

# Curriculum Vitae

Armin Fuchs, Ph.D.

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## Employment:

2001-present: Associate Professor, Center for Complex Systems & Brain Sciences and Department of Physics, Florida Atlantic University, Boca Raton, FL

1995-2001: Assistant Professor, Center for Complex Systems & Brain Sciences and Department of Physics, Florida Atlantic University, Boca Raton, FL

1994-1995: Akademischer Rat (tenured staff), Institut für Theoretische Physik und Synergetik, Universität Stuttgart, Stuttgart, Germany

1993-1994: Postdoctoral fellow, funded by NIMH grant (MH42900, P.I.: J.A.S. Kelso), Center for Complex Systems, Florida Atlantic University, Boca Raton, FL

1991-1992: Individual postdoctoral fellowship, funded by DFG (German Research Foundation), Center for Complex Systems, Florida Atlantic University, Boca Raton, FL

1990-1991: Akademischer Rat (tenured staff), Institut für Theoretische Physik und Synergetik, Universität Stuttgart, Stuttgart, Germany

1985-1990: Wissenschaftlicher Angestellter (comparable: Research Assistant), Institut für Theoretische Physik und Synergetik, Universität Stuttgart, Stuttgart, Germany

## Education:

Postdoctoral fellow, Center for Complex Systems, Florida Atlantic University, 1991-1994

Ph.D. (Theoretical Physics), Universität Stuttgart, Stuttgart, Germany, 1990

Diploma (Theoretical Physics), Universität Stuttgart, Stuttgart, Germany, 1985

# Publications

## Textbooks:

Armin Fuchs: *Nonlinear Dynamics in Complex Systems: Theory and Applications for the Life-, Neuro- and Natural Sciences*, Springer Verlag, Berlin (2013)

## Edited Books:

Armin Fuchs, Viktor K. Jirsa, eds.: *Coordination: Neural Behavioral and Social Dynamics*, Springer Verlag, Berlin (2008)

## Refereed Journal Articles:

1. M. Jing, T.M. McGinnity, S. Coleman, A. Fuchs, J.A.S. Kelso: ‘Longitudinal Study of Temporal Changes in Diffusion Patterns in Mild Traumatic Brain Injury Using Semi-Blind Source Separation’, *IEEE Transactions on Biomedical Engineering*, revised version submitted
2. V. Murzin, A. Fuchs, J.A.S. Kelso: ‘Detection of Correlated Sources in EEG Using Combination of Beamforming and Surface Laplacian Methods’, *Journal of Neuroscience Methods*, 218: 96-102 (2013)
3. V. Kostrubiec, P.G. Zanone, A. Fuchs, J.A.S. Kelso: ‘Beyond the blank slate: routes to learning new coordination patterns depend on the intrinsic dynamics of the learner – experimental evidence and theoretical model’, *Frontiers in Human Neuroscience*, 6: 1-14 (2012)
4. M. Jing, T.M. McGinnity, S. Coleman, H. Zhang, A. Fuchs, J.A.S. Kelso: ‘Enhancement of fibre orientation distribution reconstruction in diffusion weighted imaging by single channel blind source separation’, *IEEE Transactions on Biomedical Engineering*, 59: 363-373 (2012)
5. V. Murzin, A. Fuchs, J.A.S. Kelso: ‘Anatomically Constrained Minimum Variance Beamforming Applied to EEG’, *Experimental Brain Research*, 214: 515-528 (2011)
6. S. Charron, A. Fuchs, O. Oullier: ‘Exploring brain activity in neuroeconomics’, *Revue d’Économie Politique*, 118: 97-124 (2008)
7. J.M. Mayville, A. Fuchs, J.A.S. Kelso: ‘Neuromagnetic Motor Fields Accompanying Self-paced Rhythmic Finger Movements of Different Rates’, *Experimental Brain Research*, 166: 190-199 (2005)
8. D.G. Nair, A. Fuchs, S. Burkart, F.L. Steinberg, J.A.S. Kelso: ‘Assessing recovery in middle cerebral artery stroke using functional MRI’, *Brain Injury*, 19: 1165-1176 (2005)
9. T.P. Zanto, E.W. Large, A. Fuchs, J.A.S. Kelso: ‘Gamma-Band Responses to Perturbed Auditory Sequences: Evidence for Synchronization of Perceptual Processes’, *Music Perception*, 22: 535-552 (2005)
10. D.G. Nair, K.L. Purcott, A. Fuchs, F. Steinberg, J.A.S. Kelso: ‘Cortical and cerebellar activity of the human brain during imagined and executed unimanual and bimanual action sequences: A functional MRI study’, *Cognitive Brain Research*, 15: 250-260 (2003)

11. F.W. Carver, A. Fuchs, K.J. Jantzen, J.A.S. Kelso: 'Spatiotemporal analysis of neuromagnetic activity associated with rhythmic auditory stimulation: rate dependence and transient to steady state', *Clinical Neurophysiology*, 113: 1921-1931 (2002)
12. J.M. Mayville, K.J. Jantzen, A. Fuchs, F. Steinberg, J.A.S. Kelso: 'Cortical and subcortical networks underlying syncopated and synchronized coordination revealed using fMRI', *Human Brain Mapping*, 17: 214-219 (2002)
13. V.K. Jirsa, K.J. Jantzen, A. Fuchs, J.A.S. Kelso: 'Spatiotemporal forward Solutions of the EEG and MEG using network modeling', *IEEE Transaction on Medical Imaging*, 21: 493-504 (2002)
14. K.J. Jantzen, A. Fuchs, J.M. Mayville, L. Deecke, J.A.S. Kelso: 'Neuromagnetic activity in alpha and beta bands reflect learning-induced-increases in coordinative stability', *Clinical Neurophysiology*, 112: 1685-1697 (2001)
15. J.M. Mayville, A. Fuchs, M. Ding, D. Cheyne, L. Deecke, J.A.S. Kelso: 'Event-related changes in neuromagnetic activity associated with syncopation and synchronization timing tasks', *Human Brain Mapping*, 14: 65-80 (2001)
16. A. Fuchs, V.K. Jirsa: 'The HKB Model Revisited: How Varying the Degree of Symmetry Controls Dynamics', *Human Movement Science*, 19: 425-449 (2000)
17. A. Fuchs, J. Mayville, D. Cheyne, H. Weinberg, L. Deecke, J.A.S. Kelso: 'Spatiotemporal Analysis of Neuromagnetic Events Underlying the Emergence of Coordinative Instabilities', *Neuroimage*, 12: 71-84 (2000)
18. A. Fuchs, V.K. Jirsa, J.A.S. Kelso: 'Issues for the Coordination of Human Brain Activity and Motor Behavior', *Neuroimage*, 11: 375-377 (2000)
19. A. Fuchs, L. Deecke, J.A.S. Kelso: 'Phase Transitions in the Human Brain Revealed by Large SQUID Arrays: Response to Daffertshofer, Peper and Beek', *Physics Letters A*, 266: 303-308 (2000)
20. A. Fuchs, V.K. Jirsa, J.A.S. Kelso: 'Theory of the Relation between Human Brain Activity (MEG) and Hand Movements', *Neuroimage*, 11: 359-369 (2000)
21. J.M. Mayville, S.L. Bressler, A. Fuchs, J.A.S. Kelso: 'Spatiotemporal Reorganization of Electric Activity in the Human Brain Associated with a Timing Transition in Rhythmic Auditory-Motor Coordination', *Experimental Brain Research*, 127: 371-381 (1999)
22. J.A.S. Kelso, A. Fuchs, R. Lancaster, T. Holroyd, D. Cheyne, H. Weinberg: 'Dynamic Cortical Activity in the Human Brain Reveals Motor Equivalence', *Nature*, 392: 814-818 (1998)
23. V.K. Jirsa, A. Fuchs, J.A.S. Kelso: 'Connecting cortical and behavioral dynamics: bimanual coordination', *Neural Computation*, 10: 2019-2045 (1998)
24. A. Fuchs, V.K. Jirsa, H. Haken, J.A.S. Kelso: 'Extending the HKB-Model of Coordinated Movement to Oscillators with different Eigenfrequencies', *Biological Cybernetics*, 74: 21-30 (1996)
25. J.J. Buchanan, J.A.S. Kelso, A. Fuchs: 'Coordination dynamics of trajectory formation', *Biological Cybernetics*, 74: 41-54 (1996)
26. J.A.S. Kelso, A. Fuchs: 'Selforganizing dynamics of the human brain: Critical Instabilities and Sil'nikov chaos', *Chaos*, 5: 64-69 (1995)

27. A. Fuchs, J.A.S. Kelso: 'A Theoretical Note on Models of Interlimb Coordination', *Journal of Experimental Psychology: Human Perception and Performance*, 20: 1088-1097 (1994)
28. J.A.S. Kelso, S.L. Bressler, S. Buchanan, G.C. DeGuzman, M. Ding, A. Fuchs, T. Holroyd: 'A phase transition in human brain and behavior', *Physics Letters A*, 169: 134-144 (1992) [197]
29. A. Fuchs, J.A.S. Kelso, H. Haken: 'Phase transitions in the human brain: spatial mode dynamics', *International Journal of Bifurcation and Chaos*, 2: 917-939 (1992)
30. H. Haken, J.A.S. Kelso, A. Fuchs, A.S. Pandya: 'Dynamic Pattern Recognition of Coordinated Biological Motion', *Neural Networks*, 3: 390-401 (1990)
31. H. Haken, A. Fuchs, W. Banzhaf: 'Mustererkennung durch synergetische Computer (Pattern Recognition by Synergetic Systems)', *Design & Elektronik*, 6: 93-99, 7: 82-86 (1989)
32. A. Fuchs, H. Haken: 'Nonequilibrium Phase Transitions and Associative Memory. Numerical Results', *Zeitschrift fr Physik B*, 71: 519-520 (1988)
33. A. Fuchs, H. Haken: 'Pattern Recognition and Associative Memory as Dynamical Processes in a Synergetic System I', *Biological Cybernetics*, 60: 17-22 (1988)
34. A. Fuchs, H. Haken: 'Pattern Recognition and Associative Memory as Dynamical Processes in a Synergetic System II', *Biological Cybernetics*, 60: 107-109 (1988)
35. A. Fuchs: 'Synergetics, Selfsimilarity and Computergraphics', *Zeitschrift fr Naturforschung*, 42a: 319-323 (1986)
36. A. Fuchs, G. Mahler: 'Model Study on disordered one-dimensional Microstructures', *Solid State Communications*, 55: 1035-1037 (1985)

### **Book Chapters:**

1. A. Fuchs: 'Spatial Spectral Methods', in: *Encyclopedia of Computational Neuroscience*, D. Jaeger, R. Jung, eds., Springer Verlag, Berlin, under review (6 pages)
2. A. Fuchs: 'Dynamical systems in one and two dimensions: a geometrical approach', in: *Nonlinear dynamics in human behavior*, R. Huys, ed., Springer Verlag, Berlin, pp. 1-34 (2010)
3. A. Fuchs, J.A.S. Kelso: 'Movement Coordination', in: *Encyclopedia of Complexity and Systems Science*, B. Meyers, ed. in chief, Springer Verlag, Berlin, pp. 5718-5736 (2009)
4. A. Fuchs, V.K. Jirsa: 'Scott Kelso's Contributions to Our Understanding of Coordination', in: *Coordination: Neural, Behavioral and Social Dynamics*, A. Fuchs, V.K. Jirsa, eds., Springer Verlag, Berlin, pp. 327-346 (2008)
5. A. Fuchs: 'Beamforming and Its Applications to Brain Connectivity', in: *Handbook of Brain Connectivity*, V.K. Jirsa, R.A. McIntosh, eds., Springer Verlag, Berlin, pp. 357-378 (2007)
6. P. Ferrari, A. Fuchs, D.O. Cheyne, K.J. Jantzen, J.A.S. Kelso: 'Cortical Networks Underlying Coordinated Movements by Magnetoencephalographic Beamforming', in: *New Frontiers in Biomagnetism*, D. Cheyne, B. Ross, G. Stroink, eds., Elsevier, pp. 337-340 (2006)

7. A. Fuchs: 'Combining Brain Imaging Technologies: Using Brain Surfaces', in: *Biomag 2002, Proceedings of the 13th International Conference on Biomagnetism*, H. Nowak, J. Haueisen, F. Geißler, R. Huonker, eds., VDE Verlag, Berlin, pp. 878-880 (2002)
8. V.K. Jirsa, K.J. Jantzen, A. Fuchs, J.A.S. Kelso: 'Neural field dynamics on the folded three-dimensional cortical sheet and its forward EEG and MEG', in: *Information Processing in Medical Imaging*, M.F. Insana, R.M. Leahy, eds., Springer Verlag, Berlin, pp. 286-299 (2001)
9. J.A.S. Kelso, V.K. Jirsa, A. Fuchs: 'From Level to Level in Brain and Behavior', in: *New Developments in Statistical Mechanics*, M. Bachelor, L.T. Wille, eds., World Scientific, Singapore (1999)
10. J.A.S. Kelso, V.K. Jirsa, A. Fuchs: 'Traversing Scales of Brain and Behavioral Organization I: Concepts and Experiments', in: *Analysis of Neurophysiological Brain Functioning*, C. Uhl, ed., Springer, Berlin (1999)
11. A. Fuchs, V.K. Jirsa, J.A.S. Kelso: 'Traversing Scales of Brain and Behavioral Organization II: Analysis and Reconstruction', in: *Analysis of Neurophysiological Brain Functioning*, C. Uhl, ed., Springer, Berlin (1999)
12. V.K. Jirsa, J.A.S. Kelso, A. Fuchs: 'Traversing Scales of Brain and Behavioral Organization III: Theoretical Modeling', in: *Analysis of Neurophysiological Brain Functioning*, C. Uhl, ed., Springer, Berlin (1999)
13. R. Haas, A. Fuchs, H. Haken, E. Horvath, A.S. Pandya, J.A.S. Kelso: 'Recognition of dynamic patterns by a synergetic Computer', in: *Progress in Neural Networks*, O.M. Omidvar, ed., Ablex Publishing Corporation, Norwood, NJ (1995)
14. R. Haas, A. Fuchs, H. Haken, E. Horvath, A.S. Pandya, J.A.S. Kelso: 'Recognition of Dynamic Patterns by a Synergetic Computer', in: *Ambiguity in Mind and Nature*, P. Kruse, M. Stadler, eds., Springer, Berlin (1995)
15. A. Fuchs, J.A.S. Kelso: 'Pattern formation in the human brain during qualitative changes in sensorimotor coordination', in: *Proceedings of the World Congress on Neural Networks 1993*, vol. 4: 476-479 (1993)
16. A. Fuchs, J.A.S. Kelso: 'Self-organization in brain and behavior: Critical instabilities and dynamics of spatial modes', in: *Nonlinear Dynamical Analysis of the EEG*, B.H. Jansen, M.E. Brandt, eds., World Scientific, Singapore (1992)
17. T. Ditzinger, A. Fuchs, H. Haken: 'Synergetic Approach to Phenomena of Perception in Natural and Artificial Systems', in: *Evolution of Dynamical Structures in Complex Systems*, R. Friedrich, A. Wunderlin, eds., Springer, Berlin (1990)
18. A. Fuchs, H. Haken: 'Synergetic Systems for Pattern Recognition', in: *First Symposium on Systematology, Journal of Shanghai Institute of Mechanical Engineering*, 13: 9-22 (1991)
19. R. Friedrich, A. Fuchs, H. Haken: 'Modeling of Spatio-temporal EEG Patterns', in: *Mathematical approaches to brain function diagnostics*, I. Dvorak, A.V. Holden, eds., Manchester University Press (1991)
20. R. Friedrich, A. Fuchs, H. Haken: 'Spatiotemporal EEG Patterns', in: *Synergetics of Rhythms*, H. Haken, H.P. Köpchen, eds., Springer, Berlin (1991)

21. J.A.S. Kelso, S.L. Bressler, S. Buchanan, G.C. DeGuzman, M. Ding, A. Fuchs, T. Holroyd: ‘Cooperative and critical phenomena in the human brain revealed by multiple SQuIDS’, in: *Measuring chaos in the human brain*, D. Duke, W. Pritchard, eds., World Scientific, New Jersey (1991)
22. M. Bestehorn, R. Friedrich, A. Fuchs, H. Haken, A. Kuhn, A. Wunderlin: ‘Synergetics Applied to Pattern Formation and Pattern Recognition’, in: *Optimal Structures in Heterogeneous Reaction Systems*, P. Plath, ed., Springer, Berlin (1989)
23. R. Friedrich, A. Fuchs, H. Haken: ‘Synergetic Analysis of Spatiotemporal EEG-Patterns’, in: *Nonlinear Wave Processes in Excitable Media*, A.V. Holden et al., eds., Plenum Press, New York (1989)
24. A. Fuchs, H. Haken: ‘The Synergetic Approach to Pattern Recognition’, in: *Irreversible Processes and Selforganization*, W. Ebeling, H. Ulbricht, eds., Teubner Verlag, Leipzig (1989)
25. A. Fuchs, H. Haken: ‘Pattern Recognition and Associative Memory as a Dynamical Process in Nonlinear Systems’, in: *Dynamic Patterns in Complex Systems*, J.A.S. Kelso, A.J. Mandell, M.F. Shlesinger, eds., World Scientific, Singapore (1988)
26. A. Fuchs, H. Haken: ‘Computer Simulation of Pattern Recognition as a Dynamical Process of a Synergetic System’, in: *Neural and Synergetic Computers*, H. Haken, ed., Springer, Berlin (1988)
27. A. Fuchs, H. Haken: ‘Pattern Recognition and Pattern Formation as Dual Processes’, in: *Proceedings of the International Conference on Neural Nets I*, SOS Printing, San Diego, CA (1988)
28. A. Fuchs, R. Friedrich, H. Haken, D. Lehmann: ‘Spatiotemporal Analysis of Multi-channel Alpha EEG Map Series’, in: *Computational Systems - Natural and Artificial*, H. Haken, ed., Springer, Berlin (1987)

### Abstracts:

1. V. Murzin, A. Fuchs, E. Tognoli, J.A.S. Kelso: Finding neuromarker sources: A dynamical beamformer approach to single, mirror and complex interactions between neural ensembles. Program No. 712.29. 2012 Neuroscience Meeting Planner. New Orleans, LA: Society for Neuroscience, 2012. Online.
2. V. Murzin, A. Fuchs, J.A.S. Kelso, E. Tognoli: Improved spatiotemporal EEG source analysis of extended cortical sources of neural activity. Program No. 623.25. 2011 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience, 2011. Online.
3. A. Fuchs, E. Tognoli, D. Benites, J.A.S. Kelso: Neural correlates of social coordination: Spatiotemporal analysis of brain and behavioral measures. Program No. 293.17. 2010 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2010. Online.
4. M. Ballan, R. Stackman, A. Henik, A. Fuchs: Spatiotemporal brain dynamics of a two digit number comparison task. Program No. 393.217. 2010 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2010. Online.
5. V. Murzin, J.A.S. Kelso, A. Fuchs: Detecting the spatiotemporal dynamics of neural activity on the cortical surface: Applying anatomically constrained beamforming to EEG. Program No. 687.9. 2009 Neuroscience Meeting Planner. Chicago, IL: Society for Neuroscience, 2009. Online.

6. A. Fuchs, K.J. Jantzen, J.A.S. Kelso: Sequential diffusion tensor imaging reveals directional changes in white matter tracts during recovery from mild traumatic brain injury. Program No. 894.18. 2009 Neuroscience Meeting Planner. Chicago, IL: Society for Neuroscience, 2009. Online.
7. A. Fuchs, K.J. Jantzen, J.A.S. Kelso: Diffusion tensor imaging analysis of sequential scans in mild traumatic brain injuries. Program No. 398.1. 2008 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience, 2008. Online.
8. K.J. Jantzen, A. Fuchs, F.L. Steinberg, J.A.S. Kelso: Serial fMRI and diffusion tensor imaging applied to the study of mild brain injury. No. 682.10. 2006 Neuroscience Meeting Planner. Atlanta, GA: Society for Neuroscience, 2006. Online.
9. T.P. Zanto, M.L. Marshall, A. Fuchs, E.W. Large: Sparse sampling in auditory fMRI experiments: a necessity or a waste of time? A combined functional MRI and EEG study. Program No. 975.16. 2005 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience, 2005. Online.
10. H. Yu, A. Fuchs, D. Sternad: Two types of control for rhythmic and discrete movements? New results from fMRI. Program No. 774.8. 2005 Neuroscience Meeting Planner. Washington, DC: Society for Neuroscience, 2005. Online.
11. M.L. Marshall, A. Fuchs, T.P. Zanto, E.J. Modestino, Short- and long-duration needle stimulation of acupoint GB37: an EEG study. Program No. 384.12. 2003 Neuroscience Meeting Planner. New Orleans, LA: Society for Neuroscience, 2003. Online.
12. T.P. Zanto, E.W. Large, A. Fuchs, J.A.S. Kelso: Gamma-band activity during temporally perturbed auditory sequences. Program No. 486.18. 2003 Neuroscience Meeting Planner. New Orleans, LA: Society for Neuroscience, 2003. Online.
13. D.G. Nair, A. Fuchs, F.L. Steinberg, J.A.S. Kelso, E.W. Large: Assessing recovery from stroke using functional MRI: a serial case study. Program No. 823.6. 2003 Neuroscience Meeting Planner. New Orleans, LA: Society for Neuroscience, 2003. Online.
14. D. Sternad, H. Yu, A. Fuchs: Rhythmic timing and brain function: a fMRI study. Program No. 824.5. 2003 Neuroscience Meeting Planner. New Orleans, LA: Society for Neuroscience, 2003. Online.
15. A. Fuchs: Combining noninvasive brain imaging technologies: Using brain surfaces as constraints for inverse solutions in EEG and MEG. Program No. 863.11. 2003 Neuroscience Meeting Planner. New Orleans, LA: Society for Neuroscience, 2003. Online.
16. F.W. Carver, A. Fuchs, J.A.S. Kelso: Neuroelectric and neuromagnetic brain activity underlying rhythmic movements: Separation of responses using independent components analysis and projection onto the cortical surface. Program No. 459.5. 2002 Neuroscience Meeting Planner. Orlando, FL: Society for Neuroscience, 2002. Online.
17. A. Fuchs, J.A.S. Kelso: Combining noninvasive brain imaging technologies to enhance the spatial and temporal resolution and understanding of human brain activity. Program No. 932.3. 2001 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2001. Online.
18. F.W. Carver, A. Fuchs, V.K. Jirsa, J.A.S. Kelso: Neuromagnetic activity of evoked responses to rhythmic auditory stimulation: Amplitude dependence and interference. Program No. 512.19. 2001 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience, 2001. Online.

19. K.J. Jantzen, D. Cheyne, L. Deecke, A. Fuchs, J.A.S. Kelso: Learning sensorimotor coordination alters the stability of large-scale cortical (MEG) dynamics. Program No. 264.15. 2000 Neuroscience Meeting Planner. New Orleans, LA: Society for Neuroscience, 2000. Online.
20. A. Fuchs, J.M. Mayville, K.L. Purcott, F. Steinberg, J.A.S. Kelso: Cerebellar activation distinguishes sensorimotor task difficulty in functional MRI. Program No. 560.3. 2000 Neuroscience Meeting Planner. New Orleans, LA: Society for Neuroscience, 2000. Online.
21. J.M. Mayville, D. Cheyne, L. Deecke, M. Ding, A. Fuchs, J.A.S. Kelso: Desynchronization of MEG (15-30 Hz) associated with overt and imagined sensorimotor coordination reflects task difficulty. Program No. 833.7. 2000 Neuroscience Meeting Planner. New Orleans, LA: Society for Neuroscience, 2000. Online.
22. F.W. Carver, A. Fuchs, J.M. Mayville, S.W. Davis, J.A.S. Kelso: Systematic investigation of the human brain's responses to rhythmic auditory stimulation. Dynamical Neuroscience VII: Integration Across Multiple Imaging Modalities. Delray Beach, FL, 1999
23. A. Fuchs, K.L. Purcott, D.G. Nair J.M. Mayville S. Owens, F. Steinberg, J.A.S. Kelso: Brain activity in perception-motor coordination revealed by functional MRI. Dynamical Neuroscience VII: Integration Across Multiple Imaging Modalities. Delray Beach, FL, 1999
24. V.K. Jirsa, J.A.S. Kelso, A. Fuchs: Macroscopic reorganization of neural activity due to heterogeneous connections. Dynamical Neuroscience VII: Integration Across Multiple Imaging Modalities. Delray Beach, FL, 1999
25. J.A.S. Kelso, A. Fuchs, J.M. Mayville, D. Cheyne, H. Weinberg, L. Deecke: Decomposition of brain signals into physiological events underlying phase transitions in the human brain. Dynamical Neuroscience VII: Integration Across Multiple Imaging Modalities. Delray Beach, FL, 1999
26. D.G. Nair, K.L. Purcott, A. Fuchs, J.M. Mayville, F. Steinberg, J.A.S. Kelso: Comparing motor and imaginary activation in the brain: A functional MRI study in normal subjects and a stroke patient. Dynamical Neuroscience VII: Integration Across Multiple Imaging Modalities. Delray Beach, FL, 1999
27. V.K. Jirsa, J.A.S. Kelso, A. Fuchs: Macroscopic reorganization of neural activity due to heterogeneous connections. Society for Neuroscience Abstracts 25/2: 2257, 1999
28. J.A.S. Kelso, A. Fuchs, J.M. Mayville, A.J. Nash, D. Cheyne, H. Weinberg, L. Deecke: Decomposition of brain signals into physiological events underlying phase transitions in the human brain. Society for Neuroscience Abstracts 25/1: 1137, 1999
29. A. Fuchs, J.A.S. Kelso,: Large scale electric (EEG), magnetic (MEG) and metabolic (fMRI) activity during human sensorimotor coordination. Abstract of the international conference: Progress in Motor Control II, State College, PA, 1999
30. V.K. Jirsa, A. Fuchs, J.A.S. Kelso: Neural field theory connecting cortical and behavioral dynamics: Bimanual Coordination. Society for Neuroscience Abstracts 23/2: 1139, 1997
31. T. Holroyd, J.A.S. Kelso, A. Fuchs, D. Cheyne, H. Weinberg: Neuromagnetic field dynamics during rhythmic sensorimotor coordination. Society for Neuroscience Abstracts 23/2: 2087, 1997



32. V.K. Jirsa, A. Fuchs, J.A.S. Kelso: Correlation between brain activity and motor behavior: Theory and experiment. Abstracts of the 4th Experimental Chaos Conference, Boca Raton, FL, 1997
33. R. Lancaster, T. Holroyd, A. Fuchs, D. Cheyne, H. Weinberg, J.A.S. Kelso: The task dependent nature of brain dynamics: Motor equivalence in the brain. Dynamical Neuroscience IV, Washington, DC, 1996
34. J.M. Mayville, G.V. Wallenstein, A. Nash, A. Fuchs, S.L. Bressler, J.A.S. Kelso: Cortical dynamics of the human EEG associated with behavioral phase transitions in an auditory motor task. Society for Neuroscience Abstracts 22/2: 890, 1996
35. J.A.S. Kelso, A. Fuchs, T. Holroyd, D. Cheyne, H. Weinberg: Bifurcations in brain and behavior. Society for Neuroscience Abstracts 20: 444, 1994
36. J.J. Buchanan, J.A.S. Kelso, A. Fuchs: Coordination dynamics of trajectory formation: I. Experimental results. Society for Neuroscience Abstracts 19: 544, 1993
37. A. Fuchs, J.A.S. Kelso, J.J. Buchanan: Coordination dynamics of trajectory formation: II. Theoretical results. Society for Neuroscience Abstracts 19: 544, 1993
38. G.V. Wallenstein, S.L. Bressler, A. Fuchs, J.A.S. Kelso: Spatiotemporal dynamics of phase transitions in the human brain. Society for Neuroscience Abstracts 19: 1606, 1993
39. J.A.S. Kelso, S.L. Bressler, S. Buchanan, G.C. deGuzman, M. Ding, A. Fuchs, T. Holroyd: A sensorimotor phase transition in the human brain revealed by multiple low-temperature SQUIDs. Society for Neuroscience Abstracts 17: 657, 1991

## Presentations and Lectures

### International:

Research Center Jülich, Germany, December 2007

Movement and Perception Laboratory, CNRS (Centre Nationale de la Recherche Scientifique), Marseille, France, December 2007

Laboratoire de Recherche Efficience et Deficiencie Motrices, University of Montpellier, France, December 2007

Taught part on two-dimensional systems (1 day) at the summer school 'Nonlinear Dynamics in Movement and Cognitive Sciences', Marseille, France, July 2007

International Conference 'Coordination: Neural, Behavioral and Social Dynamics', Boca Raton, FL, February 2007

Laboratoire de Recherche Efficience et Deficiencie Motrices, University of Montpellier, France, July 2006

Movement and Perception Laboratory, CNRS, Marseille, France, July 2006

Physics Colloquium, University of Cottbus, Germany, June 2006

Microsystems Technology Seminars, University of Freiburg, Germany, June 2006

Workshop on Emerging Computing held by EPSRC (Engineering and Physical Sciences Research Council), London, UK, July 1998

International Workshop 'Model-based Analysis of Neurophysiological Brain Functioning', Leipzig, Germany December 1997

Colloquium of the Department of Physics, Queens University, Kingston, Ontario, June 1997

International Society of Brain Topography (ISBET), Zurich, Switzerland, March 1997

Max-Planck-Institute of Neurophysiological Research, Leipzig, Germany, August 1996

Shanghai Institute of Mechanical Engineering, Shanghai, China, November 1990

Institute of Systems Science, Academia Sinica, Beijing, China, November 1990

Winter Seminar 'Messung und Selbstähnlichkeit (Measurement and Selfsimilarity)', Zeinisjoch, Galtür, Austria, February 1990

Colloquium of the Department of Physics at the University of Ilmenau, Germany, January 1990

Colloquium of the Department of Physics at the University of Hamburg, Germany, May 1989

Colloquium of the Department of Physics at the University of Regensburg, Germany, December 1989

IPSO-4 (Fourth International Conference on Irreversible Processes and Selforganization), Rostock, Germany, February 1989

DPG (Meeting of the German Physical Society), Karlsruhe, Germany, March 1988

Winter Seminar 'Optimal Structures in Heterogeneous Reactions', Zeinisjoch, Galtür, Austria, February 1988

International Symposium ‘Neural and Synergetic Computers’, Schloss Elmau, Bavaria, Germany, June 1988

International Symposium ‘Computational Systems – Natural and Artificial’, with R. Friedrich, Schloss Elmau, Bavaria, Germany, May 1987

Workshop ‘Symmetrie, Selbstähnlichkeit und Computergrafik (Symmetry, Self-similarity and Computer Graphics)’, Symposium on Symmetry, Darmstadt, Germany, June 1986

### **National:**

Society for Neuroscience, San Diego, CA, November 2010 (poster presentation)

Society for Neuroscience, Chicago, IL, October 2009 (poster presentation)

Society for Neuroscience, Washington, DC, November 2008 (poster presentation)

Department of Biomedical Engineering, University of Florida, Gainesville, FL, April 2006

Physics Colloquium, Montana State University, Bozeman, MT, January 2005

Department of Complex & Biological Systems, Montana State University, Bozeman, MT, January 2005

Debates in Dynamics III, Pennsylvania State University State College, PA, May 2004

Society for Neuroscience, Orlando, FL, November 2003 (poster presentation)

International Workshop: ‘Neuroinformatics and Electrophysiological Neuroimaging’, Carmel, CA, January 2000

International conference ‘Progress in Motor Control II’, State College, PA, August 1999

Workshop: ‘Modeling Action and Perception: Debates in Dynamics’, State College, PA, August 1999

Department of Kinesiology, Pennsylvania State University, State College, PA, February 1998

Penn State Action Club, Pennsylvania State University, State College, PA, February 1998

Dynamical Neuroscience Workshop, Boca Raton, FL, November 1994

Graduate Seminar in Nonlinear Dynamics, Gatech, Atlanta, GA, June 1992

Second Annual Conference on Nonlinear Dynamical Analysis of the EEG, Houston, TX, April 1992

### **Local:**

Physics Colloquium, Florida Atlantic University, September 2012

Physics Colloquium, Florida Atlantic University, November 2011

Minisymposium Complex Systems & Brain Sciences, Florida Atlantic University, December 2010

Human Brain and Behavior Laboratory, Florida Atlantic University, October 2010

Physics Colloquium, Florida Atlantic University, October 2009

Dynamical Systems Seminar, Florida Atlantic University, September 2009

Neuroscience Seminars, Florida Atlantic University, December 2006

Physics Colloquium, Florida Atlantic University, April 2006

Frontiers in Science, Florida Atlantic University, January 2006

Palm Beach Community College, West Palm Beach, February 2003

# Teaching and Advising

## Courses:

- PHY 6938/ISC 6930: ‘Medical Imaging Physics’; Spring 2013 (5)<sup>1</sup>, Spring 2012 (10), Spring 2011 (12), Spring 2010 (4), Spring 2009 (7)
- ISC 6937: ‘Proseminar – Research in Complex Systems’; Fall 2012 (12), Fall 2011 (5), Fall 2010 (7), Spring 2008 (7), Spring 2006 (9), Spring 2000 (8)
- MAP 6211/PHY 6938: ‘Introduction to Dynamical Systems and Chaos I’; Fall 2012 (7), Fall 2011 (10), Fall 2010 (5), Fall 2009 (8), Fall 2008 (6), Fall 2006 (6), Fall 2004 (5)
- MAP 6212: ‘Introduction to Dynamical Systems and Chaos II’; Summer 2004 (5), Spring 1999 (5)
- PHY 3221: ‘Classical Mechanics’; Fall 2012 (12), Fall 2011 (9)
- PHY 4523: ‘Statistical Mechanics’; Spring 2008 (4)
- ISC 6930: ‘Computational Tools’; Summer 2007 (7)
- ISC 6930: ‘Brain Data Analysis and Modeling’; Spring 2007 (10)
- ISC 6925: ‘Introduction to Complex Systems Tools’; Summer 2006 (7), Summer 2005 (7), Summer 2003 (11)
- ISC 6467: ‘Noninvasive Brain Recording’; Fall 2005 (13)
- ISC 6950: ‘Methods in Complex Systems’; Summer 2005 (7)
- ISC 6930: ‘Current Topics in CSBS’; Spring 2005 (7)
- PHY 2049 (PHY 3041 before Fall 1997): ‘General Physics II’; Spring 2004 (50), Fall 1999 (50), Fall 1997 (59), Spring 1997 (50), Fall 1996 (55), Spring 1996 (45), Fall 1995 (81)
- ISC 6930: ‘fMRI Basics and Applications’; Fall 2003 (8)
- ISC 6930: ‘Practical Brain Imaging’; Spring 2003 (8), Spring 2002 (6), Summer 2001 (7)
- ISC 6464: ‘Synergetics’; Fall 2002 (7), Fall 1999 (5), Fall 1996 (5)
- ISC 6930: ‘Research in Brain Imaging’; Summer 2002 (8)
- ISC 6930: ‘Computational Brain Physics’; Spring 2001 (8), Fall 1997 (7), Summer 1996 (4)
- ISC 6930: ‘Brain Imaging Techniques and Technologies’; Fall 2000 (6)
- PHY 2054: ‘College Physics’; Spring 2000 (29), Fall 1998 (41)
- ISC 6930: ‘Research/Seminar in Complex Systems’; Summer 1998 (9), Spring 1998 (4), Spring 1997 (5)
- PHY 2048: ‘General Physics I’; Spring 1998 (129)

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<sup>1</sup>Number in parentheses (...) indicate number of students in the course.

**Current Ph.D. Students:**

Stephanie Lewkowicz (Physics 2011- )

Vahid Tayefeh (Physics 2012- )

**Ph.D. Graduates:**

Vyacheslav Murzin (Physics 2010, chair): Detecting the Spatiotemporal Dynamics of Neural Activity on the Cortical Surface: Applying Anatomically Constrained Beamforming to EEG

Angelica Hotiu (Physics 2010, chair): Diffusion Tensor Imaging in Mild Traumatic Brain Injuries

Paul Ferrari (CSBS 2009, chair): Spatiotemporal Beamformer Analysis of Neuromagnetic Activity in Sensori-motor Cortex: Rhythmic Perception, Production and Sensorimotor Coordination

Mohammad Dastjerdi (CSBS 2007, co-chair with Dawei Dong): Efficient Representation of Natural Visual Input in the Thalamus

Frederick W. Carver (CSBS 2003, co-chair with Scott Kelso): Neural Correlates of Rhythmic Auditory Stimulation and Rhythmic Movement: Rate Dependence and Transient to Steady-State Transition

Justine M. Mayville (CSBS 2000, chair): Neural Correlates of Human Sensorimotor Coordination: EEG, MEG and Functional MRI

**Former Ph.D. Students:**

William Hahn (CSBS 2011-2013), started working with Dr. Elan Barenholz in summer 2013

Meltem Ballan (CSBS 2006-2009), graduated from FAU 2010 under the supervision of Dr. Robert Stackman

Balasz Szemes (CSBS 2003-2006), left for MS in Bioengineering at FAU

Michael Marshall (CSBS 2001-2007), part time student, graduated from FAU 2011 under the supervision of Dr. Howard Prentice

**Member on Ph.D. Committees at FAU:**

Amirali Farokhniaee (Physics 2012- )

Cyndee Finkel (Physics 2009-2013)

Muhilam Mahalingam (CSBS 2009)

Young-Ah Rho (CSBS 2007-2009)

Ajay Pillai (CSBS 2006-2008)

Heather Chapin (CSBS 2006-2009)

Roxana Stefanescu (Physics 2006-2009)

Jeanna Winchester (CSBS 2005-2009)

Arpan Banerjee (CSBS 2005-2007)

Murad Qubbaj (Physics 2005-2007)

Ted Zanto (CSBS 2003-2006)

Collins Assisi (CSBS 2002-2005)

Dinesh Nair (CSBS 2001-2004)

Patrick Foo (CSBS 1997-2000)

Philip Gleason (CSBS 1997-1999)

Tom Holroyd (CSBS 1996-1997)

**Outside Member on Ph.D. Committees:**

Abhishek Nerella, Kinesiology and Integrative Biosciences, Pennsylvania State University, 2006

Michaela Enculescu, Physics, Technical University of Cottbus, Germany, 2006

Hong Yu, Kinesiology and Integrative Biosciences, Pennsylvania State University, 2005

**Other Advising Activities:**

Since my arrival in 1995, I served as Graduate Advisor for the students in the Ph.D. Program in Complex Systems & Brain Sciences

Faculty advisor for the student club FANS (Florida Atlantic Neuroscience Society) during the time of its existence (2009-2011)

Faculty advisor for the Complex Systems student club during the time of its existence (1997-1999)

**Teaching Awards:**

Teaching Incentive Program Award, Florida Atlantic University, 1998