

## CONTENTS

<b>PREFACE</b>	v
<b>LECTURES</b>	
Cortical dynamics — experiments and models <i>S. Rotter and <u>A. Aertsen</u></i>	3
Is nonlinearity evident in time series of brain electrical activity? <i>T. Schreiber</i>	13
Finding and characterizing unstable fixed points by controlling system dynamics <i>D.T. Kaplan</i>	23
Detection of phase locking from noisy data: application to magnetoencephalography <i><u>M. Rosenblum</u>, <u>P. Tass</u>, <u>J. Kurths</u>, <u>J. Volkmann</u>, <u>A. Schnitzler</u> and <u>H.-J. Freund</u></i>	34
Dynamical analysis in clinical practice <i><u>P.E. Rapp</u> and <u>T.I. Schmah</u></i>	52
Rhythms of the brain: between randomness and determinism <i><u>F.H. Lopes da Silva</u>, <u>J.P.M. Pijn</u>, <u>J.A. Gorter</u>, <u>E. van Vliet</u>, <u>E.W. Daalman</u> and <u>W. Blanes</u></i>	63
Pre-ictal changes of the EEG dynamics in epileptic patients: clinical and neurobiological implications <i><u>M. Baulac</u>, <u>M. Le van Quyen</u>, <u>J. Martinerie</u>, <u>S. Clemenceau</u>, <u>C. Adam</u> and <u>F.J. Varela</u></i>	77
Spatio-temporal dynamics of epileptogenic networks <i><u>M. Le van Quyen</u>, <u>J. Martinerie</u> and <u>F.J. Varela</u></i>	86
Pre-ictal changes and EEG analyses within the framework of Lyapunov theory <i><u>H.R. Moser</u>, <u>P.F. Meier</u>, <u>H.G. Wieser</u> and <u>B. Weber</u></i>	96
Epilepsy — when chaos fails <i><u>J.C. Sackellares</u>, <u>L.D. Iasemidis</u>, <u>D.-S. Shiau</u>, <u>R.L. Gilmore</u> and <u>S.N. Roper</u></i>	112
Possible clinical and research applications of nonlinear EEG analysis in humans <i><u>K. Lehnertz</u>, <u>R.G. Andrzejak</u>, <u>J. Arnhold</u>, <u>G. Widman</u>, <u>W. Burr</u>, <u>P. David</u> and <u>C.E. Elger</u></i>	134
Dynamics of EEG signals during petit-mal epileptic seizures <i><u>R. Friedrich</u></i>	156

Detection of epileptic dynamics in neuromagnetic signals: spectral analyses versus characteristics of correlation function	164
<i>E. Bohl, R. Kenzler, T. Elbert, B. Rockstroh and C.E. Elger</i>	
Nonlinear methods for evoked potential analysis and modeling	173
<i>B.H. Jansen</i>	
From slow potentials to chaos: processing in the brain and controlling the brain	194
<i>H. Preißl and W. Lutzenberger</i>	

## POSTERS

Detection of deterministic dynamics in short discrete time series	213
<i>A. Celletti, C. Froeschlé, I.V. Tetko and A.E.P. Villa</i>	
Characterization of linear and nonlinear structure in high-dimensional, spatially extended systems: the algorithm of multichannel nonlinear cross prediction	217
<i>C.J. Stam and W.S. Pritchard</i>	
Surrogate data for non-stationary signals	222
<i>A. Schmitz and T. Schreiber</i>	
Analysis of fluctuating data sets of diffusion processes	226
<i>S. Siegert, R. Friedrich and P. Hänggi</i>	
Complications in applying the method of surrogate data to EEG	230
<i>D. Kugiumtzis</i>	
Spontaneous synchronisation in a discrete neural network model	234
<i>D. Volk</i>	
Patterns of complexity and coherent oscillations in a thalamo-cortical network model	238
<i>J. Schwarz, A. Stevens, K. Bräuer and M. Bartels</i>	
Non-linear coupling of local field potentials across cortical sites in parvalbumin-deficient mice	243
<i>A.E.P. Villa, P. Dutoit, I.V. Tetko, W. Hunziker, M. Celio and B. Schwaller</i>	
Analytical proof of chaos in single neurons and consequences	247
<i>L. Andrey</i>	
EEG-detected episodes of low-dimensional self-organized cortical activity and the problem of chaos in the brain	251
<i>R. Cerf, E.H. El Ouasdad and M. El Amri</i>	
Correlation dimension as a method to investigate human REM-sleep	255
<i>G. Fritzer and T. Maß</i>	

The application of a non-linear analysis technique to the monitoring of anesthetic effects in the rat	259
<i>P.L.C. van den Broek, J. van Egmond, C.M. van Rijn, R. Dirksen, A.M.L. Coenen and L.H.D.J. Booij</i>	
Detection of determinism in EEG time series from human sleep by an interspike interval approach	263
<i>A. Galka</i>	
Detecting spatio-temporal information flow in the cortex by mutual information analysis of MEG data	267
<i>L.-H. Hiss and B. Pompe</i>	
Evidence of inverse covariation between alpha power and correlation dimension in human brain dynamics	271
<i>W.S. Tirsch, M. Keidel, S. Perz, H. Scherb and G. Sommer</i>	
Correlation sums from EEG time series: a measure to quantify depth of anesthesia	275
<i>G. Widman, B. Rehberg, A. Hoeft, K. Lehnertz and C.E. Elger</i>	
Detection of phase synchronization in human MEG data	279
<i>P. Tass, J. Gross, M.G. Rosenblum, A. Schnitzler, J. Volkmann, J. Kurths and H.-J. Freund</i>	
MEG-recordings of syllables perception: perturbations from a stable state in the auditory cortex	283
<i>K. Mathiak, I. Hertrich, W. Lutzenberger and H. Ackermann</i>	
Measuring changes in cognitive event related potentials	288
<i>R.A. Pittenger, A.M. Albano, R.C. Josiassen and P.E. Rapp</i>	
Fast subdural signals in humans show task- and event-related changes of conventional and novel coupling measures during cognitive processes	292
<i>A. Bruns, R. Eckhorn, H. Jokeit and A. Ebner</i>	
Brain activity detected by complexity measurements: a methodological approach	297
<i>R. Mammoliti, M.F. Santarelli, A. Benassi and L. Landini</i>	
Phase-locking of event-related alpha oscillations	301
<i>R. Quian Quiroga, E. Başar and M. Schürmann</i>	
Nonlinear filtering in wavelet domain: application to single trial analysis of limbic P300 potentials	305
<i>A. Effern, K. Lehnertz, T. Grunwald, P. David and C.E. Elger</i>	
Influence of the power-spectrum of the pre-stimulus EEG on the consecutive auditory evoked potential in rats	309
<i>M.L.A. Jongsma, C.M. van Rijn, R. Quian Quiroga, W.J. van Schaijk, R. Dirksen and A.M.L. Coenen</i>	

Efficient ARMA modeling of ECOG data of epileptic patients during pre-ictal, inter-ictal and ictal states <i>D.C. Boronowski and P.D. Spanos</i>	313
Characterization of nonlinear dynamics in the scalp EEG of epileptic seizures <i>U. Möller, K. Schmidt, H. Witte and M. Feucht</i>	317
The use of principal component analysis in the analysis of depth recordings during epileptic seizures <i>S.V. Notley, S.J. Elliott, L.E. Sundstrom, W.P. Gray, D. Lurton and A. Rougier</i>	321
Detecting interdependences in intracranial EEG recordings of epilepsy patients <i>J. Arnhold, P. Grassberger, K. Lehnertz and C.E. Elger</i>	325
Linear and nonlinear analysis of EEG for the prediction of epileptic seizures <i>D. Kugiumtzis and P.G. Larsson</i>	329
Sensitive measures of condition change in EEG data <i>L.M. Hively, P.C. Gailey and V.A. Protopopescu</i>	333
Bursting discharges in a mathematical model of the neocortex <i>C. Hauptmann and F. Giannakopoulos</i>	337
Nonlinear deterministic dynamics in seizure free EEG epochs as an indicator of the epileptogenic process. A comparison of three surrogate methods <i>R.G. Andrzejak, G. Widman, K. Lehnertz, P. David and C.E. Elger</i>	340
EEG dimensional complexity mapping in stroke <i>M. Molnár, Z. Nagy and J. Kenéz</i>	344
Nonlinear dynamic in the EEG of schizophrenic patients and its variation with mental task <i>M. Dressel, B. Ambühl-Braun, R. Dünki, P.F. Meier and T. Elbert</i>	348
Nonlinear analysis of EEG slow-wave activity during sleep and sleep regulation modeling: a study in narcoleptic patients under bed rest conditions <i>R. Ferri, S. Pettinato, F. Ferrillo, L. Nobili and M. Billiard</i>	353
The correlation dimension of absence-like phenomena in the EEGs of rats <i>C.M. van Rijn, P.L.C. van den Broek, R. Dirksen, J. van Egmond and A.M.L. Coenen</i>	357

## LIST OF PARTICIPANTS