

IWR Colloquium

Winter Semester 2020 / 2021

December 16, 2020 • 16:30

Virtual Talk

Speaker:

Dr. Rebecca Mease

Institute of Physiology and Pathophysiology, Medical Faculty Heidelberg

Title:

“From bistable neurons to recurrent neuronal networks:
data challenges in the thalamocortical system”

Abstract:

Our group uses high-density neuronal recordings in combination with modern molecular methods to manipulate targeted neuronal populations, with the aim of understanding neural pathways involved in sensory integration and behavior. Functional dissection of these pathways in vivo has only become possible in the last decade with advances in experimental techniques, and with these advances have come new challenges in data analysis and modeling at different spatiotemporal scales. A central challenge is understanding how heterogeneous single neuron and synaptic properties give rise to patterns of network activity relevant to behavior.

In this talk, I will give an overview of our ongoing efforts to understand communication between the cortex and the thalamus, particularly corticothalamic "feedback" pathways from the deepest layers of cortex. The thalamus is the primary route for new information to enter the cerebral cortex, the "headquarters" of the mammalian nervous system. In turn, corticothalamic neurons project back to the thalamus, dynamically sculpting the transfer of thalamocortical information. Such recurrent cortico-thalamo-cortical loops are a network motif conserved across sensory modalities and species, and are the neural substrates of diverse sensory and cognitive functions and dysfunctions. These pathways comprise specific circuits with distinct anatomical and functional properties, which we and others have found impact a variety of neural computations: adaptation, robust information transfer, and top-down control of sensory encoding.

Throughout, I will emphasize key concepts and techniques in neuroscience, and also highlight existing challenges in data scale and complexity that I hope will pique the interest of the IWR community.

Website IWR-Colloquium:
www.iwr.uni-heidelberg.de/iwr-colloquium