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INTERNSHIP OFFER, Oheim lab, academic year 2020-21

MASTER PROJECT: Labelling of active astrocytes with genetically encoded Calcium integrators – an *in vitro* proof-of-concept study.

About half of the cells in the human brain are not neurons. Our aim is to understand their contribution and particularly that of cortical astrocytes and Bergmann glia of the cerebellum to brain metabolism and signaling. We focus on how ion channels, transporters and organelles of the glial perisynaptic processes ensheathing neuronal synapses contribute to shaping and modulating synaptic transmission, and we combine electrophysiology and advanced microscopy and optogenetic tools.

Unlike neurons, astrocytes mostly largely electrically silent when recorded from with whole-cell patch-clamp electrophysiology. However, they display complex calcium signals [Dur19], ranging from local, short-lived transients of elevated free cytosolic calcium concentration ('Ca²⁺ microdomains') [Shi13, Sch18], to propagating Ca²⁺ waves, encompassing large cell populations [Shi16]. The goal of the current internship is to test and validate, in acute astrocyte-neuron co-culture, a genetically encoded Ca²⁺ integrator, CAMPARI [Fos15], to label active astrocytes and correlate these signals with spontaneously occurring and evoked Ca²⁺ signals.

Students should have a strong interest in experimental neuroscience, biophysics, or cell biology. The ideal candidate has already practical lab skills for, a background in quantitative biology, and a deep desire to understand the principles underlying the functioning of the nervous system. Cell culture, microscopic imaging and programming skills are beneficial. For applications we request: (i) a statement of motivation, (ii) a *curriculum vitae*, (iii) the names and emails of 2 academic references.

Further reading

[Dur19] Durque & Araque (2019) Neuroscience <https://doi.org/10.1016/j.neuroscience.2018.11.010>
[Fos15] Fosque *et al.* (2015) Science <https://doi.org/10.1126/science.1260922>
[Sch18] Schmidt & Oheim (2018) *bioRxiv*. <https://doi.org/10.1016/j.brainresbull.2017.04.011>
[Shi13] Shigetomi *et al.* (2013) J Gen Physiol <https://doi.org/10.1085/jgp.201210949>
[Shi16] Shigetomi *et al.* (2016) Trends Cell Biol. <https://doi.org/10.1016/j.tcb.2016.01.003>

Contact

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