



Sonderforschungsbereich/Transregio 31 "Das aktive Gehör"

EINLADUNG

zum Vortrag im Rahmen des Seminars des SFB/TRR 31

Freitag, 10. Dezember 2010, 14 Uhr c.t.

im Raum W2 1-143 der Universität Oldenburg
und Medical Campus Magdeburg, H28 / R 2.31
(per Videoübertragung)

***"Simultaneous TMS and EEG and the required
methods of recording and post-processing"***

Prof. Risto Ilmoniemi

Biomedical Engineering and Computational Science
Universität Aalto, Finland

Electroencephalography (EEG) allows one to record the evolving spatiotemporal pattern of cerebral activity evoked by transcranial magnetic stimulation (TMS) with millisecond time resolution [1]. Because the neuronal response is very sensitive to the precise location and orientation of the TMS coil with respect to the head and because TMS may also produce stimulus artifacts, great care is necessary to obtain useful data and to analyze them properly.

If the location and orientation of the stimulator coil is known with respect to the head, one can calculate the distribution and orientation of the induced electric current in the brain. This allows one to deliver the stimuli to desired spots in the brain according to individual MRI. Navigated brain stimulation (NBS) can have 3-mm accuracy (rms location error) in targeting the neuron-stimulating electric field. When the TMS-evoked EEG is recorded, one obtains direct measures of cortical excitability and time-resolved area-to-area connectivity. Because the repeatability (rms) of NBS may be as small as 1-2 mm, one can monitor changes in excitability and connectivity in the course of treatment, medication, or rehabilitation. Although the electrical artifact due to the TMS pulse has been largely solved by device manufacturers, one needs special precautions and post-processing to deal with artifacts, in particular those from the TMS-activated muscles. Examples of TMS-EEG studies include those of Komssi et al. [2] and Massimini et al. [3].

[1] Ilmoniemi et al., NeuroReport 8, 3537-3540 (1997)

[2] Komssi et al., Clin. Neurophysiol. 113, 175-184 (2002)

[3] Massimini et al., Science 309, 2228-2232 (2005)