



## Mathematisches Kolloquium

Am **Freitag**, dem 21. April 2023, spricht um 14 Uhr c.t. im Hörsal IV der Fachrichtung Mathematik, Gebäude E2.4, [Teams-Link](#),

**Prof. Dr. Carsten Wolters,**  
**University of Münster**

über das Thema:

**New methods of combined EEG/MEG source analysis and targeted optimized brain stimulation in the diagnosis and therapy of focal epilepsy**

*Abstract:*

My talk will address mathematics, validation and evaluation of new methods in bioelectromagnetism. The first part will focus on forward and inverse approaches of combined Electro- (EEG) and Magnetoencephalography (MEG) source analysis (EMEG). To improve the understanding of basic concepts such as filtering, averaging and signal-to-noise ratio, I will start with a visual experiment and pre-process the data live to generate visually evoked potentials (VEP) and fields (VEF). For source analysis forward modeling, I will then introduce new finite element method (FEM) based approaches using realistic, skull-conductivity calibrated anisotropic head modeling. Dipole scan, beamforming and hierarchical Bayesian modeling (HBM) inverse approaches will then be studied for the inverse problem. Source analysis of evoked potentials and fields in brain research and in the diagnosis of focal epilepsy will show the complementarity of EEG and MEG. The shorter second part will address targeted and optimized multi-channel transcranial electric brain stimulation (mc-TES) as a new therapy for focal epilepsy. I will show that Helmholtz reciprocity couples the TES forward modeling to the EEG one and that EMEG-targeted and individually optimized mc-TES reduces significantly epileptic activity, and this on a quasi-non-invasive way.

Der Gast wird von Prof. Dr. Thomas Schuster betreut.

Alle Interessenten und Interessentinnen sind zum Vortrag herzlich eingeladen. Der Vortrag findet im **hybriden Format** statt.

**Die Dozenten der Mathematik**