



## Seewiesen Colloquia

Speaker invited by: Manfred Gahr

Thursday, May 02, 2013, 13h, House 4, Lecture Room

## Neural Circuits for Fly Visual Course Control

Prof. Dr. Alexander Borst

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Visual navigation has been studied extensively in flies, both in tethered as well as in freely flying animals. As neural control elements, the tangential cells of the lobula plate seem to play a key role: they are sensitive to visual motion, have large receptive fields, and, with their spatial distribution of preferred directions, match the optic flow as elicited during certain types of flight maneuvers. However, several key questions have remained unanswered for long: 1. What is the neural circuit presynaptic to the tangential cells responsible for extracting the local direction of motion? 2. Do the lobula plate tangential cells indeed control turning responses of the fly? 3. Is there a separate visual course control system allowing the fly to detect and track individual objects? I will present recent progress towards answering these questions made by combining whole-cell patch recording and behavioral studies with silencing, optogenetic stimulation and optical recording from genetically targeted candidate neurons in *Drosophila*.

### Who is Alexander Borst?

Studies of Biology, Universität Würzburg, Germany (1976-1980).

PhD with Martin Heisenberg, Universität Würzburg, Germany (1984).

Research Assistant, Max-Planck-Institute of Biological Cybernetics, Tübingen (1984-1993).

Junior Group Leader at the Friedrich-Miescher-Laboratory, Tübingen (1993-1999).

Professor at UC Berkeley (1999-2001).

Director, Max Planck Institute of Neurobiology, Martinsried (since 2001)

### Selected publications:

- Weber F, Machens CK, Borst A (2012) Disentangling the functional consequences of the connectivity between optic-flow processing neurons. *Nature Neurosci* 15: 441-448.
- Borst A, Euler T (2011) Seeing things in motion: Models, circuits, and mechanisms. *Neuron* 71: 974-994.
- Eichner H, Joesch M, Schnell B, Reiff DF, Borst A (2011) Internal structure of the fly elementary motion detector. *Neuron* 70: 1155-1164.
- Joesch M, Schnell B, Raghu SV, Reiff DF, Borst A (2010) ON and OFF pathways in *Drosophila* motion vision. *Nature* 468: 300-304.
- Weber F, Machens CK, Borst A (2010) Spatio-temporal response properties of optic-flow processing neurons. *Neuron* 67: 629-642.