



Marcel Oberlaender, Ph.D.

Curriculum Vitae

Education

- 2006 – 2009 Ph.D at the Combined Faculties for the Natural Sciences and for Mathematics of the Ruperto-Carola University of Heidelberg, Germany, final grade: “*Summa Cum Laude*”
- 2003 – 2004 Non-degree Bachelor of Science at University of Melbourne, Australia
- 2000 – 2006 Physics Diploma (Master degree equivalent) at University of Heidelberg, Germany; final grade: “*very good*”

Research Experience

- 2009 – Postgraduate Research, Laboratory of Dr. Bert Sakmann, Max Planck Florida Institute, Jupiter, USA, Department of Digital Neuroanatomy. “Structure-function relationships in the rat vibrissal system”
- 2006 – 2009 Graduate Research, Laboratory of Dr. Bert Sakmann, Max Planck Institute of Neurobiology, Martinsried, Germany, Group Cortical Column in silico. “3D reverse engineering of neural microcircuits”
- 2005 – 2006 Undergraduate Research, Laboratory of Dr. Bert Sakmann, Max Planck Institute for Medical Research, Heidelberg, Germany, Department of Cell Physiology. “Automated reconstruction of 3D neuron morphology”

Teaching Experience

- 2008 Assistant lecturer and tutor at faculty of “Physics and Astronomy” at University of Heidelberg
- 2002 – 2005 Assistant lecturer and tutor at faculty of “Mathematics and Computer Sciences” at University of Heidelberg, Germany

Awards

- 2007 Tamagawa-Riken Junior Research Travel Award, Hakuba, Japan

Refereed Publications

- 2011
1. Lang, S., Dercksen, V.J., Sakmann, B., & Oberlaender, M. (2011). Simulation of signal flow in 3D reconstructions of an anatomically realistic neural network in rat vibrissal cortex. *Neural Networks*
 2. Oberlaender, M., Boudewijns, Z.S.R.M., Kleele, T., Mansvelder, H.D., Sakmann, B., & de Kock, C.P.J. (2011). Three-dimensional axon morphologies of individual layer 5 neurons indicate cell type-specific intracortical pathways for whisker motion and touch. *PNAS*.
 3. *Related addendum:* Boudewijns, Z.S.R.M., Kleele, T., Mansvelder, H.D., Sakmann, B., de Kock, C.P.J., & Oberlaender, M. (2011). Semi-automated three-dimensional reconstructions of individual neurons reveal cell type-specific circuits in cortex. *Communicative & Integrative Biology, Volume 4, Issue 4*
 4. Oberlaender, M., Dercksen, V.J., Sakmann, B., & Hege, H.C. (2011). Interactive Visualization – a Key Prerequisite for Reconstruction of Anatomically Realistic Neural Networks. *Proceedings of the 2009 Workshop on Visualization in Medicine and Life Sciences (VMLS 09)*
- 2010
5. Meyer, H.S., Wimmer, V.C., Oberlaender, M., de Kock, C.P., Sakmann, B., & Helmstaedter, M. (2010). Number and laminar distribution of neurons in a thalamocortical projection column of rat vibrissal cortex. *Cereb Cortex, 20*, 2277-2286.
- 2009
6. Dercksen, V.J., Weber, B., Guenther, D., Oberlaender, M., Prohaska, S., & Hege, H.C. (2009). Automatic Alignment of Stacks of Filament Data. *IEEE Int. Symp. on Biomedical Imaging: From Nano to Macro (ISBI)* 971-974
 7. Oberlaender, M., Dercksen, V.J., Egger, R., Gensel, M., Sakmann, B., & Hege, H.C. (2009). Automated three-dimensional detection and counting of neuron somata. *J Neurosci Methods, 180*, 147-160.
 8. Oberlaender, M., Broser, P.J., Sakmann, B., & Hippler, S. (2009). Shack-Hartmann wave front measurements in cortical tissue for deconvolution of large three-dimensional mosaic transmitted light brightfield micrographs. *J Microsc, 233*, 275-289.
- 2007
9. Oberlaender, M., Bruno, R.M., Sakmann, B., & Broser, P.J. (2007). Transmitted light brightfield mosaic microscopy for three-dimensional tracing of single neuron morphology. *J Biomed Opt, 12*, 064029.

Publications Submitted & In Preparation

10. Oberlaender, M., de Kock, C.P.J., Bruno, R.M., Ramirez, A., Meyer, H.S., Dercksen, V.J., Helmstaedter, M., & Sakmann, B. (under review). Cell type-specific three-dimensional structure of thalamocortical networks in a barrel column of rat vibrissal cortex. *Neuron*
11. Oberlaender, M., Ramirez, A., & Bruno, R.M. (in preparation). Sensory Deprivation Induces Extensive Structural Plasticity of Thalamocortical Axons in Adult Rats
12. Dercksen, V.J., Sakmann, B., Hege, H.C., & Oberlaender, M. (in preparation). Efficient 3D reconstruction of single neuron morphology from stacks of transmitted light brightfield microscopy images

Conference Abstracts

- 2011
1. Oberlaender, M., Narayanan, R.T., Ramirez, A., Baltruschat, L., Sakmann, B., Bruno, R.M., & de Kock, C.P. J. (Poster) 3D reconstruction of cell type-specific thalamocortical and intracortical circuits in rat barrel cortex. *SfN, Washington, USA*
 2. Egger, R., Narayanan, R.T., de Kock, C.P.J., Sakmann, B., & Oberlaender, M. (Poster) 3D reconstruction and standardization of the barrel field in rat vibrissal cortex. *SfN, Washington, USA*
 3. Oberlaender, M., Lang, S., Dercksen, V.J., & Sakmann, B. (Poster & Talk) 3D reverse engineering and simulation of signal flow in anatomically realistic neuronal networks. *NeuroInformatics, Boston, USA*
 4. Oberlaender, M., de Kock, C.P.J., Bruno, R.M., Meyer, H.S., Dercksen, V.J., Lang, S., & Sakmann, B. (Poster & Talk) Anatomical determinants of cortical function in vivo and in silico. *Computations in Neocortical Circuits, Janelia Farm, USA*
 5. Oberlaender, M., Meyer, H.S. & Sakmann, B. (Talk, Invited) Decision Making in Healthy and Diseased Brains. *Alzheimer's Educational Conference, West Palm Beach, USA*
- 2010
6. Oberlaender, M., de Kock, C.P.J., Bruno, R.M., Meyer, H.S., Dercksen, V.J., & Sakmann, B. (Talk, Invited) Digital Neuroanatomy – 3D reconstruction of anatomically realistic neuronal networks. *NeuroInformatics, Kobe, Japan*
 7. Oberlaender, M., de Kock, C.P.J., Bruno, R.M., Meyer, H.S., Dercksen, V.J., Lang, S., & Sakmann, B. (Talk, Invited) Digital Neuroanatomy – 3D reconstruction of neuronal circuits in silico. *Morphology and computations of single neurons, FENS satellite, Amsterdam, The Netherlands*
 8. Lang, S., Oberlaender, M., Bastian, P., & Sakmann, B. (Talk by Stefan Lang) Simulation of innervation and activation scenarios of morphologically detailed, large-scale neuron networks in a column of the primary somatosensory cortex with NeuroDUNE. *BCCN, Berlin, Germany*
- 2009
9. Oberlaender, M., de Kock, C.P.J., Bruno, R.M., Meyer, H.S., Dercksen, V.J., & Sakmann, B. (Poster) 3D distribution and sub-cellular organization of thalamocortical VPM synapses for individual excitatory neuronal cell types in rat barrel cortex. *SfN, Chicago, USA*
 10. de Kock, C.P.J., Oberlaender, M., Boudewijns, Z.S.R.M., Mansvelter, H.D., Kleele, T., & Sakmann, B. (Poster) Layer 5A pyramids of rat barrel cortex encode active whisker movement and convey information on whisker position to Layer 2/3. *SfN, Chicago, USA*
 11. Oberlaender, M., Dercksen, V.J., Lang, S., Helmstaedter, M., & Sakmann, B. (Poster & Talk). 3D mapping of synaptic connections within “*in silico*” microcircuits of full compartmental neurons in extended neuron networks on the example of thalamic neurons originating in the ventral posterior medial (VPM) nucleus of the thalamus and projecting into a cortical column in rat primary somatosensory cortex (S1). *NeuroInformatics, Pilsen, Czech republic*
 12. Oberlaender, M., Dercksen, V.J., Lang, S., Helmstaedter, M., & Sakmann, B. (Poster & Talk). 3D mapping of synaptic connections within “*in silico*” microcircuits of full compartmental neurons in extended neuron networks on the example of thalamic neurons originating in the ventral posterior medial

(VPM) nucleus of the thalamus and projecting into a cortical column in rat primary somatosensory cortex (S1). *NeuroInformatics, Pilsen, Czech Republic*

13. Lang, S., Drouvelis, P., Kurz, T., Oberlaender, M., Bastian, P., & Sakmann, B. (Poster) Efficient reconstruction of large-scale neuronal morphologies. *BCCN, Frankfurt, Germany*
14. Oberlaender, M., de Kock, C.P.J., Bruno, R.M., Dercksen, V.J., Helmstaedter, M., Lang, S., & Sakmann, B. (Talk, Invited). Reconstruction of an average cortical column in silico. *Mechanisms of Brain and Mind, Rusutsu, Japan*
- 2008 15. Oberlaender, M., Dercksen, V.J., Broser, P.J., Bruno, R.M., & Sakmann, B. (Poster). „NeuroMorph“ and „NeuroCount“: automated tools for fast and objective acquisition of neuronal morphology and quantitative structural analysis. *NeuroInformatics, Stockholm, Sweden*
16. Oberlaender, M., & Sengupta, B. (Talk). Dendritic Subthreshold Computation of L5 Pyramidal Neurons. *Summer School in Computational Neuroscience, Ottawa, Canada*
- 2007 17. Oberlaender, M., Broser, P.J., Dercksen, V.J., Bruno, R.M., Hippler, S., & Sakmann, B. (Poster). NeuroMorph: A semi-automated tool for 3D tracing of widely spreading, biocytin labeled axonal and dendritic arbors using transmitted light brightfield mosaic microscopy. *SfN, San Diego, USA*
18. Oberlaender, M., Bruno, R.M., Sakmann, B. & Broser, P.J. (Poster). NeuroMorph: A semi-automated tool for 3D tracing of Single Neuron Morphology. *Spring School – The Presynaptic Terminal, Jerusalem, Israel*
19. Oberlaender, M., Bruno, R.M., Sakmann, B. & Broser, P.J. (Poster and Talk). NeuroMorph: A semi-automatic tool for detailed tracing of extensive neuronal branching patterns. *10th Tamagawa-Riken Dynamic Brain Forum, Hakuba, Japan*

Invited Talks

- 2011 1. Department of Systems and Computational Neurobiology, MPI of Neurobiology, Martinsried, Germany
2. Laurent Department, MPI Brain Research, Frankfurt, Germany
3. Neuroscience Department, Columbia University, NY, USA
4. Florida Atlantic University, Boca Raton, USA
- 2010 5. University of Miami, USA
- 2009 6. Neuroscience Department, Columbia University, NY, USA
7. Department of Integrative Neurophysiology, VU University, Amsterdam, The Netherlands
- 2008 8. Department of Neurophysiology, Brain Research Institute, Zürich, Switzerland

Reviewer

- 2011 Journal of Neuroinformatics
- 2010 Journal of Neuroscience Methods