



## MASTER THESIS RESEARCH PROJECT IN SYSTEMS NEUROSCIENCE:

### Plasticity during auditory learning

Learning to recognize a sound confers an advantage to behave freely and safely in our environment. The auditory cortex processes the sounds we hear and associate them with their behavioral meanings. The process by which this sound-behavior association is acquired is called auditory associative learning. We are currently investigating this process with the goal of unravelling the plastic changes allowing such auditory learning. Our hypothesis is that throughout the learning process, the structural connectivity of auditory neurons is reinforced, conferring to those neurons the memory of the learned stimulus. In order to test this hypothesis, we train mice to a behavioral sound discrimination task. We use chronic in vivo electrophysiology and optogenetics to record and manipulate auditory neurons across auditory learning to investigate learning-related plastic changes at the functional level. In order to relate this observed functional plasticity with structural changes occurring at the connectivity and synaptic level, we use virus-based connectivity tracing. This will allow deciphering how changes in synaptic inputs onto auditory neurons are involved in auditory learning.

If you are interested in pursuing this project for your master thesis, please contact us. The candidate will be trained in behavioral tasks, electrophysiology, optogenetics, stereotaxic viral injections, immunohistochemistry, microscopy and image analysis.

This work will take place in the Brain and sound lab (<http://www.brainsoundlab.com/>) directed by Prof. Tania Rinaldi Barkat at the University of Basel under the supervision of Dr. Florian Studer. The general objective of the lab is to uncover the development of the auditory cortex and the role of GABAergic neuronal subclasses in auditory coding using in vivo electrophysiology, optogenetics, calcium imaging, behavioral assays, cochlear implants and immunohistochemistry.

Motivated candidates should send CV and a motivation letter to Prof. Tania Rinaldi Barkat ([tania.barkat@unibas.ch](mailto:tania.barkat@unibas.ch)) and Dr. Florian Studer ([florian.studer@unibas.ch](mailto:florian.studer@unibas.ch)).