2 Ph.D. positions in sensory neuroscience

Position: Ph.D. Student

Qualification: M.Sc. degree in biology, physics or a related discipline is required

Deadline: 15 September 2022, Applicants will be considered until the position is filled.

Employment Start Date: 1 December 2022 or later

Contract Length: 4 years maximum

City: Bonn

Country: Germany

Institution: University of Bonn, Medical faculty

Department: Institute of Physiology II, Behavioral Neuogenetics group

Position description:

PhD positions, salary according to 65% TVL-E13, for 4 years, starting December 2022 or later.
The doctoral projects are funded by the new Research Unit 5424 'Modulation of olfaction: How recurrent circuits govern state-dependent behavior' of the DFG (German Research Foundation, speaker Prof. Dr. Veronica Egger; see also https://bernstein-network.de/en/newsroom/news/202207042/).
Both positions are embedded into the highly collaborative network of the new research unit which entails workshops (e.g., programming, imaging), regular scientific meetings and cross-disciplinary training/lab rotations. In addition, PhD students will benefit from being integrated in local graduate programs (https://bigs-neuroscience.de), soft skill trainings, networking opportunities and international conferences.
We are looking for highly-motivated individuals with a background in neurobiology or related fields. Ideally with some experience in programming and data analysis or strong motivation to acquire these skills, and a desire to develop cutting-edge experimental techniques. Experience with behavioral or neuronal activity analysis is considered a plus. Very good comprehension of English is mandatory; knowledge of German is not a requirement.

Project description:

The aim of our research is to understand the cellular and neural mechanisms of internal state and context-specific behavior. Why do animals perceive the same sensory information differently due to a change in their physiological state or current situation? How do different individuals experience the same situation? To tackle these questions, we use mouse and drosophila genetics in combination with innovative behavioral analysis, in vivo functional imaging, and state-of-the-art neural circuit mapping techniques. We further aim at achieving a circuit-based understanding of neural processing by combining experimental data with computational modelling.
The goal of these projects is to unravel how changes in reproductive state influence the female brain and female choice behavior across phylae. To this end, we focus on new models of state-dependent modulation in mice and flies.

Project 1: Molecular and cellular mechanisms of estrus state-dependent odor valence modulation (PI: Annika Cichy)

We recently identified a new model of estrus state-dependent modulation of odor valence in female mice. The goal of this project is to unravel the underlying molecular mechanisms and neural circuits of this change in behavior with the long-term goal to gain a better understanding of how untrained odor valence is encoded and modulated by endocrine state. To achieve this goal, we combine in vivo imaging and electrophysiological recordings with automated behavioral analysis, genetic manipulations and circuit tracing.

Project 2: Recurrent connections between higher olfactory brain areas and their role in mating state-dependent behavior in Drosophila (PI: Ilona Grunwald Kadow)

We discovered several circuit motifs in the fly's brain poised to undergo long-lasting synaptic plasticity upon mating. You will characterize how recurrent connections between higher olfactory that are involved in this modulation impact mating state-dependent changes in female flies, with the long-term goal to understand how reproductive state induces plasticity and which signals from the body are used to relay reproductive state and the experience of mating. To this end, you will leverage a combination of cutting-edge methods including genetics, advanced behavioral paradigms, 2-photon imaging and circuit tracing.

Relevant literature:

Cichy A, Dewan A, Zhang J, Kaye S, Teng T, Blanchard K, Feinstein P, Bozza T (2021). Map-independent representation of an aggression-promoting social cue in the main olfactory pathway. *BioRxiv* https://www.biorxiv.org/content/10.1101/2021.12.30.474554v1

Cichy A (2022) How the body rules the nose. *Neuroforum*. doi: 10.1515/nf-2022-0003

Hussain A*, Üçpunar HK*, Zhang M, Loschek LF, Grunwald Kadow IC (2016). Neuropeptides modulate female chemosensory processing upon mating in Drosophila. *PLoS Biology* 14:e1002455. doi: 10.1371/journal.pbio.1002455

Boehm AC, Friedrich AB, Hunt S, Bandow P, Siju KP, De Backer JP, Julia Claussen, Link MH, Hofmann TF, Dawid C, Grunwald Kadow IC (2021). A dopamine-gated learning circuit underpins reproductive state-dependent odor preference in Drosophila females. *BioRxiv* doi: https://doi.org/10.1101/2021.07.24.453623

Application

Please send further inquiries and application documents to: cichy@uni-bonn.de, ilona.grunwald@uni-bonn.de

1. A curriculum vitae
2. A letter of motivation explaining your scientific interests, your strengths when working on a problem, why us etc.
3. Contact details for 2 referees
4. A written sample of scientific research, e.g., a manuscript, thesis, or code etc.