CURRICULUM VITAE - TATYANA SHARPEE

Personal information

Born	July 19, 1975; Kiev, Ukraine
Maiden name	Tatyana Barabash
Visa status	permanent US resident

Current position

Sloan Postdoctoral Fellow
Sloan Center for Theoretical Neurobiology
Department of Physiology, UCSF
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Education

2001 Ph.D. in Physics, Michigan State University "Many-electron Tunneling in a Magnetic Field".

1997 M.S. in Physics, Kiev State University (Ukraine Diploma in Physics with honors).

Professional Society Membership

American Physical Society (since 1996).

Society for Neuroscience (since 2001).

Awards

Research grant from the Swartz Foundation 2003-2004.

The 2001 Sherwood K. Haynes Physics Award to an "Outstanding Physics/Astronomy Graduate Student" from Department of Physics-Astronomy, Michigan State University.

Thomas A. Kaplan Award for Best CMP Research Presentation by a Graduate Student 1998-1999.

Second Prize for a poster presentation at CFMR Symposium for "Crystal Engineering Research and Applications", East Lansing (1999).

George Soros scholarship for undergraduate students 1994-1995.

Research Interests. Application of methods from condensed matter and statistical physics to biological problems:

Quantifying and characterizing the near optimal performance of biological systems. Studies of adaptation to the probability distribution of inputs. Comparison of responses to natural stimuli vs. noise ensembles.

The role of spike timing in neural coding and decoding, with an emphasis on formation of invariant neural representations.

Computations in systems of neurons with nearly Poisson and nearly periodic firing.

Physical mechanisms of learning and memory.

Research Experience

2001- present	Information-theoretic method for the analysis of neuronal responses to natural stimuli. Characterization of responses of cells in primary visual cortex to natural stimuli and development of information-theoretic criterion for their categorization.
1996- 2001	Theory of tunneling in a magnetic field. Many-electron tunneling from correlated 2D electron systems.
1994-1996	Phenomenological theory of plastic deformation that explains stress jumps in intermetallic compounds and fcc metals.
	Stabilization by an external electric field of nematic liquid crystals with macroscopic inclusions.
1993-1994	Boundary value problem for a linearized Korteweg-de-Vries equation
	Working knowledge of Mathematica, C/C++, Matlab, LaTeX/TeX, HTML. Programming experience in Fortran, Pascal.

Invited talks

"Probing feature selectivity of V1 neurons with natural stimuli", Neural Coding workshop at the Mathematical Biosciences Institute, Ohio State University, February 2003.

"Characterizing Neural Responses to Natural Stimuli: Most Informative Dimensions", Sloan-Swartz Meeting, Boston, MA, July 2002.

"Tunneling in a magnetic field in the semiclassical approximation", NASA Ames Research Center, April 2002.

"Many-electron tunneling in a magnetic field", Condensed Matter Seminar, Bell Laboratories, January 2001.

Service

Co-organizer of the computational journal club at the Keck Center for Integrative Neuroscience

Summer Schools

Methods in Computational Neuroscience, Marine Biological Laboratory, Woods Hole, MA 2001

References

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Prof. Kenneth D. Miller,
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Prof. S. D. Mahanti,
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East Lansing, MI, 48824-1116.
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phone: (517) 355-9200; fax: (517) 353-0690.

List of Publications

Papers

1. Tatyana Sharpee, Nicole C. Rust, and William Bialek, "Analyzing Neural Responses to Natural Signals: Maximally Informative Dimensions", to appear in *Neural Computation* 16(2), 2004. See also http://xxx.lanl.gov/abs/physics/0212110.

2. 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://xxx.lanl.gov/abs/physics/0208057.

3. T. Sharpee, M.I. Dykman, and P.M. Platzman, "Tunneling decay in a magnetic field", Phys. Rev. A **65**, 032122 (2002). See also http://xxx.lanl.gov/abs/cond-mat/0106566.

4. 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://xxx.lanl.gov/abs/cond-mat/0103151.

5. 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://xxx.lanl.gov/abs/cond-mat/000642.

6. 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).

7. 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).

8. 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)
[Fizika Metalov i Metalovedenie **86**, 3, pp. 24-38 (1998)].

9. 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).

10. 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).

11. S.D. Eidelman and T.O. Barabash, "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).

12. T. Barabash, "Why does an aspen leaf tremble?", Quantum **1**, pp. 16-8, (1992).

Conference Proceedings and Abstracts

1. T. Sharpee, A.V. Kurgansky, H. Sugihara, S. Rebrik, M.P. Stryker, and K.D. Miller, "Receptive fields in visual cortex computed in response to natural scenes by maximizing information", Program No. 229.1, Society for Neuroscience 2003.

2. A.V. Kurgansky, T. Sharpee, H. Sugihara, S. Rebrik, and K.D. Miller, "Information-theoretic characterization of cat V1 receptive fields", Program No. 456.13, Society for Neuroscience 2002.

3. T. Sharpee, N. Rust, W. Bialek, "Neural responses to natural stimuli: maximizing information to find the receptive fields", American Physical Society 2002 March Meeting, Indianapolis, p. 1169 (2002).

4. T. Sharpee, M.I. Dykman, P.M. Platzman, "Tunneling decay in a magnetic field", American Physical Society 2002 March Meeting, Indianapolis, p. 268 (2002).

5. T. Sharpee, M.I. Dykman, P.M. Platzman, "Enhancement of tunneling from a correlated 2D electron system by a parallel magnetic field", American Physical Society 2001 March Meeting, Seattle, p. 111 (2001).

6. T. Barabash, M.I. Dykman, P.M. Platzman, "Tunneling from a 2D Wigner crystal transverse to a magnetic field", American Physical Society 2000 March Meeting, Minneapolis, p. 1031 (2000).

7. T. Barabash, M.I. Dykman, P.M. Platzman, "Tunneling transverse to magnetic field in correlated 2D electron systems", The 13th International Conference on the Electronic Properties of Two-Dimensional Systems, Ottawa, p. 242 (1999).

8. T. Barabash, M.I. Dykman, P.M. Platzman, "Many-electron tunneling transverse to the magnetic field", American Physical Society 1999 March Meeting, Atlanta, p. 1471 (1999).

9. T. Barabash, M.I. Dykman, V.N. Smelyanskiy, "Ripplon-assisted tunneling transverse to the magnetic field", American Physical Society 1998 March Meeting, Los Angeles, p. 555 (1998).

10. 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).