

Tatyana O. Sharpee

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| EDUCATION | <i>Michigan State University</i> , East Lansing, MI Ph.D. in Theoretical Physics | 1996 – 2001 |
| | <i>Ukraine National University</i> , Kiev, Ukraine M.S. in Theoretical Physics (diploma with honors) | 1992 – 1997 |
| | Summer school: <i>Methods in Computational Neuroscience</i> Marine Biological Laboratory, Woods Hole, MA | 2001 |
| RESEARCH EXPERIENCE | <i>The Salk Institute for Biological Studies</i> , La Jolla, CA Assistant Professor | 2007 – present |
| | <i>University of California, San Francisco</i> , CA Assistant Research Scientist | 2004 – 2007 |
| | <i>University of California, San Francisco</i> , CA Sloan-Swartz Postdoctoral Fellow in Theoretical Neurobiology | 2001 – 2004 |
| RESEARCH INTERESTS | Statistical physics and information theory approach to understanding sensory processing. Statistical properties of natural auditory and visual environments. Neural adaptation as an optimization problem. Formation of selective, yet invariant neural responses with respect to continuous transformations, such as translation or scaling. | |
| GRANTS AWARDS | K25 Mentored Quantitative Research Career Development Award, National Institute of Mental Health | 2004 – 2009 |
| | Alfred P. Sloan Research Fellowship | 2008 – 2010 |
| | Searle Scholar | 2008 – 2011 |
| | NSF grant “Signal transformation in the early visual system”, PI: Dr. Lawrence Sincich. Role: Co-PI. NSF Robust Intelligence. | 2007 – 2009 |
| | Research grant from the Swartz Foundation | 2003 – 2004 |
| PROFESSIONAL SOCIETY MEMBERSHIP | American Physical Society Society for Neuroscience American Physiological Society | 1996 – present 2001 – present 2008 – present |

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| SERVICE | Ad hoc reviewer for <i>Science</i> , <i>Neuron</i> , <i>Proceedings of National Academy of Science</i> , <i>Neural Computation</i> , <i>Journal of Vision</i> , <i>Journal of Neuroscience</i> , <i>Network: Computation in Neural Systems</i> , <i>Journal of the Optical Society of America A</i> , <i>Advances in Neural Information Processing Systems</i> , <i>Journal of Neuroscience Methods</i> . | |
| | UCSD Graduate Neuroscience Admission Committee | 2008 |
| TEACHING | Lecturer for "Statistical and Computational Methods in Neurosciences", NEU 225, | 2007 |
| | Lecturer for UCSD Neuroscience bootcamp course | 2007 |
| | Lecturer for UCSD PHY171/271 "Biophysics of Neurons and Networks " | 2007 |
| | Salk High School Science Day | 2008 |
| | Supervising summer research undergraduates | 2008 |
| INVITED TALKS | Bernstein Center for Computational Neuroscience, Göttingen, Germany | 2009 |
| | Gordon Research Conference: "Sensory Coding and the Natural Environment", Italy | 2008 |
| | Center for Theoretical Neuroscience, Columbia University | 2006 |
| | 3rd workshop on "Statistical Analysis of Neural Data", Carnegie Mellon University | 2006 |
| | Rockefeller University | 2006 |
| | Department of Physics, Northwestern University | 2006 |
| | Sloan-Swartz meeting on Computational Neuroscience, California Institute of Technology | 2006 |
| | Helen Wills Neuroscience Institute, Berkeley | 2006 |
| | Center for Brain Science, Harvard University | 2005 |
| | Sloan-Swartz meeting on Computational Neuroscience, Cold Spring Harbor Laboratory | 2004 |
| | Department of Physics, Massachusetts Institute of Technology | 2004 |
| | Department of Physics, The Pennsylvania State University | 2004 |
| | Department of Physics, Florida Atlantic University | 2004 |
| | Department of Physics, Arizona State University | 2004 |
| | Neural Coding workshop, Mathematical Biosciences Institute, Ohio State University | 2002 |
| | NASA Ames Research Center | 2002 |
| | Condensed Matter Seminar, Bell Laboratories | 2001 |

LIST OF PUBLICATIONS

All published papers are available in PDF format at <http://cnl-t.salk.edu/Publications>

Papers: Neuroscience and Information-Theory

1. **T.O. Sharpee** and J.D. Victor, “Contextual modulation of V1 receptive fields depends on their spatial symmetry”, *Journal of Computational Neuroscience*, *in press*.
2. C. Attencio, **T.O. Sharpee**, and C.E. Schreiner, “Cooperative nonlinearities in auditory cortical neurons”, *Neuron*, *in press*.
3. **T.O. Sharpee**, K.D. Miller, and M.P. Stryker, “On the importance of the static nonlinearity in estimating spatiotemporal neural filters with natural stimuli”, *Journal of Neurophysiology*, **99**(5), pp. 2496-2509 (2008).
4. C.W. Clifford, M.A. Webster, G.B. Stanley, A.A. Stocker, A. Kohn, **T.O. Sharpee**, and O. Schwartz, “Visual adaptation: neural, psychological and computational aspects”, *Vision Research* **47**, pp. 3125-3131, (2007).
5. **T. Sharpee** and William Bialek, “Optimal neural decision boundaries for maximal information transmission”, *PLoS One* 2(7): e646 (2007). See also <http://arxiv.org/abs/q-bio.NC/0703046>
6. **T. Sharpee**, “Comparison of information and variance optimization strategies for characterizing neural feature selectivity”, *Statistics in Medicine* **26**(21), pp. 4009-4031 (2007).
7. **T.O. Sharpee**, H. Sugihara, S. Rebrik, A. Kurgansky, M.P. Stryker, and K.D. Miller, “Adaptive filtering enhances information transmission in visual cortex”, *Nature* **439**, pp. 936-942 (2006). See also <http://arxiv.org/abs/q-bio.NC/0611037>.
8. J. D. Victor, F. Mechler, M. Repucci, K. Purpura, **T. Sharpee**, “Responses of V1 neurons to two-dimensional Hermite Functions”, *Journal of Neurophysiology*, **95**, pp. 379-400 (2006).
9. **T. Sharpee**, Nicole C. Rust, and William Bialek, “Analyzing Neural Responses to Natural Signals: Maximally Informative Dimensions”, *Neural Computation* 16 (2), pp. 223-250 (2004). See also <http://arxiv.gov/abs/physics/0212110>.

Papers: Condensed Matter Theory and Mathematical Physics

(maiden name: Barabash)

10. **T. Sharpee**, M.I. Dykman, and P.M. Platzman, “Tunneling decay in a magnetic field”, *Phys. Rev. A* **65**, 032122 (2002). See also <http://arxiv.gov/abs/cond-mat/0106566>.
11. **T. Sharpee**, M.I. Dykman, and P.M. Platzman, “Tunneling from a correlated 2D electron system transverse to a magnetic field”, *Phys. Rev. B* **64**, 245309 (2001). See also <http://arxiv.gov/abs/cond-mat/0103151>.
12. M.I. Dykman, **T. Sharpee**, and P.M. Platzman, “Enhancement of tunneling from a correlated 2D electron system by a many-electron Mössbauer-type recoil in a magnetic field”, *Phys. Rev. Lett.* **86**, pp. 2408-11 (2001). See also <http://arxiv.gov/abs/cond-mat/000642>.
13. **T. Barabash-Sharpee**, M.I. Dykman, and P.M. Platzman, “Tunneling transverse to a magnetic field, and its occurrence in correlated 2D electron systems”, *Phys. Rev. Lett.* **84**, pp. 2227-30 (2000).
14. **T. Barabash**, M.I. Dykman, P.M. Platzman, and V.N. Smelyanskiy, “Ripplon-induced tunneling transverse to the magnetic field”, *Phys. Rev. B* **58**, pp. R10214-7 (1998).

15. M.A. Ivanov, B.A. Greenberg, and **T.O. Barabash**, “Description of the behavior of a dislocation ensemble with allowance for dislocation multiplication reproduction”, *Phys. Met. Metallogr.* **86**, 3, pp. 240-9 (1998)
16. B.A. Greenberg, M.A. Ivanov, **T.O. Barabash**, and A.G. Blokhin, “Comparative analysis of stress jumps in metals and intermetallic compounds: I. Description of two-stage straining”, *Phys. Met. Metallogr.* **81**, 4, pp. 374-80 (1996).
17. B.A. Greenberg, M.A. Ivanov, **T.O. Barabash**, and A.G. Blokhin, “Comparative analysis of stress jumps in metals and intermetallic compounds: II. Stress Macrojumps”, *Phys. Met. Metallogr.* **81**, 4, pp. 381-6 (1996).
18. **T.O. Barabash** and S.D. Eidelman, “Necessary and sufficient conditions on boundary regime that guarantee the stabilization of the solutions of a model third-order equation”, *Dopov. Nats. Akad. Nauk Ukraini*, 10, pp. 5-7 (1995).
19. **T. Barabash**, “Why does an aspen leaf tremble?”, *Quantum* **1**, pp. 16-8, (1992).

Conference Proceedings (Refereed)

20. **Tatyana Sharpee**, “Comparison of methods for characterizing neural feature selectivity”, *Advances in Neural Information Processing 20* edited by J.C. Platt, D. Koller, Y. Singer, and S. Roweis, pp. 1305-1312 (MIT Press, Cambridge, MA), 2008. See also <http://arxiv.org/abs/0801.0311>.
21. **T. Sharpee**, A.V. Kurgansky, H. Sugihara, S. Rebrik, M.P. Stryker, and K.D. Miller, “Probing neural feature selectivity of neurons in primary visual cortex with natural stimuli”, *Fluctuations and Noise in Biological, Biophysical and Biomedical Systems II*, edited by D. Abbott, S. M. Bezrukov, A. Der, and A. Sánchez, pp. 212-222, *Proceedings of SPIE* **5467** (2004).
22. **Tatyana Sharpee**, Nicole C. Rust, and William Bialek, “Maximally informative dimensions: Analyzing neural responses to natural signals”, *Advances in Neural Information Processing 15* edited by S. Becker, S. Thrun and K. Obermayer, pp. 261-268 (MIT Press, Cambridge 2003). See also <http://arxiv.gov/abs/physics/0208057>.
23. **T.O. Barabash** and S.D. Eidelman, “Asymptotic behavior of solutions of boundary value problems for linearized KdV equation”, in *Nonlinear boundary value problems*, Kiev, pp. 13-9 (1997).