

Hannah J. M. Haberkern, PhD

Emmy Noether Group Leader | Julius-Maximilians-Universität Würzburg

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Research profile. Comparative systems neuroscientist studying how nervous systems transform sensory information, internal state, and experience into robust, flexible navigation. The Haberkern Lab combines quantitative behavior, virtual reality, neurogenetics, calcium imaging, connectomics & computational analysis in flies and ants.

ACADEMIC APPOINTMENTS

- 2023–present **Emmy Noether Group Leader**, Chair of Zoology II, Julius-Maximilians-Universität Würzburg, Germany
 Independent leadership of a comparative systems neuroscience group; scientific strategy, personnel, budget, research infrastructure, teaching, and supervision.
- 2017–2023 **Postdoctoral Associate**, HHMI Janelia Research Campus, Ashburn, VA, USA
 Laboratory of Vivek Jayaraman; neural mechanisms that stabilize the *Drosophila* head direction system in naturalistic visual environments.
- 2012–2012 **Research Technician**, HHMI Janelia Research Campus, Ashburn, VA, USA
 Laboratory of Vivek Jayaraman; construction of a two-dimensional virtual-reality system for tethered walking flies.

EDUCATION

- 2012–2018 **PhD in Zoology**, University of Cambridge, UK / HHMI Janelia Research Campus, USA
 Advisors: Berthold Hedwig and Vivek Jayaraman. Research on multisensory navigation in tethered walking insects.
- 2009–2012 **MSc in Computational Biology and Bioinformatics**, ETH Zürich, Switzerland
 Thesis at the Institute of Neuroinformatics; supervisors: Steven Fry and Ruedi Stoop.
- 2006–2009 **BSc in Biomedicine**, Julius-Maximilians-Universität Würzburg, Germany
 Thesis in the laboratory of Bertram Gerber.

ACADEMIC EXPERIENCE ABROAD

- 2017–2023 **United States:** Postdoctoral Associate, HHMI Janelia Research Campus, Ashburn, Virginia.
- 2012–2018 **United Kingdom / United States:** Joined PhD program between the University of Cambridge and HHMI Janelia Research Campus.
- 2009–2012 **Switzerland:** MSc studies, ETH Zürich.

HABILITATION OR EQUIVALENT

Habilitation-equivalent qualification through leadership of a DFG Emmy Noether Research Group. The DFG defines the Emmy Noether Program as an alternative to the traditional habilitation route, designed to provide equivalent qualifications for appointment to a university professorship through independent group leadership and relevant teaching.

RESEARCH FUNDING, HONORS AND AWARDS

- 2023–2029 **Emmy Noether Program grant**, German Research Foundation (DFG), HA 10089/1-1, project no. 513850388. *Behavioral strategies and neural mechanisms for robust navigation*. Principal investigator and sole applicant; personal share: 100% of approximately €2.01 million in direct project funding, plus the 22% DFG program allowance.
- 2017 **Poster Prize**, FENS Winter School on Navigation, Obergurgl, Austria. *A virtual reality paradigm for studying visually guided navigation in head-fixed flies*.
- 2012 **PhD Fellowship**, Howard Hughes Medical Institute; tuition, living expenses, and research allowance (approx. €25,000).

Selected competitive grant applications

- 2024/2025 **ERC Starting Grant**, *When to move—adjusting navigation to environmental patterns and internal state*. Advanced to Stage 2 interview and received an A rating (“excellent and fundable”); not funded.
- 2023/2024 **Allen Discovery Center proposal**, *Global change neurobiology: Insects as a model to identify mechanisms of environmental resilience*. Collaborative proposal advanced to the final stage, including interview and site review; not funded.

RESEARCH GROUP LEADERSHIP AND MENTORING

Current lab members

- 2024–present Romita Trehan, **doctoral researcher**, University of Würzburg.
- 2025–present Johanna Wegmann, **doctoral researcher**, University of Würzburg.
- 2025–present Yiğit Yargili, **doctoral researcher**, University of Würzburg.

Current student research projects

Undergraduate Theses: Kimia Soltani (BSc thesis, University of Würzburg).

Erasmus and other internships: Siyabend Akdemir (Izmir Institute of Technology, Turkey); Isfandiyar Ibrahimov (Ludwig Maximilian University Munich); Antri Mousikos (University of Würzburg); and Annika Karl (University of Würzburg).

Doctoral advisory committees

Current Doctoral advisory / thesis committees: Hannah Soyka (University of Basel); Ronja Sinzinger and Theresa Jansen (University of Würzburg).

Past lab members

2024–2025 Özlem Gönülkirmaz-Cancalar, **postdoctoral researcher**, University of Würzburg.

2025–2026 Xenia Dünninger, **research assistant**, University of Würzburg.

2026 Sophia Heinlein, **research assistant**, University of Würzburg.

Past student research projects

Undergraduate Theses: Lukas Johnson (MSc thesis, Freie Universität Berlin, 2025); Hannah Ball (BSc thesis, University of Würzburg, 2024); Laura Porta (MSc thesis, University of Pisa, 2017/18); Shivam Chitnis (MSc thesis, IISER Pune, 2021/22).

Erasmus and other internships: Xenia Dünninger (University of Würzburg, 2026); Alperen Efendioğlu (research intern, 2024); Antonio Bollig (master's practical, 2024/25); Ülkü Ece Meral and Anouk Mangold (master's practicals, 2025); Mirjam Goldbach (bachelor's practical, 2025); Dimitra Vardalaki (Janelia Undergraduate Scholar, 2015); Mélanie Basnak (Janelia Undergraduate Scholar, 2016); Laura Porta (Janelia Undergraduate Scholar, 2017); and Shivam Chitnis (Janelia Undergraduate Scholar, 2019–2020).

MAJOR CURRENT COLLABORATIONS

Chaitanya Gokhale (Julius-Maximilians-Universität Würzburg, Germany; 2025–present): Modeling individual and collective foraging strategies.

Barry Dickson (Queensland Brain Institute, The University of Queensland, Australia; 2025–present): Central complex circuits for visual exploration.

Keram Pfeiffer (Julius-Maximilians-Universität Würzburg, Germany; 2025–present): Virtual reality setup for recordings in bees.

Daniel Kronauer (The Rockefeller University, USA; 2024–present): Connectomics in the clonal raider ant. This involves several other outside collaborators.

Mathias Wernet (Freie Universität Berlin, Germany; 2024–present): Representation of navigational cues in the *Drosophila* anterior visual pathway.

Johannes Felsenberg (Friedrich Miescher Institute for Biomedical Research, Switzerland; 2023–present): Neural and behavioral mechanisms of navigation and foraging.

ORGANIZATION OF SCIENTIFIC MEETINGS AND SEMINARS

2025 **Symposium co-chair** with Keram Pfeiffer, *Neuronal representation of space, directions and goals in insects and vertebrates*, 16th Göttingen Meeting of the German Neuroscience Society.

2025 **Workshop co-organizer**, Emmy Noether Annual Meeting.

2023 **Meeting co-organizer**, *Bridging Diverse Perspectives on the Mechanistic Basis of Foraging*, HHMI Janelia Research Campus.

2018, 2022 **Meeting co-organizer**, *Structure and Function of the Insect Central Complex*, HHMI Janelia Research Campus.

2021–2023 **Co-organizer**, virtual *Future of Foraging* seminar series, broadcast through World Wide Neuro / Crowdcast.

2018–2020 **Workshop co-organizer**, Junior Scientist Workshop on Mechanistic Cognitive Neuroscience, HHMI Janelia Research Campus.

2020 **Symposium organizer, speaker, and chair**, *Flexible navigation and the insect central complex: insights from a multifaceted brain region*, FENS Forum.

JOURNAL AND FUNDING-AGENCY REVIEW

2019–2023 **Peer review:** *Current Biology*, *PNAS*, *eLife*, *Journal of Experimental Biology*, *Journal of Neurogenetics*, *Neuroinformatics*, *Frontiers in Neural Circuits*, COSYNE abstracts.

2021–2022 **External grant review:** ERC Consolidator Grant, Wellcome Discovery Award.

COLLABORATIVE AND CONSORTIUM PROJECTS

- 2026–present **Core writing-group member for a planned Würzburg Collaborative Research Center proposal.** Contribute to the scientific framework, integration of research areas, and preparation of the proposal for submission in 2027. Planned; not yet submitted or funded.
- 2024–present **Steering-committee member of the CRANTb ant connectome consortium.** Evaluate project proposals, coordinate community access to connectomic resources, and contribute comparative expertise on navigation circuits. International collaborative research initiative; no personal grant funding associated with this role.

OTHER LEADERSHIP AND SERVICE

- 2018–2023, 2026 **Peer mentoring:** Janelia Women's Mentoring Group. University of Würzburg Junior Group Leader Peer Counseling.
- 2019–2023 **Sustainability service:** HHMI Janelia Sustainability Focus Group.

SELECTED SEMINARS AND CONFERENCE PRESENTATIONS

- 06/2026 **Invited talk.** *Navigating under challenging conditions: Does head direction circuit stability predict strategy switching?* NeuroDoWo 2026, Würzburg, Germany.
- 05/2026 **Invited seminar.** *How does the insect head direction circuit adapt to navigate in diverse conditions?* Neuroscience Seminar Series, The Rockefeller University, New York, USA.
- 04/2025 **Invited seminar.** Neural mechanisms for robust navigation in dynamic visual environments. CBD Neuroscience Lecture, VIB–KU Leuven Center for Neuroscience, Leuven, Belgium.
- 02/2025 **Invited talk.** *Neural mechanisms for robust navigation in naturalistic visual environments.* SFB 1372 International Symposium, Oldenburg, Germany.
- 10/2024 **Invited talk.** *Generating a stable head direction estimate in dynamic, naturalistic visual environments.* Insect Vision and Navigation Symposium, University of Freiburg, Germany.
- 08/2024 **Selected talk.** *Neural mechanisms for a stable head direction estimate in dynamic, naturalistic visual environments.* 15th International Congress of Neuroethology, Berlin, Germany.
- 08/2023 **Invited talk.** *Generating a stable neural compass in dynamic, naturalistic visual environments.* International Conference on Invertebrate Vision, Bäckaskog Castle, Sweden.
- 04/2022 **Invited seminar.** *Stability of a neural compass in dynamic, naturalistic environments.* Lund University, Sweden.
- 03/2022 **Invited seminar.** *Stability of a neural compass in dynamic, naturalistic environments.* Bernstein Center Freiburg, Germany.
- 08/2021 **Invited talk.** *Neural circuits that support robust and flexible navigation in dynamic naturalistic environments.* UCL BehavioNeuro Talks, University College London, UK (virtual).
- 03/2021 **Invited talk.** *Lessons from analyzing navigational circuits in the Drosophila hemibrain connectome.* NIH–DOE Brain Connectivity Workshop Series (virtual).
- 11/2020 **Invited talk.** *Heading circuit dynamics during spatial navigation in cluttered two-dimensional environments.* Entomology 2020 (virtual).
- 07/2020 **Invited talk.** *Probing central complex function during context-dependent navigation in two-dimensional environments.* FENS Forum (virtual).
- 2016–2018 **Earlier selected talks:** University of Würzburg (2018); Structure and Function of the Insect Central Complex, Janelia (selected talk, 2018); Princeton Neuroscience Institute (2016); University of Cambridge PDN Graduate Symposium (2016).

RESEARCH SOFTWARE AND OPEN RESOURCES

- 2023–present **fly2p**, maintainer and author. MIT-licensed Python package for preprocessing, visualizing, and analyzing two-photon calcium-imaging data from flies and other insects; current release v0.2.2 (September 2024).
- 2024–present **ethoVR**, creator and maintainer. Open documentation for constructing Unity-based virtual-reality systems for neurobiology and ethology, including modular software guides, hardware specifications, 3D-printable design files, and assembly instructions (<https://www.haberkernlab.de/ethoVR/>).

TEACHING EXPERIENCE

- 2024–present **Course teaching, University of Würzburg:** *Signal Transduction*, bachelor's course (summer semester 2024); *Integrative Verhaltensbiologie II* (winter semesters 2024/25, 2025/26, and planned 2026/27); *Integrative Verhaltensbiologie III* (2024 & 2026); *Behavioral Physiology and Sociobiology F1* (2024–2026); *Experimental Sociobiology* (since 2024).
- 2017–2018 **Instructor and co-organizer, Women's Coding Circle**, HHMI Janelia Research Campus. Taught Python classes and supported colleagues' programming projects.
- 2009–2010 **Teaching Assistant**, ETH Zürich. Exercises for *Introduction to Computer Science for Biologists and Pharmacists*.

- 2008–2009 **Curriculum development**, BSc Biomedicine, University of Würzburg. Student contribution to restructuring the degree program under the Bologna framework.
- 2008 **Teaching Assistant**, University of Würzburg. Examination preparation for *General Biology*.

LEAVES OF ABSENCE

- 2026 Pregnancy, including an individual employment prohibition (individuelles Beschäftigungsverbot since 01/06/2026) and maternity leave (since 22/07/2026).
- 2017–2018 In 2017, I took two months off due to prolonged illness but did not apply for temporary medical leave. In the first half of 2018, I worked reduced hours due to physical therapy and other medical appointments.

PROFESSIONAL MEMBERSHIPS

Neurowissenschaftliche Gesellschaft e.V. (German Neuroscience Society, NWG/GNS); International Society for Neuroethology (ISN); Arthropod Neuroscience Network (ANN).

References available upon request. | Last updated: August 2026