Dr. Marcel Brosch

Neuroscientist · Neural-Engineering Tool Developer

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EDUCATION

2016 – 2022

Dr. rer. nat. (Doctorate in Natural Science) summa cum laude

Leibniz Institute for Neurobiology · OvGU Magdeburg, Germany

Development and application of neuroscience tools combining electrophysiology and optophysiology: a transparent µECoG array and an optrode microdrive. Advisors: Prof. F. Ohl, Dr. M. Lippert. Awarded the Faculty of Biology's *Promotionspreis* for best doctoral thesis of the year.

2013 – 2016

M.Sc. Integrative Neuroscience

Leibniz Institute for Neurobiology · Magdeburg, Germany

Functional auditory cortico-striatal coupling during two-way active avoidance learning.

2010 – 2013

B.Sc. Biology

University Hospital Jena, Germany

Optimization of the Barnes maze protocol to detect spatial-learning differences between cyclin D2 knockout and wild-type mice.

2022

Data Analytics Graduate

Ironhack · full-time bootcamp

Python data analytics, MySQL, machine learning (scikit-learn), inferential statistics, APIs, web scraping, data visualization.

RESEARCH EXPERIENCE

2022 – present

Postdoctoral Researcher

Aharoni Lab · UCLA · Los Angeles, USA

Tool development for neuroscience and medicine, focused on one-photon imaging with wireless miniature microscopes (Miniscope Zero) and the open-source data and analysis software around them. Led the optics and wireless data link; led an interdisciplinary team of ~10.

2016 – 2022

Doctoral Researcher

Leibniz Institute for Neurobiology · Magdeburg, Germany

Designed, built, and validated two open-source neural devices; in vivo electrophysiology, optogenetics, and voltage/calcium imaging; large-scale data analysis in Python & MATLAB.

2014 – 2016

Research Assistant (multiple groups)

Leibniz Inst. for Neurobiology · Inst. for Pharmacology & Toxicology · Magdeburg

Rodent behavior and in vivo electrophysiology (Schulz & Woldeit); ultrasonic vocalization and prepulse inhibition pharmacology (Fendt); custom MATLAB analysis.

2011 – 2014

Research Assistant (earlier positions)

Jena · Berlin · Magdeburg, Germany

Primary cell culture in pain neurophysiology; stereotactic pharmacology and fear conditioning; field work in biodiversity and wildlife genetics.

PUBLICATIONS

2026

Aharoni D, **Brosch M**, Sasatani T. **Wireless power transfer for neural recording devices in freely behaving animals: current solutions and future directions.** *Proc. SPIE 13889, Optical Power Delivery II.*

2025 Vlasenko A, Altun E, de Schultz T, **Brosch M**, Ohl FW, Lippert MT. **Projection-specific optogenetic stimulation of visual cortex for neuroprosthesis.** *Brain Stimulation 18 (conference abstract).*

2021 **Brosch M**, Vlasenko A, Ohl FW, Lippert MT. **TetrODrive: an open-source microdrive for combined electrophysiology and optophysiology.** *J. Neural Eng. 18:046030.*

2020 **Brosch M**, Deckert M, Rathi S, Takagaki K, Weidner T, Ohl FW, Schmidt B, Lippert MT. **An optically transparent multi-electrode array for combined electrophysiology and optophysiology at the mesoscopic scale.** *J. Neural Eng. 17(4):046014.*

2019 Coors A, **Brosch M**, Kahl E, Khalil R, Michels B, Laub A, Franke K, Gerber B, Fendt M. **Rhodiola rosea root extract has antipsychotic-like effects in rodent models of sensorimotor gating.** *J. Ethnopharmacol. 235:320–328.*

2019 Xia Z, Arias-Gil G, Deckert M, Vollmer M, Curran A, Herrera-Molina R, **Brosch M**, Krug K, Schmidt B, Ohl FW, Lippert MT, Takagaki K. **Electrochemical roughening and carbon nanotube coating of tetrodes for chronic single-unit recording.** *bioRxiv 738245.*

2018 Fendt M, **Brosch M**, Wernecke KEA, Willadsen M, Wöhr M. **Predator odour but not TMT induces 22-kHz ultrasonic vocalizations in rats that lead to defensive behaviours in conspecifics upon replay.** *Sci. Rep. 8(1):10041.*

2018 Tegtmeier J, **Brosch M**, Janitzky K, Heinze H-J, Ohl FW, Lippert MT. **CAVE: an open-source tool for combined analysis of head-mounted calcium imaging and behavior in MATLAB.** *Front. Neurosci. 12:958.*

2017 Schulz AL, Woldeit ML, **Brosch M**, Ohl FW. **Neurobiological fundamentals of strategy change — a core competence of a companion system.** *Int. Conf. on Companion Technology (IEEE 8287074).*

in prep. Sasatani T & **Brosch M** et al. **Miniscope Zero: fully wireless, single-cell-resolution miniature microscopes for long-term imaging in freely behaving animals.** *Manuscript in preparation (co-first author).*

INVITED TALKS

2019 **A flexible and transparent electrode array for closed-loop optogenetic stimulation.** Breaking-news symposium, 13th German Neuroscience Meeting, Göttingen.

2016 **A systemic view of learning-induced brain network changes.** Young Physiologists Symposium, 95th Annual Meeting of the German Physiology Society, Lübeck.

2015 **Auditory cortico-striatal coupling during two-way active avoidance.** 4th Symposium of the Young Physiologists, Leipzig — *Best Talk Award*.

CONFERENCE PRESENTATIONS

2019 Temporal evolution of reward prediction-error signals during reward and punishment learning. **Society for Neuroscience (SfN)**, Chicago, USA (poster).

2018 A new flexible and transparent multichannel surface electrode. **FENS**, Berlin, Germany (poster).

2017 Novel flexible and transparent µECoG arrays for mesoscopic activity in auditory cortex. **Intl. Conference on Auditory Cortex**, Banff, Canada (poster).

AWARDS & HONORS

Promotionspreis — Faculty Prize for Best Doctoral Thesis, Faculty of Biology, OvGU Magdeburg.

Doctorate awarded *summa cum laude* (highest distinction).

Best Talk Award, 4th Symposium of the Young Physiologists, 2015.

Invited peer reviewer, Nature Methods.

TECHNICAL SKILLS

Programming & data: Python (Pandas, NumPy, scikit-learn), MATLAB, C/C++, SQL, Git; statistics, signal & image processing, machine learning, data visualization.

Hardware & engineering: CAD & 3D printing, microfabrication, PCB/electronics, optical design, embedded firmware, wireless power & data, rapid prototyping, device validation.

Neuroscience methods: 1-photon calcium imaging, in vivo electrophysiology, optogenetics, ECoG/tetrodes, fiber photometry, stereotactic surgery, histology, behavioral assays.

SCIENCE COMMUNICATION & SERVICE

2017 – 2019	**PhD student representative**, Leibniz Institute for Neurobiology — graduate-student coordinator for 50+ students; member of the nationwide Leibniz PhD network.
2019	**Co-founder, SimpleNeuro** — a science-communication blog written by young researchers for the public.

REFERENCES

Available upon request.