

SONYA BAHAR, Ph.D.

bahars@umsl.edu

*Center for Neurodynamics
Department of Physics and Astronomy
University of Missouri at St. Louis
One University Boulevard
St Louis MO 63121*

*Tel (314) 516-7150
Fax (314) 516-6152*

ACADEMIC POSITIONS

Director, Center for Neurodynamics (*March 2006 – present*)

**Associate Professor of Biophysics, Department of Physics and Astronomy,
University of Missouri at St Louis** (*September 2009 – present*)

**Assistant Professor of Biophysics, Department of Physics and Astronomy,
University of Missouri at St Louis** (*August 2004 – August 2009*)

POSTDOCTORAL EXPERIENCE

- *May 2002 – June 2004, Postdoctoral Research Associate, Department of Neurological Surgery, Weill-Cornell Medical College of Cornell University, New York NY.*
- *July 2001 – May 2002, National Research Service Award Postdoctoral Fellow (NIH/NINDS), Center for Neurodynamics, University of Missouri at St Louis.*
- *December 1999 – July 2001, Postdoctoral Research Associate, Center for Neurodynamics, University of Missouri at St Louis.*
- *October 1997 - November 1999, Postdoctoral Research Associate, Department of Physics, Department of Cell Biology, and Center for Nonlinear and Complex Systems, Duke University, Durham NC.*

EDUCATION

- **Ph.D. in Biophysics, Department of Biochemistry and Biophysics, University of Rochester, 1997.** Thesis advisor: Dr. Philip A. Knauf. Thesis title: *Relationship of Divalent to Monovalent Anion Transport in Band 3 and AE2.*
- **M.S. in Biophysics, Department of Biophysics, University of Rochester, 1993.**
- **B.S. in Physics, Magna cum Laude, with Minor in Mathematics, Drexel University, June 1991. Undergraduate Senior Thesis, Drexel University, May 1991.** Dr. Robert Gilmore, advisor. Title: *A Study of Chaos in a New Lorenz System.*

PUBLICATIONS (PEER-REVIEWED JOURNAL ARTICLES)

1. Dees, N.D. and Bahar, S. Noise-Optimized Speciation in an Evolutionary Model. *Submitted*.
2. Dees, N. D., Hofmann, M. and Bahar, S. Physical constraints and the evolution of different foraging strategies in aquatic space. *Animal Behavior*, in press.
3. Takeshita, D, Gale, J., Montgomery, E, Bahar, S., and Moss, F. Analyzing spike trains with circular statistics. *American Journal of Physics*, 77(5): 424-429, 2009.
4. Dees, N. D., Bahar, S. and Moss, F. Stochastic resonance and the evolution of Daphnia foraging strategy. *Physical Biology* 5(4):44001, 2008.
5. Contreras, R., Kolster, R., Voss, H. U., Ghajar, J., Suh, M. and S. Bahar. Eye-Target Synchronization in Mild Traumatic Brain Injured Patients. *Journal of Biological Physics*, 34(3-4):381-392, 2008.
6. Tsytsarev, V., Premachandra, K., Takeshita, D. and S. Bahar. Imaging Cortical Electrical Stimulation in vivo: a Comparison of the Fast Intrinsic Optical Signal and Voltage-Sensitive Dyes. *Optics Letters*. 33(9):1032-1034, 2008.
7. Dees, N. D., Bahar, S., Garcia, R. and Moss, F. Patch Exploitation in Two Dimensions: From *Daphnia* to Simulated Foragers. *Journal of Theoretical Biology*. 252:69-76, 2008.
8. Weihberger, O. and S. Bahar. Frustration, drift, and antiphase coupling in a neural array. *Physical Review E*. 76(1 Pt 1):011910, 2007.
9. Takeshita, D., Y. D. Sato and S. Bahar. Transitions between multistable states as a model of epileptic seizure dynamics. *Physical Review E*. 75:051925, 2007.
10. Bahar, S., M. Suh, M. Zhao and T. H. Schwartz. Multiwavelength Intrinsic Optical Signal Imaging of Acute Focal Seizures in Rat Neocortex. The “Epileptic Dip”. *NeuroReport*, 17(5):499-503, 2006.
11. Suh, M., S. Bahar, A. D. Mehta and T. H. Schwartz. Blood Volume and Hemoglobin Oxygenation Response Following Electrical Stimulation of the Human Cortex. *NeuroImage*, 31:66-75, 2006.
12. Suh, M., S. Bahar, A. D. Mehta and T. H. Schwartz. Temporal Dependence in Uncoupling of Blood Volume and Oxygenation during Interictal Epileptiform Events in Rat Neocortex. *Journal of Neuroscience* 25(1): 68-77, 2005.
13. Bahar, S. Burst-Enhanced Synchronization in an Array of Noisy Coupled Neurons. *Fluctuation and Noise Letters* 4(1):L87-L96, 2004.

14. Bahar, S. and F. Moss. Stochastic Resonance and Synchronization in the Crayfish Caudal Photoreceptor. *Mathematical Biosciences* **188**:81-97, 2004.
15. Bahar, S. Effect of Light on Stochastic Phase Synchronization in the Crayfish Caudal Photoreceptor. *Biological Cybernetics* **89**(3): 200-213, 2003.
16. Bahar, S. and F. Moss. The Nonlinear Dynamics of the Crayfish Mechanoreceptor System. *International Journal of Bifurcation and Chaos* **13**(8): 2013-2034, 2003.
17. Bahar, S. and F. Moss. Stochastic Phase Synchronization in the Crayfish Mechanoreceptor/Photoreceptor System. *Chaos* **13**(1): 138-144, 2003.
18. Bahar, S., A. Neiman, L. A. Wilkens and F. Moss. Phase Synchronization and Stochastic Resonance Effects in the Crayfish Caudal Photoreceptor. *Phys. Rev. E Rapid Communications* **65**:050901(R), 2002.
19. Gauthier D. J., G. M. Hall, R. A. Oliver, E. G. Dixon-Tulloch, P. D. Wolf and S. Bahar. Progress Toward Controlling In Vivo Fibrillating Sheep Atria Using a Nonlinear-Dynamics-Based Closed-Loop Feedback Method. *Chaos* **12**(3): 952-961, 2002.
20. Steuer, R., W. Ebeling, D. F. Russell, S. Bahar, A. Neiman and F. Moss. Entropy and Local Uncertainty of Data from Sensory Neurons. *Phys. Rev. E* **64**: 061911, 2001.
21. Bahar, S., J. W. Kantelhardt, A. Neiman, H. H. Aragao Rego, D. Russell, L. Wilkens, A. Bunde and F. Moss. Long-range Temporal Anti-correlations in Paddlefish Electroreceptors. *Europhysics Letters* **56**(3): 454-460, 2001.
22. Bahar, S., D. Fayuk, G. G. Somjen, P. G. Aitken, and D. A. Turner. Mitochondrial Depolarization and Intrinsic Optical Signal Imaged During Hypoxia and Spreading Depression in Rat Hippocampal Slices. *Journal of Neurophysiology* **84**(1): 311-324, 2000.
23. Oliver, R. A., G. M. Hall, S. Bahar, W. Krassowska, P. D. Wolf, E. G. Dixon-Tulloch, and D. J. Gauthier. Existence of Bistability and Correlation with Arrhythmogenesis in Paced Sheep Atria. *Journal of Cardiovascular Electrophysiology* **11**:797-805, 2000.
24. Hueter, I. and S. Bahar. Apparently Chaotic Orbits Embedded in Closed Curves. *SIAM J. on Applied Mathematics* **60**(5): 1824-1840, 2000.
25. Bahar, S., C. T. Gunter, C. Wu, S. D. Kennedy and P. A. Knauf. Persistence of External Chloride and DIDS Binding After Chemical Modification of Glu-681 in Human Band 3. *Am. J. of Physiol.* **277** (*Cell Physiol.* **46**): C791-C799, 1999.
26. Bahar, S. Time-Delay Embeddings of IFS Attractors. *Fractals* **7**(2): 133-138, 1999.

27. Hall, G. M., S. Bahar and D. J. Gauthier. Prevalence of Rate-Dependent Behaviors in Cardiac Muscle, *Phys. Rev. Lett.* **82**(14): 2995-2998, 1999.
28. Hall, G. M., S. Bahar and D. J. Gauthier. Experimental Control of a Chaotic Point Process Using Interspike Intervals. *Phys. Rev. E*, **58**(2): 1685-1689, 1998.
29. Bahar, S. Symbolic Dynamics for IFS Attractors. *Fractals*, **5**(2): 237-246, 1997.
30. Bahar, S. Orbits Embedded in IFS Attractors. *International Journal of Bifurcation and Chaos*, **7**(3): 741-749, 1997.
31. Bahar, S. Chaotic Attractors Generated by Iterated Function Systems: "Harmonic Decompositions" and the Onset of Chaos. *Chaos, Solitons and Fractals*, **8**(3): 303-312, 1997.
32. Bahar, S. Patterns of Bifurcation in Iterated Function Systems. *Chaos, Solitons and Fractals*, **7**(2): 205-210, 1996.
33. Bahar, S. Further Studies of Bifurcations and Chaotic Orbits Generated by Iterated Function Systems. *Chaos, Solitons and Fractals*, **7**(1): 41-47, 1996.
34. Bahar, S. Chaotic Orbits and Bifurcation from a Fixed Point Generated by an Iterated Function System. *Chaos, Solitons and Fractals*, **5**(6): 1001-1006, 1995.

PUBLISHED ABSTRACTS

1. Bahar, S., M. Suh and T. H. Schwartz. Intrinsic Optical Signal Imaging of Focal Seizures in the Rat Neocortex. *Epilepsia* **44** Suppl. 9:37(Abst. 1.097), 2003.
2. Suh, M., S. Bahar, A. Mehta and T. H. Schwartz. Optical Imaging of Interictal Spikes Induced by Bicuculline Methiodide in the Rat Neocortex. *Epilepsia* **44** Suppl. 9:42(Abst. 1.114), 2003.
3. Bahar, S., D. A. Turner and P. G. Aitken. Mitochondrial Depolarization Precedes Hypoxic Spreading Depression in Rat Hippocampal Slices. *Soc. for Neurosci. Abstracts* **25**:1847, 1999.
4. Knauf, P. A., S. Bahar, C. T. Gunter, C. Wu and S. D. Kennedy. External Cl⁻ and DIDS binding to band 3 persist after modification of Glu-681. *FASEB J.* **12**:A1032, 1998.
5. Knauf, P. A., E. A. Ries, L. A. Romanow, S. Bahar and E. S. Szekeres. DNDS (4,4' - dinitro - stilbene - 2,2' - disulfonate) Does Not Act as a Purely Competitive Inhibitor of Red Blood Cell Band-3 Mediated Transport. *Biophysical Journal* **64**, No. 2, Pt. 2, A307, 1993.

CONTRIBUTIONS TO CONFERENCE PROCEEDINGS

1. Bahar, S. and F. Moss. Stochastic Synchronization and Signal Rectification in the Crayfish Caudal Photoreceptor. In **Unsolved Problems of Noise and Fluctuations – UPoN 2002: Third International Conference on Unsolved Problems of Noise and Fluctuations in Physics, Biology, and High Technology**. S. M. Bezrukov, ed. AIP Conference Proceedings Volume 665, 2003, pp. 173-180.
2. Bahar, S. Reentrant Waves Induced by Local Bistabilities in a Cardiac Model. In **Proceedings of the 5th Experimental Chaos Conference**. M. Ding, W. L. Ditto, L. M. Pecora and M. L. Spano, eds. World Scientific, 2001, pp. 215-222.

BOOK CHAPTERS

1. Suh, M., S. Shariff, S. Bahar, A. D. Mehta and T. H. Schwartz. Intrinsic Optical Signal Imaging of Normal and Abnormal Physiology in Animals and Humans—Seeing the Invisible. Appeared as Chapter 17, In **Clinical Neurosurgery**, Volume 52, Lippincott Williams & Wilkins, 2005.
2. Bahar, S., M. Suh, A. Mehta and T. H. Schwartz. Intrinsic Optical Signal Imaging of Neocortical Epilepsy. In **Bioimaging in Neurodegeneration**. P. A. Broderick, D. N. Rahni, and E. H. Kolodny, eds. Humana Press, 2005.
3. Gauthier, D. J., S. Bahar, and G. M. Hall. Controlling the Dynamics of Cardiac Muscle Using Small Electrical Stimuli. In **Handbook of Biological Physics**, Volume 4 (Chapter 7): Neuro-informatics, Neural Modeling. A. J. Hoff, series editor. F. Moss and S. Gielen, volume editors. Elsevier, 2001.

BOOK REVIEWS

1. Bahar, S. **Into the Cool: Energy Flow, Thermodynamics and Life**, by Eric D. Schneider and Dorion Sagan, University of Chicago Press, 2005, 362 pages. Review for *Reports of the National Center for Science Education (RNCSE)*. 25(5-6), 2005.

INVITED TALKS (CONFERENCE)

1. Imaging Pathological Synchronization in the Cortex. Invited talk presented in **International Workshop "From Complex Systems Theory to Clinical Neurology" (MEDSIM07)**, June 4 - 8, 2007, Dresden, Germany. (Conference organizers: Hans A. Braun, Erik Mosekilde, Frank Moss).
2. Imaging the “Epileptic Dip” ... and Seizure Termination? Invited talk in symposium “Imaging Dynamical Diseases in the Brain”, February 19, 2006, at the **AAAS 2006 Annual Meeting** in St Louis MO. (Symposium organizer: self!)
3. Imaging Collective Dynamics in the Neocortex. Invited talk in symposium “Multi-scale Aspects and Dynamical Networks in Integrated Physiologic Systems”, March 22, 2005, at the **American Physical Society March Meeting 2005**, Los Angeles CA. (Symposium organizer: Dr. Plamen Ch. Ivanov)

4. Novel Techniques in Epilepsy Surgery – The Future: Optical Imaging of Epilepsy. Invited talk in **Epilepsy Surgery Update**, a conference hosted by the Department of Neurological Surgery, Weill-Cornell Medical College, New York NY, October 11, 2003. (Conference organizer: Theodore H. Schwartz, MD)
5. Phase Synchronization and Stochastic Resonance in the Crayfish Photoreceptor. Invited talk at “Stochastic Resonance: Applications in Medical and Brain Science”, September 2002 at the **International Institute for Advanced Scientific Studies (IIASS)** “E. R. Caianiello”, Vietri sul Mare, Salerno, Italy.
6. Long-Range Anti-Correlations in Paddlefish Electroreceptor and Crayfish Mechanoreceptor Neurons. Invited talk in Minisymposium “Long-Range Correlations in Dynamics and Biology”, **Sixth SIAM Conference on the Applications of Dynamical Systems**, Snowbird UT, May 20-24, 2001.

CONFERENCE PRESENTATIONS (CONTRIBUTED TALKS/ POSTERS)

1. Dees, N. and Bahar, S. Noise-Optimized Speciation in a Simple Evolutionary Model. **Contributed Talk** Presented at **American Physical Society March Meeting**, Pittsburgh PA, March 16-20, 2009.
2. Tsytsarev, V., Takeshita, D., Garver, W. and Bahar, S. Angular selectivity of single rat whisker deflection: intrinsic and voltage-sensitive dye optical imaging study. **Poster** Presented at Society for Neuroscience Annual Meeting (**Neuroscience 2008**), Washington DC, November 15-19, 2008.
3. Takeshita, D., Tsytsarev, V. and Bahar, S. Spatiotemporal patterns of phase synchronization in voltage-sensitive dye imaging of 4AP-induced epileptic seizures in the rat neocortex. **Poster** Presented at Society for Neuroscience Annual Meeting (**Neuroscience 2008**), Washington DC, November 15-19, 2008.
4. Brumm, D., Tsytsarev, V., Bahar, S. Focal Cooling: An intrinsic optical imaging study of the effect of cooling on 4-Aminopyridine induced focal seizures **Poster** presented at 4th joint MST (Rolla) – UMSL Physics Department Meeting, October 2008.
5. Contreras, R., Kolster, R., Basu, S., Voss, H. U., Ghajar, J., Suh, M., and Bahar, S. Eye-Target Synchrony and Attention. **Poster** presented at 4th joint MST (Rolla) – UMSL Physics Department Meeting, October 2008.
6. Takeshita, D., Tsytsarev, V., and Bahar, S. Phase synchronization analysis of voltage-sensitive dye imaging of drug-induced epileptic seizures. **Poster** presented at 4th joint MST (Rolla) – UMSL Physics Department Meeting, October 2008.

7. Dees, N., Hofmann, M., and Bahar, S. The Evolution of Paddlefish Turning Angle Distributions, **Poster** presented at 4th joint MST (Rolla) – UMSL Physics Department Meeting, October 2008.
8. Dees, N., Larson-Prior, L., Nolan, T., Wright, K., Politte, D. Prior, F., Bahar, S. Phase Synchrony Analysis of Network Dynamics links EEG and BOLD. **Poster** presented at 14th Annual Meeting of the Organization for **Human Brain Mapping**, June 15-19, 2008, Melbourne, Australia.
9. Takeshita, D., Tsytsarev, V., Bahar, S. Phase synchronization analysis of voltage-sensitive dye imaging during drug-induced epileptic seizures. **Talk** presented at **APS March Meeting**, March 10, 2008, New Orleans, LA.
10. Dees, N., Bahar, S., Moss, F. Evolution of Optimum Foraging Distributions in Two Dimensions. **Talk** presented at **APS March Meeting**, March 11, 2008, New Orleans, LA.
11. Tsytsarev V., Garver W., Bahar S. Optical Imaging of the Rat Barrel Cortex with Voltage-Sensitive Dye in Response to Directional Whisker Deflection. **Talk** presented at **Society for Neuroscience**, November 3-7, 2007, San Diego, CA.
12. Dees, N., Larson-Prior, L., Nolan, T., Politte, D., Prior, F. and Bahar, S. Synchrony based integration of EEG and fMRI-BOLD in cognitive state transitions. **Poster** presented at **Sixteenth Annual Computational Neuroscience Meeting (CNS 2007)**, July 7-12, 2007, Toronto, Canada.
13. R. Contreras, R. Kolster, S. Basu, H.U. Voss, J. Ghajar , M. Suh, S. Bahar. Eye-Target Synchrony and Attention. **Poster** presented at **International Workshop "From Complex Systems Theory to Clinical Neurology" (MEDSIM07)**, June 4 - 8, 2007, Dresden, Germany.
14. Takeshita, D., Satoh, Y. and S. Bahar. Phase Dynamics of a Neocortical Neural Network as a Possible Model for Epileptic Seizures. **Talk** presented at **SIAM Conference on Applications of Dynamical Systems (DS07)**, May 28-June 1, 2007, Snowbird, Utah.
15. Contreras, R., R. Kolster, S. Basu, H. U. Voss, J. Ghajar, M. Suh and S. Bahar. Eye-Target Synchrony and Attention. **Talk** presented at the **American Physical Society March Meeting**, Denver CO, March 5-9, 2007.
16. Dees, N., L. Larson-Prior, T. Nolan, D. Politte, F. Prior and S. Bahar. Synchrony-Based Integration of fMRI-BOLD and EEG in Cognitive State Transitions. **Poster** presented at **Joint UMSL/UMR Physics Department Meeting**, March 2, 2007.
17. Takeshita, D., Y. Satoh and S. Bahar. Phase dynamics of coupled neural oscillators: application to epileptic seizures. **Poster** presented at **Joint UMSL/UMR Physics Department Meeting**, March 2, 2007.

18. Brumm, D., V. Tsytsarev and S. Bahar. Imaging the effects of focal cooling on neocortical seizures using the intrinsic optical signal. **Poster** presented at **Joint UMSL/UMR Physics Department Meeting**, March 2, 2007.
19. Takeshita, D., R. Contreras, V. Tsytsarev, and S. Bahar. Computational Modeling of Transitions in Field Potential Activity During Seizures. **Poster** presented at **Society for Neuroscience 2006 Annual Meeting**, Atlanta GA, October 14-18, 2006.
20. Tsytsarev, V., D. Takeshita, and S. Bahar. In vivo optical imaging with calcium-sensitive dyes in an acute model of epileptic seizures. **Talk** presented at **Society for Neuroscience 2006 Annual Meeting**, Atlanta GA, October 14-18, 2006. (Talk presented by V. Tsytsarev.)
21. Takeshita, D., Y. Sato and S. Bahar. Modeling Seizure Development in the Neocortex. Talk given at **Understanding Complex Systems 2006**, University of Illinois at Urbana-Champaign, May 18 2006. (Talk presented by D. Takeshita.)
22. Contreras, R. P. and S. Bahar. Inhibitory Synaptic Coupling and Spatiotemporal Synchrony in a Neural Model. **Talk** presented at **American Physical Society March Meeting 2006**, Baltimore MD, March 13-17 2006.
23. Takeshita, D., Y. Sato and S. Bahar. Phase Reduction Analysis of Coupled Neural Oscillators: Application to Epileptic Seizure Dynamics. **Talk** presented at **American Physical Society March Meeting 2006**, Baltimore MD, March 13-17 2006.
24. Contreras, R. P. and S. Bahar. Excitatory and Inhibitory Synapses in a Neural Array. **Poster** presented at **AAAS 2006 Annual Meeting**, St Louis MO, February 16-20, 2006.
25. Takeshita, D., Y. Sato and S. Bahar. Phase Reduction Analysis of Coupled Neural Oscillators: Application to Epileptic Seizure Dynamics. **Poster** presented at **AAAS 2006 Annual Meeting**, St Louis MO, February 16-20, 2006.
26. Contreras, R. P. and S. Bahar. Effect of Inhibitory Connections on Synchrony and Bursting in a Neuronal Model. **Poster** presented at **Joint UMSL/UMR Physics Department Meeting**, October 14, 2005.
27. Takeshita, D., Y. Sato and S. Bahar. Phase Reduction Analysis of Coupled Neural Oscillators: Application to Epileptic Seizure Dynamics. **Poster** presented at **Joint UMSL/UMR Physics Department Meeting**, October 14, 2005.
28. Contreras, R. P. and S. Bahar. Effect of Inhibition on Synchronization and Bursting in a Neural Model. **Poster** presented at **Neural Coding 2005**, Marburg, Germany, August 20-26, 2005.

29. Takeshita, D., F. Moss and S. Bahar. Modeling spatiotemporal patterns of neocortical activity in epileptic seizures. **Talk** presented at the **American Physical Society March Meeting 2005**, Los Angeles, March 20-24, 2005.
30. Bahar, S., M. Suh, A. Mehta and T. H. Schwartz. Imaging Electrical Stimulation of the Human Cortex. **Talk** presented at the **American Physical Society March Meeting 2004**, held in Montréal, Canada, March 22-26, 2004.
31. Bahar, S., M. Suh and T. H. Schwartz. Intrinsic Optical Signal Imaging of Focal Seizures in the Rat Neocortex. **Poster** presented at **American Epilepsy Society 57th Annual Meeting**, Boston, December 5-10, 2003.
32. Suh, M., S. Bahar, A. Mehta and T. H. Schwartz. Optical Imaging of Interictal Spikes Induced by Bicuculline Methiodide in the Rat Neocortex. **Poster** presented at **American Epilepsy Society 57th Annual Meeting**, Boston, December 5-10, 2003.
33. Bahar, S., M. Suh and T. H. Schwartz. Intrinsic Optical Signal Imaging of Focal Seizures in the Rat Neocortex. **Poster** presented at **Neuroscience 2003 (Society for Neuroscience Annual Meeting)**, New Orleans, November 8-12, 2003.
34. Suh, M., S. Bahar, A. Mehta and T. H. Schwartz. Optical Imaging of Interictal Spikes Induced by Bicuculline Methiodide in the Rat Neocortex. **Poster** presented at **Neuroscience 2003 (Society for Neuroscience Annual Meeting)**, New Orleans, November 8-12, 2003.
35. Mehta, A., M. Suh, S. Bahar and T. H. Schwartz. Intraoperative Intrinsic Optical Signal Imaging of Neocortical Stimulation. **Talk** presented at **Neuroscience 2003 (Society for Neuroscience Annual Meeting)**, New Orleans, November 8-12, 2003.
36. Schwartz, T. H., M. Suh, S. A. Anderson, C. P. Wonders, S. Bahar, A. Mehta and K.-H. Wong. Feasibility of Interneuron Transplantation in the Treatment of Chronic Seizures in the Rat. **Poster** presented at **Neuroscience 2003 (Society for Neuroscience Annual Meeting)**, New Orleans, November 8-12, 2003.
37. Suh, M., S. Bahar, A. Mehta and T. H. Schwartz. Optical Imaging of Interictal Spikes Induced by Bicuculline Methiodide in the Rat Neocortex. **Poster** presented at **Neuroscience 2003 (Society for Neuroscience Annual Meeting)**, New Orleans, November 8-12, 2003.
38. Bahar, S. and F. Moss. Stochastic Synchronization and Signal Rectification in the Crayfish Caudal Photoreceptor. **Talk** presented at **UPoN 2002: Third International Conference on Unsolved Problems of Noise and Fluctuations in Physics, Biology, and High Technology**, Washington DC, September 3-6, 2002.

39. Bahar, S., A. Neiman and F. Moss. Enhanced Information Transmission in the Crayfish Caudal Photoreceptor. **Talk** presented at **American Physical Society March Meeting**, Indianapolis IN, March 18-22, 2002.
40. Breite, S.R., S. Bahar, A. Neiman and F. Moss. Response Function of the Crayfish Caudal Photoreceptor to Hydrodynamic Stimuli. **Talk** presented at **American Physical Society March Meeting**, Indianapolis IN, March 18-22, 2002.
41. Bahar, S. and F. Moss. Phase Synchronization in the Crayfish Caudal Photoreceptor. **Talk** presented at **American Physical Society March Meeting**, Seattle WA, March 12-16, 2001.
42. R. Steuer, W. Ebeling (Humboldt University of Berlin, Germany), D. Russell, S. Bahar, A. Neiman, F. Moss (Center for Neurodynamics, UMSL, St. Louis, MO). Entropy and Predictability of Data from Sensory Neurons. **Contributed talk presented by R. Steuer** at **American Physical Society March Meeting**, Seattle WA, March 12-16, 2001.
43. Bahar, S. A Synaptic Model for the Paddlefish Electroreceptor. **Poster** presented at **Nonlinear Analysis 2000**, NYU/Courant Institute, May 28-June 3, 2000.
44. Bahar, S., D. Fayuk, G. G. Somjen, D. A. Turner and P. G. Aitken. Mitochondrial Depolarization in Rat Hippocampus During Hypoxia and Spreading Depression. **Talk** presented at **American Physical Society March Meeting**, Minneapolis MN, March 19-24, 2000.
45. Bahar, S., D. Fayuk, G. G. Somjen, D. A. Turner and P. G. Aitken. Mitochondrial Depolarization Precedes Hypoxic Spreading Depression in Rat Hippocampal Slices. **Poster** presented at **Society for Neuroscience Annual Meeting**, Miami Beach FL, October 22-25, 1999.
46. Oliver, R. A., W. Krassowska, G. M. Hall, S. Bahar, P. D. Wolf and D. J. Gauthier. Existence of bistability and correlation with arrhythmogenesis in sheep atria. **Talk** presented at **BMES/EMBS 99** (joint meeting of the Biomedical Engineering Society and the IEEE Engineering in Medicine and Biology Society), Atlanta GA, October 13-16, 1999 (talk given by R. A. Oliver).
47. Bahar, S., G. M. Hall, R.A. Oliver, W. Krassowska and D.J. Gauthier, Transitions between 2:1 and 1:1 responses in cardiac muscle induced by added stimuli. **Talk** presented at **BMES/EMBS 99**, Atlanta GA, October 13-16, 1999.
48. Bahar, S. Reentrant Waves Induced by Local Bistabilities in a Cardiac Model. **Talk** given at the **5th Experimental Chaos Conference**, Orlando FL, June 28-July 1, 1999.
49. Bahar, S., G. M. Hall and D. J. Gauthier. Inducing transitions between bistable states in bullfrog cardiac muscle using small electrical stimuli. **Talk** given at **American Physical Society Centennial Meeting**, Atlanta GA, March 22-26, 1999.

50. Hall, G. M., S. Bahar and D. J. Gauthier. Control of Alternans in Cardiac Muscle Using Time-Delay Autosynchronization. **Talk** given at **American Physical Society Centennial Meeting**, Atlanta GA, March 22-26, 1999 (talk given by G. M. Hall).
51. Bahar, S., G. M. Hall, R. A. Oliver, W. Krassowska and D. J. Gauthier. Inducing transitions between bistable states in cardiac muscle using small electrical stimuli. **Talk** given at **Dynamics Days '99**, Georgia Institute of Technology, Atlanta GA, January 6-9, 1999.
52. Bahar, S. Time-Delay Embeddings of IFS Attractors. **Talk** given at **Periodic Orbit Theory in Biology**, Krasnow Institute for Advanced Study, George Mason University, Fairfax VA, July 11-12, 1998.
53. Hall, G. M., S. Bahar and D. J. Gauthier. A Test-Bed for Control of Cardiac Chaos. **Poster** presented at **Dynamics Days '98**, University of North Carolina at Chapel Hill, Chapel Hill NC, January 9-10, 1998.
54. Bahar, S. Symbolic Dynamics for IFS Attractors. **Talk** given at **SIAM/MAA Meeting** (Society for Industrial and Applied Mathematics/Mathematical Association of America), Baltimore MD, January 7, 1998.
55. Bahar, S. Symbolic Dynamics for IFS Attractors. **Poster** presented at **4th Experimental Chaos Conference**, Boca Raton FL, August 6-9, 1997.
56. Bahar, S. Orbits Embedded in Iterated Function System Attractors **Poster** presented at the **Gordon Conference on Fractals**, New England College NH, June 16-21, 1996.
57. Bahar, S. and P. A. Knauf. Oxalate Transport in Human Promyelocytic Leukemic HL-60 Cells. **Poster** presented at **Experimental Biology '96 (FASEB)**, Washington DC, April 14-17, 1996.
58. Bahar, S. Chaotic Orbits and Attractors Generated by Iterated Function Systems. **Poster** presented at **AMSIE'96 (AAAS Annual Meeting and Science Innovation Exposition)**, Baltimore MD, February 8-13, 1996.
59. Bahar, S. and P. A. Knauf. Sulfate Transport in Human Promyelocytic HL-60 Cells. **Poster** presented at the **49th Annual Meeting of the Society of General Physiologists**, Woods Hole MA, September 6-10, 1995.

INVITED TALKS (NON-CONFERENCE)

1. Imaging Pathological Synchronization in the Brain. **Drexel University, Department of Physics and Atmospheric Science Colloquium**, February 19, 2009. Host: Bob Gilmore.

2. Imaging Pathological Synchronization in the Brain. **Saint Louis University, Department of Chemistry Seminar**, January 23, 2009 Host: Istvan Kiss.
3. Imaging Synchronization in Seizures. **Washington University in St. Louis, Physics Department Colloquium**, September 24, 2008. Host: John Rigden.
4. Imaging Synchronization in Seizures. **University of Minnesota, Center for Neuroengineering / Department of Neuroscience Seminar**, September 12, 2008. Host: Steven Rothman.
5. Synchronization, Epilepsy, and Brain Imaging. **Department of Biomedical Engineering Colloquium, Washington University in St. Louis**, October 30, 2007. Host: Dr. Yoram Rudy.
6. Searching for the Elusive Initial Dip...and Other Things. **Department of Physics Colloquium, University of Michigan**, Ann Arbor MI, October 2, 2006. Host: Dr. Michal Zochowski.
7. Searching for the Elusive Initial Dip. **Department of Physics Colloquium, George Mason University**, Fairfax VA, April 28, 2006. Hosts: Drs. Karen Sauer and Shobita Satyapal.
8. Searching for the Elusive Initial Dip. **Department of Physics Colloquium, University of South Florida, Tampa**, April 14, 2006. Host: Dr. Chun-Min Lo.
9. Focal Seizures, Oxygenation and the Elusive Initial Dip. **Neurology / Hope Center for Neurological Disorders Research Seminar, Washington University**, January 23, 2006. Host: Dr. Steven M. Rothman.
10. Focal Seizures, Oxygenation and the Elusive Initial Dip. **Computational Neuroscience Group, Department of Physics, Washington University**, December 5, 2005. Host: Dr. Charles Anderson.
11. Imaging Epileptic Seizures with the Intrinsic Optical Signal. **Department of Physics and Astronomy, Drexel University**, June 23, 2005. Host: Dr. Leonard X. Finegold.
12. Imaging Epileptic Seizures with the Intrinsic Optical Signal. **Department of Physics, University of Missouri at Columbia**, February 23, 2005. Host: Dr. Carsten Ullrich.
13. Imaging Epileptic Seizures with the Intrinsic Optical Signal. **Department of Physics, University of Missouri at Rolla**, February 3, 2005. Hosts: Drs. G. Dan Waddill and Thomas Vojta.
14. Imaging Brain Activity with the Intrinsic Optical Signal: Neocortical Seizures and the 'Elusive Initial Dip'. **Department of Mechanical Engineering, Washington University in St Louis**, January 20, 2005. Host: Dr. Amy Shen.

15. Imaging Seizures in the Rat Neocortex Using the Intrinsic Optical Signal. Department of Biology, **University of Missouri at St Louis**, September 14, 2004. Host: Dr. Wendy Olivas.
16. Phase Synchronization and Signal Rectification in the Crayfish Photoreceptor. **Applied Biodynamics Laboratory, Department of Bioengineering, Boston University**. February 2001. Host: Dr. James J. Collins.
17. Phase Synchronization in the Crayfish Photoreceptor. **Harvard University/Boston University Chaos Club**. February 2001. Host: Dr. Plamen Ch. Ivanov.
18. Bistability and Hysteresis in Cardiac Muscle: *in vitro* and *in vivo*. **Department of Physiology, University of Marburg, Germany**. November 2000. Host: Dr. Hans A. Braun.
19. Phase Synchronization in the Crayfish Caudal Photoreceptor. **Institut für Theoretische Physik III, Justus-Liebig-Universität, Giessen, Germany**. November 2000. Hosts: Dr. Armin Bunde and Dr. Frank Moss.
20. Light Sensitivity, Mechanical Noise and Sensory Integration in the Crayfish Caudal Photoreceptor. **Department of Bioengineering, University of Illinois at Chicago**. October 2000. Host: Dr. John Hetling.
21. Bistability and Hysteresis in Cardiac Muscle: *in vitro* and *in vivo*. **School of Biomedical Engineering, Science and Health Systems, Drexel University**. May 2000. Host: Dr. Banu Onaral.
22. Bistability and Hysteresis in Cardiac Muscle: *in vitro* and *in vivo*. **Institut de génie biomédical and Centre de recherche de l'Hôpital du Sacré-Coeur, Faculté de Médecine, Université de Montréal**. January 2000. Host: Dr. Alain Vinet.
23. Bistability and Hysteresis in Cardiac Muscle: *in vitro* and *in vivo*. **Department of Physiology, McGill University, Montréal, Canada**. January 2000. Host: Dr. Michael Guevara.
24. Bistability and Hysteresis in Frog Ventricle. **Center for Neurodynamics, University of Missouri at St. Louis**, April 1998. Host: Dr. Frank Moss.
25. Symbolic Dynamics for IFS Attractors. **Department of Chemistry, University of Toronto**. January 1997. Host: Dr. Simon Fraser.
26. Chaotic Attractors Generated by an Iterated Function System. **Department of Physics and Astronomy, Drexel University**. May 1995. Host: Dr. Robert Gilmore.

CONFERENCES ORGANIZED

- **Noise and Complexity in Nonlinear Systems: A Conference Celebrating Frank Moss's 70th Birthday.** Held at the University of Missouri at St Louis (Department of Physics and Astronomy), October 22-23, 2004. Co-organized with Dr. Gabor Balázsi.

CONFERENCE SESSIONS ORGANIZED

- Organizer and chair of symposium **“Imaging Dynamical Diseases in the Brain”**, AAAS Annual Meeting, St Louis MO, February 19, 2006. Invited Speakers: M. Suh, H. Ma, S. Rothman, R. Bucholz.
- Organizer and chair of minisymposium **“Intrinsic Optical Signals in the Brain”**, American Physical Society March Meeting, Austin TX, March 3-7, 2003. Invited Speakers: T. Schwartz, A. Grinvald, D. Hochman and E. Kaplan.
- Organizer and chair of minisymposium **“Patterns in the Brain: from Calcium Waves to Cortical Rhythms”**, First SIAM Conference on Biological Sciences, Boston, Sept 24-26, 2001. Invited speakers: P. Jung, M. Sanderson, N. Kopell, A. Cornell-Bell.
- Organizer and chair of minisymposium **“Long-Range Correlations in Dynamics and Biology”**, Sixth SIAM Conference on the Applications of Dynamical Systems, Snowbird UT, May 20-24, 2001. Invited Speakers: M.-Z. Ding, P. Ivanov, J. Kantelhardt, F. Moss/S.Bahar.
- Organizer and chair, **“Correlations and Anti-Correlations in Biology and Medicine”**, Focus Session at the American Physical Society (Division of Biological Physics) March Meeting, Seattle WA, March 2001. Invited Speakers: A. Bunde, F. Moss.

AWARDS

- 2009 Trailblazer, University of Missouri – St. Louis, March 19, 2009
- St. Louis Academy of Science Innovation Award, April 15, 2008
- Presidential Early Career Award for Scientists and Engineers (PECASE), 2007
- University of Missouri – St. Louis Office of Disability Access Services, Meritorious Service Award, April 17, 2007
- NIH/NINDS National Research Service Award (Postdoctoral), 2001-2002
- William Neuman Award, Department of Biophysics, University of Rochester, 1996

MEMBERSHIPS IN PROFESSIONAL SOCIETIES

- American Physical Society (Division of Biological Physics, Group on Statistical and Nonlinear Physics).
- American Association for the Advancement of Science (AAAS).
- National Center for Science Education (NCSE)
- Union of Concerned Scientists (UCS)

EDITORIAL SERVICE

- **Editor** of “The Biological Physicist”, the Newsletter of the Division of Biological Physics (<http://www.aps.org/units/dbp>), since 2000.
- **Editor in Chief** (with Prof. Rudolf Podgornik), since 2004.
Journal of Biological Physics (published by Springer).
(<http://www.springerlink.com/openurl.asp?genre=journal&issn=0092-0606>)

Updated 13 Jan 10