ILYA NEMENMAN

Kavli Institute for Theoretical Physics
Kohn Hall, University of California
Santa Barbara, CA 93106

Tel. (805) 893–3457; Fax. (805) 893–2431
E-mail: nemenman@kitp.ucsb.edu

PROFESSIONAL PREPARATION

Princeton University	Biophysics	PhD 2000
San Francisco State University	Physics	MS 1997
Santa Clara University	Physics/Math	BS 1995
Belarusian State University	Physics	1991 – 1994

APPOINTMENTS

2001 – present	Post–doctoral Scientist	Kavli Institute for Theoretical Physics, University of California, Santa Barbara
2000 – 2001	Post–doctoral Scientist	NEC Research Institute, Division of Physical Sciences, Princeton, New Jersey
1998 – 1999	Researcher	Gravity Probe B (GP-B) experiment, HEPL, Stanford University
1997 – 1997	Researcher	L3 experiment, CERN/PPE
1996 – 2000	Graduate Student	Department of Physics, Princeton University. Thesis advisor: Prof. W. Bialek
1995 – 1997	Graduate Student	Department of Physics, San Francisco State University. Advisor: Prof. R. Adler

TEACHING EXPERIENCE

Department of Statistics, UCSB	Winter 2002	Visiting Instructor	Short course in *Statistical Inference*
Courant Institute, NYU, Bioinformatics group	Fall 2002	Visiting Instructor	Short course in *Statistical Inference*
Marine Biological Laboratory, Woods Hole, Mass.	1999 – 2001	Teaching assistant	Methods in Computational Neuroscience
Department of Physics, Princeton University	1997 – 1999	Teaching assistant	Undergraduate physics laboratory, upper division mechanics
Department of Physics, Princeton University	1997	Author	"Demonstrations solutions manual" for undergraduate mechanics laboratory
Department of Physics, San Francisco State Univ.	1995 – 1996	Teaching assistant	Undergraduate classical physics laboratory

HONORS AND AWARDS

2003	Neural Information and Coding Workshop	Travel Award
2001	National Science Foundation	ASI Travel Award for attending Les Houches School "Physics of Biomolecules and Cells"
1999	Department of Physics, Princeton	Outstanding Teaching Assistant
1997	San Francisco State University	Graduate Student Distinguished Achievement Award
1996	Department of Physics, SFSU	Outstanding Teaching Assistant
1993 – 1994	Belarusian State University	Honorary Stipend
1991	Belarusian National High School Physics Olympiad	Winner

RESEARCH GRANTS

2003	NSF Grant No. ECS-0332479, "Developing Learning Theory for Genetic Network Inference"	co–Principal Investigator

SYNERGISTIC ACTIVITIES

2003 – 2004	Assisting in organization of KITP program "Understanding the brain"
Dec 2003	Organizer of the *NIPS'03* workshop "Estimation of entropy and information of undersampled probability distributions: Theory, algorithms, and applications to the neural code "
2002	Member of the UCSB interdepartmental data mining group
2000 – 2001	Organizer of several biophysics seminars at the NEC Research Institute

SUMMARY OF RESEARCH INTERESTS

Application of methods of theoretical physics, information and learning theories to analysis of cognition and of design and function of biochemical, genetic, and neuronal networks.

SELECTED REFERENCES

William Bialek (Princeton; thesis advisor), Curtis Callan (Princeton), David Gross (UCSB), Jonathan Miller (Baylor College of Medicine), Rob de Ruyter van Steveninck (Indiana University), Alex Silbergleit (Stanford), Naftali Tishby (Hebrew University), Chris Wiggins (Columbia University). Additional references available upon request.

RECENT PRESENTATIONS

Dec 2003	*NIPS'03* workshop on *Entropy Estimation*, Whistler, BC
Nov 2003	KITP, UCSB, "Patterns formation" program seminar
Oct 2003	Columbia University, Computational biology seminar
Mar 2003	KITP, UCSB, Colloquium
Mar 2003	*Neural Information and Coding* workshop, Snowbird, Utah
Dec 2002	*NIPS'02* workshop on *Universal Learning*, Whistler, BC
Dec 2002	*NIPS'02* workshop on *Negative Results and Open Problems*, Whistler, BC
Nov 2002	CalTech, Complexity Club seminar
Nov 2002	Princeton University, Biophysics group seminar
Oct 2002	Columbia University, Applied mathematics seminar
Oct 2002	Courant Institute, NYU, Bioinformatics seminar
May 2002	Department of Statistics, UCSB, Colloquium
Mar 2002	ITP, UCSB, Director's blackboard lunch seminar
Dec 2001	*NIPS'01* presentation
Oct 2001	ITP, UCSB, Special seminar

PUBLICATIONS AND PREPRINTS

References to the E-print archive are provided for preprints. An up to date publication list is available at `www.menem.com/~ilya/professional/publications.html`.

Nemenman, I., Wiggins, C. Geometric measures of regulatory complexity, preprint (2003).

Nemenman, I., Bialek, W., and de Ruyter van Steveninck, R. Entropy and information in neural spike trains: Progress on the sampling problem. Available at *physics/0306063* (2003).

Silbergleit, A., Mandel, I., and Nemenman, I. Potential and field singularity at a surface point charge. *J. Math. Phys.*, **44** (2003).

Wiggins, C. and Nemenman, I. Process pathway inference via time series analysis. *Experim. Mech.* **43** (2003).

Silbergleit, A., Nemenman, I., and Mandel, I. On the interaction of point charges in an arbitrary domain. *Techn. Phys.* **48**(2), pp. 146–151 (2003).

Holy, T., and Nemenman. I. On impossibility of learning in a reparameterization covariant way, preprint (2002).

Nemenman, I. Inference of entropies of discrete random variables with unknown cardinalities. Available at *physics/0207009* (2002).

Nemenman, I., Shafee, F., and Bialek, W. Entropy and inference, revisited. In *Adv. Neural Inf. Proc. Syst. 14*, T. Dietterich, S. Becker, and Z. Ghahramani, eds. MIT Press, Cambridge, MA (2002).

Nemenman, I. and Bialek, W. Occam factors and model-independent Bayesian learning of continuous distributions. *Phys. Rev. E* **65** (2002). Also appeared in *NIPS 2000*.

Bialek, W., Nemenman, I., and Tishby, N. Complexity through nonextensivity. *Physica A* **302** (2001).

Bialek, W., Nemenman, I., and Tishby N. Predictability, complexity and learning. *Neural Comp.* **13** (2001).

Nemenman, I. *Information Theory and Learning: A Physical Approach.* Princeton University Ph. D. dissertation (2000). Available at *physics/0009032*.

Adler, R., Nemenman, I., Overduin, J., and Santiago, D. On the detectability of quantum spacetime foam with gravitational-wave interferometers. *Phys. Lett. B* **477** (2000).

Nemenman I. and Silbergleit, A. Explicit Green's function of a boundary value problem for a sphere and trapped flux analysis in Gravity Probe B experiment. *J. Appl. Phys.* **86** (1999).

Naud, J., Nemenman, I., Van Raamsdonk, M., and Periwal, V. Minimal subtraction and the Callan–Symanzik equation. *Nucl. Phys. B* **540** (1999).

Kominis, I. and Nemenman, I. BGO Dead crystal correction and shower fitting. *L3 Note 2157*, CERN (1997).

Minkevich, A. and Nemenman, I. On the influence of the gravitating vacuum on the dynamics of homogeneous isotropic models in gauge theories of gravity. *Class. Quantum. Grav.*, **12** (1995).