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Title of the talk and abstract (max. 300 words, it will not be edited):

**Source localization and network analysis in tremor.**

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Tremor represents a frequent clinical symptom in movement disorders. In this presentation recent MEG studies on underlying brain networks of different tremor syndromes will be discussed.

MEG investigations of Parkinson's disease (PD) resting tremor have identified an abnormally synchronized oscillatory network comprising subcortical and cortical areas that are driven at tremor frequency or twice the tremor frequency. The same network is also active during voluntary repetitive movements of healthy subjects imitating PD resting tremor. However, increased thalamocortical and decreased premotor-motor-cortical coherence differentiates PD resting tremor from tremor imitation. Administration of levodopa reduces thalamocortical coherence and results in clinical tremor reduction. These findings provide strong evidence for a pathophysiological role of abnormal oscillatory synchronization. MEG investigation of patients with other tremor syndromes, such as essential tremor and hepatic tremor have also revealed abnormal oscillatory patterns which are, however, distinct from PD tremor.

In summary, there is accumulating evidence that distinct abnormal oscillatory synchronization in cortico-subcortical loops constitutes an important pathophysiological mechanism underlying different tremor syndromes. Thus, studying pathological oscillatory synchronization as revealed by MEG may offer new perspectives for differential diagnosis and disease monitoring.

## Curriculum vitae

### Personal Data

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Institution Universitätsklinikum Düsseldorf,  
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### Education/Training

1979-1986 Study of Medicine at Aachen, Kiel and Cambridge/UK  
1986 Medical State Examination and Full Medical License  
1992 Dissertation (Dr. med.) at Christian-Albrechts-University of Kiel  
1993 Board certificate in Psychiatry  
1995 Board certificate in Neurology  
1996 Board certificate in Clinical Neurophysiology  
1998 Habilitation in „Neurology and Neurophysiology” at Heinrich-Heine-University, Düsseldorf

### Clinical, Research and Academic Positions

1988-1991 Residency and Research Scientist, Dept. of Psychiatry, Heinrich-Heine-University, Düsseldorf  
1991 -1998 Residency and Research Scientist, Dept. of Neurology, Heinrich-Heine-University, Düsseldorf  
1994-1995 Visiting Scientist at MEG lab of Brain Research Centre, Helsinki  
1995-2001 Principal investigator of collaborative research center (SFB 194) of German Research Council, Heinrich-Heine-University, Düsseldorf  
1998-2005 Leader of MEG Research Group funded by Volkswagen Foundation, Heinrich-Heine-University, Düsseldorf  
1998-2003 Consultant neurologist and docent in Neurology at Heinrich-Heine-University, Düsseldorf  
2002-today Principal investigator of collaborative research center (SFB 575) of German Research Council, Heinrich-Heine-University, Düsseldorf  
2003 Associate Professor and Director of Movement Disorders Clinic, Heinrich-Heine-University, Düsseldorf  
2006 Professor of Neurology at Heinrich-Heine-University, Düsseldorf  
2007 Professor and Chair of Neuroscience and Neurology, Wales Institute of Cognitive Neuroscience, Bangor, UK  
Since 2008 Professor and Chair of Clinical Neuroscience and Medical Psychology, Head of Movement Disorders Center at the Department of Neurology, Heinrich-Heine-University Düsseldorf

### Awards

2003 Hans-Jörg-Weitbrecht Clinical Neuroscience Award  
2006 Reinhard-Heynen and Emmi-Heynen-Award  
2006 Heinrich-Pette-Award

1. Pollok B, Makhloufi H, Butz M, Gross J, Timmermann L, Wojtecki L, Schnitzler A. (2009) Levodopa affects functional brain networks in parkinsonian resting tremor. *Mov Disord*, 24, 91-8.
2. Reck C, Florin E, Wojtecki L, Krause H, Groiss S, Voges J, Maarouf M, Sturm V, Schnitzler A, Timmermann L. (2009) Characterisation of tremor-associated local field potentials in the subthalamic nucleus in Parkinson's disease. *Eur J Neurosci.*, 29, 599-612.
3. Schnitzler A, Gross J. (2005) Normal and pathological oscillatory communication in the brain. *Nat Rev Neurosci*, 6, 285-96.
4. Schnitzler A, Münks C, Butz M, Timmermann L, Gross J. (accepted 2009) Synchronized brain network associated with essential tremor as revealed by magnetoencephalography. *Movement Disorders*, 24 (11), 1629-1635.
5. Timmermann L, Gross J, Dirks M, Volkmann J, Freund HJ, Schnitzler A. (2003) The cerebral oscillatory network of parkinsonian resting tremor. *Brain*, 126, 199-212.