

The **Department of Theoretical Neuroscience** (Head: Prof. Daniel Durstewitz) at the **Central Institute of Mental Health** invites applications for a

PhD student position (E 13 TV-L)

(50% of the fulltime weekly hours) in the newly founded research group **Data-driven network models of higher cognitive functions** (Head: Dr. Joachim Hass) to be filled as soon as possible. The position is initially limited for 3 years.

The research group develops biologically realistic computational neural network models of the neocortical structures such as the prefrontal cortex and the motor cortex. These models closely adhere to physiological data from both *in vitro* and *in vivo* experiments and are used to study higher cognitive functions such as time perception and working memory.

The successful candidate will work in the project „**The human mirror neuron system – measurement and beyond**“ funded by the **Heidelberg Academy for Sciences and Humanities**. The joint project of the Departments of Theoretical Neuroscience and Clinical Psychology of the Central Institute of Mental Health aims at a deeper understanding of the mirror neuron system in humans, which is thought to play a crucial role in social cognition by representing the emotions and intentions of others in the motor cortex. The project combines multimodal measurements (involving fMRI, EEG, transcranial magnetic stimulation and genotyping) with computational modeling.

The Central Institute of Mental Health is an internationally renowned research institute for psychiatry and neuroscience as well as a clinic for psychiatry, psychotherapy and psychosomatics (part of the medical faculty of the University of Heidelberg). The research group closely interacts with neurobiologists and psychologists at the institute. The Department of Theoretical Neuroscience is focused on computational modeling and statistical data analysis of prefrontal cortex and hippocampus functions. It is one of the core research units of the Bernstein Center for Computational Neuroscience (BCCN) Heidelberg-Mannheim. Access to high-performance computing facilities is provided.

Tasks: The project involves the development of a rate-based, brain-scale model as well as the further development of an existing spiking network model of the motor cortex. The resulting two-stage model is then being adapted to the multimodal experimental data using stochastic optimization techniques. In particular, the effects of the transcranial magnetic stimulation and different levels of dopamine and oxytocin are to be implemented in the model and directly compared with the experimental data. Participation in the project organization and publication writing is also expected. It is also possible to participate in the analysis of the fMRI data.

Requirements: The candidate should have a university degree (master or equivalent) in physics, mathematics, computer science, computational neuroscience or similar, a strong interest in neurobiological research and very good programming skills (ideally in MATLAB and C). Good communication skills in English as well as knowledge in nonlinear dynamics, numerical optimization or neural modeling are also required. Knowledge in neuroscience or experimental psychology is beneficial.

Applicants should send their application documents (cover letter including a brief description of personal qualifications and future research interests, CV and contact details of two personal references) to joachim.hass@zi-mannheim.de. Questions and informal discussions about the position are also welcome under this email address. The call is open until the position is filled.