Position for Early Stage Researcher (36 months)

SwitchBoard is an In Innovative Training Network (ITN) funded by the European Commission's Horizon 2020 programme under the Marie Curie Actions, comprising 11 European Universities, research institutions and companies, coordinated by Eberhard Karls Universität Tübingen, Germany. The duration of the project, entitled "In the eye of the observer: Visual processing at the heart of the retina", is 48 months, starting on November 01, 2015. The network will progressively open a total of 15 (3 year) full-time positions for PhD training.

Project Title

Synaptic computations at the bipolar cell-to-ganglion cell synapse

Project description

The retina breaks high-dimensional patterns of light modulated in space, time, wavelength into parallel, feature selective pathways for transmission to the brain[1]. Retinal ganglion cells (RGCs), the only retinal neurons that send information to the brain, inherit much of their visual response selectivity in the retina's 'switchboard', the inner plexiform layer[2] (IPL). Here, the presynaptic terminals of bipolar cells (BCs)[2], the only neurons that relay the photoreceptor (PR) signal into the inner retina, form complex synapses with amacrine cells (ACs) and RGC dendrites. This optically accessible BC/AC/RGC synapse[3,4] is probably the most important yet least understood computational locus of the circuit[5]. Working on zebrafish larvae and adults, we will use 2-photon imaging of light-evoked changes in voltage[6], calcium[7] and glutamate release[8] release at different synaptic sites, as well as computational modeling, to study synaptic transmission *in vivo* and in retinal explants. Critically, we will combine spectrally separable fluorescent indicators to study any two processes at a time (e.g. pre- and post-synaptic calcium, or presynaptic calcium and synaptic release).

1. Masland, R. H. The fundamental plan of the retina. *Nat. Neurosci.* 4, 877–86 (2001).
2. Euler, T., Haverkamp, S., Schubert, T. & Baden, T. Retinal Bipolar Cells: Elementary Building Blocks of Vision. *Nat. Rev. Neurosci.* 15, 507–519 (2014).
3. Baden, T., Esposti, F., Nikolaev, A. & Lagnado, L. Spikes in Retinal Bipolar Cells Phase-Lock to Visual Stimuli with Millisecond Precision. *Curr. Biol.* 21, 1859–1869 (2011).
4. Baden, T., Berens, P., Bethge, M. & Euler, T. Spikes in Mammalian Bipolar Cells Support Temporal Layering of the Inner Retina. *Curr. Biol.* 23, 48–52 (2012).
5. Baden, T., Euler, T., Weckström, M. & Lagnado, L. Spikes and ribbon synapses in early vision. *Trends Neurosci.* 36, 480–8 (2013).
6. St-Pierre, F., Marshall, J. & Yang, Y. High-fidelity optical reporting of neuronal electrical activity with an ultrafast fluorescent voltage sensor. *Nat. Methods* (2014).
7. Tian, L. *et al.* Imaging neural activity in worms, flies and mice with improved GCaMP calcium indicators. *Nat. Methods* 6, 875–81 (2009).
8. Marvin, J. S. *et al.* An optimized fluorescent probe for visualizing glutamate neurotransmission. 10, (2013).

Methods

2-photon imaging, computational modelling, basic zebrafish genetics

Candidate profile

MSc or equivalent degree in natural sciences (biology, physics, maths etc.), engineering/computer science or a related discipline which allows to start a doctorate or PhD thesis. A basic knowledge in at least one of neuroscience, computer programming and information processing is desirable. Experience working with zebrafish is an asset. Good manual skills are essential (dissections).

Envisaged JOB STARTING DATE

Latest on August 1, 2016

How to apply & Contact

Please send your application including

(1) CV
(2) letter of motivation

to Tom Baden at tom@badenlab.org

Please include contact details for 2 references.

More information can be found on the lab website at www.badenlab.org.

Eligibility Criteria

The EU has strict eligibility criteria for Early Stage Researchers: Candidates
- must not have resided or carried out their main activity in the country of the host institution for more than 12 months in the 3 years immediately prior to their recruitment.
- should not possess a PhD
- should have less than 4 years of research experience. This is measured from the date when they obtained the degree which formally entitles them to embark on a doctorate, either in the country in which the degree was obtained or in the country in which the research training is provided.