

PhD student/postdoc in Sensory and Behavioral Neuroscience

Opportunities
for Talents

The labs of **Julijana Gjorgjieva** (Max Planck Institute for Brain Research, Frankfurt, Germany) and **Ilona Grunwald Kadow** at the TUM School of Life Sciences, Technical University of Munich, Germany invite applications for a fully-funded position (Postdoc or PhD student). We are looking for highly-motivated individuals with a strong quantitative background (in mathematics, physics, engineering, computer science, or related fields), experience in programming and data analysis, and a desire to develop cutting-edge experimental techniques. Previous background in neuroscience, imaging or behavioral analysis is a plus!

Our aims

The project will examine the neural basis of need and effort-based decision-making in a collaboration between the lab of Prof. Julijana Gjorgjieva, who develops theoretical models of neural circuit processing based on experimental data, and the lab of Prof. Ilona Grunwald Kadow, who studies neural circuits underlying sensory processing and decision making in animal models.

The project aims to uncover circuit principles and behavioral readouts of motivation, persistence, and value perception as a function of internal state or experience (e.g. hunger). In particular, the Grunwald Kadow lab is collecting rich data sets of behavioral trajectories of single *Drosophila* flies as well as functional imaging data (i.e. multiphoton and light-sheet) of neuronal populations (e.g. modulatory neurons). The project will aim to develop sophisticated analysis techniques that extract key statistical features of the behavioral trajectories and imaging data, and build mathematical models that reproduce the data and make new predictions to be further tested experimentally. By combining behaviour, genetics and imaging, we will also develop neural circuit models that involve several brain areas, including sensory brain areas and higher cognitive regions of the fly brain (i.e. mushroom body). The synergy of experiment and theory will enable a unique approach to answer key questions about the neural basis for motivation and modulated behavior, which is not possible with either approach alone.

References:

S. Sayin, J.-F. De Backer, M. E. Wosniack, L. Lewis, K.P. Siju, L.-M. Frisch, P. Schlegel, A. Edmondson-Stait, N. Sharifi, C.B. Fisher, S. Calle-Schuler, S. Lauritzen, D. Bock, M. Costa, G.S.X.E. Jefferis, J. Gjorgjieva, I. C. Grunwald Kadow (2018). A neural circuit arbitrates between perseverance and reward in hungry *Drosophila*. *BioRxiv* doi.org/10.1101/259119

J. Gjorgjieva, G. Drion and E. Marder (2016). Computational implications of biophysical diversity and multiple timescales in neurons and synapses for circuit performance. *Curr Opin Neurobiol* 37:44-52.

Lewis L, Siju KP, Aso Y, Friedrich AB, Bulteel AJB, Rubin GM, Grunwald Kadow IC (2015). A higher brain circuit for immediate integration of conflicting sensory information in *Drosophila*. *Current Biology* PMID: 26299514, doi: 10.1016/j.cub.2015.07.015

Application

The position will be based at the Technical University of Munich, with frequent visits to the Max Planck Institute for Brain Research in Frankfurt, two of the most exciting and international cities in Germany.

Applicants will be considered until the position is filled.

For further information please visit: <http://www.cns.wzw.tum.de> and <http://www.neuro.wzw.tum.de> or email gjorgjieva@brain.mpg.de and ilona.grunwald@tum.de.

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To apply, please email the following to: neuro@wzw.tum.de (ref. GGK application)

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.