IGSN CONFERENCE
25 Years of Neuroscience Excellence

April 21-22, 2026

Session 1: Neuroscientific Perspectives: From Cellular Models to Neural Circuits and Behavioral Functions

AYLA AKSOY AKSEL

NMI Natural and Medical Sciences Institute at the University of Tübingen, Germany

FROM BRAIN CIRCUITS TO CELL MODELS: A JOURNEY IN NEUROSCIENCE

Understanding the mechanisms through which neuronal circuits are modulated to shape complex behavioral outcomes remains a challenge in neuroscience. Among others, dopaminergic signaling has an important role in associative learning that is mediated primarily by amygdala, an evolutionarily conserved brain region composed of anatomically and functionally distinct subnuclei. Using specific optogenetic stimulation of dopaminergic axons ex vivo, it was possible to identify multiple mechanisms affecting function of amygdala microcircuits.

On the other hand, in vitro cellular models provide means to gain complementary mechanistic insight into dopaminergic neuron function. These systems lack the architectural complexity of the intact brain; however, they retain critical genetic, molecular, and electrophysiological properties, offering a controlled setting that could be extended to human-based context.

Overall, multimodal approaches in neuroscience can shed light on different aspects of neuronal function and advance our understanding of the brain activity.