GEORG-AUGUST-UNIVERSITÄT
GÖTTINGEN / GERMANY

International Max Planck Research School

Neurosciences

MSc/PhD/MD-PhD Program

YEARBOOK 2015 / 2016

Yearbook 2015/2016

MSc/PhD/MD-PhD Neuroscience Program

at the University of Göttingen

International Max Planck Research School

Index / Imprint

Letter from the President

Success for a comprehensive research university such as our Georg-August University of Göttingen is rooted in excellent science and its integration into an optimal learning environment to educate competent and critical young academics. I am very glad that our university in cooperation with the local Max-Planck Institutes and the German Primate Center has been able to establish conditions, which make top interdisciplinary science possible in an international setting enabling us all to feel the Göttingen Spirit.

The two international MSc/PhD programs in Neurosciences and Molecular Biology truly have contributed to our continued strive for excellence in science-oriented training both by integrating faculty members from university and non-university institutes across institutional borders and by providing comprehensive services especially for international students on the Göttingen Research Campus. Based on the proven concepts and the experience of these programs the Göttingen Graduate School for Neurosciences, Biophysics and Molecular Biosciences (GGNB) was established, which is continuously supported by the federal Excellence Initiative since 2007.

The Neuroscience and Molecular Biology programs remain unique within the Graduate School GGNB in offering integrated MSc/PhD curricula with a fast track option which allow excellent BSc graduates to directly enter the PhD phase after successfully absolving the initial 1st year training phase. For over a decade these international programs have been particularly successful in attracting high numbers of worldwide applicants of good academic quality providing the basis for the selection of the very best candidates. New ideas introduced by these programs have meanwhile been adopted by the Georg-August University School of Science (GAUSS) and other graduate schools for the benefit of the entire university.

While maintaining their successful structure the content and focus of the training curriculum of the programs has continuously been adapted to the changing research topics. Consequently, new faculty members are integrated to reflect novel developments in research. They will further ensure optimal individual supervision and up-to-date research-oriented training. Beyond academia both programs keep close contact with the relevant industries to enhance the opportunities of the graduates for a successful professional career in the private sector.

I would very much like to thank all colleagues and institutions for their committed support of these international programs and, last but not least, the German Academic Exchange Service (DAAD), the Lower Saxony Ministry of Science and Culture, and the various generous donors. The Georg-August University of Göttingen will continue to support these programs to promote international exchange at all levels and for further interaction with our partners worldwide.

Prof. Dr. Ulrike Beisiegel

(President of the Georg August University Göttingen)

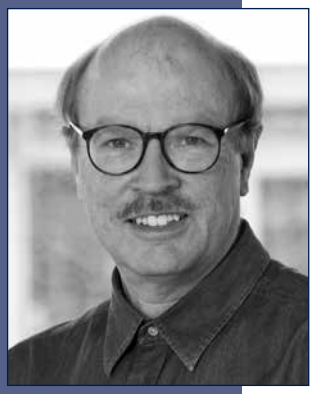
Letter from the Max Planck Society

The mission of the Max Planck Society is to conduct basic research in science and humanities at the highest level. More than 80 Max Planck Institutes are located on scientific campuses across Germany, most of them close to universities.

Scientific ties between Max Planck Institutes and universities are traditionally strong. In 1998, during the 50th year celebration of the Max Planck Society in Göttingen, the Max Planck Society, together with the Hochschulrektorenkonferenz, launched the International Max Planck Research Schools as a new joint program to further intensify cooperation.

The goals of the International Max Planck Research Schools are

- to attract excellent students from all around the world to intensive Ph.D. training programs in Germany, preparing them for careers in science,
- to integrate Max Planck scientists in top-level scientific training of junior scientists,
- to intensify the ties to the universities owing to the participation of internationally renowned Max Planck scientists in joint teaching activities, and
- to strengthen international relationships by providing individual support to each student and by exposing foreign students to German culture and the German language.



By now, 61 International Max Planck Research Schools have been established involving 71 Max Planck Institutes, 32 German universities and 26 universities abroad. About 3,050 PhD students from 120 countries are presently enrolled.

More than 3,320 PhD students have graduated to date from an International Max Planck Research School.

Since their foundation in the year 2000, the Göttingen International Max Planck Research Schools in Neurosciences and Molecular Biology have met with extraordinary success. Every year, the programs receive hundreds of applications, with the quality of the students consistently being very high. Most students graduated so far have moved on to postdoctoral positions, many at prestigious international institutions. In the past years, the Göttingen Schools received unanimous acclaim during external evaluations and won national awards. For instance they are the only Life Science Programs within Germany that were selected for the “Top Ten International Master’s Degree Courses 2006”. The Schools have also re-shaped the local scientific community, strengthening the ties between the participating institutions, and initiated new scientific collaborations that augment the international reputation of Göttingen as a center of scientific excellence. Furthermore, the Schools served as role models and founding members of the Göttingen Graduate School for Neurosciences, Biophysics, and Molecular Biosciences, thus being instrumental for the continued support by the German Excellence Initiative provided to the university. We hope that in the years to come the students of the International Max Planck Research Schools will be successful in their professional careers. We also hope that they will remember their training period in Göttingen as an exciting and stimulating phase in their lives.

Martin Stratmann
President
Max Planck Society

Gregor Eichele
Dean of the IMPRS
Neurosciences

Overview

This yearbook is intended to provide information on the International MSc/PhD/MD-PhD Neuroscience Program in Göttingen, Germany, which was established in 2000. In addition to general information on the program, the yearbook introduces the current year's students, the faculty members, the program committee, and the coordination team.

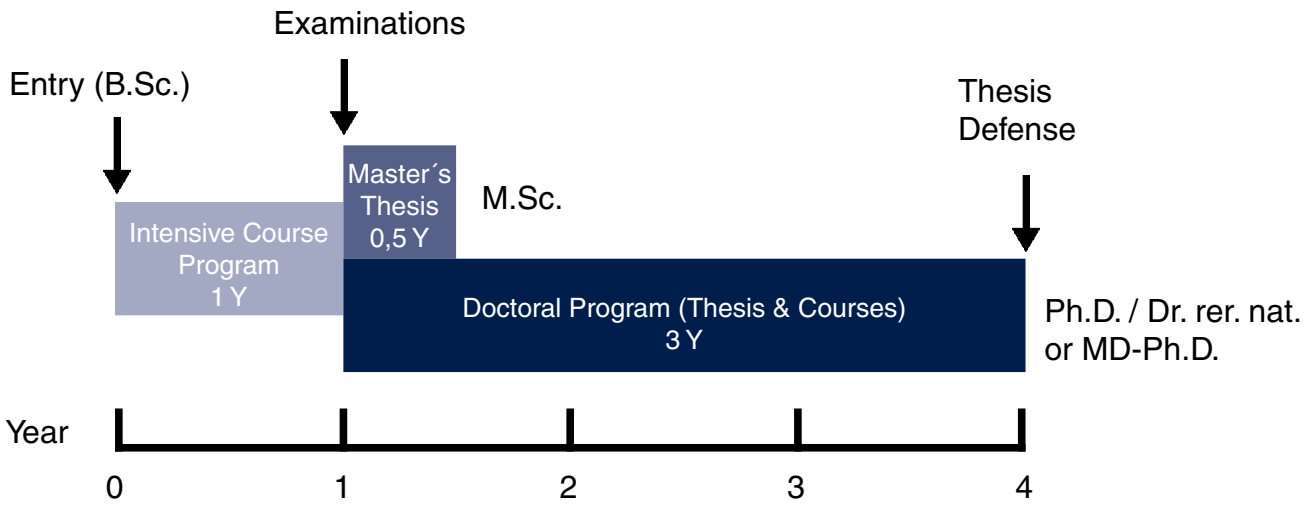
The program is a member of the Göttingen Graduate School for Neurosciences, Biophysics, and Molecular Biosciences (GGNB), which is funded by the Excellence Initiative of the German Federal and State Governments. It is offered by the University of Göttingen, the Max Planck Institute for Biophysical Chemistry (MPIbpc), the Max Planck Institute for Experimental Medicine (MPIem), the Max Planck Institute for Dynamics and Self-Organization (MPIds), the German Primate Center (DPZ), and the European Neuroscience Institute (ENI). Further to their active participation in the Neuroscience Program, the above mentioned partners closely cooperate in the Cluster of Excellence and DFG Research Center Nanoscale Microscopy and Molecular Physiology of the Brain (CNMPB), the Göttingen Center for Molecular Biosciences (GZMB), the Center for Systems Neuroscience (ZNV), in several collaborative research centers (Sonderforschungsbereiche, SFB), and in interdisciplinary doctoral programs (Graduiertenkollegs, GK).

The International MSc/PhD/MD-PhD Neuroscience Program qualifies students for professional work in the neurosciences. The program is open to students from Germany and from abroad, who hold a Bachelor's degree (or equivalent) in the biosciences, medicine, psychology, physics, or related fields. All courses are held in English. Scholarships are available. The academic year starts in October and is preceded by a three week orientation program. Applications may be submitted until January 15 of the year of enrollment. To ensure a high standard of individual training, the number of participants is limited to 20 students per year.

All students initially participate in one year of intensive course work. This first segment of the program comprises lectures, tutorials, seminars, methods courses, and independent, individually supervised research projects (laboratory rotations). The traditional German structure of academic semesters is not followed. The condensed schedule allows students to accumulate 90 credits (ECTS) within one year, which would normally require three semesters.

Subsequently, two separate segments are offered:

- **PhD Program:** Good to excellent results after the first year qualify for direct admission to a three-year doctoral project in one of the participating research groups. The Master's thesis requirement is waived in this case. After successful defense of a doctoral thesis, the degree Doctor of Philosophy (Ph.D.) or the equivalent title Doctor rerum naturalium (Dr. rer. nat.) is conferred. Students who finished medical school can apply for an MD-Ph.D. title.
- **MSc Program:** Alternatively, students may conclude the program with a Master's thesis, based on six months of experimental scientific research. The degree Master of Science (M.Sc.) is awarded upon successful completion of the Master's thesis.



Intensive Course Program (First Year)

Throughout the first year, current topics in the neurosciences are covered by

- lectures
- tutorials
- methods courses
- laboratory rotations
- seminars
- skills courses

Lectures and Tutorials

A comprehensive lecture series is organized into a sequence of 4-6 week units. The following topics are taught on an advanced level throughout the first year (36 weeks, 4 hours per week):

A. Neuroanatomy

B. Physiology and Basic Statistics

C. Modelling, Autonomous Nervous System, Pharmacology

D. Molecular Biology, Development, and Neurogenetics

E. Sensory and Motor Systems

F. Clinical Neurosciences and Higher Brain Functions

G. Specialization Seminars and Tutorials

Each lecture is accompanied by a tutorial session, where students meet with a tutor in small groups. Tutorials involve exercises, review of lecture material, and discussion of related topics.

Methods Courses

During the first months of the Neuroscience Program, students participate in a series of methods courses to introduce them to principles and practical aspects of basic scientific techniques and the handling of model organisms. The practical courses and tutorials comprise the following topics:

I Neuroanatomy

- comparative development of the vertebrate brain
- cytology and ultrastructure of the human brain
- functional neuroanatomy of sensory and motor systems
- immunocytochemical techniques and single neuron recording
- development and neuroanatomy of invertebrate models

II Physiology and Basic Statistics

- introduction to medical statistics and programming languages
- electrophysiological techniques
- membrane physiology / synaptic transmission
- FLIM / Ca-imaging / FCS techniques / confocal microscopy
- sensory and behavioral physiology

III Modelling, Autonomous Nervous System, Pharmacology

- neuronal modelling
- behavioral analysis
- neuroendocrinology / neuropharmacology
- protein separation techniques

IV Molecular Biology, Development, and Neurogenetics

- cell culture methods
- methods in molecular biology
- genetics of transgenic mouse models

Laboratory Rotations

Starting in January, every student carries out three independent research projects (laboratory rotations) in participating laboratories. Each project is individually supervised and involves seven weeks of experimental work, followed by one week for data analysis and presentation. For each project, a report must be completed in the format of a scientific publication. The laboratory rotations must cover at least two different subjects.

Seminars

Seminars start in March. The class meets weekly for two hours to discuss two or three student presentations. The presentations are research reports based on work from the laboratory rotations.

Examinations

After the first year of intensive training, all students take one written and two oral Master's examinations. The Master's examinations explore the students' theoretical background in topics covered by lectures and tutorials. All candidates are examined both in the field of anatomy and physiology in two separate oral exams.

PhD Program

Students who have passed the Master's examinations with good or excellent results qualify for direct admission to a three-year doctoral project in one of the participating research groups without being required to complete a Master's thesis first.

The PhD program emphasizes independent research on the part of the students. Doctoral students select three faculty members as their doctoral thesis committee which closely monitors progress and advises students in their research project. Laboratory work is accompanied by seminars and lecture series, a wide variety of advanced methods courses, training in scientific writing and oral presentation skills, courses in intercultural communication, bioethics and research ethics, elective courses, and participation in international conferences or workshops.

At the end of the PhD training program, a doctoral thesis is submitted either in the traditional format, or as a collection of scientific publications in internationally recognized journals along with a general introduction and a discussion of the results. The degree Ph.D. or, alternatively, Dr. rer. nat. will be awarded after the successful defense of the doctoral thesis. Having fullfilled all PhD degree requirements, medical students may apply for the degree of an MD-Ph.D. at the Medical Faculty.

Master's Program

After the first year of intensive training, students may conclude the program with a six-month thesis project, leading to a Master of Science degree. The thesis project involves experimental work under the supervision of faculty members of the Neuroscience Program. Students have the opportunity to conduct their Master's thesis project at an affiliated research institution abroad.

Orientation, Language Courses, Social Activities

A three-week orientation prior to the program provides assistance and advice for managing day-to-day life, including arrangements for bank account, health insurance, residence permit, housing, and enrollment. Students have the opportunity to meet faculty members and visit laboratories of the participating institutions. In addition, the orientation program informs students about computing and library facilities, the city and university of Göttingen, sports facilities, and cultural events.

An intensive basic language course in German is offered in cooperation with the *Lektorat Deutsch als Fremdsprache* to facilitate the start in Göttingen. Additional language courses and social activities accompany the program.

Application, Selection, and Admission 2015

Applicants must hold a Bachelor's degree or equivalent in biology, medicine, psychology, physics, chemistry, or related fields. Applicants who are not native speakers of English should demonstrate adequate competence of the English language by acceptable results in an internationally recognized test.

In the year 2015, the coordination office received 363 applications from 59 countries.

Continent	Applications	Admissions *
Europe (total)	**100**	**8**
Germany	35	3
other West Europe	33	4
East Europe	32	1
America (total)	**36**	**3**
North America	17	1
Central/South America	19	2
Africa (total)	**70**	**1**
North Africa	28	0
Central/South Africa	42	1
Asia (total)	**155**	**8**
Near East	55	5
Central Asia/ Far East	100	3
Australia	**2**	**0**

*Incl. 3 NEURASMUS students (from Brazil, Ethiopia, and Syria).

Students 2015/2016

Name		Home Country
Heba	Ali *	Syria
Burak	Bali	Turkey
Allison	Barry	Canada
Tizibt Ashine	Bogale *	Ethiopia
Tal	Dankovich	Israel
Robert	Epple	Germany
Burak	Gür	Turkey
Alina Sophie	Heukamp	Germany
Nehal	Johri	India
Dimokratis	Karamanlis	Greece
Ronja	Markworth	Germany
Sebastian Mauricio	Molina Obando	Spain
Helena Maria (Linda)	Olsthoorn	The Netherlands
Carolina	Piletti Chatain *	Brazil
Sonja	Pribićević	Serbia
Alejandro	Restrepo Arango	Colombia
Aditya	Singh	India
Nikoloz	Sirmpilatze	Greece
Özge	Uslu	Turkey
Kwok Yui Reymond (Tony)	Yip	Hong Kong (SAR)

* NEURASMUS students

Heba Ali

Syria

Heba Ali

EDUCATION

College / University:

Tishreen University

Highest Degree:

B.Sc. in Pharmacy and Pharmaceutical Chemistry

Major Subjects:

Pharmacology, Physiology, Chemistry, Drug Design, Biochemistry, and Molecular Biology

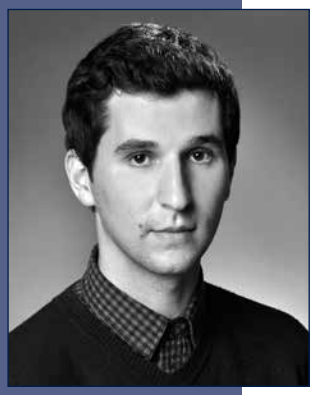
Lab Experience:

Basic techniques in Molecular Biology and Genetics: DNA and RNA extraction, PCR, Karyotyping, Fluorescence *in situ* hybridization (FISH) analysis

Scholarships:

2015 – 2017: Erasmus Mundus Scholarship

Burak Bali



Turkey

Burak Bali

EDUCATION

College / University:

Bogazici University

Highest Degree:

M.Sc.

Major Subjects:

Molecular Biology and Genetics

Lab Experience:

Molecular cloning, PCR, electrophoretic applications, immunohistochemistry, fluorescence and confocal microscopy, functional calcium imaging, electroporation, microinjection

Projects / Research:

2013 – 2015: M.Sc. thesis project “The Role of Sustentacular Cells in Adult Neurogenesis”, Dr. Stefan Fuss, Bogazici University

June – Aug 2012: summer internship project “Role of Carbon Metabolism in Drought Stress Metabolism”, Dr. Diana Santelia, Univ. of Zurich, Switzerland

Scholarships:

2015 – 2016: Stipend by the International Max Planck Research School

2013 – 2015: Graduate Scholarship by the Scientific and Technological Research Council of Turkey

2008 – 2013: Undergraduate Scholarship by the Scientific and Technological Research Council of Turkey

Canada

Allison Barry

EDUCATION

College / University:

Dalhousie University

Highest Degree:

B.Sc.

Major Subjects:

Neuroscience

Lab Experience:

Basic molecular biology and cell culturing, optogenetic tools, retroviral transductions, Western blotting, *Drosophila melanogaster* care, EM techniques and sample handling, High Resolution Confocal, Fluorescence, and Bright-field Microscopy, Software: ImageJ, Fiji, Reconstruct, R, and Excel

Projects / Research:

Apr – Aug 2015: Research Assistant; Work with ESC derived motor neurons to study ALS, Dr. V Rafuse, Dalhouse University

Aug 2014 – Apr 2015: Thesis: "Examining the role of Synaptopodin 2 during myocyte fusion in mouse embryonic stem (ES) cell derived muscle", Dr. V Rafuse, Dr. R Duncan, Dalhousie University

May 2012 – Apr 2015: Research Assistant; Work with *Drosophila melanogaster*, Dr. IA Meinertzhagen, Dalhousie University

Scholarships:

2015 – 2016: Stipend by the International Max Planck Research School

2013, 2014, 2015: NSERC URSA Research Scholarship

Ethiopia

Tizibt Ashine Bogale

EDUCATION

College / University:

Hawassa University College of Medicine and Health Sciences

Highest Degree:

Doctor of Medicine (MD)

Major Subjects:

Medicine

Lab Experience:

Basic lab techniques

Scholarships:

2015 – 2017: Erasmus Mundus Scholarship

Israel

Tal Dankovich

EDUCATION

College / University:

Tel Aviv University

Highest Degree:

B.Sc.

Major Subjects:

Neurosciences

Lab Experience:

Basic molecular biology and cell culture techniques, expression cloning, immunohistochemistry, PCR, electrophysiological techniques, behavioral methods

Projects / Research:

2014 – 2015: “Examination of the molecular mechanisms of interaction between G protein subunits and GIRK channels”. B. Sc. research project, Dept. Physiology, Tel Aviv University

May – Aug 2015: “The extent of the specificity of rapamycin as a suppressor of alcohol-related memories in mice”. Dept. Psychobiology, Tel Aviv University

Aug 2014 – Mar 2015: “Searching for an unidentified glial protein in peripheral Nodes of Ranvier”. Weizmann Insitute of Science, Rehovot

Scholarships:

2015 – 2016: Stipend by the International Max Planck Research School

2014: Young Weizmann Scholars grant, Weizmann Institute of Science

2012 – 2015: Academic merit award, Tel Aviv University

Germany

Robert Epple

EDUCATION

College / University:

Dresden University of Technology

Highest Degree:

M.Sc.

Major Subjects:

Molecular Bioengineering

Lab Experience:

Optogenetics, electrophysiology, behavioral experiments, fMRI, TMS, techniques in molecular and cellular biology, genetic recombination, confocal microscopy, transmission electron miscroscopy

Projects / Research:

Bachelor’s thesis: Processing of vocalizations in the auditory cortex of Mongolian gerbils. Student job: Emotional regulation by real-time fMRI Neurofeedback. Master’s thesis: Optogenetic tracing of frontal output pathways

Scholarships:

2015 – 2016: Stipend by the International Max Planck Research School

Aug – Dec 2012: Erasmus stipend in Helsinki

Turkey

Burak Gür

EDUCATION

College / University:

Sabanci University

Highest Degree:

B.Sc.

Major Subjects:

Molecular Biology, Genetics, and Bioengineering

Lab Experience:

Basic molecular biology, chromatography and tissue culture techniques, PCR

Projects / Research:

Dec 2013 – Jan 2015: Cloning, expression and purification of the gamma subunit of heterotrimeric G-proteins from rice (RGG2) in *E. coli*. Prof. Dr. Zehra Sayers, Sabanci University

July – Sep 2014: DRG neuronal cultures peripheral nerve regeneration studies *in vitro* and *in vivo* using rat and dog models. Ahmet Hoke M.D., Ph. D., Neurology Dept., Johns Hopkins University

June – Aug 2013: Plant Micropropagation and Plant Tissue Culture. Prof. Dr. Selim Cetiner, Sabanci University

Scholarships:

2015 – 2016: Stipend by the International Max Planck Research School

2010 – 2015: Sabanci University Undergraduate Scholarship

Germany

Alina Sophie Heukamp

EDUCATION

College / University:

Georg August University Göttingen

Highest Degree:

B.Sc.

Major Subjects:

Biology

Lab Experience:

Behavioral analysis of *Drosophila* mutants, video analysis, *Drosophila* handling and basic crossings

Projects / Research:

Aug 2014 – Feb 2015: internship, Dept. of Cellular Neurobiology, Georg August University Göttingen, Dr. Bart Geurten

Mar – Aug 2015: Bachelor's thesis: "Sensory-motor processing and social behavior of Neuroligin4-deficient *Drosophila melanogaster*", Dept. of Cellular Neurobiology, Georg August University Göttingen

Scholarships:

2015 – 2016: Stipend by the International Max Planck Research School

2013 – 2015: Lower Saxony Scholarship

Nehal Johri

India

Nehal Johri

EDUCATION

College / University:

St. Xavier's College, Mumbai

Highest Degree:

B.Sc.

Major Subjects:

Life Sciences & Biochemistry

Lab Experience:

Neuroanatomy, high speed videography, confocal microscopy, behavior studies in insects, biochemical assays, experimental techniques of microbiology

Projects / Research:

2014 – 2015: Feedback from the wings and shock absorbance at the Dipteran gear box, Dr. Sanjay Sane, National Centre for Biological Sciences (TIFR), Bangalore

2014: Intra-specific effects of allelochemicals in *Vigna radiata*, Dr. Nandita Mangalore, St. Xavier's College, Mumbai

2013: Effect of predation threat on development of mosquito larvae and its trade-offs, Dr. Suhel Quader, NCBS (TIFR), Bangalore

Scholarships:

2015 – 2016: Stipend by the International Max Planck Research School

Dimokratis Karamanlis

Greece

Dimokratis Karamanlis

EDUCATION

College / University:

Aristotle University of Thessaloniki

Highest Degree:

Doctor of Medicine (MD)

Major Subjects:

Human Medicine

Lab Experience:

Rat handling, electrophysiological recordings (ECG, EEG, compound action potential), simple ECG and EEG analyses, machine learning

Projects / Research:

2011 – 2013: "The role of N-acetylcysteine in reversing cardiac arrhythmias induced by chloral hydrate in rats". Lab of Physiology, School of Medicine, Aristotle University of Thessaloniki

2012: "Study of the cognitive and affective reactions of consumers to humorous sexist advertisements via the method of Electroencephalography". Lab of Medical Informatics, School of Medicine, Aristotle University of Thessaloniki

2011 – 2012: "Community-powered advancement of public transportation with the use of mobile technologies: A participatory environmental sensing approach", School of Engineering, Aristotle University of Thessaloniki

2010 – 2012: "Personal health records in medical education". Lab of Medical Informatics, School of Medicine, Aristotle University of Thessaloniki

Scholarships:

2015 – 2016: DAAD Scholarship for Graduates of All Disciplines

Germany

Ronja Markworth

EDUCATION

College / University:

University of Alberta, Canada

Highest Degree:

B.Sc.

Major Subjects:

Neurosciences

Lab Experience:

Basic techniques in immunohistochemistry, cryosectioning, mouse handling, and behavioral analysis

Projects / Research:

Sep 2014 – Apr 2015: Bachelor thesis “Voluntary running in chronic EAE decreases disease progression and alters pain behaviour in male mice“, Prof. Bradley Kerr, University of Alberta

Scholarships:

2015 – 2016: Stipend by the international Max Planck Research School

2011 – 2013: University of Alberta Academic Excellence Scholarship

Spain

Sebastian Mauricio Molina Obando

EDUCATION

College / University:

Autonomous University of Barcelona

Highest Degree:

B.Sc.

Major Subjects:

Biomedical Sciences

Lab Experience:

Jan – June 2015: Systems Biology Program at Genomic Regulation Center. Mara Dierssen Neurobiology Research Group. Study of the neurotrophic properties of EGCG on mammalian neuronal cultures, work in a laminar flow cabinet, PCR, Electrophoresis, Contrast Phase Microscope, Boolean Network

Projects / Research:

Professional Practica: Study of neurotrophic properties of EGCG on mammalian neuronal cultures

Bachelor Thesis: “Cell and Gene Therapy in Alzheimer’s Disease”

Scholarships:

2015 – 2016: Stipend by the International Max Planck Research School

2011 – 2015: General and Mobility Scholarship by the Spanish Government

The Netherlands

Helena Maria (Linda) Olsthoorn

EDUCATION

College / University:

University College Roosevelt, Utrecht University

Highest Degree:

B.Sc. (Hon.)

Major Subjects:

Life Sciences and Cognitive Science

Lab Experience:

Basic techniques in molecular and cellular biology, western blotting, gel electrophoresis, DNA extraction, *in situ* hybridization, cryosectioning, immunohistochemistry, fluorescent microscopy. Animal models: Mouse and Avian embryo

Projects / Research:

Dec 2014 – May 2015: "The Pathological Mechanism underlying Amyotrophic Lateral Sclerosis, exploring the loss-of-function hypothesis in ALS caused by C9orf72 and the role of interactor FMRP and its targets in axonal degeneration by mutant FUS", Dept. of Translational Neuroscience, Prof. Jeroen Pasterkamp, Utrecht University

July – Aug 2014: "The Role of ALS-linked Proteins TDP-43 and FUS in Avian Neural Circuit Development", Dept. of Molecular Life Sciences, Prof. Dr. Esther Stoeckli, University of Zurich, Switzerland

Scholarships:

2015 – 2016: Stipend by the International Max Planck Research School

Brazil

Carolina Piletti Chatain

EDUCATION

College / University:

Universidade Federal do Rio Grande do Sul

Highest Degree:

B.Sc.

Major Subjects:

Biomedicine

Lab Experience:

Basic techniques in cell biology and biochemistry, immunocytochemistry, life cell imaging, behavioral tests, perfusion, stereotactic surgery

Projects / Research:

Jun – Aug 2015 "Arf6 and the regulation of p75NTR trafficking". Vanderbilt, USA.

Jun 2013 – Jun 2015 "The use of retinoic-acid differentiated SH-SY5Y cells in the study of 6-hydroxydopamine-induced cell death in Parkinson's disease model" and "Identification of transcription factors which act as master regulators in Parkinson's and Alzheimer's Disease". U. Fed Rio Grande do Sul, Brazil.

Mar 2013 – May 2015 "Acute social defeat in male Wistar rats, neuronal activity, inflammatory markers and coping strategies". U. Fed Rio Grande do Sul, Brazil.

Scholarships:

Sep 2015 – Aug 2017: Erasmus Mundus Scholarship.

Jun – Aug 2015: Vanderbilt International Summer Research Academy

Jun – Sep 2014: Globalink Research Internship Award

Jan – March 2013: Singapore International Pre-Graduate Award

Serbia

Sonja Pribićević

EDUCATION

College / University:

University of Belgrade

Highest Degree:

B.Sc.

Major Subjects:

Molecular Biology, Physiology, Cell Biology

Lab Experience:

Bacterial cell culturing, plant tissue culturing, DNA, RNA and protein extraction, chloroplast isolation, electrophoresis, PCR, Southern blot analysis, spectrophotometry, work in sterile conditions

Projects / Research:

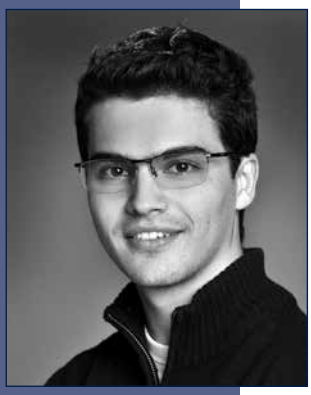
Oct 2014 – June 2015: Quantification and characterization of glutamine 1;5 synthetase in *Arabidopsis thaliana*; Dept. for Plant Physiology, Milan Dragi**ć**evi**ć**, Institute for biological research "Siniša Stankov**ć**", University of Belgrade

May – June 2014: "Effects of Phloxine B on the Population Growth of Bacillus subtilis and *Escherichia coli*"; Centre for Research and Interdisciplinarity, Tamara Miloševi**ć** and Alice Demarez, University Paris-Descartes, Paris, France

Feb – Mar 2014: Ageing in yeast cells; Centre for Research and Interdisciplinarity, Tamara Miloševi**ć**, University Paris-Descartes, Paris, France

Scholarships:

2015 – 2016: Stipend by the International Max Planck Research School



Colombia

Alejandro Restrepo Arango

EDUCATION

College / University:

Universidad Nacional de Colombia, Bogotá

Highest Degree:

B.Sc. in Biology

Major Subjects:

Cell Biology, Neuroscience

Lab Experience:

Basic techniques in molecular and cellular biology

Projects / Research:

2014 – 2015: Evaluation of the effect of LXR agonist treatment on the vascular endothelium, neuroinflammation and lipid metabolism in an animal model of Alzheimer's disease

Scholarships:

2015 – 2016: Stipend by the International Max Planck Research School

India

Aditya Singh

EDUCATION

College / University:

Indian Institute of Science Education and Research (IISER) Trivandrum

Highest Degree:

BS-MS Dual Degree

Major Subjects:

Life Sciences with a minor in Chemical Sciences

Lab Experience:

Molecular biology techniques, behavioral studies, experience in field work

Projects / Research:

Aug 2014 – Apr 2015: Master's thesis project "Recruitment behavior in stingless bee *Trigona iridpennis*", Dr. Hema Somanathan, IISER Trivandrum

May – July 2014: summer internship, Dr. Spaethe's lab of Sensory Ecology, University of Würzburg, Germany

Jan – Apr 2014: minor subject thesis "Structural validation of Ubiquitin using Residual Dipolar Couplings", Dr. Vinesh V, IISER Trivandurm

May – July 2013: summer project "Feeding behavior of Street Dogs", Dr. Anindita Bhadra, IISER Kolkata

Scholarships:

2015 – 2016: Stipend by the International Max Planck Research School

Aug 2010 – May 2015: Kishore Vaigyanik Protsahan Yojana (KVPY) Scholarship

2014: DAAD WISE Scholarship

2013: Summer Research Programme, IISER Kolkata

Greece

Nikoloz Sirmpilatze

EDUCATION

College / University:

Aristotle University of Thessaloniki

Highest Degree:

Doctor of Medicine (MD)

Major Subjects:

Medicine

Lab Experience:

Basic cellular and molecular techniques (cell cultures, western blot, gel electrophoresis)

Scholarships:

2014 – 2015: DAAD Study Scholarship for Graduates of All Disciplines

2009 – 2011: Scholarship for distinction during undergraduate studies, State Scholarships Foundation of Greece (IKY)

Turkey

Özge Uslu

EDUCATION

College / University:

Bogazici University

Highest Degree:

B.Sc.

Major Subjects:

Molecular Biology and Genetics

Lab Experience:

Bioimaging, RNA injection, molecular cloning, zebrafish care, and behavioral assays

Projects / Research:

Jan – June 2015: Development of an RNA injection approach to study IRES function in zebrafish in Sense Lab, Bogazici University

Scholarships:

2015 – 2016: Stipend by the International Max Planck Research School

June – Sep 2014: RVO, grant Yaksi Lab at NERF in KU Leuven, Belgium

Sep 2009 – June 2014: The Scientific and Technological Research Council of Turkey (TUBITAK) – Undergraduate Scholarship Program

Sep 2005 – Sep 2009: Terakki Foundation Schools Scholarship

Hong Kong (SAR)

Kwok Yui Reymond (Tony) Yip

EDUCATION

College / University:

Chinese University of Hong Kong (CUHK)

Highest Degree:

B.Sc.

Major Subjects:

Biochemistry

Lab Experience:

Basic molecular biology, qPCR, Gene knockdown, Immunofluorescence, basic rodent handling, blood sample handling

Projects / Research:

Feb – Aug 2015: Nasopharnygeal Cancer biomarker identification pharmacology

June 2013 – June 2014: Stac as a plausible regulator of cerebellar Purkinje Cell dendritic aborization

June – Aug 2013: NGF induces pain hypersensitivity via upregulation of HCN ion channel family

Scholarships:

2015 – 2016: Stipend by the International Max Planck Research School

2013: Exchange Scholarship to University of Cambridge

Faculty

Name		Institute	
Andrea	Antal	Clinical Neurophysiology	U Göttingen
Mathias	Bähr	Neurology	U Göttingen
Thomas	Bayer	Molecular Psychiatry	U Göttingen
Henrik	Bringmann	Sleep and Waking	MPI bpc
Nils	Brose	Molecular Neurobiology	MPI em
Wolfgang	Brück	Neuropathology	U Göttingen
Camin	Dean	Trans-synaptic Signaling	ENI
Thomas	Dresbach	Anatomy and Embryology	U Göttingen
Hannelore	Ehrenreich	Clinical Neurosciences	MPI em
Gregor	Eichele	Genes and Behavior	MPI bpc
André	Fiala	Molecular Neurobiology of Behavior	U Göttingen
André	Fischer	German Center for Neurodegenerative Diseases	U Göttingen
Alexander	Flügel	Neuroimmunology	U Göttingen
Jens	Frahm	Biomedical NMR Research / Physical Chemistry	MPI bpc
Tim	Friede	Medical Statistics	U Göttingen
Theo	Geisel	Nonlinear Dynamics	MPI ds
Tim	Gollisch	Ophthalmology	U Göttingen
Martin	Göpfert	Cellular Neurobiology	U Göttingen
Robert	Gütig	Theoretical Neuroscience	MPI em
Ralf	Heinrich	Neurobiology	U Göttingen
Stefan	Hell	NanoBiophotonics	MPI bpc
Michael	Hörner	Neurobiology	U Göttingen
Swen	Hülsmann	Cellular- and Sensory Physiology	U Göttingen
Reinhard	Jahn	Neurobiology	MPI bpc
Siegrid	Löwel	Systems Neuroscience	U Göttingen
Till	Marquardt	Developmental Neurobiology	ENI
Ira	Milosevic	Synaptic Vesicle Dynamics	ENI
Tobias	Moser	Otolaryngology	U Göttingen
Klaus-Armin	Nave	Neurogenetics	MPI em
Luis	Pardo	Molecular Biology of Neuronal Signals	MPI em
Walter	Paulus	Clinical Neurophysiology	U Göttingen
Jeong Seop	Rhee	Neurophysiology	MPI-em
Michael	Rickmann	Neuroanatomy	U Göttingen
Silvio O.	Rizzoli	Neuro- and Sensory Physiology	ENI
Detlev	Schild	Molecular Neurophysiology	U Göttingen
Oliver	Schlüter	Molecular Neurobiology	ENI
Manuela	Schmidt	Somatosensory Signaling	MPI em
Michael	Sereda	Molecular and Translational Neurology	MPI em
Marion	Silies	Visual Processing	U Göttingen
Mikael	Simons	Biochemistry and Molecular Cell Biology	MPI em
Jochen	Staiger	Neuroanatomy	U Göttingen
Anastassia	Stoykova	Molecular Cell Biology	MPI bpc
Stefan	Treue	Cognitive Neuroscience and Biological Psychology	DPZ
Melanie	Wilke	Cognitive Neurology	U Göttingen
Fred	Wolf	Nonlinear Dynamics	MPI ds
Fred	Wouters	Cellular Biophysics	U Göttingen

U Göttingen = Georg August University, MPI bpc = Max Planck Institute for Biophysical Chemistry, MPI em = Max Planck Institute for Experimental Medicine, MPI ds = Max Planck Institute for Dynamics and Self-Organization, DPZ = German Primate Center, ENI = European Neuroscience Institute

Address

Göttingen University
Medical School
Dept. of Clinical
Neurophysiology
Robert-Koch-Straße 40

37075 Göttingen
Germany

phone: + 49-551-39 8461
fax: + 49-551-39 8126
e-mail: aantal@gwdg.de

Further Information

http://www.neurologie.uni-goettingen.de/

Andrea Antal

Clinical Neurophysiology

- 1990 - Diploma in Biology, Attila József University of Sciences, Szeged, Hungary
- 1993 - University Doctor, Attila József University of Sciences, Szeged, Hungary
- 1998 - Albert Szent-Györgyi Medical University, Szeged, Hungary
- 2005 Habilitation Georg-August University, Göttingen, Germany
- 2010 Extraordinary professor, Georg-August University, Göttingen, Germany

Major Research Interests

Neuroplasticity became one central topic of neuroscience research in the last decades. Dynamic modifications of neuronal networks are an important substrate for learning and memory formation. Pathological neuroplasticity might be one foundation of numerous central nervous system diseases. Transcranial direct current stimulation (tDCS) was developed by our group as a non-invasive tool to induce neuroplasticity in the human cerebral cortex. Neuroplastic excitability enhancements or reductions are accomplished which outlast the stimulation duration relevantly.

The primary aim of our recent work is to develop and establish new non-invasive brain stimulation methods to induce physiological changes in the central nervous system in order to investigate cognition and complex information processing. Transcranial alternating current stimulation (tACS) and random noise stimulation (tRNS) are new external stimulation techniques influencing cortical excitability and activity. tACS and tRNS permit, due to the oscillating stimulation, external interference with the cortical oscillations. They can particularly modulate the temporary connections of cortical areas during a given task. Neuronal oscillations in the brain are associated with the processing of sensory information, learning, cognition, arousal, attention and also pathological conditions (e.g. Parkinson's tremor, epilepsy). Therefore, the external modulation of cortical oscillations could be an important component of induced cerebral plasticity. In terms of effectiveness tRNS seems to have at least the same therapeutic potential for the treatment of diseases such as depression and chronic pain as rTMS and tDCS.

The secondary aim of our studies is the modulation of pain perception by tDCS and theta-burst stimulation (TBS) in healthy subjects, in patients with chronic pain and migraine. Many neurological diseases are characterized by pain as a key symptom. Systematic studies to investigate the mechanisms of pain are of outmost importance, since they may subsequently result in improved treatment strategies. tDCS as a tool aims to induce prolonged neuronal excitability and activity alterations in the human brain via alterations of the neuronal membrane potential. Accordingly, tDCS in the human is a promising tool in the treatment of diseases that are accompanied by changes of cortical excitability.

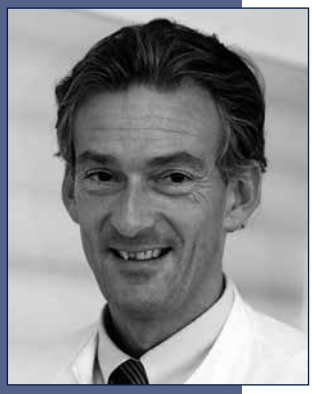
Selected Recent Publications

Laczo B, Antal A, Niebergall R, Treue S, Paulus W (2011) Transcranial alternating current stimulation in a high gamma frequency range applied over V1 improves contrast perception but does not modulate spatial attention. Brain Stimulation: in press

Ambrus GG, Zimmer M, Kincses TZ, Harza I, Kovacs G, Paulus W, Antal A (2011) The enhancement of cortical excitability over the DLPFC before and during training impairs categorization in the prototype distortion task. Neuropsychologia 49: 1974-80

Antal A, Kriener N, Lang N, Boros K, Paulus W (2011) Cathodal transcranial direct current stimulation of the visual cortex in the prophylactic treatment of migraine, Cephalalgia 31: 820–28

Antal A, Polania R, Saller K, Morawetz C, Schmidt-Samoa C, Baudewig J, Paulus W, Dechent P (2011) Stronger activation of the MST and weaker activation of the MT area to visual stimulation in migraineurs. Cephalalgia 31: 338-45



Address

Department of Neurology
University of Göttingen
Medical School
Robert-Koch-Str. 40

37075 Göttingen
Germany

phone: + 49-551-39 66603
fax: + 49-551-39 9348
e-mail: mbaehr@gwdg.de

Further Information

http://www.baehrlab.med.uni-goettingen.de/

Mathias Bähr

Professor of Neurology

- 1985 MD, University of Tübingen Medical School, Training in Neurology at University Hospitals in Tübingen and Düsseldorf
- DFG and Max Planck Fellow at the Max Planck Institute for Developmental Biology Tübingen and at the Department of Anatomy and Cell Biology, Washington University St.Louis
- Schilling-Foundation Professor for Clinical and Experimental Neurology, University of Tübingen
- Director at the Department of Neurology, University of Göttingen since 2001

Major Research Interests

Neuronal cell loss is not only a major feature of human neurodegenerative diseases like Parkinson's disease (PD), Alzheimer's disease (AD) or stroke, but can also be observed in neuroinflammatory conditions like Multiple Sclerosis (MS) or after traumatic lesions, e.g. of the optic nerve. We examine the cellular and molecular mechanisms of neuronal dysfunction and neuronal cell death in animal models of the respective disorders with the ultimate goal to detect new targets for a therapeutic neuroprotective intervention.
We have used for many years the retino-tectal system in rodents as our standard model to study de-and regeneration *in vitro* and *in vivo*. Our group has in detail analysed the cellular and molecular cascades that follow lesions of the optic nerve and ultimately lead to cell death of the retinal ganglion cells. To monitor the changes that occur directly after lesions we succeeded in implementing *in vivo* life-imaging of the rat and mouse optic nerve, which offers us a unique opportunity to study the complex processes that follow traumatic or inflammatory lesions of CNS fibre tracts.
In classical neurodegeneration research we have choosen PD as our topic. In this field, a multidisciplinary research team with our participation in the area C2 of the excellence cluster CNMPB examines the role of a-synuclein aggregation for dopaminergic dysfunction and cell death and characterizes other disease related proteins in order to develop new neuroprotective strategies.
In all our model systems we use AAV-mediated viral gene transfer to express different disease-or de-/regeneration associated genes as research tools and also as potential therapeutic factors to manipulate the respective molecular events *in vitro* and *in vivo*. To that end, we have e.g. developed regulatory elements that allow a controlled gene expression in complex *in vivo* models.
The final aim of our research approaches is to describe in detail the molecular pathophysiology that leads to axonal and neuronal loss and to develop new therapeutic strategies, some of which have already been translated into proof of concept studies in human patients.

Selected Recent Publications

Eckermann K, Kügler S, Bähr M. (2015) Dimerization propensities of Synucleins are not predictive for Synuclein aggregation. Biochim Biophys Acta 1852(8): 1658-64

Ribas VT, Schnepf B, Challagundla M, Koch JC, Bähr M, Lingor P (2015) Early and sustained activation of autophagy in degenerating axons after spinal cord injury. Brain Pathol. 25(2): 157-70

Kretzschmar B, Hein K, Moinfar Z, Könnecke B, Sättler MB, Hess H, Weissert R, Bähr M (2014) Treatment with atacicept enhances neuronal cell death in a rat model of optic neuritis. J Neuroimmunol. Mar 15;268(1-2): 58-63

Tereshchenko J, Maddalena A, Bähr M, Kügler S (2014) Pharmacologically controlled, discontinuous GDNF gene therapy restores motor function in a rat model of Parkinson's disease. Neurobiol Dis 65: 35-42

Doeppner TR, Kaltwasser B, Fengyan J, Hermann DM, Bähr M (2013) TAT-Hsp70 induces neuroprotection against stroke via anti-inflammatory actions providing appropriate cellular microenvironment for transplantation of neural precursor cells. J Cereb Blood Flow Metab. 33(11): 1778-88

Koch JC, Knöferle J, Tönges L, Michel U, Bähr M, Lingor P. (2011) Imaging of rat optic nerve axons *in vivo*. Nat Protoc. 3;6(12): 1887-96

Brück W, Bähr M, Lingor P (2010) Mechanisms of acute axonal degeneration in the optic nerve *in vivo*. Proc Natl Acad Sci U S A. 107(13): 6064-9

Address

Dept. of Molecular Psychiatry
University of Göttingen
Von-Siebold-Str. 5

37075 Göttingen
Germany

phone: + 49-551-39 22912
fax: + 49-551-39 10291
e-mail: tbayer@gwdg.de

Further Information

http://www.alzheimer-bayer.de/

Thomas Bayer

Professor of Molecular Psychiatry

- 1984 – 1989 Diploma in biology, University of Stuttgart and Whitney Lab Florida
- 1989 – 1993 PhD at the University of Cologne (PhD Thyssen Graduate School)
- 1993 Postdoctoral Research Fellow, University of Cologne, Cologne
- 1993 – 1997 Postdoctoral Research Fellow, Institute of Neuropathology, University of Bonn Medical Center, Bonn
- 1997 – 2002 Lab leader, Department of Psychiatry, University of Bonn Medical Center, Bonn
- 2002 – 2007 Head of Neurobiology Lab, University of Saarland Medical Center, Homburg
- 2004 Appointment to apl Professor at the University Medical Center Saarland
- 2007 – present University Professor in “Molecular Psychiatry” at the Georg-August-University Göttingen, University Medicine Göttingen
- 2006 – 2011 Coordinator of the European Commission funded International Alzheimer PhD School «Neurodegeneration in Alzheimer’s disease – mechanism, consequence and therapy»
- Personal tutor of the Studienstiftung at the Georg-August-University Göttingen

Major Research Interests

Pathogenesis of Alzheimer’s disease, neuronal cell death mechanisms, preclinical proof-of-concept studies; characterization and development of mouse models for Alzheimer’s disease (neuropathology, anatomy, biochemistry, behavioural tests), preclinical therapy studies in mouse models, blood and CSF biomarker analysis, coordination and design of a phase II clinical study with Alzheimer’s disease patients.

Selected Recent Publications

Bayer TA (2015) Proteinopathies, a core concept for understanding and ultimately treating degenerative disorders? European Neuropsychopharmacology 25: 713-724

Bayer TA, Wirths O (2014) Focusing the amyloid cascade hypothesis on N-truncated Abeta peptides as drug targets against Alzheimer’s disease. Acta Neuropathol 127(6): 787-801

Bouter Y, Kacprowski T, Weissmann R, Dietrich K, Borgers H, Brauß A, Sperling C, Wirths O, Albrecht M, Jensen LR, Kuss AW & Bayer TA (2014) Deciphering the molecular profile of plaques, memory decline and neuron-loss in two mouse models for Alzheimer’s disease by deep sequencing. Frontiers in Aging Neurosciences 6: 10.3389/fnagi.2014.00075

Bouter Y, Dietrich K, Wittnam JL, Rezaei-Ghaleh N, Pillot T, Papot-Couturier S, Lefebvre T, Sprenger F, Wirths O, Zweckstetter M, Bayer TA (2013) N-truncated amyloid β (Aβ) 4-42 forms stable aggregates and induces acute and long-lasting behavioral deficits. Acta Neuropathol 126(2): 189-205

Wirths O, Bayer TA (2012) Intraneuronal Ab accumulation and neurodegeneration: Lessons from transgenic models. Life Sciences 91: 1148-1152

Wittnam JL, Portelius E, Zetterberg H, Gustavsson MK, Schilling S, Koch B, Demuth H-U, Blennow K, Wirths O, Bayer TA (2012) Pyroglutamate Amyloid ß (Aß) Aggravates Behavioral Deficits in Transgenic Amyloid Mouse Model for Alzheimer Disease. J Biol Chem 287 (11): 8154-8162

Jawhar S, Wirths O, Schilling S, Graubner S, Demuth HU, Bayer TA (2011) Overexpression of glutaminyl cyclase, the enzyme responsible for pyroglutamate abeta formation, induces behavioral deficits and glutaminyl cyclase knock-out rescues the behavioral phenotype in 5XFAD mice. Journal of Biological Chemistry 286(6): 4454–4460

Address

Dept. of Sleep and Waking
Max Planck Institute for
Biophysical Chemistry
Am Fassberg 11

37077 Göttingen
Germany

phone: +49-551-201 1358
fax: +49-551-3899 715
e-mail: henrik.bringmann@
mpibpc.mpg.de

Further Information

http://www.mpibpc.
mpg.de/english/research/
ags/bringmann/

Henrik Bringmann

Max Planck Research Group Leader

- PhD at the Max Planck Institute for Cell Biology and Genetics, Dresden
- Postdoctoral fellow at the Laboratory of Molecular Biology, Cambrigde, UK
- Max Planck Research Group Leader since 2009

Major Research Interests

Sleep states occur in the life of every animal studied. While the function of waking is obvious, the function of sleep is unknown. Sleep has been suggested to serve a restorative function in the nervous system. Our lab is trying to understand the function and regulation of sleep by studying different model organisms. We have started our studies by looking at sleep in the larva of the nematode *Caenorhabditis elegans*, and are also working with mice.

We are combining behavioral assays with genetics and functional imaging. We recently found a single sleep-inducing neuron in *C. elegans* that is homologous to mammalian sleep neurons. This highly simplified sleep-inducing system in a tractable genetic model provides a great starting point to understand the regulation of sleep and to manipulate sleep in order to study the function of sleep.

Selected Recent Publications

Turek M, Lewandrowski IL, Bringmann H (2013) An AP2 transcription factor is required for a sleep-active neuron to induce sleep-like quiescence in *C. elegans*. Current Biology 23 (22): 2215-2223

Schwarz J, Lewandrowski IL, Bringmann H (2011) Reduced activity of a sensory neuron during a sleep-like state in *Caenorhabditis elegans*. Current Biology 21 (24): R983-R984

Redemann S, Schloissnig S, Ernst S, Pozniakowsky A, Ayloo S, Hyman AA, Bringmann H (2011) Codon adaptation-based control of protein expression in *C. elegans*. Nature Methods 8: 250-252

Address

Dept. of Molecular Neurobiology
Max Planck Institute for Experimental Medicine
Hermann-Rein-Str. 3

37075 Göttingen
Germany

phone: +49-551-3899 725
fax: +49-551-3899 715
e-mail: brose@em.mpg.de

Further Information

http://www.em.mpg.de/

Nils Brose

Professor, Director at the Max Planck Institute for Experimental Medicine

- Undergraduate studies in Biochemistry, Eberhard Karls University, Tübingen, Germany (1981 – 1985)
- MSc in Physiology with Marianne Fillenz, University of Oxford, Oxford, UK (1987)
- PhD in Biology with Reinhard Jahn, Ludwig Maximilians University, Munich, Germany (1990)
- Postdoctoral training with Stephen F. Heinemann (Salk Institute, La Jolla, CA, USA) and Thomas C. Südhof (University of Texas Southwestern Medical Center, Dallas, TX, USA) (1991 – 1995)
- Research Group Leader, Max Planck Institute of Experimental Medicine, Göttingen, Germany (1995 – 2001)
- Director, Department of Molecular Neurobiology, Max Planck Institute of Experimental Medicine, Göttingen, Germany (since 2001)

Major Research Interests

Research in the Department of Molecular Neurobiology focuses on the molecular mechanisms of nerve cell development and synapse formation and function in the vertebrate central nervous system. We combine biochemical, morphological, mouse genetic, behavioral, and physiological methods to elucidate the molecular basis of nerve cell differentiation, synapse formation and transmitter release processes. Our work in the field of nerve cell development focuses on the role of protein ubiqutination and SUMOylation in cell polarity formation, cell migration, and neuritogenesis. The synaptogenesis research in our group concentrates on synaptic cell adhesion proteins, their role in synapse formation, and their dysfunction in neuropsychiatric diseases. Studies on the molecular mechanisms of neurotransmitter release focus on components of the presynaptic active zone and their regulatory function in synaptic vesicle fusion.

Selected Recent Publications

Imig C, Min SW, Krinner S, Arancillo M, Rosenmund C, Südhof TC, Rhee J, Brose N*, Cooper BH* (2014) The morphological and molecular nature of synaptic vesicle priming at presynaptic active zones. Neuron 84: 416-431 (*joint corresponding authors)

Lipstein N, Sakaba T, Cooper BH, Lin K-H, Strenzke N, Ashery U, Rhee J-S, Taschenberger H, Neher E, Brose N (2013) Dynamic control of synaptic vesicle replenishment and short-term plasticity by Ca^{2+}-Calmodulin-Munc13-1 signaling. Neuron 79: 82-96

Tirard M, Hsiao H-H, Nikolov M, Urlaub H, Melchior F, Brose N (2012) *In vivo* localization and identification of SUMOylated proteins in the brain of His6-HA-SUMO1 knock-in mice. Proc Natl Acad Sci USA 109: 21122-21127

Kawabe H, Neeb A, Dimova K, Young SM Jr, Takeda M, Katsurabayashi S, Mitkovski M, Malakhova OA, Zhang D-E, Umikawa M, Kariya K, Goebbels S, Nave K-A, Rosenmund C, Jahn O, Rhee J-S, Brose N (2010) Regulation of Rap2A by the ubiquitin ligase Nedd4-1 controls neurite development in cortical neurons. Neuron 65: 358-372

Jamain S, Radyushkin K, Hammerschmidt K, Granon S, Boretius S, Varoqueaux F, Ramanantsoa N, Gallego J, Ronnenberg A, Winter D, Frahm J, Fischer J, Bourgeron T, Ehrenreich H, Brose N (2008) Reduced social interaction and ultrasonic communication in a mouse model of monogenic heritable autism. Proc Natl Acad Sci USA 105: 1710-1715

Jockusch W, Speidel D, Sigler A, Sørensen J, Varoqueaux F, Rhee J-S, Brose N (2007) CAPS-1 and CAPS-2 are essential synaptic vesicle priming proteins. Cell 131: 796-808

Address

Department of
Neuropathology
University of Göttingen
Robert-Koch-Str. 40

37075 Göttingen
Germany

phone: + 49-551-39 22700
fax: + 49-551-39 8472
e-mail: wbrueck@med.uni-goettingen.de

Further Information

http://www.uni-goettingen.de/en/57922.html

Wolfgang Brück

Professor of Neuropathology

- 1986 MD Johannes Gutenberg University in Mainz, 1994 national boards in neuropathology
- 1996 – 2002 Associate professorships for neuropathology at the University of Göttingen and the Charité in Berlin
- Since 2002 full professor and director of the Department of Neuropathology, University of Göttingen

Major Research Interests

- Immunopathology of multiple sclerosis
- Brain-specific mechanisms of immune response in multiple sclerosis
- Axonal damage in inflammatory demyelination and mechanisms of remyelination
- Mechanisms and consequences of microglial activation

Selected Recent Publications

Pfeifenbring S, Bunyan RF, Metz I, Röver C, Huppke P, Gärtner J, Lucchinetti CF, Brück W (2015) Extensive acute axonal damage in pediatric multiple sclerosis lesions. Ann. Neurol., 77: 655-667

Metz I, Weigand SD, Popescu BF, Frischer JM, Parisi JE, Guo Y, Lassmann H, Brück W*, Lucchinetti CF* (2014) Pathologic heterogeneity persists in early active multiple sclerosis lesions. Ann Neurol 75: 728-738

Rodriguez EG, Wegner C, Kreutzfeldt M, Neid K, Thal DR, Jürgens T, Brück W, Stadelmann C, Merkler D (2014) Oligodendroglia in cortical multiple sclerosis lesions decrease with disease progression, but regenerate after repeated experimental demyelination. Acta Neuropathol Feb 25. [Epub ahead of print]

Brück W, Gold R, Lund BT, Oreja-Guevara C, Prat A, Spencer CM, Steinman L, Tintoré M, Vollmer TL, Weber MS, Weiner LP, Ziemssen T, Zamvil SS (2013) Therapeutic decisions in multiple sclerosis: moving beyond efficacy. JAMA Neurol 70: 1315-1324

Singh S, Metz I, Amor S, van der Valk P, Stadelmann C, Brück W (2013) Microglial nodules in early multiple sclerosis white matter are associated with degenerating axons. Acta Neuropathol 125: 595-608

Brück W, Popescu B, Lucchinetti CF, Markovic-Plese S, Gold R, Thal DR, Metz I (2012) Neuromyelitis optica lesions may inform multiple sclerosis heterogeneity debate. Ann Neurol 72: 385-394

Filippi M, Rocca MA, Barkhof F, Brück W, Chen JT, Comi G, Deluca G, De Stefano N, Erickson BJ, Evangelou N, Fazekas F, Geurts JJ, Lucchinetti C, Miller DH, Pelletier D, Popescu BF, Lassmann H (2012); for the Attendees of the Correlation between Pathological MRI findings in MS workshop.Association between pathological and MRI findings in multiple sclerosis. Lancet Neurol 11: 349-360

Manrique-Hoyos N, Jürgens T, Grønborg M, Kreutzfeldt M, Schedensack M, Kuhlmann T, Schrick C, Brück W, Urlaub H, Simons M, Merkler D (2012) Late motor decline after accomplished remyelination: Impact for progressive multiple sclerosis. Ann Neurol 71: 227-244

Metz I, Radue EW, Oterino A, Kümpfel T, Wiendl H, Schippling S, Kuhle J, Sahraian MA, Gray F, Jakl V, Häusler D,. Brück W (2012) Pathology of immune reconstitution inflammatory syndrome in multiple sclerosis with natalizumab-associated progressive multifocal leukoencephalopathy. Acta Neuropathol 123: 235-245

Lucchinetti CF, Popescu BF, Bunyan RF, Moll NM, Roemer SF, Lassmann H, Brück W, Parisi JE, Scheithauer BW, Giannini C, Weigand SD, Mandrekar J, Ransohoff RM (2011) Inflammatory cortical demyelination in early multiple sclerosis. N Engl J Med 365: 2188-2197

Address

European Neuroscience Institute
Grisebachstr. 5

37077 Göttingen
Germany

phone: +49-551-39 13903
fax: +49-551-39 20150
e-mail: c.dean@eni-g.de

Further Information

http://www.eni.gwdg.de/index.php?id=324

Camin Dean

Group Leader Trans-synaptic Signaling

- 2003: Ph.D. University of California, Berkeley, and Columbia University
- 2004 – 2010: Postdoctoral Fellow, University of Wisconsin, Madison
- since 2010: Group Leader, European Neuroscience Institute Göttingen

Major Research Interests

Our lab is interested in the mechanisms by which individual synapses, neurons and circuits dynamically adjust their transmission properties in response to changes in neuronal network activity. To accomplish this, neurons signal to each other not only unidirectionally via classical pre to post-synaptic transmission, but also bidirectionally via pre or post-synaptic release of neuropeptides and neurotrophins. This bidirectional channel of communication is essential for the modulation of synapse and circuit strength, via regulation of distinct membrane fusion events on both sides of the synapse, including synaptic vesicle exocytosis, post-synaptic receptor recycling, and adhesion molecule recycling. We investigate the mechanisms by which these trans-synaptic signaling events are regulated, at the level of single synapses, single neurons and neuronal networks, using a combination of live imaging approaches, electrophysiology, and biochemistry in neuronal cell culture and brain slices. Our overall goal is to understand how neurons communicate changes in activity to affect circuit function, and ultimately behavior, during learning and memory acquisition, or to counteract aberrant brain states such as seizure activity.

Selected Recent Publications

Zhang G, Bai H, Zhang H, Dean C, Wu Q, Li J, Guariglia S, Meng Q, Cai D (2011) Neuropeptide exocytosis involving synaptotagmin-4 and oxytocin in hypothalamic programming of body weight and energy balance. Neuron 69(3): 523-35

Lee H, Dean C, Isacoff E (2010) Alternative splicing of neuroligin regulates the rate of presynaptic differentiation. J Neurosci 30(34): 11435-46

Arthur CP, Dean C, Pagratis M, Chapman ER, Stowell MH (2010) Loss of synaptotagmin IV results in a reduction in synaptic vesicles and a distortion of the Golgi structure in cultured hippocampal neurons. Neuroscience 167(1): 135-42

Dean C, Scheiffele P (2009) Imaging synaptogenesis by measuring accumulation of synaptic proteins. In Imaging in Developmental Biology: A Laboratory Manual. Cold Spring Harbor Protocols. R. Wong, J. Sharpe and R. Yuste eds. (11): pdb.prot5315

Liu, H, Dean, C, Arthur, CP, Dong, M, Chapman, ER (2009) Autapses and networks of hippocampal neurons exhibit distinct synaptic transmission phenotypes in the absence of synaptotagmin I. J. Neurosci 29(23): 7395-403

Dean C, Liu H, Dunning FM, Chang PY, Jackson, MB, Chapman, ER (2009) Synaptotagmin-IV modulates synaptic function and LTP by regulating BDNF release. Nature Neurosci (6): 767-76

Zhang Z, Bhalla A, Dean C, Chapman ER, Jackson MB (2009) Synaptotagmin IV: a multifunctional regulator of peptidergic nerve terminals. Nat. Neurosci 12(2): 163-71

Dong M, Yeh F, Tepp WH, Dean C, Johnson EA, Janz R, Chapman ER (2006) SV2 is the protein receptor for botulinum neurotoxin A. Science 312(5773): 592-6

Dean C, Dresbach T. Neuroligins and neurexins: linking cell adhesion, synapse formation and cognitive function (2006) Trends Neurosci 29(1): 21-9. Review

Baksh MM, Dean C, Pautot S, Demaria S, Isacoff E, Groves JT (2005) Neuronal activation by GPI-linked neuroligin-1 displayed in synthetic lipid bilayer membranes. Langmuir 21(23): 10693-8

Dean, C, Scheiffele, P (2004) Imaging synaptogenesis by measuring accumulation of synaptic proteins in transfected neurons. In Imaging in Neuroscience and Development, R. Yuste & A. Konnerth eds.

Address

Center of Anatomy
Dept. of Anatomy and Embryology
University of Göttingen
Kreuzbergring 36

37075 Göttingen
Germany

phone: + 49-551-39 7004
fax: + 49-551-39 7043
e-mail: thomas.dresbach@med.uni-goettingen.de

Further Information

http://www.embryologie.uni-goettingen.de/select.php?lang=en&nav=for&p=thomas.dresbach

Thomas Dresbach

Professor of Anatomy

- Dr. rer. nat. (Biology), 1996, University of Bonn
- DFG research fellow and postdoctoral Fellow with E. Gundelfinger at the Leibniz Institute for Neurobiology, 1997 – 2003
- Teacher and independent research group leader at the University of Heidelberg, Institute for Anatomy and Cell Biology (Dept. Prof. Dr. J. Kirsch), 2003 – 2010
- Professor at the School of Medicine, University of Göttingen, 2010

Major Research Interests

Our group studies synapse formation with particular focus on the biogenesis of presynaptic nerve terminals. Our goal is to understand the mechanisms of synaptogenesis in enough detail to pinpoint molecular causes of synaptopathies. We study neuronal cultures to unravel fundamental mechanisms operating at the heart of synaptogenesis, and we have begun to study specialized synapses such as the giant synapses of the mammalian auditory system to determine how these mechanisms act together to generate the remarkable specification and heterogeneity of synapses in the brain.
Using live imaging, molecular biological and ultrastructural approaches, we currently analyze
- the role of novel, vertebrate-specific presynaptic proteins in synaptic function
- the trafficking and assembly of synaptic organelles and protein complexes
- the transsynaptic signalling events controlling presynaptic differentiation.
These efforts should help us understand both the common principles by which the various types of synapses are generated, and how they are fine-tuned for specific tasks, such as a particular strength, reliability or adaptivity.

Selected Recent Publications

Stan A, Pielarski K N, Brigadski T, Wittenmayer N, Fedorchenko O, Gohla A, Lessmann V, Dresbach T, Gottmann K (2010) Essential co-operation of N-Cadherin and Neuroligin-1 in the transsynaptic control of vesicle accumulation. Proc Natl Acad Sci U S A 107: 11116-21

Wittenmayer N, Korber C, Liu H, Kremer T, Varoqueaux F, Chapman ER, Brose N, Kuner T, Dresbach T (2009) Postsynaptic Neuroligin1 regulates presynaptic maturation. Proc Natl Acad Sci U S A 106: 13564-13569

Fairless R, Masius H, Rohlmann A, Heupel K, Ahmad M, Reissner C, Dresbach T, Missler M (2008) Polarized targeting of neurexins to synapses is regulated by their C-terminal sequences. J Neurosci 28: 12969-12981

Tsuriel S, Fischer A, Wittenmayer N, Dresbach T, Garner CC, Ziv NE (2008) Exchange and redistribution dynamics of the cytoskeleton of the active zone molecule Bassoon. J Neurosci 29: 351-358

Kremer T, Kempf C, Wittenmayer N, Nawrotzki R, Kuner T, Kirsch J, Dresbach T (2007) Mover is a novel vertebrate-specific presynaptic protein with differential distribution at subsets of CNS synapses. FEBS Lett 581: 4727-4733

Dresbach T, Torres V, Wittenmayer N, Altrock WD, Zamorano P, Zuschratter W, Nawrotzki R, Ziv NE, Garner CC, Gundelfinger ED (2006) Assembly of active zone precursor vesicles: obligatory trafficking of presynaptic cytomatrix proteins Bassoon and Piccolo via a trans-Golgi compartment. J Biol Chem 281: 6038-6047

Gutenberg A, Buslei R, Fahlbusch R, Buchfelder M, Brück W (2005) Immunopathology of primary hypophysitis: implications for pathogenesis. Am J Surg Pathol 29: 329-38

Address

Max Planck Institute
of Experimental Medicine
Clinical Neuroscience
Hermann-Rein-Str. 3

37075 Göttingen
Germany

phone: + 49-551-3899 615
fax: + 49-551-3899 670
e-mail: ehrenreich
@em.mpg.de

Further Information

http://www.em.mpg.de/site/index.php?id=36

Hannelore Ehrenreich

Professor of Neurology and Psychiatry

- 1981 Doctor of Veterinary Medicine, University of Munich
- 1983 Elective Period, University of Newcastle-upon-Tyne, England
- 1985 Guest Lecturer, University of the Philippines, Manila
- 1985 – 1986 Clinical Fellow, Department of Internal Medicine, University of Munich
- 1987 Graduation (Medicine), University of Munich
- 1987 – 1988 Residency, Department of Neurology, University of Munich
- 1989 Doctor of Medicine, University of Munich
- 1989 – 1991 Postdoctoral Fellow NIAID, NIH, Bethesda, MD, USA
- 1992 – 1994 Residency, Departments of Neurology and Psychiatry, University of Göttingen
- 1994 Habilitation (Neurology and Psychiatry)
- 1994 – present Head, Clinical Neuroscience, MPIEM
- 1995 – present Consultant & Professor of Neurology & Psychiatry, University of Göttingen
- 2000 – 2002 Vice President, University of Göttingen
- 2008 Adjunct Professor of Biology and Psychology, University of Göttingen

Major Research Interests

Translational Neuroscience
(1) Molecular-cellular basis of neuropsychiatric diseases with focus on mechanisms of disease and on endogenous neuroprotection/neuroregeneration (erythropoietin/EPO variants)
(2) Preclinical and clinical research on neuroprotection/neuroregeneration in acute (ischemia/hypoxia, neurotrauma) and chronic diseases (schizophrenia, autism, MS, alcoholism)
(3) Phenotype-based genetic association studies (PGAS) as a tool to understand the genotype contribution to (disease) phenotypes

Selected Recent Publications

Schizophrenia Working Group of the Psychiatric Genomics Consortium. Biological insights from 108 schizophrenia-associated genetic loci. Nature doi: 10.1038/nature13595. Epub 2014. IF 42.351

Dahm L, Ott C, Steiner J, Stepniak B, Teegen B, Saschenbrecker S, Hammer C, Borowski K, Begemann M, Lemke S, Rentzsch K, Probst C, Martens H, Wienands J, Spalletta G, Weissenborn K, Stöcker W, Ehrenreich H. (2014) Seroprevalence of autoantibodies against brain antigens in health and disease. Annals of Neurology. doi: 10.1002/ana.24189. IF 11.91

Hammer C, Stepniak B, Schneider A, Papiol S, Tantra M, Begemann M, Sirén AL, Pardo LA, Sperling S, Mohd Jofrry S, Gurvich A, Jensen N, Ostmeier K, Lühder F, Probst C, Martens H, Gillis M, Saher G, Assogna F, Spalletta G, Stöcker W, Schulz TF, Nave KA, Ehrenreich H. (2013) Neuropsychiatric disease relevance of circulating anti-NMDA receptor autoantibodies depends on blood-brain barrier integrity. Mol Psychiatry. 2014 Oct;19(10): 1143-9. doi: 10.1038/mp.2013.110. Epub 2013 Sep 3

Hagemeyer N, Goebbels S, Papiol S, Kästner A, Hofer S, Begemann M, Gerwig UC, Boretius S, Wieser GL, Ronnenberg A, Gurvich A, Heckers SH, Frahm J, Nave KA, Ehrenreich H (2012) A myelin gene causative of a catatonia-depression syndrome upon aging. EMBO Molecular Medicine 4: 528-39. IF 9.390

Wüstenberg T, Begemann M, Bartels C, Gefeller O, Stawicki S, Hinze-Selch D, Mohr A, Falkai P, Aldenhoff JB, Knauth M, Nave KA, Ehrenreich H (2011) Recombinant human erythropoietin delays loss of gray matter in chronic schizophrenia. Molecular Psychiatry16: 26-36. IF 14.897

Address

Dept. of Genes and Behaviour
Max Planck Institute for Biophysical Chemistry
Am Fassberg 11

37077 Göttingen
Germany

phone: +49-551-201 2701
fax: +49-551-201 2705
e-mail: gregor.eichele@mpibpc.mpg.de

Further Information

http://www.genesandbehavior.org/

Gregor Eichele

Professor, Director at the Max Planck Institute for Biophysical Chemistry

- 1976 – 1980 Ph.D. protein crystallography (J. N. Jansonius, Biocenter, University of Basel, Switzerland)
- 1981 – 1984 Postdoctoral training in Developmental Biology (B. M. Alberts, University of California, San Francisco)
- 1985 – 1989 Assistant Professor of Cellular and Molecular Physiology, Harvard Medical School, Boston, USA
- 1989 – 1990 Associate Professor of Cellular and Molecular Physiology, Harvard Medical School, Boston, USA
- 1991 – 1992 Associate Professor of Biochemistry, Baylor College of Medicine, Houston, USA
- 1992 – 1998 Professor of Biochemistry and Neuroscience, Baylor College of Medicine, Houston, USA
- 1998 – 2006 Director at the Max Planck Institute of Experimental Endocrinology, Dept. of Molecular Embryology, Hanover, Germany
- 2006 – Director at the Max Planck Institute of Biophysical Chemistry, Dept. Genes and Behavior, Goettingen, Germany

Major Research Interests

Dynamic interplay between gene expression, brain development and architecture and behaviour.

Selected Recent Publications

Whelan G, Kreidl E, Wutz G, Egner A, Peters JM, Eichele G (2011) Cohesin acetyltransferase Esco2 is a cell viability factor and is required for cohesion in pericentric heterochromatin. EMBO J 2012 Jan 4;31(1): 71-82. doi: 10.1038/emboj.2011.381. Epub 2011 Nov 18

Lein, E.S. et al. (2007). Genome-Wide Atlas of Gene Expression in the Adult Mouse Brain. Nature 445: 168-176

Jakubcakova, V., Oster, H., Tamanini, F., Cadenas, C., Leitges, M., van der Horst, G.T., Eichele, G. (2007). Light entrainment of the mammalian circadian clock by a PRKCA-dependent posttranslational mechanism. Neuron 54: 831-43

Oster, H., Damerow, S., Kiessling, S., Jakubcakova, V., Abraham, D., Tian, J., Hoffmann, M. W., and Eichele, G. (2006). The circadian rhythm of glucocorticoids is regulated by a gating mechanism residing in the adrenal cortical clock. Cell Metabolism 4:163-173

Carson, J.P., Ju, T., Lu, H.C., Thaller, C., Xu, M., Pallas, S.L., Crair, M.C., Warren, J., Chiu, W. and Eichele, G. (2005). A Digital Atlas to characterize the mouse brain transcriptome. PLoS Comput Biol 1: 289-296

Zheng, B., Albrecht, U., Kaasik, K., Sage, M., Lu, W., Vaishnav, S., Li, Q., Su, Z. S., Eichele, G., Bradley, A., and Lee, C. C. (2001). Nonredundant roles of the mPer1 and mPer2 genes in the mammalian circadian clock. Cell 105: 683-694

Address

Dept. of Molecular
Neurobiology of Behavior
Schwann-Schleiden
Research Centre
Julia-Lermontowa-Weg 3

37077 Göttingen
Germany

phone: +49-551-39 177920
fax: +49-551-39 177921
e-mail: afiala@gwdg.de

Further Information

http://www.uni-goettingen.de/de/111890.html

André Fiala

Professor of Molecular Neurobiology of Behavior

- 1996 Degree (Diploma) in Biology, Free University of Berlin
- 1996 – 1999 PhD student, Free University of Berlin
- 2000 – 2001 Research Fellow, Memorial Sloan-Kettering Cancer Center, New York
- 2001 – 2008 Research Assistant, University of Würzburg
- 2008 Habilitation in Neurobiology and Genetics, University of Würzburg
- 2008 Professor of Molecular Neurobiology of Behavior, University of Göttingen

Major Research Interests

We study neuronal mechanisms underlying olfaction, learning and memory, and goal-directed behavior using the model organism Drosophila melanogaster. The fruit fly *Drosophila* offers the advantage of expressing transgenes in almost any population of it's about 100.000 neurons. Transgenes used by us are, for example, fluorescent sensor proteins that allow us to monitor the spatio-temporal activity of neurons, or light-sensitive proteins by which neuronal activity can be stimulated through illumination. Using these optogenetic techniques in combination with behavioral analyses we aim at unraveling the functioning of dedicated neuronal circuits, and how these circuits contribute to organizing behavior. In addition, molecular mechanisms underlying learning and memory processes are investigated.

Selected Recent Publications

Pech U, Revelo NH, Seitz KJ, Rizzoli SO, Fiala A (2015). Optical dissection of experience-dependent pre- and postsynaptic plasticity in the *Drosophila* brain. Cell Rep 10: 2083-95

AzimiHashemi N, Erbguth K, Vogt A, Riemensperger T, Rauch E, Woodmansee D, Nagpal J, Brauner M, Sheves M, Fiala A, Kattner L, Trauner D, Hegemann P, Gottschalk A, Liewald JF (2014). Synthetic retinal analogues modify the spectral and kinetic characteristics of microbial rhodopsin optogenetic tools. Nat Commun 5: 5810

Andlauer TF, Scholz-Kornehl S, Tian R, Kirchner M, Babikir HA, Depner H, Loll B, Quentin C, Gupta VK, Holt MG, Dipt S, Cressy M, Wahl MC, Fiala A, Selbach M, Schwarzel M, Sigrist SJ (2014). Drep-2 is a novel synaptic protein important for learning and memory. Elife 2014 Nov 13;3. doi: 10.7554/eLife.03895

Dawydow A, Gueta R, Ljaschenko D, Ullrich S, Hermann M, Ehmann N, Gao S, Fiala A, Langenhan T, Nagel G, Kittel RJ (2014). Channelrhodopsin-2-XXL, a powerful optogenetic tool for low-light applications. Proc Natl Acad Sci U S A 111: 13972-7

Vasmer D, Pooryasin A, Riemensperger T, Fiala A (2014). Induction of aversive learning through thermogenetic activation of Kenyon cell ensembles in *Drosophila*. Front Behav Neurosci 8: 174

Barth J, Dipt S, Pech U, Hermann M, Riemensperger T, Fiala A (2014). Differential associative training enhances olfactory acuity in *Drosophila melanogaster*. J Neurosci 34: 1819-37

Gupta VK, Scheunemann L, Eisenberg T, Mertel S, Bhukel A, Koemans TS, Kramer JM, Liu KS, Schroeder S, Stunnenberg HG, Sinner F, Magnes C, Pieber TR, Dipt S, Fiala A, Schenck A, Schwaerzel M, Madeo F, Sigrist SJ (2013). Restoring polyamines protects from age-induced memory impairment in an autophagy-dependent manner. Nat Neurosci 16: 1452-60

Pech U, Dipt S, Barth J, Singh P, Jauch M, Thum AS, Fiala A, Riemensperger T (2013). Mushroom body miscellanea: transgenic *Drosophila* strains expressing anatomical and physiological sensor proteins in Kenyon cells. Front Neural Circuits 7: 147

Address

Dept. for Psychiatry and Psychotherapy
University Medical Center
German Center for Neurodegenerative Diseases (DZNE)
Grisebachstr. 5

37077 Göttingen
Germany

phone: +49-551-39 10378
fax: +49-551-39 9836
e-mail: afische2@gwdg.de

Further Information

http://fischerlab.uni-goettingen.de/index.php

André Fischer

Professor for Psychiatry and Psychotherapy

- 2003 – 2006: Postdoctoral Associate in the lab of Li-Huei Tsai; Harvard Medical School, Department of Pathology, Boston, USA; Picower Center for Learning and Memory, M.I.T, Cambridge, USA
- 2007 – 2011: Independent Group Leader at ENI
- since 2011: W3 Professor at the Department for Psychiatry and Psychotherapy, University Medical Center Göttingen
- since 2011: Speaker of the German Center for Neurodegenerative Diseases (DZNE) site Göttingen

Major Research Interests

The long-term goal of our research is to understand the cellular and molecular mechanisms underlying brain diseases and to develop neuroprotective and neurodegenerative therapeutic approaches. There is now accumulating evidence that on an individual level health or disease critically depends on the interaction between genes and environment. Epigenetic mechanisms such as histone-modification, DNA-methylation and non-coding RNA-mediated processes are key-regulators of gene-environment interactions. Importantly, such epigenetic mechanisms have recently been implicated with the pathogenesis of neurodegenerative and psychiatric diseases. Thus our current hypothesis is that deregualtion of genome-environment interactions, especially via epigenetic gene-expression, is a key feature of neurodegenerative diseases such as Alzheimer's disease. We combine studies in patient material, mouse and cellular models, behavioral, molecular, genetic, and bioinformatic techniques to address these questions.

Selected Recent Publications

Stilling R, et al. Fischer A (2014) K-Lysine acetlytransferase 2A regualtes a hippocampal gene-expression network linked to memory formation. EMBO J 2014, Epub ahead of print

Kerimoglu C, et al. Fischer A (2013) Histone-methyltransferase MLL2 (kmt2b) is required for memory formation in mice. J Neurosci 33,8: 3452-3464

Govindarajan N, et al. Fischer A (2013) Reducing HDAC6 ameliorates cognitive deficits in a mouse model for Alzheimer?s disease. EMBO Molecular Medicine, 2013 do10.1002/emmm.201201923. [Epub ahead of print]

Zovoilis A, et al. Fischer A (2011) microRNA-34c is a novel target to treat dementias. EMBO J 2011 Sep 23;30(20): 4299-308. doi: 10.1038/emboj.2011.32

Agis-Balboa RC, et al. Fischer A (2011) A hippocampal insulin-growth factor 2 pathway regulates the extinction of fear memories. EMBO J 2011 Aug 26;30(19): 4071-83. doi: 10.1038/emboj.2011.293

Peleg, S, et al. Fischer A (2010) Altered histone H4 lysine 12 acetylation is associated with age-dependent memory impairment in mice. Science 328: 753

Fischer A, Sananbenesi F, Wang X, Dobbin M, Tsai LH (2007) Recovery of learning and memory is associated with chromatin remodeling. Nature 447: 178-82 (AF is corresponding author)

Address

Institute for Multiple Sclerosis Research
Dept. of Neuroimmunology
Waldweg 33

37073 Göttingen
Germany

phone: +49-551-39 13332
fax: +49-551-39 13348
e-mail: fluegel@med.uni-goettingen.de

Further Information

http://www.neuroimmunologie.uni-goettingen.de/

Alexander Flügel

Professor of Neuroimmunology

- 1993 MD Ludwig-Maximilians-University (LMU) Munich
- 2002 – 2007 Group leader at the Institute of Neuroimmunology, Max-Planck-Institute for Neurobiology, Martinsried, Munich
- 2008 Associate professor for Experimental Immunology at the Institute for Immunology, LMU Munich
- since 12/2008 Full professor and director of the Department of Neuroimmunology / Institute for Multiple Sclerosis Research, University of Göttingen

Major Research Interests

- Neuroimmunology
- T cell biology
- Intravital imaging

The focus of my interest lies on the mechanisms and factors that allow T cells to enter the central nervous system, to communicate in this milieu and to influence the brain tissue.
My colleagues and I pursue the following aims, i) development of new models and tools to study CNS autoimmunity; ii) revealing the basics of pathogenesis in (auto-)immune diseases of the nervous system; iii) deducing and developing new therapeutical approaches; and iv) analyzing the mechanisms of action for (adverse) effects of new therapeutical procedures.

Selected Recent Publications

Cordiglieri C, Odoardi F, Zhang B, Nebel M, Kawakami N, Klinkert WE, Lodygin D, Lühder F, Breunig E, Schild D, Ulaganathan VK, Dornmair K, Dammermann W, Potter BV, Guse AH, Flügel A (2010) Nicotinic acid adenine dinucleotide phosphate-mediated calcium signalling in effector T cells regulates autoimmunity of the central nervous system. Brain 133: 1930-1943

Bartholomäus I, Kawakami N, Odoardi F, Schläger C, Miljkovic D, Ellwart JW, Klinkert WE, Flugel-Koch C, Issekutz TB, Wekerle H, Flügel A (2009) Effector T cell interactions with meningeal vascular structures in nascent autoimmune CNS lesions. Nature 462: 94-98

Dammermann W, Zhang B, Nebel M, Cordiglieri C, Odoardi F, Kirchberger T, Kawakami N, Dowden J, Schmid F, Dornmair K, Hohenegger M, Flügel A*, Guse AH*, Potter BV* (2009) NAADP-mediated Ca^{2+} signaling via type 1 ryanodine receptor in T cells revealed by a synthetic NAADP antagonist. Proc Natl Acad Sci USA 106: 10678-10683

Odoardi F, Kawakami N, Klinkert WE, Wekerle H, Flügel A (2007) Blood-borne soluble protein antigen intensifies T cell activation in autoimmune CNS lesions and exacerbates clinical disease. Proc Natl Acad Sci USA 104: 18625-18630

Odoardi F, Kawakami N, Li Z, Cordiglieri C, Streyl K, Nosov M, Klinkert WE, Ellwart JW, Bauer J, Lassmann H, Wekerle H, Flügel A (2007) Instant effect of soluble antigen on effector T cells in peripheral immune organs during immunotherapy of autoimmune encephalomyelitis. Proc Natl Acad Sci USA 104: 920-925

Kawakami N, Nägerl UV, Odoardi F, Bonhoeffer T, Wekerle H, A. Flügel A. (2005) Live imaging of effector cell trafficking and autoantigen recognition within the unfolding autoimmune encephalomyelitis lesion. Journal of Experimental Medicine 201(11): 1805-14

Address

Biomedical NMR Research
Max Planck Institute
for Biophysical Chemistry
Am Fassberg 11

37077 Göttingen
Germany

phone: +49-551-201 1721
fax: +49-551-201 1307
e-mail: jfrahm@gwdg.de

Further Information

http://www.biomednmr.mpg.de/

Jens Frahm

Professor, Director at the Max Planck Institute for Biophysical Chemistry, Biomedizinische NMR Forschungs GmbH (not-for profit)

- 1974 Diploma in Physics, Univ. of Göttingen
- 1977 Doctorate in Physical Chemistry, Univ. of Göttingen
- 1977 – 1982 Postdoctoral Researcher, MPI for Biophysical Chemistry
- 1982 – 1992 Head, Independent Research Group 'Biomedizinische NMR' (BMFT grant)
- since 1993 Director, Biomedizinische NMR Forschungs GmbH (not-for-profit, based on group's patents)
- 1994 Habilitation, Faculty of Chemistry, Univ. of Göttingen
- since 1997 Adjunct Professor, Faculty of Chemistry, Univ. of Göttingen
- since 2011 External Scientific Member, MPI for Dynamic and Self-Organization

Major Research Interests

- Development and biomedical applications of magnetic resonance imaging (MRI): noninvasive studies of structure and function at the system level (animals and humans)
- Methodology: non-Cartesian MRI, parallel MRI, numerical reconstruction techniques, real-time MRI, cardiovascular MRI
- Human neuroscience: functional neuroimaging, neuro-feedback, fiber tractography
- Animal studies: models of human brain disorders, nonhuman primates, genetically modified mice

Selected Recent Publications

Zhang S, Joseph AA, Voit D, Schaetz S, Merboldt KD, Unterberg-Buchwald C, Hennemuth A, Lotz J, Frahm J (2014) Real-time MRI of cardiac function and flow ? Recent progress. Quant Imaging Med Surg, doi: 10.3978/j.issn.2223-4292.2014.06.03

Schweizer R, Helms G, Frahm J. (2014) Revisiting a historic human brain with magnetic resonance imaging ? the first description of a divided central sulcus. Front Neuroanat 8, doi: 10.3389/fnana.2014.00035

Watanabe T, Frahm J, Michaelis T (2014) Reduced intracellular mobility underlies manganese relaxivity in mouse brain *in vivo*: MRI at 2.35 and 9.4 T. Brain Struct Funct, doi: 10.1007/s00429-014-0742-8

Quodbach J, Moussavi A, Tammer R, Frahm J, Kleinebudde P (2014) Tablet disintegration studied by high-resolution real-time MRI. J Pharma Sci 103: 249-255

Frahm J, Schätz S, Untenberger M, Zhang S, Voit D, Merboldt KD, Sohns JM, Lotz J, Uecker M (2014) On the temporal fidelity of nonlinear inverse reconstructions for real-time MRI ? The motion challenge. The Open Med Imaging J 8: 1-7

Joseph AA, Kowallick JT, Merboldt KD, Voit D, Schaetz S, Zhang S, Sohns JM, Lotz J, Frahm J (2014) Real-time flow MRI of the aorta at a resolution of 40 ms. J Magn Reson Imaging 40: 206-213

Address

Dept. of Medical Statistics
University of Göttingen
Humboldtallee 32

37073 Göttingen
Germany

phone: +49-551-39 4990
fax: +49-551-39 4995
e-mail: tim.friede@med.uni-goettingen.de

Further Information

http://www.ams.med.uni-goettingen.de/index-en.shtml

Tim Friede

Professor of Biostatistics

- 1998 Dipl.-Math. (Master's degree in Mathematics), University of Karlsruhe, Germany
- 2001 Dr .sc. hum. (PhD), University of Heidelberg, Germany
- 2001 – 2004 PostDoc / lecturer, Dept. of Mathematics and Statistics, Lancaster University, UK
- 2004 – 2006 Expert Statistical Methodologist, Novartis Pharma AG, Basel, Switzerland
- 2006 – 2009 Associate Professor of Medical Statistics, University of Warwick, UK
- since 1/2010 Professor of Biostatistics and Director, Dept. of Medical Statistics, University Medical Center Göttingen

Major Research Interests

Clinical biostatistics including designs for clinical trials (in particular flexible adaptive designs) and systematic reviews / meta-analyses

Selected Recent Publications

Stellmann JP, Stürner KH, Young KL, Siemonsen S, Friede T, Heesen C (2015) Regression to the mean and predictors of MRI disease activity in RRMS placebo cohorts - is there a place for baseline-to-treatment studies in MS? PLoS ONE 10(2): e0116559. doi:10.1371/journal.pone.0116559

Schmidt C, Gerlach N, Peter C, Gherib K, Lange K, Friede T, Zerr I (2015) CSF Apolipoprotein E concentration and progression of Alzheimer's Disease. Journal of Alzheimer's Disease 43(4): 1229-1236

Huppke B, Ellenberger D, Rosewich H, Friede T, Gärtner J, Huppke P (2014) Clinical presentation of pediatric multiple sclerosis before puberty. European Journal of Neurology 2: 441-446

Schmidt C, Wolff M, von Ahsen N, Lange K, Friede T, Zerr I (2014) CR1 is potentially associated with rate of decline in sporadic Alzheimer's disease. Journal of Clinical Neuroscience (in press)

Schmidt C, Becker H, Peter C, Lange K, Friede T, Zerr I (2014) Plasma prion protein concentration and progression of Alzheimer's disease. Prion (in press)

Schmidt C, Gerlach N, Peter C, Gherib K, Lange K, Friede T, Zerr I (2014) CSF Apolipoprotein E concentration and progression of Alzheimer's Disease. Journal of Alzheimer's Disease (in press)

Mollenhauer B, Trautmann E, Sixel-Döring F, Wicke T, Ebentheuer J, Schaumburg M, Lang E, Focke NK, Kumar K, Lohmann K, Klein C, Schlossmacher M, Kohnen R, Friede T, Trenkwalder C (2013) Non-motor and diagnostic findings in *de novo* Parkinson's disease subjects of the DeNoPa cohort. Neurology (in press).

Steinvorth SM, Röver C, Schneider S, Nicholas R, Straube S, Friede T (2013) Explaining temporal trends in annualized relapse rates in placebo groups of randomized controlled trials in relapsing multiple sclerosis: Systematic review and meta-regression. Multiple Sclerosis Journal (in press).

Pugliatti M, Eskic D, Mikolcic T, Pitschnau-Michel D, Myhr K-M, Sastre-Garriga J, Otero S, Wieczynska L, Torje C, Holloway E, Rienhoff O, Friede T, Buckow K, Ellenberger D, Hillert J, Glaser A, Flachenecker P, Fuge J, Schyns-Liharska T, Kasilingam E, Moretti A, Thalheim C for the EUReMS Consortium. (2012) Assess, compare and enhance the status of Persons with Multiple Sclerosis (MS) in Europe: a European Register for MS. Acta Neurologica Scandinavica 2012: 126 (Suppl. 195): 24–30

Address

Dept. of Nonlinear Dynamics
Max Planck Institute for Dynamics and Self-Organizationn
Am Fassberg 17

37077 Göttingen
Germany

phone: +49-551-5176 400
fax: +49-551-5176 402
e-mail: geisel@nld.ds.mpg.de

Further Information

http://www.nld.ds.mpg.de

Theo Geisel

Professor of Theoretical Physics
Director, Max Planck Institute for Dynamics and Self-Organization
Coordinator, Bernstein Center for Computational Neuroscience

- Dr. rer. nat., University of Regensburg (1975)
- Heisenberg fellow (1983 – 1987)
- Professor of Theoretical Physics, Universities of Würzburg (1988 - 1989), Frankfurt (1989 – 1996), and Göttingen (since 1996)
- Director, Max Planck Institute for Dynamics and Self-Organization, Göttingen (since 1996)

Major Research Interests

How do the myriads of neurons in our cortex cooperate when we perceive an object or perform another task? How do they self-organize in the preceding learning process? Questions like these address the complex dynamics of spatially extended and multicomponent nonlinear systems, which still reserve many surprises. In networks of sufficiently many spiking neurons e.g. we find unstable attractors, a phenomenon which would neither have been guessed nor understood without mathematical modelling and which many physicists consider an oxymoron. They can provide a neuronal network with a high degree of flexibility to adapt to permanently changing tasks. The tools and mathematical methods developed in studies of chaotic behaviour in the past can now help us clarify the dynamics and function of complex networks and spatially extended systems and reveal the biological role of dynamical phenomena like unstable attractors.

These methods lend themselves to applications in neuroscience from the level of single cells to the level of cell assemblies and large cortical networks, from the time scales of action potentials (milliseconds) to the time scales of learning and long-term memory (up to years). My work in the past has dealt among others with studies of stochastic resonance of single neurons under periodic and endogenous stimulation, detailed investigations of the properties, functions, and conditions of neuronal synchronization, and the development of neuronal maps in the visual cortex. We have elucidated the influence of the network topology on synchronization and other dynamical properties and demonstrated the existence of speed limits to network synchronization due to disordered connectivity. Besides, I am also focusing on other applications of nonlinear dynamics, e.g. for quantum chaos in semiconductor nanostructures and in mathematical models for the description and forecast of the spread of epidemics.

Selected Recent Publications

Hennig H, Fleischmann R, Fredebohm A, Hagmayer Y, Nagler J, Witt A, Theis F, Geisel T (2011) The nature and perception of fluctuations in human musical rhythms. PLoS ONE 6(10): e26457.

Belik V, Geisel T, Brockmann D (2011) Natural Human Mobility Patterns and Spatial Spread of Infectious Diseases. PHYSICAL REVIEW X 1(011001): 1-5.

Metzger JJ, Fleischmann R, Geisel T (2010) Universal Statistics of Branched Flows. Phys. Rev. Lett. 105(2): 020601

Tchumatchenko T, Geisel T, Volgushev M, Wolf F (2010) Signatures of synchrony in pairwise count correlations. Front Comput Neurosci doi: 10.3389/neuro.10.001.2010.

Levina A, Herrmann JM, Geisel T (2009) Phase transitions towards criticality in a neural system with adaptive interactions. Phys Rev Lett 102: 118110

Ng GS, Hennig H, Fleischmann R, Kottos T, Geisel T (2009) Avalanches of Bose-Einstein Condensates in Leaking Optical Lattices. New J Phys 11: 073045

Levina A, Herrmann JM, Geisel T (2007) Dynamical Synapses Causing Self-Organized Criticality in Neural Networks. Nature Physics 3: 857-860

Address

Dept. of Ophthalmology
University Medical Center
Göttingen
Waldweg 33

37073 Göttingen
Germany

phone: +49-551-39 13542
fax: +49-551-39 13541
e-mail: tim.gollisch@med.uni-goettingen.de

Further Information

http://www.retina.uni-goettingen.de/

Tim Gollisch

Professor for Sensory Processing in the Retina

- Diploma in Physics, University of Heidelberg, 2000
- PhD in Biophysics, Humboldt University Berlin, 2004
- Postdoctoral Researcher, Harvard University, Dept. of Molecular and Cellular Biology, 2004-2007
- Max Planck Research Group Leader, Max Planck Institute of Neurobiology, Munich-Martinsried, 2007-2010
- Professor for Sensory Processing in the Retina, School of Medicine, University of Göttingen since 2010

Major Research Interests

We are interested in how the neuronal network of the retina processes visual signals. The focus of our work is on studying the function of the various neuron types in the retina and their synaptic connections. One goal is to better understand the "neural code" of the retina: how do the patterns of electrical activity in retinal neurons transmit information about the visual environment to downstream brain areas? Another goal is to better understand "neural computation" in the retina: how do the cells in the retinal network interact to produce a specific, useful response? On the basis of these questions, we also study how dysfunction of the retinal circuitry, for example in retinal diseases, compromises sensory processing.
Our investigations are based on various techniques of recording the activity of neurons in the retina while stimulating the network with different visual images or movies. We use multi-electrode array recordings, whole-cell patch-clamp recordings, and fluorescence imaging and combine the experiments with statistical analyses and mathematical modeling.

Selected Recent Publications

Garvert MM, Gollisch T (2013) Local and global contrast adaptation in retinal ganglion cells. Neuron 77: 915-928

Bölinger D, Gollisch T (2012) Closed-loop measurements of iso-response stimuli reveal dynamic nonlinear stimulus integration in the retina. Neuron 73: 333-346

Gollisch T, Meister M (2010) Eye smarter than scientists believed: Neural computation in circuits of the retina. Neuron 65: 150-164

Gollisch T (2009) Throwing a glance at the neural code: Rapid information transmission in the visual system. HFSP Journal 3: 36-46

Gollisch T, Meister M (2008) Rapid neural coding in the retina with relative spike latencies. Science 319: 1108-1111

Herz AVM, Gollisch T, Machens CK, Jaeger D (2006) Modeling single-neuron dynamics and computations: A balance of detail and abstraction. Science 314: 80-85

Gollisch T, Herz AVM (2005) Disentangling sub-millisecond processes within an auditory transduction chain. PLoS Biology 3: e8

Gollisch T, Herz AVM (2004) Input-driven components of spike-frequency adaptation can be unmasked *in vivo*. J Neurosci 24: 7435-7444

Address

Dept. of Cellular Neurobiology
Schwann-Schleiden Research Centre
Julia-Lermontowa-Weg 3

37077 Göttingen
Germany

phone: +49-551-39 177955
fax: +49-551-39 177952
e-mail: mgoepfe@gwdg.de

Further Information

http://www.uni-goettingen.de/de/114662.html

Martin Göpfert

Professor for Cellular Neurobiology

- 1998 Degree in Biology, University of Erlangen-Nürnberg
- 1998 – 2002 DAAD and Leoplodina Research Fellow, Dept. Neurobiology, University of Zürich and School of Biological Sciences, University of Bristol
- 2002 – 2003 Royal Society University Research Fellow, School of Biological Sciences, University of Bristol
- 2003 – 2008 Independent group leader, Volkswagen Foundation Group 'Active auditory mechanics in insects', Dept. Animal Physiology, University of Cologne
- 2008 Associate Professor for Molecular Biology and Biophysics of Sensory Systems, University of Cologne
- 2008 Full Professor for Cellular Neurobiology, University of Göttingen

Major Research Interests

Our group studies fundamental processes in hearing. By combining mechanical measurements with genetics, molecular biology, immunohistochemistry, electrophysiology, calcium imaging, and biophysical modelling, we are trying to decipher how molecular processes shape the performance of an ear. Our preferred model system is the hearing organ of the fruit fly *Drosophila melanogaster*, the auditory sensory cells of which share conserved molecular modules with the hair cells in our ears.
Our work has uncovered striking parallels between fly and vertebrate hearing, including the functional equivalence of the auditory transduction and adaptation machineries, the motility of auditory sensory cells, transducer-based force generation, and the expression of homologous genes. Our work also provided first insights into the diverse roles of – and interactions between – transient receptor potential (TRP) ion channels in hearing, and a model of TRP-function in the fly's auditory system has been devised. Using a novel electrostatic actuation method, we were able to identify hair cell-like signatures of transducer gating and adaptation in the fly's auditory mechanics and could show that a simple transduction model as proposed to describe hair cell mechanics comprehensively explains the macroscopic behaviour of an ear. Based on these findings, we are currently devising a computational model that allows for the high-throughput characterization of genetic hearing defects. Candidate genes for hearing, in turn, are narrowed down by expression profiling using whole-genome microarrays. By testing how these genes contribute to auditory function and performance, we aim for a comprehensive molecules-to-system description of the functional workings of an ear.

Selected Recent Publications

Zhang W, Cheng LE, Kittelmann M, Li J, Petkovic M, Cheng T, Jin P, Guo Z, Göpfert MC, Jan L, Jan YN (2015) Ankyrin repeats act as a tether for conveying force to gate the NOMPC mechanotransduction channel. Cell, in press

Nesterov A, Spalthoff C, Kandasamy R, Katana R, Rankl NB, Andres A, Jähde P, Dorsch JA, Stam LF, Braun F-J, Warren B, Salgado VL, Göpfert MC (2015) TRP channels in insect stretch receptors as insecticide targets. Neuron 83: 665 - 671

Albert JT, Göpfert MC (2015) Hearing in Drosophila. Curr Opin Neurobiol 34C: 79 - 85

Geurten BR, Jähde P, Corthals K, Göpfert MC (2014) Saccadic body turns in walking *Drosophila*. Front Behav Neurosci 8: 365

Andres M, Göpfert MC (2014) Neuronal osmotransduction: push-activating TRPV1 with microtubules. Dev Cell 30: 363 - 364

Zanini D, Göpfert MC (2013) Mechanosensation: tethered ion channels. Curr Biol 23: R349 - 351

Address

Dept. of Theoretical Neuroscience
Max Planck Institute for Experimental Medicine
Hermann-Rein-Straße 3

37075 Göttingen
Germany

phone: +49-551-38 99490
e-mail: guetig@em.mpg.de

Further Information

http://www.em.mpg.de/index.php?id=281

Robert Gütig

Group Leader Theoretical Neurosciences

- Undergraduate studies in Physics and Psychology, FU Berlin, University of Cambridge and Heidelberg University (1993 – 1999)
- MPhil in Theoretical Pysics, University of Cambridge, UK (1997)
- PhD in Computational Neuroscience with Ad Aertsen, University of Freiburg (1999 – 2002)
- Postdoctoral training with Andreas Hertz, Institute of Theoretical Biology, HU Berlin (2003 – 2005)
- Postdoctoral training with Haim Sompolinsky, Interdisciplinary Center for Neural Computation, Hebrew University of Jerusalem, Israel (2005 – 2011)
- Max Planck Research Group Leader, Theoretical Neuroscience (since 2011)

Major Research Interests

We use analytical and numerical modeling techniques to identify the computational principles underlying spike based information processing and learning in central nervous systems and to understand how these principles are implemented by biological processes. Specifically, we focus on the role of action potential timing in subserving sensory neuronal representations and computation as well as in controlling synaptic plasticity. Projects center around the recently developed tempotron family of spiking neuronal network models and cover a broad range of topics including mathematical analyzes of information processing in spiking neuronal networks, spike-based learning in single and multilayer neuronal networks, sensory spike data analysis, temporal processing with short term synaptic dynamics, as well as applied development of visual and speech processing systems.

Selected Recent Publications

Gütig R, Gollisch T, Sompolinsky H, Meister M (2013). Computing complex visual features with retinal spike times. PLoS One 8: e53063.

Gütig R, Sompolinsky H (2009). Time-warp-invariant neuronal processing. PLoS Biology 7: e1000141

Gütig R, Sompolinsky H (2006). The tempotron: a neuron that learns spike timing-based decisions. Nature Neuroscience 9: 420-428

Gütig R, Aharonov R, Rotter S, Sompolinsky H (2003). Learning input correlations through non-linear temporally asymmetric Hebbian plasticity. Journal of Neuroscience 23: 3697-3714

Gütig R, Rotter S, Aertsen A (2003). Analysis of higher-order neuronal interactions based on conditional inference. Biological Cybernetics 88: 352-359

Gütig R, Aertsen A, Rotter S (2002). Statistical signi cance of coincident spikes: count-based versus rate-based statistics. Neural Computation 14: 121-153

Betsch T, Plessner H, Schwieren C, Gütig R (2001). I like it but I don't know why: A value-account approach to implicit attitude formation. Personality and Social Psychology Bulletin 27: 242-253

Gütig R, Eberlein C (1998). Quantum radiation from moving dielectrics in two, three, and more spatial dimensions. Journal of Physics A 31: 6819-6838

Address

Dept. of Cellular Neurobiology
Schwann-Schleiden Research Centre
Julia-Lermontowa-Weg 3

37077 Göttingen
Germany

phone: +49-551-39 177958
fax: +49-551-39 177952
e-mail: rheinri1@gwdg.de

Further Information

http://wwwuser.gwdg.de/~neuro/ag_heinrich/index.html

Ralf Heinrich

Professor of Molecular Neuropharmacology of Behavior

- 1995: Dr. rer. nat., University of Göttingen
- 1997 – 1999: Postdoctoral fellow, Harvard Medical School, Boston, USA
- 2004: Habilitation, Zoology
- 2002 – 2008: Junior professor for Molecular Neuropharmacology of Behavior, Göttingen

Major Research Interests

Behavior is the product of complex interactions between various types of neurons that integrate external sensory information with internal physiological states. Motivational systems in general bias an organism to perform most useful actions to secure survival and reproduction by influencing the initiation, intensity, direction and persistence of behaviors. Our lab is especially interested in central nervous and humoral mechanisms underlying the selection and adaptation of actions that are most appropriate for the particular situation an animal encounters. We study the neurochemical mechanisms underlying motivational states in behavior with a combination of neuroethological, pharmacological, electrophysiological, histochemical and immunocytochemical methods and apply these to intact animals, reduced preparations and cultured cells of various invertebrate species.
Another series of projects explores the neuroprotective and neuroregenerative mechanisms of erythropoietin (Epo) in insects. Similar to earlier studies on mammalian nervous systems, it has been demonstrated that human recombinant Epo increases insect neuronal survival *in vitro* by interfering with apoptotic pathways and improves insect neuronal regeneration *in vitro* and *in vivo* by yet unidentified mechanisms. These results suggest that mammals and insects may share an Epo-like ligand/receptor system with both structural and functional similarities in neuroprotection and neuroregeneration.
Invertebrates offer unique advantages over more complex nervous systems of vertebrates and especially mammals, such as a smaller number of neurons in the central nervous system, individually identifiable neurons and rather limited repertoires of behaviors, many of which are composed of genetically determined and stereotype movements. For studying a particular nervous mechanism one can select the most suitable and experimentally accessible preparation from a huge variety of different species with specific anatomical characteristics and more or less complex behaviors.

Selected Recent Publications

Miljus N, Heibeck S, Jarrar M, Micke M, Ostrowski D, Ehrenreich H, Heinrich R (2014) Erythropoietin-mediated neuroprotection in insects involves JAK/STAT but not IP3K transduction pathways. Neuroscience 258: 218-227

Hahn N, Gurvich A, Geurten B, Piepenbrock D, Kästner A, Zanini D, Xing G, Xie W, Göpfert MC, Ehrenreich H, Heinrich R (2013) Monogenic heritable autism gene neuroligin impacts Drosophila social behaviour. Behavioural Brain Research 252: 450-457

Heinrich R, Kunst M, Wirmer A (2012) Reproduction-related sound production of grasshoppers regulated by internal state and actual sensory environment. Frontiers in Decision Neuroscience 6, 89: 1-9

Ostrowski D, Ehrenreich H, Heinrich R (2011) Erythropoietin promotes survival and regeneration of insect neurons *in vivo* and *in vitro*. Neuroscience 188: 95-108

Johnsson T, Kravitz EA, Heinrich R (2011) Sound production during agonistic behaviour of male *Drosophila melanogaster*. Fly 5: 29-38

Wirmer A, Heinrich R (2011) Nitric oxide/cGMP signaling in the corpora allata of female grasshoppers. J Insect Physiology 57: 94-107

Farca Luna AJ, Heinrich R, Reischig T (2010) The circadian biology of the marbled crayfish. Frontiers in Bioscience E2(4): 1414-1431

Address

Dept. of NanoBiophotonics
Max Planck Institute for
Biophysical Chemistry
Am Fassberg 11

37077 Göttingen
Germany

phone: +49-551-201 2500
fax: +49-551-201 2505
e-mail: hell-office@
gwdg.de

Further Information

http://www.mpibpc.mpg.de/groups/hell/

Stefan Hell

Professor, Director at the Max Planck Institute for Biophysical Chemistry

- 1987 Diploma in Physics, Univ. of Heidelberg
- 1990 Doctorate in Physics, Univ. of Heidelberg
- 1991 – 1993 Postdoctoral Researcher, EMBL (European Molecular Biology Laboratory)
- 1993 – 1996 Principal Investigator, Laser Microscopy Group; Univ. of Turku, Finland
- 1996 Habilitation in Physics, Univ. Heidelberg; Physics teaching since 02/1996
- 1997 – 2002 Head, Max-Planck Junior Group High Resolution Optical Microscopy, at the Max-Planck-Institute for Biophysical Chemistry Göttingen, Germany
- since 10/2002 Director at the Max Planck Institute for Biophysical Chemistry, Head of Department of NanoBiophotonics
- since 12/2003 Apl. Prof., Faculty of Physics, Univ. of Heidelberg
- since 12/2003 Head of High Resolution Optical Microscopy Division, DKFZ Heidelberg
- since 01/2004 Hon. Prof., Faculty of Physics, Univ. of Göttingen

Major Research Interests

Optical microscopy beyond the diffraction barrier with far-field optics
Invention of STED, RESOLFT, GSDIM and 4Pi microscopy and related techniques

Selected Recent Publications

Berning S, Willig KI, Steffens H, Dibaj P, Hell SW (2012) Nanoscopy in a Living Mouse Brain. Science 335: 551

Testa, I., N. T. Urban, S. Jakobs, C. Eggeling, K. I. Willig, S. W. Hell (2012) Nanoscopy of Living Brain Slices with Low Light Levels. Neuron 75: 992-1000

Grotjohann T, Testa I, Leutenegger M, Bock H , Urban NT, Lavoie-Cardinal F, Willig KI, Eggeling C, Jakobs S, Hell SW (2012) Diffraction-unlimited all-optical imaging and writing with a photochromic GFP. Nature 478: 204-208

Vicidomini, G., Moneron, G., Han, K. Y., Westphal V., Ta H., Reuss M., Engelhardt J., Eggeling C., Hell S. W. (2011) Sharper low-power STED nanoscopy by time gating. Nature Meth 8: 571-573

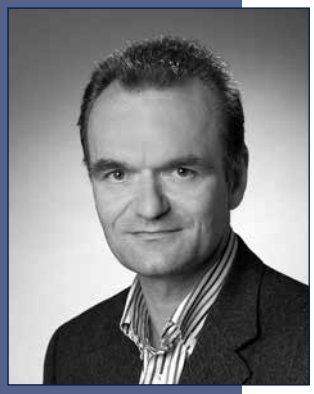
Liu KSY, Siebert M, Mertel S, Knoche E, Wegener S, Wichmann C, Matkovic T, Muhammad K, Depner H, Mettke C, Bückers J, Hell SW, Müller M, Davis GW, Schmitz D, Sigrist SJ (2011) RIM-Binding Protein, a Central Part of the Active Zone, Is Essential for Neurotransmitter Release. Science 334: 1565-1569

Maurer PC, Maze JR, Stanwix PL, Jiang L, Gorshkov AV, Zibrov AA, Harke B, Hodges JS, Zibrov AS, Yacoby A, Twitchen D, Hell SW, Walsworth RL, Lukin MD (2010) Far-field optical imaging and manipulation of individual spins with nanoscale resolution. Nature Phys 6: 912-918

Eggeling C, Ringemann C, Medda R, Schwarzmann G, Sandhoff K, Polyakova S, Belov VN, Hein B, von Middendorff C, Schönle A, Hell SW (2009) Direct observation of the nanoscale dynamics of membrane lipids in a living cell. Nature 457: 1159-1163

Hell SW, Rittweger E (2009) Light from the dark. Nature 461: 1069-1070

Westphal V, Rizzoli SO, Lauterbach MA, Kamin D, Jahn R, Hell SW (2008) Video-Rate Far-Field Optical Nanoscopy Dissects Synaptic Vesicle Movement. Science 320: 246-249



Address

Dept. of Celular Neurobiology
Johann-Friedrich-Blumenbach Institute for Zoology and Anthropology
Grisebachstr. 5

37077 Göttingen
Germany

phone: +49-551-39 12307
fax: +49-551-39 12308
e-mail: mhoerne@gwdg.de

Further Information

http://www.uni-goettingen.de/en/57983.html

Michael Hörner

Professor of Cellular Neurobiology

- Research Assistant, MPI for Ethology, Seewiesen, 1985/1986
- Dr. rer. nat., University of Göttingen, 1989
- 1989 – 1990 Postdoctoral Fellow, Medical University of Kiel, Dept. Physiology
- 1990 – 1997 Assistant Professor, Institute for Zoology and Anthropology, Göttingen
- 1992/1997 Research Fellow Marine Biological Labs, Woods Hole, USA
- 1993/1996 Research Fellow, Arizona Research Labs, Tucson, USA
- 1994 – 1995 Feodor-Lynen/Humboldt Fellow, Harvard Medical School, Boston, USA
- 1997 Habilitation (Zoology)
- 1997 – 2002 Associate Professor, Institute for Zoology and Anthropology, Göttingen
- 2002 – 2004 Guest Professor, University of Science & Technology, Hongkong
- Apl. Professor, J.-F. Blumenbach Institute for Zoology and Anthropology Göttingen, since 2004 and Scientific Coordinator International MSc/PhD/MD-PhD Program Neurosciences

Research Interests

Molecular Mechanisms Of Synaptic And Non-Synaptic Modulation

Biogenic amines such as serotonin, dopamine, histamine or octopamine (OA), the pendant of norepinephrine in invertebrates, are widely distributed within the animal kingdom. These evolutionary conserved neuroactive substances are involved in the control of vital functions in both vertebrates and invertebrates. Biogenic amines often initiate long-lasting neuro-modulatory effects in their targets, which is due to diffusion following non-synaptic release activating G-protein coupled to intracellular pathways. My work is focussed on the investigation of cellular and molecular mechanisms underlying the modulation of neuronal signaling in identified networks in invertebrate model systems. Using electrophysiological, pharmacological and immunocytochemical techniques in combination with behavioral measurements, I am investigating mechanisms of aminergic modulation in identified neurons of defined networks in insects and crustacea. To address both mechanistic and functional questions, a parallel approach has been developed, which allows to investigate single identified neurons both *in-vivo* with intact synaptic connections and *in-vitro* in primary "identified" cell culture, where neurons are separated from connections to other neurons. The functional meaning of aminergic modulation on the cellular level in behaviorally-relevant circuits is assessed by quantitative behavioral measurements. The investigations show that OA enhances the responsiveness of a neuronal network in insects ("giant fiber pathway") which triggers a fast escape reaction. The reaction to sensory stimuli in the postsynaptic giant interneurons, which are monosynaptically coupled to sensory neurons via excitatory cholinergic synapses, is significantly enhanced by OA application. Characteristic changes of the action potentials *in-vivo* ("spike broadening") and patch-clamp recordings *in-vitro* suggest, that OA selectively affects slow K^+-conductances in postsynaptic giant interneurons

Selected Recent Publications

Rose T, Gras H, Hörner M (2006) Activity-dependent suppression of spontaneous spike generation in the Retzius neurons of the leech, *Hirudo medicinalis* L. Invertebrate Neuroscience 6: 169-176 (DOI 10.1007/s10158-006-0030-2)

Hörner M, Heinrich R, Cromarty SI, Kravitz EA (2002) Synaptic connectivity of amine-containing neurosecretory cells of lobsters: inputs to 5HT- and OCT- containing neurons. in: The Crustacean Nervous System. (ed. K. Wiese) Springer Verlag, Berlin, Heidelberg, New York, pp156-172

Ferber M, Hörner M, Cepok S, Gnatzy W (2001) Digger wasp versus cricket: Mechanisms underlying the total paralysis caused by the predators venom. J Neurobiol 47: 207-2222

Heinrich R, Cromarty SI, Hörner M, Edwards DH, Kravitz EA (1999) Autoinhibition of serotonin cells: An intrinsic regulatory mechanism sensitive to the pattern of usage of the cells. Proc Natl Acad Sci USA 96: 2473-2478

Kloppenburg P, Hörner M (1998) Voltage-activated currents in identified giant interneurons isolated from adult crickets, *Gryllus bimaculatus*. J Exp Biol 201(17): 2529-2541

Address

University Medical Center
Göttingen
Experimental Neuroanes-
thesiology
Humboldtallee 23

37073 Göttingen
Germany

phone: +49-551-39 9592
fax: +49-551-39 9676
e-mail: shuelsm2@uni-
goettingen.de

Further Information

http://www.neuro-physiol.
med.uni-goettingen.de/
groups/shuelsmann/de/
home/index.php

Swen Hülsmann

Professor of Neurophysiology

- Dr. med., University of Münster, 1995
- Postdoctoral fellow, University of Münster Dept. of Neurosurgery, 1995 – 1996
- Postdoctoral fellow, University of Göttingen, Dept. of Neurophysiology, 1996 – 2001
- Group leader (Wissenschaftlicher Assistent) Neurophysiology, since 2001
- Principle Investigator at the DFG Research Center for Molecular Physiology of the Brain (CMPB) since 2002
- Habilitation, University of Göttingen, 2005

Major Research Interests

Most behavioral aspects of life are attributed to neurons, leaving many white spots of knowledge about the function of the different types of glial cells. Our group aims to identify and clarify the mechanisms that allow astrocytes to modulate and stabilize the most vital behavior of breathing.

Selected Recent Publications

Rahman J, Besser S, Schnell C, Eulenburg V, Hirrlinger J, Wojcik SM, Hülsmann S (2014) Genetic ablation of VIAAT in glycinergic neurons causes a severe respiratory phenotype and perinatal death. Brain Struct Funct 2014 Jul 16 [Epub ahead of print]

Schnell C, Shahmoradi A, Wichert SP, Mayerl S, Hagos Y, Heuer H, Rossner MJ, Hülsmann S (2013) The multispecific thyroid hormone transporter OATP1C1 mediates cell-specific sulforhodamine 101-labeling of hippocampal astrocytes. Brain Struct Funct. 2013 Oct 16 [Epub ahead of print]

Schnell C, Hagos Y, Hülsmann S (2012) Active sulforhodamine 101 uptake into hippocampal astrocytes. PLoS One. 2012;7(11): e49398. doi: 10.1371/journal.pone.0049398. Epub 2012 Nov 26

Latal AT, Kremer T, Gomeza J, Eulenburg V, Hülsmann S (2010) Development of synaptic inhibition in glycine transporter 2 deficient mice. Mol Cell Neurosci. 2010 Aug;44(4): 342-52. doi: 10.1016/j.mcn.2010.04.005. Epub 2010 May 4

Streckfuss-Bömeke K, Vlasov A, Hülsmann S, Yin D, Nayernia K, Engel W, Hasenfuss G, Guan K (2009) Generation of functional neurons and glia from multipotent adult mouse germ-line stem cells. Stem Cell Res. 2009 Mar;2(2): 139-54. doi: 10.1016/j.scr.2008.09.001. Epub 2008 Oct 7

Härtel K, Schnell C, Hülsmann S (2009) Astrocytic calcium signals induced by neuromodulators via functional metabotropic receptors in the ventral respiratory group of neonatal mice. Glia. 2009 Jun;57(8): 815-27. doi: 10.1002/glia.20808

Address

Dept. of Neurobiology
Max Planck Institute for
Biophysical Chemistry
Am Fassberg 11

37077 Göttingen
Germany

phone: +49-551-201 1635
fax: +49-551-201 1639
e-mail: rjahn@gwdg.de

Further Information

http://www.mpibpc.gwdg.de/abteilungen/190/

Reinhard Jahn

Professor, Director at the Max Planck Institute for Biophysical Chemistry

- Dr. rer. nat. 1981, University of Göttingen
- Assistant Professor, The Rockefeller University, New York (USA) 1985
- Junior Group leader, Max Planck Institute for Psychiatry, Martinsried, 1986
- Associate Professor of Pharmacology and Cell Biology, Yale University, and Investigator, Howard Hughes Medical Institute, New Haven (USA) 1991
- Professor of Pharmacology and Cell Biology, Yale University, New Haven, 1995
- Director, Max Planck Institute for Biophysical Chemistry, Göttingen, 1997

Major Research Interests

Our group is interested in the mechanisms of membrane fusion, with the main emphasis on regulated exocytosis in neurons. Intracellular membrane fusion events are mediated by a set of conserved membrane proteins, termed SNAREs. For fusion to occur, complementary sets of SNAREs need to be present on both of the fusing membranes, which then assemble in a zipper-like fashion to initiate membrane merger. The neuronal SNAREs are among the best characterized. They are the targets of the toxins responsible for botulism and tetanus, and they are regulated by several addtional proteins including synaptotagmin, the calcium sensor for neurotransmitter release. To understand how these proteins mediate fusion, we study their properties *in vitro* with biochemical and biophysical approaches using native and artificial membranes.
In a second set of projects, we use modern techniques such as quantitative proteomics to better understand supramolecular protein complexes involved in synaptic function. Using our quantitative description of synaptic vesicles as point of departure we aim at unraveling presynaptic protein networks involved in synaptic vesicle docking and fusion. Furthermore, we are studying regulation of presynaptic function by small GTPases and by protein phosphorylation.

Selected Recent Publications

Ryo J-K, Min D, Rah S-H, Kim SJ, Park Y, Kim H, Kim H-M, Jahn R*, Yoon T-Y* (2015) Spring-loaded unraveling of a single SNARE complex by NSF in one round of ATP turnover. Science 347: 1485-1489 (*corresponding authors)

Binotti B, Pavlos NJ, Riedel D, Wenzel D, Vorbrüggen G, Schalk AM, Kühnel K, Boyken J, Erck C, Martens H, Chua JJE, Jahn R (2015) The GTPase Rab26 links synaptic vesicles to the autophagy pathway. eLife 4: e05597

Honigmann A, van den Bogaart G, Iraheta E, Risselada HJ, Milovanovic D, Mueller V, Müllar S, Diederichsen U, Fasshauer D, Grubmüller H, Hell SW, Eggeling C, Kühnel K, Jahn R (2013) Phosphatidylinositol 4,5-bisphosphate clusters act as molecular beacons for vesicle recruitment. Nat Struct Mol Biol 20: 679-686

Park Y, Hernandez JM, van den Bogaart G, Ahmed S, Holt M, Riedel D, Jahn R (2012) Controlling synaptotagmin activity by electrostatic screening. Nature Struct Mol Biol 19: 991-997

Jahn R, Fasshauer D (2012) Exocytosis of synaptic vesicles – molecular machines, calcium, and beyond (review). Nature 490(7419): 201-7

Hernandez JM, Stein A, Behrmann E, Riedel D, Cypionka A, Farsi Z, Walla PJ, Raunser S, Jahn R (2012) Membrane fusion intermediates via directional and full assembly of the SNARE complex. Science 336: 1581-1584

Chua JJ, Butkevich E, Worseck JM, Kittelmann M, Gronborg M, Behrmann E, Stelzl U, Pavlos NJ, Lalowski M, Eimer S, Wanker EE, Klopfenstein DR*, Jahn R* (2012) Phosphorylation-regulated axonal dependent transport of syntaxin 1 is mediated by a Kinesin-1 adapter. Proc Natl Acad Sci USA 109: 5862-5867

van den Bogaart G, Meyenberg K, Risselada JH, Amin H, Willig KI, Hubrich BE, Dier M, Hell SW, Grubmüller H, Diederichsen U, Jahn R (2011) Membrane protein sequestering by ionic protein-lipid interactions. Nature 479: 552-555

Address

Bernstein Focus Neurotechnology (BFNT) and
Johann-Friedrich-Blumenbach Institute for
Zoology and Anthropology
Systems Neuroscience Group
von-Siebold-Str. 4

37075 Göttingen
Germany

phone: +49-551-39 20160
+49-551-39 20161
fax: +49-551-39 20162
e-mail: sloewel@gwdg.de

Further Information

http://systemsneuroscience.uni-goettingen.de/

Siegrid Löwel

Professor of Systems Neuroscience

- Dr. phil. nat. (Ph.D.), 1988, Johann-Wolfgang-Goethe-Universität Frankfurt am Main
- Research Assistant, Dept. Neurophysiology (Prof. Dr. Wolf Singer), Max-Planck-Institut für Hirnforschung, Frankfurt am Main,1990 – 1997
- Head of the Research Group "Visual Development and Plasticity", Leibniz Institute for Neurobiology, Magdeburg, 1997 – 2002 & 2004 – 2005
- Associate Research Physiologist/Research Associate Professor, School of Medicine, Dept. Physiology, University of California in San Francisco, USA, 2002 – 2003
- Magdeburg (http://www.unimagdeburg.de/gleichstellungsbuero/gleich/erxleb.htm), 2003 – 2004
- Dorothea-Erxleben-Guest Professorship, Otto-von-Guericke-Universität
- Scholarship in the Hertie-Excellency Program "Neurosciences", 2004 - 2005
- Professor of Neurobiology, Friedrich-Schiller-Universität Jena, 2005 – 2010
- Prof. of Systems Neuroscience, BFNT and Johann-Friedrich-Blumenbach Institute for Zoology and Anthropology, Georg-August-Universität Göttingen, since 2010

Major Research Interests

The Löwel lab is focussed on understanding the development and plasticity of neuronalcircuits in the mammalian cortex. We use a combination of techniques, including optical imaging, electrophysiology and neuroanatomy to explore how experience and learning influence the structure and function of nerve cell networks and how activity patterns and genetic factors influence these processes. We hope that answering these key questions not only helps to understand the rules underlying brain development, functioning and learning but additionally will open up new avenues to develop clinically relevant concepts to promote regeneration and rehabilitation for diseased and injured brains.
The Löwel lab has made major contributions to experience-dependent changes in nerve cell networks: We were the first to demonstrate that the learning rule for the development of long-range cortical circuits is correlated activity. "neurons wire together if they fire together" (Löwel& Singer, 1992, Science 255: 209-212). We also provided evidence that these connections play a major role for context dependent effects in visual perception (Crook et al., 2002, Exp. BrainRes. 143: 295-302; Schmidt et al., 1997, Europ. J. Neurosci. 5: 1083-1089).
We were also the first to demonstrate a major effect of genetic factors on the layout of cortical maps (Kaschube et al., 2002, J. Neurosci. 22: 7206-7217) and provided evidence that long-range connections between neurons coordinate the development of different brain regions and even of the two brain hemispheres (Kaschube et al., 2009, PNAS 106: 17205-17210). Recently, we helped to establish optical imaging of intrinsic signals as a screening tool for cortical plasticity in mice (Cang et al., 2005, Vis. Neurosci. 685-691) and started characterizing various mutant mice (e.g. Goetze et al., 2010, Thygarajan et al., 2010).

Selected Recent Publications

Huang X*, Stodieck SK*, Goetze B, Schmidt K-F, Cui L, Wenzel C, Hosang L, Dong Y, Löwel S*, Schlüter OM* (2015) The progressive maturation of silent synapses governs the duration of a critical period. Proc Natl Acad Sci USA.112(24): E3131-40, doi: 10.1073/pnas.1506488112. Epub 2015 May 26

van Wyk M, Pielecka-Fortuna J, Löwel S, Kleinlogel S (2015) Restoring the ON-switch in blind retinas: Opto-mGluR6, a next-generation, cell-tailored optogenetic tool. PLoS Biology 13(5): e1002143. doi: 10.1371/ journal.pbio.1002143. eCollection 2015 May

Address

Developmental
Neurobiology
European Neuroscience
Institute Göttingen
Grisebachstr. 5

37077 Göttingen
Germany

phone: +49-551-39 13400
fax: +49-551-39 9843
e-mail: Till.Marquardt@
mpi-mail.mpg.de

Further Information

http://www.eni.gwdg.de/
index.php?id=169

Till Marquardt

Group Leader Developmental Neurobiology

- 1997 – 2001: Diploma (Dipl. Biol.) and Ph.D. (Dr. rer. nat.) thesis research with Peter Gruss at the Max-Planck Institute of Biophysical Chemistry, Göttingen
- 2001 – 2006:Postdoctoral research associate (2001 – 2005), Damon Runyon Fellow (2002 – 2005) and staff scientist (2006) with Samuel L. Pfaff at the Salk Institute for Biological Studies, La Jolla, USA
- Since 2007: Research group leader and principal investigator at the European Neuroscience Institute, Göttingen
- 2007 – 2012: Emmy Noether Young Investigator (DFG)
- Since 2012: European Research Council (ERC) grant holder

Major Research Interests

My team employs a combination of molecular genetics, live-cell microscopy, electrophysiology and behavior analysis to study two key aspects of nervous system development and function: we exploit the unique position of motor neurons at the intersection of central nervous system and movement apparatus to resolve the molecular machineries promoting neuron functional specialization and to understand their contribution to neural network function (focus 1) and we study axon-axon- and axon-glia signaling mechanisms contributing to peripheral nervous system assembly or pathology (focus 2).

Selected Recent Publications

Müller D, Cherukuri P, Henningfeld K, Poh CP, Wittler L, Grote P, Schlüter O, Schmidt J, Laborda J, Bauer SR, Brownstone RM, Marquardt T (2014). Dlk1 promotes a fast motor neuron biophysical signature required for peak-force execution. Science 343: 1264-1266

Wang L, Marquardt T (2012) Live monitoring of heterotypic axonal interactions *in vitro*. Nature Protocols 7: 351-363

Bonanomi D, Chivatakarn O, Bai G, Lettieri K, Abdesselem H, Marquardt T, Pierchala BA, Pfaff SL (2012) Ret is a multifunctional co-receptor that integrates diffusible- and contact-axon guidance signals. Cell 148: 568-582

Wang L, Klein R, Zheng B, Marquardt T (2011) Anatomical coupling of sensory and motor nerve trajectory through axon tracking. Neuron 71: 263-277

Gallarda B, Bonanomi D, Müller D, Brown A, Alaynick WA, Lemke G, Pfaff SL, Marquardt T (2008) Segregation of axial sensory and motor pathways through heterotypic trans-axonal signaling. Science 320: 233-236

Further reading

Wang L, Marquardt T (2013) What axons tell each other: axon-axon signaling in nerve and circuit assembly. Curr Opin Neurobiol 23: 974-982

Address

Synaptic Vesicle Dynamics
European Neuroscience
Institute Göttingen
Grisebachstr. 5

37077 Göttingen
Germany

phone: +49-551-39 12379
fax: +49-551-39 12346
e-mail: i.milosevic@
eni-g.de

Further Information

http://www.eni.gwdg.de/
index.php?id=374

Ira Milosevic

Group Leader Synaptic Vesicle Dynamics

- 2001: Diploma (Dipl. Ing.) in Molecular Biology University of Zagreb, Zagreb, Croatia; thesis work performed at Eötvös Lorand University, Dept. of Biochemistry, Budapest, Hungary and Ruder, Boskovic Institute, Dept. of Molecular Genetics, Zagreb, Croatia (advisors: Prof. Ivana Weygand-Durasevic, Prof. Laszlo Nyitray)
- 2003: M.Sc., IMPRS Neurosciences, Georg August University Göttingen, Germany; thesis work performed at Max Planck Institute for Biophysical Chemistry, Dept. of Membrane Biophysics and Dept. of Biochemistry (advisors: Prof. Erwin Neher, Prof. Reinhard Jahn)
- 2006: Ph.D., IMPRS Neurosciences, Georg August University Göttingen, Germany; thesis work performed at Max Planck Institute for Biophysical Chemistry, Dept. of Membrane Biophysics and Dept. of Biochemistry (advisors: Prof. Erwin Neher, Prof. Reinhard Jahn)
- 2006 – 2012: PostDoc, HHMI and Yale University School of Medicine, Dept. of Cell Biology, New Haven, CT, USA (advisor: Prof. Pietro De Camilli)
- since 2012: Independent Group Leader at the European Neuroscience Institute Göttingen

Major Research Interests

The laboratory investigates fundamental aspects of synaptic vesicle recycling that have relevance to neurological and neurodegenerative diseases, using mouse and mammalian cells as a model system. A cutting edge genomic engineering is combined with the latest techniques of imaging and cell biology to study the processes that regulate synaptic vesicle formation. In a distinct but related strand of work, we are exploring the signaling processes that originate from altered neurotransmission and lead to neurodegeneration.

Selected Recent Publications

Milosevic I*, Giovedi S*, Lou X, Raimondi A, Collesi C, Shen H, Paradise S, O'Toole E, Ferguson S, Cremona O, De Camilli P (2011) Recruitment of endophilin to clathrin coated pit necks is required for efficient vesicle uncoating after fission. Neuron 72 (4): 587-601 *equal contribution

de Wit H, Walter A, Milosevic I, Gulyás-Kovács A, Sørensen JB,Verhage M (2009) Four proteins that dock secretory vesicles to the target membrane. Cell 138 (5): 935-946

Nagy G*, Milosevic I*, Mohrmann R, Wiederhold K, Walter AM, Sørensen JB (2008) The SNAP-25 linker as an adaptation toward fast exocytosis. Mol Biol Cell 19 (9): 3769-3781 *equal contribution

Gulyás-Kovács A, de Wit H, Milosevic I, Kochubey O, Toonen R, Klingauf J, Verhage M, Sørensen JB. (2007) Munc18-1: sequential interactions with the fusion machinery stimulate vesicle docking and priming. J Neurosci 27(32): 8676-8686 (accompanied by an editorial comment in J Neurosci 27 (32), i)

Address

Institute for Auditory Neuroscience
University Medical Center Göttingen
Robert-Koch-Str. 40

37075 Göttingen
Germany

phone: +49-551-39 22803
fax: +49-551-39 22299
e-mail: tmoser@gwdg.de

Further Information

http://www.auditory-neuroscience.uni-goettingen.de/

http://www.innerearlab.uni-goettingen.de/

https://www.mpibpc.mpg.de/14722384/moser

http://www.dpz.eu/en/platforms/optogenetics/auditory-neuroscience.html

Tobias Moser

Professor of Auditory Neuroscience

- MD University of Jena, 1995
- Postdoc with E. Neher at the MPI for Biophysical Chemistry, 1994 – 1997
- Junior Group Leader at the at the MPI for Biophysical Chemistry, Göttingen 1997 – 2001
- Residency in Otolaryngology, University Medical Center Göttingen 1997 – 2002
- Group Leader at the Department of Otolaryngology, University Medical Center Göttingen since 2001
- Research Group Leader at MPI for Biophysical Chemistry, MPI for Experimental Medicine and German Primate Center, Göttingen since 2014
- Director, Institute for Auditory Neuroscience, University Medical Center Göttingen 2015

Major Research Interests

Auditory Neuroscience - Synaptic Physiology and Pathophysiology – Audiology and Neuroprosthetics

Our work focuses on the molecular physiology and pathophysiology of sound encoding at the hair cell ribbon synapse and its restoration. We have physiologically and morphologically characterized synapses of wild-type and mutant mice with defects in hair cell synaptic coding from the molecular to the systems level. This way we have contributed to the understanding of structure and function of the hair cell ribbon synapse and co-initiated the concept of auditory synaptopathy. Molecular dissection and detailed physiological characterization of ribbon synapse function employ a spectrum of molecular, biophysical, physiological, psychophysical and clinical approaches. Towards restoration of hearing we pursue the optogenetic stimulation of cochlea and gene replacement therapy.

Selected Recent Publications

Schrauwen I, Helfmann S, Inagaki A, Predoehl F, Tabatabaiefar MA, Picher MM, Sommen M, Seco CZ, Oostrik J, Kremer H, Dheedene A, Claes C, Fransen E, Chaleshtori MH, Coucke P, Lee A, Moser T, Van Camp G (2012) A Mutation in CABP2, Expressed in Cochlear Hair Cells, Causes Autosomal-Recessive Hearing Impairment. Am J Hum Genet 91: 636-45

Nouvian R, Neef J, Bulankina AV, Reisinger E, Pangršic T, Frank T, Sikorra S, Brose N, Binz T, Moser T (2011) Exocytosis at the hair cell ribbon synapse apparently operates without neuronal SNARE proteins. Nat Neurosci 14: 411-413

Frank T, Rutherford MA, Strenzke N, Pangrsic T, Khimich D, Fejtova A, Gundelfinger ED, Liberman MC, Harke B, Bryan KE, Lee A, Egner A, Riedel D, Moser T (2010). Bassoon and the synaptic ribbon organize Ca^{2+} channels and vesicles to add release sites and promote refilling. Neuron 68: 724-738

Pangrsic T, Lasarow L, Reuter K, Takago H, Schwander M, Riedel D, Frank T, Tarantino LM, Bailey JS, Strenzke N, Müller U, Brose N, Reisinger E*, Moser T* (2010) Hearing requires otoferlin-dependent efficient replenishment of synaptic vesicles in hair cells. Nat Neurosci 13: 869-876

Meyer AC, Frank T, Khimich D, Hoch G, Riedel D, Chapochnikov, NM, Yarin YM, Harke B, Hell S, Egner A, Moser T (2009) Tuning of Synapse Number, Structure and Function in the Cochlea, Nat Neurosci 12: 444-534

Address

Dept. of Neurogenetics
Max Planck Institute for
Experimental Medicine
Hermann-Rein-Strasse 3

37075 Göttingen
Germany

phone: +49-551-3899 757
fax: +49-551-3899 758
email: nave@em.mpg.de

Further Information

http://www.em.mpg.de/index.php?id=34&no_cache=1

Klaus-Armin Nave

Professor, Director at the Max Planck Institute for Experimental Medicine

- 1987 PhD, University of California, San Diego
- 1987 – 1991 Postdoc, The Salk Institute, la Jolla, California
- 1991 Junior Group Leader, ZMBH, University of Heidelberg
- 1998 Professor of Molecular Biology (C4), ZMBH, University of Heidelberg
- 2000 Director, Department of Neurogenetics, Max Planck Institute for Experimental Medicine Göttingen and Professor of Biology, University of Heidelberg

Major Research Interests

We are interested in the mechanisms of neuron-glia interactions in the higher nervous system, and in the genes that are required for normal glial cell function. Here, transgenic and mutant mice have become important to study developmental processes as well as genetic diseases. For example, oligodendrocytes are glial cells highly specialized for enwrapping CNS axons with multiple layers of membranes, known to provide electrical insulation for rapid impulse propagation. We found that oligodendrocytes are also essential for maintaining the long-term integrity of myelinated axons, independent of the myelin function itself. The mechanisms by which oligodendrocytes support long-term axonal survival are still under investigation. The importance of glial cells as the “first line of neuroprotection”, however, is illustrated by several myelin-associated diseases in which axonal neurodegeneration contribute to progressive disability. These range in humans from peripheral neuropathies (CMT1) to spastic paraplegia (SPG2), and presumably multiple sclerosis (MS) and certain forms of psychiatric disorders. We are developing transgenic animal models for some of these diseases, in order to dissect the underlying disease mechanisms and, in the case of CMT1A, have used these models to design novel therapeutic strategies.
The glial “decision” to myelinate an axonal segment is partly controlled by the axon itself, but the signaling mechanism is not understood. We have found that axonal neuregulin-1 (NRG1) is the major determinant of myelination in the peripheral nervous system. We are now investigating NRG1 dysregulation also in CNS myelination, using quantifiable behavioural functions in mice. By combining genetics with enviromental risk factors for schizophrenia (in collaboration with H. Ehrenreich) we will explore the hypothesis that NRG1, a known human schizophrenia susceptibility gene, points to an important role of myelinating glia in some psychiatric disorders.

Selected Recent Publications

Stassart RM, Fledrich R, Velanac V, Brinkmann BG, Schwab MH, Meijer D, Sereda MW, Nave K-A (2013) A role for Schwann cell derived neuregulin-1 in remyelination. Nat Neurosci 16: 48-54

Saher G, Rudolphi F, Corthals K, Ruhwedel T, Schmidt KF, Löwel S, Dibaj P, Barrette B, Möbius W, Nave K-A (2012) Therapy of Pelizaeus-Merzbacher disease in mice by feeding a cholesterol-enriched diet. Nat Med 18: 1130-1135

Fünfschilling U, Supplie LM, Mahad D, Boretius S, Saab AS, Edgar J, Brinkmann BG, Kassmann CM, Tzvetanova ID, Möbius W, Diaz F, Meijer D, Suter U, Hamprecht B, Sereda MW, Moraes CT, Frahm J, Goebbels S, Nave K-A (2012). Glycolytic oligodendrocytes maintain myelin and long-term axonal integrity. Nature 485: 517-521

Goebbels S, Oltrogge JH, Wolfer S, Wieser GL, Nientiedt T, Pieper A. Ruhwedel T, Groszer M, Sereda MW, Nave K-A (2012) Genetic disruption of Pten in a novel mouse model of tomaculous neuropathy. EMBO Mol Med 4: 486-499

Dhaunchak AS, Colman DR, Nave K-A (2011) Misalignment of PLP/DM20 transmembrane domains determines protein misfolding in Pelizaeus-Merzbacher disease. J Neurosci 31: 14961-14971

Nave K-A (2010) Myelination and support of axonal integrity by glia. Nature 468: 244-252

Address

Dept. of Molecular Biology
of Neuronal Signals
Max Planck Institute for
Experimental Medicine
Hermann-Rein-Strasse 3

37075 Göttingen
Germany

phone: +49-551-3899 643
fax: +49-551-3899 644
email: pardo@em.mpg.de

Further Information

http://www.uni-goettingen.de/en/127638.html

Luis A. Pardo

Group Leader Molecular Biology of Neuronal Signals

- 1986 M.D., University of Oviedo, Spain
- 1990 Ph.D. University of Oviedo, Spain
- 1991 – 1993 Postdoctoral fellow, Max-Planck Institute of Biophysical Chemistry
- 1994 – 1996 Researcher, University of Oviedo, Spain
- 1997 – 2000 Senior researcher, Max-Planck Institute of Experimental Medicine
- 2001 – 2003 Chief Scientific Officer, iOnGen AG
- since 2004 group leader at the Max-Planck Institute of Experimental Medicine

Major Research Interests

Our research interest focuses on the role of ion channels in the initiation and progression of tumors. For this, we take advantage of the knowledge of the physiology and molecular biology of channels and use electrophysiological techniques along with advanced microscopy, protein engineering and animal models. Most of our work has been on a particular potassium channel frequently expressed (75%) in human tumors. We try to take advantage of the particular features of ion channels (for example, their surface expression) to design novel diagnostic and therapeutic procedures.
We also try to understand the mechanisms underlying the role of ion channels in tumors, regarding both permeation properties as well as non-canonical functions.

Selected Recent Publications

Kohl T, Lörinczi E, Pardo LA, Stühmer W (2011) Rapid internalization of the oncogenic K^+ channel Kv10.1 PLoS ONE 6: e26329

Hartung F, Stühmer W, Pardo LA (2011) Tumor cell-selective apoptosis induction through targeting of kv10.1 via bifunctional trail antibody. Mol Cancer 10: 109

Chen Y, Sánchez A, Rubio ME, Kohl T, Pardo LA, Stühmer W (2011) Functional Kv10.1 channels localize to the inner nuclear membrane. PLoS ONE 6: e19257

Gómez-Varela D, Kohl T, Schmidt M, Rubio ME, Kawabe H, Nehring RB, Schafer S, Stühmer W, Pardo LA (2010) Characterization of Eag1 channel lateral mobility in rat hippocampal cultures by single-particle-tracking with quantum dots. PLoS ONE 5: e8858

Agarwal J, Griesinger F, Stühmer W, Pardo L (2010) The potassium channel ether a go-go is a novel prognostic factor with functional relevance in acute myeloid leukemia. Molecular Cancer 9: 18

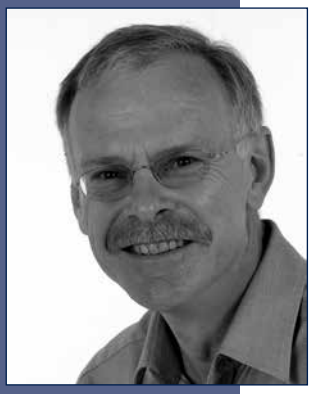
Wulf H, Castle N, Pardo LA (2009) Voltage-gated potassium, chanels as therapeutic drug targets. Nature Reviews Drug Discovery

Downie BR, Sanchez A, Knotgen H, et al. (2008) Eag1 expression interferes with hypoxia homeostasis and induces angiogenesis in tumors. J Biol Chem 283: 36234-40

Pardo LA, Stuhmer W (2008) Eag1: an emerging oncological target. Cancer Res 68: 1611-3

Gomez-Varela D, Zwick-Wallasch E, Knotgen H, et al. (2007) Monoclonal antibody blockade of the human Eag1 potassium channel function exerts antitumor activity. Cancer Res 67: 7343-9

Weber C, Mello de Queiroz F, Downie BR, Suckow A, Stuhmer W, Pardo LA (2006) Silencing the activity and proliferative properties of the human EagI Potassium Channel by RNA Interference. Journal of Biological Chemistry 281: 13030-7



Address

Dept. of Clinical Neurophysiology
University of Göttingen
Robert Koch Str. 40

37075 Göttingen Germany

phone: +49-551-39 6650
fax: +49-551-39 8126
e-mail: wpaulus@med.uni-goettingen.de

Further Information

http://www.neurologie.uni-goettingen.de/

Walter Paulus

Professor of Clinical Neurophysiology

- Dr. med., University of Düsseldorf, 1978
- Training in Neurology at the Universities of Düsseldorf, UCL London and Munich
- Habilitation (Neurology and Clinical Neurophysiology) in Munich
- Prof. and Head of the Department of Clinical Neurophysiology 1992

Major Research Interests

We intend to understand and modulate cortical plasticity in man. This is mainly done on a behavioural, imaging and electrophysiological level. We use (motor) learning paradigms, evaluate them by behavioural techniques and by recording EMG; EEG or fMRI data in the context with connectivity analyses. We develop and/or apply stimulation techniques such as repetitive transcranial magnetic stimulation (rTMS), transcranial direct current stimulation, alternating current stimulation or random noise stimulation (tDCS, tACS, tRNS). TMS induces a short electric current in the human brain. Both rTMS and electric stimulation techniques offer the prospect of inducing LTD and LTP like effects in the human brain. Diseases in our focus are Parkinson's disease, epilepsy, migraine, stroke and dystonia.
The Department of Clinical Neurophysiology pursues other research areas such as Neurorehabilitation in conjunction with the Bernstein Centre of Computational Neuroscience and with the Company Otto Bock. Another focus concerns Hereditary Neuropathies in collaboration with the MPI for Experimental Medicine, speech disorders with a focus on stuttering and others (overview researcher ID A-3544-2009).

Selected Recent Publications

Voss U, Holzmann R, Hobson A, Paulus W, Koppehele-Gossel J, Klimke A, Nitsche M A (2014) Induction of self awareness in dreams through frontal low current stimulation of gamma activity. Nat Neurosci 17(6): 810-2

Paulus W (2014) Transcranial brain stimulation: potential and limitations. e-Neuroforum doi:DOI 10.1007/s13295-014-0056-6

Sommer M, Norden C, Schmack L, Rothkegel H, Lang N, Paulus W (2013) Opposite optimal current flow directions for induction of neuroplasticity and excitation threshold in the human motor cortex. Brain Stimul 6(3): 363-70

Polanía R, Nitsche MA, Korman C, Batsikadze G, Paulus W (2012) The importance of timing in segregated theta phase-coupling for cognitive performance. Curr Biol 22: 1314-8

Antal A, Polania R, Schmidt-Samoa C, Dechent P, Paulus W. (2011) Transcranial direct current stimulation over the primary motor cortex during fMRI. Neuroimage. 2011 Mar 15;55(2): 590-6

Moliadze V, Antal A, Paulus W. Boosting brain excitability by transcranial high frequency stimulation in the ripple range. J Physiol 2010 588: 4891-904

Nitsche MA, Kuo MF, Karrasch R, Wächter B, Liebetanz D, Paulus W (2009) Serotonin affects transcranial direct current-induced neuroplasticity in humans. BIOL PSYCHIAT 66(5): 503-8

Address

Dept. of Molecular Biology
of Neuronal Signals
Max Planck Institute for
Experimental Medicine
Hermann-Rein-Strasse 3

37075 Göttingen
Germany

phone: +49-551-3899 643
fax: +49-551-3899 644
email: pardo@em.mpg.de

Further Information

http://www.uni-goettingen.de/en/127638.html

Jeong Seop Rhee

Group leader, Max Planck Institute for Experimental Medicine

- M.S. in Biology, Sogang University Master thesis, Seoul, Korea (1992)
- Ph. D. Kyushu University, School of Medicine Department of Physiology, Japan (1997)
- Assistant Professor, Kyushu University, Faculty School of Medicine Department of Physiology, Japan (1997 – 2000)
- Postdoctoral fellow, Max-Planck Institute Biophysical Chemistry, Department of Membranbiophysik, Germany (2000 – 2004)
- Assistant Professor, Baylor College of Medicine, Department of Human Genetics and Neuroscience, USA (2004 – 2006)
- Group Leader, Max Planck Institute of Experimental Medicine, Göttingen, Germany (since 2006)

Major Research Interests

We study that signaling between nerve cells in the brain is mainly mediated at synapses, which are specialized cellular contact sites. The transfer of information at synapses can be regulated dynamically, a process that is called synaptic plasticity. Our main research goal is to elucidate the molecular mechanisms that underlie synaptic plasticity at synapses in the central nervous system. For this purpose we mainly use electrophysiological methods, in combination with nerve cells from genetically modified mice or virus-mediated molecular perturbation of nerve cell function.

Neurotransmitter release is the first step in synaptic signaling. It is mediated by exocytosis of synaptic vesicles at highly specialized contact sites, the active zones of synapses. Neurotransmitters are stored in synaptic vesicles, which undergo a complex trafficking cycle in the presynaptic compartment in order to sustain the rapid and repetitive transfer of information between nerve cells. Synaptic vesicles are initially tethered at the active zone plasma membrane, a process termed docking. Subsequently vesicles undergo a prefusion reaction termed priming, which renders docked vesicles fusion competent, thus defining the readily releasable pool of vesicles. Triggered by the arrival of an action potential at the nerve terminal and the concomitant increase in the intracellular Ca^{2+} concentration, a fraction of fusion competent vesicles in the readily releasable pool fuse with the plasma membrane and release their content. After fusion, vesicular membrane and protein components are recycled by endocytosis and used for additional rounds of exocytosis.

Essentially, each step of the synaptic vesicle cycle can contribute to the regulation of synaptic plasticity. We combine mouse genetics, molecular biological and morphological methods, and patch clamp electrophysiological analyses of autaptic cultured neurons, organotypic brain slice cultures, acute brain slices, or acutely isolated neurons with active presynaptic terminals in order to identify the molecular mechanisms underlying the individual synaptic vesicle recycling steps. In the past, we characterized mutant mice lacking identified presynaptic protein components of the neurotransmitter release machinery. Experiments on mutant mouse neurons are complemented by virus mediated expression of proteins in cultured neurons, which allows us to perform detailed structure-function analyses of presynaptic proteins.

Selected Recent Publications

Shin OH, Lu J, Rhee JS, Tomchick DR, Pang ZP, Wojcik SM, Camacho-Perez M, Brose N, Machius M, Rizo J, Rosenmund C, Südhof TC (2010) Munc13 C(2) B domain is an activity-dependent Ca(2+) regulator of synaptic exocytosis. Nat Struct Mol Biol 17: 280-288

Kawabe H*, Neeb A, Dimova K, Young SM Jr, Takeda M, Katsurabayashi S, Mitkovski M, Malakhova OA, Zhang DE, Umikawa M, Kariya K, Goebbels S, Nave KA, Rosenmund C, Jahn O, Rhee JS, Brose N* (2010) Regulation of Rap2A by the ubiquitin ligase Nedd4-1 controls neurite development in cortical neurons. Neuron 65: 358-372

Address

Department of Neuro- and Sensory Physiology
University Medical Center Göttingen
Humboldtallee 23

37073 Göttingen
Germany

phone: +49-551-39 5911
fax: +49-551-39 6031
e-mail: srizzol@gwdg.de

Further Information

http://rizzoli-lab.de/

Silvio O. Rizzoli

Professor, Director of Department of Neuro- and Sensory Physiology

- 1996 – 2000 BSc in Biochemistry at the University of Bucharest, Romania
- 2000 – 2004 PhD in Physiology at the University of Colorado, Denver, USA (Department of Physiology and Biophysics, Prof. W. J. Betz)
- 2004 – 2007 Postdoctoral Fellow, Dept. of Neurobiology, Max-Planck Institute for Biophysical Chemistry, Göttingen
- 2007 – 2012 Group Leader (STED Microscopy) at the European Neuroscience Institute Göttingen (ENI-G)
- 2012 – 2014 Professor (W3), University Medical Center Göttingen
- 2014 – Director of the Department of Neuro- and Sensory Physiology, University Medical Center Göttingen

Major Research Interests

Conventional fluorescence microscopy is limited by the diffraction of light: fluorescent objects that are close together cannot be discerned. Stimulated emission depletion (STED) is a recent advancement in optical physics that breaks the diffraction barrier, allowing microscopes to obtain much clearer images. The diffraction barrier has been particularly problematic for imaging synaptic vesicles, which are among the smallest known organelles (30-50 nm in diameter). They are located in small areas in the synapses (about 1 micron in diameter). The group takes advantage of the increased imaging resolution provided by STED to investigate synaptic vesicle function, with an emphasis on synaptic vesicle recycling. Since STED microscopy also allows imaging of protein domains, the group aims at studying the patterning of protein domains in the synapse, in order to understand its molecular architecture.

Selected Recent Publications

Wilhelm BG, Mandad S, Truckenbrodt S, Kröhnert K, Schäfer C, Rammner B, Koo SJ, Claßen GA, Krauss M, Haucke V, Urlaub H, Rizzoli SO (2014) Composition of isolated synaptic boutons reveals the amounts of vesicle trafficking proteins. Science 344: 1023-1028

Revelo NH, Kamin D, Truckenbrodt S, Wong AB, Reuter-Jessen K, Reisinger E, Moser T, Rizzoli SO (2014) A new probe for super-resolution imaging of membranes elucidates trafficking pathways. J Cell Biol 205: 591-606

Saka SK, Vogts A, Kröhnert K, Hillion F, Rizzoli SO*, Wessels JT* (2014) Correlated optical and isotopic nanoscopy. Nat Commun 5: 3664. *corresponding author

Saka SK, Honigmann A, Eggeling C, Hell SW, Lang T, Rizzoli SO (2014) Multiprotein assemblies underlie the mesoscale organization of the plasma membrane. Nat Commun 5: 4509

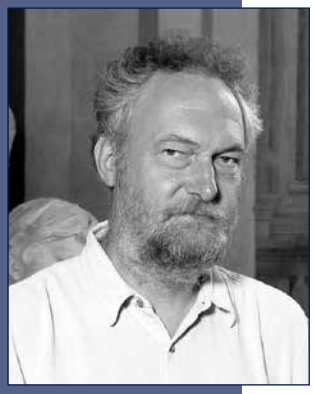
Opazo F, Levy M, Byrom M, Schäfer C, Geisler C, Groemer TW, Ellington AD, Rizzoli SO (2012) Aptamers as potential tools for super-resolution microscopy. Nat Methods 9: 938-939

Denker A, Bethani I, Kröhnert K, Körber C, Horstmann H, Wilhelm BG, Barysch SV, Kuner T, Neher E, Rizzoli SO (2011a) A small pool of vesicles maintains synaptic activity *in vivo*. Proc Natl Acad Sci USA 108: 17177-17182

Denker A, Kröhnert K, Bückers J, Neher E, Rizzoli SO (2011b) The reserve pool of synaptic vesicles acts as a buffer for proteins involved in synaptic vesicle recycling. Proc Natl Acad Sci USA 108: 17183-17188

Wilhelm BG, Groemer TW, Rizzoli SO (2010) The same synaptic vesicles drive active and spontaneous release. Nat Neurosci 13: 1454-1456

Hoopmann P, Punge A, Barysch SV, Westphal V, Bückers J, Opazo F, Bethani I, Lauterbach MA, Hell SW, Rizzoli SO (2010) Endosomal sorting of readily releasable synaptic vesicles. Proc Natl Acad Sci USA 107: 19055-19060



Detlev Schild

Professor of Physiology

- 1979 Diploma in Physics, University of Göttingen
- 1982 M.D., University of Göttingen
- 1985 Dr. rer. nat., University of Göttingen
- 1987 Dr. med., University of Göttingen
- 1997 Appointed head of the Department of Molecular Neurophysiology in the Center of Physiology and Pathophysiology, Medical School, University of Göttingen

Major Research Interests

We are trying to understand how the sense of smell works. Olfactory systems are able to detect and distinguish thousands of molecules in our environment. Receptor neurons are endowed with hundreds of different receptor molecules to bind odorants and transduce the chemical signals into electrical ones. Chemosensory information is thus represented in a rather high-dimensional space. The receptor neurons, which code the hitting probability of odor molecules binding to their molecular receptors, eventually generate trains of action potentials, a one-dimensional vector of stochastic processes. They convey their information onto the brain, in particular the olfactory bulb, where the receptor neuron signals are transformed into a two-dimensional neuronal image of firing activities. Glomerula, small skeins of receptor nerve fibers and synapses in the olfactory bulb, appear to be the heart of olfactory coding.
Using a combination of electrophysiological techniques, single molecule detection, photochemical and high resolution imaging techniques as well as computational and modeling methods, we are studying the biophysical and physicochemical details of

- the primary coding processes,
- the synaptic transmission in glomerula
- the generation of the neuronal chemotopic map as well as
- the processes and mechanism of odor learning and memory.

Selected Recent Publications

Alevra M, Schwartz P, Schild D (2012) Direct measurement of diffusion in olfactory cilia using a modified FRAP approach. PLoS ONE, 7(7): e39628

Breunig E, Kludt E, Czesnik D, Schild D (2011) The styryl dye FM1-43 supresses odorant responses in a subset of olfactory neurons by blocking cyclic nucleotide-gated (cng) channels. J Biol Chem 286(32): 28041-28048

Junek S, Kludt E, Wolf F, Schild D (2010) Olfactory coding with patterns of response latencies. Neuron 67: 872-884

Breunig E, Manzini I, Piscitelli F, Gutermann B, Di Marzo V, Schild D, and Czesnik D (2010) The endocannabinoid 2-AG controls odor sensitivity in larvae of *Xenopus laevis*. J Neurosci 30: 8965-8973

Hassenklöver T, Schwartz P, Schild D, Manzini I (2009) Purinergic signaling regulates cell proliferation of olfactory epithelium progenitors. Stem Cells 27: 2022-2031

Chen T-W, Lin B-J, Schild D (2009) Odor coding by modules of coherent mitral/tufted cells in the vertebrate olfactory bulb. PNAS 106: 2401-2406

Junek S, Chen T-W, Alevra M, Schild D Activity Correlation Imagin (2009) Visualizing Function and Structure of Neuronal Populations. Biophys J 96: 3801 - 3809

Czesnik D, Schild D, Kuduz J, Manzini I (2007) Endocannabinoid actions in the olfactory epithelium. Proc Natl Acad Sci USA 104: 2967-2972

Franze K, Grosche J, Skatchkov SN, Schinkinger S, Schild D, Uckermann O, Travis K, Reichenbach A, Guck J (2007) Spotlight on Glial Cells: Living Optical Fibers in the Vertebrate Retina. Proc Natl Acad Sci USA 104: 8287-8292

Address

Dept. of Neurophysiology
and Cellular Biophysics in
the Center of Physiology
and Pathophysiology
University of Göttingen
Humboldtallee 23

37073 Göttingen
Germany

phone: +49-551-39 5915
fax: +49-551-39 8399
e-mail: dschild@gwdg.de

Further Information

http://www.uni-goettingen.de/en/58026.html

Address

Molecular Neurobiology
European Neuroscience Institute (ENI)
Grisebachstrasse 5

37077 Göttingen
Germany

phone: +49-551-39 10374
fax: +49-551-39 12346
e-mail: oschlue@gwdg.de

Further Information

http://www.uni-goettingen.de/en/58027.html

Oliver Schlüter

Group Leader Molecular Neurobiology

- 1995 – 2001 M.D. Ph.D. with Thomas C. Südhof at the Max-Planck-Institute for Experimental Medicine in Göttingen (Germany)
- Dr. rer. nat. (PhD) 2000, University of Hannover
- Dr. med. (Medical thesis), University of Göttingen
- 2002 – 2006 Postdoc with Robert C. Malenka at Stanford University Medical Center (USA)
- Independent group leader (Emmy-Noether/DFG) at the European Neuroscience Institute Göttingen (ENI-G), since 2006

Major Research Interests

Activity-dependent modulations of synaptic transmission are important mechanisms of information processing and storage in neuronal circuits. A variety of related but mechanistically distinct forms of synaptic plasticity have been described in *in vitro* preparations of brain slices.
A major goal of my laboratory is to elucidate the underlying molecular events, leading to and regulating changes in synaptic efficacy. Newly developed techniques of molecular replacement, using mouse genetics and/or viral-mediated gene transfer allow us to manipulate the molecular composition of single neurons in a spatial and temporal controlled manner.
In particular, we are able to investigate the effects of heterologously expressed proteins on the background of wild-type neurons, or neurons, in which the endogenous protein expression is diminished. We combine this technique with simultaneous dual whole cell patch clamp recordings from rodent brain slices to monitor changes in synaptic efficacy in the manipulated cell in comparison to the neighboring control cell.
Knowledge gained from the understanding of molecular mechanisms of synaptic transmission and plasticity will ultimately provide important clues for the function of neuronal circuits and potentially the functioning of the brain.

Selected Recent Publications

Bonnet SA*, Akad DS*, Samaddar T, Liu Y, Huang X, Dong Y, Schlüter OM# (2013) Synaptic state-dependent functional interplay between Postsynaptic Density-95 and Synapse-associated Protein 102. J Neurosci 33(33): 13398-409

Suska A*, Lee BR, Huang YH, Dong Y#, Schlüter OM# (2013). Selective presynaptic enhancement of the prefrontal cortex to nucleus accumbens pathway by cocaine. Proc Ntl Acad Sci USA 110(2): 713-8

Brown TE, Lee BR, Mu P, Ferguson D, Dietz D, Ohnishi YN, Lin Y, Suska A, Ishikawa M, Huang YH, Shen H, Kalivas PW, Sorg BA, Zukin RS, Nestler EJ, Dong Y, Schlüter OM (2011) A silent synapse-based mechanism for cocaine-induced locomotor sensitization. J Neurosci 31: 8163-74

Xu* W, Schlüter OM, Steiner P, Czervionke BL, Sabatini B, Malenka RC (2008) Molecular dissociation of the role of PSD-95 in regulating synaptic strength and LTD. Neuron 57: 248-62

Schlüter OM, Xu* W, Malenka RC (2006) Alternative N-terminal domains of PSD-95 and SAP97 govern activity-dependent regulation of synaptic AMPA receptor function. Neuron 51: 99-111

Schlüter OM, Basu J, Südhof TC, Rosenmund C (2006) Rab3 superprimes synaptic vesicles for release: implications for short-term synaptic plasticity. J Neurosci 26, 1239-46

Chandra S, Gallardo G, Fernandez-Chacon R, Schlüter OM, Südhof TC (2005) Alpha-synuclein cooperates with CSPα in preventing neurodegeneration. Cell 123: 383-96

Address

Somatosensory Signaling Group
Max Planck Institute for Experimental Medicine
Hermann-Rein-Str. 3

37075 Göttingen
Germany

phone: +49-551-3899 572
fax: +49-551-3899 573
e-mail: mschmidt@em.mpg.de

Further Information

http://www.em.mpg.de/index.php?id=311

Manuela Schmidt

Group Leader Somatosensory Signaling

- 1997 – 2002: Diploma, Biology, University of Wuerzburg, Germany
- 2001 – 2002: Master, Neurosciences, International Max Planck School Neurosciences, Goettingen, Germany
- 2002 – 2006: PhD, Neurosciences, International Max Planck School Neurosciences, Laboratory of Stephan Sigrist, ENI-G, Goettingen, Germany
- 2007 – 2012: Postdoc with Ardem Patapoutian, The Scripps Research Institute, La Jolla, California, USA
- Since 2012: Emmy Noether Group Leader

Major Research Interests

The perception of and appropriate reaction to external and internal stimuli is critical for survival. In vertebrates, chemical, mechanical (from pleasant touch to painful contact) and thermal stimuli are detected by specialized somatic sensory neurons which transfer these signals via the spinal cord to the brain. An important subset of these neurons, so-called nociceptors, senses noxious stimuli. Consequently, their activation mediates nociception and leads to the sensation of pain.
Pain is the single most common symptom for which patients seek medical assistance. While acute pain has served as a protective mechanism throughout evolution to guard the body against injury, pain can also become chronic and highly debilitating. Unfortunately, chronic pain imposes substantial challenges to medical practice: current therapies can be effective for short-term treatment however many do not provide sufficient relief to chronic conditions or cause strong side-effects. Therefore, a deeper understanding of the molecular mechanisms underlying both, acute and chronic pain is crucially needed.
Our research focuses on the comparative and quantitative analysis of somatosensory signaling networks in established mouse models of acute and chronic pain. To this purpose our lab employs interactomics, genetic profiling, calcium-imaging, electrophysiology, neuronal tracing and mouse behavioral studies in order to address key questions:

- What are the specific dynamic changes that occur at the molecular, cellular and network levels in nociceptors during acute and chronic pain?
- How are these changes mirrored in pain-related regions of the central nervous system?

Selected Recent Publications

Rouwette T, Avenali L, Sondermann J, Narayanan P, Gomez-Varela D, Schmidt M (2015) Modulation of nociceptive ion channels and receptors via protein-protein interactions - implications for pain relief. Channels (Austin). 2015 Jul 4;9(4): 175-85. doi: 10.1080/19336950.2015.1051270. Epub 2015 Jun 3.

Coste B, Murthy SE, Marthur J, Schmidt M, Mechioukhi Y, Delmas P, Patapoutian A. (2015) Piezo1 ion channels pore properties are dictated by C-terminal region. Nature Communications 6; doi: 10.1038/ncomms8223

Avenali L, Narayanan P, Rouwette T, Cervellini I, Sereda M, Gomez-Varela D, Schmidt M. (2014). Annexin A2 Regulates TRPA1-Dependent Nociception. J Neurosci. 34(44): 14506-16. doi: 10.1523/JNEUROSCI.1801-14

Dubin AE, Schmidt M, Mathur J, Petrus MJ, Xiao B, Coste B, Patapoutian A (2012) Inflammatory signals enhance piezo2-mediated mechanosensitive currents. Cell Rep Sep 27;2(3): 511-7

Gómez-Varela D, Schmidt M, Schoellerman J, Peters EC, Berg DK (2012) PMCA2 via PSD-95 Controls Calcium Signaling by α7-Containing Nicotinic Acetylcholine Receptors on Aspiny Interneurons. J Neurosci 16;32(20): 6894-905

Coste B, Xiao B, Santos JS, Syeda R, Grandl J, Spencer KS, Kim SE, Schmidt M, Mathur J, Dubin AE, Montal M, Patapoutian A (2012) Piezo proteins are pore-forming subunits of mechanically activated channels. Nature 19;483(7388): 176-81

Address

AG “Molecular and
Translational Neurology”
Max Planck Institute
for Experimental Medicine
Hermann-Rein-Str. 3

37075 Göttingen
Germany

phone: +49-551-3899 745
+49-551-3899 757
fax: +49-551-3899 753
e-mail: sereda@
em.mpg.de

Further Information

http://www.em.mpg.de/
index.php?id=122&L=1

Michael Sereda

Group Leader Molecular and Translational Neurology

- 2007 Group leader ”Molecular and Translational Neurology“, Max Planck Institute of Experimental Medicine
- 2008 Board certification in Neurology (Facharzt für Neurologie)
- 2008 Attending Neurologist and Head Neurogenetics Outpatients Clinic, Dept. of Clinical Neurophysiology, University of Göttingen, UMG
- 2010 Associate Professorship “Neurology and Neurogenetics” (Habilitation)
- 2012 DFG-Heisenberg Professorship “Hereditary Neuropathies”, Dept. of Clinical Neurophysiology, University of Göttingen

Major Research Interests

We pursue a basic research interest in glia cell biology, axon-glia interaction and mechanisms of diseases of the peripheral nervous system (PNS). We have generated a transgenic rat model of the most frequent human neuropathy, Charcot-Marie-Tooth disease type 1A (CMT1A). This disease is associated with a partial duplication of chromosome 17 which leads to an overexpression of the tetraspan protein PMP22. Transgenic “CMT rats” expressing additional copies of this gene share characteristic clinical features of the human disease, including muscle weakness, reduced nerve conduction velocities, and marked Schwann cell hypertrophy resulting in onion bulb formation. The CMT rat allows a better understanding of the cellular disease mechanism operating in human CMT1A, and is helpful in the analysis of modifier genes, epigenetic factors, and in the evaluation of experimental treatment strategies. In an attempt to translate findings from the animal model to humans we have recently identified biomarkers of disease severity in CMT1A patients. We are currently validating markers in patients from across Europe which should help us to perform clinical trials in the near future.

Selected Recent Publications

Stassart RM, Fledrich R, Velanac V, Brinkmann BG, Schwab MH, Meijer D, Sereda MW, Nave K-A (2013) A role for Schwann cell-derived neuregulin-1 in remyelination. Nat Neurosci 1: 48-54

Fünfschilling U, Supplie LM, Mahad D, Boretius S, Saab AS, Edgar J, Brinkmann BG, Kassmann CM, Tzvetanova ID, Möbius W, Diaz F, Meijer D, Suter U, Hamprecht B, Sereda MW, Moraes CT, Frahm J, Goebbels S, Nave K-A (2012) Glycolytic oligodendrocytes maintain myelin and long-term axonal integrity. Nature 29: 517-21

Fledrich R, Schlotter-Weigel B, Schnizer TJ, Wichert SP, Stassart RM, Meyer zu Hörste G, Klink A, Weiss BG, Haag U, Walter MC, Rautenstrauss B, Paulus W, Rossner MJ, Sereda MW (2012) A rat model of Charcot-Marie-Tooth disease 1A recapitulates disease variability and supplies biomarkers of axonal loss in patients. Brain 135: 72-87

Brinkmann BG, Agarwal A, Sereda MW, Garratt AN, Lai C, Müller T, Wende H, Stassart RM, Nawaz S, Humml C, Velanac V, Radyushkin K, Goebbels S, Fischer TM, Birchmeier C, Ehrenreich H, Schwab MH, Nave K-A (2008) Neuregulin-1/ErbB signaling serves distinct functions in myelination of the peripheral and central nervous system. Neuron 28;59(4): 581-95

Meyer zu Horste G, Prukop T, Liebetanz D, Mobius W, Nave K-A, Sereda MW (2007) Antiprogesterone therapy uncouples axonal loss from demyelination in a transgenic rat model of CMT1A neuropathy. Ann Neurol 61(1): 61-72

Address

AG Visual Processing
European Neurosciene
Institute Göttingen (ENI)
Grisebachstr. 5

37077 Göttingen
Germany

phone: +49-551-39 13905
e-mail: msilies@eni-g.de

Further Information

http://www.eni.gwdg.de/index.php?id=356

Marion Silies

Group Leader Visual Processing

- PhD in Biology, University of Münster, 2009
- Postdoctoral Fellow, Stanford University, 2009 - 2014
- Group leader, European Neuroscience Institute Göttingen, since 2014

Major Research Interests

We aim to understand how neural networks perform critical computations. In sensory systems, a variety of computations extract information from the environment to guide behavior. Our understanding of these processes remains fragmentary: in some systems, specific neurons have been identified that respond to distinct sensory cues; in others, specific behavioral outputs or computational models that predict physiology or behavior are known. We want to get a complete understanding of how neurons gain specific physiological properties, how they are organized in circuits and how these circuits guide distinct behaviors.

Animals ranging from insects to humans use visual motion to navigate through the environment, capture prey, or escape predators. Because motion vision requires circuits to integrate visual information over both space and time it has long been considered a paradigmatic computation for understanding brain function and models that describe how motion information can be extracted have long existed. However, the neural circuits that implement these models are still incompletely understood. Moreover, many molecular and cellular mechanisms regulate synaptic activity or modulate cellular properties in identified neurons, but they have only rarely been associated with specific, behaviorally relevant computations. My lab intends to achieve this by studying motion detection in a genetic model organism, the fruit fly Drosophila. In flies, motion-guided behaviors have been studied in detail and described computationally. We use cell biological and genetic approaches to manipulate critical neurons in motion detecting circuits. In combination with physiology and quantitative behavioral analysis, we hope to identify the mechanisms by which a nervous system can integrate molecular, cellular and circuit mechanisms to compute behaviorally critical outputs from specific inputs.

Selected Recent Publications

Sugie A, Hakeda-Suzuki S, Suzuki E, Silies M, Shimozono M, Möhl E, Suzuki T, Tavosanis G (2015) Molecular Remodeling of the Presynaptic Active Zone of *Drosophila* Photoreceptors via Activity-Dependent Feedback. Neuron 86: 711-725

Silies M, Gohl DM, and Clandinin TR (2014) Motion-Detecting Circuits in Flies: Coming Into View. Annual Review of Neuroscience 37: 307-327

Gohl DM, Freifeld F, Silies M, Hwa JJ, Horowitz M and Clandinin TR (2014) Large-scale mapping of transposable element insertion sites using digital encoding of sample identity. Genetics 196: 615-623

Clark DA, Fitzgerald JE, Ales JM, Silies M, Gohl DM, Norcia AM and Clandinin TR (2014) Flies and humans use a shared computational strategy that exploits natural scene statistics to estimate motion. Nature Neuroscience 17: 296-303

Silies M*, Gohl DM*, Fisher YE, Freifeld L, Clark DA and Clandinin TR (2013) Modular use of peripheral input channels tunes motion-detecting circuitry. Neuron 79: 111-127
*equal contribution

Gohl DM, Silies MA, Gao XJ, Bhalerao S, Luongo FJ, Lin CC, Potter CJ and Clandinin TR (2011) A genetically convertible enhancer trap for directed combinatorial dissection of gene expression patterns. Nature Methods 8: 231-237

Address

Max Planck Institute for Experimental Medicine
Hermann-Rein-Str. 3

37075 Göttingen
Germany

phone: +49-551-3899 533
e-mail: msimons@gwdg.de

Further Information

http://www.em.mpg.de/index.php?id=133&no_cache=1&tx_jppageteaser_pi1[backId]=16

Mikael Simons

Group Leader of Centre for Biochemistry and Molecular Cell Biology

- 2004 Facharzt/Specialty qualification in Neurology
- 2005 Habilitation in Neurology, University of Tübingen
- 2004 – 2008 Junior group leader, Centre for Biochemistry and Molecular Cell Biology, University of Göttingen
- 2007 Attendant at the Department of Neurology; Head of the Multiple Sclerosis out-patient clinic, Department of Neurology, University of Göttingen
- 2008 Group leader with an ERC Starting Grant at the Max-Planck Institute for Experimental Medicine
- Feb 2009 W3- Heisenberg Professorship, Department of Neurology, University of Göttingen

Major Research Interests

Mechanisms of myelin biogenesis and repair
The myelin sheath is one of the most abundant membrane structures in the vertebrate nervous system. It is formed by the spiral wrapping of glial plasma membrane extensions around the axons, followed by the extrusion of cytoplasm and the compaction of the stacked membrane bilayers. These tightly packed membrane stacks provide electrical insulation around the axons and maximize their conduction velocity. Axonal insulation by myelin not only facilitates rapid nerve conduction but also regulates axonal transport and protects against axonal degeneration. Damage to the myelin sheath, as it for example occurs in multiple sclerosis (MS) results therefore in severe neurological disability also as a result of neurodegeneration.
Our main goal is to come up with new approaches of how to promote remyelination in demyelinating diseases such as MS. To realize this goal we need to understand how myelin is formed during normal development.

Selected Recent Publications

Aggarwal S, Snaidero N, Pähler G, Frey S, Sánchez P, Zweckstetter M, Janshoff A, Schneider A, Weil MT, Schaap IA, Görlich D, Simons M (2013) Myelin membrane assembly is driven by a phase transition of myelin basic proteins into a cohesive protein meshwork. PLoS Biol 11(6): e1001577

Aggarwal S, Yurlova L, Snaidero N, Reetz C, Frey S, Zimmermann J, Pähler G, Janshoff A, Friedrichs J, Müller DJ, Goebel C, Simons M (2011) A Size Barrier Limits Protein Diffusion at the Cell Surface to Generate Lipid-Rich Myelin-Membrane Sheets. Dev Cell 21(3): 445-56

Aggarwal S, Yurlova L, Simons M (2011) Central nervous system myelin: structure, synthesis and assembly. Trends Cell Biol 21(10): 585-93

Budde H, Schmitt S, Fitzner D, Opitz L, Salinas-Riester G, Simons M (2010) Control of oligodendroglial cell number by the miR-17-92 cluster. Development 137(13): 2127-32

Hsu C, Morohashi Y, Yoshimura SI, Manrique-Hoyos N, Jung SY, Lauterbach M, Bakhti M, Grønborg G, Möbius W, Rhee JS, Barr FA, Simons M (2010) Regulation of exosome secretion by Rab35 and its GTPase-activating proteins TBC1D10A-C. J Cell Biol 189(2): 223-32

Simons M, Raposo G (2009) Exosomes-vesicular carriers for intercellular communication. Curr Opin Cell Biol 21(4):575-81

Trajkovic K, Hsu C, Chiantia S, Rajendran L, Wenzel D, Wieland F, Schwille P, Brugger B, Simons M (2008) Ceramide triggers budding of exosome vesicles into multivesicular endosomes. Science 319(5867): 1244-7

Simons M, Trotter J (2007) Wrapping it up: the cell biology of myelination. Curr Opin Neurobiol. 17(5): 533-40

Fitzner D, Schneider A, Kippert A, Möbius W, Willig KI, Hell SW, Bunt G, Gaus K, Simons M (2006) Myelin basic protein-dependent plasma membrane reorganization in the formation of myelin. EMBO J 25(21): 5037-4

Address

Center of Anatomy
Dept. of Neuroanatomy
University of Göttingen
Kreuzbergring 36

37075 Göttingen
Germany

phone: +49-551-39 7051
fax: +49-551-39 14016
e-mail: jochen.staiger@med.uni-goettingen.de

Further Information

http://neuro.ukat.gwdg.de/barrels/

Jochen Staiger

Professor of Neuroanatomy

- 1993 Graduation as Dr. med. at the Medical Faculty of the Justus-Liebig-University Giessen; grade: summa cum laude
- 1994 – 2000 Post-doc at the C. & O. Vogt-Institute for Brain Research, Düsseldorf, (Head: Prof. Dr. K. Zilles); Leader of the research group „Cortical microcircuits“
- 2000 Habilitation and Venia legendi for Anatomy at the Medical Faculty of the Heinrich-Heine-University Düsseldorf
- 2006 Appointment as W3 Univ.-Professor for Cell Biology at the Albert-Ludwigs-University Freiburg
- Since 2010 Full professor and director of the Department of Neuroanatomy at the Georg-August-University Göttingen

Major Research Interests

- Developmental plasticity induced by early postnatal deprivation of sensory stimulation in mice with intact or genetically altered thalamocortical projections
- Thalamo-cortical interactions as the first stage of cortical information processing
- Microcircuits in columnar modules – examining the Bauplan of synaptic connectivity of neocortex
- Tactile learning: Genomic regulation of experience-dependent plasticity in the trigeminal somatosensory system

Selected Recent Publications

Staiger JF, Bojak I, Miceli S, Schubert D (2015) A gradual depth-dependent change in connectivity features of supragranular pyramidal cells in rat barrel cortex. Brain Structure & Function 220: 1317-1337(IF 4.567)

Guy J, Wagener RJ, Mock M, Staiger JF (2014) Persistence of Functional Sensory Maps in the Absence of Cortical Layers in the Somatosensory Cortex of Reeler Mice. Cereb Cortex doi: 10.1093/cercor/bhu052 (IF 8.665)

Feldmeyer D, Brecht M, Helmchen F, Petersen CCH, Poulet JFA, Staiger JF, Luhmann HJ, Schwarz C (2013) Barrel cortex function. Prog Neurobiol 103: 3-27 (IF 9.035)

Harsan LA, Dávid C, Reisert M, Schnell S, Hennig J, von Elverfeldt D, Staiger JF (2013) Mapping remodeling of thalamocortical projections in the living reeler mouse brain by diffusion tractography. Proc Natl Acad Sci USA 110: E1797-E1806 (IF 9.737)

De Felipe J, Lopez-Cruz PL, Benavides-Piccione R, Bielza C, Larranaga P, Anderson S, Burkhalter A, Cauli B, Fairen A, Feldmeyer D, Fishell G, Fitzpatrick D, Freund TF, Gonzalez-Burgos G, Hestrin S, Hill S, Hof PR, Huang J, Jones EG, Kawaguchi Y, Kisvarday Z, Kubota Y, Lewis, DA, Marin O, Markram H, McBain CJ, Meyer HS, Monyer H, Nelson SB, Rockland K, Rossier J, Rubenstein JL, Rudy B, Scanziani M, Shepherd GM, Sherwood CC, Staiger JF, Tamas G, Thomson A, Wang Y, Yuste R, Ascoli GA (2013) New insights into the classification and nomenclature of cortical GABAergic interneurons. Nature Reviews Neuroscience 14: 202-16 (IF 30.455

Address

Dept. of Molecular Developmental Neurobiology
Max Planck Institute for Biophysical Chemistry
Am Faßberg 11

37077 Göttingen
Germany

phone: +49-551-201 1710
fax: +49-551-201 1504
e-mail: astoyko@gwdg.de

Further Information

http://www.uni-goettingen.de/en/58038.html

Anastassia Stoykova

Privatdozentin, Developmental Biology, Max Planck Institute for Biophysical Chemistry

- 1973 – 1988 Research Associate, Bulgarian Academy of Sciences, Sofia
- 1987 PhD, Institute Molecular Biology, Bulg. Acad. Sci., Sofia
- 1989 Habilitation (neurochemistry), Sofia
- 1989 – 1991 Assistant Research Professor, Inst. Mol. Biol., Bulg. Acad. Sci., Sofia
- 1991 – 2002 Senior Research Scientist, Max Planck Institute for Biophysical Chemistry, Dept. Molecular Cell Biology, Göttingen
- 1989 Habilitation (developmental biology), Faculty of Medicine, University Göttingen
- 2002 – 2008 Research Group Leader, Dept. Mol Cell Biol, MPIPBC, Göttingen
- since 2008 Independent Research Group Leader MPI-bpc (W2, MPG Minerva Program)
- since 2010 Adj. Professor at the University of Göttingen

Major Research Interests

Composed of six cellular layers, the mammalian neocortex is a modular structure with many functional areas in which the neurons have specific morphology, number, connections and unique physiological properties. Our group is interested in understanding the molecular and cellular mechanisms involved in specification of the immense diversity of the cortical neurons in order to be generated in a correct time, number and place during development. We have recently identified sets of genes with a differential expression between distinct domains and layers of the embryonic mouse cortex. To study the function of selected candidates in the transcriptional control of neurogenesis, we combine approaches for targeted gene inactivation or gene activation in transgenic mice using the conventional and conditional knock-out strategies with biochemical, morphological, gene expression, tissue culture methods and techniques for gene transfer in isolated brain or living mouse embryos.
With one gene, the transcription factor Pax6, we are further ahead in understanding its function. Pax6 is a critical gene for neocortical development, endowing the pluripotent radial glial progenitors with neurogenic ability and controlling the cortical patterning, including layer and area formation. Our current research focuses in unraveling genetic mechanisms by which Pax6 regulates these developmental processes with a special emphasis on its role in the control of neuronal subtype identity. We address these questions by stuyding the function of genes recently identified by us to act as Pax6 targets or Pax6 protein partners controlling its neurogenic function. We further aim to get insight into Pax6 dependent mechanisms involved in generation of stem/progenitors cells and their regenerative properties in neurogenic zones of the adult brain.

Selected Recent Publications

Boretius S, Michaelis T, Tammer R, Ashery-Padan R, Frahm J, Stoykova A (2009) *In vivo* MRI of altered brain anatomy and fiber connectivity in adult Pax6 deficient mice. Cereb Cortex 19: 2838-2847

Tuoc TC., Radyushkin K, Tonchev A, Pinon MC, Ashery-Padan R, Molnar Z, Davidoff MS, Stoykova A (2009) Selective cortical layering abnormalities and behavioral deficits in cortex-specific Pax6 knock-out mice. J Neurosci 29: 8349-8335

Pinon MC, Tuoc TC, Ashery-Padan R, Molnar Z, Stoykova A (2008) Altered molecular regionalization and normal thalamocortical connections in cortex-specific Pax6 knock-out mice. J Neurosci 28: 8724-8734

Tuoc TC, Stoykova A. (2008) Trim11 modulates the function of neurogeneic transcription factor Pax6 through ubiquitin proteosome system. Genes & Development 22: 1972-1986

Stefan Treue

Professor, Director of the German Primate Center

- Head of the Cognitive Neuroscience Laboratory
- 1992 Ph.D. Massachusetts Institute of Technology
- 1992 – 1993 Postdoctoral Fellow, MIT
- 1993 – 1995 Postdoctoral Fellow, Baylor College of Medicine, Houston, Texas
- 1995 – 2001 Work Group Leader, Laboratory of Cognitive Neuroscience, University of Tübingen
- 2000 – 2001 Professor of Animal Physiology, University of Tübingen
- 2001 Professor of Cognitive Neuroscience and Biological Psychology, University of Göttingen

Major Research Interests

Research at the Cognitive Neuroscience Laboratory is aimed at understanding the neural basis of visual perception. Vision is an active process that is far more than a passive registration of our environment. Rather, on its way from the eyes to and through the cortex, visual information is modulated by numerous processes that enhance some aspects while diminishing others. One of these processes is attention, i.e. the ability to filter out unwanted information and concentrate the brain´s processing abilities on relevant information.
The accurate representation of visual motion in the environment is one of the most important tasks of the visual system. Correspondingly, research in the laboratory concentrates on this ability as a model for sensory information processing in general.
We use various techniques. While our emphasis is on electrophysiology, i.e. the recording of the activity of neurons in the visual cortex of macaque monkeys and measuring human perceptual abilities with psychophysical methods, we also use theoretical approaches and functional brain imaging.
Using these techniques, we have been able to elucidate how motion information is represented in primate cortical area MT and how attention changes that representation and correspondingly the percept of the visual environment.

Selected Recent Publications

Niebergall R, Khayat PS, Treue S, Martinez-Trujillo J (2011) Multifocal attention filters out distracter stimuli within and beyond receptive field boundaries of primate MT neurons. Neuron 72:1067-1079

Anton-Erxleben K, Stephan VM, Treue S (2009) Attention reshapes center-surround receptive-field structure in macaque cortical area MT. Cerebral Cortex 19: 2466-2478

Busse L, Katzner S, Treue S (2008) Temporal dynamics of neuronal modulation during exogenous and endogenous shifts of visual attention in macaque area MT. Proceedings of the National Academy of Sciences 105(42): 16380-16385

Womelsdorf T, Anton-Erxleben K, Pieper F, Treue S (2006) Dynamic shifts of visual receptive fields in cortical area MT by spatial attention. Nature Neuroscience 9 (19): 1156-1160

Martinez-Trujillo JC, Treue S (2004) Feature-based attention increases the selectivity of population responses in primate visual cortex. Current Biology 14: 744-751

Martinez-Trujillo JC, Treue S (2002) Attentional modulation strength in cortical area MT depends on stimulus contrast. Neuron 35: 365-370

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Address

Dept. of Cognitive Neurosciences
German Primate Center
Kellnerweg 4

37077 Göttingen
Germany

phone: +49-551-3851 115
fax: +49-551-3851 452
e-mail: treue@gwdg.de

Further Information

http://www.dpz.eu/en/unit/cognitive-neurosciences/about-us.html

Address

Dept. of Cognitive Neurology
University Medical Center Göttingen
Robert-Koch-Straße 40

37075 Göttingen
Germany

phone: +49-551-39 13131
fax: +49-551-39 13243
e-mail: melanie.wilke@med.uni-goettingen.de

Further Information

http://www.cognitive-neurology.med.uni-goettingen.de/index.html/

Melanie Wilke

Professor of Cognitive Neurology

- 1997-2001: M.A. in Psycholinguistics, Neuropsychology and Neurobiology, Ludwig-Maximilians-University, Munich, Germany
- 2001-2005: PhD student at the Max Planck Institute for Biological Cybernetics, Tübingen, Advisor: Dr. D.A. Leopold
- 2005-2008: Postdoctoral Fellow in the Laboratory of Neuropsychology, NIMH, Bethesda, Advisor: Dr. D.A. Leopold
- 2008-2010: Postdoctoral Fellow in the Division of Biology, Caltech, Pasadena; Advisor: Prof. R.A. Andersen
- since 2011: Co-Investigator in the “Decision and Awareness” group (DAG) at the German Primate Center (DPZ)
- since 2011: Schilling Foundation Professor (W3), Director of the department of Cognitive Neurology and Head of the MR-Research Unit, UKG, Georg August University Göttingen

Major Research Interests

The long-term goal of our research is to understand how neural activity gives rise to spatial awareness and how distributed information is integrated to guide the selection of movement goals. Furthermore we are dedicated to perform translational research from monkey models of cognitive disorders to human patients. Current research focuses on the question how thalamic nuclei and cortical areas interact during visual perception and decision making. Another line of research is concerned with the neural mechanisms underlying spatial neglect, which is a frequent and severe consequence of brain damage in humans. Specifically, we are investigating pathological and compensatory changes in large-scale brain networks in human stroke patients by means of imaging (DTI, fMRI) and stimulation (tACS, tDCS, TMS) methods. We develop and employ monkey models of spatial neglect to study the underlying neural mechanisms by means of fMRI, electrophysiological recordings, inactivation and stimulation techniques with the goal to develop new therapeutic interventions.

Selected Recent Publications

Cabral-Calderin Y, Schmidt-Samoa C, Wilke M (2015) Rhythmic gamma stimulation affects bistable perception. Journal of Cognitive Neuroscience 20: 1-10

Hwang E, Hauschild M, Wilke M, Andersen RA (2014) Spatial and Temporal Eye-Hand Coordination Relies on the Parietal Reach Region. Journal of Neuroscience 34: 12884-92

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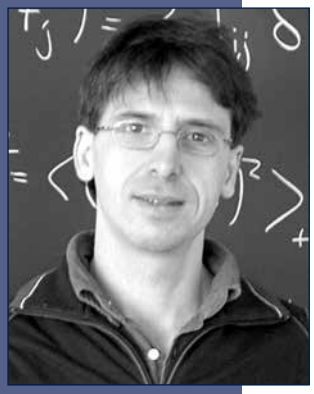
Hwang EJ, Hauschild M, Wilke M, Andersen RA (2012) Inactivation of the parietal reach region causes optic ataxia, impairing reaches but not saccades. Neuron 76(5): 1021-9

Wilke M*, Kagan I*, Andersen RA (2012) Functional Imaging Reveals Rapid Reorganization of Cortical Activity after Parietal Inactivation in Monkeys. PNAS 109: 8274-9

*equal contribution



Address

Dept. of Nonlinear Dynamics
Max Planck Institute for Dynamics and Self-Organization
Bunsenstr. 10

37073 Göttingen
Germany

phone: +49-551-5176 423
fax: +49-551-5176 409
e-mail: Fred-WL@NLD.DS.MPG.den.de

Further Information

http://www.uni-goettingen.de/en/58058.html

Fred Wolf

Group Leader Theoretical Neurophysics

- 1999 Dr. phil. nat., J.W. Goethe Universität, Frankfurt
- 2000 Amos de Shalit Fellow, Racah Institute of Physics and Interdisciplinary Center for Neural Computation, Hebrew Univ., Jerusalem (Israel)
- 2001 – 2004 Research Associate, Max-Planck-Institut für Strömungsforschung, Göttingen
- Fall 2001, 2003, 2004 Visiting Scholar, Kavli Institute for Theoretical Physics, UC Santa Barbara (USA)
- Since 2004 Head of the Research Group “Theoretical Neurophysics”, Department of Nonlinear Dynamics, Max-Planck-Institut für Strömungsforschung, Göttingen

Major Research Interests

- Theoretical neuroscience and nonlinear dynamics
- Dynamics and synchronization in cortical neural networks
- Function and development of the visual cortex
- Sensory processing in the auditory system

The brains of humans and animals arguably are among the most complex systems in nature. Over the past decade, theoretical neuroscience - the use of quantitative theories, mathematical modelling and advanced quantitative data analysis methods for the study of brain function - has started to provide powerfull new approaches for understanding the neuronal basis of preception, learning, memory, and other higher brain functions. This is because, even during the neuronal processing of the most elementary sensory stimulus large ensembles of interacting nerve cells distributed throughout the brain are activated, the collective operations of which are often hard to understand by means of purely qualitative reasoning.
The primary focus of our research in theoretical neuroscience is self-organisation in the dynamics of cortical networks. In particular, we have developed novel approches to model and predict the dynamics and and neuronal plasticity of the visual cortex. To quantitatively connect theory and experiment in this system, we recently also designed methods that enable to quantify the organization of visual cortical functional architecture with high precision. Another important focus of our work is the mathematical analysis of the dynamics of large and complex networks of pulse-coupled neuron models. The concepts and tools for the representation of the dynamics of cortical circuits developed enable a rational and transparent design of models of higher cortical functions such as the processes underlying perceptual learning phenomena.

Selected Recent Publications

Tchumatchenko T, Malyshev A, Geisel T, Volgushev M, Wolf F (2010) Correlations and synchrony in threshold neuron models. Phys Rev Lett 104(5): 058102

Junek S, Kludt E, Wolf F, Schild D (2010) Olfactory Coding with Patterns of Response Latencies. Neuron 67(5): 872-884

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Address

Laboratory for Molecular and Cellular Systems
Dept. of Neuro- and Sensory Physiology
Centre II, Physiology and Pathophysiology
University of Göttingen
Humboldtalee 23

37073 Göttingen
Germany

phone: +49-551-39 12368
fax: +49-551-39 12266
e-mail: fred.wouters @gwdg.de

Further Information

http://www.uni-goettingen.de/en/58060.html

Fred Wouters

Professor, Laboratory for Molecular and Cellular Systems

- 1997 Dr. (Ph. D.), Faculty of Chemistry, University of Utrecht, The Netherlands
- 1997 – 2000 Postdoctoral fellow, Imperial Cancer Research Fund (ICRF), London UK
- 2000 – 2001 Postdoctoral fellow, European Molecular Biology laboratory (EMBL), Heidelberg
- 2001 Appointed as group leader at the European Neuroscience Institute, Göttingen
- 2006 PD (habilitation), Physiology, Göttingen University

Major Research Interests

The focus of our research is the regulation and role of the neuronal cytoskeleton in the modulation of neuronal shape and motility during chemotactic processes. The growing neuronal growth cone probes its environment for the chemical composition of its substrate and the presence of neighbouring cells. The former information is sampled by cell adhesion receptors in focal adhesion structures that, next to their sensing function also perform a structural function in that they provide the cell with a means to exert force on its substrate. We are primarily interested in the signal transduction processes that regulate these effects and the cross-talk between the different motility systems.
The main interest areas in this question are; 1. The role and molecular mechanism of lipid raft-resident cell adhesion molecules in the remodelling of the membrane cytoskeleton, 2. Dynamic control of growth cone protein content by local proteolysis and chaperone function during chemotactic responses, 3. Role and mechanism of the neuronal exocyst complex as critical landmarks for dendritic/axonal neuritogenesis.
Our group has a related interest in the pathophysiological mechanism of neurodegeneration by intracellular aggregation of the tau protein, as occurs in Alzheimer's disease. As tau is an intrinsically unstructured protein that can undergo remarkable conformational changes upon binding to microtubules and in the Alzheimer-related aggregation condition, it presents an ideal model system for the biophysical analysis of protein conformational change and protein interactions.
Our research depends on the development and application of advanced microscopy techniques, primarily; fluorescence lifetime imaging microscopy (FLIM), and Förster resonance energy transfer (FRET) microscopy, in combination with a range of GFP-based optical biosensors and novel bioconjugation approaches for organic dyes, and protein biochemical/molecular biological techniques to resolve and quantify biochemical reactions and conditions in living cells.

Selected Recent Publications

Iliev AI, Djannatian JR, Nau R, Mitchell TJ, Wouters FS (2007) Cholestrol-dependent actin remodeling via RhoA and Rac1 activation by the *Streptococcus pneumoniae* toxin pneumolysin. Proc Natl Acad Sci USA 104: 2897-2902

Esposito A, Dohm CP, Kermer P, Bahr M, Wouters FS (2007) alpha-Synuclein and its disease-related mutants interact differentially with the microtubule protein tau and associate with the actin cytoskeleton. Neurobiol Dis 26: 521-531

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Graduate Program Committee

Prof. Dr. Gregor Eichele (Spokesperson IMPRS)
Prof. Dr. André Fiala
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Prof. Dr. Fred Wouters
Robert Epple
Siv Vingill

Program Coordination

Neuroscience Program

Prof. Dr. Michael Hörner
(Program Coordinator)

Sandra Drube
(Program Assistant)

Coordination Office Neurociences
European Neuroscience Institute
Georg-August-Universität
Grisebachstraße 5

37077 Göttingen
Germany

phone:
+49 – 551 – 39 12307 / 91244
fax:
+49 – 551 – 39 12308
e-mail:
gpneuro@gwdg.de

Further Information

http://www.gpneuro. uni-goettingen.de

Molecular Biology Program

Dr. Steffen Burkhardt
(Program Coordinator)

Kerstin Grüniger
(Program Assistant)

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Georg-August-Universität
Göttingen

Max Planck Institutes for
- Biophysical Chemistry
- Experimental Medicine
- Dynamics and Self-Organization

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