GEORG-AUGUST-UNIVERSITÄT
GÖTTINGEN / GERMANY

International Max Planck Research School

Neurosciences

MSc/PhD/MD-PhD Program

YEARBOOK 2017 / 2018

Yearbook 2017/2018

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, 66 International Max Planck Research Schools have been established involving 72 Max Planck Institutes, 35 German universities and 26 universities abroad. About 3,200 PhD students from 120 countries are presently enrolled.

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

Nils Brose
Dean of the IMPRS
Neurosciences

Overview

This yearbook is intended to provide information on the International MSc/PhD/MD-PhD Program for Neurosciences 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.

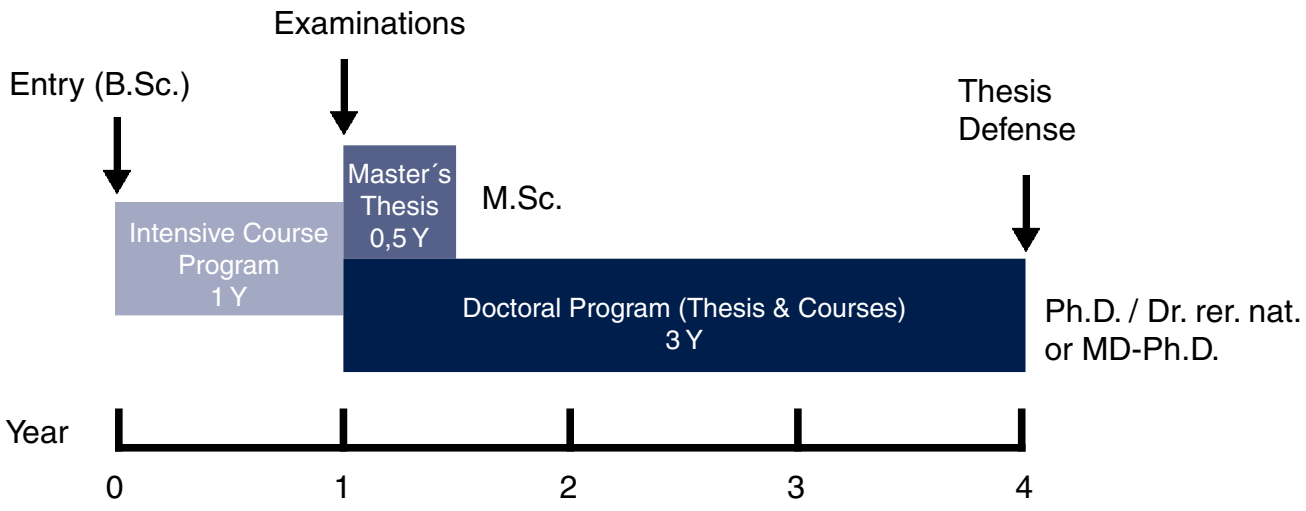
The program is a member of the Göttingen Graduate School for Neurosciences, Biophysics, and Molecular Biosciences (GGNB), which is funded by the Excellence Initiative of the German Federal and State Governments. It is offered by the University of Göttingen, the Max Planck Institute for Biophysical Chemistry (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 (Theoretical Modules)

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. (Module M.Neuro.11) Neuroanatomy, Development

B. (Module M.Neuro.12) Physiology and Basic Statistics

C. (Module M.Neuro.13) Modelling, Autonomous Nervous System, Pharmacology

D. (Module M.Neuro.14) Molecular Biology, Development, Neurogenetics

E. (Module M.Neuro.15) Sensory and Motor Functions

F. (Module M.Neuro.16) 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 (Practical Modules)

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:

M.Neuro.21 Histology & Cytology

- 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

M.Neuro.22 Electrophysiology

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

M.Neuro. 23 Microscopy & Imaging

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

M. Neuro.24 Zoo-Physiology

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

Laboratory Rotations (Practical Module M.Neuro.25)

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 2017

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 2017, the coordination office received 420 applications from 72 countries.

Continent	Applications	Admissions *
Europe (total)	**65**	**8**
Germany	23	3
other West Europe / Middle Europe	32	2
East Europe	10	3
America (total)	**46**	**6**
North America	21	3
Central/South America	25	3
Africa (total)	**75**	**0**
North Africa	29	0
Central/South Africa	46	0
Asia (total)	**233**	**5**
Near East	77	0
Central Asia / Far East	156	5
Australia	**1**	**0**

*Incl. 3 NEURASMUS students (from Albania, Cuba, Germany).

Students 2017/2018

Name		Home Country
Irene Melati	Aji	Indonesia
Aishwarya	Bhonsle	India
Tony	Carricarte*	Cuba
Daniela	Doda*	Albania
Delane	Espinueva	Canada
Conor	Heins	USA
Hendrik	Heiser	Germany
Inés	Hojas García-Plaza	Spain
Anna Marie	Müllen	Germany
Dmytro	Nesterenko	Ukraine
Tarana	Nigam	India
Melanie	Nuesch Germano	Uruguay / Italy
Adrián	Palacios Muñoz	Mexico
Sabine	Rannio*	Germany
Marina	Slashcheva	Russian Federation
Jesse	St. Amand	USA
Yannan	Su	P.R. China
Mariia	Zeziulia	Ukraine

* NEURASMUS student

Neurasmus is an Erasmus Mundus Joint Master Degree program (EMJMDs) which is based on the cooperation of 5 partner universities, comprising Université de Bordeaux/ France, Vrije Universiteit Amsterdam/Netherlands, Universitätsmedizin Göttingen/ Germany, Charité - Universitätsmedizin Berlin/Germany and Université Laval/Canada.

For details please refer to the Neurasmus website:
http://www.neurasmus.u-bordeaux2.fr/

Indonesia

Irene Melati Aji

EDUCATION

College / University:

Philipps-Universität Marburg

Highest Degree:

B.Sc.

Major Subjects:

Biomedical Science

Lab Experience:

Western blot, PCR, two-electrode voltage clamp, *in-situ* hybridization, basic patch clamp, protein labeling and detection with fluorescent markers, neuronal 3d-reconstruction with Neurolucida, morphological analysis of neurons with Neurolucida Explorer and Matlab, cluster analysis with Matlab, histochemical processing of brain slices stained with biocytin

Projects / Research:

August 2016: Internship at the Institute for Neuroscience and Medicine (Jülich Research Center)

February – August 2016: Research project for bachelor thesis: Classification of L6-interneurons in Rat´s Barrel Cortex Based on Axonal Projection Patterns (Jülich Research Center)

Scholarships:

2017 – 2018: Stipend by the International Max Planck Research School

India

Aishwarya Bhonsle

EDUCATION

College / University:

Brandeis University, University of Bristol

Highest Degree:

M.Sc.

Major Subjects:

Biophysics and Neuroscience

Lab Experience:

MATLAB, Fiji/ImageJ, Mathematica, LabView, Javascript, BASIC, C++, Python, Prism (statistical analysis), and Microsoft Office. Cell culture, biotinylation assay, Western blot, protein gel electrophoresis, LDH assay, bacterial transformation, minipreps, midipreps, PCR. Some experience with *Drosophila* genetics and management, and various microscopy and spectroscopy techniques

Projects / Research:

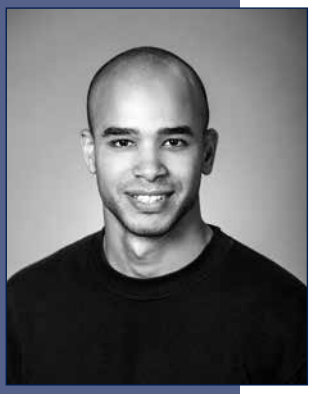
September 2012 – October 2014: Developing software in MATLAB for particle detection & analysis, and colocalization detection on data obtained from Array Tomography (Brandeis University, USA)

April – August 2016: Master's thesis "The role of altered AMPAR subunit composition in the neuronal response to repeated mild mechanical injury *in vitro*"

Scholarships:

2017 – 2018: Stipend by the International Max Planck Research School

Tony Carricarte



Cuba

Tony Carricarte

EDUCATION

College / University:

University of Havana

Highest Degree:

B.Sc.

Major Subjects:

Cellular and Molecular Biology, Neurophysiology, Genetics, Zoology, Statistics

Lab Experience:

Basic Programming, EEG processing, tDCS application

Projects / Research:

2016: Effects of Digital Training Games on Math Academic Achievement in Scholar Age Children (Cuban Center for Neuroscience)

2015 – 2016: Commercial Electrical Stimulator Produces Impairment on Working Memory Performance (Cuban Center for Neuroscience)

2014 – 2015: Functional Connectivity and Electroencephalographic Differences in Two Subtypes of ADHD (University of Havana)

Scholarships:

2017 – 2019: Erasmus Mundus Scholarship

Daniela Doda

Albania

Daniela Doda

EDUCATION

College / University:

University of Genoa, Italy

Highest Degree:

B.Sc.

Major Subjects:

Biotechnology

Lab Experience:

Mouse primary neuron culture, immunofluorescence, confocal microscopy, calcium imaging

Projects / Research:

March 2016 – February 2017: Multifunctional sensors for synaptic activity: E2GFP fluorescent probe

June 2016 – September 2016: Biocompatibility and performances of graphene-neuron interfaces

Scholarships:

2017 – 2019: Erasmus Mundus Scholarship

2014 – 2017: ARSEL scholarship

April 2016: International School of Biophysics Antonio Borsellino Scholarship

Delane Espinueva

Canada

Delane Espinueva

EDUCATION

College / University:

University of British Columbia

Highest Degree:

B.Sc.

Major Subjects:

Behavioural Neuroscience, Speech Science

Lab Experience:

Rodent husbandry, transcardial perfusion, stereotaxic surgery, cerebral irradiation, genotyping, behavioural training, mmunohistochemistry, light/ confocal microscopy, neuron reconstruction, basic training in cell culture

Projects / Research:

2016 – 2017: Investigating the neuroplastic effects of learning on different aged neurons born in adulthood and during development

2015 – 2017: Neuroplastic effects of delay-discounting: a morpholog. analysis

2014 – 2017: The role of adult neurogenesis in visuo-spatial learning and memory is dependent on stress during training and sex

2016: Adult neurogenesis and early circuit vulnerability in Alzheimer's Disease

2014 – 2015: Mapping the emotional impact of the physical environment

Scholarships:

2017 – 2018: Stipend by the International Max Planck Research School

2016 – 2017: UBC Dean of Science Scholarship

Conor Heins

USA

Conor Heins

EDUCATION

College / University:

Swarthmore College

Highest Degree:

B.A.

Major Subjects:

Neuroscience

Lab Experience:

Computational and statistical modelling, network science, machine learning, calcium imaging, monitoring animal behavior, opto- and chemogenetic approaches

Projects / Research:

2016 – present: Investigating neuronal ensemble coding through *in vivo* calcium imaging in rats (National Institute on Drug Abuse)

2015 – 2017: Neuronal basis of aggressive motivated behavior in male mice

2014 – 2015: Optogenetic interrogation of the role of short neuropeptide F in sleep & circadian rhythms in *D. melanogaster*

2012 – 2015: EEG correlates of social inference in sentence processing

Scholarships:

2016 – 2017: SmartStart II Training Award in Computational Neuroscience, Bernstein Association for Computational Neuroscience

2015 – 2017: NIH Post-baccalaureate Intramural Research Training Award (IRTA)

2014: Hans Wallach Fellowship for independent Research in Psychology

Germany

Hendrik Heiser

EDUCATION

College / University:

Georg-August-Universität Göttingen

Highest Degree:

B.Sc.

Major Subjects:

Biology

Lab Experience:

Animal handling course, Optical Imaging of intrinsic signals, conduction of various behavioral experiments, vibratome slicing, PCR, animal model: mouse (*Mus musculus*)

Projects / Research:

2017: Bachelor's thesis "Vision and plasticity in mice – effects of postsynaptic proteins PSD-93, PSD-95 and neurogranin"

2016: 2 month project "Arctic Geoecology" at the Scientific Research Station in Abisko, Northern Sweden

Scholarships:

2017 – 2018: Stipend by the International Max Planck Research School

2016: Erasmus+ scholarship

Spain

Inés Hojas García-Plaza

EDUCATION

College / University:

Universidad Autónoma de Madrid

Highest Degree:

B.Sc.

Major Subjects:

Biochemistry

Lab Experience:

Cell cultures, immunohistochemistry, immunofluorescence, tissue-clearing techniques, confocal and fluorescence microscopy, MRI

Projects / Research:

Jan – June 2017: Bachelor's thesis "Immunohistochemic characterization of the inflammation in a porcine model of ischemic stroke and correlation with MRI"

July – Sep 2016: Analysis of microglia morphology with tissue-clearing techniques

Scholarships:

2017 – 2018: Fundación Mutua Madrileña Scholarship

Germany

Anna Marie Müllen

EDUCATION

College / University:

Georg-August-University Göttingen

Highest Degree:

B.Sc.

Major Subjects:

Biology, Molecular Biosciences

Lab Experience:

Basic molecular and cellular techniques, mouse handling (incl. narcosis, topical drug application), cell culturing (incl. isolation and culturing of murine and human primary keratinocytes), flow cytometric analysis, immunohistochemistry and immunofluorescence, fluorescence microscopy

Projects / Research:

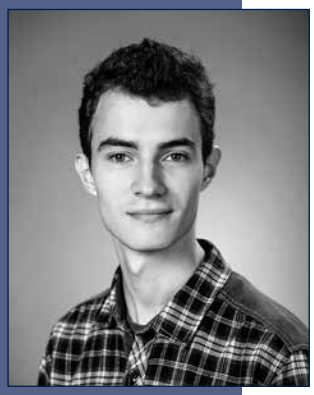
Feb – Apr 2017: Internship, Institute for Human Genetics, University Medical Center Göttingen, Germany

Apr – Aug 2016: Bachelor's thesis "Characterization of CD4-expressing cells of the murine and human epidermis"

Scholarships:

2017 – 2018: Stipend by the International Max Planck Research School

2016 – present: Studienstiftung des deutschen Volkes e.V. (German Academic Scholarship Foundation)



Ukraine

Dmytro Nesterenko

EDUCATION

College / University:

Taras Shevchenko National University of Kyiv

Highest Degree:

M.Sc.

Major Subjects:

Biology, Cytology and Histology

Lab Experience:

Various techniques in cytology and histology, cellular and tissue culture, animal models

Projects / Research:

2013 – 2015 : Different origin stem cells in treatment of hippocampus ischemic injury (Bogomoletz Institute of Physiology)

2015 – 2017: Treatment of spinal cord mechanical injury with stem and neurogel fragments with cellular elements transplantation

Scholarships:

2017 – 2018: Stipend by the International Max Planck Research School

2015 – 2016: Advanced scholarship in Taras Shevchenko National University of Kyiv

2011 – 2015: Scholarship during study term in Taras Shevchenko National University of Kyiv

India

Tarana Nigam

EDUCATION

College / University:

VIT University, Vellore, India

Highest Degree:

B.Tech.

Major Subjects:

Cell Biology and Genetics, Biochemistry, Immunology, Neurobiology, Biophysics, Bioinformatics

Lab Experience:

Basic Microbiology and Molecular Biology Techniques, Immuno histo-chemistry, Embryo handling and cryo-storage, Fluorescent and Confocal Microscopy, Mice Handling and Behavioral Tests

Projects / Research:

Internship in Pharmaceutical Industry; Isolation of DNA from environmental samples using metagenomic approach; analysis of a mouse transgenic model, as a tool to study Facioscapulohumeral dystrophy; study of stress-related and depression-like behavior in a transgenic mouse model of GRD1Cre; Transcriptional Regulation of Adult Neurogenesis in the mouse hippocampus

Scholarships:

2017 – 2018: Stipend by the International Max Planck Research School

2015 and 2016: CNRS, France- stipend for internships

2015: Summer Research Fellowship (Indian Academy of Sciences)

Uruguay

Melanie Nuesch Germano

EDUCATION

College / University:

Universidad de la República

Highest Degree:

B.Sc.

Major Subjects:

Human Biology, Minor: Neuroscience

Lab Experience:

Human genomic data analysis and big data handling; statistical software programming (especially MATLAB, R and Plink); gene panel designing; molecular and genomic data base usage, Western Blot, dissection techniques

Projects / Research:

Jun 2016 – Jun 2017: Bachelor's thesis "Study of 41 genetic markers of late onset Alzheimer's disease risk in 28 populations of the world"

Aug 2015 – Jun 2016: Gene panel design for epilepsy and Alzheimer's disease

Mar – Jul 2015: Western blotting to compare KPRP levels in cerebrospinal fluid samples of transgenic SOD1 mice

2012 – 2013: Does Gymnotus carapo show a mixed type neuro-myogenic organ?

Scholarships:

2017 – 2018: Stipend by the International Max Planck Research School

2012: "PAIE" grant of CSIC (Sectorial Commission of Scientific Research of the University of the Republic, Uruguay)

Mexico

Adrián Palacios Muñoz

EDUCATION

College / University:

Universidad Autónoma de Nuevo León (UANL)

Highest Degree:

B.Sc.

Major Subjects:

Physics

Lab Experience:

Synthesis of Superconductors and Nanomaterials, Molecular Dynamics Simulations and Monte Carlo, Chemical Kinetics Theoretical Modelling, Patch Clamp/ Cell Culture/ Cell Culture Transfection/ Multielectrode Extracellular Recordings

Projects / Research:

2015: Cooperative dynamics of Na channels (MPI-em Göttingen, Germany)

2013 – 2016: Simulations of Molecular Dynamics (UANL)

2013: Modelling of Nanoreactor from a Viral Capsid, for BIOMOD 2013 Contest (Harvard)

2013: RNA Thermometers, for iGEM 2013 Contest (MIT)

2013 – 2014: Computational Simulation of Molecules related to Neurodegenerative Disease (UTSA)

Scholarships:

2017 – 2018: Stipend by the International Max Planck Research School

2014 – 2015: DAAD Stipend

Germany

Sabine Rannio

EDUCATION

College / University:

University of Bristol

Highest Degree:

B.Sc.

Major Subjects:

Neuroscience

Lab Experience:

Electrophysiology: preparation of mouse and rat hippocampal and cortical slices, voltage/current clamp, grease gap and field recordings

Optogenetics: characterisation of optogenetically modified PV-interneurons

Genotyping: PCR; DNA extraction, electrophoresis

Imaging: confocal microscopy, staining

Projects / Research:

2016 – 2017: Bachelor's thesis "Pharmacological insights into subunit-selective antagonism of NMDA receptors"

2016: Summer research project "Characterisation of optogenetic control in the hippocampus" (University of Bristol)

Scholarships:

2017 – 2019: Erasmus Mundus Scholarship

2016: Vacation Studentship Scheme, Physiological Society

Marina Slashcheva

Russian Federation

Marina Slashcheva

EDUCATION

College / University:

St. Petersburg State University

Highest Degree:

B.Sc.

Major Subjects:

Biology

Lab Experience:

Molecular biology techniques, SDS-PAGE, Western blot), cell culturing, light and fluorescence microscopy, patch-clamp, optogenetics

Projects / Research:

Jul 2017 – Sep 2017: Effect of dendrite structure on optogenetic stimulation" (IHRS BioSoft Guest student program in Jülich, Germany)

Nov 2016 – Feb 2017: ECM proteins involved in homeostasis and plasticity (DZNE Magdeburg, Germany)

Feb 2016 – Jul 2017: Fragmentation patterns in circulating cell-free DNA (Bioinformatics Institute, St. Petersburg)

2015 – 2017: Bachelor's thesis "Investigation of transcription strategy of the AR9 bacteriophage" (Ctr. Nanobiotechnology, St. Petersburg)

Scholarships:

2017 – 2018: Stipend by the International Max Planck Research School

2016 – 2017: State Academic Scholarship of St. Petersburg State University

Jesse St. Amand

USA

Jesse St. Amand

EDUCATION

College / University:

Arizona State University

Highest Degree:

B.Sc.

Major Subjects:

Physics and Biochemistry

Lab Experience:

Python, Matlab, Java, Javascript, HTML, CSS, Mathematica, Linux, R, human behavioral studies, fMRI, EEG, transcranial functional ultrasound, gel electrophoresis, NMR, rat handling, operant conditioning, biochemistry techniques

Projects / Research:

May 2016 – June 2017: Habituation of Self-Control; Neural Correlates of Sophistication in Decision-Making: Predicting Self-Control Using fMRI; More is Meaningful: Magnitude Effect in Intertemporal Choice Depends on Self-Control; Neurometric Approach for Estimating Temporal Discount Rates from EEG Data

Aug 2015 – May 2016: Bachelor's thesis "Habituation of Intertemporal Decision-Making: Influence on Framing Effects"

Aug – Dec 2014: Response inhibition and distribution of behavior iin rats

Scholarships:

2017 – 2018: Stipend by the International Max Planck Research School

2012 – 2016: Regent High Honors Endorsemen

P.R. China

Yannan Su

EDUCATION

College / University:

Nanjing University

Highest Degree:

B.Sc.

Major Subjects:

Biological Science

Lab Experience:

Basic molecular, cellular and physiological techniques, intracellular and extracellular recording

Projects / Research:

2015 – 2016: Bachelor's thesis "Neural control of foot muscles by motoneurons active during locomotion of Aplysia"

2015: Network and behavioral actions of GdFFD in Aplysia locomotion

2014: Jiangsu Student Innovation Training Project: Time Perspective and Meaning in Life

Scholarships:

2017 – 2018: Stipend by the International Max Planck Research School

2014 – 2015: Academic Scholarship, Nanjing University

2013 – 2014: Scholarship for Extracurricular Activities, Nanjing University

Ukraine

Mariia Zeziulia

EDUCATION

College / University:

Taras Shevchenko National University of Kyiv

Highest Degree:

B.Sc.

Major Subjects:

Biophysics, Electrophysiology

Lab Experience:

Patch-clamp, working with electrophysiological software (Clampfit, QuB), basic cellular and molecular biology techniques, fluorescent microscopy

Projects / Research:

Sep 2015 – Jun 2017: Gating model of receptor-operated TRPC4 ion channel (National Academy of Sciences of Ukraine, Kyiv)

Jul – Aug 2016: Development of fluorescent proteins sensitive to cell membrane voltage (Academy and University Center Nove Hrady, Czech Republic)

Sep 2011 – Jun 2013: Biochemical parameters of fish blood to assess the quality of marine environment (National Academy of Sciences, Sevastopol, Ukraine)

Scholarships:

2017 – 2018: Stipend by the International Max Planck Research School

2014 – 2017: Ukrainian State Scholarship for students with excellent studying achievements awarded after each semester

2013 – 2014: Stipend from President of Ukraine for academic excellence

Faculty

Name		Institute	
Andrea	Antal	Clinical Neurophysiology	U Göttingen
Mathias	Bähr	Neurology	U Göttingen
Thomas	Bayer	Molecular Psychiatry	U Göttingen
Susann	Boretius	Functional Imaging Laboratory	DPZ
Henrik	Bringmann	Sleep and Waking	MPI bpc
Nils	Brose	Molecular Neurobiology	MPI em
Wolfgang	Brück	Neuropathology	U Göttingen
Camin	Dean	Trans-synaptic Signaling	ENI
Peter	Dechent	Cognitive Neurology	U Göttingen
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	MPI bpc
Tim	Friede	Medical Statistics	U Göttingen
Alexander	Gail	Sensorimotor Transformations	DPZ
Tim	Gollisch	Ophthalmology	U Göttingen
Martin	Göpfert	Cellular Neurobiology	U Göttingen
Robert	Gütig	Theoretical Neuroscience	MPI em
Ralf	Heinrich	Cellular Neurobiology	U Göttingen
Stefan	Hell	NanoBiophotonics	MPI bpc
Michael	Hörner	Cellular Neurobiology	U Göttingen
Swen	Hülsmann	Experimental Neuroanesthesiology	U Göttingen
Reinhard	Jahn	Neurobiology	MPI bpc
Siegrid	Löwel	Systems Neuroscience	U Göttingen
Ira	Milosevic	Synaptic Vesicle Dynamics	ENI
Tobias	Moser	Auditory Neuroscience & InnerEarLab	U Göttingen
Klaus-Armin	Nave	Neurogenetics	MPI em
Tiago	Outeiro	Neurodegeneration and Restaurative Research	U Göttingen
Luis	Pardo	Molecular Biology of Neuronal Signals	MPI em
Walter	Paulus	Clinical Neurophysiology	U Göttingen
Arezoo	Pooresmaeili	Perception and Cognition	ENI
Jeong Seop	Rhee	Neurophysiology	MPI-em
Michael	Rickmann	Neuroanatomy	U Göttingen
Silvio O.	Rizzoli	Neuro- and Sensory Physiology	ENI
Annekathrin	Schacht	CRC Text Structures	U Göttingen
Hansjörg	Scherberger	Neurobiology	DPZ
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
Jochen	Staiger	Neuroanatomy	U Göttingen
Anastassia	Stoykova	Molecular Developmental Neurobiology	MPI bpc
Stefan	Treue	Cognitive Neurosciences	DPZ
Melanie	Wilke	Cognitive Neurology	U Göttingen
Sonja	Wojcik	Neurotransmitter Systems	MPI em
Fred	Wolf	Theoretical Neurophysics	MPI ds
Fred	Wouters	Molecular and Cellular Systems	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

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Andrea Antal

Professor of 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. Furthermore, pathological neuroplasticity might be one foundation of numerous central nervous system diseases.

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 direct current stimulation (tDCS) was developed by our group as a non-invasive tool to induce neuroplasticity in the human cerebral cortex. 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, this method is a promising tool in the treatment of diseases that are accompanied by changes of cortical excitability. Transcranial alternating current stimulation (tACS) and random noise stimulation (tRNS) are new external stimulation techniques influencing cortical 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.

Selected Recent Publications

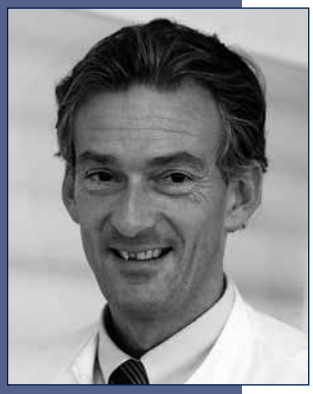
Antal A, Alekseichuk I, Bikson M, Brockmöller J, Brunoni AR, Chen R, Cohen LG, Dowthwaite G, Ellrich J, Flöel A, Fregni F, George MS, Hamilton R, Haueisen J, Herrmann CS, Hummel FC, Lefaucheur JP, Liebetanz D, Loo CK, McCaig CD, Miniussi C, Miranda PC, Moliadze V, Nitsche MA, Nowak R, Padberg F, Pascual-Leone A, Poppendieck W, Priori A, Rossi S, Rossini PM, Rothwell J, Rueger MA, Ruffini G, Schellhorn K, Siebner HR, Ugawa Y, Wexler A, Ziemann U, Hallett M, Paulus W (2017) Low intensity transcranial electric stimulation: Safety, ethical, legal regulatory and application guidelines. Clinical Neurophysiology, in press

Turi Z, Mittner M, Paulus W, Antal A (2017) Placebo Intervention Enhances Reward Learning in Healthy Individuals. Scientific Reports 7: 41028

Alekseichuk I, Turi Z, de Lara G, Antal A, Paulus W (2016) Spatial working memory in humans depends on theta and high gamma synchronization in prefrontal cortex. Current Biology 26: 1513-21

Antal A, Herrmann CS (2016) Transcranial alternating current and random noise stimulation: Possible mechanisms. Neural Plasticity 2016: 3616807

Alekseichuk I, Diers K, Paulus W, Antal A. (2015) Transcranial electrical stimulation of the occipital cortex during visual perception modifies the magnitude of BOLD activity: a combined tES-fMRI approach. Neuroimage pii: S1053-8119(15)01056-3



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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

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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, pre-clinical 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

Storck SE, Meister S, Nahrath J, Meißner JN, Schubert N, Di Spiezio A, Baches S, Vandenbroucke RE, Bouter Y, Prikulis I, Korth C, Weggen S, Heimann A, Schwaninger M, Bayer TA and Pietrzik CU (2016) Endothelial LRP1 transports amyloid-? 1-42 across the blood-brain barrier. J Clin Invest 126: 123-36

Antonios G, Borgers H, Richard BC, Brauß A, Meißner J, Weggen S, Pena V, Pillot T, Davies SL, Bakrania P, Matthews D, Brownlees J, Bouter Y, Bayer TA (2015) Alzheimer therapy with an antibody against N-terminal Abeta 4-X and pyroglutamate Abeta 3-X. Scientific Reports 5: 17338 | DOI: 10.1038/srep17338

Bouter Y, Noguerola JSL, Tucholla P, Crespi GAN, Parker MW, Wiltfang J, Miles LA and Bayer TA (2015) Abeta targets of the biosimilar antibodies of Bapineuzumab, Crenezumab, Solanezumab in comparison to an antibody against N-truncated Abeta in sporadic Alzheimer disease cases and mouse models. Acta Neuropathol 130(5)713-729

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

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Susann Boretius

Professor of Functional Imaging at the German Primate Center

- 1994: License to practice veterinary medicine
- 2000: Doctor of veterinary medicine, University of Leipzig
- 2003: Diploma in Physics, Georg-August-University of Göttingen
- 2003-2011: Scientific assistant, Max-Planck-Institute for Biophysical Chemistry, Göttingen, Biomedizinische NMR Forschungs GmbH (Prof. J. Frahm)
- 2011-2015: Professor of Biomedical Imaging with focus on magnetic resonance technologies, Christian-Albrechts University of Kiel, Germany
- 2013-2015: Head of the Molecular Imaging North Competence Center, Christian-Albrechts University of Kiel
- 2015-today: Professor of Functional Imaging, Faculty of Biology and Psychology, Georg-August University Göttingen and head of the Functional Imaging Laboratory, German Primate Center, Göttingen

Major Research Interests

Magnetic resonance imaging (MRI) and spectroscopy (MRS) Neurosciences: basic and translational research

Our research is focused on the development and improvement of magnetic resonance (MR) methods for application in basic biomedical and applied clinical research especially in the fields of neurosciences. We are particularly interested in applying this method on experimental animals, but we do complementary studies in humans as well. As truly non-invasive techniques, MRI and MRS are important methods for translational research, because almost the same methods can be applied in animals and humans. In this context, our research and development activities aim to continuously improve the spatial and temporal resolution of MRI and MRS in rodents, in non-human primates and in humans. With the help of these techniques we are ?watching? the brain while it thinks and aiming to better understanding what?s happen with the brain during maturation and aging, and under healthy and pathological conditions as well. Moreover, by using appropriate animal models and more advanced contrast mechanism like diffusion based techniques, magnetization transfer and susceptibility mapping our goal is to increase the sensitivity and specificity of these MR methods for more precise diagnostics and for a more specific and early detection of the response to therapeutic intervention.

Selected Recent Publications

Poggi G, Boretius S, Möbius W, Moschny N, Baudewig J, Ruhwedel T, Hassouna I, Wieser GL, Werner HB, Goebbels S, Nave KA, Ehrenreich H (2016) Cortical network dysfunction caused by a subtle defect of myelination. GLIA 2016 64(11): 2025-40

Dommaschk M, Peters M, Gutzeit F, Schütt C, Näther C, Sönnichsen FD, Tiwari S, Riedel C, Boretius S, Herges R (2015) Photoswitchable Magnetic Resonance Imaging Contrast by Improved Light-Driven Coordination-Induced Spin State Switch. J AM CHEM SOC 137: 7552-7555

Boretius S, Tammer R, Michaelis T, Brockmöller J, Frahm J (2013) Halogenated volatile anesthetics alter brain metabolism as revealed by proton magnetic resonance spectroscopy of mice *in vivo*. NEUROIMAGE 69: 244-55

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 (2012) Glycolytic oligodendrocytes maintain myelin and long-term axonal integrity. NATURE 485: 517-21

Boretius S, Kasper L, Tammer R, Michaelis T, Frahm J (2009) MRI of cellular layers in mouse brain *in vivo*. NEUROIMAGE 47: 1252-60

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Henrik Bringmann

Research Group Leader at the Max Planck Institute for Biophysical Chemistry

- 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, Besseling J, Bringmann H (2015) Agarose microchambers for long-term calcium imaging of *Caenorhabditis elegans*. J Vis Exp Jun 24;(100): e52742

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*. Curr. Biol. 21 (24): R983-R984

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

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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

Our research focuses on the molecular mechanisms of nerve cell development and synapse formation and function in the vertebrate central nervous system. To this end, we combine biochemical, morphological, mouse genetic, physiological, and behavioral methods to elucidate the molecular basis of nerve cell differentiation, synapse formation, transmitter release, and postsynaptic transmitter sensing. In selected cases, we explore the dysfunction of corresponding biological processes in neuropsychiatric diseases. Our work in the field of nerve cell development focuses on the role of SUMOylation in cell polarity formation, cell migration, and neuritogenesis, our synaptogenesis research concentrates on synaptic cell adhesion proteins and their role in synapse formation and function, and our 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

Sigler A, Oh WC, Imig C, Altas B, Kawabe H, Cooper BH, Kwon H-B, Rhee J-S*, Brose N* (2017) Formation and maintenance of functional spines in the absence of presynaptic glutamate release. Neuron 94: 304-311 (*joint corresponding authors)

Kawabe H, Mitkovski M, Kaeser PS, Hirrlinger J, Opazo F, Nestvogel D, Kalla S, Fejtova A, Verrier SE, Bungers SR, Cooper BH, Varoqueaux F, Wang Y, Nehring RB, Gundelfinger ED, Rosenmund C, Rizzoli SO, Südhof TC, Rhee J-S, Brose, N. (2017) ELKS1 localizes the synaptic vesicle priming protein bMunc13-2 to a specific subset of active zones. J Cell Biol 216: 1143-1161

Lipstein N, Verhoeven-Duif NM, Michelassi FE, Calloway N, van Hasselt PM, Pienkowska K, van Haaften G, van Haelst MM, van Empelen R, Cuppen I, van Teeseling HC, Evelein AMV, Vorstman JA, Thoms S, Jahn O, Duran KJ, Monroe GR, Ryan TA, Taschenberger H, Dittman JS, Rhee J-S, Visser G, Jans JJ*, Brose N* (2017) Synaptic UNC13A protein variant causes increased synaptic transmission and dyskinetic movement disorder. J Clin Invest 127: 1005-1018 (*joint corresponding authors)

Hammer M, Krueger-Burg D, Tuffy LP, Cooper BH, Taschenberger H, Goswami SP, Ehrenreich H, Jonas P, Varoqueaux F, Rhee J-S, Brose N (2015) Perturbed hippocampal synaptic inhibition and gamma-oscillations in a Neuroligin-4 knock-out mouse model of autism. Cell Rep 13: 516-523

Soykan T, Schneeberger D, Tria G, Buechner C, Bader N, Svergun D, Tessmer I, Poulopoulos A, Papadopoulos T, Varoqueaux F, Schindelin H, Brose N (2014). A conformational switch in Collybistin determines the differentiation of inhibitory postsynapses. EMBO J 18: 2113-2133

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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

Kinzel S, Lehmann-Horn K, Torke S, Häusler D, Winkler A, Stadelmann C, Payne N, Feldmann L, Saiz A, Reindl M, Lalive PH, Bernard CC, Brück W, Weber MS. (2016) Myelin-reactive antibodies initiate T cell-mediated CNS autoimmune disease by opsonization of endogenous antigen. Acta Neuropathol 132: 43-58

Jürgens T, Jafari M, Kreutzfeldt M, Bahn E, Brück W, Kerschensteiner M, Merkler D. (2016) Reconstruction of single cortical projection neurons reveals primary spine loss in multiple sclerosis. Brain 139: 39-46

Pfeifenbring S, Nessler S, Wegner C, Stadelmann C, Brück W. (2015) Remyelination After Cuprizone-Induced Demyelination Is Accelerated in Juvenile Mice. J. Neuropathol. Exp Neurol 74: 756-66

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

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, Pförtner R, Pham T, Zhang J, Hayardeny L, Piryatinsky V, Hanisch UK, Regen T, van Rossum D, Brakelmann L, Hagemeier K, Kuhlmann T, Stadelmann C, John GR, Kramann N, Wegner C. (2012) Reduced astrocytic NF-?B activation by laquinimod protects from cuprizone-induced demyelination. Acta Neuropathol 124: 411-424

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

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

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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

Hurtado-Zavala JI, Ramachandran B, Ahmed S, Halder R, Bolleyer C, Awasthi A, Wagener RJ, Anderson K, Drenan RM, Lester HA, Miwa JM, Staiger JF, Fischer A, Dean C (2017) TRPV1 regulates excitatory innervation of OLM neurons in the hippocampus. Nat Commun Jul 19;8: 15878

Burk K, Murdoch JD, Freytag S, Koenig M, Bharat V, Markworth R, Burkhardt S, Fischer A, Dean C (2017) EndophilinAs regulate endosomal sorting of BDNF-TrkB to mediate survival signaling in hippocampal neurons. Sci Rep May 19;7(1): 2149

Burk K, Ramachandran B, Ahmed S, Hurtado-Zavala JI, Awasthi A, Benito E, Faram R, Ahmad H, Swaminathan A, McIlhinney J, Fischer A, Perestenko P, Dean C (2017) Regulation of Dendritic Spine Morphology in Hippocampal Neurons by Copine-6. Cereb Cortex Feb 3: 1-18

Wolfes AC, Ahmed S, Awasthi A, Stahlberg MA, Rajput A, Magruder DS, Bonn S, Dean C (2017) A novel method for culturing stellate astrocytes reveals spatially distinct Ca^{2+} signaling and vesicle recycling in astrocytic processes. J Gen Physiol Jan;149(1): 149-170

Ramachandran B, Ahmed S, Dean C (2015) Long-term depression is differentially expressed in distinct lamina of hippocampal CA1 dendrites. Front Cellular Neurosci Feb 5;9: 23

Ramachandran B, Ahmed S, Zafar N, Dean C (2015) Ethanol inhibits long-term potentiation in hippocampal CA1 neurons, irrespective of lamina and stimulus strength, through neurosteroidogenesis. Hippocampus Jan;25(1): 106-18

Shinoda Y, Ahmed S, Ramachandran B, Bharat V, Brockelt D, Altas B, Dean C (2014) BDNF enhances spontaneous and activity-dependent neurotransmitter release at excitatory terminals but not at inhibitory terminals in hippocampal neurons. Front Synaptic Neurosci Nov 10;6: 27

Liu H, Chapman ER, Dean C (2013) "Self" versus "Non-Self" Connectivity Dictates Properties of Synaptic Transmission and Plasticity. PLoS One Apr 29;8(4)

Dean C, Dunning FM, Liu H, Bomba-Warczak E, Martens H, Bharat V, Ahmed S, Chapman ER (2012) Axonal and dendritic synaptotagmin isoforms revealed by a pHluorin-syt functional screen. Mol Biol Cell May 23(9): 1715-27

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Peter Dechent

Research Group Leader, Cognitive Neurology

- 1991 – 2001 Studies of Biology, University of Mainz
- 1994 Scientific Assistant at the Biophysical Institute, University of Mainz
- 1995 – 1996 Scholarship of the Erasmus-Program, University of Manchester, England
- 1996 Research Fellow at the Neuroscience Department, Karolinska Institute, Stockholm, Sweden
- 1997 – 1998 Diploma Thesis at the 'Biomedical NMR Research' at the Max-Planck-Institute for Biophysical Chemistry, Göttingen; Diploma in Biology
- 1998 – 2001 Doctoral thesis at the 'Biomedical NMR Research'; Dr.rer.nat. (Biology)
- 2001 – 2003 Postdoc at the 'Biomedical NMR Research' (Laboratory of Prof. Dr. J. Frahm)
- since 2004 Head of the Research Group 'MR-Research in Neurology and Psychiatry' Medical Faculty, University Göttingen

Major Research Interests

- Combination of functional magnetic resonance imaging (fMRI) with non-invasive brain stimulation techniques like transcranial Direct / Alternating Current Stimulation (tDCS/tACS) and Transcranial Magnetic Stimulation (TMS) to modulate functional brain networks in healthy and pathologic conditions.
- Characterization of hemodynamic processes, the basis of blood oxygenation level dependent (BOLD) changes in standard fMRI investigations.
- Application of modern MR techniques to investigate the human brain in healthy and pathologic conditions. Applied methods comprise:
  - Structural MRI
  - Diffusion-weighted- and diffusion-tensor-imaging (DWI/DTI)
  - Localized MR-spectroscopy (MRS)

Selected Recent Publications

Helms G, Schlumbohm C, Garea-Rodriguez E, Dechent P, Fuchs E. Pharmacokinetics of the MRI contrast agent gadobutrol in common marmoset monkeys (Callithrix jacchus). J Med Primatol (accepted)

Barke A, Preis MA, Schmidt-Samoa C, Baudewig J, Kröner-Herwig B, Dechent P. (2016) Neural correlates differ in high and low fear-avoidant chronic low back pain patients when imagining back-straining movements. J Pain 2016 May 31. [Epub ahead of print]

Cabral-Calderin Y, Weinrich C, Schmidt-Samoa C, Poland E, Dechent P, Bähr M, Wilke M. (2016) Transcranial alternating current stimulation affects the BOLD signal in a frequency and task-dependent manner. Hum Brain Mapp 37(1): 94-121

Cabral-Calderin Y, Williams K, Dechent P, Opitz A, Wilke M. (2016) Transcranial alternating current stimulation modulates spontaneous low frequency fluctuations as measured with fMRI. Neuroimage 2016 Jul 5. [Epub ahead of print]

August JM, Rothenberger A, Baudewig J, Roessner V, Dechent P. (2015) May Functional Imaging be Helpful for Behavioral Assessment in Children? Regions of Motor and Associative Cortico-Subcortical Circuits Can be Differentiated by Laterality and Rostrality. Front Hum Neurosci 9: 314

Goya-Maldonado R, Weber K, Trost S, Diekhof E, Keil M, Dechent P, Gruber O. (2015) Dissociating pathomechanisms of depression with fMRI: bottom-up or top-down dysfunctions of the reward system. Eur Arch Psychiatry Clin Neurosci 265(1): 57-66

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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

Körber C, Horstmann H, Venkataramani V, Herrmannsdörfer F, Kremer T, Kaiser M, Schwenger DB, Ahmed S, Dean C, Dresbach T, Kuner T (2015) Modulation of Presynaptic Release Probability by the Vertebrate-Specific Protein Mover. Neuron 87: 521-33

Mendoza Schulz A, Jing Z, Sánchez Caro JM, Wetzel F, Dresbach T, Strenzke N, Wichmann C, Moser T (2014) Bassoon-disruption slows vesicle replenishment and induces homeostatic plasticity at a CNS synapse. EMBO J 33: 512-27

Ahmed S, Wittenmayer N, kremer T, Hoeber J, Kiran Akula A, urlaub H, Islinger M, Kirsch J, Dean C, Dresbach T (2013) Mover is a homomeric phospho-protein present on synaptic vesicles. PLoS One 8: e63474

Stan A, Pielarski KN, 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 USA 107: 11116-111121

Wittenmayer N, Kremer T, Varoqueaux N, Brose N, Dresbach T (2009) Neuroligin 1 promotes the maturation of presynaptic boutons. Proc Natl Acad Sci USA 106: 13564-13569

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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

Castillo-Gomez E, Oliveira B, Tapken D, Bertrand S, Klein-Schmidt C, Pan H, Zafeiriou P, Steiner J, Jurek B, Trippe R, Prüss H, Zimmermann W-H, Bertrand D, Hollmann M, Ehrenreich H: (2016) All naturally occurring autoantibodies against the NMDA receptor subunit NR1 have pathogenic potential irrespective of epitope and immunoglobulin class. Mol Psychiatry, in press

Hassouna I, Ott C, Dahm L, Offen N, Neher RA, Mitkovski M, Winkler D, Sperling S, Fries L, Goebbels S, Vreja IC, Hagemeyer N, Dittrich M, Rossetti MF, Kröhnert K, Hannke K, Boretius S, Zeug A, Höschen C, Dandekar T, Dere E, Neher E, Rizzoli SO, Nave KA, Sirén AL, Ehrenreich H. (2016) Revisiting adult neurogenesis and the role of erythropoietin for neuronal and oligodendroglial differentiation in the hippocampus. Mol Psychiatry, doi: 10.1038/mp.2015.212

Biological insights from 108 schizophrenia-associated genetic loci; Nature 2014; 511(7510): 421-7

Stepniak B, Papiol S, Hammer C, Ramin A, Everts S, Hennig L, Begemann M, Ehrenreich H. (2014) Accumulated environmental risk determining age at schizophrenia onset, Lancet Psychiatry, published online Oct. 22, 2014 http://dx.doi.org/10.1016/S2215-0366(14)70379-7

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

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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 behavior.

Selected Recent Publications

Faubel R, Westendorf C, Bodenschatz E, Eichele G (2016) Cilia-based flow network in the brain ventricles. Science 353(6295): 176-8

Hammerschmidt K, Whelan G, Eichele G, Fischer J (2015) Mice lacking the cerebral cortex develop normal song: insights into the foundations of vocal learning. Sci Rep (5): 8808

Husse J, Leliavski A, Tsang AH, Oster H, Eichele G (2014) The light-dark cycle controls peripheral rhythmicity in mice with a genetically ablated suprachiasmatic nucleus clock. FASEB J (11): 4950-4960

Diez-Roux G et al (2011) A high-resolution anatomical atlas of the transcriptome in the mouse embryo. PLoS Biology 9: e1000582

Kiessling S, Eichele G, Oster H (2010) Adrenal glucocorticoids have a key role in circadian resynchronization in a mouse model of jet lag. Journal of Clinical Investigation 120: 2600-2609

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

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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

Martelli C, Pech U, Kobbenbring S, Pauls D, Bahl B, Sommer MV, Pooryasin A, Barth J, Arias CWP, Vassiliou C, Luna AJF, Poppinga H, Richter FG, Wegener C, Fiala A, Riemensperger T (2017) SIFamide Translates Hunger Signals into Appetitive and Feeding Behavior in *Drosophila*. Cell Rep 20: 464-478

Gupta VK, Pech U, Bhukel A, Fulterer A, Ender A, Mauermann SF, Andlauer TF, Antwi-Adjei E, Beuschel C, Thriene K, Maglione M, Quentin C, Bushow R, Schwärzel M, Mielke T, Madeo F, Dengjel J, Fiala A, Sigrist SJ (2016) Spermidine Suppresses Age-Associated Memory Impairment by Preventing Adverse Increase of Presynaptic Active Zone Size and Release. PLoS Biol 14: e1002563

Riemensperger T, Kittel RJ, Fiala A (2016) Optogenetics in Drosophila neuroscience. Methods Mol Biol 1408: 167-75

Pooryasin A, Fiala A (2015). Identified serotonin-releasing neurons induce behavioral quiescence and suppress mating in *Drosophila*. J Neurosci 35: 12792-812

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

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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

Bahari-Javan S, Varbanov H, Halder R, Benito E, Kaurani L, Burkhardt S, Anderson-Schmidt H, Anghelescu I, Budde M, Stilling RM, Costa J, Dietrich D, Figge C, Folkerts H, Gade K, Heilbronner U, Koller M, Konrad C, Nussbeck SY, Scherk H, Spitze C, Stierl S, Stöckel J, Thiel J, Hagen M, Zimmermann J, Zitzelsberger A, Schulz A, Schmitt A, Delalls I, Falkai P, Schulze TG, Dityatev A, Sananbenesi F, Fischer A (2017) Hdac1 as a target for individualized therapy of schizophrenia patients. PNAS. Epub ahead of print

Benito E, Urbanke U, Ramachandran B, Barth J, Halder R, Awasthi A, Jain G, Capece V, Burkhardt S, Navarro-Sala M, Nagarajan N, Schütz AL, Johnsen SA, Bonn SA, Lührmann R, Dean C, Fischer A (2015) Reinstating transcriptome plasticity and memory function in models for cognitive decline. Journal of Clinical Investigation 125(9): 3572-84

Zovoilis A, Agbemenyah HY, Agis-Balboa RC, Stilling RM, Edbauer D, Rao P, Farinelli L, Delalle I, Schmitt A, Falkai P, Bahari-Javan S, Burkhardt S, Sananbenesi F, Fischer A (2011) microRNA-34c is a novel target to treat dementias. EMBO J 30(20): 4299-308. doi: 10.1038/emboj.2011.327

Peleg S, Sananbenesi F, Zovoilis A, Burkhardt S, Bahari-Javan S, Agis-Balboa RC, Cota P, Wittnam JL, Gogol-Doering A, Opitz L, Salinas-Riester G, Dettenhoffer M, Farinelli L, Chen W, Fischer A (2010) Altered histone H4 lysine 12 acetylation is associated with age-dependent memory impairment in mice. Science 328: 753

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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

Schläger C*, Körner H*, Krueger M, Vidoli S, Haberl M, Mielke D, Brylla E, Issekutz T, Cabañas C, Nelson PJ, Ziemssen T, Rohde V, Bechmann I, Lodygin D, Odoardi F*, Flügel A* (2016) Effector T-cell trafficking between the leptomeninges and the cerebrospinal fluid. Nature 530: 349-353. *equal contribution

Flach A*, Litke T*, Strauss J*, Haberl M, Cordero Gómez C, Reindl M, Saiz A, Fehling HJ, Wienands J, Odoardi F, Lühder F§, Flügel A§ (2016) Autoantibody-boosted T-cell reactivation in the target organ triggers manifestation of autoimmune CNS disease. PNAS 113: 3323-3328. *§equal contribution

Lodygin D, Odoardi F, Schläger C, Körner H, Kitz A, Nosov M, van den Brandt J, Reichardt HM, Haberl M, Flügel A (2013) A combination of fluorescent NFAT and H2B sensors uncovers dynamics of T cell activation in real time during CNS autoimmunity. Nature Medicine 19: 784-790

Odoardi F, Sie C, Streyl K, Ulaganathan VK, Schläger C, Lodygin D, Heckelsmiller K, Nietfeld W, Ellwart J, Klinkert WE, Lottaz C, Nosov M, Brinkmann V, Spang R, Lehrach H, Vingron M, Wekerle H, Flügel-Koch C, Flügel A (2012) T cells become licensed in the lung to enter the central nervous system. Nature 488: 675-679

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

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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

Tan Z, Roeloffs V, Voit D, Joseph AA, UntenbergerM, K.D. Merboldt KD, Frahm J. (2016) Model-based reconstruction for real-time phase-contrast flow MRI ? Improved spatiotemporal accuracy. Magn Reson Med doi: 10.1002/mrm.26192

Iltis PW, Frahm J, Voit D, Joseph AA, Burke R, Altenmüller E. (2016) Inefficiencies in motor strategies of horn players with embouchure dystonia: comparisons to elite performers. Med Probl Perform Art. 31: 69-77

Watanabe T, Frahm J, Michaelis T. (2016) Amide proton signals as pH indicator for *in vivo* MRS and MRI of the brain? Responses to hypercapnia and hypothermia. NeuroImage doi: 10.1016/j.neuroimage.2016.03.013

Untenberger M, Tan Z, Voit D, Joseph AA, Roeloffs V, Merboldt KD, Schaetz S, Frahm J. (2016) Advances in real-time phase-contrast flow MRI using asymmetric radial gradient echoes. Magn Reson Med 75: 1901-1908

Hofer S, Wang X, Roeloffs V, Frahm J. (2015) Single-shot T1 mapping of the corpus callosum: A rapid characterization of fiber bundle anatomy. Front Neuroanat 9: 57

Dreha-Kulaczewski S, Joseph AA, Merboldt KD, Ludwig H-C, Gärtner J, Frahm J. (2015) Inspiration is the major regulator of human CSF flow. J. Neurosci 35: 2485-2491

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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

Varges D, Manthey H, Heinemann U, Ponto C, Schmitz M, Krasnianski A, Breithaupt M, Fincke F, Kramer K, Friede T, Zerr I (2016) Doxycycline in early CJD ? double-blinded randomized phase II and observational study. Journal of Neurology, Neurosurgery & Psychiatry 88: 119-125

Raffel J, Wallace A, Gveric D, Reynolds R, Friede T, Nicholas R (2017) Patient-reported outcomes and survival in multiple sclerosis: a 10-year retrospective cohort study using the MSIS-29. PLOS Medicine 14(7): e1002346

Gold SM, Enck P, Hasselmann H, Friede T, Hegerl U, Mohr DC, Otto C (2017) Control conditions for randomized trials of behavioral interventions in psychiatry: A decision framework. Lancet Psychiatry (in press)

Stellmann JP, Krumbholz M, Friede T, Gahlen A, Borisow N, Fischer K, Hellwig, Pache F, Ruprecht K, Havla J, Kümpfel T, Aktas O, Hartung HP, Ringelstein M, Geis C, Kleinschnitz C, Berthele A, Hemmer B, Angstwurm K, Young KL, Schuster S, Stangel M, Lauda F, Tumani H, Mayer C, Zeltner L, Ziemann U, Linker RA, Schwab M, Marziniak M, Then Bergh F, Hofstadt-van Oy U, Neuhaus O, Zettl U, Faiss J, Wildemann B, Paul F, Jarius S, Trebst C, Kleiter I on behalf of NEMOS (Neuromyelitis Optica Study Group) (2017) Immunotherapies in neuromyelitis optica spectrum disorder: Efficacy and predictors of response. Journal of Neurology, Neurosurgery and Psychiatry 88(8): 639-647

Nicotra A, Claus Newman C, Eremin O, Friede T, Malik O, Nicholas R (2016) Peripheral nerve dysfunction in middle-aged subjects born with thalidomide embryopathy. PLoS ONE 11(4): e0152902. doi:10.1371/journal.pone.0152902

Mollenhauer B, Zimmermann J, Sixel-Döring F, Focke NK, Wicke T, Ebentheuer J, Schaumburg M, Lang E, Trautmann E, Zetterberg H, Taylor P, Friede T, Trenkwalder C & the DeNoPa Study Group (2015) Monitoring of thirty marker candidates in early Parkinson?s disease as progression markers. Neurology 87: 168-77

Metz I, Beißbarth T, Ellenberger D, Pache F, Stork L, Ringelstein M, Aktas O, Jarius S, Wildemann BT, Dihazi H, Friede T, Brück W, Ruprecht K, Paul F (2015) Serum peptide reactivities may distinguish neuromyelitis optica subgroups and multiple sclerosis. Neurology: Neuroimmunology & Neuroinflammation 2016;3:e204; doi: 10.1212/NXI.0000000000000204

Chataway J, Friede T (2016) The N-MOmentum trial: building momentum to advance trial methodology in a rare disease. Multiple Sclerosis Journal 22: 852-853

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Alexander Gail

Professor for Sensorimotor Neuroscience and Neuroprosthetics at the German Primate Center

- 1997: Physics Diploma, Philipps University, Marburg
- 2002: Dr. rer. nat. (Physics) Philipps University, Marburg
- 2002 – 2003: Postdoc (Neurophysics Laboratory of R. Eckhorn, Marburg)
- 2003 – 2006: Postdoc (Laboratory of R. Andersen, Pasadena, CA, USA)
- 2006 – present: Head of Sensorimotor Research Group, German Primate Center and Bernstein Center for Computational Neuroscience
- 2012 – present: Professor for Sensorimotor Neuroscience and Neuroprosthetics, Georg-August University Göttingen

Major Research Interests

Sensorimotor integration, cognitive movement planning, neuroprosthetics, neuronal synchronization, visual object coding; methods: awake monkey electrophysiology, extracellular multi-channel microelectrode recordings, psychophysics in human and non-human primates, correlation and spectral coherence analysis, pattern recognition

Selected Recent Publications

Morel P, Ulbrich P, Gail A (2017) What makes a reach movement effortful? – Physical effort discounting supports common minimization principles in decision making and motor control. PLOS Biology, in press

Kuang S, Morel P, Gail A (2016) Planning movements in visual and physical space in monkey posterior parietal cortex. Cerebral Cortex 26(2): 731-747

Klaes C, Schneegans S, Schöner G, Gail A (2012) Sensorimotor learning biases choice behavior: A learning neural field model for decision making. PLOS Computational Biology 8(11): e1002774

Klaes C, Westendorff S, Chakrabarti S, Gail A (2011) Choosing goals, not rules: Deciding among rule-based action plans. Neuron 70: 536-548

Westendorff S, Klaes C, Gail A (2010) The cortical timeline for deciding on reach motor-goals. J Neurosci 30: 5426-5436

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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

Liu JK, Schreyer HM, Onken A, Rozenblit F, Khani MH, Krishnamoorthy V, Panzeri S, Gollisch T (2017) Inference of neuronal functional circuitry with spike-triggered non-negative matrix factorization. Nature Communications 8: 149

Krishnamoorthy V, Weick M, Gollisch T (2017) Sensitivity to image recurrence across eye-movement-like image transitions through local serial inhibition in the retina. eLife 6: 322431

Kühn NK, Gollisch T (2016) Joint encoding of object motion and motion direction in the salamander retina. J Neurosci 36:12203-12216

Liu JK, Gollisch T (2015) Spike-triggered covariance analysis reveals phenomenological diversity of contrast adaptation in the retina. PLoS Comput Biol 11: e1004425

Takeshita D, Gollisch T (2014) Nonlinear spatial integration in the receptive field surround of retinal ganglion cells. J Neurosci 34: 7548-7561

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

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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

Versteven M, Vanden Broeck L, Geurten B, Zwarts L, Decraecker L, Beelen M, Göpfert MC, Heinrich R, Callaerts P (2017) Hearing regulates *Drosophila* aggression. Proc Natl Acad Sci USA 114: 1958-1963

Andrés M, Seifert M, Spalthoff C, Warren B, Weiss L, Giraldo D, Winkler M, Pauls S, Göpfert MC (2016) Auditory efferent system modulates mosquito hearing. Curr Biol 26: 2028-2036

Guo Y, Wang Y, Zhang W, Meltzer S, Zanini D, Yu Y, Li J, Cheng T, Guo Z, Wang Q, Jacobs JS, Sharma Y, Eberl DF, Göpfert MC, Jan LY, Jan YN, Wang Z (2016) Transmembrane channel-like (tmc) gene regulates *Drosophila* larval locomotion. Proc Natl Acad Sci USA 113: 7243-7248

Göpfert MC, Hennig RM (2016) Hearing in Insects. Annu Rev Entomol 61: 257-276

Zhang W, Cheng LE, Kittelmann M, Li J, Petkovic M, Cheng T, Jin P, Guo Z, Göpfert MC, Jan LY, Jan YN. (2015) Ankyrin repeats convey force to gate the NOMPC mechanotransduction channel. Cell 162: 1391-1403

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Robert Gütig

Group Leader Theoretical Neuroscience at the Max Planck Institute for Experimental Medicine

- 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 (2016) Spiking neurons can discover predictive features by aggregate-label learning. Science 351: 1041 (aab4113–1-aab4113–14)

Gütig R (2014) To spike, or when to spike? Curr. Opin. Neurobiol 25C: 134-139

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

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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

Hahn N, Knorr DY, Liebig J, Wüstefeld L, Peters K, Büscher M, Bucher G, Ehrenreich H, Heinrich R (2017) The insect orthologue of the human orphan cytokine receptor CRLF3 is a neuroprotective erythropoietin receptor in insects. Frontiers in Molecular Neuroscience (in press)

Miljus N, Massih B, Weis MA, Rison JV, Bonnas CB, Sillaber I, Ehrenreich H, Geurten BRH, Heinrich R (2017) Neuroprotection and endocytosis: erythropoietin receptors in insect nervous systems. Journal of Neurochemistry 141: 63-74

Miljus N, Heibeck S, Jarrar M, Micke M, Ostrowski D, Ehrenreich H, Heinrich R (2014) Erythropoietin-mediated protection of insect brain neurons involves JAK and STAT but not PI3K transduction pathways. Neuroscience 258:218-227

Hahn N, Geurten B, Gurvich A, 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

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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

Balzarotti F, Eilers Y, Gwosch KC, Gynna AH, Westphal V, Stefani FD, Elf J, Hell SW (2017) Nanometer resolution imaging and tracking of fluorescent molecules with minimal photon fluxes. Science 355: 606-612

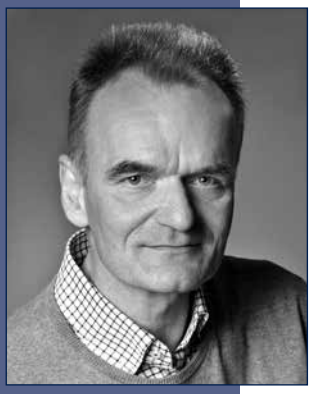
Göttfert F, Pleiner T, Heine J, Westphal V, Görlich D, Sahl SJ, Hell SW (2017) Strong signal increase in STED fluorescence microscopy by imaging regions of subdiffraction extent. PNAS 114: 2125-2130

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

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

Sieber, JJ, Willig KI, Kutzner C, Gerding-Reimers C, Harke B, Donnert G, Rammner B, Eggeling C, Hell SW, Grubmüller H, Lang T (2007) Anatomy and dynamics of a supramolecular membrane protein cluster. Science 317: 1072-1076

Willig KI, Rizzoli SO, Westphal V, Jahn R, Hell SW (2006) STED-microscopy reveals that synaptotagmin remains clustered after synaptic vesicle exocytosis. Nature 440: 935-939



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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, Dept. Of Cellular Neurobiology, Schwann-Schleiden Research Centre Göttingen, since 2004 and Scientific Coordinator International MSc/PhD/MD-PhD Program for 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

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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

Hülsmann S, Mesuret G, Dannenberg J, Arnoldt M, Niebert M (2016) GlyT2-dependent preservation of MECP2-expression in inhibitory neurons improves early respiratory symptoms but does not rescue survival in a mouse model of Rett syndrome Front. Physiol. doi: 10.3389/fphys.2016.00385

Rahman J, Besser S, Schnell C, Eulenburg V, Hirrlinger J, Wojcik SM, Hülsmann S (2015) Genetic ablation of VIAAT in glycinergic neurons causes a severe respiratory phenotype and perinatal death. Brain Struct Funct 220: 2835-2849

Schnell C, Shahmoradi A, Wichert SP, Mayerl S, Hagos Y, Heuer H, Rossner MJ#, Hülsmann S# (2015) The multispecific thyroid hormone transporter OATP1C1 mediates cell-specific Sulforhodamine 101-labeling of hippocampal astrocytes. Brain Struct Funct 220: 193-203

Winter SM, Fresemann J, Schnell C, Oku Y, Hirrlinger J, Hülsmann S (2009) Glycinergic interneurons are functionally integrated into the inspiratory network of mouse medullary slices. Pflügers Arch 458: 459-469

Grass D, Pawlowski PG, Hirrlinger J, Papadopoulos N, Richter DW, Kirchhoff F, Hülsmann S (2004) Diversity of functional astroglial properties in the respiratory network. J Neurosci 24: 1358-1365

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Reinhard Jahn

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- 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 are interested in the mechanisms by which synaptic vesicles sequester and store neurotransmitters. Uptake is mediated by specific vesicular neurotransmitter transporters that are energized by an electrochemical proton gradient across the membrane. Presently we aim for a better understanding of the transport mechanisms using a variety of biochemical and biophysical approaches including imaging of single vesicles. Finally, we use quantitative proteomics to better understand how the presynaptic protein network contributes to the regulation of synaptic release, focusing on protein phosphorylation.

Selected Recent Publications

Jakharwal S, Lee CT, Urlaub H., Jahn R (2017) An activated Q-SNARE/SM protein complex as a possible intermediate in SNARE assembly. EMBO J in press

Farsi Z, Preobraschenski J, van den Bogaart G, Riedel D, Jahn R*, Woehler A (2016) Single-vesicle imaging reveals different transport mechanisms between glutamatergic and GABAergic vesicles. Science 351: 981-984. (*corresponding author)

Park Y, Seo JB, Fraind A, Pérez-Lara A, Yavuz H, Han K, Jung SR, Kattan I, Walla PJ, Choi M, Cafiso DS, Koh DS, Jahn R (2015) Synaptotagmin-1 binds to PIP(2)-containing membrane but not to SNAREs at physiological ionic strength. Nature Struct Mol Biol 22: 815-823

Jahn R, Fasshauer D. (2012) Molecular machines governing exocytosis of synaptic vesicles. Nature 490: 201-7

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

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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 neuronal circuits in the mammalian cortex. We use a combination of techniques, including optical imaging, 2-photon imaging, electrophysiology and virus-mediated knock-down to explore how experience and learning influence the structure and function of nerve cell networks. 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 e.g. 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).

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

Kalogeraki E, Greifzu F, Haack F, Löwel S (2014) Voluntary physical exercise promotes ocular dominance plasticity in adult mouse primary visual cortex. J Neurosci 34: 15476-15481

Stodieck SK, Greifzu F, Goetze B, Schmidt K-F, Löwel S (2014) Brief dark exposure restored ocular dominance plasticity in aging mice and after a cortical stroke. Exp Gerontol 60: 1-11

Pielecka-Fortuna J*, Wagener RJ*, Goetze B, Martens A-K, Schmidt K-F, Staiger JF*, Löwel S* (2014) The disorganized visual cortex in reelin-deficient mice is highly functional and allows for enhanced plasticity. Springer Brain Struct Funct doi: 10.1007/s00429-014-0866-x

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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

Murdoch JD, Rostsoky C, Gowrisankaran S, Arora AS, Soukup SF, Vidal R, Capece V, Freytag S, Fischer A, Verstreken P, Bonn S, Raimundo N, Milosevic I (2016) Endophilin-A deficiency induces the FoxO3a-Fbxo32 network in the brain and causes dysregulation of autophagy and the ubiquitin-proteasome system. Cell Rep 17(4): 1071-86

Villar-Piquéa A, Fonseca TL, Sant'Anna R, Fonseca-Ornelas L, Pinho R, Masaracchia C, Szegö EM, Milosevic I, Zweckstetter M, Ventura S, Outeiro TF (2016) Environmental and genetic factors support the dissociation between alpha-synuclein aggregation and toxicity. PNAS USA 113(42): E6506-15

Pechstein A*, Gerth F*, Milosevic I, Jäpel M, Eichhorn-Grünig M, Vorontsova O, Bacetic J, Maritzen T, Shupliakov O, Freund C, Haucke V (2015) Vesicle uncoating regulated by SH3-SH3 domain-mediated complex formation between endophilin and intersectin at synapses. EMBO Rep 16(2): 232-9

Giordano F, Saheki Y, Idevall-Hagren O, Colombo SF, Pirruccello M, Milosevic I, Gracheva EO, Bagriantsev SN, Borgese N, De Camilli P (2013) PI(4,5)P2-dependent and Ca^{2+}-regulated ER-PM interactions mediated by the extended synaptotagmins. Cell 153 (7): 1494-509

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

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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

Hernandez VH, Gehrt A, Reuter K, Jing Z, Jeschke M, Mendoza Schulz A, Hoch G, Bartels M, Vogt G, Garnham CW, Yawo H, Fukazawa Y, Augustine GJ, Bamberg E, Kügler S, Salditt T, de Hoz, L, Strenzke N, Moser T (2014) Optogenetic stimulation of the auditory pathway. J Clin Investigation, 124(3): 1114-29

Chapochnikov NM, Takago H, Huang CH, Pangrsic T, Khimich, D, Neef J, Auge E, Göttfert F, Hell SW, Wichmann C, Wolf F, Moser T (2014) Uniquantal Release through a Dynamic Fusion Pore Is a Candidate Mechanism of Hair Cell Exocytosis. Neuron, 83: 1-15

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(7): 869-76

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

Khimich D, Nouvian R, Pujol R, Tom Dieck S, Egner A, Gundelfinger ED, Moser T (2005) Hair Cell Synaptic Ribbons are Essential for Synchronous Auditory Signaling. Nature 434: 889-94

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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

Goebbels S, Wieser GL, Pieper A, Spitzer S, Weege B, Yan K, Edgar JM, Yagensky O, Wichert S, Agarwal A, Karram K, Renier N, Tessier-Lavigne M, Rossner MJ, Káradóttir RT, Nave KA (2017) A neuronal PI(3,4,5)P3-dependent program of oligodendrocyte precursor recruitment and myelination. Nature Neuroscience 20: 10-15

Saab AS, Tzvetavona ID, Trevisiol A, Baltan S, Dibaj P, Möbius W, Kusch K, Goetze B, Jahn HM, Huang W, Steffens H, Schomburg ED, Pérez-Samartín A, Pérez-Cerdá F, Bakhtiari D, Matute C, Löwel S, Griesinger C Hirrlinger J, Kirchhoff F, Nave KA (2016) Oligodendroglial NMDA receptors regulate axonal energy metabolism. Neuron 91: 199-132

Quintes S, Brinkmann BG, Ebert M, Fröb F, Kungl T., Arlt FA, Tarabykin V, Huylebroeck D, Meijer D, Suter U, Wegner M, Sereda MW, Nave KA (2016) Sip1 is essential for Schwann cell differentiation, myelination and nerve repair. Nature Neuroscience 19: 1050-1059

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

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

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Tiago Fleming Outeiro

Professor of Aggregopathies, Director of the Department of Neurodegeneration and Restaurative Research

- 1994 – 1998 B.S. in Biochemistry Faculty of Sciences, University of Porto, Portugal
- 1999 – 2004 Ph.D. in Molecular and Cell Biology Whitehead Institute for Biomedical Research, MIT Cambridge, University of Chicago (UC), USA
- 2004 Consultant and Research Scientist, FoldRx Pharmaceuticals, Inc, Cambridge, USA: Ph.D. work was transferred to the start-up company FoldRx Pharmaceuticals, Inc.
- 2004 – 2007 Postdoctoral Research Fellow; advisor Dr. Brad Hyman, MGH Harvard University, USA
- 2007 – 2011 Principal Investigator and Group Leader at Instituto de Medicina Molecular, Lisbon, Portugal
- 2007 – 2008 Visiting Scientist, Massachusetts General Hospital, Harvard Medical School, Boston, USA
- 2007 – present Auxiliar Professor, Instituto de Fisiologia, Faculdade de Medicina da Universidade de Lisboa, Portugal
- 2010 – present: Full Professor of Aggregopathies, Director of the Department of Neurodegeneration and Restaurative Research, University Medical Center Göttingen

Major Research Interests

Our research interests are focused on the understanding of the molecular mechanisms which lead to neurodegeneration in diseases such as Parkinson's, Huntington's, or Alzheimer's disease. These diseases are intimately associated with protein misfolding and aggregation in specific regions of the brain.
Because the molecular pathways involved in protein homeostasis are highly conserved, we employ a wide variety of model organisms, from the simple but powerful budding yeast to mammalian cell culture and mice, to study the origin of the problems.
We are also developing novel *in vivo* imaging approaches based on multi-photon microscopy to observe protein misfolding and aggregation in the living brain.
Our ultimate goals are to develop novel therapeutic approaches for these and other related disorders. We are working closely together with clinicians in order to accelerate drug discovery efforts, translating basic research into clinical applications that will improve the lives of patients.

Selected Recent Publications

Vicente Miranda H, Szego ÉM, Oliveira LM, Breda C, Darendelioglu E, de Oliveira RM, Ferreira DG, Gomes MA, Rott R, Oliveira M, Munari F, Enguita FJ, Simões T, Rodrigues EF, Heinrich M, Martins IC, Zamolo I, Riess O, Cordeiro C, Ponces-Freire A, Lashuel HA, Santos NC, Lopes LV, Xiang W, Jovin TM, Penque D, Engelender S, Zweckstetter M, Klucken J, Giorgini F, Quintas A, Outeiro TF (2017) Glycation potentiates -synuclein-associated neurodegeneration in synucleinopathies. Brain 2017 Apr 10

de Oliveira RM, Vicente Miranda H, Francelle L, Pinho R, Szegö ÉM, Martinho R, Munari F, Lázaro DF, Moniot S, Guerreiro P, Fonseca-Ornelas L, Marijanovic Z, Antas P, Gerhardt E, Enguita FJ, Fauvet B, Penque D, Pais TF, Tong Q, Becker S, Kügler S, Lashuel HA, Steegborn C, Zweckstetter M, Outeiro TF (2017) Correction: The mechanism of sirtuin 2-mediated exacerbation of alpha-synuclein toxicity in models of Parkinson disease. PLoS Biol 2017 Apr 5;15(4): e1002601

Villar-Piqué A, Lopes da Fonseca T, Sant'Anna R, Szegö ÉM, Fonseca-Ornelas L, Pinho R, Carija A, Gerhardt E, Masaracchia C, Abad Gonzalez E, Rossetti G, Carloni P, Fernández CO, Foguel D, Milosevic I, Zweckstetter M, Ventura S, Outeiro TF (2016) Environmental and genetic factors support the dissociation between -synuclein aggregation and toxicity. Proc Natl Acad Sci U S A 2016 Oct 5

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Luis A. Pardo

Group Leader Molecular Biology of Neuronal Signals at the Max Planck Institute for Experimental Medicine

- 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

Sánchez A, Urrego D, Pardo LA. (2016) Cyclic expression of the voltage-gated potassium channel KV10.1 promotes disassembly of the primary cilium. EMBO Rep 2016 May;17(5): 708-23. doi: 10.15252/embr.201541082. Epub 2016 Apr 20

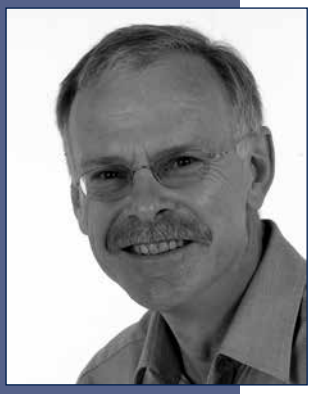
Urrego D, Movsisyan N, Ufartes R, Pardo LA. (2016) Periodic expression of Kv10.1 driven by pRb/E2F1 contributes to G2/M progression of cancer and non-transformed cells. Cell Cycle 2016 Mar 18;15(6): 799-811. doi: 10.1080/15384101.2016.1138187

Mortensen LS, Schmidt H, Farsi Z, Barrantes-Freer A, Rubio ME, Ufartes R, Eilers J, Sakaba T, Stuehmer W, Pardo LA (2015) K(V)10.1 opposes activity-dependent increase in Ca^{2+} influx into the presynaptic terminal of the parallel fibre-Purkinje cell synapse. Journal of Physiology-London 593: 181-196

Lörinczi É, Gómez-Posada JC, de la Peña P, Tomczak AP, Fernández-Trillo J, Leipscher U, Stühmer W, Barros F, Pardo LA (2015) Voltage-dependent gating of KCNH potassium channels lacking a covalent link between voltage-sensing and pore domains. Nat Commun 6

Pardo LA, Stühmer W (2014) The roles of K^+ channels in cancer. Nat Rev Cancer 14: 39-48

Jimenez-Garduno AM, Mitkovski M, Alexopoulos IK, Sanchez A, Stuhmer W, Pardo LA, Ortega A (2014) KV10.1 $K^{(+)}$-channel plasma membrane discrete domain partitioning and its functional correlation in neurons. Biochim Biophys Acta 1838: 921-31



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

Alekseichuk et al. (2016) Spatial Working Memory in Humans Depends on Theta and High Gamma Synchronization in the Prefrontal Cortex. Current Biology 26: 1513-1521

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

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Arezoo Pooresmaeili

Group Leader Perception and Cognition

- 1994 – 2001 Tehran University School of Medicine and Health Sciences, obtained degree: MD
- 2003 – 2009 PhD projects exploring mechanisms of visual attention in the primary visual cortex and Frontal Eye Fields (under supervision of Dr. Pieter Roelfsema)
- 2009 – 2011 Postdoctoral fellow, Pisa Vision Lab, with Dr. Concetta Morrone and Dr. David Burr
- 2011 – 2014 Postdoctoral fellow, Berlin School of Mind and Brain, with Dr. Ray Dolan (Einstein Visiting Fellow)
- Since 2015 Group Leader, Perception and Cognition Group, European Neuroscience Institute, Göttingen, Germany

Major Research Interests

- Systems Neuroscience
    - Cognitive Neuroscience
        - Behavioral, Neuroimaging, Electrophysiology and Brain Stimulation Studies in humans
            - Sensory Perception
            - Attention
            - Reward Processing
            - Decision Making
            - Social Cognition

Selected Recent Publications

Arezoo Pooresmaeili, Aurel Wannig, Raymond J. Dolan (2015) Receipt of reward leads to altered estimation of effort. Proc Natl Acad Sci U S A 112(43): 13407-10. doi: 10.1073/pnas.1507527112. Epub 2015 Oct 12

Arezoo Pooresmaeili, Thomas H.B. FitzGerald, Dominik R. Bach, Ulf Toelch, Florian Ostendorf, Raymond J. Dolan (2014) Crossmodal effects of value on perceptual acuity and stimulus encoding. Proceedings of the National Academy of Sciences (PNAS) 111(42): 15244-9. doi: 10.1073/pnas.1408873111

Arezoo Pooresmaeili and Pieter Roelfsema (2014) A growth-cone model for the spread of object-based attention. Current Biology 24(24): 2869-77. doi: 10.1016/j

Arezoo Pooresmaeili, Jasper Poort, Pieter R Roelfsema (2014) Simultaneous selection by object-based attention in visual and frontal cortex. Proceedings of the National Academy of Sciences (PNAS) 111(17): 6467-72. doi: 10.1073/pnas.1316181111

Arezoo Pooresmaeili, Roberto Arrighi, Laura Biagi, Maria Concetta Morrone: (2013) Blood Oxygen Level-Dependent Activation of the Primary Visual Cortex Predicts Size Adaptation Illusion. Journal of Neuroscience 33(40): 15999-16008

Arezoo Pooresmaeili, Jasper Poort, Alexander Thiele, Pieter R Roelfsema (2010) Separable codes for attention and luminance contrast in the primary visual cortex. Journal of Neuroscience 30(38): 12701-11

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- 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)
- Professor, Georg August University Goettingen, Germany (since 2017)

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

Lai Y, Choi UB, Leitz J, Rhee HJ, Lee C, Altas B, Zhao M, Pfuetzner RA, Wang A, Brose N, Rhee JS and Brunger AT (2017) Molecular mechanisms of synaptic vesicle priming by Munc13 and Munc18. Neuron, in press

Sigler A, Oh WC, Imig C, Altas B, Kawabe H, Cooper BH, Kwon HB, Rhee JS*, Borse N* (2017) Formation and Maintenance of Functional Spines in the Absence of Presynaptic Glutamate Release. Neuron 94: 304-311 (*joint corresponding authors)

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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

Vreja IC, Nikic I, Goettfert F, Bates M, Kröhnert K, Outeiro TF, Hell SV, Lemke EA, Rizzoli SO (2015) Super-resolution Microscopy of Clickable Amino Acids Reveals the Effects of Fluorescent Protein Tagging on Protein Assemblies. ACS Nano 9: 11034-41

Vreja IC, Kabatas S, Saka SK, Kröhnert K, Höschen C, Opazo F, Diederichsen U, Rizzoli SO (2015) Secondary-ion mass spectrometry of genetically encoded targets. Angew Chem Int Ed Engl 54: 5784-5788

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

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Annekathrin Schacht

Professor of Affective Neuroscience and Psychophysiology

- 2004 – 2008: Research Scientist, Biological Psychology / Psychophysiology (Prof. Dr. Werner Sommer), Institute of Psychology, HU Berlin
- 2008: Dissertation (Dr. rer. nat., HU Berlin)
- 2009: Visiting Professor of Psychology of Motivation and Emotion (substitution), Department of Psychology, University of Potsdam
- 2010: Invited Junior Professor of Affective Neuroscience, Swiss Center for Affective Sciences (CISA), University of Geneva
- 2010: Visiting Professor of Cognitive Neuroscience, Institute of Psychology, Humboldt-Universitaet zu Berlin
- 2011: Habilitation (venia legendi) in Psychology (HU Berlin)
- since 10/2010: Junior Professor (tenure track), Courant Research Centre “Text Structures”, University of Goettingen
- since 2016: Professor of Affective Neuroscience and Psychophysiology, Institute of Psychology, University of Goettingen

Major Research Interests

Our main research activities focus on the interplay of cognition and emotion in several domains of human information processing, including faces and written and spoken language. Our work aims to identify the specification of the origins, dynamics, and boundary conditions of emotion effects within and between different stimulus domains and modalities, as well as to better define the emotional outcomes of cognitive operations. In order to answer our research questions, we employ a combination of well-established experimental paradigms with several psychophysiological measures, including event-related brain potentials (ERPs), eye movements, electrodermal and respiratory activity, facial muscle activity (via EMG recordings), and changes of pupil diameter.
Research areas:

- Affective and motivational impacts on visual sensory processing
- Emotion-cognition interplay in the processing of written and spoken language
- Face processing, including emotional expressions, attractiveness, and face identity
- Audiovisual integration of social signals in human communication

Selected Recent Publications

Bayer M, Ruthmann K, Schacht A (2017) The impact of personal relevance on emotion processing: evidence from event-related potentials and pupillary responses. Social Cognitive and Affective Neuroscience 2017, nsx075, DOI: 10.1093/scan/nsx075

Hammerschmidt W, Sennhenn-Reulen H, Schacht A (2017) Associated motivational salience impacts early sensory processing of human faces. NeuroImage 156: 466-474. DOI: 10.1016/j.neuroimage.2017.04.032

Rossi V, Vanlessen N, Bayer M, Grass A, Pourtois G, Schacht A (2017) Motivational salience modulates early visual cortex responses across task sets. Journal of Cognitive Neuroscience 29: 968-979. DOI: 10.1162/jocn_a_01093

Rellecke J, Sommer W, Schacht A (2012) Does processing of emotional facial expressions depend on intention? Time-resolved evidence from event-related brain potentials. Biological Psychology 90(1): 23 - 32. DOI: 10.1016/j.biopsycho.2012.02.002

Schacht A, Adler N, Chen P, Guo T, Sommer W (2012) Association with Positive Outcome induces Early Effects in Event-related Brain Potentials. Biological Psychology 89: 130-136. DOI: 10.1016/j.biopsycho.2011.10.001

Rellecke J, Palazova M, Sommer W, Schacht A (2011) On the automaticity of emotion processing in words and faces: Event-related brain potentials evidence from a superficial task. Brain and Cognition 77: 23-32

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Hansjörg Scherberger

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- Dipl. math. (MS Math), University of Freiburg, Germany, 1993
- Dr. med. (MD), University of Freiburg, Germany, 1996
- Postdoctoral Fellow, Dept of Neurology, University of Zürich, Switzerland, 1995 – 1998
- Postdoctoral Fellow, California Institute of Technology, 1998 – 2000
- Senior Postdoctoral Fellow, California Institute of Technology, 2000 – 2004
- Work group leader, Institute of Neuroinformatics, ETH / University of Zürich, Switzerland, 2004 – 2009
- Professor for Primate Neurobiology, University of Göttingen and Deutsches Primatenzentrum GmbH, since 2008

Major Research Interests

We are interested in how hand movements are generated in the primate brain and how intentions to grasp objects can be decoded for controlling a neural prosthesis. For this, we investigate the cortical representation of hand movements in motor-related cortical areas and their relation to sensory systems and decision making. Furthermore, we are developing brain-machine interfaces that can read out such movement intentions to control robotic devices. Such systems could be useful for future applications aiming to restore hand function in paralyzed patients.

Selected Recent Publications

Townsend BR, Subasi E, Scherberger H (2011) Grasp movement decoding from premotor and parietal cortex. J Neurosci 31: 14386-14398

Fluet MC, Baumann M, Scherberger H (2010) Context-specific grasp movement representation in macaque ventral premotor cortex. J Neuroscience 30: 15175-15184

Baumann M, Fluet MC, Scherberger H (2009) Context-Specific Grasp movement representation in the macaque anterior intraparietal area. J Neuroscience 29: 6436–6448

Scherberger H (2009) Neural control of motor prostheses. Current Opinion in Neurobiology 19: 629–633

Scherberger H, Andersen RA (2007) Target selection signals for arm reaching in the posterior parietal cortex. Journal of Neuroscience 27: 2001–2012

Scherberger H, Jarvis MR, Andersen RA (2005) Cortical local field potential encodes movement intentions in the posterior parietal cortex. Neuron 46: 347-354

Musallam S, Corneil BD, Greger B, Scherberger H, Andersen RA (2004) Cognitive control signals for neural prosthetics. Science 305: 258–262

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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

Liu Y, Cui L, Schwartz MK, Dong Y, Schlüter OM (2017) Adrenergic gate release in spike timing-dependent synaptic potentiation. Neuron 93(2): 394-408

Shukla A, Beroun A, Panopoulou M, Neumann PA, Grant SGN, Olive MF, Dong Y, Schlüter OM (2017) Calcium permeable AMPA receptors and silent synapses in cocaine-conditioned place preference. EMBO J 36(4):458-474

Huang X, Stodieck SK, Goetze B, Cui L, Wong MH, Wenzel C, Hosang L, Dong Y, Löwel S#, Schlüter OM# (2015) Progressive Maturation of Silent Synapses Governs the Duration of a Critical Period. PNAS. 112(24): E3131-40

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

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

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Manuela Schmidt

Group Leader Somatosensory Signaling at the Max Planck Institute for Experimental Medicine

- 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

Gomez-Varela D, Schmidt M (2016) Exploring novel paths towards protein signatures of chronic pain. Molecular Pain, Commentary 2016 Dec 7;12. pii: 1744806916682242

Narayanan P, Sondermann J, Rouwette T, Karaca S, Urlaub H, Mitkovski M, Gomez-Varela D, Schmidt M (2016). Native Piezo2 Interactomics Identifies Pericentrin as a Novel Regulator of Piezo2 in Somatosensory Neurons. J Proteome Res, 5;15(8): 2676-87. doi: 10.1021/acs.jproteome.6b00235

Rouwette T, Sondermann J, Avenali L, Gomez-Varela D, Schmidt M (2016). Standardized profiling of the membrane-enriched proteome of mouse dorsal root ganglia provides novel insights into chronic pain. Molecular & Cellular Proteomics, doi: 10.1074/mcp.M116.058966

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

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Michael Sereda

Group Leader Molecular and Translational Neurology at the Max Planck Institute for Experimental Medicine

- 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

Quintes S, Brinkmann BG, Ebert M, Fröb F, Kungl T, Arlt FA, Tarabykin V, Huylebroeck D, Meijer D, Suter U, Wegner M, Sereda MW*, Nave KA* (2016) Zeb2 is essential for Schwann cell differentiation, myelination and nerve repair. Nat Neuro 9: 1050-9. *Co-corresponding

Fledrich R, Stassart RM*, Klink A, Rasch LM, Prukop T, Haag L, Czesnik D, Kungl T, Abdelaal TA, Keric N, Stadelmann C, Brück W, Nave KA*, Sereda MW* (2014) Soluble neuregulin-1 modulates disease pathogenesis in rodent models of Charcot-Marie-Tooth disease 1A. Nat Med Sep;20(9): 1055-61. *Co-corresponding

Stassart, R.M., Fledrich, R., Velanac, V., Brinkmann, B.G., Schwab, M.H., Meijer, D., Sereda, M.W.*, and Nave, K.-A.* (2013). A role for Schwann cell-derived neuregulin-1 in remyelination. Nat Neurosci 16: 48-54. *Co-corresponding

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(Pt 1): 72-87

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

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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

Fischer YE, Leong JCS, Sporar K, Ketkar MD, Gohl DM, Clandinin TR, Silies M (2015) A visual pathway with wide field properties is required for elementary motion detection. Current Biology 22: 3178-3189

Fisher YE*, Silies M* and Clandinin TR (2015) Orientation selectivity sharpens correlation based elementary motion detection in *Drosophila*. Neuron 88: 390-402.*equal contribution

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

Silies M, Klämbt C (2010) APC/C-Fzr/Cdh1 dependent regulation of cell adhesion controls glial migration in the *Drosophila* PNS. Nature Neuroscience 13: 1357-1364

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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

Walker F, Möck M, Feyerabend M, Guy J, Wagener RJ, Schubert D, Staiger JF*, Witte M* (2016) Parvalbumin- and vasoactive polypeptide-expressing neocortical interneurons impose differential inhibition on Martinotti cells. Nature Communications 7: 13664

Wagener RJ, Witte M, Guy J, Mingo-Moreno N, Kugler S, Staiger JF (2016) Thalamocortical Connections Drive Intracortical Activation of Functional Columns in the Mislaminated Reeler Somatosensory Cortex. Cereb Cortex 26: 820-837

Guy J, Wagener RJ, Mock M, Staiger JF (2015) Persistence of Functional Sensory Maps in the Absence of Cortical Layers in the Somatosensory Cortex of Reeler Mice. Cerebral Cortex 25: 2517-2528

Prönneke A, Scheuer B, Wagener RJ, Mock M, Witte M, Staiger JF (2015) Characterizing VIP Neurons in the Barrel Cortex of VIPcre/tdTomato Mice Reveals Layer-Specific Differences. Cerebral Cortex 25: 4854-4868

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

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Adj. Professor of Developmental Biology

- 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

Tuoc T, Dere E, Radyushkin R, Pham L, Nguen H, Tonchev A, Ronnenberg A, Shi Y, Steiger J, Eherenreich H, Stoykova A (2016) Ablation of BAF170 in developing and postnatal dentate gyrus affects neural stem cell proliferation, differentiation and learning. Mol Neurobiology (doi:10.1007/sl2035-016-9948-5)

Tylkowski MA, Yang K, Hoyer-Fender S, Stoykova A (2015) Pax6 controls centriole maturation in cortical progenitors through Odf2. Cellular and Molecular Life Sciences 72 (9): 1795-1809

Paul V, Tonchev AB, Henningfeld KA, Pavlakis E, Rust B, Pieler T, Stoykova A (2014) Scratch2 modulates neurogenesis and cell migration through antagonism of bHLH proteins in the developing neocortex. Cerebral Cortex 24 (3): 754-772

Tuoc TC, Boretius S, Sansom SN, Pitulescu M, Frahm J, Livesey FJ, Stoykova A (2013) Chromatin regulation by BAF170 controls cerebral cortical size and thickness. Developmental Cell 25 (3): 256-269

Zembrzycki A, Chou SJ, Ashery-Padan R, Stoykova A, O'Leary DDM (2013) Sensory cortex limits cortical maps and drives top-down plasticity in thalamocortical circuits. Nature Neuroscience 16 (8): 1060-1067

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- 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

Yao T, Treue S, Krishna BS (2016) An attention-sensitive memory trace in macaque MT following saccadic eye movements. PLoS Biol 14:e1002390

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

Treue S, Hol K, Rauber HJ (2000) Seeing multiple directions of motion – Physiology and psychophysics. Nature Neuroscience 3 (3): 270-276

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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

Storm F, Boly M, Casali M, Massimini M, Olcese M, Pennartz CMA, Wilke M (2017) Consciousness regained: disentangling mechanisms, brain systems, and behavioral responses. J of Neuroscience, (in press)

Wilke M, Dechent P, Bähr M (2017) Sarcoidosis manifestion centered on the thalamic pulvinar leading to persistent astasia. Movement Disorders: Clinical Practice, (in press)

Dominguez-Vargas A, Schneider L, Wilke M*, Kagan I* (2017) Electrical Microstimulation of the Pulvinar Biases Saccade Choices and Reaction Times in a Time-Dependent Manner. J of Neuroscience 37(8): 2234-2257. *equal contribution

Cabral-Calderin Y, Williams K, Dechent P, Opitz A, Wilke M (2016) Transcranial alternating current stimulation modulates spontaneous low frequency fluctuations as measured with fMRI. 2016. Neuroimage 141: 88-107

Cabral-Calderin Y, Weinrich C, Schmidt-Samoa C, Poland E, Dechent P, Bähr M, Wilke M (2016) Transcranial alternating current stimulation affects the BOLD signal in a frequency and task-dependent manner. Hum Brain Map 37(1): 94-121

Tsuchiya N, Wilke M, Frässle S, Lamme V (2015) No-report paradigms: Extracting the true neural correlates of consciousness. Trends Cogn Sci 19(12): 757-70

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

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

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Group Leader at the Max Planck Institute for Experimental Medicine

- Diploma in Biology, RWTH Aachen, Germany (1994)
- Ph.D. in Molecular and Cellular Biology, Baylor College of Medicine,
- Houston, TX, USA (2000)
- Postdoctoral fellow, Department of Molecular Neurobiology, Max Planck Institute of Experimental Medicine, Göttingen, Germany (2001)
- Group leader, Max Planck Institute of Experimental Medicine, Göttingen, Germany (2008)
- Habilitation, Medical Faculty of the Georg August University Göttingen, Germany (2014)

Major Research Interests

We study the molecular processes underlying neurotransmitter release and the functional consequences of alterations in these processes at the cellular and network levels.
In the past, projects were mainly focused on analyzing the role of vesicular neurotransmitter transporters in neurons as determining factors in the establishment and maintenance of glutamatergic, GABAergic and glycinergic synaptic phenotypes.
Current projects include the analysis of regulatory mechanisms that control the release of non-classical neurotransmitters from large dense-core vesicles in neuroendocrine chromaffin cells and peptidergic neurons.

Selected Recent Publications

Wüstefeld L, Winkler D, Janc OA, Hassouna I, Ronnenberg A, Ostmeier K, Muller M, Brose N, Ehrenreich H, Wojcik SM (2015) Selective expression of a constitutively active erythropoietin receptor in GABAergic neurons alters hippocampal network properties without affecting cognition. J Neurochem doi: 10.1111/jnc.13445. [Epub ahead of print]

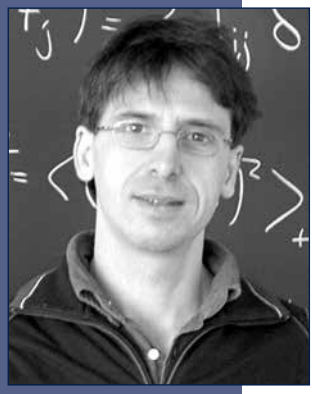
Man KM, Imig C, Walter AM, Pinheiro PS, Stevens DR, Rettig J, Sorensen JB, Cooper BH, Brose N, Wojcik SM (2015) Identification of a Munc13-sensitive step in chromaffin cell large dense-core vesicle exocytosis. eLife 4, doi: 10.7554/eLife.10635

Rahman J, Besser S, Schnell C, Eulenburg V, Hirrlinger J, Wojcik SM Hulsmann S (2015) Genetic ablation of VIAAT in glycinergic neurons causes a severe respiratory phenotype and perinatal death. Brain Struct Funct 220: 2835-2849

Wojcik SM, Tantra M, Stepniak B, Man KN, Muller-Ribbe K, Begemann M, Ju A, Papiol S, Ronnenberg A, Gurvich A, Shin Y, Augustin I, Brose N, Ehrenreich H (2013) Genetic Markers of a Munc13 Protein Family Member, BAIAP3, Are Gender-Specifically Associated with Anxiety and Benzodiazepine Abuse in Mice and Humans. Mol Med 19: 135-148

Wojcik SM, Katsurabayashi S, Guillemin I, Friauf E, Rosenmund C, Brose N, Rhee JS (2006) A Shared Vesicular Carrier Allows Synaptic Corelease of GABA and Glycine. Neuron 50: 575-587

Herzog E, Takamori S, Jahn R, Brose N, Wojcik SM (2006) Synaptic and vesicular co-localization of the glutamate transporters VGLUT1 and VGLUT2 in the mouse hippocampus. J Neurochem 99: 1011-1018



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Fred Wolf

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- 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

Palmigiano A, Geisel T, Wolf F jsa, Battaglia D (2017) Flexible information routing by transient synchronization. Nature Neurosci doi: 10.1038/nn.4569

Chapochnikov N M, Takago H, Huang C-H, Pangrsic T, Khimich D, Neef J, Auge E, Göttfert F, Hell S W, Wichmann C, Wolf F jsa, Moser T (2014) Uniquantal Release through a Dynamic Fusion Pore Is a Candidate Mechanism of Hair Cell Exocytosis. Neuron 83(6): 1389-1403, doi: 10.1016/j.neuron.2014.08.003

Kaschube M, Schnabel M, Löwel S, Coppola DM, White LE, and Wolf F (2010) Universality in the Evolution of Orientation Columns in the Visual Cortex. Science 330: 1113

Naundorf B, Wolf F jsa, Volgushev M (2006) Unique features of action potential initiation in cortical neurons. Nature 440: 1060

Wolf F, Geisel T (1998) Spontaneous pinwheel annihilation during visual development. Nature 395: 73-78

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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

de Castro MA, Bunt G, Wouters FS (2016) Cathepsin B launches an apoptotic exit effort upon cell death-associated disruption of lysosomes. Cell Death Discov. 2016 Feb 29;2: 16012

Schmitz M, Wulf K, Signore SC, Schulz-Schaeffer WJ, Kermer P, Bähr M, Wouters FS, Zafar S, Zerr I (2014) Impact of the cellular prion protein on amyloid-β and 3PO-tau processing. J Alzheimers Dis 38(3): 551-65

Schulz O, Pieper C, Clever M, Pfaff J, Ruhlandt A, Kehlenbach RH, Wouters FS, Großhans J, Bunt G, Enderlein J (2013) Resolution doubling in fluorescence microscopy with confocal spinning-disk image scanning microscopy. Proc Natl Acad Sci U S A 2013 Dec 24;110(52): 21000-5

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van den Bogaart G, Holt MG, Bunt G, Riedel D, Wouters FS, Jahn R (2010) One SNARE complex is sufficient for membrane fusion. Nature Struct Mol Biol 17: 358-365

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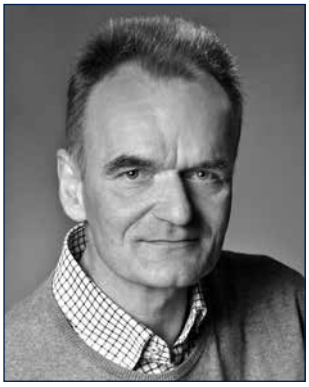

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