

PhD position Neurosciences / University of Göttingen / Gliem S.

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Description of the project

Neurons operate within highly ordered structural networks in the brain using precisely-timed patterns of activity. These activity patterns are mediated by synapses made across the dendrites of each neuron. Synaptic activity is

integrated in the dendrites and if strong enough, induces a neuron to fire action potentials and activate its neuronal neighbours in the network.

Morphological abnormalities of dendritic synapses are observed throughout the brain in specific cognitive disorders of mental retardation. Structural impairments in the dendrites can significantly alter the function of the neuronal network and are proposed to underlie cognitive deficits seen in these cognitive disorders.

The last two decades of imaging technology have seen rapid progress to visualise the neuronal activity either at high resolution on a single dendrite or at lower resolution across an intact network of hundreds of neurons in the brain. Relating the function of a neuronal network and mapping it to the synaptic activity in the individual dendrites is a challenging task. However, it is essential if we wish to understand the integration of synaptic activity in an intact circuit in the brain during both normal and impaired information processing.

Our lab at the University of Göttingen has recently developed the novel methodology called "activity correlation imaging" in order to image the activities of entire neuronal populations while simultaneously visualising.

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