E I N L A D U N G

zum Vortrag im Rahmen des Seminars des SFB/TRR 31

Freitag, 25. April 2008, 14 Uhr c.t.

Raum W2 1-143, Universität Oldenburg und
Raum G26.1 – 010, Rechenzentrum der Universität Magdeburg
(per Videokonferenz)

Three new methods for MEG/EEG signal analysis and denoising

Alain de Cheveigné
Laboratoire Psychologie de la Perception,
Université Paris Descartes - CNRS
and Département d'Etudes Cognitives, Ecole Normale Supérieure

The level of noise in recordings from MEG (magnetoencephalography) and EEG (electroencephalography) sets a limit to what can be learned with these techniques. Brain activity below the noise floor is not resolved, while stronger patterns may be distorted by residual noise and/or filtering required to reduce noise. Noise also reduces the feasablity of applications such as brain-machine interfaces (BMI), in which brain signals are used to directly control the environment via a prosthesis. Progress in noise reduction translates into a cleaner picture of brain processes. I will present three new methods for noise reduction that target the three main sources of noise observed in electrophysiology: environmental noise from power lines and machinery, sensor noise, and physiological noise (e.g. heartbeat or ongoing brain processes). The first method extends standard regression methods by the use of time delays that compensate for convolutional mismatches between reference and brain channels, thus increasing the effectiveness of environmental noise reduction. The second method uses local subspace projection to remove sensor noise (thermal noise and glitches). The third method uses a recent blind separation technique (DSS) to synthesize spatial filters to optimally enhance stimulus-evoked components. Combined, the methods typically offer about 40 dB improvement in signal-to-noise ratio for MEG data. They have also proved useful for other recording techniques such as SEEG and intrinsic optical imaging.