

## **Prof. Dr. rer. nat. Carsten H. Wolters: Research**

### **Research interests**

The main research areas of the SIM-NEURO (Stimulation, Imaging and Modeling of NEURONal networks in the human brain) research group at the IBB are the development of new methods and applications for multimodal brain imaging and brain stimulation to reconstruct and manipulate neuronal networks in the brain. Brain imaging methods include modalities such as Electroencephalography (EEG), Magnetoencephalography (MEG), Magnetic Resonance Imaging (MRI), diffusion MRI (dMRI), functional MRI (fMRI) and Positron Emission Tomography (PET). A special focus is on the development of multimodal imaging and combined EEG/MEG/MRI source reconstruction methods using new forward and inverse approaches. In the brain stimulation research field we contribute new optimization methods for multi-sensor setups to transcranial electric (TES) and magnetic stimulation (TMS) and combined TES/TMS. We develop artifact-correction, linear and non-linear registration as well as segmentation approaches for structural MRI such as T1-MRI, T2-MRI and dMRI and for PET. The new methodology is applied in the field of neuroscientific brain research and in clinical applications such as presurgical epilepsy diagnosis and schizophrenia.

A detailed list of my research interests ordered by keywords can be found as a last subsection in this file.

### **Running projects**

- 2021-2024 ERA PerMed: Grant number: ERAPERMED2020-227; Action full title: "Personalised diagnosis and treatment for refractory focal paediatric and adult epilepsy"; Action acronym: PerEpi.  
Own status: Coordinator and PI.  
Further PI's:  
Alena Buyx, Munich;  
Sampsa Pursiainen, Tampere, Finland.  
Fabrice Wallois, Amiens, France.  
PerEpi website, PerEpi at DRKS  
ERA newsletter, ERA newsletter pdf  
PerEpi, ERA Permed, PerEpi at BMG,  
pdf of press release Münster, Press release Münster  
pdf of Wissen.Leben, Wissen.Leben: Page 4 upper left, Press release Tampere.
- 2020-2024 DFG-project "Multi-channel transcranial direct current stimulation (mc-tDCS): a novel approach to modulate smooth pursuit eye movement control in healthy individuals and patients with psychotic disorders."  
Own status: PI (WO1425/10-1)  
Further PIs:  
Joachim Gross (GR2024/8-1), IBB;

Rebekka Lencer (LE1122/7-1), Klinik für psychische Gesundheit, Universitätsklinikum Münster.

Gepris

2018-2022 NIH (Grant Number: 1 R01 EB 026299-01), "BrainStorm: Highly Extensible Software for Advanced Electrophysiology and MEG/EEG Imaging", Software grant for integrating SimBio-NeuroFEM and DUNEuro into Brainstorm.

Own status: Collaborator.

PIs: Prof. Richard Leahy, School of Engineering, USC, Los Angeles, USA and Prof. John Mosher, Department of Neurology, McGovern Medical School, University of Texas, USA.

2017-2021 DFG priority program (SPP 1665/2): "Resolving and Manipulating Neuronal Networks in the Mammalian Brain - from Correlative to Causal Analysis", Project "Individualized closed-loop transcranial alternating current stimulation".

Own status: PI (WO1425/5-2)

Further PI's: C.Hermann (HE 3353/8-2), Allgemeine Psychologie (Fakultät VI), Carl von Ossietzky Universität Oldenburg; T.Schneider (SCHN 1511/1-2), Institut für Neurophysiologie und Pathophysiologie, Universitätsklinikum Hamburg-Eppendorf.

Gepris

2016-2021 DFG-project "Rekonstruktion epilepsietypischer Quellen durch simultane Auswertung von EEG-und MEG-Daten unter Nutzung kalibrierter realistischer Kopfmodelle.

Own status: PI (WO1425/7-1)

Further PI: S. Rampp (RA20662/1-1), Neurochirurgische Klinik, Universitätsklinikum Erlangen.

Gepris

2020-2021 DAAD PPP Finnland 2020, project 57523877: "Reconstructing Somatosensory Network Connectivity with Advanced Bayesian Imaging".

Own status: PI

Further PI: Prof. Sampsa Pursiainen, University of Tampere, Finland.

Web

### **Completed projects**

2016-04/2020 DFG-project "Neurostimulation for the treatment of disturbed pharyngeal sensitivity as a major cause of neurogenic dysphagia".

Own status: Collaborator (WO 1425/6-1)

PI's: R. Dziewas (DZ 78/1-1) and S. Suntrup (SU 922/1-1), Department of

Neurology, University Hospital Münster.  
Gepris

- 2014-2019 MSCA-ITN-2014-ETN: Marie Skłodowska-Curie Innovative Training Networks, Grant agreement no.: 641652, Action acronym: ChildBrain), Action full title: "Advancing brain research in children's developmental neurocognitive disorders".  
Own status: PI.  
ChildBrain, Press release Münster
- 2018-2019 DAAD PPP Finnland 2018, project 57405052: "Advancing FEM for Reconstructing and Manipulating the Human Somatosensory Cortex".  
Own status: PI  
Further PI: Prof. Sampsa Pursiainen, University of Tampere, Finland.  
Web
- 2014-2017 IZKF-project (JU 2/024/15): "Transcranial direct current stimulation of the medial prefrontal cortex for therapy of unipolar major depression".  
Own status: Collaborator.  
PI: M.Junghöfer, IBB.  
Further collaborator: V.Arolt, Clinic and Polyclinic for Psychiatry and Psychotherapy, University of Münster.
- 2014-2016 DFG priority program (SPP 1665/1): "Resolving and Manipulating Neuronal Networks in the Mammalian Brain - from Correlative to Causal Analysis", Gepris Project "Causal role of brain oscillations in perception: modulation of network dynamics by transcranial alternating current stimulation (tACS). C.H.Wolters (WO1425/5-1); C.Hermann (HE 3353/8-1), Allgemeine Psychologie (Fakultät VI), Carl von Ossietzky Universität Oldenburg; A.Engel (EN 533/13-1), Institut für Neurophysiologie und Pathophysiologie, Universitätsklinikum Hamburg-Eppendorf. Gepris
- 2011-2014 DFG-project KonnekFEM: Entwicklung, Validierung und Anwendung von Verfahren zur Bestimmung der Konnektivität zwischen Hirnstrukturen . C.H.Wolters (WO1425/3-1); L.Grasedyck (GR 3179/3-1), IGPM, RWTH Aachen; T.Knösche (KN 588/4-1), MPI for Human Cognitive and Brain Sciences Leipzig; B.Maess (MA 4940/1-1), MPI for Human Cognitive and Brain Sciences Leipzig; J.Haueisen (HA 2899/14-1), Institut für Biomedizinische Technik und Informatik, TU Ilmenau. Gepris
- 2011-2014 DFG-project COMESA-PED: Rekonstruktion epilepsietypischer Quellen durch simultane Auswertung von EEG-und MEG-Daten unter Nutzung kalibrierter realistischer Kopfmodelle. C.H.Wolters (WO1425/2-1); H. Stefan (STE380/14-1), Epilepsy Center Erlangen. Gepris

- 2007–2012 Industrially funded project AF940097, "Automatic generation of head models and influence of skull segmentation on finite element forward modeling in EEG and MEG".
- 2007-2010 DFG-project EMOBEAMFEM: Entwicklung kombinierter EEG/MEG Beamformer Methoden auf der Basis hoch realistischer Kopfvolumenleitermodelle sowie deren Evaluation anhand der Untersuchung des "prefrontal-thalamic sensory gating" Systems und möglicher Störungen dieses Systems bei schizophrenen Patienten. M.Junghöfer (JU 445/5-1), IBB; C.H.Wolters, IBB; C.Pantev, IBB. Gepris
- 2007-2010 DFG-project FEMINVERS: Entwicklung und Validierung von Verfahren zur Lokalisation von Hirnaktivität mit Hilfe der Methode der Finiten Elemente. C.H.Wolters (WO 1425/1-1); L.Grasedyck (GR 3179/1-1), MPI for Mathematics in the Sciences Leipzig; J. Haueisen (HA 2899/6-1), Biomagnetic Center Jena; T.Knösche (KN 588/2-1), MPI for Human Cognitive and Brain Sciences Leipzig. Gepris
- since 2004 NCCR-NIH Center for Bioelectric Field Modeling, Simulation and Visualization. PI's: C.Johnson, R.S. MacLeod, SCI Institute, University of Utah. Co-Investigators: see webpage. My own status: NCCR collaborator. Web.
- 2000–2003 SimBio-A generic environment for bionumerical simulation. European Commission, Information Society Technologies (IST) Programme, Framework V, Project IST-1999-10378. PI's: G.Lonsdale, U.Hartmann, NEC CCRLE, St.Augustin, Germany; F.Kruggel, C.Wolters, MPI for Cognitive Neuroscience Leipzig, Germany; Rod Hose, University of Sheffield, England. Co-Investigators: see Web.

### **Software development**

- since 2015 DUNEuro - A software toolbox for forward modeling in neuroscience, Schrader et al., 2021 and Wiki1, Wiki2
- since 2018 BrainStorm-DUNEuro integration:  
Web
- since 2013 Fieldtrip-SimBio integration:  
Vorwerk et al., 2018, Web
- since 2003 SimBio: A free toolbox for EEG and MEG source analysis and brain stimulation using the finite element method.  
Wiki, Old-Wiki, overview report.

## **Open data**

1. Piastra, M.C., Schrader, S., Nüssing, A., Antonakakis, M., Medani, T., Wollbrink, A., Engwer, C., Wolters, C.H., The WWU DUNEuro reference data set for combined EEG/MEG source analysis, available as open data set on Zenodo (2020).  
DOI.

## **Large-scale medical equipment**

since 2008 3T magnetic resonance scanner for brain research for the Medical Faculty of the Westfälische Wilhelms-Universität Münster:

2008-09 Contribution to the DFG-application

2010-12 Member of the committee for the choice of the manufacturer

2012-17 Member of the steering committee for the use of the new scanner

## **Awards (own and those of my students)**

- 08/2022 Best presentation award (2nd place): Erdbrügger, T., Westhoff, A., Radecke, J.-O., Lencer, R., Gross, J., Pursiainen, S., Engwer, C., and Wolters, C.H., CutFEM for EEG forward modeling, Proceedings of the Workshop Biosignale, August 24-26, Dresden, Germany (2022).  
Web, pdf.
- 10/2019 Keynote speaker recognition award to Carsten Wolters, 19th IEEE International Conference on Bioinformatics and Bioengineering, BIBE2019 keynotes, Athens, Greece, October 28-30, 2019.  
Award.
- 09/2019 Young Investigator Award (1.000 Eur) to Marios Antonakakis: For his talk entitled "Individual targeting effects and optimization of multi-channel transcranial electric stimulation of the human primary somatosensory cortex", 13<sup>th</sup> Int Conf on Complex Medical Engineering, Dortmund, Germany, Sept.23-25, 2019.  
Award, Abstract booklet, Web1, Web1.
- 04/2018 Best poster award (3rd place, (500 \$): Antonakakis, M., Oostenveld, R., Wellmer, J., Möddel, G., Haueisen, J., Rampp, S., Wolters, C.H., Age-related skull conductivity estimated by a calibration procedure using combined somatosensory evoked potentials and fields on realistic head models, 50 years of MEG, ISACM/EMEGS, Poros, Greece, April 20-21, 2018.  
Award, Web, pdf of poster
- 05/2017 Wolters, C.H., Prof.(apl) at the Medical Faculty, Westfälische Wilhelms-Universität Münster, Germany, 2017: Fulfillment of criteria,

- 11/2016 Featured article in IEEE Trans.Biomed.Eng., see Web:  
Fiederer, L.D.J., Lahr, J., Vorwerk, J., Lucka, F., Aertsen, A., Wolters, C.H., Schulze-Bonhage, A., Ball, T., Electrical Stimulation of the Human Cerebral Cortex by Extracranial Muscle Activity: Effect Quantification with Intracranial EEG and FEM Simulations, *IEEE Trans Biomed Eng*, 63(12), pp.2552–2563 (2016).
- 04/2016 Best poster award (1st place): Nüßing, A., Wolters, C.H., Brinck, H. and Engwer, C., The Unfitted Discontinuous Galerkin Method for Solving the EEG Forward Problem: A Second Order Study, Proc. of the workshop BIOSIGNAL PROCESSING 2016, April 7–8, Berlin, Germany, (2016).  
Web, pdf.
- 02/2016 A proposed image of the following paper was chosen as cover image of NeuroImage, volume 128, 2016:  
Fiederer, L.D.J., Vorwerk, J., Lucka, F., Dannhauer, M., Yang, S., Dümpelmann, M., Schulze-Bonhage, A., Aertsen, A. Speck, O., Wolters, C.H. and Ball, T., The role of blood vessels in high-resolution volume conductor head modeling of EEG, *NeuroImage*, 128:193–208, (2016).
- 09/2015 Best poster award (1st place): Nüßing, A., Wolters, C.H., Brinck, H. and Engwer, C. The unfitted discontinuous Galerkin method in brain research, BACI2015, International Conference on Basic and Clinical Multimodal Imaging, Utrecht, The Netherlands, Sept. 1-5, 2015. Web pdf of poster
- 01/2015 Journal of Neural Engineering: Selected as one of the 16 highlights of 2014: Wagner S, Rampersad SM, Aydin Ü, Vorwerk J, Oostendorp TF, Neuling T, Herrmann CS, Stegeman DF, Wolters CH, Investigation of tDCS volume conduction effects in a highly realistic head model, *J. Neural Eng.*, 11:016002(14pp), (2014).
- 04/2014 Best poster award (2nd place): Lucka, F., Tellen, S., Wolters, C.H., Burger, M. Workshop "Innovative Verarbeitung bioelektrischer und biomagnetischer Signale" - bbs2014, Physikalisch-Technische Bundesanstalt, Berlin, Germany, April 10-11 (2014). Web, pdf of poster
- 11/2013 Best poster award (1st place): Wagner S., Aydin Ü., Vorwerk J., Herrmann, C., Burger M., Wolters C.H., NeuroVisionen 9, 29.11.2013, Cologne, pdf of poster
- 11/2012 Faculty of 1000, 20.Nov.2012; F1000 Prime Recommendation of:  
Neuling, T., Rach, S., Wagner, S., Wolters, C.H. and Herrmann, C.S., *NeuroImage*, 63(2):771-778, (2012). DOI Web
- 10/2012 Best poster award (1st place): Lucka, F., Pursiainen, S., Burger, M. and Wolters, C.H., NeuroVisionen 8, 26.10.2012, Aachen, Web, Web2

- 04/2012 Best scientific contribution award (1st place in section "biomagnetism"): Lucka, F., Pursiainen, S., Burger, M. and Wolters, C.H., Workshop "Innovative Verarbeitung bioelektrischer und biomagnetischer Signale" - bbs2012, Physikalisch-Technische Bundesanstalt, 19.-20.04.2012, Berlin, Web,
- 03/2012 Best scientific contribution award (1st place): Ruthotto, L., Gigengack, F., Burger, M., Wolters, C.H., Jiang, X., Schaefers, K.P. and Modersitzki, J., Bildverarbeitung für die Medizin, Berlin, March 18-20, Web1, Web2, (2012).
- 05/2010 First Muenster Science Slam (Lars Ruthotto):  
Newspaper article (german) YouTube video
- 11/2007 Paper evaluated for Faculty of 1000 Biology:  
Wolters, C.H., Anwander, A., Tricoche, X., Weinstein, D., Koch, M.A., and MacLeod, R.S., *NeuroImage*, Vol.30, No.3, pp.813-826(2006). Web
- 08/2002 Young Investigators Award: Anwander, A., Wolters, C.H., Dümpelmann, M. and Knösche, T.R. 13<sup>th</sup> Int.Conf. on Biomagnetism, Jena, Germany. Web.
- 06/1998 Friedrich Springorum medal: Wolters, C.H., RWTH Aachen, Germany.
- 1992 DAAD-grant: Wolters, C.H., For studying at INSA de Lyon (<http://www.insa-lyon.fr>), 1992-1993, Lyon, France.

### **Member of advisory board**

- since 11/2016 Wolters, C.H.: Member of the scientific advisory board of EU-project STIPED entitled "Transcranial brain stimulation as innovative therapy for chronic pediatric neuropsychiatric disorders", Coordinator: Michael Siniatchkin, Christian-Albrechts-Universität zu Kiel, Kiel, Germany.  
Web.

### **Organization of workshops/conferences/dissemination/outreach**

- 11/2022 Lencer, R. (Lübeck) & Wolters, C.H.: S-160 Light on the horizon? Exploring transcranial electric stimulation (tES) as novel non-pharmacological treatment approach, Kongress der Deutschen Gesellschaft für Psychiatrie und Psychotherapie, Psychosomatik und Nervenheilkunde e. V. (DGPPN), Berlin, Nov.23-26 (2022).  
Web.
- 09/2022 Vorwerk, J. (Innsbruck) & Wolters, C.H.: FS: Patient-Specific Bioelectric Field Modeling and Simulation in Brain Research, Joint Annual Conference of the Austrian, German and Swiss Societies for Biomedical Engineering, Innsbruck, Austria, Sept.28 (2022).  
Web.

- 08/2022 Wolters, C.H. & Rampp, S. (Erlangen): Symposium 14 entitled "Contribution of MEG, EEG and TES to the presurgical diagnosis and treatment of epilepsy", 22nd Int.Conf.on Biomagnetism (Biomag2022), Aug.28-Sept.1, 2022, Birmingham, GB.  
Web.
- 08/2022 Nagarajan, S. & Wolters, C.H. & Haufe, S.: Satellite to the 22nd Int.Conf.on Biomagnetism (Biomag2022) entitled "Algorithms in Biomagnetism: From Sensing, Forward Modeling, Imaging to Advanced Analytics", Aug.27, 2022, Birmingham, GB.  
Web. Program. Program.
- 08/2022 Wolters, C.H.: Wissenschaftlicher Beirat for workshop entitled "Biosignale2022" and chair of the session "EEG Processing & Brain Monitoring", Dresden, Aug.24-26, (2022).  
Web
- 09/2021 Wolters, C.H. and Rampp, S.: Scientific Symposium on "Electric and Magnetic Source Imaging and brain stimulation in Neurology, Epileptology and Cognitive Neuroscience: general and methodological issue", Annual Meeting on Imaging and Electrophysiology (AMIE) in Neurology, Neurosurgery and Neuroscience and Summer School on Imaging in Epilepsy (SuSIE), Bochum, Sept.13-17 (2021).  
Web
- 09/2020 Wolters, C.H. and Rampp, S.: Scientific Symposium on "EEG and MEG source imaging in epileptology", Annual Meeting on Imaging and Electrophysiology (AMIE) in Neurology, Neurosurgery and Neuroscience and Summer School on Imaging in Epilepsy (SuSIE), Bochum, Sept.13-17 (2020).  
Web
- 03/2020 Wolters, C.H.: Wissenschaftlicher Beirat for workshop entitled "Biosignale2020: Innovative Verarbeitung bioelektrischer und -magnetischer Signale", Kiel, March 11-13, (2020).  
Web
- 09/2019 Wolters, C.H. and Schneider, T.: Session OS5-1: "New methods and experimental results for optimized multi-channel tES (II)", 13th Int. Conf. on Complex Medical Eng., Dortmund,Germany, Sept.23-25, (2019).  
Web, Abstract-Book, CME-Booklet.
- 09/2019 Wolters, C.H. and Knösche, T.: Session OS4-1: "New methods and experimental results for optimized multi-channel tES (I)", 13th Int. Conf. on Complex Medical Eng., Dortmund,Germany, Sept.23-25, (2019).  
Web, Abstract-Book, CME-Booklet.



- 08/2019 Wolters, C.H. and Rampp, S.: Scientific Symposium coupled with a Poster Session on “EEG and MEG source analysis methods”, SuSIE - Summer School on Imaging in Epilepsy, Epilepsy Surgery and Epilepsy Research , Bochum, Aug.25 (2019).  
Web
- 08/2019 Wolters, C.H. and Rampp, S.: Seminar on “Source Analysis with Open Source Tools”, SuSIE - Summer School on Imaging in Epilepsy, Epilepsy Surgery and Epilepsy Research , Bochum, Aug.27 (2019).  
Web
- 03/2019 Antonakakis, M., Wessing, I., Wollbrink, A., Wolters, C.H., Das Gehirn bei der Arbeit beobachten: Ein Tag in der Hirnforschung, Girls’ Day, March 28, 2019. Evaluation, Web1, Web2.
- 08/2018 Wolters, C.H. & Rampp, S. (Erlangen): Panel Session entitled ”Advanced MEG/EEG source analysis in epilepsy”, 21th Int.Conf.on Biomagnetism (Biomag2018), Aug.26-30, 2018, Philadelphia, USA.  
Web.
- 06/2018 Wolters, C.H.: Workshop on “Epilepsy and transcranial electric stimulation”, IBB , Münster, June 28 (2018).  
Web
- 09/2018 Rampp, S., (Erlangen) & Wolters, C.H.: Session ”From Desktop to Epilepsy Surgery - New Source Analysis Approaches in Clinical Practice”, 54. Jahrestagung der Deutschen Gesellschaft für Epileptologie (DGfE) e.V., Fürth, June 13-16 (2018).  
Web
- 06/2018 Homölle, S., Piastra, M.C., Oostenveld, R., Schrader, S., Wolters, C.H.: Educational Course on “EEG and MEG Source Reconstruction with FieldTrip”, 2018 OHBM Annual Meeting, Singapore, June 17 (2018).  
Web
- 04/2018 Wolters, C.H., Wollbrink, A., Piastra, M.C., Antonakakis, M. Das Gehirn bei der Arbeit beobachten: Ein Tag in der Hirnforschung, Girls’ Day, April 26, 2018. Evaluation. Web.
- 03/2018 Wolters, C.H.: Wissenschaftlicher Beirat for workshop entitled “Biosignale2018: Innovationen bei der Erfassung und Analyse bioelektrischer und biomagnetischer Signale” and chair of the session “EEG/MEG Quellenrekonstruktion”, Augustinerkloster Erfurt, March 21-23, (2018).  
Program, Web
- 03/2018 Nitsche, M. & Wolters, C.H.: Symposium entitled “Neue Methoden und Anwendungen der transkraniellen Hirnstimulation”, 62. Wissenschaftliche

Jahrestagung der Deutschen Gesellschaft für Klinische Neurophysiologie (DGKN2018), Berlin, Germany, March 15-17 (2018).

Program, Web

- 05/2017 Junghöfer, M., Wollbrink, A. & Wolters, C.H. (org.): "Abschiedssymposium Christo Pantev". Medizinische Fakultät, Westfälische Wilhelms-Universität Münster, Alexander-von-Humboldt Haus, Hüfferstr., May 12, 2017.  
Program
- 04/2017 Moliadze, V. & Wolters, C.H.: Symposium entitled "Besonderheiten transkranieller Hirnstimulation bei Kindern und Jugendlichen", Deutsche Gesellschaft für Klinische Neurophysiologie (DGKN2017), Leipzig, Germany, April 27-29 (2017).  
Program Web
- 04/2017 Wolters, C.H., Wollbrink, A., Piastra, M.C., Antonakakis, M., Schrader, S. Das Gehirn bei der Arbeit beobachten: Ein Tag in der Hirnforschung, Girls' Day, April 27, 2017. Evaluation. Web.
- 04/2017 Wolters, C.H.: Workshop with about 30 participants from all over Germany entitled "Theory and praxis for simulation of transcranial electric stimulation (tES) using SimBio with outlook to DUNEuro", IBB, April 7, 2017, Münster, Germany.  
Program.
- 04/2017 Wolters, C.H.: SPP1665 kick-off meeting of Troika Münster/Oldenburg/Hamburg IBB, April 6, 2017, Münster, Germany.  
Program.
- 10/2016 Wolters, C.H. and Oostenveld, R.: Symposium entitled "Improving source reconstruction for MEG and EEG in children", Biomag2016, 20th Int.Conf.on Biomagnetism, Oct.1-6, 2016, Seoul, Korea.  
Web, pdf.
- 10/2016 Wolters, C.H. and Haueisen, J.: Symposium entitled "Validating and Evaluating New Methods for Source Analysis", Biomag2016, 20th Int.Conf.on Biomagnetism, Oct.1-6, 2016, Seoul, Korea.  
Web, pdf.
- 04/2016 Wolters, C.H., Piastra, M.C., Cunediglu, U., Das Gehirn bei der Arbeit beobachten: Ein Tag in der Hirnforschung, Girls' Day, April 26, 2016. Web. Evaluation.
- 04/2016 Wolters, C.H.: Wissenschaftlicher Beirat, Workshop Biosignalverarbeitung 2016: Innovationen bei der Erfassung und Analyse bioelektrischer und biomagnetischer Signale, April 7-8, 2016, Tieranatomisches Theater der HU, Berlin. Web.

- 03/2016 Stefan, H. & Wolters, C.H. (symposium chairs), Quellenlokalisierung und Netzwerkanalyse: Ansatz zur Therapiesteuerung in der Epileptologie, 60. Jahrestagung der Deutschen Gesellschaft für Klinische Neurophysiologie und Funktionelle Bildgebung (DGKN2016), Düsseldorf, Germany, March 16-19 (2016).  
Web
- 09/2015 Wolters, C.H.: ChildBrain kick-off workshop, 44 participants from 18 nations, Institute for Biomagnetism and Biosignalanalysis, University of Münster, Sept. 22-24, 2015.  
Press release Westfälische Nachrichten (in german),  
Press release Die Glocke (in german),  
Press release (in german),  
Workshop program,  
ChildBrain webpage
- 09/2015 Organization of the ChildBrain kick-off workshop at IBB in Münster. Web
- 09/2015 Wolters, C.H.: Scientific committee, BACI2015, International Conference on Basic and Clinical Multimodal Imaging, Utrecht, The Netherlands, Sept. 1-5, 2015. Web
- 09/2015 Wolters, C.H., & Rampp, S., (Erlangen): Session "EEG/MEG inverse modeling 1: combined EEG-MEG", BACI2015, International Conference on Basic and Clinical Multimodal Imaging, Utrecht, The Netherlands, Sept. 1-5, 2015. Web
- 04/2015 Wolters, C.H., & Stefan, H. & Trinka, E.: Seminar "EEG und MEG Komplementarität in der präoperativen Diagnostik", 9. Dreiländertagung der Deutschen und Österreichischen Gesellschaften für Epileptologie und der Schweizerischen Liga gegen Epilepsie, Dresden, 22.-25. April 2015. Web
- 10/2014 Wolters, C.H., & Rampp, S., (Erlangen): Workshop "New methodology and results in EEG, MEG and combined EEG/MEG source analysis in presurgical epilepsy diagnosis, 23. Deutsches EEG/EP Mapping Meeting, Giessen, Germany, October 24-26, (2014). Program
- 08/2014 Wolters, C.H.: Awards committee, Biomag2014, 19th Int.Conf.on Biomagnetism, August 24-28, 2014, Halifax, Canada. Web.
- 03/2010 Steinhoff, U. & Wolters, C.H.: Session on BBS2014 (Innovative Verarbeitung bioelektrischer und biomagnetischer Signale), PTB Berlin, April 10.-11, 2014, Program
- 04/2014 Wolters, C.H.: Wissenschaftlicher Beirat, Innovative Verarbeitung bioelektrischer und biomagnetischer Signale, April 10.-11, 2014, PTB Berlin. Web.

- 09/2013 Wolters, C.H.: 6th International Summer School in Biomedical Engineering - Multimodal integration of brain measurements in research and clinical practice, September 23rd - October 6th, 2013 in Havana, Cuba. Web.
- 02/2013 Scherg, M. and Wolters, C.H. (org.): Workshop entitled "Efficient evaluation of interictal epileptiform activity in EEG and MEG". With participation of epilepsy experts from Munich, Erlangen, Bochum, Bonn, Bethel, Osnabrück and Münster, Feb.20.-22, 2013, Institute for Biomagnetism and Biosignal-analysis, Münster, Germany.
- 03/2012 Wolters, C.H. (org.): Chair for track O "Modeling and Simulation of Brain and Heart". 46.DGBMT Jahrestagung, Sept.16-19, 2012, Jena, Germany. Web
- 03/2010 Wolters, C.H. & Haueisen, J. (org.): Workshop on "Forward modeling in EEG and MEG source analysis". Biomag2010, 17th Int.Conf.on Biomagnetism, March 28-April 1, 2010, Dubrovnik, Croatia. Program
- 09/2008 Dobel, C., Junghöfer, M. & Wolters, C.H. (org.): "Fusing brain states and mental domains". Otto Creutzfeldt Center for Cognitive and Behavioral Neuroscience, Medizinische Fakultät, Westfälische Wilhelms-Universität Münster. Invited guests from Europe and the USA. Program
- 07/2003 Co-organization of the SimBio project-meeting at the MPI-CBS in Leipzig.
- 11/2000 Wolters, C.H. & Anwander, A. (org.): "Models to Generate Individual Anisotropic Conductivity Maps of Head Tissues from Multimodal MR and Influence on EEG/MEG Source Localization", MPI-CBS, Leipzig. Invited guests from Europe and the USA.
- 07/2000 Co-organization of the SimBio project-meeting at the MPI-CBS in Leipzig.

### **Reviewer for funding agencies**

- Deutsche Forschungsgemeinschaft (DFG)
- Alexander von Humboldt-Stiftung
- Academic Promotions, Human Resources, Cardiff University

### **Member of expert committees**

since 03/2018 Deutsche Gesellschaft für Biomedizinische Technik (DGBMT), Fachausschuss "Magnetische Methoden in der Medizin".  
Web

## **Editorial positions**

- Guest editor of Brain Sciences for the special issue on "Modern Bioelectromagnetism Methods for Optimizing Diagnosis and Therapy in Epilepsy".  
Web
- Associate editor for the International Journal of Bioelectromagnetism, IJBEM.  
Web
- Biomag Central: Section editor for Mathematical modelling.  
Web
- Review editor for Frontiers in Neuroscience, Section Brain Imaging Methods.  
Web

## **Reviewer for**

- Brain Stimulation
- Brain Topography
- Computational Intelligence and Neuroscience
- Computer Methods and Programs in Biomedicine
- Enzy.Biomed.Eng.
- Frontiers in Neuroscience
- Human Brain Mapping
- IEEE Transactions on Biomedical Engineering
- IEEE Transactions on Circuits and Systems
- IEEE Transactions on Medical Imaging.
- IEEE Transactions on Neur Sys Rehab Eng
- Inverse Problems
- Journal of Applied Electromagnetics and Mechanics
- Journal of Applied Numerical Mathematics
- Journal of Neurology and Clinical Neurophysiology
- Journal of Neuroscience Methods
- Med. Biol. Eng. Comp. (MBEC)

- NeuroImage
- Physics in Medicine and Biology
- Scholarpedia, Encyclopedia of Computational Neuroscience
- SIAM Computational Science and Engineering Book Series
- SIAM Journal for Scientific Computing

## Teaching

- 04/2021–07/2021 "Neue mathematische Methoden im Bioelektromagnetismus und deren neurowissenschaftliche Anwendungen, Teil II", Veranstaltungs-Nr.: 104447, Type of presentation: Vorlesung, Assignment: Master Mathematik (88 105 10, 88 105 13), Staatsexamen Medizin (08 107 0), Gaststudium Medizinische Wissenschaften (A2 E84 0), Zus Dr. rer. medic Medizinische Wissenschaften (67 E84 9), together with Joachim Groß (7%), Institute for Biomagnetism and Biosignalanalysis, Christoph Kellinghaus (7%), Klinikum Osnabrück, Harald Kugel (7%), Institute of Clinical Radiology, UKM and Gabriel Möddel (7%), Clinic for Neurology, UKM.  
Web.
- 04/2021–07/2021 "Neue mathematische Methoden im Bioelektromagnetismus und deren neurowissenschaftliche Anwendungen, Teil I", Veranstaltungs-Nr.: 104446, Type of presentation: Übung, Assignment: Master Mathematik (88 105 10, 88 105 13), Staatsexamen Medizin (08 107 0), Gaststudium Medizinische Wissenschaften (A2 E84 0), Zus Dr. rer. medic Medizinische Wissenschaften (67 E84 9).  
Web.
- 15/05/2020 "Vorlesung der Neurologie", Veranstaltungs-Nr.: 512015, Type of presentation: Lecture, Web,
- 10/2020–02/2021 "Neue mathematische Methoden im Bioelektromagnetismus und deren neurowissenschaftliche Anwendungen, Teil I", Veranstaltungs-Nr.: 102432, Type of presentation: Vorlesung, Assignment: Master Mathematik (88 105 10, 88 105 13), Staatsexamen Medizin (08 107 0), Gaststudium Medizinische Wissenschaften (A2 E84 0), Zus Dr. rer. medic Medizinische Wissenschaften (67 E84 9), together with Joachim Groß (7%), Institute for Biomagnetism and Biosignalanalysis, Christoph Kellinghaus (7%), Klinikum Osnabrück, Harald Kugel (7%), Institute of Clinical Radiology, UKM and Gabriel Möddel (7%), Clinic for Neurology, UKM.  
Web.
- 10/2020–02/2021 "Neue mathematische Methoden im Bioelektromagnetismus und deren neurowissenschaftliche Anwendungen, Teil I", Veranstaltungs-Nr.: 102433,

Type of presentation: Übung, Assignment: Master Mathematik (88 105 10, 88 105 13), Staatsexamen Medizin (08 107 0), Gaststudium Medizinische Wissenschaften (A2 E84 0), Zus Dr. rer. medic Medizinische Wissenschaften (67 E84 9).

Web.

04/2020–07/2020 "New mathematical methods in bioelectromagnetism and their neuroscientific applications, Part II", Veranstaltungs-Nr.: 100578, Type of presentation: Lecture, Assignment: Master Mathematik (88 105 10, 88 105 13), Staatsexamen Medizin (08 107 0), Gaststudium Medizinische Wissenschaften (A2 E84 0), Zus Dr. rer. medic Medizinische Wissenschaften (67 E84 9), together with Joachim Groß (7%), Institute for Biomagnetism and Biosignal-analysis, Christoph Kellinghaus (7%), Klinikum Osnabrück, Harald Kugel (7%), Institute of Clinical Radiology, UKM and Gabriel Möddel (7%), Clinic for Neurology, UKM.

Web,

10/2019–02/2020 "New mathematical methods in bioelectromagnetism and their neuroscientific applications, Part II", Veranstaltungs-Nr.: 100577, Type of presentation: Practice, Assignment: Master Mathematik (88 105 10, 88 105 13), Staatsexamen Medizin (08 107 0), Gaststudium Medizinische Wissenschaften (A2 E84 0), Zus Dr. rer. medic Medizinische Wissenschaften (67 E84 9).

Web.

13/01/2020 "Vorlesung der Neurologie", Veranstaltungs-Nr.: 512015, Type of presentation: Lecture, Web,

10/2019–02/2020 "New mathematical methods in bioelectromagnetism and their neuroscientific applications, Part I", Veranstaltungs-Nr.: 108355, Type of presentation: Lecture, Assignment: Master Mathematik (88 105 10, 88 105 13), Staatsexamen Medizin (08 107 0), Gaststudium Medizinische Wissenschaften (A2 E84 0), Zus Dr. rer. medic Medizinische Wissenschaften (67 E84 9), together with Joachim Groß (7%), Institute for Biomagnetism and Biosignal-analysis, Christoph Kellinghaus (7%), Klinikum Osnabrück, Harald Kugel (7%), Institute of Clinical Radiology, UKM and Gabriel Möddel (7%), Clinic for Neurology, UKM.

Web, Evaluation.

10/2019–02/2020 "New mathematical methods in bioelectromagnetism and their neuroscientific applications, Part I", Veranstaltungs-Nr.: 108356, Type of presentation: Practice, Assignment: Master Mathematik (88 105 10, 88 105 13), Staatsexamen Medizin (08 107 0), Gaststudium Medizinische Wissenschaften (A2 E84 0), Zus Dr. rer. medic Medizinische Wissenschaften (67 E84 9).

Web.

- 04/2019–07/2019 "Mathematical methods for EEG/MEG reconstruction and TES/TMS manipulation of neuronal networks in the human brain, Part II", Veranstaltungs-Nr.: 106341, Type of presentation: Lecture, Assignment: Master Mathematik (88 105 10, 88 105 13), Staatsexamen Medizin (08 107 0), Gaststudium Medizinische Wissenschaften (A2 E84 0), Zus Dr. rer. medic Medizinische Wissenschaften (67 E84 9), together with Christoph Kellinghaus (7%), Klinikum Osnabrück, Harald Kugel (7%), Institute of Clinical Radiology, UKM and Gabriel Möddel (7%), Clinic for Sleep Medicine and Neuromuscular Diseases, UKM, Paul Muhle (7%), Clinic for Neurology, UKM.  
Web
- 04/2019–07/2019 "Mathematical methods for EEG/MEG reconstruction and TES/TMS manipulation of neuronal networks in the human brain, Part II", Veranstaltungs-Nr.: 106345, Type of presentation: Practice, Assignment: Master Mathematik (88 105 10, 88 105 13), Staatsexamen Medizin (08 107 0), Gaststudium Medizinische Wissenschaften (A2 E84 0), Zus Dr. rer. medic Medizinische Wissenschaften (67 E84 9).  
Web.
- 19/12/2018 Beitrag zur curriculären Lehre von Medizinstudenten, 90 min. Vorlesung zur allgemeinen Neurologie, Rainer Dziewas & Heinz Wiendl (organizers), Universitätsklinikum Münster.
- 10/2018–02/2019 "Mathematical methods for EEG/MEG reconstruction and TES/TMS manipulation of neuronal networks in the human brain, Part I", Veranstaltungs-Nr.: 104384, Type of presentation: Lecture, Assignment: Master Mathematik (88 105 10, 88 105 13), Staatsexamen Medizin (08 107 0), Gaststudium Medizinische Wissenschaften (A2 E84 0), Zus Dr. rer. medic Medizinische Wissenschaften (67 E84 9), together with Christoph Kellinghaus (7%), Klinikum Osnabrück, Harald Kugel (7%), Institute of Clinical Radiology, UKM and Gabriel Möddel (7%), Clinic for Sleep Medicine and Neuromuscular Diseases, UKM.  
Web, Student rating, Part I.
- 10/2018–02/2019 "Mathematical methods for EEG/MEG reconstruction and TES/TMS manipulation of neuronal networks in the human brain, Part I", Veranstaltungs-Nr.: 104385, Type of presentation: Practice, Assignment: Master Mathematik (88 105 10, 88 105 13), Staatsexamen Medizin (08 107 0), Gaststudium Medizinische Wissenschaften (A2 E84 0), Zus Dr. rer. medic Medizinische Wissenschaften (67 E84 9).  
Web.
- 20/04/2018 Beitrag zur curriculären Lehre von Medizinstudenten, 90 min. Vorlesung zur allgemeinen Neurologie, Rainer Dziewas & Heinz Wiendl (organizers), Universitätsklinikum Münster.



- 04/2018–07/2018 "Transcranial electric and magnetic stimulation of the brain: From simulation to clinical applications in neurology and psychiatry, Part II", Veranstaltungs-Nr.: 102562, Type of presentation: Lecture, Assignment: Master Mathematik (88 105 10, 88 105 13), Staatsexamen Medizin (08 107 0), Gaststudium Medizinische Wissenschaften (A2 E84 0), Zus Dr. rer. medic Medizinische Wissenschaften (67 E84 9), together with Rebekka Lencer (7%), Clinic for Psychiatry, UKM, and Harald Kugel (7%), Institute of Clinical Radiology, UKM.  
Web. Student rating,
- 04/2018–07/2019 "Transcranial electric and magnetic stimulation of the brain: From simulation to clinical applications in neurology and psychiatry, Part II", Veranstaltungs-Nr.: 102563, Type of presentation: Practice, Assignment: Master Mathematik (88 105 10, 88 105 13), Staatsexamen Medizin (08 107 0), Gaststudium Medizinische Wissenschaften (A2 E84 0), Zus Dr. rer. medic Medizinische Wissenschaften (67 E84 9).  
Web.
- 22/02/2018 Juror für Münsteraner Studierfähigkeitstest von Medizinstudenten im Auftrag des Institutes für Ausbildung und Studienangelegenheiten (IfAS), Universitätsklinikum Münster.
- 22/11/2017 Beitrag zur curriculären Lehre von Medizinstudenten, 90 min. Vorlesung zur allgemeinen Neurologie, Rainer Dziewas & Heinz Wiendl (organizers), Universitätsklinikum Münster.
- 10/2017–02/2018 "Transcranial electric and magnetic stimulation of the brain: From simulation to clinical applications in neurology and psychiatry, Part I", Veranstaltungs-Nr.: 100607, Type of presentation: Lecture, Assignment: Master Mathematik (88 105 10, 88 105 13), Staatsexamen Medizin (08 107 0), Gaststudium Medizinische Wissenschaften (A2 E84 0), Zus Dr. rer. medic Medizinische Wissenschaften (67 E84 9), together with Rebekka Lencer (7%), Clinic for Psychiatry, UKM, and Harald Kugel (7%), Institute of Clinical Radiology, UKM.  
Web.
- 10/2017–02/2018 "Transcranial electric and magnetic stimulation of the brain: From simulation to clinical applications in neurology and psychiatry, Part I", Veranstaltungs-Nr.: 100608, Type of presentation: Practice, Assignment: Master Mathematik (88 105 10, 88 105 13), Staatsexamen Medizin (08 107 0), Gaststudium Medizinische Wissenschaften (A2 E84 0), Zus Dr. rer. medic Medizinische Wissenschaften (67 E84 9).  
Web.
- 14/06/2017 Beitrag zur curriculären Lehre von Medizinstudenten, 90 min. Vorlesung zur allgemeinen Neurologie: "Quellenanalyse und Hirnstimulation in der

neurologischen Grundlagenforschung und Klinik”, Rainer Dziewas & Heinz Wiendl (organizers), Universitätsklinikum Münster.

04/2017–07/2017 ”Bioelectromagnetism and multimodal imaging and stimulation of neuronal systems, Part II”, Veranstaltungs-Nr.: 108003, Type of presentation: Lecture, Assignment: Master Mathematik (88 105 10, 88 105 13), Staatsexamen Medizin (08 107 0), Gaststudium Medizinische Wissenschaften (A2 E84 0), Zus Dr. rer. medic Medizinische Wissenschaften (67 E84 9), together with Christoph Kellinghaus (7%), Klinikum Osnabrück, Harald Kugel (7%), Institute of Clinical Radiology, UKM and Gabriel Möddel (7%), Clinic for Sleep Medicine and Neuromuscular Diseases, UKM.  
Web.

04/2017–07/2017 ”Bioelectromagnetism and multimodal imaging and stimulation of neuronal systems, Part II”, Veranstaltungs-Nr.: 108004, Type of presentation: Tutorial, Assignment: Master Mathematik (88 105 10, 88 105 13), Staatsexamen Medizin (08 107 0), Gaststudium Medizinische Wissenschaften (A2 E84 0), Zus Dr. rer. medic Medizinische Wissenschaften (67 E84 9).  
Web.

02/2017 Juror für Münsteraner Studierfähigkeitstest von Medizinstudenten im Auftrag des Institutes für Ausbildung und Studienangelegenheiten (IfAS), Universitätsklinikum Münster.

28/10/2016 Beitrag zur kurrikulären Lehre von Medizinstudenten, 90 min. Vorlesung zur allgemeinen Neurologie: ”Nicht-invasive Rekonstruktion und Manipulation neuronaler Netzwerke in der neurologischen Grundlagenforschung und Klinik”, Rainer Dziewas & Heinz Wiendl (organizers), Universitätsklinikum Münster.

10/2016–02/2017 ”Bioelectromagnetism and multimodal imaging and stimulation of neuronal systems, Part I”, Veranstaltungs-Nr.: 106318, Type of presentation: Lecture, Assignment: Master Mathematik (88 105 10, 88 105 13), Staatsexamen Medizin (08 107 0), Gaststudium Medizinische Wissenschaften (A2 E84 0), Zus Dr. rer. medic Medizinische Wissenschaften (67 E84 9), together with Christoph Kellinghaus (7%), Klinikum Osnabrück, Harald Kugel (7%), Institute of Clinical Radiology, UKM and Gabriel Möddel (7%), Clinic for Sleep Medicine and Neuromuscular Diseases, UKM.  
Web.

10/2016–02/2017 ”Bioelectromagnetism and multimodal imaging and stimulation of neuronal systems, Part I”, Veranstaltungs-Nr.: 106319, Type of presentation: Tutorial, Assignment: Master Mathematik (88 105 10, 88 105 13), Staatsexamen Medizin (08 107 0), Gaststudium Medizinische Wissenschaften (A2 E84 0), Zus Dr. rer. medic Medizinische Wissenschaften (67 E84 9).  
Web.

- 15/04/2016 Beitrag zur kurrikulären Lehre von Medizinstudenten, 90 min. Vorlesung zur allgemeinen Neurologie: "Wie hilft die Grundlagenforschung dem Kliniker: Fallbeispiele aus der prächirurgischen Epilepsiediagnostik", Rainer Dziewas & Heinz Wiendl (organizers), Universitätsklinikum Münster.
- 04/2016–07/2016 "New methods for reconstructing and manipulating neuronal networks in the human brain, Part II", Veranstaltungs-Nr.: 102932, Type of presentation: Lecture, Assignment: Master Mathematik (88 105 10, 88 105 13), Staatsexamen Medizin (08 107 0), Gaststudium Medizinische Wissenschaften (A2 E84 0), Zus Dr. rer. medic Medizinische Wissenschaften (67 E84 9), together with Christoph Kellinghaus (7%), Klinikum Osnabrück, Harald Kugel (7%), Institute of Clinical Radiology, UKM and Gabriel Möddel (7%), Clinic for Sleep Medicine and Neuromuscular Diseases, UKM. Web.
- 04/2016–07/2016 Tutorial for the lecture "New methods for reconstructing and manipulating neuronal networks in the human brain, Part I and II", Veranstaltungs-Nr.: 510390, Type of presentation: Tutorial, Assignment: Master in Mathematics (88 105 10, 88 105 13), Staatsexamen Medizin (08 107 0), Gaststudium Medizinische Wissenschaften (A2 E84 0), Zus Dr. rer. medic Medizinische Wissenschaften (67 E84 9), together with Ugur Cunedioğlu, Institute for Biomagnetism and Biosignalanalysis, University of Münster. Web.
- 04/2016 Wolters, C.H., Piastra, M.C., Cunedioğlu, U., Das Gehirn bei der Arbeit beobachten: Ein Tag in der Hirnforschung, Girls' Day, April 26, 2016. Web, Evaluation.
- 10/2015–02/2016 "New methods for reconstructing and manipulating neuronal networks in the human brain, Part I", Veranstaltungs-Nr.: 102932, Assignment: Master in Mathematics or Staatsexamen Medizin, Type of presentation: Lecture, together with Christoph Kellinghaus (13%), Klinikum Osnabrück, Harald Kugel (13%), Institute of Clinical Radiology, UKM and Gabriel Möddel (7%), Clinic for Sleep Medicine and Neuromuscular Diseases, UKM. Web, Student rating.
- 10/2014–02/2015 OCC Ringvorlesung, pdf.
- 04/2014–07/2014 "Moderne nicht-invasive Methoden zur Erforschung des menschlichen Gehirns, Teil 2", Veranstaltungs-Nr.: 103619, Assignment: Master in Mathematics or Staatsexamen Medizin, Type of presentation: Lecture, together with Christoph Kellinghaus (13%), Klinikum Osnabrück, Harald Kugel (13%), Institute of Clinical Radiology, UKM and Gabriel Möddel

(7%), Clinic for Sleep Medicine and Neuromuscular Diseases, UKM. Web  
Student rating, pdf.

- 04/2014–07/2014 Übung zu den Vorlesungen "Moderne nicht-invasive Methoden zur Erforschung des menschlichen Gehirns, Teil 1 und 2", Veranstaltungs-Nr.: 103623, Assignment: Master in Mathematics or Staatsexamen Medizin, Type of presentation: Tutorial Web Student rating, pdf
- 10/2013–03/2014 "Moderne nicht-invasive Methoden zur Erforschung des menschlichen Gehirns", Veranstaltungs-Nr.: 109695, Assignment: Master in Mathematics, Type of presentation: Lecture, together with Christoph Kellinghaus (13%), Klinikum Osnabrück, Harald Kugel (13%), Institute of Clinical Radiology, UKM and Gabriel Möddel (7%), Clinic for Sleep Medicine and Neuromuscular Diseases, UKM. Student rating, Web.
- 10/2012–03/2013 "Innovative Methoden zur Diagnose und Therapie von Epilepsien, Teil 2", Veranstaltungs-Nr.: 102320, Assignment: Master in Mathematics, Type of presentation: Lecture, together with Christoph Kellinghaus (13%), Klinikum Osnabrück and Harald Kugel (13%), Institute of Clinical Radiology, UKM. Student rating, Web
- 10/2012–03/2013 "Innovative Methoden zur Diagnose und Therapie von Epilepsien, Teil 2", Veranstaltungs-Nr.: 102517, Assignment: Master in Mathematics, Type of presentation: Tutorial, Student rating, Web
- 10/2012–03/2013 "Innovative Methoden zur Diagnose und Therapie von Epilepsien, Teil 2", Assignment: Staatsexamen Medizin, Type of presentation: Lecture and Tutorial, together with Christoph Kellinghaus (13%), Klinikum Osnabrück and Harald Kugel (13%), Institute of Clinical Radiology, UKM. Student rating, Web
- 04/2012–07/2012 "Innovative Methoden zur Diagnose und Therapie von Epilepsien", Assignment: Staatsexamen Medizin, Type of presentation: Lecture, together with Christoph Kellinghaus (13%), Klinikum Osnabrück. Student rating, Web
- 04/2012–07/2012 "Innovative Methoden zur Diagnose und Therapie von Epilepsien", Veranstaltungs-Nr.: 101335, Assignment: Master in Mathematics, Type of presentation: Lecture, together with Christoph Kellinghaus (13%), Klinikum Osnabrück. Student rating, Web
- 02/2012–03/2012 "Neurophysiology: from cell to system", Veranstaltungs-Nr.: 132659, Assignment: Master in Biowissenschaften or Biomedizin, Type of presentation: Practical course, together with H.C.Pape, C.Pantev, Budde, Coulon, Juengling, Junghoefer, Lesting, Seidenbecher, Otto-Creutzfeld-Center (OCC), Fachbereich Medizin, Westfälische Wilhelms-Universität Münster. Web,

- 10/2011–02/2012 "Praktikum: Mathematische Elektrophysiologie", Veranstaltungs-Nr.: 109869, Assignment: Master in Mathematics, Type of presentation: Practical course, together with M.Burger, Fachbereich Mathematik und Informatik, Westfälische Wilhelms-Universität Münster. Web,
- 04/2011–07/2011 "Seminar: Mathematical methods for the registration and segmentation of magnetic resonance images", Veranstaltungs-Nr.: 101367, Assignment: Diploma in Computer Science, Mathematics or Medicine, Type of presentation: Seminar, Fachbereich Mathematik und Informatik sowie Medizin, Westfälische Wilhelms-Universität Münster. Web,
- 10/2010–01/2011 "Mathematical methods for bioelectromagnetism and for the analysis of biosignals", Veranstaltungs-Nr.: 101278, Assignment: Diploma in Computer Science, Mathematics or Medicine, Type of presentation: Lecture, Fachbereich Mathematik und Informatik sowie Medizin, Westfälische Wilhelms-Universität Münster. Web.
- 04/2010–07/2010 "Part III: Mathematical methods for biomagnetism and for the analysis of biosignals", Veranstaltungs-Nr.: 102759, Assignment: Diploma in Computer Science, Mathematics or Medicine, Type of presentation: Lecture, Fachbereich Mathematik und Informatik sowie Medizin, Westfälische Wilhelms-Universität Münster. Web.
- 10/2009–02/2010 "Part II: Mathematical methods for biomagnetism and for the analysis of biosignals", Veranstaltungs-Nr.: 102430, Assignment: Diploma in Computer Science, Mathematics or Medicine, Type of presentation: Lecture, Fachbereich Mathematik und Informatik sowie Medizin, Westfälische Wilhelms-Universität Münster. Web.
- 04/2009–07/2009 "Part I: Mathematical methods for biomagnetism and for the analysis of biosignals", Belegnr.: 102346, Assignment: Diploma in Computer Science or Mathematics, Type of presentation: Lecture, Fachbereich Mathematik und Informatik, Westfälische Wilhelms-Universität Münster. Web.
- 10/2008–02/2009 "Numerische Verfahren in der EEG und MEG Quellenanalyse", Belegnr.: 102352, Assignment: Diploma in Computer Science or Mathematics, Type of presentation: Seminar, Fachbereich Mathematik und Informatik, Westfälische Wilhelms-Universität Münster.
- since 04/2005 IBB Instituts-Colloquium
- since 04/2005 Seminar "Modern Investigation Methods in Human Neuroscience", Institut für Biomagnetismus und Biosignalanalyse, Otto Creutzfeldt Center for Cognitive and Behavioral Neuroscience, Medizinische Fakultät, Westfälische Wilhelms-Universität Münster.
- 11/1997–12/2004 Interdisciplinary lectures about Electro- and Magnetoencephalography for the staff of the MPI-institutes and students of the University of Leipzig.

- 10/1995–07/1996 Lecturer for Numerische Mathematik III and IV for Mathematics-students, Institut für Geometrie und Praktische Mathematik (IGPM, W.Dahmen), RWTH Aachen, <http://www.igpm.rwth-aachen.de>.
- 07/1994–07/1996 Lecturer for “Mathematisches Praktikum” for Mathematics-students in 3rd and 4th semester, IGPM, RWTH Aachen.

### **Dissertation geneology**

3. My own dissertation geneology
2. My own geneology tree: Only 5 generations from Helmholtz and 9 from Gauss
1. My own geneology tree only through the branch of Prof.Zeidler

### **PhD promoter (completed)**

10. Sophie Schrader, 03/2022, ”Calibrating finite element headmodels using EEG/MEG to account for variability in conductivity”, PhD thesis, Westfälische Wilhelms-Universität Münster, together with Prof.C.Engwer. Dissertation was funded by DFG project WO1425/7-1 and RA2062/1-1.  
pdf, Gepris.
9. Marios Antonakakis, 04/2021, ”The Effect of Experimental and Modeling Parameters on Combined EEG/MEG Source Analysis and Transcranial Electric Stimulation Optimization of Somatosensory and Epilepsy Activity”, PhD thesis, Westfälische Wilhelms-Universität Münster, together with Jens Haueisen. Dissertation was funded by MSCA-ITN-2014-ETN: Marie Skłodowska-Curie Innovative Training Networks, Grant agreement no.: 641652, Action acronym: ChildBrain.  
URN, pdf.
8. Maria Carla Piastra, 03/2019, ”New Finite Element Methods for MEG and combined EEG/MEG Forward Problem”, PhD thesis, Westfälische Wilhelms-Universität Münster, together with Prof.C.Engwer. Dissertation was funded by MSCA-ITN-2014-ETN: Marie Skłodowska-Curie Innovative Training Networks, Grant agreement no.: 641652, Action acronym: ChildBrain.  
pdf1, pdf2.  
Now at Web
7. Andreas Nüssing, 07/2018, ”Fitted and Unfitted Finite Element Methods for Solving the EEG Forward Problem”, PhD thesis, Westfälische Wilhelms-Universität Münster, together with Prof.C.Engwer and Prof.H.Brinck.  
Eversion, pdf.

6. Johannes Vorwerk, 02/2016, "New Finite Element Methods to Solve the EEG/MEG Forward Problem", PhD thesis, Westfälische Wilhelms-Universität Münster, together with Prof.C.Engwer.  
pdf
5. Sven Wagner, 08/2015 "Optimizing tCS and TMS multi-sensor setups using realistic head models", PhD thesis, Westfälische Wilhelms-Universität Münster, together with Prof. Martin Burger.  
pdf
4. Ümit Aydin, 03/2015, "Combined EEG and MEG source analysis of epileptiform activity using calibrated realistic finite element head models", PhD thesis, Westfälische Wilhelms-Universität Münster, together with Prof. J. Haueisen.  
pdf, Web.  
Now at Web
3. Felix Lucka, 01/2015, "Bayesian Inversion in Biomedical Imaging", PhD thesis, Westfälische Wilhelms-Universität Münster, together with Prof. Martin Burger, Universität Münster.  
pdf, Web.  
Now at Web
2. Benjamin Lanfer, 07/2014, "Automatic Generation of Volume Conductor Models of the Human Head for EEG Source Analysis", PhD thesis, Westfälische Wilhelms-Universität Münster, together with Dr. M. Scherg and Prof. Martin Burger.  
pdf.
1. S.Lew, 07/2008, "Conductivity estimation with EEG/MEG Brain Source Localization in a Finite Element Head Model", PhD thesis, SCI Institute, University of Utah, USA, together with Prof.R.S.MacLeod.  
pdf,

### **PhD promoter (running)**

5. Malte Höltershinken, ERA PerMed project PerEpi, since 10/2021.
4. Tim Erdbrügger, DFG project WO1425/10-1, Gepris, since 04/2021.
3. Yvonne Buschermöhle, DFG project WO1425/10-1, Gepris, since 04/2021.
2. Asad Khan, DFG project WO1425/5-2, Gepris, since 02/2017.
1. Frank Neugebauer, DFG project WO1425/7-1, Gepris, since 06/2016.

## PhD thesis contributions

22. Co-supervisor for Atena Rezaei, PhD, "Forward and Inverse Modeling via Finite Elements in EEG/MEG Source Localization : Application to Event Related Responses", Faculty of Engineering and Natural Sciences, Tampere University, Finland, Dec.2021.  
Eversion.
21. Reviewer for Dr. med. thesis of Philipp Mathmann, "The influence of Age, Gender, Health-Related Behaviors, and Other Factors on Occupationally Relevant Health Complaints of Singers", Dissertation zur Erlangung des doctor medicinae, Medizinische Fakultät, University of Münster, Germany, Dec.2021.
20. Member of the graduation committee for the PhD thesis of Felix Heitkötter, "Musikwahrnehmung und -verarbeitung bei Cochlea-Implantaten", Dissertation zur Erlangung des doctor rerum medicinalium, Medizinische Fakultät, University of Münster, Germany, Dec.7, 2021.
19. Reviewer for Dr. med. thesis of Antonia Mersmann, "Assoziationen zwischen polygenem Risiko für Angsterkrankungen, Ängstlichkeit und neuronaler Emotionsverarbeitung", Dissertation zur Erlangung des doctor medicinae, Medizinische Fakultät, University of Münster, Germany, Oct.2021.
18. Reviewer for PhD thesis of Benjamin Kalloch, "Towards Individualized Transcranial Electric Stimulation Therapy through Computer Simulation", PhD in Computer Science, Fakultät für Mathematik und Informatik, University of Leipzig, Germany, July 2021.  
Eversion
17. Reviewer and member of the graduation committee for the PhD thesis of: Michael Wenske, "Data-aware methods for the simulation of glioblastoma multiforme", PhD in Mathematics, Fachbereich Mathematik und Informatik, University of Münster, Germany, 2021. pdf.
16. Reviewer and member of the graduation committee for the PhD thesis of: Hermann Sonntag, 08/2019, "The effect of uncertainty in MEG-to-MRI coregistrations on MEG inverse problems", PhD thesis, Fakultät für Informatik und Automatisierung, Technische Universität Ilmenau, together with Prof. J. Haueisen.  
Eversion.
15. Reviewer, opponent and member of the graduation committee for the PhD thesis of Anne Hanrath, "Finite Element Representation of the EEG Forward Problem with Multipole Expansion", PhD in Mathematics, Fakultät



für Mathematik, Informatik und Naturwissenschaften, RWTH Aachen, Germany, March 22, 2019.

Web, pdf.

14. Contribution to the PhD thesis of: Laith Hamid, "M/EEG Source Imaging via the Spatiotemporal Kalman Filter and its Applications in Epileptology", Technische Fakultät der Christian-Albrechts-Universität zu Kiel, Germany, Dec.5, 2018.  
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13. Reviewer, opponent and member of the graduation committee for the PhD thesis of Ralf Engbers, "Non-Negative Matrix Factorization for Dynamic Positron Emission Tomography", PhD in Mathematics, Fachbereich Mathematik und Informatik, University of Münster, Germany, Dec.13, 2018. pdf,
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4. Opponent for PhD thesis of Sylvain Vallaghé, Doctor of Science, Specialized in Control, Signal and Image Processing, INRIA Sophia Antipolis, University of Nice-Sophia Antipolis, Graduate School of Information and Communication Sciences, Frankreich, "EEG and MEG forward modelling: computation and calibration", 2008.
3. Reviewer for PhD thesis of Sampsa Pursiainen, Institute of Mathematics, Helsinki University of Technology, Helsinki, Finland, "Computational methods in electromagnetic biomedical inverse problems", 2008.  
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### **Supervisor for master and diploma theses**

36. Simone Wlotzka, 10/2022, "Detection of interictal epileptiform discharges (IED) in EEG using Machine Learning", Master Thesis, Westfälische Wilhelms-Universität Münster. together with Prof.B.Wirth  
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35. Alexander Frank, 04/2022, "Sensitivity of optimization of transcranial direct current stimulation to electrode modeling", Master Thesis, Westfälische Wilhelms-Universität Münster. together with Prof.B.Wirth  
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34. Fabian Kaiser, 02/2022, "Optimization of transcranial electrical stimulation montages to reduce seizure frequency and severity in patients with refractory focal epilepsy", Master Thesis, Westfälische Wilhelms-Universität

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33. Pia Lange, 02/2022, "The Localized Subtraction Source Model for Solving the EEG and MEG Forward Problem using the Continuous Galerkin Finite Element Method", Master Thesis, Westfälische Wilhelms-Universität Münster. together with Prof.C.Engwer  
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32. Paul Lunkenheimer, 01/2022, "Comparison of Boundary Element Fast Multipole and Finite Element Methods for the solution of the EEG forward problem", Master Thesis, Westfälische Wilhelms-Universität Münster. together with Prof.S.N.Makarov and Prof.C.Engwer  
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31. Reiner Stubbemann, 01/2022, "Application of the mixed-FEM approach for the MEG-Problem", Master Thesis, Westfälische Wilhelms-Universität Münster. together with Prof.C.Engwer  
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29. Carlotta Barkhau, 07/2021, "Evaluation of the Multipolar Venant Source Modeling Approach in EEG Source Analysis", Master Thesis, Westfälische Wilhelms-Universität Münster. together with Prof.C.Engwer  
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28. Yvonne Buschermöhle, 04/2021, "Source Analysis of the Auditory Steady State Response for varying Modulation Frequencies: A combined EEG-MEG Group Study", Master Thesis, Westfälische Wilhelms-Universität Münster. together with Dr. Oliver Kamps and PD. Dr. Svetlana Gurevich.  
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27. T. Erdbrügger, 03/2021, "CutFEM forward modeling for geometries with touching surfaces in bioelectromagnetism", Master Thesis, Westfälische Wilhelms-Universität Münster. together with Prof.C.Engwer  
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26. J. Hüwel, 2021, "Effects of source modeling in the finite element method based EEG forward problem", Master Thesis, Westfälische Wilhelms-Universität Münster. together with Prof.C.Engwer  
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25. J. Kramps, 2019, "Numerische Untersuchungen zu den Auswirkungen der Quellmodelle auf das FEM-basierte MEG-Vorwärtsproblem", Master Thesis, Westfälische Wilhelms-Universität Münster. together with Prof.C.Engwer  
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24. A. Dachwitz, 2019, "Accurate Methods to Compute the MEG Forward Problem", Master Thesis, Westfälische Wilhelms-Universität Münster. together with Dr. Oliver Kamps and PD. Dr. Svetlana Gurevich.  
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23. N. Vogenauer, 08/2019, "Sensitivity of tES Optimization to Different FEM Approaches", Master Thesis, Westfälische Wilhelms-Universität Münster. together with Prof.C.Engwer  
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18. F. Neugebauer, 2016, "Beamformer inverse analysis in presurgical epilepsy diagnosis", Master Thesis, Westfälische Wilhelms-Universität Münster, together with Prof.M.Burger  
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17. S. Homölle, 2016, "Comparison of optimization approaches in high-definition transcranial current stimulation in the mammalian brain", Master Thesis,

Westfälische Wilhelms-Universität Münster, together with Prof.M.Burger  
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16. B. Agsten, 2015, "Comparing the complete and the point electrode model for combining tCS and EEG", Master Thesis, Westfälische Wilhelms-Universität Münster, together with Prof.S.Pursiainen and Prof.M.Burger  
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11. D.Ritterskamp, 2012, "A Neural Network with Synaptic Plasticity: Applications to Epileptic Seizures", Diploma Thesis, Westfälische Wilhelms-Universität Münster, together with Prof.R.Friedrich.  
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9. S.Wagner, 2011, "An adjoint FEM approach for the EEG Forward Problem", Diploma Thesis, Westfälische Wilhelms-Universität Münster. together with Prof.M.Burger.  
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### **Master thesis reviews**

1. Athanasios Delatolas, 06/2022, Electromagnetic Brain Source Analysis with Statistical and Deep Learning Approaches, Diploma Thesis, Technical University of Crete, Greece. Supervisors: M. Sc. Marios Antonakakis, and Prof. Michalis Zervakis.  
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and Prof. Michalis Zervakis.  
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3. S. Tellen, Master Thesis in Mathematics, Fachbereich Mathematik und Informatik, Supervisor: Prof.M.Burger Universität Münster. "Sparse Reconstruction and Realistic Head Modelling in EEG/MEG", 2013.
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### **Supervisor for bachelor theses**

9. Lena Rutz, Bachelor of Science, "Vergleich enzephalographischer Verfahren (MEG, EEG) und Quellenanalysen von visuell evozierten Antworten", together with Andreas Wollbrink and Prof. Dr. Karin Mittmann Biomedical Engineering, University of Applied Sciences Münster, 2022. pdf.
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6. Marcel Kettelmann, Bachelor of Science, Fachbereich Physik, "Verwendung von EEG und MEG zur Quellenrekonstruktion akustisch evozierter Potentiale und Felder", together with Dr. Oliver Kamps Universität Münster, 2016.  
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### **Supervisor for internships**

1. Anna-Gesina Hülemeier, internship of 160 hours from Nov.8, 2017 to June 28, 2018. Fachbereich Psychologie, Universität Münster.

### **Examinations for master and diploma students**

27. Mirko Zumdick, oral examination (Verbreiterung / 11007), Master in Mathematics, Fachbereich Mathematik und Informatik, March 4, 2022.
26. Jessica Balzer, oral examination (Spezialisierungsmodul Wissenschaftliches Rechnen / 18010), Master in Mathematics, Fachbereich Mathematik und Informatik, March 4, 2022.
25. Philine Rabea Reisdorf, oral examination (Spezialisierungsmodul Ang.Math. / 17010), Master in Mathematics, Fachbereich Mathematik und Informatik, Okt.21, 2021.
24. Gina Ripploh, oral examination (Spezialisierungsmodul Wissenschaftliches Rechnen / 18010), Master in Mathematics, Fachbereich Mathematik und Informatik, Okt.21, 2021.
23. Jorunn Mense, oral examination (Verbreiterung / 11007), Master in Mathematics, Fachbereich Mathematik und Informatik, Sept.24, 2021.
22. Alexander Frank, oral examination (Spezialisierungsmodul Ang.Math. / 17010), Master in Mathematics, Fachbereich Mathematik und Informatik, Dec.18, 2020.
21. Malte Höltershinken, oral examination (Spezialisierungsmodul Wissenschaftliches Rechnen / 18010), Master in Mathematics, Fachbereich Mathematik und Informatik, Oct.26, 2020.



20. Paul Moritz Lunkenheimer, oral examination (Spezialisierungsmodul Wissenschaftliches Rechnen / 18010), Master in Mathematics, Fachbereich Mathematik und Informatik, Sept.2, 2020.
19. Simone Wlotzka, oral examination (Spezialisierungsmodul Wissenschaftliches Rechnen / 18010), Master in Mathematics, Fachbereich Mathematik und Informatik, May 20, 2020.
18. Nadine Woltering, oral examination (Spezialisierungsmodul Ang.Math. / 17010), Master in Mathematics, Fachbereich Mathematik und Informatik, Jan.23, 2020.
17. Pia Lange, oral examination (Spezialisierungsmodul Ang.Math. / 17010), Master in Mathematics, Fachbereich Mathematik und Informatik, Dec.6, 2019.
16. Jan Hüwel, oral examination (Spezialisierungsmodul Ang.Math. / 17010), Master in Mathematics, Fachbereich Mathematik und Informatik, Dec.6, 2019.
15. Carlotta Bo Catharine Barkhau, oral examination (Spezialisierungsmodul Ang.Math. / 17010), Master in Mathematics, Fachbereich Mathematik und Informatik, Oct.2, 2019.
14. Tim Erdbrügger, oral examination (Spezialisierungsmodul Ang.Math. / 17010), Master in Mathematics, Fachbereich Mathematik und Informatik, Sept.28, 2018.
13. Judith Kramps, oral examination (Spezialisierungsmodul Ang.Math. / 17010), Master in Mathematics, Fachbereich Mathematik und Informatik, Sept.29, 2017.
12. Nikolas Vogenauer, oral examination (Spezialisierungsmodul Ang.Math. / 17010), Master in Mathematics, Fachbereich Mathematik und Informatik, Aug.17, 2016.
11. Joana Klages, oral examination (Spezialisierungsmodul Ang.Math. / 17010), Master in Mathematics, Fachbereich Mathematik und Informatik, Aug.17, 2016.
10. Michael Krühler, oral examination (Spezialisierungsmodul Ang.Math. / 17010), Master in Mathematics, Fachbereich Mathematik und Informatik, June 27, 2016.
9. Bastian Pietras, oral examination (Spezialisierungsmodul Ang.Math. / 17010), Master in Mathematics, Fachbereich Mathematik und Informatik, Nov.5, 2014.

8. Sophie Schrader, oral examination (Spezialisierungsmodul Ang.Math. / 17010), Master in Mathematics, Fachbereich Mathematik und Informatik, Nov.5, 2014.
7. Simon Homölle, oral examination (Ergänzungsmodul), Master in Mathematics, Fachbereich Mathematik und Informatik, Sept.29, 2014.
6. Assja Laas, oral examination (Spezialisierungsmodul Wissenschaftliches Rechnen / 18001), Master in Mathematics, Fachbereich Mathematik und Informatik, Sept.29, 2014.
5. Janna Heins, oral examination (Spezialisierungsmodul Ang.Math. / 17010), Master in Mathematics, Fachbereich Mathematik und Informatik, Sept.29, 2014.
4. Frank Neugebauer, oral examination (Ergänzungen und Wissenschaftliches Arbeiten / 22001), Master in Mathematics, Fachbereich Mathematik und Informatik, Sept.29, 2014.
3. Florian Grüne, oral examination (Schwerpunktprüfung), Master in Mathematics, Fachbereich Mathematik und Informatik, April 19, 2013.
2. Sven Wagner, oral examination (Schwerpunktprüfung zur Diplomarbeit), Diploma in Mathematics, Fachbereich Mathematik und Informatik, May 20, 2011.
1. Johannes Vorwerk, oral examination (Schwerpunktprüfung zur Diplomarbeit), Diploma in Mathematics, Fachbereich Mathematik und Informatik, March 31, 2011.

### **Research interests ordered by keywords**

My research interests, ordered by keywords, include:

- Reviews, see, e.g. Gross et al., 2021; Wolters et al., 2021; de Munck et al., 2012
- Epilepsy research, see, e.g., Neugebauer et al., 2022; Hamid et al., 2020; Rampp et al., 2019; Aydin et al., 2017; Neugebauer et al., 2017; WN, 2016; Wellmer et al., 2016; Aydin PhD, 2015; Aydin et al., 2015; Aydin et al., 2014; Lanfer et al., 2013; Rullmann et al., 2009
- Evoked potentials and fields research, see, e.g., Zulkifly et al., 2022; Kahn et al., 2022; Rezaei et al., 2021; Antonakakis et al., 2020; Rezaei et al., 2020; Antonakakis et al., 2019; Baltus et al., 2018; Vorwerk et al., 2018, Winker et al., 2018; Vorwerk et al., 2018; Aydin PhD, 2015; Lucka PhD, 2015; Aydin et al., 2014; Lew et al., 2009; Sander et al., 2010; Okamoto et al., 2007

- Artefact-correction, registration and segmentation of medical image datasets, see, e.g., Lanfer PhD thesis, 2014; Ruthotto et al., 2012; Gigengack et al., 2012; Ruthotto diploma, 2010; Wolters et al., 2006
- Diffusion tensor magnetic resonance imaging (DT-MRI), see, e.g., Ruthotto et al., 2012; Ruthotto diploma, 2010; Rullmann et al., 2009; Wolters et al., 2006
- Helmholtz reciprocity that directly relates source analysis and transcranial brain stimulation forward problems, see, e.g., Wagner et al., 2016; Wagner PhD, 2015; Wagner diploma, 2011
- Guideline for head volume conductor modeling (in EEG/MEG and tES/TMS) Schrader et al., 2021; Piastra et al., 2021; Antonakakis et al., 2020; Antonakakis et al., 2019; Vorwerk et al., 2018; Vorwerk PhD, 2016; Vorwerk et al., 2014; Wagner et al., 2014; Wagner PhD, 2015; Wolters et al., 2006; Wolters PhD, 2003
- Validation and evaluation in animal models, see, e.g., Lau et al., 2016; Güllmar et al., 2006
- Finite element methods (FEM) for bioelectromagnetic forward problems, see, e.g., Schrader et al., 2021; Vorwerk et al., 2019, Miinalainen et al., 2018, Piastra et al., 2018, Vorwerk et al., 2018; Engwer et al., 2017; Vorwerk et al., 2017; Pursiainen et al., 2017; Nüßing et al., 2016; Pursiainen et al., 2016; Vorwerk PhD, 2016; Bauer et al., 2015; Drechsler et al., 2009; Wolters et al., 2007b; Wolters et al., 2007a; Wolters et al., 2004; Wolters et al., 2002
- Multipole modeling for bioelectromagnetic forward problems, see, e.g., Vorwerk et al., 2019
- Bayesian Approximation Error (BAE) approach for bioelectromagnetic forward problems, see, e.g., Rimpiläinen et al., 2018,
- FEM has linear complexity and can be computationally efficient and fast, see, e.g., Schrader et al., 2021; Wolters et al., 2004; Wolters et al., 2002
- Inverse approaches in EEG/MEG/MRI/DTI/fMRI source reconstruction, such as minimum current estimation (see, e.g., Pursiainen et al., 2017), Bayesian modeling (see, e.g., Rezaei et al., 2021; Rezaei et al., 2020; Rimpiläinen et al., 2018, Lucka PhD, 2015; Lucka et al., 2012; Lucka diploma, 2011), spatio-temporal current density approaches (see, e.g., Dannhauer et al., 2013; Schmitt et al., 2002), Kalman filtering (see, e.g., Hamid et al., 2020; Hamid et al., 2013), other current density approaches (see, e.g., Iordanov et al., 2018, Lucka PhD, 2015; Lucka et al., 2012; Lucka diploma, 2011; Rullmann et al., 2009), beamforming (see, e.g., Neugebauer et al., 2017; Steinsträter et al., 2010), goal function scan (see, e.g., Aydin et al., 2015; Aydin et al., 2014; Dannhauer et al., 2011; Lanfer et al., 2013) and dipole fit approaches (see, e.g., Lanfer et al., 2013; Sander et al., 2010; Rullmann et al., 2009; Wolters et al., 1999).
- EEG/MEG connectivity analysis, see, e.g., Cho et al., 2015

- Brain stimulation (tDCS, tACS, TMS), see, e.g., Zulkifly et al., 2022; Kahn et al., 2022; Schrader et al., 2021; Radecke et al., 2020; Ronconi et al., 2020; Muhle et al., 2020; Winker et al., 2019; Baltus et al., 2018; Winker et al., 2018; Pursiainen et al., 2018; Wagner et al., 2016a; Wagner et al., 2016b; Wagner PhD, 2015; Schmidt et al., 2015; Wagner et al., 2014; Rampersad et al., 2014; Janssen et al., 2013; Neuling et al., 2012a; Neuling et al., 2012b; Wagner diploma, 2011; Oostendorp et al., 2008
- Optimization of multi-sensor brain stimulation (tDCS, tACS, TMS), see, e.g., Kahn et al., 2022; Wagner et al., 2016; Wagner PhD, 2015; Schmidt et al., 2015;
- Combined EEG/MEG/MRI data analysis and source reconstruction, see, e.g., Kahn et al., 2022; Schrader et al., 2020; Antonakakis et al., 2020; Piastra et al., 2018; Aydin et al., 2017; Aydin et al., 2015; Aydin et al., 2014; Hamid et al., 2013; Wolters et al., 2010
- Methods for estimating head tissue conductivities, see, e.g., Antonakakis et al., 2020; Schrader et al., 2020; Antonakakis et al., 2019; Aydin et al., 2014; Wolters et al., 2010; Lew et al., HBM, 2009; Lew PhD, 2008,
- Complete electrode model versus point electrode model in source analysis and brain stimulation, see, e.g., Pursiainen et al., 2017; Pursiainen et al., 2016; Agsten master, 2015; Pursiainen et al., 2013; Pursiainen et al., 2012
- Evaluation and comparison of FEM and boundary element method (BEM) approaches for bioelectromagnetic forward modeling, see, e.g., Antonakakis et al., 2019; Vorwerk et al., 2012; de Munck et al., 2012; Vorwerk diploma, 2011 Lew et al., 2009; Wolters and de Munck, 2007
- Sensitivity investigations, see, e.g., Piastra et al., 2021; Vorwerk et al., 2019; Schmidt et al., 2015
- Specific sensitivity investigations for volume conductor modeling with regard to skull (see, e.g., Schrader et al., 2020; Antonakakis et al., 2020; Antonakakis et al., 2019; Aydin et al., 2014; Vorwerk et al., 2014; Vorwerk et al., 2018; Wagner et al., 2014; Lanfer et al., 2012; Dannhauer et al., 2011; Vorwerk et al., 2014; Steinsträter et al., 2010), cerebrospinal fluid (see, e.g., Piastra et al., 2021; Vorwerk et al., 2014; Wagner et al., 2014; Aydin et al., 2014; Lanfer et al., Biomed Tech, 2012; Wolters et al., 2006), brain anisotropy (see, e.g., Vorwerk et al., 2014; Wagner et al., 2014; Aydin et al., 2014; Steinsträter et al., 2010; Wolters et al., 2006; Güllmar et al., 2006), blood vessels (see, e.g., Fiederer et al., 2016), insulating ECoG grid in combined ECoG/EEG epilepsy investigations (see, e.g., Lanfer et al., 2013), and fontanels and sutures in baby and infant volume conductors (see, e.g., Pursiainen et al., 2016; Lew et al., 2013).
- Neuroscientific research on babies and infants, see, e.g., Pursiainen et al., 2017; Lew et al., 2013

- Brain oscillations, see, e.g., Zulkify et al., 2022; Ronconi et al., 2020;
- Schizophrenia research, see, e.g., Gonzalez-Hernandez et al., 2015
- Swallowing research, see, e.g., Muhle et al., 2020
- Cognitive neuropsychology, see, e.g., Ronconi et al., 2020; Winker et al., 2019; Huster et al., 2009; Winker et al., 2018
- Signal pre-processing, see, e.g., Sander et al., 2010
- Cardiac positron emission tomography (PET), see, e.g., Gigengack et al., 2012; Ruthotto, 2010
- Scientific programming, see, e.g., Schrader et al., 2021; Härdtlein et al., 2010; Wolters et al., 2002