DFG-funded FOR 5807 is offering **8 positions for doctoral researchers** (m/f/d/x)

The recently funded research group "*Dynamic Integration of GPCR Signaling to Control Organ Function and Animal Behavior"*, consisting of 7 projects distributed across different institutions in Germany, is seeking to fill 8 PhD positions as soon as possible. Funding is available for 4 years, according to TV-L 13 (65 %). The FOR5807 aims to elucidate fundamental principles of GPCR signaling to understand the general and specific rules of metabotropic signaling. Our research focuses on three complementary lines of investigation:
i) The Central Nervous System (CNS) as a central organ for environmental sensing, signal integration, and body control
ii) The heart as the organ most tightly regulated by the autonomic nervous system
iii) The behavior of intact animals.
To address these questions, we will exploit new possibilities based on recently developed optical tools for the manipulation and readout of GPCR function. These tools will allow us to bridge different levels of complexity, ranging from subcellular domains to whole animals and from milliseconds to days. We aim to understand how intracellular signals are precisely controlled and integrated, how different GPCR ligands and GPCR types affect organ function, and how this relates to animal behavior.

Your profile:

- Highly motivated scientists with an MSc (or equivalent) in the field of Life Sciences or Natural Sciences
- Strong interest in GPCR-mediated modulation of excitable networks and animal behavior
- Problem-solving competence and the ability to work independently
- Strong commitment to the project
- Efficiency in team-working in the lab environment and with collaboration partners
- Excellent writing and communication skills in English
- Programming skills are a plus

Further information on individual projects can be requested from the project leaders. Applications should be directed to the project leaders directly and include a letter of motivation, CV, and contact information for reference letters. The project leaders are listed below. The deadline for applications is August 31st, 2025, unless otherwise specified.

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1. One position is available at the "Brain-wide Networks" Research Group at the Department of Ophtalmology of the University Medical Center in Göttingen.

   Project title: The Locus Coeruleus Catecholaminergic System as a Modular Regulator of Brain Network Dynamics and Animal Physiology

   The locus coeruleus (LC), a small brainstem nucleus with widespread projections, modulates attention, learning, arousal, and autonomic function. Once thought to generate a uniform arousal signal, the LC is now believed to act modularly, producing distinct effects across brain regions. This project aims to determine whether LC neuron properties vary by projection target or if these differential effects are shaped by regional GPCR expression and neurotransmitter uptake. The PhD candidate will explore these mechanisms using whole-brain functional ultrasound imaging, projection-specific optogenetics, fluorescent catecholamine sensors, fiber

photometry, and pharmacological tools. The project will be done in close collaboration with the Wiegert Lab at the Medical Faculty Mannheim, Heidelberg University.

Questions and applications should be directed to Prof. Dr. Emilie Macé:
emilie.mace@med.uni-goettingen.de

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2. One position is available at the Department of Neurophysiology of the Medical Faculty Mannheim of Heidelberg University.

   Project title: The Locus Coeruleus Catecholaminergic System as a Modular Regulator of Brain Network Dynamics and Animal Physiology

   The Locus Coeruleus (LC) is the master regulator of the noradrenergic signaling in the central nervous system. While the brain-wide effects of noradrenaline (NA) signaling are relatively well understood, it remains a mystery how local, target-region specific effects are of NA are regulated. In addition, the LC co-releases additional transmitter molecules, including Dopamine (DA). How balance of NA and DA release is regulated, and how these transmitters differentially modulate brain function in a target specific manner, is also poorly understood. Using various state-of-the-art approaches such as viral tracing, patch clamp electrophysiology, optogenetics and calcium imaging, both in vitro and in vivo, this project aims to elucidate the modular architecture and functionality of the LC. We aim to reveal the mechanisms by which distinct, projection specific LC neurons specifically and differentially modulate local brain networks, whole-brain function, and animal physiology and behavior. The project will be done in close collaboration with the Macé Lab at the Department of Ophtalmology of the University Medical Center in Göttingen.

   Questions and applications should be directed to Prof. Simon Wiegert:
   simon.wiegert@medma.uni-heidelberg.de

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3. A second position is available at the Department of Neurophysiology of the Medical Faculty Mannheim of Heidelberg University.

   Project title: GPCR-mediated postsynaptic integration of catecholaminergic signaling in learning and memory

   Many neuronal processes affect memory formation, with neuromodulators being one important factor contributing to stable long-term memories. While noradrenaline (NA) and dopamine (DA) have been linked to the formation of fear and extinction memories, much less is known about their interdependence and the dynamics of signal integration in postsynaptic target cells. Using fear conditioning and extinction training in mice in combination with state-of-the-art biosensors for catecholamines and cAMP as well as optoGPCRs, this project aims to elucidate the mechanisms of noradrenalin- and dopamine mediated cAMP integration across cell types and brain regions. By investigating the net effect of catecholamine release on cAMP dynamics in different target neurons, we hope to identify common motifs of the

neuromodulatory mechanisms underlying fear and extinction memory formation. An extended deadline later than August, 31st, might apply to this project.

Questions and applications should be directed to Dr. Alexander Dieter:
alexander.dieter@medma.uni-heidelberg.de

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4. One position is available at the Cellular and Molecular Neurophysiology Group at the Institute of Physiology and Pathophysiology of the FAU Erlangen-Nürnberg.
   Project title: Foraging under threat: Dopaminergic control of dynamic goal-oriented behavior in *Drosophila melanogaster*

   Animals must balance food search with avoidance of acute or persistent threats, including dangerous temperatures. In addition, the brain needs to encode and integrate information on physiological needs to ensure appropriate context-dependent behavioral responses. Dopaminergic (DA) signaling in a central part of the insect brain, the mushroom body, plays a conserved key role in the integration of external and internal stimuli to drive goal directed behavior. This project aims to determine where and how specific DA signaling is integrated to tune behavioral output according to the animal's physiological state and sensory environment. The PhD candidate will explore these mechanisms using functional imaging with fluorescent catecholamine/calcium/cAMP sensors, as well as connectomics, optogenetics, and behavioral approaches in *Drosophila* larvae. The project will be conducted in close collaboration with the Grunwald Kadow Lab at the Medical Faculty Bonn, University of Bonn.

   Questions and applications should be directed to Prof. Dr. Peter Soba: peter.soba@fau.de

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5. One position is available in the Cellular and Molecular Neurobiology lab at the Buchmann Institute for Molecular Life Sciences of Goethe University in Frankfurt

   Project title: Dopaminergic and serotonergic signaling in the interplay of locomotion, food-motivated behaviour and feeding in *Caenorhabditis elegans*

   The nervous system of the nematode is separated into two parts, where 282 neurons regulate locomotion, sensation and other behaviors, while another 20 neurons constitute the pharyngeal nervous system that mediates feeding. While there are no anatomical connections apart from one gap junction, the two nervous systems interact *via* neuromodulators, i.e. serotonin and dopamine. Dopamine is released when the animal finds food, which regulates the locomotion nervous system to slow down. Another neuron senses the presence of food in the pharynx, leading to serotonin release, which is sensed by body neurons. These neuromodulators activate different types of G-protein coupled receptors (GPCRs) with opposing signaling action in the same neurons. We want to understand how this can convey specific outcomes and will generate and use light-activated GPCRs to study these neuromodulator pathways. Likewise, we will study where precisely these transmitters are released in which situation, using genetically encoded fluorescent indicators and optogenetic stimulation. The project will be conducted in close collaboration with the Scholz Lab in Bonn (Caesar).

Questions and applications should be directed to Prof. Dr. Alexander Gottschalk: a.gottschalk@em.uni-frankfurt.de

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6. One position is available at the Institute for Cardiovascular Physiology of the University Medical Center Göttingen.

   Project title: Signal integration, amplification and compartmentation of adrenergic signaling in cardiomyocytes

   We are looking for an excellent and highly motivated PhD student with an interest in the study of integration and compartmentation of β-adrenergic signaling in cardiomyocytes by nanodomain specific optogenetic stimulation and cAMP imaging. The project will be conducted in close collaboration with the Nikolaev Lab at the Medical Center Hamburg-Eppendorf, Hamburg University. Please apply via this link (Deadline: 15th of August, 2025):

   https://umg.recruiting-portal.com/r/z112usqp7ybqh0l/PhD+Student+fmd/37073/G%C3%B6ttingen

   Questions and applications should be directed to Prof. Tobias Brügmann: tobias.bruegmann@med.uni-goettingen.de

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7. One position is available at the Max Rubner Center for Cardiovascular Metabolic Renal Research, Deutsches Herzzentrum der Charité (DHZC), Berlin

   Project title: The balance of Gs and Gi signaling in fibroblasts and cardiomyocytes affecting cardiac (patho-) physiology

   Cardiac fibroblasts are the most abundant non-myocyte cell type in the heart and play key regulatory roles in cardiac remodeling, fibrosis, and hypertrophy. Cardiac fibroblasts express an array of GPCRs that contribute to regulation of fibrosis. This project aims at dissecting the role of GPCR signaling in human cardiac fibroblasts derived from induced pluripotent stem cells (iPSC) and to study intercellular interactions between cardiac fibroblasts and cardiac myocytes. The PhD candidate will perform differentiation of iPSC expressing optogenetic GPCRs (optoGPCRs) and employ 2D culture and 3D engineered heart tissues to identify the mechanisms of fibrosis associated to GPCR signaling. By using optoGPCRs, the PhD candidate will be able to control with unprecedented resolution the GPCR activation and dissect the cellular contribution to fibrosis. This project will be carried out in close collaboration with the Saβe Lab at the Rheinische Friedrich-Wilhelms-University Bonn.

   Questions and applications should be directed to Dr. Claudia Crocini: claudia.crocini@dhzc-charite.de

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8. One position is available at the Institute for Experimental Cardiovascular Medicine (IEKM) at the Medical Faculty of Freiburg University.

Project title: Illuminating structural and functional determinants of GPCR-mediated neuron–cardiomyocyte crosstalk across spatial scales

Coordinated neuron–cardiomyocyte signaling ensures beat-by-beat control of heart function. The intra-cardiac nervous system comprises postganglionic sympathetic and parasympathetic neuronal projections that, together with sensory afferent neurons and local circuit neurons, provide a complex regulatory system involved in the control of cardiac activity. This project aims to elucidate the macro-structure of parasympathetic and sympathetic neurons, their approximation sites with cardiomyocytes, the distribution of pre- and postjunctional proteins across all chambers of the healthy heart and the dynamics of neuron–cardiomyocyte signaling and downstream functional effects at the whole-heart level. To experimentally assess neuron-cardiomyocyte signaling, the PhD candidate will use optogenetics, single-cell and whole-heart electrophysiology and mechanics, and 3D fluorescent imaging and reconstruction. The project will be conducted in close collaboration with the Eva Rog-Zielinska group at IEKM. An extended deadline later than August, 31st, might apply to this project.

Questions and applications should be directed to Dr. Franziska Schneider-Warme:
Franziska.schneider.uhz@uniklinik-freiburg.de