coulon, P. & Diester, I. A starting kit for training and establishing in vivo electrophysiology, intracranial pharmacology, and optogenetics. *Journal of Neuroscience Methods* 336, 108636. ISSN: 01650270. <https://linkinghub.elsevier.com/retrieve/pii/S0165027020300583> (Apr. 2020).
- J10. Karvat, G., Schneider, A., Alyahyay, M., Steenbergen, F., Tangermann, M. & Diester, I. Real-time detection of neural oscillation bursts allows behaviourally relevant neurofeedback. *Communications Biology* 3. ISSN: 2399-3642. <http://dx.doi.org/10.1038/s42003-020-0801-z> (Feb. 2020).
- J11. Zöllner, T. et al. Silencing of TGF β signalling in microglia results in impaired homeostasis. *Nature Communications* 9, 4011. ISSN: 2041-1723. <https://www.nature.com/articles/s41467-018-06224-y> (Oct. 1, 2018).

Working papers

- W1. Alyahyay, M. et al. Mechanisms of Premotor-Motor Cortex Interactions during Goal Directed Behavior Jan. 21, 2023. <http://biorxiv.org/lookup/doi/10.1101/2023.01.20.524944>.

Tools & Software

[FreiCtrl_Laser](#): Repository with hardware and GUI code and documentation for the FreiLaser, optogenetic signal generator.

[SpikeGLX-remoteCTRL](#): Tools for interfacing the SpikeGLX Neuropixels recording software via other python processes.

[DataStructure_tools](#): Metadata storage and data processing pipelines based on DataJoint. Integrated with eLabFTW laboratory notebook for documentation.

[FreiPose_Recorder](#): GUI-based tool for synchronized video recordings using Basler cameras.

[MCC_DAQ](#): GUI- based tool for visualization and recording of signals using the Measurement Computing Corporation hardware.

[FreiPose](#): Python package for estimating 3D pose of animals.

Presentations

Posters

- P1. Artur Schneider, Julian Graef & Ilka Diester. FreiControl: A cost-efficient, open-source system for investigating individual strategies in decision making of rodents
FENS meeting. 2024. <https://www.world-wide.org/fens-24/freicontrol-cost-efficient-open-source-741ccb4d>.
- P2. Artur Schneider, Julian Graef & Ilka Diester. 3D pose estimation enables virtual head-fixation in freely moving rats
NCM Society meeting. 2022.
- P3. Artur Schneider, Christian Zimmermann, Thomas Brox & Ilka Diester. FreiPose 3D motion capturing allows behavioral classification in freely moving animals and reveals neuronal multiplexing
FENS meeting. 2020.
- P4. Artur Schneider, Christian Zimmermann, Thomas Brox & Ilka Diester. Marker free 3D tracking reveals insights into the role of the motor cortex in movement planning and execution in freely moving rodents
SFN meeting. 2019.

Symposia

- 26.03.2025 Organizer and chair at S3: Prefrontal mechanisms of adaptive cognitive behaviors in health and disease at 16th Göttingen Meeting of the German Neuroscience Society.

Academic Service

Journal Reviewer

- 2025 HardwareX

Last updated: August 5, 2025